FINAL

VOLUME I:

FEASIBILITY STUDY FOR THE ST. LOUIS NORTH COUNTY SITE

MAY 1, 2003

U.S. Army Corps of Engineers
St. Louis District Office
Formerly Utilized Sites Remedial Action Program

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prepared by
U.S. Army Corps of Engineers, St. Louis District Office, Formerly Utilized Sites Remedial Action Program

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ACRONYMS, ABBREVIATIONS

ACL	alternate concentration limit
AOC	Administrative Order or Consent
AEA	Atomic Energy Act of 1954
AEC	U.S. Atomic Energy Commission
ALARA	as low as reasonably achievable
ANL	Argonne National Laboratory
ARAR	applicable or relevant and appropriate requirement
BERA	baseline ecological risk assessment
BHE	BHE Environmental, Inc.
BNAE	base/neutral and acid extractable
BNI	Bechtel National, Inc.
BRA	baseline risk assessment
CAS	chemical abstract service
CD	Consent Decree
CDC	Commercial Discount Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMM	Continental Mining & Milling Company
COC	contaminant of concern
CTC	Clemson Technical Center
CWA	Clean Water Act
d	day
DOE	U.S. Department of Energy
EE/CA	engineering evaluation/cost analysis
EIS	environmental impact statement
EM31	electromagnetic terrain conductivity tool
EM61	high sensitivity metal detector
EMS	emergency medical services
EPA	U.S. Environmental Protection Agency
EP-TOX	extraction procedure toxicity
ERA	ecological risk assessment
ERDA	Energy Research and Development Administration
EWDAA	Energy and Water Development Appropriations Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FFA	Federal Facilities Agreement
FS	Feasibility Study
FS-EIS	Feasibility Study/Environmental Impact Statement
FUSRAP	Formerly Utilized Sites Remedial Action Program
FWS	U.S. Fish and Wildlife Service
FY	fiscal year
GIFREHC	General Investment Funds Real Estate Holding Company
gpd	gallons per day
GRA	general response action

ACRONYMS, ABBREVIATIONS (CONT'D)

HI	hazard index
HISS	Hazelwood Interim Storage Site
HQ	hazard quotients
HZ	hydrostratigraphic zone
I-270	Interstate 270
IA	Investigation Area
ICRP	International Commission on Radiological Protection
ISA	initial screening of alternatives
LDR	Land Disposal Restrictions
MARSSIM	Multi-Agency Radiation Site Survey and Investigation Manual
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MCW	Mallinckrodt Chemical Works
MDC	Missouri Department of Conservation
MDNR	Missouri Department of Natural Resources
MED	Manhattan Engineer District
MMI	Modified Mercalli intensity
MSA	Metropolitan Statistical Area
MSD	St. Louis Metropolitan Sewer District
MSL	mean sea level
NCP	National Contingency Plan
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	U.S. Nuclear Regulatory Commission
O&M	operations and maintenance
ORNL	Oak Ridge National Laboratory
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PCOC	potential chemicals of concern
POTW	publicly owned treatment works
PP	Proposed Plan
PRG	preliminary remediation goal
RA	Remedial Action
RAGS	Risk Assessment Guidance for Superfund
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RG	remediation goal
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	reasonable maximum exposure
ROD	Record of Decision

ACRONYMS, ABBREVIATIONS (CONT'D)

s	second
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SERA	Supplemental Ecological Risk Assessment
SHPO	State Historical Preservation Office (Missouri)
SLAPS	St. Louis Airport Site
SLDS	St. Louis Downtown Site
SOR	sum of ratios
sp.	species
SVOC	semi-volatile organic compound
TBC	to be considered
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TOC	total organic compound
TOX	total organic halogens
UAO	Unilateral Administrative Orders
UF_4	uranium tetrafluoride
UMTRCA	Uranium Mill Tailings Radiation Control Act
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
VOC	volatile organic compound
VP	vicinity property
yr	year
°C	degree(s) Celsius (centigrade)
°F	degree(s) Fahrenheit

1×10^{-2}	=	1/100	=	one in one hundred
1×10^{-3}	=	1/1,000	=	one in one thousand
1×10^{-4}	=	1/10,000	=	one in ten thousand
1×10^{-5}	=	1/100,000	=	one in one hundred thousand
1×10^{-6}	=	1/1,000,000	=	one in one million
1×10^{-7}	=	1/10,000,000	=	one in ten million
1×10^{-8}	=	1/100,000,000	=	one in one hundred million

MEASUREMENTS

Name	Abbreviation
Length	
centimeter	cm
feet, foot	ft
inches	in
kilometer	km
meter	m
mile	mi
yard	yd
Area	
hectare	ha
square kilometer	km^2
square mile	mi^2
Volume	
cubic meters	m^3
cubic yards	yd^3
gallons	gal
liter	L
milliliter	mL
Mass or Weight	
gram	g
kilogram	kg
milligram	mg
microgram	µg
pound	lb
ton	T
Radiological Units	
becquerel	Bq
curie	Ci
microroentgen	µR
millirad	mrad
millirem	mrem
picocurie	pCi
microcuries	µCi
sievert	Sv

MEASUREMENT CONVERSIONS

Multiply number of →	→ by →	→ to obtain number of
Length		
cm	0.3937	in
m	3.2808	ft
m	1.0936	yd
km	0.62137	mi
Area		
acre	640	mi^2
acre	2.4712	hectare
km^2	2.59	mi^2
Volume		
mL	1000	L
L	0.26418	gal
Mass or Weight		
µg	1000	mg
mg	1000	g
g	28.35	oz
g	1000	kg
kg	2.205	pound
Radiological Units		
pCi	10^{-2}	Ci
Ci	$3.7x10^{10}$	Bq
rem	0.01	Sv
to obtain number of ←	**← by ←**	**← Divide number of**

CHEMICAL SYMBOLS AND FORMULAS

Ac	actinium
$BaCO_3$	barium carbonate
$BaSO_4$	barium sulfate
DCE	dichloroethene
H_2SO_4	sulfuric acid
MCPA	2-methyl-4-chloro phenoxyacetic acid
MCPP	2-(2-methyl-5-chlorophenoxy) propionic acid
MgF_2	magnesium fluoride
Na_2CO_3	sodium carbonate
Pa	protactinium
Pb	lead
$PbSO_4$	lead sulfate
Ra	radium
$RaSO_4$	radium sulfate
TCE	trichloroethene
Th	thorium
U	uranium
UF_4	uranium tetrafluoride
UNH	uranyl nitrate hexahydrate
UO_2	uranium dioxide
$UO_2(NO_3)_2$	uranyl nitrate
UO_3	uranium trioxide

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The North County Site is part of the St. Louis Formerly Utilized Sites Remedial Action Program (FUSRAP) Site, which is comprised of multiple properties located in two distinct areas: the St. Louis North County Site (North County Site) and the St. Louis Downtown Site (SLDS). The North County Site is located in northern St. Louis County near the Lambert-St. Louis International Airport. The North County Site includes the St. Louis Airport Site (SLAPS); the Latty Avenue properties [which are: the Hazelwood Interim Storage Site, Futura Coatings (HISS/Futura), and the Latty Avenue Vicinity Properties (VPs)]; and SLAPS VPs. SLAPS VPs include properties near SLAPS and areas along Coldwater Creek. The North County Site includes three properties on the U.S. Environmental Protection Agency's (EPA's) National Priorities List (NPL): SLAPS, HISS, and Futura Coatings. This Feasibility Study (FS) addresses all of the properties that constitute the North County Site.

SLDS is located in downtown St. Louis near the Mississippi River. Remediation of wastes in accessible soils and ground water at SLDS that resulted from uranium manufacturing and processing activities was addressed in a separate Record of Decision (ROD), which was signed in 1998.

Authority

USACE is conducting response actions under the legislative authority contained in Public Law 107-66, the Energy and Water Development Appropriations Act (EWDAA) for Fiscal Year 2002 (FY02). This law establishes the authority of the United States Corps of Engineers (USACE) to conduct response actions for releases related to the nation's early atomic energy program as the lead federal agency, subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP). This plan is being submitted as part of USACE's public participation responsibilities under Section 117(a) of CERCLA.

Actions taken at the North County Site will be conducted under FUSRAP. FUSRAP was initiated to identify and clean up or otherwise control sites where residual radioactive material remains because of uranium manufacturing and processing activities conducted during the nation's atomic energy program. FUSRAP also addresses commercial operations that Congress has authorized or directed FUSRAP to remediate. The Department of Energy (DOE) managed FUSRAP until 1997. On October 13, 1997, the U.S. Congress transferred responsibility for FUSRAP from the DOE to USACE through the 1998 EWDAA.

The scope of this FS is limited to FUSRAP wastes. As defined by the Federal Facility Agreement (FFA), these wastes include the following types of materials:

- All wastes, including but not limited to radiologically contaminated wastes, resulting from or associated with uranium manufacturing or processing activities conducted at SLDS; and

- other chemical or non-radiological wastes that have been mixed or commingled with radiologically contaminated wastes resulting from or associated with uranium manufacturing or processing activities conducted at SLDS.

Those contaminants not resulting from FUSRAP-related activities are outside the scope of this FS.

CERCLA Process

Several CERCLA documents preceded the development of this FS. The DOE completed and received EPA approval of the Remedial Investigation (RI) Report and Baseline Risk Assessment (BRA) prior to the transfer of FUSRAP to USACE. The RI report (BNI, 1992a) characterizes the nature and extent of contamination. The BRA (ANL, 1993) describes the risks to human health and the environment posed by radiological and associated chemical contamination. The BRA also evaluates the need for action by defining the potential risks associated with taking no action to mitigate or eliminate the risks. The results from the RI and BRA reports were used by USACE to prepare the FS for the North County Site in accordance with procedures developed under CERCLA. Supplementary documents (such as the SLAPS Implementation Report and the Ecological Risk Assessment) have been prepared to analyze new data and to evaluate new guidance that was generated or issued since the RI and BRA were prepared.

USACE, and previously DOE, have for many years involved the regulators and public in the CERCLA process for the St. Louis Sites. As a result, USACE has a good understanding of the regulator and public positions. USACE provides monthly briefings at the St. Louis Oversight Committee meetings. A Citizens Remediation Task Force actively investigated the St. Louis Sites from 1994 to 1996 and published their report that included specific recommendations and hundreds of pages of analysis. (The Citizens Remediation Task Force became the St. Louis Oversight Committee after publishing their report.) EPA Region VII has been actively involved and has provided informal comments from region staff and from the National Remedy Review Board pursuant to DOE's FFA. The Missouri Department of Natural Resources (MDNR) has a local office working on FUSRAP and interacts regularly with USACE staff.

Public input regarding remedial activities conducted at the North County Site has been received from these and many other sources. Public meetings have been held, including monthly meetings with a local interest group (St. Louis Oversight Committee) and concerned members of the public. Another source of input was comments received from the public and the regulators on the draft FS/Environmental Impact Statement prepared by the DOE before FUSRAP was transferred to USACE. Comments were also received on the engineering evaluation/cost analysis (EE/CA) documents, prepared to evaluate and select removal actions at North County Site properties. In addition, some comments relevant to the North County Site were received on the Proposed Plan (PP) and FS for SLDS, which resulted in the 1998 ROD for accessible soils and ground water for SLDS.

This FS identifies, develops, and evaluates six remedial action alternatives to achieve a final remedy for the North County Site. This FS addresses all media within all of the properties that constitute the North County Site. Media addressed specifically include soil, sediment, surface water, ground water, and structures. Alternatives are developed on the basis of the nature and extent of FUSRAP-related contamination documented in the RI, the BRA, this FS, and related reports. This FS report evaluates the potential impact of the remedial action alternatives based on the nine CERCLA evaluation criteria that are discussed in subsequent sections of this document. The FS process includes regulatory agency and public review.

SITE HISTORY

From 1942 to 1957, under contracts with the Manhattan Engineer District (MED) and the Atomic Energy Commission (AEC), the SLDS was used for processing various forms of uranium compounds. In 1946, MED acquired the 21.7 acre tract of land now known as SLAPS to store residues and scrap from uranium processing at the Mallinckrodt (SLDS) facility. In 1966 and 1967, most of the stored residues were sold and removed from SLAPS. On-site structures at SLAPS were razed and buried on the property. Buried deposits of uranium-238 (U-238), radium-226 (Ra-226) and thorium-230 (Th-230) remain on the SLAPS property. The company that purchased the vast majority of the material stored at the SLAPS moved the materials to the HISS/Futura on Latty Avenue. Most of this material was later shipped to Colorado. Over time, residues migrated from the sites or were released or otherwise deposited when waste was hauled along transportation routes, contaminating the soils and sediments at the SLAPS VPs.

Initially the uranium-bearing feed materials were relatively pure “black oxides,” which had been extracted from uranium ores by other companies located throughout the United States. As the demand for purified uranium continued to increase, SLDS began extracting uranium directly from uranium ores rather than only purifying uranium extracted by other companies.

In 1944, Belgian Congo Shinkolobwe ore containing unusually high percentages of uranium (greater than 30% by weight) were processed. The supplier of the ores retained title to the ore residuals after processing (these residuals are called "raffinate cake").

Because there was no room to store the raffinate cake at the downtown site, the AEC began searching for a suitable storage location for the raffinate cake. The AEC ultimately obtained title to SLAPS by condemnation proceedings on January 3, 1947.

The uranium production process at SLDS is described in more detail in Section 2.1 of the FS. Several wastes and by-products were transported from SLDS to SLAPS for storage:

- Radium-bearing residues, referred to as “K-65” residues;
- AM-7 Pitchblende raffinate cake;
- AM-10 or Colorado raffinate cake;
- AJ-4 Barium Sulfate Cake (unleached) and AJ-4 Barium Cake (leached);
- C-liner slag that was created during metal forming operations; and
- Empty drums, contaminated steel and alloy scrap, and building debris.

The scrap metal stored at SLAPS was sold in 1962 and moved to Knoxville, Tennessee, and the SLAPS residues were purchased by a private company, Continental Mining & Milling Company (CMM) in 1966. The conditions of CMM's license specified that it was only for removal of stockpiled residues from 50 Brown Road (SLAPS) and storage at the licensee's facility at 9200 Latty Avenue.

In February 1967, CMM became insolvent and its lender, the Commercial Discount Corporation (CDC) of Chicago obtained possession of the Latty property and the residues. On June 26, 1967, CDC began shipping the residues to Cotter Corporation facilities. CDC sold remaining residuals at Latty Avenue to Cotter Corporation in 1969. In 1973, Cotter shipped undried AM-10 Colorado raffinate cake to Canon City and transported the leached AJ-4 barium sulfate cake, mixed with topsoil, to Westlake landfill in western St. Louis County.

Several removal actions conducted in accordance with approved engineering evaluation/cost analyses (EE/CAs) are either on-going or completed at the North County Site. These removal actions were conducted at numerous properties from 1994 to the present. Table ES-8 summarizes the response status of each of the designated properties in North County. Removal actions started under the EE/CAs are complete at the time the ROD is approved. The ROD criteria would supercede commitments to cleanup criteria in previously issued documents, (e.g., EE/CAs).

The first removal action at SLAPS was conducted in Spring 1985, when gully erosion occurred in the western portion of the site along Coldwater Creek. A retaining wall (gabion wall) was constructed along the bank to combat the erosion problem. In Fall 1997, an interim removal action was conducted at SLAPS to address contamination in an area immediately east of the gabion wall. Approximately 3,900 cubic meters (m^3) [5,100 cubic yards (yd^3)] of contaminated material were removed from the western end of SLAPS under this action and transported off-site. In 1998, a removal action was begun at SLAPs and the Ballfields (a SLAPS Vicinity Property) in accordance with an approved May 1998 EE/CA. As part of this action, a sedimentation basin was constructed in 1999 at the west end of SLAPS to limit the migration of contamination offsite via surface-water runoff. Other components of this removal action include excavation of contaminated soils from SLAPS and the Ballfields (excluding the ditch north of McDonnell Boulevard), offsite disposal of the excavated materials, and backfilling with approved fill material. A rail spur was installed on SLAPS in 1998 to provide a load-out area and staging area for shipment of contaminated materials to off-site disposal or recycling locations.

During 2000 and 2001, removal actions were conducted in the eastern portion of SLAPS and at the barium/radium pits. These actions resulted in the removal of approximately 20,600 m^3 (27,000 yd^3) of contaminated soils from the East End of SLAPS and 38,100 m^3 (49,800 yd^3) of contaminated soils from the Radium Pits area. Additional removals are ongoing at the East End Extension of SLAPS, which includes the areas of contaminated soil between the Radium Pits and the East End and in the drainage ditch immediately south of McDonnell Boulevard. By Fall 2001, approximately 45,900 m^3 (60,000 yd^3) had been removed from portions of the East End Extension. Removal of contaminated soils located in the central portion of SLAPS, referred to as Phase 1, was initiated in Fall 2001 and continued through 2002. Phase 1 is expected to be completed by May 2003. A total of 74,200 m^3 (97,000 yd^3) will have been removed from the

Phase I area. To date, all material has been shipped to properly permitted or licensed off-site disposal facilities.

Removal actions have also been conducted at several SLAPS VPs and Latty VPs. In 1995, DOE excavated contaminated soils from six residential SLAPS VPs and two industrial Latty Avenue VPs and transported 3,500 m^3 (4,610 yd^3) of material off-site for disposal (DOE, 1995). Another removal action resulted in the excavation and disposal of about 8,600 m^3 (11,300 yd^3) (ex-situ) of contaminated soils from the North Ditch between McDonnell Boulevard and the former ballfield area. During 2000, approximately 5,400 m^3 (7,100 yd^3) of contaminated soils were excavated from a portion of VP-38, a haul road vicinity property located at the northwest corner of Latty Avenue and Hazelwood Avenue.

At HISS, removal of all storage and spoil piles has been conducted under the 1998 HISS EE/CA. Preparation for the removal action included the construction of a railroad spur along the eastern boundary of HISS that was completed in early 1999. Removal of the stockpiles began in March 2000 and was completed approximately 18 months later. Nearly 44,300 m^3 (58,000 yd^3) of material from the two Spoil Piles, two Eastern Piles, the HISS Supplemental Storage Pile, and the HISS Main Pile were removed.

SITE CHARACTERISTICS

Site Description

The North County Site properties are located in northern St. Louis County, Missouri and involve five local municipal jurisdictions. Specific sites include SLAPS, Latty Avenue properties (HISS/Futura and Latty Avenue VPs), and SLAPS VPs. A total of more than 87 properties are involved. Coldwater Creek, which is a SLAPS VP, flows adjacent to SLAPS and drains the North County Site. Average annual precipitation for the area is approximately 36 inches per year. Depth to ground water varies from 27 to 75 feet (ft). The population of this immediate area is approximately 38,000 and is located within the St. Louis Metropolitan area, which has a population of 2.7 million.

In the 1940s, the area was primarily agricultural with a few private residences. In the 1950s and 1960s, private residences and commercial/industrial developments began to populate the North County Site. In the last twenty years, commercial/industrial development of the area has continued. This urban area consists predominately of commercial and industrial properties, although it also includes private residences, vacant lots, a farming area, a community garden, a recreation area, and Coldwater Creek. The reasonably anticipated future land use for most habitable properties is industrial. Given the rapid changes in the uses of these properties in the last 50 years, however, reasonably anticipated land uses may include residential with some limited agricultural.

Coldwater Creek is the major drainage mechanism for the SLAPS and HISS/Futura areas. Coldwater Creek flows adjacent to SLAPS, then meanders near HISS/Futura and other Latty Avenue properties and continues to flow through northern St. Louis County until it discharges into the Missouri River. Coldwater Creek floods areas of the North County Site including portions of SLAPS, HISS/Futura, and several VPs. Periodic maintenance and flood control measures are regularly undertaken. From the airport through the industrial areas, the water quality in Coldwater Creek is generally poor. Coldwater Creek is protected for livestock and wildlife watering and aquatic-life usage from its intersection with U.S. Highway 67 downstream to the mouth of the creek at the Missouri River. This portion of the Creek is classified by the state as a Class "C" waterway, which means there are periods of no flow in the creek, but permanent pools are always present.

Studies of aquatic life in Coldwater Creek have shown the stream ecology is severely impacted by industrial and other operations in North County unrelated to the FUSRAP-related activities. Pollutants enter the stream in storm water from commercial and industrial facilities, residential areas, and the Lambert-St. Louis International Airport. SLAPS storm-water run-off also flows into Coldwater Creek. More than a dozen facilities, which are permitted under the National Pollutant Discharge Elimination System (NPDES) program, discharge directly into the stream, including Ford Motor Company, Lambert-St. Louis International Airport, and Boeing Corp. Discharges include storm-water runoff, airport deicing fluids, and manufacturing discharges.

The North County Site is situated on a modest upland area between the Missouri and Mississippi River flood plains in northern St. Louis County. The upland area surrounds a topographic depression known as the Florissant Basin. Pleistocene soils and recent fill overlay shale and limestone bedrock. Faulting is not evident at the site, and the limestone bedrock appears to be almost flat.

The North County Site is underlain by a sequence consisting of loess, clay, sands, and gravel that was deposited by wind, stream and lake processes. This sedimentary sequence was deposited on limestone bedrock, which lies at a depth of approximately 100 ft below ground surface at the North County Site. Pennsylvanian shale overlies the limestone on the east side of SLAPS, but is absent to the west and absent at HISS/Futura. Chemical and hydrologic characteristics define five hydrostratigraphic (water property) zones (HZs) at the North County Site. The shallow ground-water zone, HZ-A, consists of fill, silts, and clays. Underlying HZ-A are HZ-B, which consists of highly impermeable clay, and HZ-C, which consists of silty clay and clayey silt deposits. The underlying shale and limestone bedrock are recognized as HZ-D and HZ-E, respectively. The limestone aquifer (HZ-E) is the protected aquifer for the site. All five HZs (HZ-A through HZ-E) occur beneath SLAPS; HZ-D (shale) is not found beneath HISS/Futura.

The uppermost hydrostratigraphic zone, HZ-A, has a low recharge rate. HZ-A cannot be considered a viable source of potable water because of the low recharge rate and the presence of chemical pollutants from the highly industrialized North County region. The ground water in HZ-A generally flows to the west and northwest. Water flow through soil is interpreted to discharge into Coldwater Creek from SLAPS and the Latty Avenue properties.

Chemical compositions of ground-water samples collected from the shallow hydrostratigraphic zone, HZ-A, are highly variable and include major anions and cations, radionuclides, metals, and organic compounds. On the other hand, chemical compositions of ground-water samples collected from lower zones are remarkably similar to each other but distinctly different from the bulk of the ground-water samples collected from HZ-A.

Additionally, while contaminants of potential concern (COPCs) were found in HZ-A no contaminants of concern (COCs) were identified for the potential drinking water zone, the limestone aquifer (HZ-E). The rate of vertical contaminant movement suggests times exceeding 1,000 years to reach the Limestone Aquifer. This arrival period assumes continued soil contamination. Removal of the soil source of contamination will result in lower concentrations reaching ground water and will lengthen the arrival period to still greater time lengths. Combined with low measured hydraulic conductivities in HZ-A, HZ-B, and HZ-D, these characteristics indicate that ground water in HZ-A has limited communication with water in the lower HZs (DOE, 1994a).

This interpretation is supported by tritium concentrations in samples from HZ-A and the lower HZs. Tritium concentrations in HZ-A are significantly higher than in any of the other HZs, indicating that HZ-A has communication with atmospheric tritium. Tritium is not a FUSRAP-related contaminant but is present in the atmosphere as a result of a natural process (the interaction of cosmic rays with the atmosphere) and man-made processes (nuclear weapon fallout). The uniform tritium concentrations in HZ-B through HZ-E indicate an older tritium reservoir (likely naturally-occurring) that has not been connected with the contaminated shallow zone.

The EPA has developed a ground-water classification system to assess ground water on the basis of ground-water value and vulnerability to contamination. Using EPA's Superfund Ground-Water Classification Flow Chart, the ground-water classification was evaluated as part of the FS. The water-bearing units of the HZ-E limestone aquifer meet the requirements for a Class IIB designation. Class IIB means the ground-water source could be used for drinking water, but is not currently used. The upper HZ-A water-bearing unit at the airport areas meets Class III definitions. Class III includes ground waters that "are so contaminated by naturally occurring conditions, or by the affects of broad-scale human activity (i.e., unrelated to a specific activity), that they cannot be cleaned up using treatment methods reasonably employed in public water-supply systems." Class III also encompasses ground waters where yields are insufficient to meet the needs of an average size family. The low permeability of the upper ground water units confirms that these units are unlikely to produce water in sufficient quantities to serve as a drinking water supply. Except for HZ-E, the water bearing units (HZ-A, B, C and D) were classified as Class IIIA, because the site is surrounded by industrial activities and the creek feeds surface water bodies (the Missouri River) that are used for drinking water.

No threatened or endangered species have been found at the North County Site. The only federal and state designated endangered or threatened species that have any significant possibility of occurring within the area of the North County Site are the pallid sturgeon and the bald eagle. Pallid sturgeons are found in the Mississippi and Missouri Rivers, but Coldwater Creek does not provide adequate water quality or quantity for a suitable habitat. No sightings of Bald Eagles have been reported at this site.

Potential wetlands have been identified along Coldwater Creek, and portions of the North County Site lie within the 100-year flood plain.

No known archeological or historical sites are impacted by the contamination at the North County Site.

NATURE AND EXTENT OF CONTAMINATION

The media affected by contamination are soils and sediments. The total risk from COPCs in surface water (Coldwater Creek) do not exceed acceptable risk levels; therefore, surface water is not a medium of concern. Some COPCs were identified in the upper hydrostratigraphic zone (HZ-A) of ground water under the SLAPS, but this zone is not currently used as a water supply source, and does not communicate with the water in the lower zones. COPCs were not found in lower hydrostratigraphic zones. Therefore, useable ground water is not impacted and the media of concern are soils and sediments.

The patterns of soil contamination around SLAPS and HISS/Futura indicate that airborne transport has been a significant contributor in the past [e.g., from SLAPS north to Investigation Area 9 (IA-9), the former ballfield and park area]. Spillage from trucks was also a major mechanism for contaminant transport to haul road properties when materials were transported from SLAPS to the site on Latty Avenue (HISS/Futura). Contamination in Coldwater Creek has been affected by flood events that moved contaminated sediment within the floodplain as well as downstream.

Soil: Elevated levels of radioactive materials in the uranium, thorium, and actinium decay series including Ra-226, Th-230, and U-238 have been detected in SLAPS soil. The remedial investigations found concentrations ranging from background to 5,600 picocuries per gram (pCi/g), 37,780 pCi/g, and 1,700 pCi/g, respectively. (However, some slightly higher values for Th-230 were found at test pits for IA-4 removals.) The characterization data indicate that non-radiological contaminants related to uranium manufacturing and processing activities at SLDS are present. However, these chemicals would be addressed by remediating the radionuclides at the North County Site because the FUSRAP-related chemicals are generally co-located with the radionuclides. Chemical sampling will be done to confirm that chemicals are addressed. Contamination at SLAPS covers most of the surface, and subsurface soils down to about 20 ft deep. Contaminated scrap and building rubble were also reportedly buried on SLAPS. Geotechnical investigations have identified features on SLAPS consistent with burials of this type. Sampling indicates that the radioactively contaminated soils generally do not exhibit Resource Conservation and Recovery Act (RCRA) hazardous waste characteristics. Although some volatile organic compounds (VOCs) were found, there is no documentation or other evidence to date to indicate that organic COCs were released at these sites from uranium ore processing wastes that originated at SLDS. A records search of industrial facilities surrounding the Latty Avenue properties has identified processes that could generate RCRA-listed wastes. The remedial design investigations done prior to any soil removal must consider the presence of these contaminants.

The results of investigations conducted at the Latty Avenue properties are similar to results for investigations conducted at SLAPS. Radioanalytical studies indicate that Ra-226, Th-230, and U-238 are present in HISS/Futura surface soils at concentrations as high as 700 pCi/g, 830 pCi/g, and 800 pCi/g, respectively.

Ground Water: Current risks associated with exposure to contaminated ground water are minimal. Although some contaminants are present in the shallow HZ-A ground water, their presence does not require action because a complete pathway to receptors does not exist. Because the potential yield is very low for HZ-A ground water, it does not constitute a source of potable drinking water. In addition, sample data show that there are no COCs in HZ-E ground water, the potential water resource. The hydrologic and chemical data also show that the water in the contaminated ground-water zone (HZ-A) has limited connection with the lower ground-water zones. The existence of from 50 to 80 ft of low permeability clay-rich soils, together with limited mobility of the radionuclides of interest, strongly suggest that contamination from the HZ-A unit is not likely to migrate to the lower water-bearing units. Ground water from HZ-A at SLAPS flows toward Coldwater Creek. Hydrological studies of SLAPS indicate that the slow discharge of ground water to Coldwater Creek is not significantly impacting the creek.

SUMMARY OF SITE RISKS

The BRA and related studies were prepared to evaluate the risk to human health and the environment from radioactive materials and chemicals if no cleanup were conducted at the North County Site. The BRA concluded that remedial action at the site was warranted. However, because additional data have been gathered, a supplemental risk assessment was included in the FS. The FS risk assessment evaluated risks at the site (for the no action alternative) and evaluated the potential risk in the future following cleanup for each of the remedial alternatives presented in the FS. The results of the FS risk evaluation are discussed below.

The primary health risks include cancer (carcinogenic) and toxic (non-carcinogenic) human health effects. Cancer risk estimates were compared to the CERCLA risk range of one in one million (10^{-6}) to one in ten thousand (10^{-4}) outlined in the NCP. As defined in the NCP, acceptable exposure levels are generally levels that represent an excess upper-bound lifetime cancer risk to an individual in the range of 10^{-6} to 10^{-4}. The potential for non-carcinogenic effects from chemicals was evaluated by dividing the intake ratios by published chronic reference dose values. These values were then added for each chemical to obtain a hazard index. A hazard index (HI) greater than one indicated a potential for adverse health effects.

An ecological risk screening was also conducted. The screening process involved comparing the maximum concentrations of contaminants at the site to screening values. The ecological evaluation also considered the rarity, diversity, and importance of habitats at the site.

Table ES-1 presents the total risk for the reasonable maximum exposure (RME) expected to occur under current and future land use. The excess lifetime cancer risk and dose for the RME receptor at all the North County Site properties are summarized in Table ES-2. The dose represents the energy absorbed from exposure to ionizing radiation and is expressed in units of mrem/year. Risks and doses from exposure to radionuclides were calculated for year 0 through year 1000. For each property unit, receptors were evaluated for a range of current and future uses, including residential land use, an industrial worker, a construction worker, a maintenance worker, a recreational user (or trespasser), and a utility worker. The resident is assumed to live at the site for 350 days per year for 30 years. The industrial worker is assumed to be at the site for 8 hours per day, 250 days per year, for 25 years. The maintenance worker is assumed to be present for 8 hours per week and holds the position for 6.6 years. The recreational user (or

Table ES-1. RME Receptors Risk Summary

Carcinogens

Scenario Timeframe: Current
Receptor Population: Maintenance Worker
Receptor Age: Adult
Receptor Location: SLAPS

Medium	Exposure Medium	Exposure Route-Pathway	Contaminant of Concern	Carcinogenic Risk: Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Route Total
Soil	Soil	Soil On-Site - Direct Contact	None [a]	Note b	Note b	Note b	Note b	Note b
	Dust	Soil On-Site – Inhalation of Soil as Dust	None [a]	Note b	Note b	Note b	Note b	Note b
							Chemical Soil Risk Total	Note b

Medium	Exposure Medium	Exposure Route-Pathway	Contaminant of Concern	Carcinogenic Risk: Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Route Total
Soil	Soil/Dust	Soil On-Site - Direct Contact and Inhalation of Soil as Dust	Radionuclides	Note c	Note c	-	Note c	4.8E-05
							Radiological Soil Risk Total	4.8E-05

Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child
Receptor Location: SLAPS

Medium	Exposure Medium	Exposure Route-Pathway	Contaminant of Concern	Carcinogenic Risk: Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Route Total
Soil	Soil	Soil On-Site - Direct Contact	Arsenic [d]	8.0E-05	doesn't apply to direct contact	6.6E-07	doesn't apply to direct contact	8.1E-05
	Dust	Soil On-Site - Inhalation of Soil as Dust	Arsenic [d]	doesn't apply to inhalation	4.6E-08	doesn't apply to inhalation	doesn't apply to inhalation	4.6E-08
							Chemical Soil Risk Total	8.1E-05

Medium	Exposure Medium	Exposure Route-Pathway	Contaminant of Concern	Carcinogenic Risk: Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Route Total
Soil	Soil/Dust	Soil On-Site - Direct Contact and Inhalation of Soil as Dust	Radionuclides	Note c	Note c	-	Note c	3.7E-03
							Radiological Soil Risk Total	3.7E-03
							Total Risk	Note e

Table ES-1. RME Receptors Risk Summary (Cont'd)

Medium	Exposure Medium	Exposure Route-Pathway	Contaminant of Concern	Primary Target Organ(s)	Non-Carcinogenic Hazard Quotient			
Non-Carcinogens								
Scenario Timeframe:		Current						
Receptor Population:		Maintenance Worker						
Receptor Age:		Adult						
Receptor Location:		SLAPS						
Medium	**Exposure Medium**	**Exposure Route-Pathway**	**Chemical of Concern** [f]	**Primary Target Organ(s)**	**Non-Carcinogenic Hazard Quotient** **Ingestion**	**Inhalation**	**Dermal**	**Exposure Route Total**
Soil	Soil	Soil On-Site - Direct Contact	Arsenic	Cardiovascular, Skin/Hair	1.1E-01	doesn't apply to direct contact	1.1E-04	1.1E-01
		Soil On-Site - Direct Contact	Nickel	Lungs, Immune System	4.2E-02	doesn't apply to direct contact	6.5E-05	4.3E-02
		Soil On-Site - Direct Contact	Thallium	CNS, Skin/Hair	2.0E-03	doesn't apply to direct contact	4.2E-06	2.0E-03
		Soil On-Site - Direct Contact	Vanadium	Lungs	2.0E-02	doesn't apply to direct contact	8.4E-04	2.1E-02
	Dust	Soil On-Site – Inhalation of Soil as Dust	Arsenic	Cardiovascular, Skin/Hair	doesn't apply to inhalation	-	doesn't apply to inhalation	-
		Soil On-Site - Inhalation of Soil as Dust	Nickel	Lungs, Immune System	doesn't apply to inhalation	-	doesn't apply to inhalation	-
		Soil On-Site - Inhalation of Soil as Dust	Thallium	CNS, Skin/Hair	doesn't apply to inhalation	-	doesn't apply to inhalation	-
		Soil On-Site - Inhalation of Soil as Dust	Vanadium	Lungs	doesn't apply to inhalation	-	doesn't apply to inhalation	-
							Chemical Soil Hazard Index Total	1.7E-01
							Cardiovascular System Total Hazard Index	1.1E-01
							Central Nervous System (CNS) Total Hazard Index	2.0E-03
							Immune System Total Hazard Index	4.3E-02
							Respiratory System (Lungs) Total Hazard Index	6.3E-02
							Skin/Hair Total Hazard Index	1.1E-01
					Ingestion	**Inhalation**	**Dermal**	**Exposure Route Total**
Soil	Soil/Dust	Soil On-Site - Direct Contact and Inhalation of Soil as Dust	Radionuclides	Note g	Note g	Note g	Note g	Note g
							Radiological Soil Total Dose (mrem/yr)	2.2E+01

Table ES-1. RME Receptors Risk Summary (Cont'd)

Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child
Receptor Location: SLAPS

Medium	Exposure Medium	Exposure Route-Pathway	Contaminant of Concern [h]	Primary Target Organ(s)	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Route Total
Soil	Soil	Soil On-Site - Direct Contact	Arsenic	Cardiovascular, Skin/Hair	4.2E-01	doesn't apply to direct contact	3.4E-03	4.2E-01
		Soil On-Site - Direct Contact	Barium	Cardiovascular	9.8E-02	doesn't apply to direct contact	4.7E-03	1.0E-01
		Soil On-Site - Direct Contact	Chromium	Lungs	3.8E-01	doesn't apply to direct contact	6.4E-02	4.5E-01
		Soil On-Site - Direct Contact	Nickel	Lungs, Immune System	1.6E-01	doesn't apply to direct contact	2.0E-03	1.6E-01
		Soil On-Site - Direct Contact	Thallium	CNS, Skin/Hair	7.7E-02	doesn't apply to direct contact	1.3E-03	7.8E-02
		Soil On-Site - Direct Contact	Vanadium	Lungs	7.7E-02	doesn't apply to direct contact	2.6E-02	1.0E-01
		Soil On-Site - Direct Contact	Zinc	Blood	5.2E-03	doesn't apply to direct contact	8.8E-05	5.3E-03
	Dust	Soil On-Site - Inhalation of Soil as Dust	Arsenic	Cardiovascular, Skin/Hair	doesn't apply to inhalation	-	doesn't apply to inhalation	-
		Soil On-Site - Inhalation of Soil as Dust	Barium	Cardiovascular	doesn't apply to inhalation	2.7E-03	doesn't apply to inhalation	2.7E-03
		Soil On-Site - Inhalation of Soil as Dust	Chromium	Lungs	doesn't apply to inhalation	2.3E-03	doesn't apply to inhalation	2.3E-03
		Soil On-Site - Inhalation of Soil as Dust	Nickel	Lungs, Immune System	doesn't apply to inhalation	-	doesn't apply to inhalation	-
		Soil On-Site - Inhalation of Soil as Dust	Thallium	CNS, Skin/Hair	doesn't apply to inhalation	-	doesn't apply to inhalation	-
		Soil On-Site - Inhalation of Soil as Dust	Vanadium	Lungs	doesn't apply to inhalation	-	doesn't apply to inhalation	-
		Soil On-Site - Inhalation of Soil as Dust	Zinc	Blood	doesn't apply to inhalation	-	doesn't apply to inhalation	-
							Chemical Soil Hazard Index Total	1.3E+00
							Blood Total Hazard Index	5.3E-03
							Cardiovascular System Total Hazard Index	5.2E-01
							Central Nervous System (CNS) Total Hazard Index	7.8E-02
							Immune System Total Hazard Index	1.6E-01
							Respiratory System (Lungs) Total Hazard Index	7.1E-01
							Skin/Hair Total Hazard Index	5.0E-01

Table ES-1. RME Receptors Risk Summary (Cont'd)

Medium	Exposure Medium	Exposure Point	Contaminant of Concern	Primary Target Organ(s)	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Route Total
Soil	Soil/Dust	Soil On-Site - Direct Contact and Inhalation of Soil as Dust	Radionuclides	Note g	Note g	Note g	Note g	Note g
							Radiological Soil Total Dose (mrem/yr)	3.2E+02

Notes:

[a] No Contaminants of Concern (COC) were identified for this property or any other property for the Maintenance Worker receptor.

[b] Not applicable since there are no COCs.

[c] The risk for radionuclides was calculated based only as a total across applicable exposure pathways and are not presented for each individual pathway.

[d] Although not a COC for this property, this contaminant was identified as a COC for another property for the Resident receptor. Risks are shown here for all carcinogenic residential COCs.

[e] The total risk (e.g., sum of chemical and radionuclide risks) may not be directly additive but the risk from exposure to radionuclides far exceeds the risk from exposure to non-radionuclides. Therefore the total risk is approximately the same as the radiological risk.

[f] Although none of the chemicals listed are COCs at this site, these chemicals have been identified as COCs for another property for the Maintenance Worker receptor. Hazards are shown here for all non-carcinogenic maintenance worker COCs.

[g] Radionuclide exposure is not presented in terms of hazard quotient (see dose in mrem/yr).

[h] Although none of the chemicals listed are COCs at this site (since all target organs produce a total HI < 1), these chemicals have been identified as COCs for another property for the Resident receptor. Hazards are shown here for all non-carcinogenic residential COCs except for antimony, which was not evaluated for risk at this site since it was eliminated in the soil screening process.

\- Toxicity criteria are not available to quantitatively address this route of exposure

Table ES-2. Supplemental Human Health Risk Evaluation Summary Table

Property Name	RESIDENTIAL SCENARIO				INDUSTRIAL SCENARIO				CONSTRUCTION SCENARIO			
	Dose	**Dose**	**Risk**	**Risk**	**Dose**	**Dose**	**Risk**	**Risk**	**Dose**	**Dose**	**Risk**	**Risk**
	Year = 0.0	**Year = 1000**	**Year = 0.0**	**Year = 1000**	**Year = 0.0**	**Year = 1000**	**Year = 0.0**	**Year = 1000**	**Year = 0.0**	**Year = 1000**	**Year = 0.0**	**Year = 1000**
VPs (highest value)	60	51	9E-04	7E-04	18	15	2E-04	2E-04	47	42	2E-05	2E-05
VPs (average value)	2.7	4.3	6E-05	7E-05	0.8	1.3	2E-05	2E-05	2.3	3.2	9E-07	2E-06
Coldwater Creek	not applicable				not applicable				8.6	2.9	3E-06	2E-06
Railroad	not applicable				not applicable				6.7	5.4	3E-06	2E-06
Road Right-of-Way	29	37	4E-04	5E-04	8.0	11	1E-04	1E-04	25	31	9E-06	1E-05
HISS	42	9.3	5E-04	1E-04	12	2.7	1E-04	4E-05	34	7.4	1E-05	3E-06
Futura	294	18	3E-03	3E-04	79	5.3	8E-04	7E-05	251	14	8E-05	6E-06
IA-1	3407	78	4E-02	1E-03	946	24	9E-03	3E-04	2801	56	1E-03	3E-05
IA-2	382	180	5E-03	3E-03	105	51	1E-03	7E-04	322	149	1E-04	6E-05
IA-3	492	65	6E-03	9E-04	144	18	2E-03	2E-04	369	54	2E-04	2E-05
IA-4	1159	315	2E-02	4E-03	337	90	4E-03	1E-03	890	262	4E-04	1E-04
IA-5	179	89	2E-03	1E-03	48	25	5E-04	3E-04	156	73	5E-05	3E-05
IA-6	84	68	9E-04	1E-03	21	20	2E-04	3E-04	80	55	2E-05	2E-05
IA-7	621	256	6E-03	4E-03	164	72	2E-03	9E-04	557	213	2E-04	8E-05
IA-8	341	221	3E-03	3E-03	87	63	8E-04	8E-04	325	184	8E-05	7E-05
IA-9	24	16	2E-04	2E-04	6.0	4.5	6E-05	6E-05	22	13	6E-06	5E-06
IA-10	24	5.0	3E-04	8E-05	6.5	1.5	7E-05	2E-05	20	3.6	7E-06	2E-06
IA-11	0.0	0.0	1E-07	4E-07	0.0	0.0	2E-08	1E-07	0.0	0.0	5E-10	1E-08
IA-12	30	42	4E-04	6E-04	7.6	12	9E-05	2E-04	30	35	7E-06	1E-05
IA-13	10	4.8	1E-04	8E-05	2.8	1.5	3E-05	2E-05	8.8	3.3	3E-06	2E-06
SLAPS	321	110	4E-03	2E-03	89	31	1E-03	4E-04	267	91	1E-04	4E-05

Property Name	MAINTENANCE SCENARIO				RECREATIONAL/TRESPASSER SCENARIO				UTILITY WORKER SCENARIO			
	Dose	**Dose**	**Risk**	**Risk**	**Dose**	**Dose**	**Risk**	**Risk**	**Dose**	**Dose**	**Risk**	**Risk**
	Year = 0.0	**Year = 1000**	**Year = 0.0**	**Year = 1000**	**Year = 0.0**	**Year = 1000**	**Year = 0.0**	**Year = 1000**	**Year = 0.0**	**Year = 1000**	**Year = 0.0**	**Year = 1000**
VPs (highest value)	3.8	3.4	1E-05	8E-06	0.9	0.8	5E-06	4E-06	1.9	1.7	8E-07	7E-07
VPs (average value)	0.2	0.3	5E-07	7E-07	0.0	0.1	3E-07	3E-07	0.1	0.1	3E-08	6E-08
Coldwater Creek	0.7	0.2	1E-06	8E-07	0.1	0.1	5E-07	4E-07	0.3	0.1	1E-07	6E-08
Railroad	0.5	0.4	2E-06	1E-06	0.1	0.1	8E-07	6E-07	0.3	0.2	1E-07	1E-07
Road Right-of-Way	2.1	2.5	5E-06	6E-06	0.4	0.6	2E-06	3E-06	1.0	1.2	4E-07	5E-07
HISS	2.8	0.6	7E-06	2E-06	0.6	0.1	3E-06	7E-07	1.3	0.3	6E-07	1E-07
Futura	21	1.1	4E-05	3E-06	4.0	0.3	2E-05	1E-06	10	0.6	3E-06	2E-07
IA-1	233	4.2	5E-04	1E-05	49	1.3	2E-04	7E-06	112	2.2	4E-05	1E-06
IA-2	27	12	6E-05	3E-05	5.4	2.7	2E-05	1E-05	13	6.0	5E-06	2E-06
IA-3	29	4.3	8E-05	1E-05	7.6	1.0	4E-05	5E-06	15	2.1	7E-06	8E-07
IA-4	71	21	2E-04	5E-05	18	4.7	9E-05	2E-05	36	10	2E-05	4E-06
IA-5	13	6.0	3E-05	1E-05	2.5	1.3	1E-05	6E-06	6.2	2.9	2E-06	1E-06
IA-6	6.9	4.5	1E-05	1E-05	1.1	1.0	4E-06	5E-06	3.2	2.2	8E-07	9E-07
IA-7	48	17	8E-05	4E-05	8.3	3.8	3E-05	2E-05	22	8.5	7E-06	3E-06
IA-8	28	15	4E-05	4E-05	4.3	3.3	2E-05	2E-05	13	7.4	3E-06	3E-06
IA-9	1.9	1.0	3E-06	3E-06	0.3	0.2	1E-06	1E-06	0.9	0.5	2E-07	2E-07
IA-10	1.7	0.3	3E-06	9E-07	0.3	0.1	1E-06	4E-07	0.8	0.1	3E-07	7E-08
IA-11	0.0	0.0	6E-10	5E-09	0.0	0.0	2E-10	2E-09	0.0	0.0	2E-11	4E-10
IA-12	2.6	2.8	4E-06	7E-06	0.4	0.6	2E-06	3E-06	1.2	1.4	3E-07	5E-07
IA-13	0.7	0.3	1E-06	9E-07	0.1	0.1	6E-07	4E-07	0.4	0.1	1E-07	7E-08
SLAPS	22	7.4	5E-05	2E-05	4.6	1.6	2E-05	8E-06	11	3.6	4E-06	1E-06

Note: doses are in mrem/yr.

trespasser) is assumed to be on-site for 2 hours per day, 26 days per year, for 9 years. The construction worker is assumed to be exposed 8 hours per day, 250 days per year, for one year. (The construction worker scenario best represents the current risks at SLAPS where removal actions are being performed.) For road and rail work, the construction worker is assumed to be exposed 8 hours per day, 90 days per year, for one year, (36% of the construction worker exposure duration). A utility worker is classified as a subset of the construction worker scenario. While the exposure parameters for a utility worker would be similar to a construction worker, the exposure durations for a utility worker would be much less. Input from local utility companies suggests that a reasonable exposure duration is 8 hours per day, 10 days per year, for one year (4% of the construction worker exposure duration).

The data show that the non-radiological contaminants associated with FUSRAP-related activities are commingled with radiological contaminants, and that, at most properties, the risks from exposure to non-radionuclides are at least an order of magnitude lower than the risks from exposure to radionuclides. As shown in Table D-4a in Appendix D, the risks due to radiological COCs at most properties at the North County Site for the current RME receptor scenario are within the CERCLA risk range (10^{-6} to 10^{-4}), whereas the risks due to non-radiological COCs for the current RME receptor scenario are generally between 10^{-8} to 10^{-4}. Additional information concerning non-radiological risk calculations is presented in Appendix D.

Risk levels determined using the actual current land uses indicate that most properties included in the North County Site (including all designated residential properties) are within the CERCLA risk range (10^{-6} to 10^{-4}) specified for protection of human health. This results from current practices used to control exposures (e.g., USACE radiation safety support to utility operations). As shown in Table ES-2, current risks for several properties exceed the CERCLA risk range for some scenarios. If land uses should change in the future (e.g., properties that are currently under commercial/industrial uses become residential), risks exceeding the CERCLA risk range could exist at many of the property units.

CONCLUSIONS OF RISK EVALUATION

The risk evaluation indicates there is a need for cleanup action within the North County Site. Under current land use conditions, the cancer risks and hazard indices are calculated to exceed the CERCLA risk range for plausible scenarios (recreational/trespasser, maintenance, industrial, and construction workers) within the North County Site. In addition, for reasonably anticipated future land use scenarios (industrial and residential), the risks and/or the HIs could exceed the CERCLA risk range and/or a HI of 1 at many properties. Chemicals of potential concern were screened based on potential risks and hazards to identify COCs. Those contaminants related to FUSRAP uranium manufacturing or processing activities that were detected at the site at levels that present a risk greater than 10^{-6} (given that the media-specific and receptor-specific total risk is above 10^{-4}) or a hazard quotient greater than 0.1 (given that the media-specific and receptor-specific total hazard is above 1) were identified as COCs for the North County Site.

Soils: The radionuclides identified as COCs in soils and sediments include isotopes of thorium, uranium, radium, protactinium, and actinium. Eleven metals are identified as non-radiological surface soil COCs: antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium. Four non-radionuclide subsurface soil COCs are identified. They are antimony, arsenic, thallium, and uranium.

Ground Water: An assessment of ground water concluded that there are no COCs in HZ-E ground water, the protected water resource. Although some soil contaminants have entered the shallow HZ-A ground water, their presence does not require action. The HZ-A ground water has no defined COCs because a complete pathway to receptors does not exist. Therefore the chemicals do not meet the definition of COC.

Although the chemical trichloroethene (TCE) was found in HZ-A, it was not identified as a COC because the shallow ground water is not a source of potable drinking water and because TCE is not identified as FUSRAP-related. The USACE will continue to monitor the ground water for TCE where appropriate if TCE is co-located with FUSRAP COCs requiring remediation. In addition, soils containing TCE source-term commingled with FUSRAP COCs will be remediated.

Surface Water: Several COPCs were identified in surface-water samples from Coldwater Creek. However, an evaluation of the data against background, risk, and hazard criteria indicates that the levels present are within the acceptable risk range. For that reason, no COCs were identified for surface water, and surface water is not a medium of concern.

Sediments: As with soils, radionuclides are identified as COCs in Coldwater Creek sediments. One metal (arsenic) and five organics also exceed risk criteria in Coldwater Creek sediment. Organic and arsenic concentrations increase with distance downstream from SLAPS and HISS/Futura. Thus, the elevated concentrations are most likely the result of the heavy industrial activity in the area, and are not FUSRAP-related. For this reason, neither the organics nor arsenic are retained as COCs in the sediments, limiting COCs for sediments to radionuclides only.

Ecological Risk: A screening level ecological risk evaluation was conducted for the site. Further risk evaluation was not needed because of the low risks relative to the uncertainty in the risk estimates; the low probability of significant ecological effects on local populations; and the lack of unique, rare, and critical habitat at the North County Site. The ecological risk evaluation concluded that remediation of the site was not required to protect the environment.

REMEDIAL ACTION OBJECTIVES

USACE is conducting response actions under the legislative authority contained in Public Law 107-66, the EWDAA for FY02. This law establishes the authority of USACE to conduct response actions for releases related to the nation's early atomic energy program as the lead federal agency, subject to CERCLA and the NCP. CERCLA requires that a remedial action "shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment." In addition, CERCLA requires that the remedial action selection "shall require, at the completion of the remedial action, a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation." For that reason, the second primary remedial action objective is to attain the criteria or standards of control that are established in the ARARs for the site COCs.

To determine the appropriate remedial action, the NCP sets forth a requirement for establishing remedial action objectives (RAOs). RAOs are based on the nature and extent of contamination, threatened resources, the potential for human and environmental exposure, and reasonably anticipated land uses. The RAOs for the North County Site are established, in general, to eliminate or minimize potential human exposure to soils and sediments contaminated with FUSRAP-related COCs at levels that exceed the standards established in the ARARs or the site-specific risk-based RGs. Although risk levels based on a commercial/industrial future anticipated land use are within the CERCLA risk range (10^{-6} to 10^{-4}) for most properties in the North County Site, action is required to comply with ARARs and site-specific RGs. Remediation will result in residual site conditions that allow for unlimited use and unrestricted exposure. There are no goals for HZ-A ground-water improvement. The pathways and risks are such that the HZ-A ground water does not require remediation. COC removal from soil will lessen the impact of contaminants upon HZ-A ground water. The media-specific RAOs developed for the North County Site for soils and sediments are shown in Table ES-3.

Table ES-3. Remedial Action Objectives for Remediation of the North County Site

Media	Remedial Action Objectives
Soils and Sediments	Eliminate or minimize potential human exposure to soils and sediments contaminated with FUSRAP-related COCs at levels that exceed the standards established in the ARARs or the site-specific remediation goals. Prevent exposures from residual contamination in soils and sediments with concentrations greater than remediation goals Eliminate or minimize volume, toxicity, and mobility of contaminated soils and sediments Eliminate or minimize the potential migration of contaminants off-site, including the potential for migration to ground water and surface water, by removing the sediment and soil sources.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires the selection of a remedial action that is protective of human health and the environment and complies with "applicable or relevant and appropriate requirements (ARARs)." CERCLA states this is a standard, requirement, criteria, or limitation under a Federal environmental law or a more stringent State environmental or facility siting law, which is not legally applicable to the hazardous substance or pollutant or contaminant, but which is relevant and appropriate under the circumstances of the release of the hazardous substance or pollutant or contaminant. With respect to ARARs, CERCLA specifically requires that "the remedial action selected shall require, at the completion of the remedial action, a level or standard of control for [a] hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation (ARAR)." Pursuant to 40 CFR 300.430(e)(9)(iii)(B) the alternatives "shall be assessed to determine whether they attain applicable or relevant and appropriate requirements (ARARs) under Federal environmental laws and state environmental or facility siting laws."

The proposed ARARs for the radionuclides addressed in this response action includes Title 40 Code of Federal Regulations Part 192 (40 CFR 192), Subparts A, B and C; and 10 CFR 40, Appendix A, Criterion 6(6).

40 CFR Subpart A defines the "standards for control of residual radioactive materials from inactive uranium processing sites." This section sets several standards that provide protection for stabilized residual materials disposal areas at uranium processing sites. 40 CFR 192.02(a) states that control of residual radioactive materials must be designed to be effective for up to 1000 years to the extent achievable, and in any case, for at least 200 years.

Subpart B identifies EPA's standards for remedial actions of land and buildings contaminated with residual radioactive materials at inactive uranium processing sites and provides cleanup standards for Ra-226 in soil, among other things.

Subpart C provides regulations for the implementation of standards established in Subparts A and B. Among other things, it sets forth conditions appropriate for the development of supplemental standards. Supplemental standards are derived pursuant to 40 CFR 192 Subpart C for subsurface materials at the primary storage areas (i.e., SLAPS and HISS/Futura) for use with the containment and treatment alternatives. The supplemental standards are appropriate in accordance with 40 CFR 192.21 (c) which specifies that supplemental standards may be applied under circumstances that would result in excessive remedial action costs relative to the long-term benefits and where the residual radioactive materials do not pose a clear present or future hazard. The supplemental standards for the primary storage areas in the containment and treatment alternatives (Alternatives 2 and 3) are to be used in conjunction with institutional controls.

10 CFR 40, Appendix A, is the Nuclear Regulatory Commission's (NRC's) regulations for active uranium processing sites, and these regulations conform to the standards set by EPA in 40 CFR 192. Criterion 6(6) is the NRC process for developing remediation goals (RGs) for other radionuclides to be consistent with the Ra-226 limits. 10 CFR 40, Appendix A, Criterion 6(6) is used in the North County Site as an ARAR to derive cleanup goals for non-radium radionuclides, particularly uranium and thorium, which are not explicitly included in EPA's 40 CFR 192 standards. In addition, this criteria requires the use of the unity rule when multiple contaminants are present. The unity rule sums the ratio of the residual concentration to remediation goals for each radiological contaminant of concern. Criterion 6(6) also provides relevant and appropriate radiological criteria for decommissioning lands and structures associated with uranium recovery facilities.

Criteria which are the basis of ARARs (40 CFR Part 192 and 10 CFR Part 40) are protective for all future anticipated land uses. This protectiveness has been upheld by judicial action.

DERIVATION OF REMEDIATION GOALS AND CLEANUP LEVELS

The remediation goals proposed for the North County Site comply with ARARs, are protective of human health and environment and are consistent with the NCP. They are protective under conditions of RME for residential site conditions (see Preamble to the final rule for 40 CFR 192 as specified in 48 FR 600). No directly applicable chemical-specific requirements are identified. Relevant and appropriate requirements are identified for radioactive contaminants in soil. Remediation goals for other contaminants in soil are derived using site-specific evaluations. Risk and dose assessments were also performed to assure protectiveness in light of multiple contaminants and multiple pathways (e.g., inhalation, ingestion, and direct exposure) at the North County Site. The remediation goal for Ra-226 is set forth in 40 CFR 192, Subpart B. Site-specific remediation goals for U-238 and Th-230 are derived in accordance with 10 CFR 40, Appendix A, Criterion 6(6) and 40 CFR 192, Subpart A. Table D-11 lists concentrations that produce the radium benchmark doses for the key St Louis North County Site radionuclides for a range of potential receptors. The remediation goal for Th-230 accounts for the in-growth of Ra-226 which is the limiting risk consideration.

No chemical-specific requirements were identified for non-radiological contaminants. Remediation goals were derived based on site-specific exposure assumptions and with the objective of meeting the acceptable risk range as provided in the NCP (See Appendix D, Section D.2.2.2). According to the NCP, acceptable exposure levels to known or suspected carcinogens are levels that represent an excess upper bound lifetime cancer risk to an individual of between one in 1,000,000 (10^{-6}) and one in 10,000 (10^{-4}). The EPA establishes preliminary remediation goals (PRGs) for all carcinogenic chemicals at the 10^{-6} level, also known as the point of departure. Final remediation goals may be different based on factors such as uncertainty, technical limitations on detection, or other considerations consistent with the remedy selection criteria defined in the NCP. In this case, practical limits on the ability to distinguish between naturally occurring background levels and very small increments above background require the use of final remediation goals that exceed the 10^{-6} level for some of the non-radiological contaminants; however, final cleanup levels remain within the acceptable risk range. Aggregate risks from final cleanup levels are also within the risk range. Remediation goals for non-carcinogens were developed to ensure that the cumulative toxic effects would result in a HI < 1.0.

The soil cleanup standards found in 40 CFR 192, Subpart B, were developed specifically for the cleanup of uranium mill tailings sites designated under Section 102 (a)(1) of the Uranium Mill Tailings Radiation Control Act (UMTRCA). These standards are intended to provide for unrestricted use of remediated properties. These standards address contaminants and circumstances similar to those found at the North County Site and are, therefore, considered relevant and appropriate to soil cleanup at the North County Site. The surface and subsurface soil criteria in 40 CFR 192, Subpart B for radium–226 are 5 and 15 pCi/g, respectively. The surface remediation goal applies to the 100 m^2 areal average concentration above background in the top

15 cm (6 in.) layer. The subsurface remediation goal applies to the $100m^2$ areal average concentration above background in any subsequent 15 cm (6 in) layer. The Ra-226 remediation goal of 5 and 15 pCi/g in surface and subsurface soils has been used with St Louis sites pursuant to the Record of Decision for the St Louis Downtown Site and to Engineering Evaluation/Cost Analyses for the St Louis North County Site. Implementation of the subsurface remediation criterion for Ra-226 results in actual average residual concentrations of Ra-226 significantly less than 5 pCi/g. This is based on cleanup results of a number of different areas and properties within the St Louis North County Site and St Louis Downtown Site, using cleanup goals of 15 pCi/g subsurface criterion for Ra-226 in combination with subsurface cleanup goals of 15 and 50 pCi/g for Th-230 and U-238, respectively. Table D-9 (Section D.2.1) lists the residual radionuclide concentrations at properties where response actions have been completed.

The site-specific Th-230 and U-238 remediation goals are derived based on the 10 CFR 40, Appendix A, Criterion 6(6), also referred to as the benchmark dose approach. These requirements supplement the standards found in 40 CFR 192.

The U-238 goal was established using U-238 as a surrogate for all of the uranium isotopes (including U-234 and U-235) and certain uranium decay products. Using the U-238 as a surrogate, the residual concentration was determined to be about 81 pCi/g. However, since some of the decay products are present above the natural abundance, the site-specific remediation goal of 50 pCi/g for U-238 is considered appropriate. Site experience shows that a 50 pCi/g limit is reasonably achievable at little extra cost. This limit has been used on the St Louis North County Site for removal actions conducted by USACE and the DOE since 1991 and is the site-specific remediation goal for U-238 established in the Record of Decision for the St Louis Downtown Site.

Table D-11 presents the calculation resulting from 10 CFR Part 40, Appendix A, Criterion 6(6) and lists the most restrictive Th-230 concentration as 330 pCi/g. This concentration, although protective with respect to Th-230, would result in the in-growth of Ra-226 such that future concentrations of Ra-226 would exceed the limits specified in ARARs. 40 CFR 192.02(a) requires the selected remedial action be designed to be effective for up to 1000 years to the extent reasonably achievable, and in any case, for at least 200 years. To ensure ARAR is met, the in-growth of Ra-226 from the Th-230 decay process must be calculated and examined. A soil concentration of 14 pCi/g of Th-230 would result in the in-growth of 5 pCi/g Ra-226 concentration at the end of the1000-year time period stated in 40 CFR 192.02(a). Although a subsurface soil concentration of 43 pCi/g would result in the in-growth of 15 pCi/g Ra-226, EPA's guidance documents for the cleanup of CERCLA sites using 40 CFR 192 as ARAR set forth EPA's expectation that remediation of subsurface soil contamination will, in practice, achieve the surface cleanup criterion of 5 pCi/g for Ra-226. (See OSWER 9200.4-25, "Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA Sites). EPA approval of this ROD is contingent upon satisfying EPA's expectations for cleanup of CERCLA sites; therefore, USACE has adopted, on a site specific basis, Th-230 surface and subsurface soil cleanup levels that are consistent with a residual Ra-226 concentration of 5 pCi/g. Constraining the concentration of Th-230 in surface soils to 14 pCi/g and subsurface soils to 15 pCi/g along with the use of the unity rule assures that the concentration of Ra-226 does not exceed 5 pCi/g during the 1000-year time period.

No remediation goal is developed for Th-232. Removal of Th-230 to the remediation goals will effectively remove Th-232 present in site soils. Analytical data indicate that Th-232 is co-located with Th-230 and is present at relatively low concentrations. Removal of soils to the radionuclide criteria results in Th-232 concentrations of less than 1.5 pCi/g including background for SLAPS, SLDS, and North County VPs. Residual concentrations do not produce risks significantly above background.

Remediation goals for radiological contaminants of concern for the St Louis North County Site soils are 5/14/50 pCi/g for Ra-226, Th-230 and U-238 in surface soils and 15/15/50 pCi/g for subsurface soils. These remediation goals are consistent with the remediation standards used in Engineering Evaluation/Cost Analyses (EE/CAs) by DOE prior to transfer of FUSRAP execution to USACE, in USACE EE/CAs and in local Records of Decision both at the St Louis Downtown Site and by DOE at Weldon Springs Remedial Action Project. These remediation goals meet the threshold criteria of overall protection of human health and the environment and compliance with ARARs and will achieve a final status that requires no restrictions on land use.

Supplemental cleanup standards have been developed for subsurface materials at the primary storage areas (SLAPS and HISS/Futura) under the containment and treatment alternatives (Alternatives 2 and 3) to ensure protectiveness under commercial/industrial use. These supplemental standards are appropriate in accordance with criteria specified in 40 CFR 192.21 (c), which states that supplemental standards may be applied under circumstances where removal would result in excessive remedial action costs relative to the long-term benefits and the residual radioactive materials do not pose a clear present or future hazard. The supplemental standards for subsurface materials at the primary storage areas are to be used in conjunction with institutional controls. For those remedial alternatives involving land use restrictions at SLAPS and HISS/Futura (Alternatives 2 and 3), supplemental standards of 25/70/250 pCi/g above background for Ra-226/Th-230/U-238 would be used for subsurface soils. These supplemental standards would protect the most likely current and future receptors (e.g., construction and utility workers) and ensure that doses to the general public would be limited to less than 100 mrem/yr if institutional controls were lost.

The Benchmark dose approach defined in Criterion 6(6) was applied in development of the Coldwater Creek subsurface sediment remediation goals. The remediation goal derived for subsurface sediments (i.e., 15 pCi/g of Ra-226, 43 pCi/g of Th-230 and 150 pCi/g of U-238 above background) is implemented for soils and sediments under the mean water gradient for Coldwater Creek. This remediation goal assures protectiveness of Coldwater Creek under all future anticipated land use conditions (e.g., recreational/trespasser, maintenance, construction, and utility uses) and minimizes adverse environmental impact associated with greater excavation in Coldwater Creek.

Other site contaminants derived from the uranium ores tend to be co-located with the principal radionuclides such that remediation of the contaminated soil to the cleanup levels described above is expected to adequately remove all ore-related contaminants. Supporting information is presented in Appendix D (Section D.2.1 and Table D-10). To verify that removal of radiological contaminants achieve remediation goals for non-radiological contaminants associated with the uranium processing activities, chemical sampling will be conducted as required during pre-design investigation and as part of the final status survey pending confirmation of co-location with radiological contaminants.

No ARARs have been identified for the non-radiological contaminants in soils at the North County Site. The remediation goals for non-radiological COCs were developed based on site-specific risk assessments and hazard evaluations. At the North County Site, eleven non-radionuclides are identified as COCs for soils: antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium. These noncarcinogens have different effects on different organs or systems in the body. The remediation goals for noncarcinogens were developed to ensure that the cumulative effect of the chemical levels of the COCs produces a HI < 1.0 for each target organ/system affected. In addition, remediation goals were selected at levels above detection limits and background levels.

Toxicologists evaluated the primary effects of the 11 metals in the soils at North County. The HIs were calculated for all six different types of receptors – residential, industrial, construction worker, maintenance worker, recreational/trespasser, and utility worker. Generally, the construction worker was identified as the most sensitive receptor, except for a few cases where the residential receptor was the most sensitive or restrictive scenario. The remediation goals for all non-radionuclides were calculated based on the HIs for the different primary target organs. The protectiveness to each primary organ was tested by adding up the HIs of the corresponding COCs targeted to that primary organ. In each case, the HI value was less than one.

Remediation goals have been derived for the 11 surface soil and 4 subsurface soil non-radiological COCs, based on their noncarcinogenic effects. These proposed remediation goals are presented in Table ES-6. Surface and subsurface soil remediation goals for antimony, arsenic, thallium, and uranium are 15/25 mg/kg, 36/40 mg/kg, 25/30 mg/kg, and 150/150 mg/kg, respectively. Seven additional non-radiological COCs were identified for surface soil only. The applicable remediation goals are as follows: 2800 mg/kg barium, 12 mg/kg cadmium, 350 mg/kg chromium, 1,000 mg/kg molybdenum, 1,500 mg/kg nickel, 300 mg/kg selenium, and 112 mg/kg vanadium. Antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium are identified as COCs for SLAPS and contiguous areas; and antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, and vanadium are identified as COCs for HISS/Futura and Latty Avenue VPs 2L and 10k530087. The non-radiological COCs will be evaluated in the final status survey pending confirmation of their co-location with radiological COCs to verify that risk and hazard criteria are fully protective under CERCLA and have been satisfied.

The proposed remediation goals (summarized in Table ES-4 for radionuclides and Table ES-5 for other chemicals) are protective based on the future anticipated land use, are achievable, and can be implemented. Further cleanup goals comply with the ARAR criteria for radionuclides and would achieve protectiveness to levels within the CERCLA risk range and below a HI of 1.0.

SUMMARY OF FEASIBILITY STUDY ALTERNATIVES

Six cleanup alternatives were developed in the FS and evaluated using the nine criteria outlined in the NCP. Per EPA's FS guidance, the cost estimates include a 30-year performance period for ongoing actions, such as monitoring and maintenance, and identify any continuing costs beyond the 30 year period. Technologies were identified that might have potential application at the North County Site. These technologies were evaluated in the Initial Screening of Alternatives document developed by DOE and subsequently re-evaluated by USACE as part of the FS.

The first step in the alternative selection process was to identify potential remedial technologies for the North County Site. In the second step, the technologies and process options for each technology were further evaluated using effectiveness, implementability, and cost criteria. Several technologies and process options were screened out as a result of the evaluations. Disposal of contamination into a permanent on-site cell located at the North County Site was eliminated due to the time and expense necessary to develop such an option. Public comments that have been received indicate strong public opposition to an on-site cell. Immobilization and stabilization technologies were narrowed to a few process options. Vitrification, biological techniques, and incineration were eliminated. The technology screening is summarized in Table ES-6. In the third step of alternatives development, the technologies and process options were combined to form six site-wide alternatives.

Emphasis was placed on the development of site-wide alternatives that ensure adequate protection of human health and the environment, achieve ARARs, and permanently and significantly reduce the volume, toxicity, or mobility of site-related contaminants. The alternatives cover a broad range from no further action to complete removal of contamination. For each alternative, USACE would conduct post-remedial action surveys to ensure that remediated areas meet the site-specific remediation goals. Table ES-7 provides a summary of soil removals under each alternative. Table ES-8 provides a summary of current and future land-use assumptions by property. The reasonable future land uses were determined based on current land uses and other considerations, including the public preference expressed for remedial alternatives that would allow unrestricted use of the North County Site. By evaluating a range of alternatives that provide for both unrestricted and restricted use, costs of restricted and unrestricted use can be compared relative to the degree of protectiveness of human health and the environment that is achieved and relative probability that institutional controls will assure future protectiveness.

Alternative 1, No Further Action

Alternative 1 includes no further remedial actions for the North County Site. This no-further-action alternative provides a baseline against which to compare other remedial alternatives and is required by the NCP and CERCLA guidance.

This alternative assumes that no additional remedial actions would be implemented at the North County Site. The rail spurs at SLAPS and HISS would be left in place. Contaminated soil and sediment would remain at current locations. The limited site security (e.g., fencing) would

Table ES-4. Summary of Proposed Remediation Goals

Remediation Goals for Unrestricted Land Use	Remediation Goals for Use with Institutional Controls at SLAPS and HISS/Futura
Surface soils would be remediated if the radionuclide concentrations above background averaged over 100 m^2 exceed 5 pCi/g of Ra-226, 14 pCi/g of Th-230, or 50 pCi/g of U-238 in the top 15 cm (6 in). Subsurface soils would be remediated if the radionuclide concentrations above background averaged over 100 m^2 exceed 15 pCi/g of Ra-226, 15 pCi/g of Th-230, or 50 pCi/g of U-238 in any subsequent 15 cm (6 in) layer. Soils and sediments below the mean water gradient of Coldwater Creek would be remediated if the radionuclide concentrations above background averaged over 100m^2 exceed 15 pCi/g of Ra-226, 43 pCi/g of Th-230, or 150 pCi/g of U-238. Soil remediation goals apply to soils above the mean water gradient of Coldwater Creek. Confirmation would include surveys and residual risk calculations to ensure that total residual site risk is within the CERCLA risk range. Final status surveys compatible with MARSSIM would be used to document achievement of the remediation goals for radiological COCs.	Supplemental standards are developed for Alternatives 2 and 3 in accordance with 40 CFR 192, Subpart C. These supplemental standards are used in conjunction with institutional controls at SLAPS and HISS/Futura (the primary areas used for storage of FUSRAP materials). Supplemental standards are appropriate for the primary storage areas under the containment and treatment alternatives because excavation to the RGs for unrestricted use would result in excessive remediation costs relative to the long-term benefits, and because the residual materials will not pose a present or future hazard. The supplemental criteria constrain doses so that public exposure limits would not be exceeded should the institutional controls be lost. The supplemental criteria for subsurface soil limit contamination to average above background concentrations of 25 pCi/g of Ra-226, 70 pCi/g of Th-230, and 250 pCi/g of U-238 or combinations of radionuclides. Institutional controls are implemented to ensure that future land use is fully protective. Supporting information concerning the derivation of these RGs is presented in Appendix D of the Feasibility Study (Section D.2.2).

Table ES-5. Proposed Remediation Goals (RGs) for Non-radionuclide Contaminants of Concern (COCs)[a]

	Surface	
Analyte	Units	Proposed RG[b]
Antimony	mg/kg	15
Arsenic	mg/kg	36
Barium	mg/kg	2,800
Cadmium	mg/kg	12
Chromium	mg/kg	350
Molybdenum	mg/kg	1,000
Nickel	mg/kg	1,500
Selenium	mg/kg	300
Thallium	mg/kg	25
Uranium	mg/kg	150
Vanadium	mg/kg	112
	Subsurface	
Analyte	Units	Proposed RG
Antimony	mg/kg	25
Arsenic	mg/kg	40
Thallium	mg/kg	30
Uranium	mg/kg	150

[a] Non-radionuclide COCs were only identified for SLAPS and contiguous areas (IAs 1-13), HISS/Futura, and Latty Avenue VPs 2L and 10k530087. Remediation of non-FUSRAP related wastes based on the RGs for non-radionuclide COCs will be conducted in areas where they are co-located with FUSRAP COCs requiring remediation.

[b] The calculated HIs for different primary target organs were based on the construction worker. Thus the same RGs are proposed for unrestricted use and for use with institutional controls.

Table ES-6. Summary of Technology Screening at the North County Site

Response Action	Technologies	Process Options	Used in the North County Alternatives				
			Alt 2	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Access Controls	Site security	Signs	X	X	X	X	
		Physical barriers, e.g., fencing		X			
Institutional Controls	Land use restrictions and notices	Land use restrictions	X	X	X	X	
		• SLAPS • HISS/Futura • Buildings, roads, bridges, and railroads • Creek (within banks) • Remaining VPs	Indust. Indust. Utility Rec. None	Indust. None Utility None None	Indust. Indust. Utility Rec. All	None None Utility None None	None None None None None
		Deed notices	X	X	X	X[b]	
		Well drilling prohibitions	X	X	X		
		Commercial/industrial zoning	X	X	X	X[b]	
Monitoring	Long-term monitoring[a]	Air, sediment, ground water, surface water	Ground water	Ground water	Ground water	Ground water (unlikely)	
Containment	Cap	Multi-media cap	SLAPS, HISS/Futura				
		Asphalt or concrete	Roads	Roads	Roads	Roads	
Removal	Excavation		Limited for SLAPS, HISS/Futura, roads, bridges, railroads and other permanent structures	Limited for SLAPS, roads, bridges, railroads, and other permanent structures	None	Limited for roads, bridges railroads, and other permanent structures	All Areas
Treatment	Soil sorting			X		Option	
	Soil washing	Enhanced soil washing		X			
	Phytoremediation	Rhizofiltration, phytoaccumulation		X			
Technologies Common to Alternatives 2 through 6							
Monitoring	Short-term monitoring (During remedial action)	Air, sediment, ground water, surface water	X	X		X	X
Containment	Revegetation		X	X		X	
	Dust mitigation	Water spray, foam	X	X		X	X
	Storage pile covers	Geotextile, spray coatings, tarps	X	X		X	X
Removal	Dredging	Hydraulic	Creek	Creek		Creek	Creek
Treatment	Recycle to uranium mill	Permitted facilities	Option	Option		Option	Option
	Size reduction	Crushing, cutting	X	X		X	X
	Dewatering	Evapotranspiration, filters, drying	X	X		X	X
Transportation	Rail	Covered rail cars, containers	X	X		X	X
	Truck	Covered trucks, containers	X	X		X	X
Disposal	Licensed or permitted off-site facility	Radioactive wastes, hazardous wastes, solid wastes	X	X		X	X

[a] In areas where contamination remains above unrestricted levels in sufficient quantities to significantly impact ground-water quality, ground-water monitoring could continue until terminated as part of the 5-year reviews. Long-term monitoring of HZ-A and long-term monitoring of Unit 4 in HZ-C (as a surrogate for HZ-E) is proposed for Alternatives 2, 3, and 4. For Alternative 5, the results of short-term monitoring would be used to determine if long-term ground-water is required to access potential contaminant migration from contaminated soils remaining beneath roads, bridges, railroads, and other permanent structures.

[b] May be needed until areas under buildings at Futura are made available for remediation.

Table ES-7. Removals Included in the Site-wide Alternatives

	Alternative 1, No Further Action	Alternative 2, Partial Excavation and Capping at SLAPS and HISS/Futura	Alternative 3, Partial Excavation and Treatment at SLAPS	Alternative 4, Institutional Controls (No Further Excavation)	Alternative 5, Excavation with Institutional Controls Under Roads, Bridges, Railroads, and Other Permanent Structures	Alternative 6, Excavation at All Properties
Total Soil Removal, Thousands of Cubic Yards						
[a]Impacted volume to be excavated, yd^3	0	150	190	0	230	300
Excavation volume, yd^3	Excavation volume: the in-situ volume of soil plus the excavation allowance needed to remove the impacted volume; (about 20%) i.e., the size of the hole; generally 20% larger than impacted volume.					
Ex-situ, yd^3	Ex-situ volume: the volume after soil swelling as a result of excavation; generally 25% larger than the excavation volume.					

[a] Impacted volume to be excavated, in-situ volume of soil above the cleanup criteria rounded to two significant figures

Table ES-8. Land Use by Property

Property ID [a]	Current Receptor	RME Receptor	Removal Status
Primary Areas Used for Storage			
Futura	Industrial	Industrial	
HISS	Construction	Industrial	Piles removed
IA-1 (Part of SLAPS)	Construction	Industrial	Partial Removal
IA-2 (Part of SLAPS)	Construction	Industrial	Partial Removal
IA-3 (Part of SLAPS)	Construction	Industrial	Partial Removal
IA-4 (Part of SLAPS)	Construction	Industrial	Removal Action
IA-5 (Part of SLAPS)	Construction	Industrial	Partial Removal
IA-6 (Part of SLAPS)	Construction	Industrial	Removal Action
IA-7 (Part of SLAPS)	Construction	Industrial	Removal Action
Areas Immediately Adjacent to Storage Areas			
VP-1(L)[c]	Industrial	Industrial	
10K530087, west of VP-1(L)	Industrial	Industrial	
VP-2(L)[c]	Industrial	Industrial	Removal Action
IA-9	Construction	Recreational	Partial Removal
IA-11	Industrial	Industrial	
IA-13	Industrial	Industrial	
VP-40(A)	Industrial	Industrial	
Properties with Small Amounts of Contamination			
VP-1 (C)[b]	Industrial	Industrial	
VP-2(C)[b]	Industrial	Industrial	
VP-3 (C)[b]	Industrial	Industrial	
VP-4 (C)[b]	Industrial	Industrial	
VP-5 (C)[b]	Industrial	Industrial	
VP-7	Industrial	Industrial	
VP-8 (C)[b]	Industrial	Industrial	
VP-9	Industrial	Industrial	
VP-10	Industrial	Industrial	
VP-11	Industrial	Industrial	
VP-12	Industrial	Industrial	
VP-13	Industrial	Industrial	
VP-15	Industrial	Industrial	
VP-35(A)	Construction	Industrial	
VP-38	Industrial	Industrial	Partial Removal
VP-57	Industrial	Industrial	
VP-58	Industrial	Industrial	
VP-59	Industrial	Industrial	
IA-10	Recreational	Recreational	
10K620452, south of Latty East	Industrial	Industrial	
Coldwater Creek, inside banks	Recreational	Recreational	
Roads, Bridges, Railroads			
Norfolk Southern	Industrial	Industrial	
Roads, bridges and railroads	Utility	Utility	
IA-8	Utility	Utility	Partial Removal
VP-14(A)	Utility	Utility	

Table ES-8. Land Use by Property (Cont'd)

Property ID [a]	Current Receptor	RME Receptor	Removal Status
Properties with No Expected Removal Volume			
10k620412, north of Latty east	Industrial	Industrial	
11k630221, NE of McDonnell rail siding	Industrial	Industrial	
11L520011, airport south of IA-13	Industrial	Industrial	
10k530076, north of VP-1(L)	Industrial	Industrial	
10k520165, southeast of VP-3(L)	Industrial	Industrial	
10k240182, north of VP-23	Industrial	Industrial	
10k240207, west of VP-27	Industrial	Industrial	
09k220029, east of VP-44	Residential	Residential	
VP-1	Industrial	Industrial	
VP-2	Industrial	Industrial	
VP-3	Industrial	Industrial	
VP-4	Industrial	Industrial	
VP-5	Industrial	Industrial	
VP-6	Industrial	Industrial	
VP-6 (C)[b]	Industrial	Industrial	
VP-7 (C)[b]	Industrial	Industrial	
VP-8	Industrial	Industrial	
VP-9 (C)[b]	Industrial	Industrial	
VP-10(C)[b]	Industrial	Industrial	
VP-14	Industrial	Industrial	
VP-16	Industrial	Industrial	
VP-17	Industrial	Industrial	
VP-18	Industrial	Industrial	
VP-19	Residential	Residential	Removal Action
VP-20	Residential	Residential	Removal Action
VP-21	Industrial	Industrial	Removal Action
VP-22	Industrial	Industrial	Removal Action
VP-23	Industrial	Industrial	Removal Action
VP-25	Industrial	Industrial	
VP-26	Industrial	Industrial	Removal Action
VP-27	Industrial	Industrial	Removal Action
VP-28	Industrial	Industrial	
VP-29	Residential	Residential	
VP-30	Industrial	Industrial	Removal Action
VP-31	Industrial	Industrial	
VP-36	Industrial	Industrial	Removal Action
VP-37	Industrial	Industrial	Removal Action
VP-41	Residential	Residential	Removal Action
VP-45	Industrial	Industrial	Removal Action
VP-46	Industrial	Industrial	
VP-48(A)	Industrial	Industrial	Removal Action
VP-49	Residential	Residential	
VP-50	Industrial	Industrial	

Table ES-8. Land Use by Property (Cont'd)

Property ID [a]	Current Receptor	RME Receptor	Removal Status
VP-51	Industrial	Industrial	
VP-52	Industrial	Industrial	
VP-54	Industrial	Industrial	
VP-55	Industrial	Industrial	
VP-56	Industrial	Industrial	Removal Action
VP-60	Industrial	Industrial	
VP-61	Industrial	Industrial	
VP-62	Industrial	Industrial	
VP-63	Industrial	Industrial	
VP-63(A)	Industrial	Industrial	
Properties with previous DOE removal actions that will require additional investigation			
VP-3(L)[c]	Industrial	Industrial	Removal Action
VP-4(L)[c]	Industrial	Industrial	Removal Action
VP-5(L)[c]	Industrial	Industrial	Removal Action
VP-6(L)[c]	Industrial	Industrial	Removal Action
VP-24	Industrial	Industrial	Removal Action
VP-31(A)	Industrial	Industrial	Removal Action
VP-32	Industrial	Industrial	Removal Action
VP-33	Industrial	Industrial	Removal Action
VP-34	Construction	Industrial	Removal Action
VP-35	Construction	Industrial	Removal Action
VP-39	Industrial	Industrial	Removal Action
VP-40	Industrial	Industrial	Removal Action
VP-42	Industrial	Industrial	Removal Action
VP-43	Residential	Residential	Removal Action
VP-44	Residential	Residential	Removal Action
VP-47	Industrial	Industrial	Removal Action
VP-48	Industrial	Industrial	Removal Action
VP-53	Industrial	Industrial	Removal Action

[a] All properties designated into FUSRAP and any additional property for which analytical data are available.

[b] Coldwater Creek VP

[c] Latty Avenue VP

be left in place, but would not be maintained. Continued routine monitoring of air, buildings, ground water, and storm water would not be performed. Five-year reviews are conducted pursuant to CERCLA for areas in which contamination is such that conditions do not allow for unlimited use and unrestricted exposure.

Technologies and Processes Common to Alternatives 2 through 6

Alternatives 2 through 6 share certain features; these similar elements are discussed in the following text.

On-going Removal Actions: Removal actions started under the EE/CAs are complete at the time the ROD is approved. The ROD criteria would supersede commitments to cleanup criteria in previously issued documents (e.g., EE/CAs). Excavation under buildings would be done when the areas are made available by the owner. Final status surveys would be conducted to ensure that remediated areas meet the cleanup criteria. Final status surveys performed pursuant to EE/CAs prior to the Multi-Agency Radiation Site Survey and Investigation Manual (MARSSIM) effective date would be compared to ROD criteria using the existing confirmation approaches.

Excavation: Consistent with the scope defined in the FFA, for alternatives that involve excavation, remediation of soils containing non-radionuclide contaminants would be conducted in those areas where they are co-located with North County Site COCs. Non-radiological COCs include antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium for SLAPS and contiguous areas; and antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, and vanadium for HISS/Futura and Latty Avenue VPs 2L and 10k530087. To verify that removal of radiological contaminants also achieves the RGs for non-radiological COCs, chemical sampling will be conducted as required during pre-design investigation and as part of the final status survey, pending confirmation of co-location with radiological contamination.

Institutional Controls: For alternatives that use institutional controls, a long-term stewardship plan would be developed to address notification requirements for property owners for changes in land use as well as future monitoring and maintenance requirements. This plan would include provisions addressing the process by which property owners can contact the federal government agency responsible for long-term control of impacted areas and periodic reviews, maintenance, and monitoring. Institutional controls would be imposed only to assure protectiveness in those areas in which the residual soil contamination exceeds the concentrations specified in ARARs or the site-specific RGs for unrestricted use.

Transportation and Waste Management: Local transportation of contaminated materials (e.g., from VPs to rail spurs) would use sealed or covered trucks. On-site movement would be performed using open trucks and conventional construction equipment. Long distance shipment would be primarily by rail from the rail spurs to off-site licensed or permitted disposal facilities. Trucking may also be used for long distance shipping. Rubble and similar materials would be crushed as appropriate for disposal. Site soils could be used as backfill if they are unimpacted, or if they meet the cleanup criteria for surface soils.

Uranium would be recycled if the costs are similar to the cost for disposal of the materials.

As necessary, pre-remedial design investigation sampling for COCs would be conducted to define the extent of contamination. Those properties where current or past activities unrelated to uranium processing have resulted in RCRA characteristic or listed waste being co-located with radioactive waste will be evaluated and sampled, as necessary, prior to remediation for the purpose of treatment and disposal.

Monitoring: Short-term monitoring would be continued during the remedial actions. Monitoring would be used to assure that contamination from the soils and the unusable ground water zone (HZ-A) does not significantly impact surface water or potable ground water. The results of the short-term monitoring of surface water, sediment, and HZ-A ground water would be used to assess any potential impacts to Coldwater Creek resulting from the remedial actions and would assist in evaluating the effectiveness of the remedial actions. In addition, monitoring will support evaluation of impacts resulting from the remaining soils unavailable for remedial action (not in Alternative 6) or residual contamination left in place. The protective nature of existing geologic deposits to resist vertical water passage would not be changed by any FUSRAP remedial alternatives.

Remedial Action Control Measures: Water encountered during remedial actions will be characterized, treated, if necessary, and released to the publicly owned treatment works (POTW) or to Coldwater Creek or its tributaries, as permitted. The treatment would address chemicals and radionuclides consistent with relevant and appropriate federal and state regulations. Excavation waters contaminated with TCE or its degradation products will not be released off-site above appropriate levels. Supporting technologies would be used to prevent the spread of contamination. These include revegetation, dust mitigation, storage pile covers, sedimentation basins, and dewatering as required during the excavation process. Backfill would be added, and the site graded to ensure appropriate surface water drainage. Erosion and sediment controls would be used.

Wetlands: Any wetlands designated using the 1987 Corps of Engineers Wetlands Delineation Manual which are impacted during removals would be restored, or equivalent wetlands would be created.

FAA Restrictions: USACE construction activities during remedial action would comply with the Federal Aviation Administration (FAA) restriction of air space around the airport, such as limits on the height of structures and equipment.

The following text presents unique features of Alternatives 2 through 6.

Alternative 2, Partial Excavation and Capping at SLAPS and HISS/Futura

Alternative 2 consists of partial excavation and capping with institutional controls. The specific components include:

- *Capping*: A multi-layer cover (cap) would be constructed at SLAPS and HISS/Futura to provide an additional barrier to limit exposures. SLAPS and HISS/Futura would be contoured and covered with 1 ft of stone intrusion barrier and 3 ft of clean soil.

- *Excavation*: All soils exceeding the RGs for unrestricted land use would be excavated at SLAPS VPs and Latty Avenue VPs, with the exception of soils beneath roads, bridges, railroads, and other permanent structures. Soils under roads, bridges, railroads, and other permanent structures are inaccessible and will not be remediated as part of this response action. When and as the inaccessible soils become available as a result of decisions by the entities that control their accessibility, new decision documents will identify the response actions to address the inaccessible soils as appropriate. Inaccessible soils for the North County Site are identified in Figure ES-3. Additional soils may be identified as inaccessible during implementation and will be deferred for separate action as documented in the post remedial action report. Institutional controls may be applied under this alternative to properties with inaccessible soils as appropriate. At SLAPS and HISS/Futura, subsurface soils exceeding the supplemental standards of 25/70/250 pCi/g above background for Ra-226/Th-230/U-238 would be shipped offsite to a permitted disposal facility. Those soils having contaminant levels exceeding the RGs for unrestricted release but below the supplemental standards would be disposed of onsite beneath a multilayer cover at SLAPS and HISS/Futura. The use of supplemental standards at SLAPS and HISS/Futura is appropriate in accordance with 40 CFR 192.21 (c) because excavation to unrestricted criteria would result in excessive remedial action costs relative to the long-term benefits and the residual radioactive materials remaining beneath the cap do not pose a clear present or future hazard. The supplemental standards for subsurface materials at the primary storage areas are to be used in conjunction with institutional controls to allow commercial/industrial use of SLAPS and HISS/Futura.

- *Dredging*: Dredging of contaminated sediments from Coldwater Creek is not part of Alternative 2. Sediments removed by other projects such as flood control would be monitored, and any sediment exceeding criteria would be shipped for off-site disposal at a licensed or permitted facility.

- *Institutional Controls:* No institutional controls would be required for accessible soils at SLAPS VPs and Latty Avenue VPs. However, institutional controls would be imposed to restrict land use at SLAPS, HISS/Futura, Coldwater Creek, and for areas beneath roads, bridges, railroads, and other permanent structures as appropriate. The controls could include deed notices to ensure that future owners are made aware of the presence of residual contamination; land use restrictions to limit activities that could disturb soils; and well-drilling prohibitions. Controls could also include zoning restrictions at SLAPS and HISS/Futura. Land use would be restricted to commercial/industrial uses at SLAPS and HISS/Futura, recreational uses at Coldwater Creek, and transportation/utility uses for roads, bridges, and railroad beds.

Five-year reviews would be conducted pursuant to CERCLA, and long-term ground-water monitoring would be performed near SLAPS and HISS/Futura as part of the five-year review process. Long-term monitoring of HZ-A and long-term monitoring of Unit 4 in HZ-C (as a surrogate for HZ-E) would be required.

Alternative 3, Partial Excavation and Treatment at SLAPS

Alternative 3 emphasizes consolidation and treatment of site soils at SLAPS. It involves excavation of contaminated soils followed by treatment. Specific components include:

- *Excavation*: All soils exceeding the RGs for unrestricted land use would be excavated at SLAPS VPs, HISS/Futura, and Latty Avenue VPs, with the exception of soils beneath roads, bridges, railroads, and other permanent structures. SLAPS would be excavated to meet the supplemental standards of 25/70/250 pCi/g above background for Ra-226/Th-230/U-238 to allow commercial/industrial land use with the use of institutional controls. Soils not meeting the supplemental standards would be shipped offsite to a permitted disposal facility. Soils under roads, bridges, railroads, and other permanent structures are inaccessible and will not be remediated as part of this response action. When and as the inaccessible soils become available as a result of decisions by the entities that control their accessibility, new decision documents will identify the response actions to address the inaccessible soils as appropriate. Inaccessible soils for the North County Site are identified in Figure ES-3. Additional soils may be identified as inaccessible during implementation and will be deferred for separate action as documented in the post remedial action report.

- *Dredging*: Soils and sediments above the Coldwater Creek criteria for unrestricted release discussed in Table ES-4 would be dredged from Coldwater Creek and consolidated at SLAPS for treatment.

- *On-site Treatment*: Excavated soils and sediments would be consolidated at SLAPS for treatment (soil sorting and enhanced soil washing). Treated soils that meet the supplemental standards for subsurface soil would be used as backfill at SLAPS and covered with clean soils. Any materials not meeting the supplemental standards for subsurface soil would be shipped off-site to a permitted disposal facility. Limited phytoremediation (planting and harvesting of selected plant species to draw contamination from soils) would be conducted in the Coldwater Creek floodplain in areas where sediments accumulate downstream of Pershall Road. The residual material would be disposed of at properly licensed or permitted disposal facilities.

- *Institutional Controls:* No institutional controls would be required for accessible soils at SLAPS VPs, Latty Avenue VPs, and HISS/Futura. Institutional controls would be used to restrict land use at SLAPS and roads, bridges, railroads, and other permanent structures as appropriate. The controls could include deed notices to ensure that future owners are made aware of the presence of residual contamination; land use restrictions to limit activities that could disturb soils; and well-drilling prohibitions. Controls could also include zoning restrictions at SLAPS. Land use would be restricted to commercial/industrial uses at SLAPS and transportation/utility uses for roads, bridges, and railroad beds.

Five-year reviews and long-term ground-water monitoring near SLAPS are included as part of this alternative. Long-term monitoring of HZ-A and long-term monitoring of Unit 4 in HZ-C (as a surrogate for HZ-E) would be required.

Alternative 4, Institutional Controls (No Further Excavation)

Alternative 4 emphasizes the use of institutional controls. It consists of the following:

- *Institutional Controls:* Institutional controls would be imposed to limit land use at SLAPS, HISS/Futura, roads, bridges, railroads, and other permanent structures, Coldwater Creek, and the VPs. Other than specific areas zoned for commercial and industrial uses and FAA limitations, no known land use controls or restrictive easements exist on the subject properties. Potential administrative problems are anticipated with enforcement, access and monitoring, and voluntary compliance with regulatory controls. Further, property owners are often less than willing participants in subordinating their fee title interests for residual site contamination. Missouri real estate law is amenable and supportive of restrictive land use controls, conveyance by quitclaim, and zoning overlay districts. The controls would vary by property and could include deed notices to assure future owners are made aware of the presence of residual contamination, land use restrictions to limit activities that could disturb soils; and well-drilling prohibitions. Zoning restrictions at SLAPS, HISS/Futura, and Vicinity Properties are also potential institutional controls. Land use would be restricted to commercial/industrial uses at SLAPS, HISS/Futura, and vicinity properties, recreational uses at Coldwater Creek, and transportation/utility uses for roads, bridges, and railroad beds. Although the implementation of institutional controls at SLAPS, HISS/Futura, under buildings, roads, bridges, and railroads, and at the VPs is technically feasible, it involves complex administrative requirements. Maintaining controls at numerous properties would be difficult. The controls would have to be maintained for a considerable period of time and would have to be enforced through a government or municipal entity. A requirement that land use restrictions "run with the land" despite ownership changes would be used to help ensure that controls are not lost. Details of institutional controls will be documented in the site long-term stewardship plan.

Five-year reviews would be accomplished in accordance with CERCLA. Long-term monitoring of ground water is included as part of this alternative until stopped as part of the five-year review process. Long-term monitoring of HZ-A and long-term monitoring of Unit 4 in HZ-C (as a surrogate for HZ-E) would be required. Title to the properties with residual contamination would remain with current landowners and would not be transferred to the federal or state government.

Alternative 5, Excavation with Institutional Controls Under Roads, Bridges, Railroads, and Other Permanent Structures

Alternative 5 emphasizes excavation and dredging with off-site disposal for all property units except under roads, bridges, railroads, and other permanent structures. Remediation of inaccessible soils in not included in this alternative and will be deferred for action at the time property becomes accessible as a result of decisions by entities that control accessibility. Institutional controls may be applied under this alternative to properties with inaccessible soils as appropriate. When and as the soils become available, new decision documents will identify the response actions to address the inaccessible soils as appropriate. Specific components include:

- *Excavation*: All soils exceeding the RGs for unrestricted land use would be excavated and shipped for off-site disposal or recycle at all properties, with the exception of soils beneath roads, bridges, railroads, and other permanent structures. Soils under roads, bridges, railroads, and other permanent structures are inaccessible and will not be remediated as part of this response action. When and as the inaccessible soils become available as a result of decisions by the entities that control their accessibility, new decision documents will identify the response actions to address the inaccessible soils as appropriate. Inaccessible soils for the North County Site are identified in Figure ES-3. Additional soils may be identified as inaccessible during implementation and will be deferred for separate action as documented in the post remedial action report.

- *Dredging*: Coldwater Creek sediments below the mean water gradient that exceed the subsurface soil criteria defined in Table ES-4 would be dredged and disposed.

- *Institutional Controls:* Institutional controls are used to assure protectiveness for alternatives at areas in which the residual soil contamination exceeds the concentrations specified in ARARs for residential use. No institutional controls would be required for accessible soils. Institutional controls would be used to restrict land use beneath roads, bridges, railroads, and other permanent structures as appropriate. The controls could include deed notices to ensure that future owners are made aware of the presence of residual contamination and land use restrictions to limit activities that could disturb soil. Controls could also include zoning restrictions at Futura. Roads, bridges, and railroad beds would be limited to use as transportation/utility corridors.

- *Monitoring:* Long-term monitoring is not required for the limestone aquifer (HZ-E). Under this alternative, the majority of the contaminant sources and all highly contaminated soils at the site will be removed. The few contaminant sources remaining in HZ-A soils, unavailable for RA at the present, are separated from HZ-E by a low hydraulic conductivity clay aquitard, Unit 3M, and the low conductivity of Unit 3 in general. The potential for contaminant migration to HZ-E is very small, as noted by prior study. In addition, although HZ-E meets the definition of a potential source of drinking water (Class IIB), it is not a current source of drinking water in the area so an exposure pathway from HZ-E ground water to receptors does not exist. Short-term ground-water monitoring of Unit 4 of HZ-C is proposed to prove continued protection of the limestone aquifer. Short-term monitoring of HZ-A ground-water would be used to assess the effects the remedial action has on HZ-A ground-water quality and the approximate contaminant transport rate through HZ-A ground water to Coldwater Creek. Short-term surface water and sediment monitoring of Coldwater will be conducted to provide additional data to assess, if Coldwater Creek is being significantly impacted by contaminant migration from HZ-A, and to determine if remedial actions are having any adverse impacts on the creek. Long-term monitoring for Unit 2 of HZ-A may be required depending upon the contamination of the post-remedial action HZ-A ground water and the rate of contaminant delivery to Coldwater Creek. HZ-A long-term monitoring is not anticipated. Short-term monitoring of HZ-A ground water after removal/remedial actions and base flow contaminant evaluation of Coldwater Creek will resolve whether long-term monitoring of HZ-A is warranted.

Inaccessible soils are not included in this remedial action and will be deferred for action until such time that they become accessible as a result of decisions by the entities that control their accessibility. The inaccessible areas at the North County Sites are shown in ES-3. Additional areas may be identified as inaccessible during implementation and will be deferred for separate action as documented in the post remedial action report. When and as the inaccessible areas become available, new decision documents will identify the response actions to address the inaccessible soils as appropriate.

Five-year reviews would be conducted only for those areas where contamination remains above unrestricted use criteria (i.e., roads, bridges, railroads, and other permanent structures).

Alternative 6, Excavation at all Properties

Alternative 6 emphasizes excavation of all contaminated material, regardless of location or accessibility. All soils exceeding the RG for unrestricted land use would be removed for all property units and disposed off-site. Unlike other alternatives, roads, bridges, railroads, and other permanent structures would be removed as required to allow excavation of soils that exceed the unrestricted use criteria. Five-year reviews and institutional controls would not be necessary.

EVALUATION OF ALTERNATIVES

The six alternatives were evaluated using the nine CERCLA evaluation criteria established in Section 300.430(d)(9)(iii) of the NCP to determine the most favorable alternative for cleanup of the North County Site. These criteria are described below.

CERCLA Evaluation Criteria

Threshold Criteria (must be met)

- ***Overall Protection of Human Health and the Environment*** **–** addresses whether an alternative provides adequate protection and describes how potential exposures to COCs are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- ***Compliance with Applicable or Relevant and Appropriate Requirements*** – addresses whether a remedy would meet all of the site ARARs. ARARs are federal and state environmental laws and promulgated regulations identified for the North County Site.

Primary Balancing Criteria (identifies major trade-offs among alternatives)

- ***Long-Term Effectiveness and Permanence*** – addresses the remaining risk and the ability of an alternative to protect human health and the environment over time once cleanup goals have been met.

- ***Short-Term Effectiveness and Environmental Impacts*** – addresses the impacts to the community and site workers during cleanup including the amount of time required for completing the action.

- ***Reduction in Toxicity, Mobility, or Volume through Treatment*** – addresses the anticipated performance of treatment that permanently and significantly reduces the toxicity, mobility, or volume of the contamination.

- ***Implementability*** – addresses the technical and administrative feasibility of an alternative, including the availability of materials and services required for cleanup.

- ***Cost*** – compares the differences in cost, including capital, operation, and maintenance costs.

Modifying Criteria (formally evaluated after the comment period)

- ***State Acceptance*** – evaluates whether the State agrees with, opposes, or has no comment on the preferred alternative. This criterion is evaluated formally when comments on the FS are reviewed.

- ***Community Acceptance*** – addresses the issues and concerns the public may have regarding each of the alternatives. This criterion is evaluated formally when comments on the FS are reviewed.

ALTERNATIVE EVALUATION AND COMPARISON

Alternative 1, No Further Action

Alternative 1 is the No-Further-Action alternative required by the NCP and CERCLA guidance. Alternative 1 would not achieve the threshold criteria, because it would not be protective of human health and the environment as required by the NCP. Because it does not meet the threshold criteria, no further evaluation is required. The cost of this alternative is $1.5 million, due to the cost of recurrent 5-year reviews.

Alternative 2, Partial Excavation and Capping at SLAPS and HISS/Futura

This alternative is protective of human health and the environment and compliant with ARARs. The long-term effectiveness and permanence is good at all of the VPs where material is removed to the unrestricted RGs. For the areas at SLAPS, HISS/Futura, Coldwater Creek, and roads, bridges, railroad, and other permanent structures, this alternative is less permanent because institutional controls could be lost in the future. Land at SLAPS and HISS/Futura would be restricted and the economic benefit to the local community would likely be reduced if there is no appropriate commercial/industrial use of the property after capping. There is a short-term risk to workers during the excavation and removal actions, and a short-term risk to members of the public due to construction and transportation activities. There is no reduction in mobility, toxicity, or volume through treatment. However, mobility would be reduced by the contaminant design. Technically this alternative is implementable, but administratively it would be difficult. MDNR has objected to placement of radioactive material on land in Missouri, and this objection may also apply to leaving existing contaminated soils in place at SLAPS and HISS/Futura. Condemnation may be required to obtain the necessary real estate interests. On-site remedies have received strong objections from local stakeholders in the past. This is the fourth most expensive alternative. The cost of this alternative is $205 million.

Alternative 3, Partial Excavation and Treatment at SLAPS

This alternative is protective of human health and the environment and is compliant with ARARs. The long-term effectiveness and permanence is good at all of the VPs where material is removed to the unrestricted RGs. Criteria for Coldwater Creek ensure protectiveness of soils and sediment below the mean water gradient. For the areas at SLAPS and roads, bridges, railroads, and other permanent structures, this alternative is less permanent because institutional controls could be lost in the future. Future development of land at SLAPS would be restricted. Some economic benefit from cleanup of other properties is expected. There is a short-term risk to workers during the excavation and removal actions. The added complexity of the treatment operation would increase short-term impacts and there would be a small increase in short-term risks to the public. There is a reduction in volume through treatment. There would be little change to toxicity.

Technically this alternative is implementable, but administratively it would be difficult. MDNR has stated objections to placement of radioactive material on land in Missouri, which is likely to be applied to the use of the treated soils as backfill. On-site remedies have received strong objections from local stakeholders in the past. Soil washing enhanced with chemical extraction has been proven effective for reducing the levels of contamination in the North County Site soils. Laboratory and conceptual design studies were conducted on soils from the North County Site to investigate treatment processes that would provide a volume reduction and reduce the remediation costs. The primary focus of the investigation was soil washing, including both physical and chemical processes (Clemson Technical Center, 1996). A bench scale selective chemical extraction process was developed that was able to consistently meet the RGs for the North County Site. Removal efficiencies of the radionuclides of interest, particularly Th-230, were consistently greater than 96%, and frequently in excess of 98%. It is expected that all of the site soils containing less than 500 pCi/g of Th-230 could be treated to meet the cleanup goals with this process. Based on limited evaluations of higher activity soils, the process may even be able to successfully treat soils containing Th-230 activities as high as 2,000 pCi/g. Based on the results of these tests a (conceptual) process design and cost estimate for a full-scale system was developed. The conceptual cost estimates show that treatment by soil washing could be cost effective if process improvements were incorporated to minimize the amount of reagents/chemicals required and effectively treat the unrecycled process waste water.

Institutional controls consisting of a restrictive covenant would be required to ensure commercial/industrial use and other developmental restrictions. It is likely that this real estate instrument would need to be obtained through condemnation.

This is the second most expensive alternative. The cost is estimated to be $284 million.

Alternative 4, Institutional Controls (No Further Excavation)

Institutional controls are used at all remaining properties. These controls are consistent with the present and expected future land use for these areas. This alternative is protective of human health and the environment as long as the controls are effective. Because no additional soils are excavated, the risks could exceed the CERCLA risk range and doses could exceed 100 mrem/yr should institutional controls fail. This alternative does not achieve either the 40 CFR 192, Subpart B or C standards. In addition, Alternative 4 does not comply with 40 CFR 192 Subpart A standards for the control of residual radioactive materials from inactive uranium processing sites. Subpart A requires that controls be maintained for at least 200 years and up to 1,000 years. Inability to meet the threshold criteria of compliance with ARARs is a significant problem with this alternative. Section 121(d) of CERCLA and the NCP § 300(f)(l)(ii)(B) require that remedial actions at CERCLA sites attain ARARs, unless such ARARs are waived under CERCLA Section 121(d)(4). Alternative 4 is less permanent because institutional controls could be lost in the future. Land use would be restricted. Short-term risks would be unchanged until institutional controls are implemented. There is no reduction in mobility, toxicity, or volume through treatment.

Technically this alternative is implementable, but administratively it would be very difficult. The implementation of institutional controls is a complicated process. Maintaining controls at numerous properties under control of private and governmental agencies would be very difficult. Condemnation may be required to obtain some land rights. On-site remedies have received strong objections from local stakeholders in the past. Alternative 4 is one of the cheaper alternatives because much of the material is being left on-site. Total cost is estimated to be $129 million.

Alternative 5, Excavation with Institutional Controls Under Roads, Bridges, Railroads, and Other Permanent Structures

This alternative is protective of human health and the environment and compliant with ARARs. Removal of accessible soils to the unrestricted RGs, sediment to the criteria for Coldwater Creek, and the use of institutional controls for roads, bridges, railroads, and other permanent structures would ensure proper remediation consistent with CERCLA protectiveness.

In general, the long-term effectiveness and permanence for this alternative is high. However, under roads, bridges, railroads, and other permanent structures, it is less permanent because institutional controls could be lost in the future. Remediation of inaccessible soils are not included in Alternative 5 and will be deferred for action until such time that they become available as a result of decisions by the entities that control their accessibility. The inaccessible areas at the North County Sites are shown in Figure ES-3. Additional areas may be identified during implementation and will be deferred for separate action as documented in the post remedial action report. When and as these areas become available, new decision documents will identify the response actions to address the inaccessible soils as appropriate. Under Alternative 5, land would be returned to economic benefit. There is a moderate short-term risk to workers during the excavation and removal actions. There is no reduction in toxicity or volume through treatment. Mobility would be slightly reduced since material would be consolidated and placed in a properly designed and permitted disposal facility. Technically and administratively this alternative is highly implementable. Also administratively this alternative would not conflict with state polices regarding radioactive contaminated material in Missouri. This is the third most expensive alternative. This alternative balances the cost and the permanence, long-term effectiveness, and state and community acceptance. The cost is estimated to be $223 million. This cost does not include costs for remediating soils under roads, bridges, railroads, or other permanent structures at a future date.

Alternative 6, Excavation at All Properties

This alternative is protective of human health and the environment and is compliant with ARARs. Alternative 6 would provide the highest long-term effectiveness and permanence, because all of the radiologically contaminated materials would be recycled or sent to permanent off-site disposal. Short-term effectiveness and environmental impacts would be in the moderate to high range. The removal of soil, particularly under the roads, bridges, railroads, and other permanent structures would increase the potential for accidents. Due to traffic disruption there could be significant economic impacts to the local community. There is, as in Alternatives 2 through 5, a short-term risk to workers during the excavation and removal actions. This is slightly greater for this alternative due to the greater volume of soil being excavated and the nature of the excavation under roads, bridges, railroads, and other permanent structures. There is no reduction in toxicity, mobility or volume through treatment because there is no treatment component of this alternative. However, mobility will be slightly reduced because the contaminated material would be placed in a regulated and properly designed disposal facility. While technically implementable, this alternative would require additional safety considerations in areas of excavation under roads, bridges, railroads, and other permanent structures. Administratively this alternative would require considerable coordination with federal, state and local departments of transportation and with railroads. Also administratively this alternative would not conflict with state polices regarding radioactive contaminated material in Missouri. Alternative 6 is the most expensive alternative. The cost of this alternative is estimated to be $286 million.

Overall Difference Among Alternatives

Overall Protectiveness: Each of the alternatives, except Alternative 1, is protective of human health and the environment. Alternatives 2, 3, 4, and 5 require the effective use of institutional controls. Alternative 4 relies only on institutional controls and is the least likely to provide a permanent protective solution. Alternative 6 removes the most soil and provides the greatest long-term permanence at the St. Louis Site, but it is also the most costly and disruptive to the community and has the highest risks over the short-term. Removal of soils to an off-site disposal location provides an improvement in overall protection at the North County Site compared to treatment and containment. Removal and consolidation actions provide an increase in protection by moving material from the current location to a more controlled location. The least benefit in terms of risk and hazard reduction is from areas where the potential for exposure is limited. This includes the deeper areas at SLAPS and HISS/Futura, areas under roads, bridges, railroads, and other permanent structures, and material below the mean water gradient in Coldwater Creek.

Alternatives 5 and 6 allow use without restrictions at SLAPS and HISS/Futura, while Alternatives 2, 3, and 4 impose institutional controls at SLAPS and/or HISS/Futura.

Compliance with ARARs: All alternatives except Alternative 1 (No-Action) and Alternative 4 (Institutional Controls with No Further Excavation) comply with ARARs. Alternative 4 does not achieve either the 40 CFR 192, Subpart A, B, or C standards.

Long-term Effectiveness and Permanence: Removal of contamination results in the greatest long-term effectiveness and permanence for Alternative 6 followed by Alternative 5. Next are Alternatives 2 and 3 because more contaminated materials are left under institutional control. Alternative 4 involves the use of institutional controls with no further excavation. This alternative is less permanent and effective than Alternatives 2, 3, 5, and 6. Alternative 1 has the least long-term effectiveness and permanence.

Reduction in Mobility, Toxicity, and Volume Through Treatment: Alternative 3 provides a reduction in contaminant volume and mobility through treatment.

Short-term Effectiveness: The biggest difference in short-term effectiveness is due to the increased potential for construction and traffic-related accidents if soil is removed from beneath roads, bridges, railroads, and other permanent structures and the increased risk of construction and transportation-related accidents due to additional shipment of materials. Comparing Alternatives 5 and 6 shows the impacts of this variation. The increase in operational risk is very large for removals from areas under major traffic corridors. The implementation of Alternatives 2, 3, 5, and 6 may temporarily impact wetlands, temporarily affect surface drainage in the floodplain, and create non-point source surface water discharges, but all of these impacts will be managed in compliance with the substantive requirements of applicable laws and regulations, and therefore are not considered to be significant obstacles to the implementation of these remedial alternatives. Materials and services are readily available and implementable for all of the alternatives.

Implementability: The most implementable alternative is Alternative 5, followed by 6 and 2 then 3. Alternative 4 is the least implementable of the action alternatives due to lack of state and community support.

Costs: Costs are greatest for Alternative 6, which removes the largest volume of soil to an off-site disposal facility. Similarly, costs are lowest for the No-Further-Action Alternative. Costs are shown in the Table below.

Costs of the Alternatives in 2003 Dollars
(Includes Monitoring if Required During 30 Year Evaluation Period)

Alternative	Cost (Million $)
Alternative 1, No-Further-Action	1.5
Alternative 2, Partial Excavation and Capping at SLAPS and HISS/Futura	205
Alternative 3, Partial Excavation and Treatment at SLAPS	284
Alternative 4, Institutional Controls (No Further Excavation)	129
Alternative 5, Excavation with Institutional Controls Under Roads, Bridges, Railroads, and Other Permanent Structures	223
Alternative 6, Excavation at All Properties	286

Note: Costing assumptions and component costs are described in Appendix C.

Modifying Criteria

State and community acceptance have been considered in the CERCLA process and will be further evaluated following review of comments received during the public comment period on the North County Site FS and PP. The state and community have expressed strong opposition to on-site remedies and alternatives that restrict future land use.

EXECUTIVE SUMMARY

FIGURES

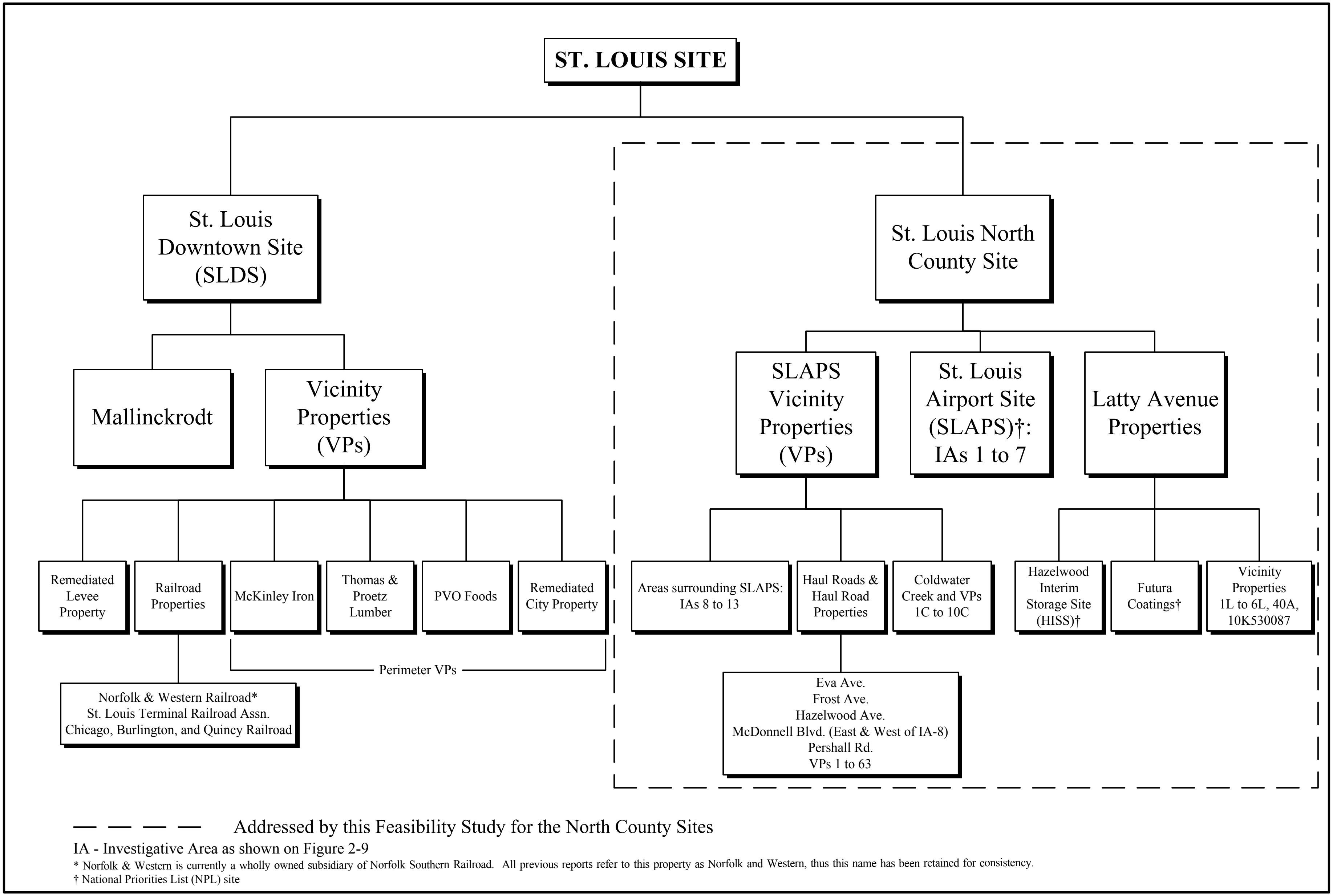
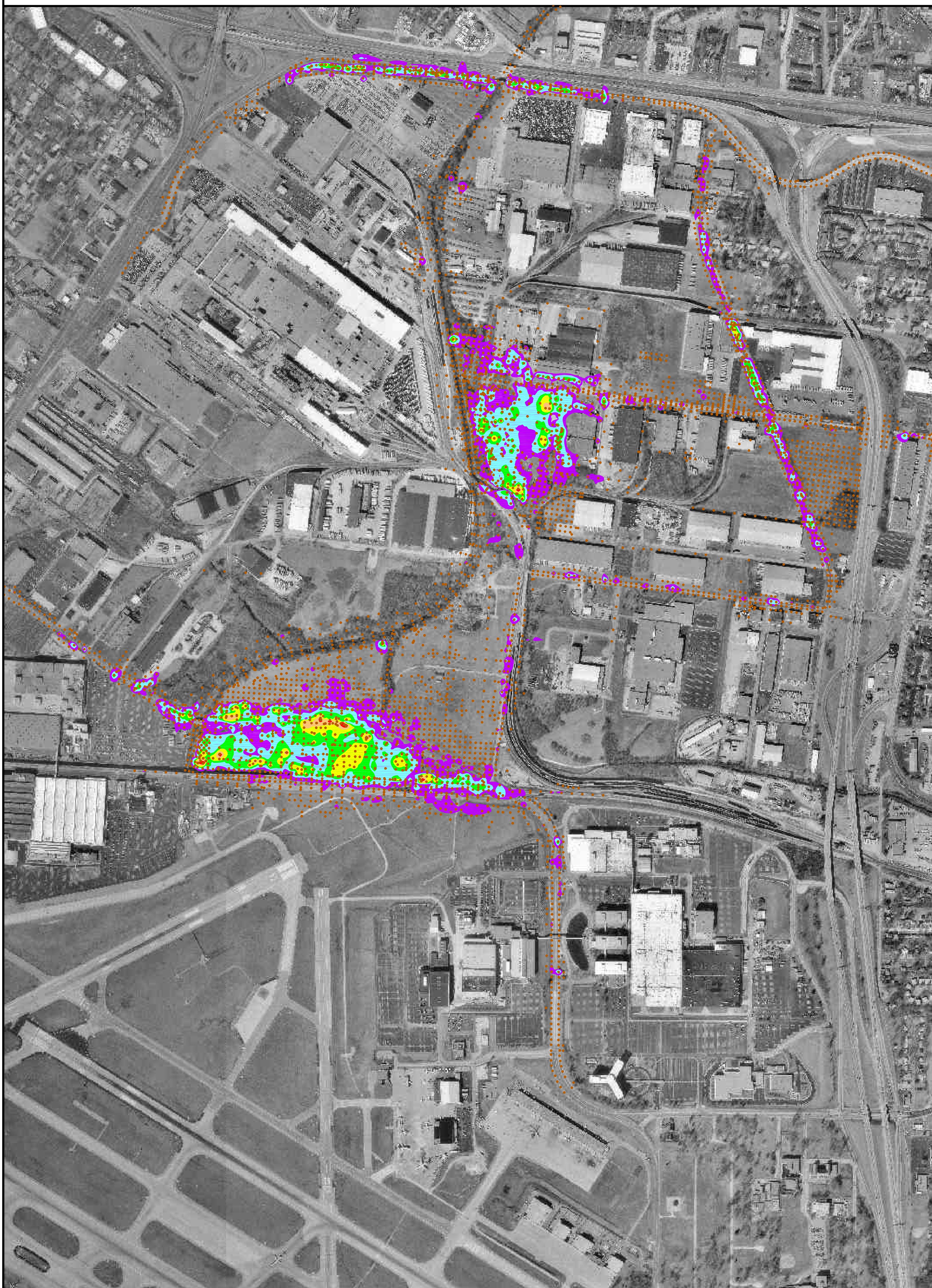


Figure ES-1. Schematic Representation of the FUSRAP St. Louis Site

U:\CAD\NORTHCO\DWGS\FSFIGURES\NorthCoRad06SOR-151550MaxR00.DWG



LEGEND:

$$\frac{\text{Ra} - \text{background}}{5 \text{ or } 15} + \frac{\text{Th} - \text{background}}{15 \text{ or } 15} + \frac{\text{U} - \text{background}}{50 \text{ or } 50}$$

Multiples of Sum of Ratios (SOR)

- .... 1 – 3
- .... 3 – 10
- .... 10 – 30
- .... 30 – 100
- .... 100 – 300
- .... >300
- ● .... SOIL SAMPLE LOCATION

NOTE: AERIAL PHOTOS CIRCA 1995–1997, PROVIDED BY MSD

0 500 1000 2000

SCALE: 1" = 1000'

FUSRAP

St. Louis Airport Site
Projected SOR 15, 15, 50
Distribution St. Louis, Missouri

DRAWN BY:	REV. NO./DATE:
R. Smith / S. Kitchings	0 – 7/3/00

Figure ES-2. Projected Radioactivity Exceeding 5 pCi/g of Radium-226, 14 pCi/g of Thorium-230, 50 pCi/g of Uranium-238 or Combinations Such That the Sum of the Ratios =1 in Surface Soil and Exceeding 15 pCi/g of Radium-226, 15 pCi/g of Thorium-230, 50 pCi/g of Uranium-238 or Combinations Such That the Sum of the Ratios =1 in Subsurface Soil

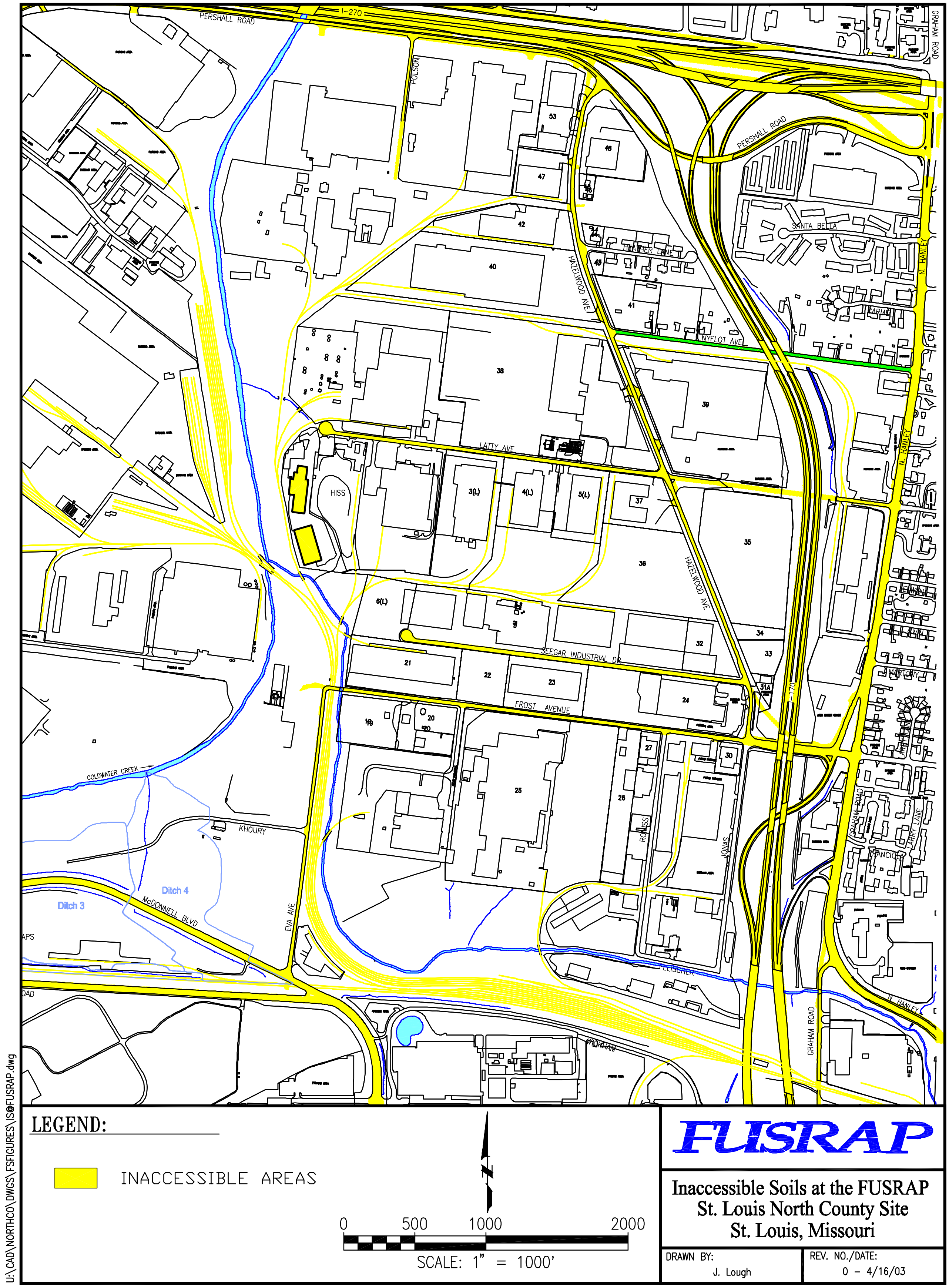


Figure ES-3. Inaccessible Soils at the North County Site.

SECTION 1

INTRODUCTION AND NEED FOR ACTION

1 INTRODUCTION AND NEED FOR ACTION

1.1 AUTHORITY FOR ACTION

The United States Army Corps of Engineers (USACE) is implementing a program for the management and remediation of radioactive contamination at the North County Site in St. Louis, Missouri. In 1974, the U.S. Congress authorized the U.S. Atomic Energy Commission (AEC) to institute the Formerly Utilized Sites Remedial Action Program (FUSRAP). FUSRAP was initiated to identify and clean up or otherwise control sites where residual radioactivity remains either from activities conducted under contract to the Manhattan Engineer District (MED) and the AEC during the early years of the nation's atomic energy program, or from commercial operations as directed by Congress. On October 13, 1997 the U.S. Congress transferred responsibility for FUSRAP from the U.S. Department of Energy (DOE) to USACE as part of the 1998 Energy and Water Development Appropriations Act (EWDAA).

USACE is conducting response actions under the legislative authority contained in Public Law 107-66, and the EWDAA for Fiscal Year 2002 (FY02). This law establishes the authority of USACE to conduct response actions for releases related to the nation's early atomic energy program as the lead federal agency, subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP). The federal government has adopted the lead role for remediation of these properties in response to a set of directives including the Atomic Energy Act (AEA) of 1954, CERCLA, and the EWDAA of 1985. In the 1985 EWDAA legislation, Congress specifically directed DOE to implement a remediation effort for the St. Louis Airport Site (SLAPS), Latty Avenue [now the Hazelwood Interim Storage Site (HISS) /Futura property], and associated haul route properties. After this Congressional direction, the U.S. Environmental Protection Agency (EPA) placed three of the North County properties onto the National Priorities List (NPL) in October 1989. The NPL is a list of sites identified for remedial action under CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA). Pursuant to Section 120 of CERCLA, a Federal Facilities Agreement (FFA) for the St. Louis Site was established between the DOE and the EPA in 1990.

The properties shown in Figure 1-1 comprise the St. Louis Site and are being cleaned up as part of FUSRAP. The St. Louis Downtown Site (SLDS) includes Mallinckrodt Chemical Works (MCW) and several vicinity properties (VPs). Accessible soils and ground water at the downtown site were addressed in a separate Record of Decision (ROD) in 1998 (USACE, 1998c). The North County Site is in the northern portion of St. Louis County. The North County Site includes the SLAPS, SLAPS VPs, and Latty Avenue Properties (Figure 1-2). SLAPS, HISS, and Futura Coatings are on the EPA's NPL.

1.2 BACKGROUND

The history of the St. Louis Sites began when Edward Mallinckrodt, President of MCW, was contacted by Dr. Arthur Compton, head of the nation's effort to develop an atomic bomb at the Metallurgical Laboratory at the University of Chicago. Dr. Compton inquired if MCW could undertake a project to prepare highly purified uranium compounds in support of the war effort.

This launched activities in St. Louis and numerous other areas in the country. These activities supported the Nation's strategic effort from the development of the first atomic bombs during World War II through the extended Cold War period that followed. From 1942 to 1957, SLDS was used for separation of uranium ores. These processing activities, conducted under MED and AEC contracts, resulted in radioactive residuals and contamination at the MCW in downtown St. Louis. Ore was imported from multiple sources, including the Belgian Congo (currently known as Zaire), Canada, and western States. The ore processing was part of a contract between MCW and the MED. The Belgian Congo ore was somewhat unique and highly desirable because it was an extremely rich ore containing as much as 70% uranium.

The extraction of the uranium from ores generated large quantities of by-products, including raffinate cake. Because of the significant quantities of other potentially valuable elements contained in the raffinate cake, the original supplier of the Belgian Congo ores, African Metals Corporation, retained ownership of the raffinate cake. Because the raffinate cake could not be disposed of, and because there was no room to store it at the MCW site, by late 1945 the AEC began searching for a suitable location to store the raffinate cake until African Metals retook possession of it. On March 2, 1946 the MED obtained consent to use 21.7 acres of land near the Lambert-St. Louis International Airport in north St. Louis County. On January 3, 1947, the MED acquired the site by condemnation proceedings for $20,000. From 1947 to 1953, the site was used first by the MED, and then by the AEC. MCW used the site under contract to the AEC from 1953 to 1967.

Several different materials were transferred to the SLAPS. Collectively referred to as the "airport residues", these materials included pitchblende raffinate cake, radium-bearing wastes, barium cake residue, Colorado raffinate cake residues, and other wastes. Much of the material was hauled in trucks and stored on the ground in uncovered piles. Subsequent disposal and relocation of the airport residues resulted in radioactive contamination at other locations near the Lambert-St. Louis International Airport.

Between March 1962 and November 1964, the AEC made four unsuccessful attempts to sell the airport residues after African Metals Corporation transferred ownership of the pitchblende raffinate cake to the U.S. Government. In 1966, the airport residues were sold to the Continental Mining and Milling Company (CMM) by the AEC. CMM began moving materials to 9200 Latty Avenue in Hazelwood (currently referred to as HISS/Futura) in order to extract uranium and other valuable metals.

On December 29, 1966, Continental's lender, the Commercial Discount Corporation of Chicago (CDC), began foreclosure proceedings against CMM and ultimately took possession of the airport residues. HISS/Futura was not owned or used for government operations. Rather, the commercial company used these areas to store the materials on the ground. Most of the materials were later sold and transferred to the Cotter Corporation processing facility in Canon City, Colorado. However, about 8,700 tons of barium sulfate waste was mixed with an estimated 39,000 tons of soil and shipped to the Westlake Landfill in St. Louis County. Westlake Landfill is an NPL site (listed August 30, 1990). EPA Region VII is the lead agency for the Westlake Landfill Remedial Investigation/Feasibility Study (RI/FS), and is the lead agency for Westlake Landfill.

Several key documents prepared for the RI/FS process are listed in Table 1-1. In June 1990, the FFA addressing the St. Louis Site was executed by EPA and DOE. This agreement was established to define implementation and oversight roles for the respective agencies involved.

USACE is preparing this FS in accordance with CERCLA and the NCP. This document evaluates the alternatives for remedial action at the site. It is based on historical data and the results of the RI, which contains information on the nature and extent of contamination, and the Baseline Risk Assessment (BRA), which evaluates potential health and ecological risks if no remedial action is taken at the site. The BRA established that action is warranted at the North County Site based on the potential for unacceptable exposure if existing access restrictions and controls are not maintained in the future. Site characterization and risk data from the RI and BRA are used in the FS process to evaluate and develop remedial action alternatives to address potential risk at the North County Site.

The RI report (BNI, 1992a) summarizes the data and analytical results from radiological and chemical characterization surveys and field investigations conducted at the St. Louis Site from 1982 through 1991. These studies were undertaken to determine the nature and extent of contamination and to characterize the geological and hydrogeological features of the properties. In general, the results from the RI indicate that the highest levels of radioactive contamination are at SLAPS and HISS, and the principal radioactive contaminants are isotopes of thorium (Th-230), radium (Ra-226), uranium (U-238), and their radioactive decay products. Contamination was found at several VPs which were not directly associated with uranium processing or waste storage. The principal radioactive contaminants at the VPs are Ra-226, Th-230, Th-232, and U-238, with Th-230 detected at the highest concentrations. Additional characterization data were collected and reported in the Remedial Investigation Addendum (SAIC, 1995) and the 2000 *SLAPS Implementation Report* (USACE, 2001).

The BRA report (ANL, 1993) evaluated the potential risk for both current and hypothetical future users of the St. Louis Site properties. Potential carcinogenic and non-carcinogenic risks to human health and the environment were quantified and compared to determine whether risks associated with the site were within acceptable ranges. On the basis of conservative estimates of carcinogenic risk levels for current users, several properties were identified as having potential carcinogenic risks in excess of the EPA target risk range. Potential future risks and hazards were found to be unacceptable for some future scenarios involving residential use of the affected properties. Based on these BRA future risk and hazard results, further response actions were warranted at the North County Site.

The RI, BRA, and FS comprise the primary evaluation documents. The Proposed Plan (PP) is published as a separate document, but is considered an integral part of the process, for it identifies the preferred alternative. The RI/FS/PP process will include appropriate agencies [e.g., EPA and Missouri Department of Natural Resources (MDNR)] and public participation. The process will conclude with the issuance of a ROD that identifies the selected remedial alternative for the North County Site.

Table 1-1. Listing of Key Documents Prepared for the North County Site

Document	Reference	Comment
National Priority List	EPA, 1989b	
Federal Facilities Agreement	DOE, 1990	Executed by EPA and DOE
Initial RI/FS Work Plan	BNI, 1992b	
EE/CA / EA for Properties in Vicinity of HISS	DOE, 1992	
Initial Screening of Alternatives	SAIC, 1992	
Remedial Investigation	BNI, 1992a	
Baseline Risk Assessment	ANL, 1993	
Draft FS/EIS	DOE, 1994b	
Remedial Investigation Addendum	SAIC, 1995	
Treatability Studies	Clemson, 1995, 1996	Detailed evaluation of soil washing
St. Louis Task Force Report	Task Force, 1996	Recommendations of an independent panel formed in 1994
EE/CA for SLAPS	USACE, 1998a	
EE/CA for HISS	USACE, 1998b	
SLAPS Implementation Report	USACE, 2001	Results of additional SLAPS area investigations performed in 1998

1.3 PURPOSE AND SCOPE OF THIS FEASIBILITY STUDY

This FS for the North County Site identifies, develops, and evaluates remedial action alternatives to achieve a final remedy for soil, sediment, surface water, ground water, and structures. The alternatives address all contamination, including but not limited to radiological contamination, resulting from or associated with uranium manufacturing or processing activities. The alternatives also address other chemical or non-radiological contaminants that have been mixed or commingled with radiological contaminants resulting from or associated with uranium manufacturing or processing activities conducted at SLDS. Contamination present at the North County Site that is not related to work under FUSRAP is beyond the scope of this document. Surface water and ground water are not addressed as source media within this FS, but are addressed only as potential transport mechanisms for soil and sediment contamination. The FS addresses all of the properties that constitute the North County Site, as shown in Figure 1-1: SLAPS and HISS/Futura (listed on the NPL); and Latty Avenue VPs and SLAPS VPs (not listed on the NPL). SLAPS VPs include tracts near SLAPS and areas along Coldwater Creek. Alternatives are developed on the basis of the nature and extent of contamination documented in the RI, the BRA, the FS, and related reports.

The evaluation of remedial action alternatives provided in this FS has been used by USACE in order to select the preferred alternative for remediation of the site. The USACE preferred alternative has been documented in the PP for the North County Site issued for public comment. As described in the preceding section, the final remedy for the site will be selected in a ROD for the North County Site, after public comment on the PP is received.

1.4 CONSULTATION AND COORDINATION WITH OTHER AGENCIES

USACE is the lead agency responsible for response actions at the North County Site pursuant to Public Law 107-66 and the EWDAA (of 1998 and 2002). An FFA for the site has been negotiated with EPA Region VII consistent with CERCLA Section 120. Plans and activities are being coordinated with appropriate Missouri State agencies, including the MDNR. The State's role is defined in a Cooperative Agreement signed July 20, 1998. The identification of federal and state regulations, which may impact site remediation, is being coordinated with the EPA Region VII and the MDNR, respectively.

The agencies responsible for natural or cultural resources addressed in the RI/FS have been consulted. These include the Missouri State Historic Preservation Office (SHPO), the U.S. Fish and Wildlife Service (FWS), county, and municipal agencies. Information on Threatened and Endangered Species has been received from the FWS and the Missouri Department of Conservation (MDC), and is described in Appendix B.

1.5 ORGANIZATION OF THE FEASIBILITY STUDY

This FS for the North County Site is organized in accordance with guidance from USACE and the EPA. Volume I contains Sections 1-6, and Volume II contains the FS Appendices. Section 1 defines the proposed action and includes the authority for action, background, purpose and scope, and consultations with other agencies. Section 2 describes the St. Louis Site, its history, the affected environment, and the nature and extent of contamination and summarizes the findings of the BRA. Section 3 defines applicable or relevant and appropriate requirements (ARARs) and remediation goals (RGs) and screens remedial technologies. Section 4 develops, screens, and evaluates remedial action alternatives for the site-wide alternatives. Section 5 presents a detailed analysis of potential remedial alternatives using CERCLA guidance evaluation criteria. Section 5 also provides a comparative analysis of the site-wide alternatives for remediation of the North County Site. Section 6 contains the report references. ARARs, correspondence, cost analysis, dose and risk analysis, and post-remedial action data are contained in Volume II, Appendices A through E, respectively.

SECTION 1

FIGURES

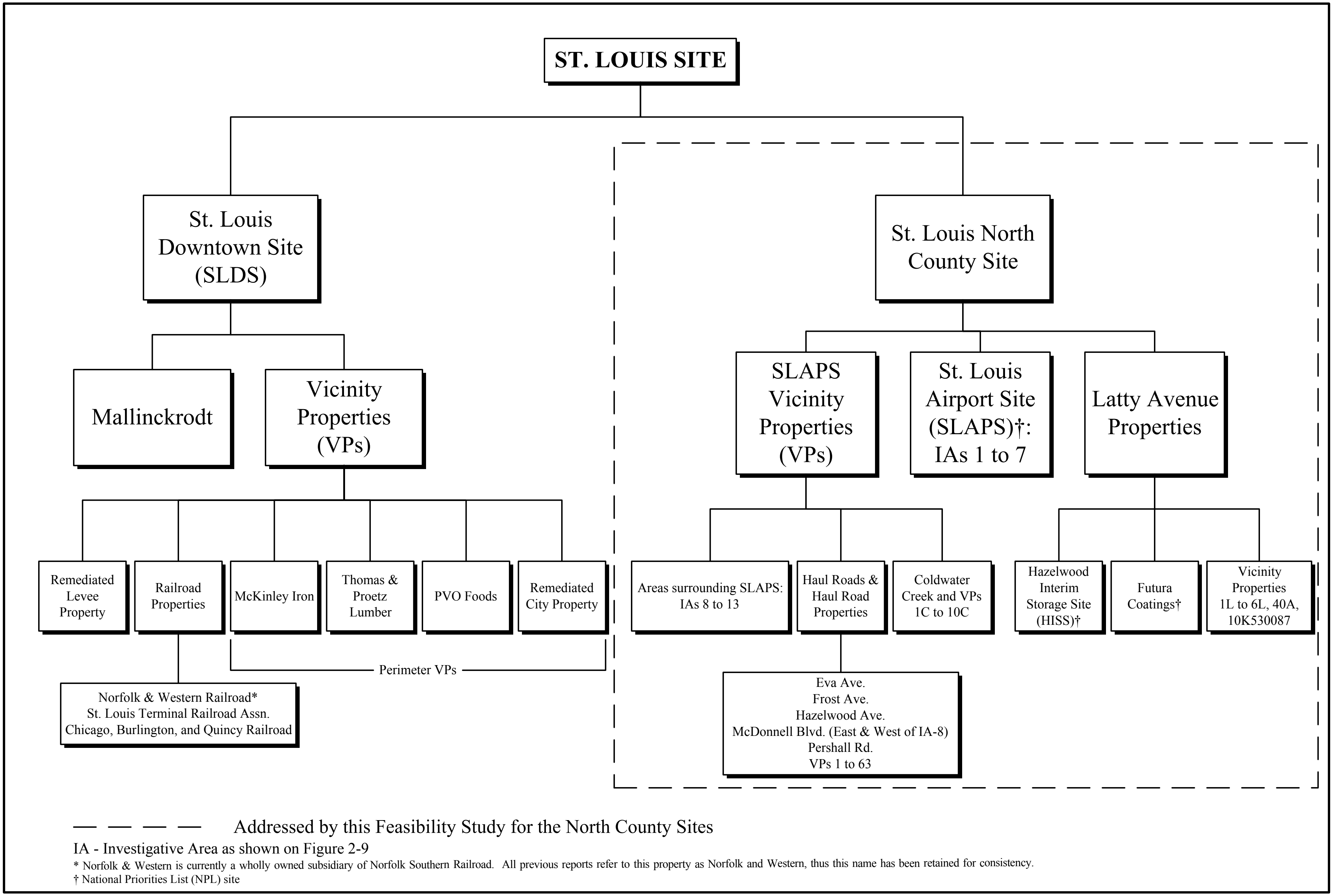
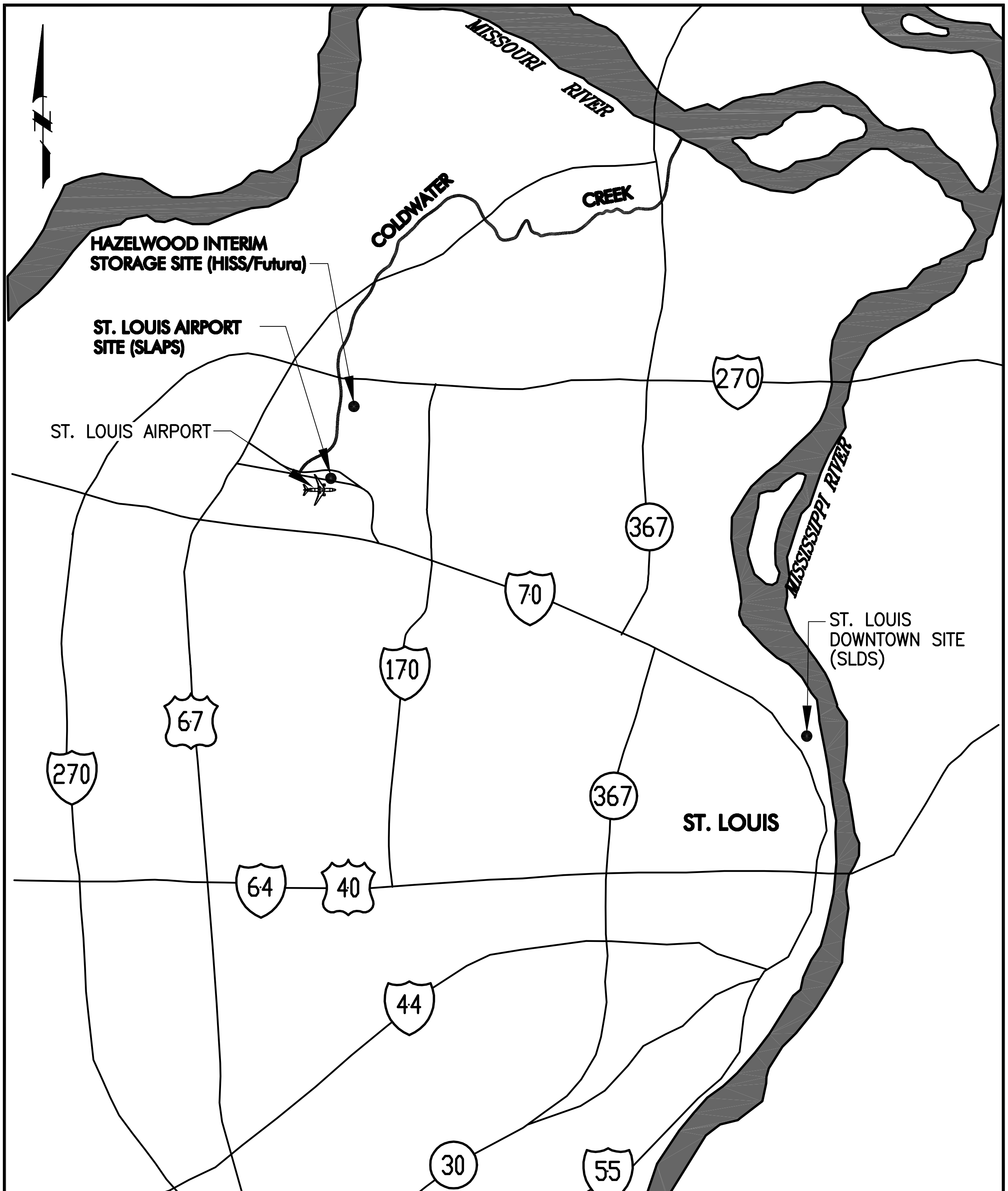


Figure 1-1. Schematic Representation of the FUSRAP St. Louis Site



U:\CAD\NORTHCO\DWGS\FSFIGURES\STLOUISVICINITYMAPR02.DWG

St. Louis North County Site: SLAPS, HISS/Futura, and Coldwater Creek Vicinity Properties not shown

FUSRAP

St. Louis Airport Site
Location of FUSRAP Properties
St. Louis, Missouri

DRAWN BY:	REV. NO./DATE:
S. Kitchings	2 – 5/2/00

Figure 1-2. Location of Key FUSRAP Properties in the St. Louis, Missouri Area

SECTION 2

SITE CHARACTERIZATION

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2 SITE CHARACTERIZATION

2.1 SITE DESCRIPTION AND HISTORY

The St. Louis Site consists of two locations designated in this report as the St. Louis Downtown Site (SLDS) and the North County Site. Both areas consist of multiple properties as defined in Figure 1-1. A separate Record of Decision (ROD) was prepared for SLDS in 1998 (USACE, 1998c).

The North County Site lies in St. Louis County, 24 kilometers (km) [15 miles (mi)] from downtown St. Louis, 18 km (11 mi) northwest of SLDS, and immediately north of Lambert-St. Louis International Airport. It includes the St. Louis Airport Site (SLAPS), the Latty Avenue Properties, and the SLAPS Vicinity Properties (VPs). The Latty Avenue Properties are: the Hazelwood Interim Storage Site (HISS), Futura Coatings, and the Latty Avenue VPs. The SLAPS VPs are properties along the haul roads, Coldwater Creek and nearby railroad lines. Recent aerial photos of the North County Site are shown in Figures 2-1 and 2-2. The properties are described in several reports including the *Remedial Investigation (RI) Report Addendum* (SAIC, 1995) and the *SLAPS Implementation Report* (USACE, 2001).

Characterization activities at the North County Site indicate that contamination is present in the soils and other media. This contamination is related to the nation's early atomic energy activities and also to the activities of others. As agreed to under the Federal Facilities Agreement (FFA), hazardous substances on the site resulting from uranium manufacturing or processing activities are included in this Feasibility Study (FS).

2.1.1 Source and Characteristics of the FUSRAP-Authorized Materials

Uranium production processes were conducted at SLDS beginning in 1942. The SLDS processes included the digestion of ore and the extraction of uranium metal. A schematic of the uranium metal production process is shown in Figure 2-3. The original feed material used at SLDS was uranium black oxide that was extracted from uranium ore and concentrated at non-St. Louis facilities. Because of pre-processing, this black oxide was relatively free of radium and radium daughter products. Later, in about 1946, Belgian Congo Shinkolobwe ores containing high percentages of uranium (greater than 30% by weight as compared to less than 1% for other ore bodies) were processed. The Shinkolobwe ore had large amounts of radium [e.g., ~0.3 curies per ton (Ci/T) of uranium], which were further concentrated by the processing at SLDS. Processing activities at SLDS also included other ores with much lower concentrations of uranium in the ore. These less concentrated ores resulted in generation of larger quantities of by-product material waste with correspondingly lower activity concentrations (particularly with respect to daughter products).

The ore extraction processes for the uranium ores, which are the first steps of Figure 2-3, are shown in more detail in Figure 2-4. The top half of Figure 2-4 shows the process for pitchblende ore and the bottom half shows the process for ore concentrates. The ore or concentrate was digested in acid for both processes. For the pitchblende ores, precipitation and filtration processes were used to remove radium and other unwanted materials by adding sulfuric acid (H_2SO_4) to precipitate radium sulfate and lead sulfate ($RaSO_4$ and $PbSO_4$.) This cake was leached with sodium carbonate (Na_2CO_3) to recover more uranium and was designated as K-65.

Excess sulfate ion was removed by adding barium carbonate ($BaCO_3$) and removing the resulting barium sulfate ($BaSO_4$) precipitate in a centrifuge. Barium has chemical properties similar to radium and served to scavenge the remaining very small mass (but high radioactivity) of radium from the aqueous solution by co-precipitation. Most of this barium sulfate cake was leached with sodium carbonate solution to recover more uranium. Both leached and unleached barium sulfate cake were stored in bulk at SLAPS and designated barium sulfate cake (AJ-4). Sometimes the leached barium sulfate cake has been called the "barium cake". The product of these ore digestion and purification steps was a partially purified aqueous solution that was then fed to an ether solvent extraction process.

The uranium was extracted from the aqueous solution into diethyl ether and then stripped from the ether phase back into the aqueous phase. This solvent extraction process resulted in an aqueous solution of uranyl nitrate [$UO_2\ (NO_3)_2$]. The nitrate was then driven off using a high temperature denitrification process to form uranium trioxide (UO_3). The next step was a high temperature reduction of the uranium trioxide under hydrogen to form uranium dioxide (UO_2). The uranium was then fluorinated to form uranium tetrafluoride (UF_4). The fluorine was removed by reacting the uranium fluoride with magnesium. This step of the process produced uranium metal and magnesium fluoride (MgF_2).

Several waste and by-product streams were produced in these processes. The K-65 residues included filter cake generated by filtration of crude uranyl nitrate hexahydrate (UNH), undigested ore and tailings, lead/radium sulfate filter cake, filter cake, and radium sulfate. The raffinate cake is the filter cake generated by lime precipitation of the raffinate (or aqueous stream) after the extraction of the uranyl nitrate hexahydrate into ether. These materials were transported from the downtown site to SLAPS for storage. The K-65 residues were shipped in drums. Other waste materials were shipped in bulk quantities in trucks and covered vehicles.

2.1.2 Summary of FUSRAP-Authorized Materials at North County Sites

The Formerly Utilized Sites Remedial Action Program (FUSRAP)-authorized materials at the North County Sites originated from uranium processing. The materials were shipped to SLAPS for storage. The K-65 residues were eventually shipped to federal facilities in Ohio and New York. Most of the remaining materials were sold to a commercial firm and moved to the HISS/Futura site for subsequent transfer to Colorado while some of the leached barium sulfate was mixed with soil and transferred to Westlake Landfill. Material spread to other properties by spillage during transfers between sites and also by wind and water erosion. The primary FUSRAP-authorized materials are summarized in Table 2-1.

Table 2-1. Summary of FUSRAP-Authorized Materials Used at North County Sites

FUSRAP-Authorized Material	Comments
K-65 residues	Radium−bearing residues (also referred to as "K-65") were stored at the site from 1946 until 1948. Storage of these materials was originally planned to be in the concrete pit at the site, but due to health concerns associated with subjecting the loose material to the elements, the material remained in drums. All of the K-65 residues were transferred to the Lake Ontario, New York, and Fernald, Ohio federal facilities in 1948 and 1949.
AM-7 Pitchblende Raffinate Cake	The pitchblende raffinate cake was defined as the solid residue that resulted from the initial digestion with nitric acid and purification of Belgian Congo pitchblende. The raffinate cake was filtered from neutralized acidic raffinate from the ether extraction of uranyl nitrate hexahydrate. This residue was re-slurried with sodium carbonate solution to improve the recovery of uranium from the pitchblende raffinate. The approximate gross weight of this material was estimated to be 74,000 tons containing about 113 tons of uranium. Based on samples collected in June of 1953, it was estimated that this residue also contained approximately 1,553,000 lbs. (780 tons) of cobalt, 1,845,000 lbs. (925 tons) of nickel, and 971,000 lbs. (490 tons) of copper. Additions to the raffinate cake stored at the site after 1953 resulted in an adjustment of this estimate by an additional 13%.
AM-10 Colorado Raffinate Cake	The Colorado raffinate cake was described as being a heterogeneous residue primarily resulting from the initial digestion with nitric acid and purification of domestic uranium concentrates, such as Colorado ore. The raffinate cake was filtered from neutralized acidic raffinate from the ether extraction of uranyl nitrate hexahydrate. This residue was re-slurried with sodium carbonate solution to improve the recovery of uranium from the pitchblende raffinate cake. This material had an estimated gross weight of 32,500 tons and contained an estimated 48 tons of uranium.
AJ-4 Unleached Barium Sulfate Cake	AJ-4 unleached barium sulfate cake was the residue created by adding barium carbonate to the dissolved uranium in nitric acid to precipitate excess sulfate (SO_4^{2-}) that had been added previously to precipitate lead and radium from the solution containing uranium (Note: AJ-4 was only generated when pitchblende was processed). The barium sulfate precipitated along with the final traces of radium and lead that were not removed in the previous precipitation step. The material was estimated to contain approximately 22 tons of uranium in a residue with a gross weight of 1,500 tons. This unleached residue was shipped to Cotter in Colorado for recovery of the uranium.
AJ-4 Leached Barium Sulfate Cake	The leached barium sulfate cake (as described above) was leached with sodium carbonate solution to recover the last traces of uranium (Note: AJ-4 was only generated when pitchblende was processed). This cake would have been predominately barium sulfate with traces of lead and radium as sulfates. The leached barium sulfate cake, also described as resulting from the initial digestion with nitric acid and purification, contained an estimated 7 tons of uranium with a gross weight of 8,700 tons. This is the residue that is believed to be buried at Westlake Landfill after being mixed with 39,000 cubic yards (yd^3) of soil at HISS/Futura.
C-701 U scalping of Magnesium Fluoride (MgF_2)	Magnesium fluoride is the by-product of the thermal reaction between magnesium metal and uranium tetrafluoride to give uranium metal. Until 1953, this magnesium fluoride was shipped to Vitro Corp.
Miscellaneous Residues and Metal Scrap	The "miscellaneous residues" were described to include an estimated 350 tons in deteriorated drums, and contained an estimated 2 tons of uranium. By 1960 there were approximately 50,000 empty drums and approximately 3,500 tons of contaminated steel and alloy scrap (generated during the decommissioning and demolition of the Destrehan Street Plant) stored on-site at SLAPS. By 1962 the majority of these materials had been sold for their metal salvage values. The bulk of the scrap metal was purchased by David Witherspoon, Inc., of Knoxville, TN, for $500 under contract number AT-(23-2)-47 on June 8, 1962.
Barrels	As shown on Figure 2-7 and 2-8, SLAPS was used extensively for barrel (drum) storage.
C-liner slag	The material described as "C-Liner Slag" (also referred to as dolomite liner slag) was also stored and later removed from SLAPS. This material was estimated to be approximately 3,500 tons. The material was described as slag created during the reduction step in the metal operations at Destrehan Street. Initially the reduction bombs were lined with dolomite. The slag was the "used dolomite". In 1953 the dolomite liner was replaced with recycled magnesium fluoride. Approximately half of the original quantity of C-liner slag was shipped to Fernald for recovery of the uranium material. The rest was sold to Cotter as an amendment to the Sale of Airport Residues.
C-Oxide, Japanese precipitates, and Vitro residues	Another material that was stored at SLAPS was a material referred to as "C-Oxide". Records indicate that the C-Oxide was shipped to Fernald for reprocessing and uranium recovery (Booz-Allen FUSRAP Archive, AEC Memo of 6/23/64). An inventory of the material stored at SLAPS, performed on April 11, 1959, also included an estimated 60 gross tons of captured Japanese uranium precipitates containing an estimated 0.2 tons of uranium. Also included in this inventory were 290 gross tons of "Vitro residues" containing approximately 1.9 tons of uranium. This material is believed to have resulted from the Vitro Corporation's facility in Canonsburg, PA, reprocessing magnesium fluoride liner material for the recovery of uranium. (Booz-Allen FUSRAP Archive, MO.1. Airport Site, Robertson, Missouri, April 11, 1959).
Building Debris	During grading and filling of the site by the Airport Authority, several contaminated areas on the west end of the site were uncovered and exhibited radiation exposure rates from 2 to 60 mrad/hr. Rubble (presumably concrete rubble) and wooden "super structures" were buried on the east end of the site. Broken concrete, from the concrete "pit", storage pad, and wash slab (decontamination pad) remained on the site under the clean fill.
Oil Dump	A Mallinckrodt Chemical Works drawing from 1955 shows an oil dump located in the vicinity of the larger AM-10 storage location shown on Figure 2-8. This alleged oil dump is not referenced in any other known literature, and can not be confirmed by aerial photos of the same vintage, or sampling results from previous investigations.

2.2 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

2.2.1 Surface Features

2.2.1.1 Description of SLAPS

SLAPS is an unincorporated property in St. Louis County owned by the City of St. Louis. SLAPS is bounded by McDonnell Boulevard to the north, Banshee Road and the Norfolk Southern Railroad on the south, and Coldwater Creek on the west. SLAPS covers 8.8 hectares (ha) (22 acres) and most of the property is surrounded by a security fence. A water main crosses the northwest corner of SLAPS and runs parallel to the railroad tracks to the south. This water main was relocated in 1998 and now runs south of the Norfolk Southern Railroad. There are no sewer lines or overhead utility lines within the perimeter fence of SLAPS, but utilities run parallel to the fence along McDonnell Boulevard.

Manhattan Engineer District (MED) obtained the title to SLAPS by condemnation proceedings on January 3, 1947, to store uranium-bearing residuals from SLDS. Storage operations were conducted from 1946 until 1966. The conditions at SLAPS prior to disposal activities are shown in a 1941 aerial photograph in Figure 2-5. The present locations of McDonnell Boulevard and Coldwater Creek are drawn on the photo to provide present day reference points.

The 1958 aerial photographs in Figure 2-6 show SLAPS and adjacent areas during the active period of storage operations at SLAPS. The large quantity of drums, metal scrap, and other by-product materials that were stored at SLAPS are shown in the photographs of Figure 2-7. The photographs further highlight the large open piles of material that were stored at SLAPS. The general layout for storage of materials in about 1958 is depicted in Figure 2-8. Concentrated radium and barium sulfate cake were stored near the center of the site near the north boundary, in the areas designated AJ-4 in Figure 2-8. The storage sheds near the gate were later abandoned in place. Through time, various meanders in Coldwater Creek were backfilled to support construction, resulting in some commingling with wastes brought to SLAPS. The alignment of McDonnell Boulevard has also changed through time. Both of these activities have resulted in off-site movement of residuals stored at SLAPS.

In November 1965, the U.S. Atomic Energy Commission's (AEC's) Airport Committee issued a report that summarized the history of SLAPS up to that point. At that time the committee reported that scrap metal and other debris had been placed in low areas on the western end of the property and covered (in 1952) with dirt to make a level storage area. The date appears to be in error since the Destrehan Street Plant at SLDS was not demolished until the 1960s.

The report also indicates that "by 1960 there were approximately 50,000 empty drums and approximately 3,500 tons of miscellaneous contaminated steel and alloy scrap (generated during the decommissioning and demolition of the Destrehan Street Plant) stored onsite at SLAPS. However, by 1962 the majority of these materials had been sold for their metal salvage values". The bulk of the scrap metal was purchased by David Witherspoon, Inc. of Knoxville, TN for $500 under contract number AT-(23-2)-47 on June 8, 1962. Terms of the contract specified that all metal scrap above existing ground level, "that was capable of being removed without excavation equipment", was to be considered part of the scrap materials offered for sale. The contract also specified that the material purchased under this contract was considered to contain source material subject to licensing requirements and AEC regulations. David Witherspoon, Inc. was already licensed by the AEC to receive source material.

A status report from February 15, 1963 indicated that the contractor (Witherspoon) was crushing drums on site by use of an "electro magnet drop hammer". At the time of the status report, Witherspoon had been on site for approximately 8 months and it was anticipated that it would take an additional two months to complete the removal of the scrap. It was noted that the cleanup of the miscellaneous general scrap had been slowed because of stored conditions (dozed into place and mixed with earth). The report further elaborated that the working crew's progress was slowed by frozen ground. Based on this information, it appears that the majority of scrap metal at the site was either used to fill very shallow depressions or piled high above ground. When Witherspoon bought the scrap, every reasonable effort was made to remove as much of the scrap as possible, including the shallow buried materials.

In 1966 and 1967, the residuals stored at SLAPS were purchased for mineral recovery by the Continental Mining and Milling Company (CMM) of Chicago. The CMM removed the materials from SLAPS and placed them in storage at what is now the HISS/Futura site on Latty Avenue under an AEC license. In 1969, after most of the residuals were removed, site structures at SLAPS were demolished and buried on the property (EPA, 1989a). Additional fill material and rubble were placed on SLAPS in the 1970s. Clean fill material was spread over the disposal area from 0.3 to 1.0 meter (m) [1 to 3 feet (ft)] to achieve surface radioactivity levels acceptable at that time. In 1973, the U.S. Government and the City of St. Louis agreed to transfer ownership of SLAPS by quitclaim deed from the AEC to the St. Louis Airport Authority. The quitclaim deed limits land use to aeronautical or aviation purposes and imposes institutional controls consisting of restrictions on excavation and drilling.

In 1986, an extensive radiological and limited chemical characterization determined that radioactive contamination extended as deep as 5.5 m (18 ft) below grade (BNI, 1987a). A radiological characterization of airport area properties was subsequently conducted from 1986 through 1990 to define the extent of radioactive contamination and to evaluate possible disposal alternatives. The U.S. Environmental Protection Agency (EPA) placed SLAPS on the National Priorities List (NPL) in 1989.

In 1998, additional soil and ground-water sampling was performed to provide additional characterization of SLAPS (USACE, 2001). SLAPS and the contiguous VPs were divided into several investigation units for purposes of analysis and description. SLAPS was divided into investigation areas (IA) 1 through 7 based on areas of former storage and other factors, such as drainage patterns (see Figure 2-8). The IAs are shown in Figure 2-9.

Several soil removal actions have been conducted at SLAPS in accordance with approved engineering evaluation/cost analyses (EE/CAs). The general locations of removal actions at the North County Site are shown in Figure 2-10.

At the western end of SLAPS, contaminated soils were moved in the area immediately east of the gabion wall on the bank of Coldwater Creek. Excavation, which began in September

1997, ran the length of the gabion wall and extended approximately 90 ft (27 m) to the east. The excavation was accomplished in six discrete areas. Area 1 was located at the southern end of the gabion wall and excavated to the maximum design depth of 13 ft (4 m) below ground surface. Ground water was encountered at 12.25 to 13.3 ft (3.75 to 4 m) below the ground surface. Excavation was halted after the design depth was achieved and the water table was encountered. Radiologically contaminated soils remain below the ground-water table in Area 1. Removal actions at Areas 2 to 6 were conducted using the cleanup criteria described in the EE/CA (USACE, 1998a). For radionuclides the cleanup criteria used were the greater of 5/15 picocuries per gram (pCi/g) for radium-226 (Ra-226) and thorium-230 (Th-230), and 50 pCi/g for uranium-238 (U-238) (all above background averages). Approximately 5,100 cubic yards (yd^3) of contaminated material (in-situ) were removed from the western end of SLAPS under this action and transported off-site. Backfilling of the excavation was completed in December 1997.

A rail spur was installed on SLAPS in 1998 to provide a load out area and staging area for shipment of contaminated materials to off-site disposal or recycling locations. About 3,000 yd^3 of contaminated soil was shipped off-site in 1998.

A sedimentation basin was constructed in 1999 at the west end of SLAPS to control surface-water runoff. The basin is lined with an impermeable liner to prevent ground-water infiltration and recharge in this area of SLAPS.

During 2000 and 2001, removals were conducted in the eastern portion of SLAPS and at the barium/radium pits. Removal of approximately 20,600 m^3 (27,000 yd^3) of contaminated soils from the East End of SLAPS was completed in February 2000 under the 1998 SLAPS EE/CA (USACE, 1998a). In November 2000, USACE completed excavation of approximately 38,100 m^3 (49,800 yd^3) of contaminated soils from the Radium Pits area and began the first phase of the East End Extension removal action. The East End Extension includes the areas of contaminated soil between the Radium Pits and the East End and in the drainage ditch immediately south of McDonnell Boulevard. By Fall 2001, approximately 45,900 m^3 (60,000 yd^3) had been removed from portions of the East End Extension. Removal of contaminated soils located in the central portion of SLAPS, referred to as Phase 1, was initiated in Fall 2001 and continued through 2002. Phase 1 is expected to be completed by May 2003. A total of 74,200 m^3 (97,000 yd^3) will have been removed from the Phase I area. To date, all material has been shipped to properly permitted or licensed off-site disposal facilities.

2.2.1.2 Description of SLAPS VPs

SLAPS VPs consist of approximately 78 properties along the roads and rail line transportation routes, Coldwater Creek, and the open fields immediately north of SLAPS (the former ballfield area). These properties were formally designated by the U.S. Department of Energy (DOE) as VPs based on preliminary characterizations. Locations for these properties are shown in Figure 2-11. Based on the results of additional characterization activities by the United States Corps of Engineers (USACE), additional properties along Coldwater Creek may require remediation. This FS is intended to address all properties at the North County Site determined to be impacted by contaminants resulting from uranium manufacturing or processing activities conducted at SLDS. The contiguous properties surrounding SLAPS were grouped into IAs for the Science Applications International Corporation (SAIC) 1999 study. These were designated as IAs 8 through 13, as shown on Figure 2-9. These properties are located within the City of Hazelwood, the City of Berkeley, the airfield owned by the City of St. Louis, and on property controlled by Boeing, Inc.

Radioactive contamination of the VPs occurred as a result of contaminated soil spillage from transport vehicles and by erosion and subsequent deposition of residual and waste stockpiles. Additionally, road and underground utility construction and Coldwater Creek flooding and sediment transport have resulted in the spread of contamination into adjacent areas.

The affected transportation routes include Eva Avenue, Frost Avenue, Hazelwood Avenue, McDonnell Boulevard, Pershall Road, and their frontage properties. For the most part, these sites are located within the City of Berkeley. However, Pershall Road, the north side of McDonnell Boulevard, and a portion of Hazelwood Avenue are within the City of Hazelwood. These routes are referred to as the haul roads. They were likely used during transfer of uranium-bearing residuals from SLDS to SLAPS, from SLAPS to HISS/Futura, from SLAPS to areas out of the region, and from HISS/Futura to sites out of the region.

Coldwater Creek flows for 153 m (500 ft) along the western border of SLAPS. The creek originates 5.8 km (3.6 mi) to the south and continues for 24 km (15 mi) in a northeasterly direction to the Missouri River. Coldwater Creek continues through Hazelwood, Florissant, and unincorporated areas of the county, and along the northern edge of the unincorporated community of Black Jack, until it discharges into the Missouri River. The creek, except for 1.2 miles under the Lambert-St. Louis International Airport, is generally accessible to the public (SAIC, 1992). The Missouri Department of Natural Resources (MDNR) has classified a portion of Coldwater Creek as a Class C waterway. Class C waterways are streams that may cease to flow in dry periods, but maintain permanent pools that can support aquatic life. Flooding occurs annually along the creek. This section of Coldwater Creek is protected for livestock and wildlife watering and aquatic use (from the intersection with U.S. 67 downstream to the mouth of the creek at the Missouri River).

A 1982 radiological characterization indicated that the ditches that drain to Coldwater Creek (BNI, 1983) contained radiological contamination levels exceeding cleanup guidelines being used at the time.

In December 1984, a mobile gamma scanning survey of potential transportation routes between SLAPS and HISS/Futura found anomalies on Hazelwood Avenue, McDonnell Boulevard, and Pershall Road (ORNL, 1985). Gamma exposure rates of up to 90 microroentgen/hour (μR/h) were found on the surface of McDonnell Boulevard. As a result, sampling along these roads was initiated to determine the concentrations of FUSRAP radionuclides. In 1985, a radiological survey of Hazelwood Avenue, McDonnell Boulevard, and Pershall Road (ORNL, 1986a) found Th-230 to be the contaminant present in soil in the highest concentrations.

Removal actions have been conducted in the North Ditch between McDonnell Boulevard and the former ballfield area. Excavation and disposal of about 11,300 yd^3 (ex-situ) of contaminated materials from the soils in the ditch on the north side of McDonnell Boulevard was performed as a removal action. The North Ditch removal areas are shown in Figure 2-10.

During 2000, approximately 5,400 m^3 (7,100 yd^3) of contaminated soils were excavated from a portion of VP-38, a haul road vicinity property located at the northwest corner of Latty Avenue and Hazelwood Avenue.

2.2.1.3 Description of Latty Avenue Properties

The Latty Avenue properties, which include HISS, Futura Coatings, and eight VPs [designated 1 (L) – 6(L), 40A, and 10k530087on Figure 2-11] are 1.2 km (0.75 mi) northeast of SLAPS. Key features of the HISS/Futura properties, located at 9200 Latty Avenue, are shown on Figure 2-12. These properties cover a 4.5-ha (11 acre) tract. The HISS and Futura (HISS/Futura) properties are in the City of Hazelwood. The VPs lie mostly within the City of Berkeley.

From 1966 to 1973, HISS/Futura was used to store radioactive material purchased from the AEC. In the 1960s, a private corporation, CMM, purchased the ore residues and the uranium process wastes being stored at SLAPS. The material was purchased for private commercial purposes including the planned extraction of the radioactive and other metals. The transfer and storage activities were licensed by the AEC. By the time CMM obtained their license, extracting the uranium on-site at SLAPS had been ruled out in favor of moving the material to HISS/Futura. The conditions of CMM's license specified that it was for the removal of the stockpiled residues from 50 Brown Road (SLAPS) and storage only at the licensee's facility at 9200 Latty Avenue. Although CMM had applied to the AEC for a license to allow processing of the materials, the AEC required additional process information before they would amend the license to allow processing. CMM never provided the necessary information to the AEC. The material purchased included:

- 74,500 tons of pitchblende (Congo) raffinate cake (AM-7) containing 113 tons of uranium;
- 32,500 tons of Colorado raffinate cake (AM-10) containing 48 tons of uranium;
- 8,700 tons of leached barium sulfate cake (AJ-4 – also sometimes called barium cake) containing 7 tons of uranium;
- 1,500 tons of unleached barium sulfate cake (AJ-4) containing 22 tons of uranium; and
- 350 tons of miscellaneous material in drums containing 2 tons of uranium.

These residues were removed from SLAPS and placed directly on the ground at HISS/Futura.

The Commercial Discount Corporation of Chicago (CDC) purchased the residues from the CMM in January 1967, dried, and shipped a majority of them to Cotter Corporation facilities in Canon City, Colorado. CDC applied for and was granted an AEC license to possess (and store) the material. Later the AEC amended CDC's license to allow them to "condition" the material by drying (to 15% moisture), load it into rail cars, and ship the dried material to Cotter's facility. Other remaining residuals at HISS/Futura were sold to Cotter Corporation in 1969. These residues included 10,000 tons of Colorado raffinate cake (raffinate cake generated when Colorado ore was substituted for pitchblende) and 8,700 tons of leached barium sulfate. In 1970, Cotter Corporation dried and shipped some more of the Colorado raffinate to its mills in Canon City. Cotter's activities in Colorado were covered by a separate license issued by the state of

Colorado. In 1973, Cotter shipped the remaining undried Colorado raffinate cake to Canon City and transported the leached barium sulfate, mixed with topsoil, to the Westlake Landfill in western St. Louis County. Cotter informed the AEC of this activity in early 1974. Westlake Landfill is not within the scope of this FS, and is being addressed by EPA and others in a separate action.

The first investigation of the Cotter property at Latty Avenue (now HISS/Futura) occurred on June 22-24, and August 11, 1976. During this investigation only four samples were collected at the Latty site. Of these, the two soil samples were analyzed for "natural uranium" and Ra-226. This information is included in the U.S. Nuclear Regulatory Commission (NRC) inspection report dated (approved) January 5, 1977.

In July 1977, a more detailed survey of HISS/Futura was conducted by the Energy Research and Development Administration (ERDA) on behalf of the NRC. The NRC report entitled "Preliminary Report on the Results of a Radiological Survey Conducted at the Former Cotter Property", produced by ERDA, contains the concentrations of radionuclides in soil samples taken inside and near buildings (at what is now Futura) (ERDA, 1977). A total of 12 samples were taken and analyzed for Ra-226, U-238, and actinium (Ac-227). The ERDA report indicates that a limited number of samples would be analyzed for Th-230, but at the time of the Preliminary Report, this had not yet occurred. It should be noted that "inside buildings" is the correct description for some of the samples since the largest building (where the drying operation took place) originally had a dirt floor.

Ranges of concentrations reported in the ERDA report were:

Ra-226	3 – 2,700 pCi/g
U-238	2.1 – 1,100 pCi/g
Ac-227	1.3 – 1,300 pCi/g

In June 1977, Jarboe Realty and Investment purchased the buildings and grounds on Latty Avenue (now HISS/Futura). The property was leased to Futura to prepare the site for commercial use. One existing building was demolished, the property was excavated and leveled, several areas were paved, three new buildings were erected, and a 1.4-ha (3.5 acre) tract of land surrounding the area was cleared.

Since the removal of the residues by CDC and Cotter, several developmental activities have resulted in the generation of contaminated soil storage piles at HISS and an adjacent property. The first interim storage pile at HISS was created in 1979 when 9,900 cubic meter (m^3) (13,000 yd^3) of contaminated soil and material was moved from the adjacent Futura parcel to the eastern half of HISS to allow construction of a manufacturing facility to proceed. In 1984, Bechtel National, Inc. (BNI) performed cleanup activities at the property at 9200 Latty Avenue that resulted in the storage of 10,700 m^3 (14,000 yd^3) of contaminated soil in the main pile at HISS. In 1986, DOE directed BNI to provide radiological monitoring support for work involving drainage and street improvements along Latty Avenue. As a result of these efforts, 3,500 m^3 (4,600 yd^3) of contaminated soil was added to a supplemental storage pile at HISS. In 1996, additional storage piles (the East Piles) were created when the owner of the property, General Investment Funds Real Estate Holding Company (GIFREHC), made commercial parking and drainage improvements on the property to the east of HISS and consolidated the excavated material into two piles on the southwest portion of Latty Avenue VP 2L. In early 1999, two additional spoils piles (Piles A and B) were created when the rail spur was installed at HISS.

Additional characterization of the main and supplemental HISS piles was conducted in 1997. The sampling was done to characterize the distribution of radiological and chemical contamination in the piles, identify the presence of any mixed waste, and support the evaluation of cleanup alternatives. The removal of all the existing storage and spoil piles shown on Figure 2-12 was conducted during 2000 and 2001 under an approved EE/CA (USACE, 1998b). Preparations included construction of a railroad spur along the eastern boundary of HISS that was completed in early 1999. Removal of 12,200 m^3 (15,900 yd^3) of contaminated soil and debris comprising the East Piles and Spoils Piles was completed in May 2000. In October 2000, USACE removed approximately 5,400 m^3 (7,100 yd^3) of material from the Supplemental Storage Pile. Work on the removal of the Main Pile began in Fall 2000, and by Summer 2001, approximately 15,300 m^3 (20,000 yd^3) of contaminated soils and debris had been loaded onto railcars for transport to an out-of-state disposal facility. Removal of the Main Pile began in September 2001. By the end of October 2001, a total of approximately 44,300 m^3 (58,000 yd^3) of material had been removed from HISS.

Currently, the Futura Site is the location of a coatings manufacturing facility that is known to generate Resource Conservation and Recovery Act (RCRA) listed wastes. Any future remediation activities on the Futura Site will evaluate the presence of listed waste with any radiological waste associated with uranium manufacturing or processing activities at SLDS. To date no evidence exists that listed wastes are co-located with the FUSRAP-related wastes. It is recognized that the presence of radiological waste mixed with listed waste may severely impact USACE's ability to treat and dispose of this waste as well as add considerable cost to the remediation of the Futura Site.

2.2.2 Meteorology

The climate of the St. Louis area is characterized as warm and moist in summer and cold and dry in winter. The region is dominated by warm, moist maritime tropical air masses, which flow northward from the Gulf of Mexico region during the summer and by colder, drier polar air masses, which drift down from the Canadian Provinces during the winter. Climatological and meteorological data from the Lambert-St. Louis International Airport over a 30-year period are summarized in Table 2-2.

In general, southerly and northwesterly winds dominate the wind regime of the St. Louis region. Southerly winds predominate from May through November, and northwesterly winds predominate from December through April. Annual normal monthly high and low temperatures are 31°C and -5°C (88°F and 23°F), respectively. The area averages 91 centimeters (cm) [36 inches (in)] per year in total (water equivalent) precipitation (i.e., rainfall plus water content of melted snowfall). Average annual snowfall is roughly 66 cm (26 in).

The tornado is the most common form of severe weather observed in this region. From 1916 through 1985, 52 recorded tornadoes occurred in the St. Louis metropolitan area. Based on records obtained from 1953 to 1990, Missouri is ranked seventh nationally in the occurrence of tornadoes and averages 11 tornado and 27 storm days per year (NOAA, 1990).

Tropical hurricanes, storms, and disturbances are much less frequent than tornadoes. Between 1886 and 1986, only eight tropical storms have crossed within a 2 × 2 degree (latitude and longitude) box centered on the St. Louis area (Tropical Cyclone Data Tape-TD9267). The consequences of such storms in the St. Louis area result in heavy rains and flooding rather than destructive winds.

Ambient air quality and the conditions for air emission control are at their worst on summer mornings in the St. Louis area because of the pattern of strong temperature inversions at night. These results reflect atmospheric stability and mixing height. Table 2-3 summarizes the seasonal distribution of stability classes [after Pasquill (1961) and Gifford (1961)] and morning and afternoon mixing heights for the St. Louis region. Three stability classes (D, E, and F), which represent neutral to stable conditions, are relatively evenly distributed for the St. Louis region with each occurring roughly 28 percent of the time on an annual basis (O'Donnell, 1981). Class D stability is associated generally with cloudy and moderately windy conditions, which tend to counteract surface layer stratification. Classes E and F are indicative of inversion conditions and occur during cool, clear nights under low to calm wind speeds. The resulting dense air trapped near the ground resists vertical mixing and creates poor dispersion conditions. The mixing height is the depth of the atmosphere over which a pollutant release will be effectively dispersed. Thus, relatively low mixing heights give rise to higher surface level concentrations due to reduced vertical mixing.

Table 2-2. Climatological and Meteorological Conditions at the Lambert-St. Louis International Airport, St. Louis, Missouri

	Temperature (°F)						
	Normal			Extreme			
Month	**Max**	**Min**	**Avg**	**High**	**Year**	**Low**	**Year**
January	39.9	22.6	31.3	76	1970	-14	1977
February	44.2	26.0	35.1	85	1972	-10	1979
March	53.0	33.5	43.3	88	1963	-5	1960
April	67.0	46.0	56.5	92	1970	22	1975
May	76.0	55.5	65.8	92	1978	31	1976
June	84.9	64.8	74.9	98	1971	43	1969
July	88.4	68.8	78.6	107	1980	51	1972
August	87.2	67.1	77.2	105	1980	47	1965
September	80.1	59.1	69.6	100	1971	36	1974
October	69.8	48.4	59.1	94	1963	23	1976
November	54.1	34.9	45.0	82	1978	1	1964
December	42.7	26.5	34.6	76	1970	-10	1976
Annual	88.4	22.6	55.9	107	1980	-14	1977

	Precipitation (in)			Relative Humidity (%)				Wind	
Month	**Max**	**Min**	**Avg**	**12 a.m.**	**6 a.m.**	**12 p.m.**	**6 p.m.**	**Speed (mph)**	**Dir**
January	5.38	0.22	1.85	78	83	66	71	10.4	NW
February	4.17	0.25	2.06	78	82	63	66	10.9	NW
March	6.67	1.09	3.03	75	82	59	60	11.9	WNW
April	9.09	0.99	3.92	71	79	55	53	11.5	WNW
May	7.25	1.02	3.86	76	83	56	56	9.4	S

Month	Precipitation (in)			Relative Humidity (%)				Wind	
	Max	Min	Avg	12 a.m.	6 a.m.	12 p.m.	6 p.m.	Speed (mph)	Dir
June	8.65	0.47	4.42	78	84	56	55	8.8	S
July	10.71	0.60	3.69	78	86	57	56	7.9	S
August	6.44	0.08	2.87	81	89	57	58	7.6	S
September	6.21	Trace	2.89	82	91	59	61	7.9	S
October	5.77	0.21	2.79	77	86	55	60	8.7	S
November	5.74	0.44	2.47	78	85	63	68	9.9	S
December	6.50	0.32	2.04	81	85	69	74	10.3	WNW
Annual	10.71	0.08	2.99	78	84	60	62	9.6	S

Source: *Local Climatological Data*, Annual Summary with Comparative Data (NOAA, 1981).

Table 2-3. Seasonal Distribution of Stability Classes and Mixing Heights for the St. Louis, Missouri Area

Season	Mixing Height (m)		Stability Class (%)					
	a.m.	p.m.	A	B	C	D	E	F
Winter	500	900	0.0	0.8	5.9	30.8	39.6	22.9
Spring	500	1600	0.6	4.9	9.5	29.1	32.2	23.7
Summer	300	1700	1.8	10.0	16.8	27.1	11.0	33.3
Fall	400	1400	0.1	3.3	9.5	24.5	29.5	33.1
Annual	400	1400	0.6	4.8	10.5	27.9	28.0	28.2

[a] Adapted from O'Donnell (1981).
[b] Mixing heights interpolated from maps generated by Holzworth (1972).

2.2.3 Surface-water Hydrology

Coldwater Creek: Coldwater Creek is the main drainage for the North County Site. Coldwater Creek and tributaries are shown in Figure 2-13. The creek is classified by MDNR as a Class "C" waterway downstream of SLAPS, for 5.5 miles from the mouth of the creek to its first intersection with Lindbergh (Section C as shown on Figure 2-14). Class C means there are periods of no flow in the creek, but permanent pools are always present. Coldwater Creek, the main surface-water drainage for SLAPS, flows through the Florissant Basin, a shallow, oval-shaped depression filled with glacial lake sediments. The stratified sands, silts, and clays filling the basin can be up to 30 m (100 ft) deep and are often covered by a layer of loess 1.5 to 7.6 m (5 to 25 ft) thick. The basin is approximately 16 km (10 mi) long on its north-south axis and 5.6 km (3.5 mi) wide on its east-west axis. The basin is bounded on the north and west by the steep bluffs of the Missouri River and on the south and east by rolling upland. The basin is nearly flat with slopes of less than 5 percent and elevations ranging from 120 to 220 m (400 to 720 ft) above mean sea level (MSL). The highest point in the watershed is located at the headwaters near Overland located approximately 6 km (4 mi) southwest of SLAPS. The lowest point is located where Coldwater Creek discharges into the Missouri River, approximately 24 km (15 mi) northeast of the SLAPS property.

Coldwater Creek empties into the Missouri River at River Mile 7 (Creek Mile 0). The creek is the primary surface-water feature in the airport area but is not used for municipal drinking water. The closest municipal water intakes are located on the Mississippi River approximately 8 km (5 mi) downstream of where the Missouri River discharges into the Mississippi River (BNI, 1992a), or 20 km (12 mi) from the mouth of Coldwater Creek.

The main channel of Coldwater Creek is 31.5 km (19.5 mi) long and has relatively short tributary streams. SLAPS is at Creek Mile 13.8, and HISS is at Creek Mile 12.9. At McDonnell Boulevard, which forms the northern boundary of SLAPS, the drainage area is 32 square kilometers (km^2) [12 square mile (mi^2)] (Hauth and Spencer, 1971). Coldwater Creek, which originates south of SLAPS, generally flows north between the cities of Overland and Florissant and then east to the Missouri River. Just up-gradient (south) of SLAPS, the creek flows in culverts under the Lambert-St. Louis International Airport. The total watershed area of Coldwater Creek is 120 km^2 (47 mi^2). The annual average flow rate of Coldwater Creek (SAIC, 1993b) is 41 ft^3 per second or equivalent to 100 million liters per day (L/d) [65 million gallons per day (gpd)].

Flooding in Coldwater Creek occurs annually. Most of the flooding results from short-term, high-intensity thunderstorms that cause flash floods. The portion of the Creek beneath the airport is buried within a concrete culvert. Coldwater Creek is the recipient of surface-water/storm-water drainage from Lambert-St. Louis International Airport. For purposes of analysis the creek has been divided into three sections: A, B, and C. Section C of Coldwater Creek, as shown on Figure 2-14, is protected for livestock/wildlife watering and aquatic-life usage (from the intersection with Lindbergh downstream to the mouth of the creek at the Missouri River).

The water quality in Coldwater Creek is generally poor. Studies of aquatic life (SAIC, 1999) indicate that the stream ecology is severely impacted. The nature of pollution causing this impact is not definitively known but is believed to result from storm-water runoff (i.e., salt, oil, antifreeze, jet fuel, etc.). In addition, high ammonia levels and low levels of dissolved solids have been detected downstream from the Metropolitan Sewer District (MSD) sewage treatment plant (Ford, 1992; USACE, 1987a). Pollutants enter the stream in storm water from commercial and industrial facilities, residential areas, and the Lambert-St. Louis International Airport. SLAPS runoff also flows into Coldwater Creek. More than a dozen facilities that are permitted under the National Pollutant Discharge Elimination System (NPDES) program discharge directly into the stream, including Ford Motor Company, Lambert-St. Louis International Airport, and the McDonnell Douglas Corporation. These discharges include storm-water runoff, cooling water discharge, water treatment, airport deicing, and manufacturing runoff. USACE currently holds an NPDES permit to discharge water runoff at HISS into the sewer system that ultimately empties into Coldwater Creek. There also is a storm-water permit for HISS. Discharges to the Publicly Owned Treatment Works (POTW) from the North County Site are subject to the provisions of the MSD.

SLAPS Drainage: From the 1970s when the site was closed until recently when removal actions were started, drainage ditches located along the northern and southern boundaries of SLAPS drained the west end. Drainage from the central and eastern ends of the site and a portion of the former ballfields was directed beneath McDonnell Boulevard and flowed west to Coldwater Creek in a drainage ditch located adjacent to the north side of McDonnell Boulevard. A drainage ditch flowing northward through the ballfields conveyed surface-water run off from the eastern end of SLAPS and eastern portions of the ballfields to Coldwater Creek.

Implementation of the non-time critical removal actions as described in the previously mentioned EE/CA has changed these drainage patterns. Contaminated soils have been excavated along the northern, southern, and western boundaries of the site that are drained by the first two of the indicated ditches. Stabilized drainage ways have been constructed along the northern and southern boundaries of the site to convey the run off currently captured by the first three ditches into a sedimentation basin that has been constructed along the western boundary of SLAPS. The primary outfall (Outfall 001a) from this basin to Coldwater Creek is at its south end. An emergency overflow spillway is located at the northwest corner of SLAPS.

2.2.4 Geology and Soils

SLAPS, HISS/Futura, and the other North County areas are situated on a modest upland area between the Missouri and Mississippi River floodplains in northern St. Louis County. The upland area surrounds a topographic depression known as the Florissant Basin. Pleistocene sediments and recent fill overlies shale and limestone bedrock. Faulting is not evident at the site, and bedrock at depth appears to be almost flat. The soils over the North County Site are predominately silty deposits that originated from former glacial advances, historical Missouri and Mississippi River flooding, and more recent fill activities.

2.2.4.1 Regional Geology

The North County Site lies within the Dissected Till Plains Section of the Central Lowlands Province of the Interior Plains Division (Fenneman, 1938). The region surrounding the Missouri and Mississippi Rivers is characterized by mature topography with short, steep valleys draining into large streams. In other areas, stream development is distinct; floodplains are broad, and streams are flood-prone. In some cases, streams may follow buried, preglacial channels (Stohr, St. Ivany, and Williams, 1981). In the vicinity of SLAPS and HISS/Futura, the channel of Coldwater Creek follows the path of an ancient channel buried by glacial sediments. The present surface topography in the area is essentially flat.

2.2.4.2 Stratigraphy

A generalized stratigraphic column for the St. Louis area is shown in Figure 2-15. The stratigraphy of the area consists of 10 to 30 m of Pleistocene sediments and recent fill overlying Desmoinesian shale, and Chesterian, and Meramecian limestone bedrock. Figure 2-16 shows a generalized surficial geologic map of the St. Louis area including the approximate western limit of Illinoisan glaciation. The approximate southern limit of Kansan and Nebraskan glaciation was just north of the Missouri River (Howe and Koenig, 1961).

Mississippian System

<u>Meramecian Series:</u> The Meramecian Series consists of three formations: Warsaw, Salem, and St. Louis. These formations, with the exception of the Warsaw whose upper part in eastern Missouri is shale, are composed mainly of limestone and some dolomite. Chert is not common but does occur in all of the formations. All three formations are present in east central Missouri, which is regarded as the type area (i.e., has typical features) for the St. Louis Formation. Warsaw and Salem are the only formations of this series that have been definitely identified in central Missouri. Limestones of the Mississippian System are reported subject to the development of karst features in the St. Louis area (Goodfield, 1965). The Warsaw and Salem Formations are not covered in the following discussion because they do not occur as bedrock near SLAPS and HISS.

<u>St. Louis Limestone:</u> The St. Louis Limestone reaches its greatest thickness and displays all of its stratigraphic features at its type area in St. Louis County and in adjacent parts of east-central and southeastern Missouri. Here, the formation is a gray, lithologic to finely crystalline, medium- to massively-bedded limestone as much as 300 m (1,000 ft) thick. Limestone breccia is common in, but not necessarily confined to, the lower part of the formation. Shale occurs as a matrix between the blocks of breccia. Blue and bluish-gray shales also form thin beds throughout the formation and increase in abundance in the northeastern part of the state. Chert is uncommon, and parts of the formation are locally dolomitic.

The compound corals *Lithostrotionella castelnaui* and *Lithostrotion proliferum* are considered to be diagnostic, and the coral *Syringopora* is common. The contact between the St. Louis and Salem Formations appears to be gradational. Limestone from the St. Louis Limestone is quarried in the St. Louis area for manufacturing cement and aggregate.

Chesterian Series

<u>Ste. Genevieve Limestone:</u> The Ste. Genevieve Limestone overlies the St. Louis Limestone and is typically present in the east-central and southeastern parts of Missouri in Ste. Genevieve and St. Louis counties , as well as eastern Perry County. It is also present in adjacent parts of Illinois and Kentucky, where it has been subdivided into members. In the St. Louis area, the Ste. Genevieve is a white, massively bedded, sandy clastic limestone. It is generally coarsely crystalline and oolitic but also contains a few beds of finely crystalline limestone. Fossils are irregularly distributed throughout the formation. The lower part of the formation contains layers of chert, as well as lenses and beds of sandstone. The lithology of Ste. Genevieve changes laterally, which makes individual units difficult to trace.

The formation is 9 m (30 ft) thick in St. Louis County. Its unconformable contact with the underlying St. Louis Limestone is marked by a basal conglomerate, and solution channels are present in numerous places. A significant erosional surface marks the top of the Ste. Genevieve Limestone.

At the North County Site, the Ste. Genevieve formation is overlain by either beds of the Pennsylvanian System or Pleistocene deposits. The Ste. Genevieve and (underlying) St. Louis Limestones were confirmed as the bedrock beneath SLAPS by examining 4.5 m (15 ft) of rock core sample from MW-35.

Pennsylvanian System

<u>Atokan Series:</u> Searight and Howe (Howe and Koenig, 1961) have provided a description of this series. They found that “Fossil evidence indicates the presence in Missouri of pre-Desmoinesian rocks which are assignable to the Atokan age. The lowermost of these rocks are the Cheltenham clays of eastern Missouri…"

<u>Desmoinesian Series:</u> The Cherokee and Marmaton Groups compose the Desmoinesian Series.

Cherokee Group: This group consists of all the strata included in the Krebs and Cabaniss Subgroups. The Krebs Subgroup is made up of sandstone, siltstone, shale, limestone, and coal beds. In many places, the Krebs consists predominately of sandstone.

The strata in the Cabaniss Subgroup consist of sandstone, siltstone, shale, underclay, limestone, and coal beds. These strata occur in 12 widely recognized successions, each of which (with certain exceptions as noted in formational descriptions elsewhere) is a cyclic unit that includes a coal bed at the top. Each succession has been named and is treated as a formation. The Lagonda Formation, which constitutes most of the Cherokee Group in the area of the North County Site (Saeger, 1975), consists of shales that are locally sandy and micaceous. Interbeds of sandstone and siltstone that are up to 3 m (10 ft) thick, plant remains, and fossils may also be present.

Marmaton Group: The Marmaton consists of a succession of shale, limestone, clay, and coal beds with more abundant limestone units that are thicker and more laterally continuous than in the Cabaniss Subgroup. The Marmaton Group in Missouri is divided into the Fort Scott and Appanoose Subgroups.

The Missourian Series does not underlie SLAPS. Any younger Mesozoic and Tertiary sediments that may have been deposited in the St. Louis area have been removed by erosion.

Post-Paleozoic (Soil) Sediments

Plio-Pleistocene sediments, which overlie Paleozoic deposits in the SLAPS and HISS area, consist of clay, silt, sand, and gravel that were deposited by glacial, alluvial, lacustrine, and eolian processes (Howe and Koenig, 1961). These sediments were deposited during several glacial stages and associated interglacial stages. From oldest to youngest, these glacial stages are Nebraskan, Kansan, Illinoisan, and Wisconsinan. The interglacial stages, which are characterized by the development of soil horizons, are not described in the following sections because of their limited occurrence.

Pre-Illinoisan Deposits: The complex nature of pre-Illinoisan sedimentation makes time, stratigraphic, and lithostratigraphic correlations difficult (Richmond and Fullerton, 1986). Deposits in the City of St. Louis area reach a maximum thickness of 13 m (42 ft), because most of the sediments in St. Louis were deposited during the pre-Illinoisan stage.

Illinoisan Stage: The Loveland Loess is the only recognized deposit associated with Illinoisan glaciation. This loess in the St. Louis area is composed of medium- to coarse-grained, noncalcareous silt. The unit reaches a maximum thickness of 6 m (20 ft) in St. Louis County.

Wisconsinan Stage: Deposits associated with Wisconsinan glaciation consist of several loess units. The Roxana Silt and the Peoria Loess are the most widespread glacial units in the St. Louis area. Both units are composed of well-sorted, medium to coarse silt with some sand. The Peoria Loess also contains occasional carbonate and manganese nodules and limonite tubes. The Peoria Loess reaches a maximum thickness of 15 m (50 ft) in the St. Louis area and is probably the uppermost sedimentary unit at SLAPS.

2.2.4.3 Structural Development

Lateral tectonic forces from the southwest created most of the faulting and folding in Missouri. As a result, the structural grain of basement crystalline rocks is aligned in a predominately northwest/southeast pattern. Numerous investigators (such as McCracken, 1971) have described a subordinate northeast/southwest structural pattern. The presence of these patterns is important in understanding the geologic and structural history of the region. The orientation of fractures in bedrock underlying SLAPS is expected to be similar to the predominant regional structural orientation.

The Ozark uplift, a region of repeated upward movement, is south of the City of St. Louis. Six episodes of regional deformation that resulted from continued uplift have been identified. The initial and most intense structural deformation episode occurred in the Precambrian era. In response to this tectonic activity, extensive block fault systems developed along northwestern-trending lineaments (McCracken, 1971).

Northwest of the St. Louis area, the Cap Au Gres fault system developed in response to the second episode of Ozark uplift in mid-Ordovician time, continued with deformation in the Devonian era (third episode), and culminated with minor deformation in the pre-Pennsylvanian period (fourth episode). Vertical movement of the Cap Au Gres fault created the Lincoln fold and a broad asymmetrical anticline known as the Eureka-House Springs anticline. Developed above a Precambrian lineament, the Eureka-House Springs anticline trends northwest to southeast and is approximately 24 km (15 mi) southwest of SLAPS. The fifth Paleozoic deformation period occurred at the end of the Pennsylvanian period (McCracken, 1971) in conjunction with movements along existing fault systems in the Precambrian basement. Rejuvenation of uplift in the Ozark region (sixth episode) with differential depression of the Mississippi Embayment occurred in pre-Pliocene time. Only minor movements along existing structures have been attributed to this final episode. Intermittent uplift appears to be continuing, as evidenced by entrenched meanders and Pleistocene terrace remnants.

Folding of bedrock formations was minimal. Steeply dipping beds are restricted to the immediate vicinity of faults, and the regional dip of strata is generally less than three degrees.

The St. Louis fault developed as an offset of secondary stress feature in response to the Ozark tectonics. The present course of the Mississippi River parallels this structural feature. The Dupo-Waterloo anticline and the Cheltenham syncline of East St. Louis and Illinois also parallel this structure. The convergence of these two regional features has created the Florissant Dome.

The Florissant Basin has formed independent of these features. Faulting is not evident at the site; bedrock at depth appears to be almost flat, dipping 11 m/km (60 ft/mi) to the north-northeast to the Cheltenham syncline, which formed because of the tectonic episodes related to the Ozark uplift. The Florissant Basin consists of variable thicknesses of unconsolidated Pleistocene sand, silt, and clay deposited on Paleozoic bedrock. These deposits represent a wide variety of origins, including glacially derived outwash and aeolian-deposited loess and alluvial deposits of the Mississippi and Missouri River systems.

The Florissant Basin was created through erosion of the bedrock surface by a tributary of the Mississippi River (Goodfield, 1965). The river and tributary were blocked by glacial advance during the Illinoisan period, creating a lake. As a result, sediment-laden waters flowed into the areas from the northeast, slowly filling the former tributary channel that cut into the top of the bedrock surface. During the subsequent glacial readvance of 10,000 to 15,000 years, a loess cover blanketed the lake sediments.

This depositional history is supported by the fine texture and lithology of the lacustrian (lake) sediments observed in soil borings from the basin and by the very flat nature of the topography. Correlation of terrace remnants in the basin northeast of the study area with high-level (flow) terrace remnants at the same elevation along the Mississippi, Missouri, and Illinois Rivers also supports this theory of origin.

The North County Site is in a tectonically inactive region about 150 miles from the tectonically active New Madrid seismic zone. A search of reported seismic events from 1795 to 1984 found 31 events of intensity III through VII on the Modified Mercalli intensity (MMI) scale within a 50-km (30-mi) radius around St. Louis (Weston, 1979; BNI, 1992a). An earthquake of intensity VII may cause structural damage, but no surface faulting would result.

2.2.4.4 Soil Development

The soil types mapped over SLAPS, HISS, and adjacent areas by the Soil Survey of St. Louis County and St. Louis City, Missouri (USDA-SCS, 1982), are predominantly the Nevin silt loam, the Nevin-Urban land complex, and the Menfro silt loam. According to the Unified Soil Classification System (USCS), a silt loam texture would be considered an ML and a silty clay loam would be a CL classification. A CL classified soil has higher clay content than an ML classification.

The Nevin silt loam is a nearly level, somewhat poorly drained soil located in moderately wide to wide depressional (formerly glacial lake) basins on uplands. This loam has formed in silty loess and lacustrine deposits. The Menfro silt loam is a gently to moderately sloping, well-drained soil located on ridge tops and side slopes of uplands and has formed in loess deposits in these adjacent upland areas. The Nevin-Urban land complex consists of intermingled areas of native Nevin soils and disturbed soils that have been developed and built upon. The complex may have had fill material placed to improve surface drainage.

The Nevin silt loam soils and undisturbed areas of Nevin soils within the Nevin-Urban land complex typically have a very dark gray to black surface layer of silt loam approximately 28 cm (11 in) thick. The first subsurface layer is a very dark gray to black silt loam about 33 cm (13 in) thick. The subsoil is a mottled dark grayish-brown and yellowish-brown, silty clay loam and silt loam about 53 cm (21 in) thick. The substratum (parent material) to a depth of about 1.5 m (60 in) is light brownish-gray, mottled silt loam. The soil permeability is moderate, surface runoff is slow, and the available water capacity is very high. A seasonal high water table may be apparent at a depth of 0.6 to 1.2 m (2 to 4 ft) below the soil surface during winter and early spring if the soil is not frozen. The Menfro silt loam soils typically have a surface layer of brown silt loam about 18 cm (7 in) thick, a subsurface layer of brown silt loam about 15 cm (6 in) thick, and a subsoil of brown silty clay loam about 107 cm (42 in) thick. The substratum (parent material) to a depth of about 1.5 m (60 in) is yellowish-brown silt loam. The soil permeability is moderate, and surface runoff is medium. This soil also has a very high available water capacity (USDA-SCS, 1982).

Soil borings completed across SLAPS penetrated predominantly the Nevin silt loam soil that has been relatively undisturbed over some of the site. Depths of disturbed soil and fill reportedly range from absent to approximately 4.3 m (14 ft) near where the drainage ditch that crosses the ballfields enters Coldwater Creek. A review of the soil boring data over most of the middle and eastern sections of SLAPS indicates predominantly undisturbed native Nevin soils with very thick black surface layers that are classified as mollic epipedons (indicative of soils formed under prairie grassland conditions). In this area of SLAPS, surface fill layers ranging from 0 to 60 cm (0 to 2 ft) thick consist of clayey subsoil materials which reportedly were placed over the site in an effort to "clay cap" the site. Other areas of SLAPS to the west and closer to Coldwater Creek reportedly encountered much thicker fill materials consisting of concrete, metal, asphalt, etc. Common, prominent soil drainage mottling was observed in the soil borings consistent with the soil survey description, and manganese stains and nodules and iron-cemented concretions were also present. The depth of the pedogenic (acted upon by current soil-forming processes) soil materials ranges from approximately 1 to 1.5 m (40 to 60 in), and below that, a mixture of silty loess and lacustrine deposits was encountered consisting of light brownish-gray silt loams (ML/CL) and silty clay loams (CL) with apparent zones of saturation.

Geotechnical analyses previously performed on SLAPS soil samples from a depth of 0 to 60 cm (0-2 ft) revealed that characteristics of the soils are consistent with reported values (USDA-SCS, 1982). Three of the four samples were from the Nevin silt loam, and one was from the Nevin-Urban land complex. The samples from the Nevin silt loam had liquid limits ranging from 34 to 35 percent and plasticity indexes of 13 to 14 percent. This agrees with reported values of 35 to 45 percent for liquid limits and 10 to 20 percent for plasticity indexes. One subsoil sample [collected from the 0.6 to 1.2 m (2 to 4 ft) depth interval] from the Nevin silt loam had values of 51 percent for liquid limit and 28 percent for plasticity index. Reported values for this interval are 40 to 50 percent for liquid limits and 20 to 30 percent for plasticity indexes. The sample from the Nevin-Urban land complex had a liquid limit of 35 percent and a plasticity index of 14 percent, which also agree with reported values. Data summarized in the soil survey indicate that soil permeability ranges from 1.5 to 5 cm (0.6 to 2 in) per hour in the 0 to 1.5 m (0 to 60 in) depth in both the Nevin and Menfro soils. The average available water capacity is approximately 0.2 inches per inch on a volume basis (USDA-SCS, 1982).

2.2.5 Hydrogeology

2.2.5.1 Greater St. Louis Area Ground Water

<u>Water Bearing Bedrock Units:</u> Miller et al. (1974) found that large amounts of water are stored in the bedrock and alluvium underlying the area. Water occurs in the bedrock along fractures and bedding planes as well as in solution openings in the bedrock. Shale is generally impervious to the movement of water and is usually not a source of supply. The availability of water from bedrock depends upon the amount of fracturing and solution which the rocks have undergone and the degree to which these openings are interconnected (Miller et al., 1974).

The water-bearing bedrock units are assigned to five groups in the City of St. Louis area based on similar lithologic characteristics, geographic distribution, and overall similarity of water quality (Miller et al., 1974). Intervening, non-productive strata also create natural boundaries between water-bearing bedrock units. The division of the stratigraphic system into five groups is also pragmatic, because individual stratigraphic units typically do not have the yield or water quality to produce significant yields of high quality water. Therefore, wells for domestic production are usually open to large sequences of strata that correspond to the five major water-bearing stratigraphic groups.

Figure 2-17 provides the generalized hydrostratigraphic column for SLAPS and HISS/Futura. The five major groups are discussed from youngest to oldest (i.e., shallowest to deepest bedrock). Five major hydrostratigraphic aquifer groups present in the St. Louis area are described in the following paragraphs.

Group 1 (Post-Maquoketa) includes all soil and rock units above the Maquoketa Shale, which acts as a confining bed in the study area (St. Louis area). Pennsylvanian and Mississippian rocks (Ste. Genevieve, St. Louis Limestones) at the upper boundary of Group 1 are relatively impermeable and may yield very little water to wells. Mississippian limestones have yields from secondary permeability. All units of Figure 2-17 are within Group 1.

Group 2 (Kimmswick-Joachim) includes all aquifers between the base of the Maquoketa Formation and the base of the Joachim Formation. The Joachim is not considered to be a good aquifer in other parts of the state and, although it is not a confining bed, it probably does not yield water in quantities large enough for it to be considered an aquifer.

Group 3 (St. Peter-Everton) includes the St. Peter Sandstone and the Everton Formation.

Group 4 (Powell-Gasconade) includes all units in the Canadian Series of Early Ordivician age. The lower part of the Everton Formation and the upper three units of the Canadian (Powell, Cotter, and Jefferson City Dolomites) are not prolific water-bearing units. Small supplies can be developed in these units, but they are subject to failure during extended periods of drought or sustained pumping.

Group 5 (Eminence-Lamotte) includes all units below the base of the Gasconade Dolomite. The Eminence Dolomite is similar to the upper three units of the Canadian Series in its water-bearing characteristics and, hence, constitutes a good boundary marker between more prolific aquifers (Miller et al., 1974).

Miller et al. (1974) concluded that all bedrock units are locally capable of yielding water in varying amounts to wells. However, they noted that SLAPS and HISS are located within the portion of the region where ground-water yields for development of future high-yield water supplies is not recommended. This is because yields in the Post-Maquoketa and Kimmswick-Joachim are insufficient, and the deeper aquifers are saline (Miller et al., 1974).

Clearly, the most significant sources of drinking water in the St. Louis area are the Missouri and Mississippi Rivers, which supply nearly all of the water used in the area. "Little of the ground water in storage is used" (Miller, et. al., 1974). It is possible that low-yield residential, domestic wells can be installed in the Post-Maquoketa interval in the vicinity of SLAPS and HISS. This is the primary bedrock aquifer in the SLAPS and HISS area (Miller, et al., 1974).

Water Quality in the Group 1 (Post-Maquoketa) Aquifers

Water from Group 1 aquifers varies from a calcium-magnesium-bicarbonate type to a sodium-sulfate, sodium-bicarbonate, or a sodium-chloride type. The dissolved solids content is quite variable, ranging from 246 to 6,880 milligrams per liter (mg/L). The water is generally low in iron and very hard (Hem, 1970). Slightly more than 75 percent of the wells sampled (ninety-nine wells were analyzed) yielded water containing less than 0.3 mg/L of iron. Hardness of the water from most of the wells was greater than 180 mg/L. Fluoride content of the water is relatively high. In 50 percent of the samples, the fluoride content was greater than 1.4 mg/L (Miller et al., 1974). Miller et al. (1974) reported the following ground-water conditions:

> *"Just over 50 percent of the wells sampled yielded potable water. These wells are, for the most part, near the outcrop line of the Meramecian Series rocks (St. Louis, Salem, and Warsaw Formations) of Mississippian age, and, based upon the 25th percentile values, they yield predominantly calcium-magnesium-bicarbonate type of water. The higher dissolved-solids contents in water from Group 1 aquifers are from an area just north and northwest of the city of St. Louis in St. Louis County, and in extreme southeastern St. Louis County. Water in these areas generally is a sodium-chloride type, but it may also contain large amounts of calcium and sulfate. Variations in the predominant chemical characteristics between calcium-magnesium-bicarbonate type and the sodium-chloride type are presumably related to the effects of geologic structure, the movement of water from overlying or underlying formations into Group 1 aquifers, and to the presence of certain minerals in the parent rock.*
>
> *Water having a high sulfate content is, for the most part, limited to the area underlain by rocks of Pennsylvanian age. These rocks comprise shales, sandstones, and siltstones that locally have minor amounts of pyrite and gypsum. These fine-grained rocks are relatively impermeable; however, over a large area, they could yield enough seepage to explain some of the sulfate anomalies in the study area."*

2.2.5.2 Hydrostratigraphy of the North County Sites

Local Hydrostratigraphy at SLAPS

The geology of the St. Louis area was briefly summarized in Section 2.2.4. In the vicinity of SLAPS and HISS/Futura, surficial deposits (Unit 1) include topsoil and anthropogenic fill (rubble, scrap metal, gravel, glass, slag, and concrete). Figure 2-18 provides a conceptual sketch of shallow ground-water flow at SLAPS. Deeper ground-water flow cannot easily be inferred from site data, especially on the scale of the model.

Pleistocene loess and glacial lacustrine deposits underlie the fill (Units 2, 3, and 4). Unit 2 corresponds to loess. Unit 3, which is subdivided into subunits 3T, 3M, and 3B, consists primarily of clay and silt lacustrian (lakebed) deposits. Unit 4 consists of clayey gravel with increasing fine- to very-fine sand and sandy gravel near the bedrock contact.

Five hydrostratigraphic zones (HZs) have been identified beneath SLAPS on the basis of different ground-water flow and chemical characteristics. As would be expected, there is overlap between the HZs and the stratigraphic units described above because the differing lithologies described above impart different hydraulic properties to the stratigraphy. The HZs are: HZ-A which corresponds to stratigraphic Units 1, 2, and 3T; HZ-B which corresponds to stratigraphic unit 3M; HZ-C which corresponds to stratigraphic Units 3B and 4; HZ-D which corresponds to shale Unit 5; and, HZ-E which corresponds to limestone bedrock Unit 6. In general, HZ-A through C have low vertical hydraulic conductivities ranging from 2.5×10^{-6} cm/s in HZ-A to 5.5×10^{-8} cm/s in HZ-B. The low hydraulic conductivities in these hydrostratigraphic units are regularly manifested by slow recharge rates in monitoring wells screened in them.

Refinements have been made to the conceptual site model based on additional geologic data and a re-evaluation of historical boring logs. The refinements were made in two principal areas: the continuity of the shallow stratigraphic units and the designation of ground-water flow vectors. The stratigraphic revisions focus on the thickness and continuity of Units 3B and 3M in the eastern portion of SLAPS. Unlike the previous conceptual models, Figure 2-18 shows the 3M Unit as continuous across SLAPS and Unit 3B as truncating against the edge of the shale slope. The upper boundary of Unit 3M is not easily differentiated from the base of 3T, but is inferred to be relatively flat due to the depositional environment and so is shown as a dashed line at the eastern edge of SLAPS where it overlies the shale (Unit 5). In addition, ground-water flow vectors are no longer depicted below the loess (Unit 2) because there is insufficient data concerning the magnitude of the gradient in Unit 3T. The majority of the flow in the upper flow regime is within the loess as opposed to the 3T unit, based on the geologic characteristics of Units 2 and 3T. The present conceptual model, although varying from earlier geometry, does not have a substantial hydrogeologic consequence.

Forty-eight ground-water wells were installed from 1979 to 1992 at SLAPS and surrounding properties. Seven of these were decommissioned in the fall of 1997 and in April 1998 (wells A, B, C, M13.5-8.5s, M13.5-8.5D, F and M11-21s). Four additional wells were installed in 1998. Four additional wells were installed in 1999, two just south of SLAPS and two at the west end of SLAPS.

Thirty-two monitoring wells penetrate HZ-A. These wells penetrate stratigraphic Units 1 and 2, but none penetrate the entire 3M Unit. Sixteen wells were finished beneath the 3M Unit. Fourteen are in the silty clay and clayey gravels of HZ-C (stratigraphic Units 3B and 4). Two were completed in HZ-D, the shale bedrock occurring beneath the eastern end of the site.

A potentiometric map for the shallow HZ-A was constructed based on water-level measurements made in December 1998 from wells near SLAPS and HISS/Futura (Figure 2-19). Ground-water flow in HZ-A is westerly to north westerly towards Coldwater Creek at a fairly uniform gradient, and ground water of HZ-A is interpreted to discharge into Coldwater Creek. Potentiometric surfaces for the remaining four HZs have not been calculated because most wells drilled deeper than HZ-A are screened across more than one of the other HZs.

The chemical character of ground water in HZ-A at SLAPS is variable and cannot be easily characterized into an average overall composition. The Stiff diagrams in Figure 2-20 help demonstrate this complex nature by illustrating the variable anion and cation compositions of ground-water samples collected from SLAPS monitoring wells in 1997. There are no characteristic ion compositions of SLAPS HZ-A ground water except that calcium is typically the dominant cation. The complex chemical signature of SLAPS HZ-A ground water that is evident in the Stiff diagrams in Figure 2-20 is apparently due to impacts from surficial sources. In contrast, the ground water of the HZs underlying HZ-A has a remarkably uniform chemical character. Anion and cation compositions of ground-water samples collected from the lower HZs at SLAPS in 1997 are illustrated in the Stiff diagrams in Figure 2-21. Ion concentrations are relatively low in the lower HZs with calcium the dominant cation and bicarbonate the dominant anion. The Stiff diagrams in Figures 2-20 and 2-21 indicate that there is little to no communication between ground water in HZ-A and the lower HZs.

The interpretation of negligible communication between HZ-A and the lower HZs is supported by Piper diagrams in Figures 2-22 to 2-25. Figure 2-22 plots the anion and cation compositions of HZ-A ground-water samples collected from both SLAPS and HISS in 1997 (SAIC, 1998a and b). The data points on Figure 2-22 show significant spread. Total dissolved solids (TDS) in the samples plotted on Figure 2-22 ranges between 482 and 5153 mg/L as shown on Figure 2-23 (USACE, 2001). In terms of anions, HZ-A ranges between carbonate, chloride, and sulfate water types. One sample (from well 53W01S) plots near the sulfate apex on the Piper diagram. The reason for this is that, unlike the remainder of the samples, its bicarbonate concentration is very low, therefore anion proportions in the sample are dominated by sulfate. In terms of cations, the bulk of the HZ-A samples are calcium/magnesium water types but two samples are significantly more calcic (from well M11-9S and well B) than the others and two samples are more sodium+potassium rich (from well 53W18S and well 53W19S).

Major ion compositional data for monitoring well samples collected at SLAPS (SAIC, 1998a) and HISS (SAIC, 1998b) from hydrostratigraphic zones deeper than HZ-A (i.e., HZ-B through HZ-E) in 1997 are plotted on the Piper diagram in Figure 2-24. Except for one sample (from well B53W12D) the compositions portrayed on Figure 2-24 are remarkably uniform. One sample (from SLAPS well B53W12D) plots as a sulfate water type on Figure 2-24 because the reported concentration of carbonate+bicarbonate in the sample is zero (SAIC 1998a), therefore the anion proportions in this sample are dominated by sulfate. The remainder of the samples from the deeper ground water at SLAPS and HISS have carbonate+bicarbonate concentrations ranging from 360 to 722 mg/L. Given the uniformity in deeper ground-water major ion compositions and the fact that no other water sample from the North County Site, including water from HZ-A, has zero carbonate + bicarbonate, it is concluded that the carbonate species analysis for the 1997 sample from well B53W12D is incorrect. Additionally, as shown on Figure 2-25, TDS in the ground-water samples from beneath HZ-A are typically lower than what was observed in the HZ-A samples. In the lower HZ samples TDS range between 250 and 1011 mg/L. The uniformity of the major ion compositions in the four hydrologically distinct hydrostratigraphic zones HZ-B, HZ-C, HZ-D, and HZ-E argues for relatively undisturbed ground water below HZ-A.

Additional evidence supporting the existence of distinct upper and lower hydrostratigraphic zones are the tritium data collected in 1997 from selected well locations at SLAPS. Tritium was detected in ground-water samples from upper and lower zones ranging between 0.02 picocuries per liter (pCi/L) and 47 pCi/L at SLAPS and 0.08 pCi/L to 139 pCi/L at HISS. Each lower zone sample contains less than 1 pCi/L of tritium. The upper zone samples at SLAPS contain greater than 1 pCi/L of tritium with 10 samples containing greater than 10 pCi/L of tritium (SAIC, 1998a and b). Figure 2-26 demonstrates the distribution of tritium ground-water concentration at SLAPS. Tritium is a Hydrogen-3 isotope with a half-life of 12.3 years. It is produced in atmosphere by natural radiation and is brought to the earth's surface by precipitation. Additional tritium was introduced into the atmosphere during nuclear weapons testing in the 1950s and 1960s. Sufficient tritium was added to the global water cycle so as to make pre-1950 water distinguishable from post-1950 water. Higher concentrations of tritium are indicative of relatively young water that has not had the time to allow for tritium decay. Lower concentrations of tritium are indicative of relatively older water that has undergone longer residence times, greater amounts of tritium decay, and has not received tritium from man-made sources (Hem, 1970). At SLAPS, an order of magnitude or more difference in tritium concentrations exist between upper zone ground-water samples and lower zone ground-water samples. These results indicate that ground water in the upper zone is recent (less than 50 years old) and the ground water in the lower zone is older (at least 50 years). Water recharge to the upper zone is evidenced by these data. The varied tritium concentrations also suggest no or limited hydraulic communications between the zones, otherwise more uniform concentrations would exist (by ground water mixing between zones) (SAIC, 1998a). There is no evidence of contaminated transport below HZ-A regardless of vertical potentiometric gradient or the presence of Subunit 3M.

In summary, the following data supports the determination that unacceptable levels of contamination will not migrate to HZ-E due to the limited connection between the shallow and deep ground-water systems:

- Lithologic data: a highly impermeable clay aquitard (Unit 3M) separates the upper ground-water system from the underlying ground-water zones. The geometric mean vertical hydraulic conductivity of the Unit 3M aquitard, based on laboratory tests, is 3.1×10^{-8} cm/s (DOE, 1994a;USACE, 2001). The underlying silty clay layer Unit 3B (geometric mean vertical hydraulic conductivity $=3.1 \times 10^{-7}$ cm/s) provides an additional barrier to vertical contaminant migration. Most chemical species will sorb to some extent to the clay particles.
- Potentiometric data: A comparison of the ground-water elevation measurements from shallow and deep monitoring well pairs indicates they exhibit different hydraulic heads. This demonstrates that the shallow and deep zones are distinct and independent ground-water systems with limited hydraulic connection.
- Chemical analysis of the major, naturally-occurring cations and anions in ground water: The different ground-water chemistry of the shallow and deep ground-water systems indicates minimal mixing occurs. The lower tritium concentrations observed in the deep ground-water also supports the determination that little downward migration occurs from the upper zone.
- Ground-water modeling results indicate the peak contaminant concentrations reaching HZ-E are well below risk levels (BNI, 1996). The rate of vertical contaminant movement suggests times exceeding 1,000 years to reach the Limestone Aquifer. This arrival period assumes continued soils contamination. There are several reasons to suggest that the arrival periods for contaminants to reach HZ-E are longer than 1,000 years. Soil source-term removal would lengthen the arrival period and would reduce the concentrations reaching HZ-E.

The ground-water monitoring data indicate localized impacts to ground water in HZ-A and an absence of impacts to lower HZ water. Uranium, manganese, nitrate, selenium, trichloroethene (TCE), and 1,2-dichloroethene (DCE) were found in HZ-A. Manganese was found in the lower HZs and may be from natural sources, as concentrations approximated those in background wells (SAIC, 1998a). Arsenic, interpreted to be from natural sources, was also found in the lower HZs. The highest uranium concentrations were found at the western end of SLAPS in HZ-A.

Recharge to HZ-A occurs from precipitation, off-site inflow of ground water, and creek-bed infiltration during high creek stage. Discharge dominantly occurs by seepage into Coldwater Creek during low creek stage (BNI, 1992a). Vertical water movement is possible under "leaky" (low hydraulic conductivity) conditions with an adequate driving pressure gradient. The lacustrian clays (Units 3T, 3M, and 3B) and the shale (Unit 5) greatly inhibit vertical water movement at HISS/Futura and SLAPS.

Local Hydrostratigraphy at HISS

Lithologic logs for wells in the area indicate that HISS is underlain by the same stratigraphic sequence as is found at SLAPS with the exception of stratigraphic Unit 5, the shale lithology, which is missing at HISS. As a result, the HZs beneath HISS are identical to those beneath SLAPS (except that HZ-D is missing).

Twenty-one ground-water monitoring wells have been installed at HISS. Of these, 20 are completed in HZ-A; only one well, HISS-5D, is completed in the lower HZs. The ground-water level measurements for the wells in HZ-A indicate a radial ground-water contour pattern at HISS as shown in Figure 2-19 that was discussed previously for SLAPS. Ground-water elevations decline from the central part of the site and movement is interpreted to be minimal in the low conductivity saturated materials. The area of the central ground-water mound corresponds to a low, wet area on the ground surface. A downward vertical gradient or hydraulic head differential existed at well cluster HISS-5/HISS-5D.

The major ion compositions of HZ-A ground water at HISS are similar to those observed at SLAPS. Figure 2-27 is the Stiff diagram for HISS ground-water samples collected in 1997 (SAIC, 1998b). The samples collected from HZ-A (all samples plotted on Figure 2-27 with the exception of the sample from well HISS-5D) show the same variation in ion compositions as observed for the SLAPS HZ-A samples. The HISS ground-water sample collected from beneath HZ-A (the sample from well HISS-5D) has the same relatively uniform composition as observed among the SLAPS deeper ground-water samples.

Ground Water Classification

At this time, neither the State of Missouri nor EPA Region VII has formally classified any of the aquifers in the St. Louis area. Using EPA's Superfund Ground Water Classification Flow Chart (EPA, 1988a), the ground-water classification was evaluated as part of this study. The water-bearing units of the limestone bedrock aquifer at SLAPS and HISS meet the requirements for a Class IIB designation. Class IIB means that the ground water is a potential source of drinking water, but not a current source.

The upper water-bearing unit at the North County Site near the former storage areas at SLAPS and HISS/Futura is of poor quality and low yield. This unit does not act as an aquifer at these areas but could fall under the Class III definitions. Class III includes ground water that is not a source of drinking water and of limited beneficial use. The guidance states that Class III includes ground waters that "are so contaminated by naturally occurring conditions, or by the effects of broad-scale human activity (i.e., unrelated to a specific activity), that they cannot be cleaned up using treatment methods reasonably employed in public water-supply systems" (EPA 1988c). Therefore, Class III designation was selected because the St. Louis Site is surrounded by industrial activities and/or an airport, which are common sources of ground-water contamination.

Class III also encompasses those ground waters which are not potential sources of drinking water due to high salinity (i.e., > 10,000 mg/L TDS) or insufficient yield. The key criteria used to evaluate a Class III designation for the shallow ground-water system at the North County Site is insufficient yield, which is defined as a level of production below that needed to meet the "long-term basic needs of an average family by a well or spring." Using an average family size of 3 and a per capita water need of approximately 50 gpd, the EPA determined the sufficient yield criterion to be a sustainable rate of 150 gpd (EPA, 1988c). The following data supports the determination that the shallow ground-water Unit HZ-A (comprised of Units 1, 2 and 3T) meets the criterion of insufficient yield.

- Regional studies of water supplies in the St. Louis area indicate that the shallow loess and the glaciolacustrine clay and silt units of the Pleistocene Series are "essentially not water yielding" (Miller et al., 1974).
- Data concerning well yields for these units are not available because the shallow deposits are not used as drinking water aquifers. However, the purge rates for shallow monitoring wells at the site can be used to estimate the yield for the shallow units. The maximum daily yield was estimated as 50 gpd for Unit 2 and 5 gpd for Subunit 3T based on first and second Quarter 1999 field data.
- The lithological character of the loess and fine-grained lacustrine deposits and their low measured hydraulic conductivities (on the order of 10^{-5} to 10^{-8} cm/s) confirm that these strata are unlikely to produce water in sufficient quantities to serve as a drinking water supply. The geometric mean hydraulic conductivity values measured at the North County Site are presented in Table 2-4."

Subclasses are differentiated based primarily of the degree of interconnection of the ground water to adjacent surface water and/or ground water. The guidance manual states that if the aquifer feeds a surface-water body (e.g., the Missouri River) that could be used for drinking water, the aquifer should be designated Class IIIA. The rationale behind this designation is that the ground water is needed to feed the baseflow of the river or creek. Based on the above rationale, the upper water-bearing units at the North County Site are being treated as Class IIIA aquifers.

More recent EPA ground-water protection guidance states that the goal for ground water which is hydrologically connected to surface water should be to reduce constituent concentrations to levels such that the discharge of ground water to surface water does not exceed water quality standards established under the Clean Water Act (CWA) (EPA, 1992). Due to the low ground-water flow rates at the North County Site near the former storage areas at SLAPS and HISS/Futura and the dispersion of contaminants in Unit 2, discharge of ground water to Coldwater Creek surface water does not result in contaminant levels above water quality standards in surface water.

Table 2-4. Hydraulic Conductivity Data for the North County Site

Hydro-stratigraphic Zone	Lithologic Unit	Dominant Lithology (Unified Soil Classification)	Type of Tests	Number of tests	Geometric Mean Hydraulic Conductivity [a] (cm/sec)	Range of Measured Hydraulic Conductivities (cm/sec)	Reference for Test Data [b]	Literature K Values [a,c] (cm/sec)
HZ-A	**Unit 1**	Topsoil, Fill	Laboratory Permeabilities (Triaxial)	1	$K_v = 2.7 \times 10^{-6}$	2.7×10^{-6}	4	Not Available
	Unit 2	Loess (ML-CL)	Field Permeabilities (Slug tests)	5	$K_h = 1.2 \times 10^{-4}$	4.8×10^{-5} to 3×10^{-4}	1,3	10^{-8} to 10^{-4} [f]
			Laboratory Permeabilities (Triaxial)	12	$K_v = 1.6 \times 10^{-6}$	7.5×10^{-9} to 2×10^{-4}	1,2,3,4	
	Unit 3T	Silty Clay (CL)	Field Permeabilities (Slug tests)	8	$K_h = 1.2 \times 10^{-5}$	1.2×10^{-6} to 1.5×10^{-4}	1,3	10^{-7} to 10^{-6} [e]
			Laboratory Permeabilities (Triaxial)	18	$K_v = 1.5 \times 10^{-6}$	3.0×10^{-8} to 7.0×10^{-5}	1,2,3,4	
HZ-B	**Unit 3M**	Highly Plastic Clay (CH)	Laboratory Permeabilities (Triaxial)	9	$K_v = 3.1 \times 10^{-8}$	1.4×10^{-8} to 7×10^{-7}	1,2,4	10^{-8} to 10^{-6} [e]
	Unit 3B	Silty clay (CL)	Field Permeabilities (Slug tests)	6	$K_h = 1.1 \times 10^{-5}$	1.2×10^{-6} to 2.9×10^{-4}	1,3	10^{-7} to 10^{-6} [e]
			Laboratory Permeabilities (Triaxial)	4	$K_v = 3.1 \times 10^{-7}$	1.7×10^{-7} to 5.7×10^{-7}	2,3,4	
HZ-C	**Unit 4**	Clayey, Sandy Gravel (GC-SM-ML)	Field Permeabilities (Slug tests)	2	$K_h = 1.5 \times 10^{-5}$	4.1×10^{-6} to 2.2×10^{-4}	3	10^{-7} to 10^{-3} [e]
			Laboratory Permeabilities (Triaxial)	4	$K_v = 1.3 \times 10^{-6}$	2×10^{-8} to 2×10^{-5}	1	
HZ-D	**Unit 5**	Shale	Field Permeabilities (Slug tests)	2	$K_h = 1.3 \times 10^{-6}$	7.5×10^{-7} to 2.3×10^{-6}	3	10^{-12} to 10^{-8} [f]
HZ-E	**Unit 6**	Sandy Limestone	Field Permeabilities (Packer Tests[d])	2	$K_h = 2.9 \times 10^{-6}$	7.5×10^{-7} to 1.1×10^{-5}	2	10^{-7} to 10^{-3} [f]

[a] K_v = vertical hydraulic conductivity, K_h = horizontal hydraulic conductivity, K= hydraulic conductivity (includes both horizontal and vertical components)

[b] References:

1. Weston, 1982. *St. Louis Airport Storage Site (SLAPS) Technical Series: Vol. 1 Site Characterization No. 1 Site History, Topographical and Radiological Data Analysis, Geological and Hydrological Data.* January
2. BNI, 1989. *Preliminary Geological, Hydrogeological, and Chemical Characterization Report for the Ball Field Area, Hazelwood and Berkeley, MO,* February.
3. DOE, 1994a. *Site Suitability Study for the St. Louis Airport Site, St. Louis, Missouri,* February
4. USACE, 2001. *SLAPS Implementation Report*, June Final

[c] Literature values are based on representative results for similar lithologies and/or soil textures

[d] Packer Tests conducted over 10 ft. interval in the upper portion of the Ste. Genevieve Limestone

[e] Based on Watson, I. And A.D. Burnett, 1993, *Hydrology An Environmental Approach,* Buchanon Books, Ft. Lauderdale, FL

[f] Based on Freeze, R.A., and J.A. Cherry, 1979, *Groundwater*, Prentice Hall, Inc., Englewood Cliffs, NJ

The EPA ground-water protection guidance (EPA, 1992) emphasizes that because funding resources are limited, states cannot focus their ground-water efforts statewide. Consequently, aquifers should not simply be discussed as having the potential for use in the future, but rather as having an expected use in the future. With this approach, aquifers that have the greatest value or benefit can be afforded greater attention (EPA, 1992). Given the proximity of the Missouri and Mississippi Rivers, and other nearby surface-water sources such as Coldwater Creek, the expected future use of ground water near the former storage areas at SLAPS and HISS/Futura is minimal. This is further reinforced by the aquifer's poor water-quality characteristics (high turbidity and high total dissolved solids) and low yield.

The unconsolidated sediment underlying the North County Site near the former storage areas at SLAPS and HISS/Futura consists of loess, lacustrine, and glacial deposits. These types of deposits are typically heterogeneous and can contain a high percentage of fine-grained materials such as silt and clay. Two relatively permeable zones (Units 2 and 4) within these unconsolidated sediments are separated by a confining layer (3T, 3M, and 3B clay subunits) and shale (Unit 5) in some locations, which are zones of less permeable material. Subunits 3B, 3M, 3T, and Unit 5 together provide a continuous low permeability layer across SLAPS that restricts communication between the upper and lower aquifer.

A total of eight private wells have been identified within a 4.8 km (3 mi) radius of SLAPS and HISS. These wells range in depth from 10.6 to 122 m (35 to 400 ft), and none of these are used for drinking water. Four of the wells had been used for irrigation and one for industrial purposes. The three other wells had been used for domestic use and were capped and abandoned in 1962, 1968, and 1979 (BNI, 1992a). Most of these wells are installed deep into fractured bedrock where better yields can be obtained as compared to the shallow unconsolidated formation.

2.2.6 Demography and Land Use

The North County Site is located in urban and suburban settings within St. Louis County. Analyses of census and other data for the City of St. Louis and for St. Louis County are compared to data for the St. Louis Metropolitan Statistical Area (MSA). The MSA includes the City of St. Louis plus St. Louis, St. Charles, Franklin, and Jefferson counties in Missouri; and five counties in Illinois.

Recent trends in population growth and density continue to show decreases for the City of St. Louis and increases for St. Louis County, as shown in Table 2-5. St. Louis County, which contains the airport area, had a 1990 population of 993,529 (EWGCC, 2001), an increase of 2.0 percent from 1980. The population data for the period from 1990 to 1992 indicate that the historical trend of decreasing population in the city and increasing population in the county is continuing. The housing trends follow these population trends. The City of St. Louis has 19 percent of the single family units, and 55 percent of the multi-family units in the area. The overall occupancy rate is 85 percent for the City of St. Louis and 95 percent for St. Louis County. The average owner vacancy rate in the city is almost double the rate in the county. These trends are shown in Tables 2-6, 2-7, and 2-8.

The North County Site properties are primarily within the municipalities of Hazelwood and Berkeley. The population of both these municipalities decreased from 1980 to 1990. The population of Berkeley was 15,922 in 1980 and 12,450 in 1990, a decrease of 21.8 percent (EWGCC, 2001). The population of Hazelwood was 16,170 in 1980 and 15,324 in 1990, a decrease of 5.2 percent. SLAPS is located within Census Tract 2115 with a population of 4,041.

The population center nearest SLAPS, with 75 to 100 people, is located approximately 0.8 km (0.5 mi) west of the property in an industrially zoned area of Hazelwood. The next closest population center, with approximately 1,500 people, is approximately 1.6 km (1 mi) northwest of SLAPS along Chapel Ridge Drive. The nearest residential areas to the Latty Avenue properties are located to the east, in the City of Berkeley. Several high-density residential areas, which include single-family homes and apartment buildings, are located east of Interstate-170. A residential area is located northeast of HISS and Hazelwood Avenue.

Table 2-5. Total Population and Population Density for the St. Louis Region, 1980–1990

Region	1980	1990	1990 Land Area		1990 Persons per	
	Population	Population	km^2	mi^2	km^2	mi^2
City of St. Louis	452,804	396,685	61	159	2,501	6,503
St. Louis County	974,180	993,529	506	1,316	755	1,964
Regional MSA	2,376,968	2,444,099	5,341	13,887	176	458

[a] Source: EWGCC 2001.

Table 2-6. Housing Units in the St. Louis Region, 1980–1990[a]

Area	Total Housing Units 1980	Total Housing Units 1990	% Change (1980-1990)
City of St. Louis	202,113	194,919	-0.3
St. Louis County	358,040	401,839	+1.1
Regional MSA	887,425	991,000[b]	1.5[c]

[a] Source: EWGCC 2001.
[b] Total housing units for the year 1987 (City of St. Louis, Community Development Agency 1992).
[c] Percent change reflects 1980-1987.

Table 2-7. Housing Characteristics 1990[a]

Region	Single-Family Units	Multi-Family Units	Mobile Homes	Total Housing Units	Total Occupied Units	Average Number Persons Per Unit	Average Owner Vacancy Rate %	Renter Vacancy Rate %
City of St. Louis	71,809	121,752	2,078	194,919	164,931	2.34	3.3	13.2
St. Louis County	302,271	98,345	1,223	401,839	380,110	2.57	1.8	9.4

[a] Source: BEA 1991; RCGA (St. Louis Regional Commerce and Growth Association) 1992.

Table 2-8. Housing and Population Characteristics[a]

Census Tract	Pop.[b]	Dwelling Units[c]	Mean Pop./Unit	Population Ages[b]		
				0-18	19-49	50 & Over
St. Louis County	993,529	380,110	2.6	257,126	489,789	273,638
2115 (SLAPS and Latty Avenue)	4,041	1,273	3.2	1,341	1,875	825
2112	9,172	3,999	2.3	1,955	4,109	3,108
2114.02	2,398	1,202	2.0	421	1,427	550
2129	3,920	1,319	3.0	1,343	1,708	869
2130	221	123	1.8	34	150	37
2116	6,647	2,438	2.7	1,857	3,041	1,749
Total (Census Tract)	26,399	10,399	2.5	6,951	12,310	7,138

[a] Source: U.S. Census Bureau 1990.
[b] Figures reported represent population within the entire census tract.
[c] Figures reported represent the total number of occupied dwelling units.

Land use for the area is described in the City of Hazelwood *Comprehensive Master Plan* (Harland, Bartholomew, and Associates, 1998) and the City of Berkeley Southeast Corridor Master Plan (Parsons, Harland, Bartholomew, and Associates, 1998) and is shown in Figure 2-28.

SLAPS and Vicinity Properties

SLAPS is located within unincorporated St. Louis County, managed by the St. Louis Airport Authority, and owned by the City of St. Louis. SLAPS is currently zoned M-1 (light industrial). The south-central and eastern portions of the property are in the approach zones of runways 17 and 24, respectively. They are just north of the adjacent Lambert-St. Louis International Airport. Land use restrictions at the site include Federal Aviation Administration (FAA) regulations restricting or prohibiting the construction, erection, alteration, or growth of any structure, tree, or other object in the approach area of the runways that interfere with the use, operation, or future development of the airport. A chain-link fence surrounds most of SLAPS. The portion of the site adjacent to Coldwater Creek is zoned M-1/FP, which indicates that it is zoned for light industrial use, and is also within the floodplain.

Land use in the vicinity of the Lambert-St. Louis International Airport is dominated by industrial and commercial uses. More than two-thirds of the land within 0.8 km (0.5 mi) of SLAPS is used for transportation-related purposes. The remaining land is used for commercial and industrial uses. Several properties in the vicinity of the airport would be expected to continue under commercially/industrial use in the foreseeable future. Immediately south of SLAPS are the Norfolk and Southern Railroad, Banshee Road, and the Lambert-St. Louis International Airport. West of SLAPS is Coldwater Creek and the Boeing property. The nearest residential properties to SLAPS are located approximately 0.6 km (0.4 mi) to the northeast on Frost Avenue in the City of Berkeley.

The property north of McDonnell Boulevard is owned by the City of St. Louis and leased to the cities of Berkeley and Hazelwood. The eastern portion of the property, within Berkeley, is referred to as the Berkeley Athletic Complex and includes Khoury League Park. Removal actions are occurring in some of this property, and the remaining fields are vacant. This eastern area is zoned "P" (park district). This zone permits the property to be used for parks, trails, golf courses, ballfields, and similar uses (Zoning Code, City of Berkeley, Section 23.14, 1992). The western portion of the property is located in the City of Hazelwood and is zoned "I" (heavy industrial). This zone allows a variety of manufacturing, storage, and assembly uses, as well as commercial and retail establishments. Additional uses are permitted upon granting of a Special Land Use Permit by the City Council (Zoning Code, City of Hazelwood, Section 32.75, 1992). Because a portion of the site within the City of Hazelwood is also within the floodplain of Coldwater Creek, all uses must also meet Municipal Code requirements pertaining to the floodplain. The City of Hazelwood has developed a *Comprehensive Master Plan* for local development, which proposes that parks, recreation fields, railroad yards, or parking lots can be located in the floodplain in accordance with zoning restrictions (Harland, Bartholomew, and Associates, 1998).

Although primarily a commercial and industrial area, Hazelwood Avenue also provides access to a residential area north of Latty Avenue along Heather Lane. This area is zoned for single-family residential use, but the land use plan indicates that this area is expected to change to business uses (Harland, Bartholomew, and Associates, 1998).

Latty Avenue Properties

HISS is owned by Jarboe Realty and Investment and leased to USACE. The area occupies the eastern portion of the 9200 Latty Avenue property and is located on a level, grassy area surrounded by a chain-link security fence. HISS has a laboratory, office trailers, and other facilities to support USACE's FUSRAP operations. Four covered and two coated surface storage piles that contain approximately 45,200 yd^3 of soil and debris contaminated with radioactive material are also on the site.

Jarboe Realty and Investment owns the Futura property. Futura is the current tenant of the western portion of the 9200 Latty Avenue property. Futura manufactures plastic coating products.

The HISS and Futura properties are zoned "I" (heavy industrial) by the City of Hazelwood (Harland, Bartholomew, and Associates, 1998). The Hazelwood *Comprehensive Master Plan* calls for continued industrial development in this area, encouraging modernization and expansion of existing industries. Three spurs of the Norfolk and Western Railroad parallel the western boundary of HISS. Norfolk and Western own the main spur. Wagner Electric Corporation, a landowner on the north side of Latty Avenue, owns the other two spurs. The easternmost railroad spur is unused, but the other two spurs are active in the area around HISS (BNI, 1992b). A recently constructed spur along the eastern edge of HISS will be used during removal of material from the Latty Avenue properties.

The closest residential properties to HISS/Futura are located approximately 0.3 km (0.2 mi) to the southwest along Frost Avenue and 0.5 km (0.3 mi) to the northeast along Hazelwood Avenue.

All of the Latty Avenue properties are located in industrial areas and are currently zoned "M-1" (light industrial) (Harland, Bartholomew, and Associates, 1998). Traffic along Latty Avenue consists primarily of large trucks and employee vehicles.

Coldwater Creek

Coldwater Creek is divided into three sections for purposes of analysis, as shown earlier on Figure 2-14. Section A, between SLAPS and Interstate 270 (I-270), flows through a predominantly industrial area. Section B, north of I-270, flows through a residential section of Hazelwood, with commercial and retail establishments nearby. Small businesses and shopping centers occur near the first intersection of the creek and Lindbergh Boulevard, 9.6 km (6 mi) downstream of SLAPS. After the first Lindbergh Boulevard/Coldwater Creek intersection, the creek flows past Florissant and through St. Ferdinand Park. The surrounding land use is predominantly residential communities and forested land until the creek intersects New Halls Ferry Road. The St. Louis MSD treatment plant is located next to the creek north of the community of Black Jack. Section C begins where the creek again intersects Lindbergh Boulevard and flows through mainly residential and natural settings and through large tracts of unincorporated land in northeastern St. Louis County. Section C ends at the mouth of the creek at the Missouri River.

Three recreational parks are located along Coldwater Creek: Fort Bellefontaine County Park, Coldwater Creek Park, and Veterans Memorial County Park. St. Louis County Department of Parks and Recreation has jurisdiction over each of these parks. Fort Bellefontaine County Park covers 14.5 ha (36 acres) on the opposite bank of Coldwater Creek 22 km (13.5 mi) downstream from SLAPS. Coldwater Creek County Park covers 95 ha (234 acres) on the east bank, near the mouth of the creek. Veteran's Memorial County Park covers 100 ha (246 acres), a small portion of which is located in the Coldwater Creek drainage area, 15 km (9.6 mi) downstream from SLAPS.

Several municipal parks also border the creek. Khoury Park is immediately north of SLAPS and is sometimes referred to as the former ballfield. St. Cin Park is located in Hazelwood, immediately north of I-270, 2.4 km (1.5 mi) from Khoury Park. Duchesne Park, 3.2 km (2 mi) downstream, is within Florissant. St. Ferdinand Park, 5.1 km (3.1 mi) downstream, is also located within Florissant. Black Jack Park is located on the southern bank of Coldwater Creek between stream kilometers 7.7 and 8.5 (miles 4.8 and 5.3).

Section A of Coldwater Creek (which is the portion of the creek that would be most affected by potential remediation activities) is considered by the City of Hazelwood to be a flood way or floodplain, thereby limiting potential development of this area. One of the goals stated in the Hazelwood *Comprehensive Master Plan* is to reduce flooding and storm drainage problems along Coldwater Creek. One of the adopted policies to accomplish this goal is to discourage incompatible development and encourage appropriate uses such as parks, ballfields, and parking lots.

2.2.7 Ecology

The biological resources were evaluated using a literature study and site reconnaissance. The reconnaissance was conducted during daylight hours (0615 to 1630 hours) on May 14 and 15, 1992. The literature review included Orzell, 1979; St. Louis County Department of Planning, 1986; and Weston, 1979. The evaluations were done for all of the North County Site areas including SLAPS, HISS/Futura, VPs, and locations downstream from SLAPS and HISS along Coldwater Creek.

The North County Site is located in the Oak-Hickory-Bluestem Parkland section of the Prairie Parkland Province (Bailey, 1980) and within the Florissant Basin (Lark, 1992). Topography is gently rolling with low bluffs north of the Missouri River. Presettlement vegetation is characterized by deciduous woodlands intermixed with open prairie (Bailey, 1980). The Missouri and Mississippi Rivers are a major influence on the vegetation of the area. Common trees before development included oaks (*Quercus* sp.), hickories (*Carya* sp.), elms (*Ulmus* sp.), sycamores (*Platanus* sp.), cottonwoods (*Populus* sp.), redbuds (*Cercis* sp.), hackberries (*Celtis* sp.), and buckeyes (*Aesculus* sp.) (Bailey, 1980). Tall grass prairie species in presettlement times included big bluestem (*Andropogon gerardi*), little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorghastrum nutans*), and prairie junegrass (*Koleria cristata*) (Weston, 1979). Today, little presettlement vegetation exists in the area around the North County Site.

2.2.7.1 SLAPS

Vegetation at SLAPS changed little between the 1979 survey (Weston, 1979) and the 1992 surveys. Recent construction and removal actions have disturbed extensive areas of SLAPS. A grass-forb type of community dominates the vegetation at SLAPS. Perennial bromegrass (*Bromus* sp.) and bluegrass (*Poa* sp.) appear to be the dominant grasses. Forbs include thistle (*Cirsiuim arvense*), vetch (*Vicia* sp.), sunflower (*Helianthus* sp.), goldenrod (*Solidago* sp.), and ragweed. Woody shrubs, including sumac, are present on the southern border. Cottonwoods (*Populus deltoides*) are present on the western border of the creek. Cottonwoods, maples (*Acer* sp.), and other species of deciduous trees are abundant along the creek north of SLAPS.

Song sparrows (*Melospiza melodia*), swifts, and red-winged blackbirds were the most common birds observed during the May 1992 reconnaissance. Three American goldfinches (*Carduelis tristis*) were seen along the creek woodlands north of SLAPS. In addition, a Mississippi kite (*Ictinia mississippiensis*) was observed hunting in the park and a red-tailed hawk (*Buteo jamaicensis*) was seen perched in a cottonwood just north of SLAPS. Numerous gopher (*Geomys* sp.) holes and more than 10 cottontail rabbits (*Sylvilagus* sp.) were observed on SLAPS. Squirrels (*Scirurus* sp.) were observed in the woodlands lining Coldwater Creek and raccoon (*Procyon lotor*) tracks were observed on mud flats by the creek just north of SLAPS.

2.2.7.2 Latty Avenue Properties

The Latty Avenue properties are mainly developed properties. Annual bromegrass (*Bromus* sp.) and annual mustard (*Lepidium* sp.) are the most common species of residual vegetation. Understory herbaceous vegetation is relatively dense and dominated by vines and nettle. Swifts, sparrows, and American goldfinches were the only birds observed in the area during the May 1992 reconnaissance.

2.2.7.3 Coldwater Creek

Less than 10 percent of the area is open space or forest, because the Coldwater Creek watershed is developed for human use (FWS, 1987). The banks of the creek are steep and void of vegetation for the first 0.6 to 0.9 m (2 to 3 ft) above the water surface during mean flow conditions. The water surface during the May 1992 survey was approximately 2.5 to 3 m (8 to 10 ft) below the bank of the creek, but flooding frequently occurs.

Biological resources in and along Coldwater Creek are less diverse than those of similar creeks in rural areas because of the poor water quality from the chemical and physical pollutants in the creek. No significant amounts of continuous vegetation are found in the watershed, and the quality of the remaining forests is rated “marginal” (Parker and Szlemp, 1987). Coldwater Creek is lined with cottonwoods, maples, elms (*Ulmus* sp.), black locust (*Robinia* sp.), box elder (*Acer nequndo*), beech (*Fagus* sp.), and mulberry (*Morus* sp.). Trees intermittently shade the creek, and herbaceous vegetation is composed of vines, forbs, and grasses. The largest vegetated areas occur downstream from the airport area, closer to the mouth of Coldwater Creek. A pair of mallards (*Anas platyrhynchos*) were observed on the creek approximately 91 m (300 ft) downstream from SLAPS. Red-eared turtles (*Chrysemys scripta*) were observed in the creek approximately 5 km (3 mi) downstream from HISS and Futura.

Previous surveys identified 19 benthic and 6 fish taxa (Nash, 1982; Parker and Szlemp, 1987). Benthic organisms were dominated by tubificids and chironomids, which are tolerant of organic pollution. Fathead minnows (*Pimephales promelas*) represented 97% of the 221 fish collected during a survey (Parker and Szlemp, 1987). This species tolerates waters with low oxygen, high temperatures, and turbidity, which characterize much of the creek.

2.2.7.4 Threatened and Endangered Species

The only federally and state designated, endangered or threatened species that may occur within the area of the proposed action (U.S. Department of Interior and Missouri Department of Conservation letters) are the pallid sturgeon (*Scaphirhynchus albus*) and bald eagle (*Haliaeetus leucocephalus*). Current federal actions are being taken to remove the bald eagle from the endangered species list. Pallid sturgeon are found in both the Mississippi and Missouri Rivers, but Coldwater Creek does not provide adequate water quality or quantity for them. Bald eagles are known to stay through the winter in the region (FWS, 1993; MDC, 1992). It is doubtful that they use the airport areas because of poor habitat quality (i.e., sparse vegetation, significant noise and human activity, and limited hunting opportunity along Coldwater Creek). The habitat suitable for bald eagles is limited on and near SLAPS (Weston, 1979; Parker and Szlemp, 1987). In addition, the U.S. Fish and Wildlife Service (FWS) reviewed another Coldwater Creek project and found that it is “highly unlikely” that the proposed USACE project on the Coldwater Creek would affect any federally-listed species (USACE, 1987a). That creek project involves a substantially greater amount of land clearing and stream bed disturbance than contemplated for this remedial action.

2.2.7.5 Wetlands and Floodplains

The FWS has identified four remnant wetlands, totaling approximately 32 ha (80 acres), along Coldwater Creek between SLAPS and HISS/Futura (Figure 2-29) (FWS, 1993). These wetlands, located on the creek bank, are classified as Palustrine/Forested/Broad-leafed/Deciduous/Temporarily Flooded. The site visit in May 1992 confirmed that broad-leafed forest communities are present in the wetland areas. The closest identified wetland is an approximate 1.6-ha (4 acres) stand on the southwest boundary of Futura. The wetlands identified along Coldwater Creek between SLAPS and HISS/Futura have not been formally defined as wetlands using the 1987 Corps of Engineers Wetlands Delineation Manual. The FWS definition of wetlands is more broadly inclusive than the definition in the Corps of Engineers Manual. The

1987 Manual also states that temporarily flooded wetlands like these should be "viewed with particular caution" (USACE, 1987b).

Hydric soils can occur in any of the soil associations in St. Louis County. However, soil units mapped along Coldwater Creek between SLAPS and Futura were not identified as typically hydric in the county soil survey (USDA-SCS, 1982). The Nevin-Urban soil association underlying the wetlands along Coldwater Creek can possess hydric properties including poor drainage, mottling, and shallow water table depth. The May 1992 site visit confirmed that the wetland areas have signs of seasonal flooding.

Portions of the North County Site lie within the 100-year floodplain. The elevation at SLAPS varies from approximately 155 to 161 m (510 to 530 ft) from east to west and land surface ranges from 4.5 to 6 m (15 to 20 ft) above Coldwater Creek. Generally, the property surface is flat. Compaction, revegetation, differential settling and erosion have created an irregular surface, because the fill placed over the property in the early 1970s was not spread evenly. The surface has been further modified as a result of construction of the rail spur and removal actions at SLAPS and the nearby ditches. The 100-year flood level at SLAPS is 159 m (522 ft) above MSL (FEMA, 1983). Figure 2-30 shows the extent of the 100-year floodplain.

The ground surface at HISS/Futura ranges from approximately 157 m (513 ft) above MSL near Latty Avenue to 160 m (525 ft) above MSL near the piles. The main waste storage pile at HISS extends approximately 8 m (26 ft) above grade. The surface slopes gently from the waste storage piles at HISS to the west and south toward Coldwater Creek. The 100-year flood level at HISS is approximately 159 m (520 ft) above MSL (FEMA, 1983). In the event of a flood of 100-year or greater magnitude, most of the property would be flooded.

2.3 NATURE AND EXTENT OF CONTAMINATION

As shown in Table 2-9, numerous characterization studies have been completed for the North County Site. The Remedial Investigation (RI) was conducted to determine the nature and extent of contamination, and to characterize the geological and hydrogeological features of the North County Site. Analytical results for radiological and chemical characterization surveys are summarized in the RI Report and appendices (BNI, 1992a), the RI Addendum (SAIC, 1995), and the *SLAPS Implementation Report* (USACE, 2001). Multiple characterization analyses were performed during these characterizations including Th-230, Th-232, Ra-226, U-238, other radionuclides, volatile organic compounds (VOCs), base/neutral and acid extractable (BNAE) compounds metals, RCRA hazardous waste characteristics, pH, specific conductance, total organic halogens (TOX), and total organic compounds (TOC). Table 2-10 presents a summary of surface soil analytical results for the North County Site (see Figure 2-10 for the location of IAs). Table 2-11 presents a summary of subsurface soil analytical results. These tables include statistical summaries of site data to illustrate both the range of concentration and the limitation of data at some properties. The data in Table 2-10 and 2-11 include only data from properties with both radiological and non-radiological results. The full set of radiological data are not presented here given the large data volume. All radiological soil data are presented in Appendix D.

A review of the past processing activities at SLDS and at the North County Site was conducted to identify process-related radioactive materials and other chemicals. The primary contaminants are radionuclides. Belgian Congo pitchblende used for uranium processing also contained arsenic, lead, manganese, and thorium, whereas domestic ores may have been enriched with arsenic, cobalt, copper, molybdenum, nickel, selenium, vanadium, and zinc in addition to the radionuclides associated with the uranium. However, based on the analyses of the residues provided in the Invitation to Bid on March 7, 1962, arsenic, beryllium and zinc are only considered trace elements. Arsenic, beryllium and zinc were among a group of 20 metals that were reported at < 0.1% in the Colorado Raffinate and not mentioned at all for the analyses of the Pitchblende Raffinate. The processes used to manufacture uranium dioxide, uranium trioxide, uranium tetrafluoride, uranyl fluoride, and uranium metal involved the use of acids, such as hydrofluoric, nitric, and sulfuric acids. These acids would likely remain in the environment as anions (e.g., fluorides, nitrates, and sulfates). In addition, because the North County Site is located in an industrialized area, it is likely that organic compounds unrelated to uranium processing activities [e.g., polycyclic aromatic hydrocarbons (PAHs) from industrial processing activities and vehicle emissions] are present. Industrial activities in the area of the airport site are a potential source of organic and non-radioactive inorganic contamination (e.g., refueling, deicing, and maintenance of aircraft) that is not related to ore processing activities at SLDS. A more detailed description of contaminants associated with uranium ore processing is provided in Section 2.3.2.

Table 2-9. Summary of Characterization Studies at the North County Sites

	Report/Date	Summary	Area
SLAPS			
	Weston, 1982	Site Characterization; site history, topographical and radiological data analysis, geological and hydrological data	SLAPS, portion of Coldwater Creek
	ORNL, 1979	Radiological survey of SLAPS	SLAPS
	BNI, 1983	Radiological survey of SLAPS ditches	SLAPS
	BNI, 1987a	Radiological and limited chemical characterization	SLAPS
	BNI, 1989	Preliminary Geological, Hydrogeological, and Chemical Characterization Report for the Ball Field Area	Ballfield
	BNI, 1990b	Chemical characterization report for SLAPS and Latty Avenue properties	SLAPS, Latty Avenue properties
	BNI, 1990a	Radiological Characterization Report for FUSRAP Properties in St. Louis	North County Site
	ORNL, 1991	Results of Mobile Gamma Scanning Activities	Transportation routes to and from SLAPS; transportation routes from HISS/Futura
	BNI, 1992a	RI Report	North county Site
	DOE, 1994a	Site Suitability Study for SLAPS	SLAPS, ballfield
	SAIC, 1995	RI Addendum	North County Site
	BNI, 1998	Post Remedial Action Report	West end excavation at SLAPS, Vicinity Properties
	SAIC, 1998a	1997 Baseline Ground-water Characterization for SLAPS Environmental Monitoring Summaries since 1983	SLAPS, Ballfield SLAPS
Latty Avenue Properties			
	ORNL, 1977	Radiological Survey at 9200 Latty Avenue	Futura
	ORAU, 1981	Radiological survey of decontamination debris at 9200 Latty Avenue	Futura
	BNI, 1985	Report on drilling and observation well installation at HISS	HISS
	BNI, 1987b	Characterization Report for HISS	HISS
	SAIC, 1998b	1997 Baseline Ground-water Characterization for HISS	
	BNI, 1987c	Environmental Monitoring Summaries –since 1985 Radiological Characterization Report for Futura Coatings	HISS Futura

Table 2-9. Summary of Characterization Studies at the North County Sites (Cont'd)

	Report/Date	Summary	Area
SLAPS Vicinity Properties			
	EWGCC, 1993	Coldwater Creek watershed toxic agent study	Coldwater Creek
	ORNL, 1985	Results of Mobile Gamma Scanning Activities in Berkeley, Bridgeton and Hazelwood	Vicinity Properties
	ORNL, 1986a	Results of the radiological measurements taken on transportation routes (LM004) in Hazelwood, MO	Vicinity Properties
	ORNL, 1986b	Radiological survey of the perimeter fence line of the former Cotter site, Hazelwood, MO (LM002)	Vicinity Properties
	BNI, 1997	Draft summary of recent Coldwater Creek data (radiological sampling in 1996 and 1997)	Coldwater Creek

Table 2-10. North County Surface Soil Data Summary

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	
Soil - All Depths	09K220205/VP-54	Aluminum	10/10	mg/kg			4260	7880	5530	L	6180	6180	u
Soil - All Depths	09K220205/VP-54	Arsenic	10/10	mg/kg			0.84	11.9	5.85	N	7.75	7.75	u
Soil - All Depths	09K220205/VP-54	Barium	10/10	mg/kg			40.7	279	143	N	183	183	u
Soil - All Depths	09K220205/VP-54	Beryllium	10/10	mg/kg			0.41	0.56	0.489	L	0.524	0.524	u
Soil - All Depths	09K220205/VP-54	Calcium	10/10	mg/kg			2320	15500	5190	X	7590	7590	u
Soil - All Depths	09K220205/VP-54	Chromium	10/10	mg/kg			10	12	10.7	N	11.1	11.1	u
Soil - All Depths	09K220205/VP-54	Cobalt	10/10	mg/kg			5.5	9.6	7.41	L	8.39	8.39	u
Soil - All Depths	09K220205/VP-54	Copper	10/10	mg/kg			9.6	16.4	13.4	N	14.5	14.5	u
Soil - All Depths	09K220205/VP-54	Iron	10/10	mg/kg			7270	28200	12800	L	16900	16900	u
Soil - All Depths	09K220205/VP-54	Lead	10/10	mg/kg			7.3	30.9	12.8	L	17.2	17.2	u
Soil - All Depths	09K220205/VP-54	Magnesium	10/10	mg/kg			1610	9940	3550	X	5020	5020	u
Soil - All Depths	09K220205/VP-54	Manganese	10/10	mg/kg			68.3	4690	1250	L	5960	4690	m
Soil - All Depths	09K220205/VP-54	Molybdenum	10/10	mg/kg			6.3	22.7	10.5	L	13.5	13.5	u
Soil - All Depths	09K220205/VP-54	Nickel	10/10	mg/kg			10.1	23.4	14.6	L	17.7	17.7	u
Soil - All Depths	09K220205/VP-54	Potassium	10/10	mg/kg			436	827	634	N	711	711	u
Soil - All Depths	09K220205/VP-54	Silver	1/10	mg/kg	1.25	1.3	2.6	2.6	1.39	D	1.64	1.64	u
Soil - All Depths	09K220205/VP-54	Sodium	10/10	mg/kg			51.8	78	66.5	N	71.8	71.8	u
Soil - All Depths	09K220205/VP-54	Vanadium	10/10	mg/kg			9.5	16.3	12.7	L	13.8	13.8	u
Soil - All Depths	09K220205/VP-54	Zinc	10/10	mg/kg			30.6	52.8	40.6	L	44.8	44.8	u
Soil - All Depths	09K220205/VP-54	Anthracene	1/10	mg/kg	0.205	0.22	0.031	0.031	0.194	D	0.227	0.031	m
Soil - All Depths	09K220205/VP-54	Benz(a)anthracene	1/10	mg/kg	0.205	0.22	0.17	0.17	0.208	D	0.216	0.17	m
Soil - All Depths	09K220205/VP-54	Benzo(a)pyrene	1/10	mg/kg	0.205	0.22	0.15	0.15	0.206	D	0.217	0.15	m
Soil - All Depths	09K220205/VP-54	Benzo(b)fluoranthene	1/10	mg/kg	0.205	0.22	0.21	0.21	0.212	D	0.214	0.21	m
Soil - All Depths	09K220205/VP-54	Benzo(ghi)perylene	1/10	mg/kg	0.205	0.22	0.084	0.084	0.199	D	0.222	0.084	m
Soil - All Depths	09K220205/VP-54	Benzo(k)fluoranthene	1/10	mg/kg	0.205	0.22	0.18	0.18	0.209	D	0.215	0.18	m
Soil - All Depths	09K220205/VP-54	Chrysene	1/10	mg/kg	0.205	0.22	0.19	0.19	0.21	D	0.214	0.19	m
Soil - All Depths	09K220205/VP-54	Dibenz(a,h)anthracene	1/10	mg/kg	0.205	0.22	0.035	0.035	0.194	D	0.227	0.035	m
Soil - All Depths	09K220205/VP-54	Fluoranthene	1/10	mg/kg	0.205	0.22	0.41	0.41	0.232	D	0.268	0.268	u
Soil - All Depths	09K220205/VP-54	Indeno(1,2,3-cd)pyrene	1/10	mg/kg	0.205	0.22	0.13	0.13	0.204	D	0.219	0.13	m
Soil - All Depths	09K220205/VP-54	Phenanthrene	1/10	mg/kg	0.205	0.22	0.18	0.18	0.209	D	0.215	0.18	m
Soil - All Depths	09K220205/VP-54	Pyrene	1/10	mg/kg	0.205	0.22	0.34	0.34	0.225	D	0.248	0.248	u
Soil - All Depths	09K220205/VP-54	Acetone	1/10	mg/kg	0.0065	0.0065	0.017	0.017	0.00755	D	0.00947	0.00947	u
Soil - All Depths	09K220205/VP-54	Toluene	7/9	mg/kg	0.003	0.0065	0.002	0.11	0.0248	L	0.192	0.11	m
Soil - All Depths	11K630221	Aluminum	1/1	mg/kg			10400	10400	10400	D		10400	m
Soil - All Depths	11K630221	Arsenic	1/1	mg/kg			16.3	16.3	16.3	D		16.3	m
Soil - All Depths	11K630221	Barium	1/1	mg/kg			172	172	172	D		172	m
Soil - All Depths	11K630221	Beryllium	1/1	mg/kg			0.65	0.65	0.65	D		0.65	m
Soil - All Depths	11K630221	Boron	1/1	mg/kg			6.2	6.2	6.2	D		6.2	m
Soil - All Depths	11K630221	Calcium	1/1	mg/kg			4320	4320	4320	D		4320	m
Soil - All Depths	11K630221	Chromium	1/1	mg/kg			16.3	16.3	16.3	D		16.3	m
Soil - All Depths	11K630221	Cobalt	1/1	mg/kg			11.6	11.6	11.6	D		11.6	m
Soil - All Depths	11K630221	Copper	1/1	mg/kg			20	20	20	D		20	m
Soil - All Depths	11K630221	Iron	1/1	mg/kg			16600	16600	16600	D		16600	m
Soil - All Depths	11K630221	Lead	1/1	mg/kg			52.1	52.1	52.1	D		52.1	m
Soil - All Depths	11K630221	Lithium	1/1	mg/kg			5.9	5.9	5.9	D		5.9	m
Soil - All Depths	11K630221	Magnesium	1/1	mg/kg			2700	2700	2700	D		2700	m
Soil - All Depths	11K630221	Manganese	1/1	mg/kg			807	807	807	D		807	m
Soil - All Depths	11K630221	Molybdenum	1/1	mg/kg			1.6	1.6	1.6	D		1.6	m
Soil - All Depths	11K630221	Nickel	1/1	mg/kg			20.7	20.7	20.7	D		20.7	m
Soil - All Depths	11K630221	Potassium	1/1	mg/kg			1470	1470	1470	D		1470	m
Soil - All Depths	11K630221	Selenium	1/1	mg/kg			0.41	0.41	0.41	D		0.41	m
Soil - All Depths	11K630221	Sodium	1/1	mg/kg			143	143	143	D		143	m
Soil - All Depths	11K630221	Strontium	1/1	mg/kg			15.8	15.8	15.8	D		15.8	m
Soil - All Depths	11K630221	Titanium	1/1	mg/kg			189	189	189	D		189	m
Soil - All Depths	11K630221	Vanadium	1/1	mg/kg			25.2	25.2	25.2	D		25.2	m
Soil - All Depths	11K630221	Zinc	1/1	mg/kg			72.7	72.7	72.7	D		72.7	m
Soil - All Depths	11K630221	Benz(a)anthracene	1/1	mg/kg			0.059	0.059	0.059	D		0.059	m

Table 2-10. North County Surface Soil Data Summary (Cont'd)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	
Soil - All Depths	11K630221	Benzo(a)pyrene	1/1	mg/kg			0.064	0.064	0.064	D		0.064	m
Soil - All Depths	11K630221	Benzo(b)fluoranthene	1/1	mg/kg			0.057	0.057	0.057	D		0.057	m
Soil - All Depths	11K630221	Benzo(ghi)perylene	1/1	mg/kg			0.061	0.061	0.061	D		0.061	m
Soil - All Depths	11K630221	Benzo(k)fluoranthene	1/1	mg/kg			0.058	0.058	0.058	D		0.058	m
Soil - All Depths	11K630221	Bis(2-ethylhexyl)phthalate	1/1	mg/kg			0.091	0.091	0.091	D		0.091	m
Soil - All Depths	11K630221	Chrysene	1/1	mg/kg			0.11	0.11	0.11	D		0.11	m
Soil - All Depths	11K630221	Fluoranthene	1/1	mg/kg			0.14	0.14	0.14	D		0.14	m
Soil - All Depths	11K630221	Indeno(1,2,3-cd)pyrene	1/1	mg/kg			0.052	0.052	0.052	D		0.052	m
Soil - All Depths	11K630221	Phenanthrene	1/1	mg/kg			0.048	0.048	0.048	D		0.048	m
Soil - All Depths	11K630221	Pyrene	1/1	mg/kg			0.11	0.11	0.11	D		0.11	m
Soil - All Depths	11K630221	Actinium-227	1/1	pCi/g			0.29	0.29	0.29	D		0.29	m
Soil - All Depths	11K630221	Cesium-137	1/1	pCi/g			0.21	0.21	0.21	D		0.21	m
Soil - All Depths	11K630221	Potassium-40	1/1	pCi/g			16.05	16.05	16.1	D		16.1	m
Soil - All Depths	11K630221	Radium-226	1/1	pCi/g			0.84	0.84	0.84	D		0.84	m
Soil - All Depths	11K630221	Radium-228	1/1	pCi/g			0.9	0.9	0.9	D		0.9	m
Soil - All Depths	11K630221	Thorium-228	1/1	pCi/g			0.91	0.91	0.91	D		0.91	m
Soil - All Depths	11K630221	Thorium-230	1/1	pCi/g			12.13	12.13	12.1	D		12.1	m
Soil - All Depths	11K630221	Thorium-232	1/1	pCi/g			0.75	0.75	0.75	D		0.75	m
Surface Soil (<0.5 ft)	11K630221	Aluminum	1/1	mg/kg			10400	10400	10400	D		10400	m
Surface Soil (<0.5 ft)	11K630221	Arsenic	1/1	mg/kg			16.3	16.3	16.3	D		16.3	m
Surface Soil (<0.5 ft)	11K630221	Barium	1/1	mg/kg			172	172	172	D		172	m
Surface Soil (<0.5 ft)	11K630221	Beryllium	1/1	mg/kg			0.65	0.65	0.65	D		0.65	m
Surface Soil (<0.5 ft)	11K630221	Boron	1/1	mg/kg			6.2	6.2	6.2	D		6.2	m
Surface Soil (<0.5 ft)	11K630221	Calcium	1/1	mg/kg			4320	4320	4320	D		4320	m
Surface Soil (<0.5 ft)	11K630221	Chromium	1/1	mg/kg			16.3	16.3	16.3	D		16.3	m
Surface Soil (<0.5 ft)	11K630221	Cobalt	1/1	mg/kg			11.6	11.6	11.6	D		11.6	m
Surface Soil (<0.5 ft)	11K630221	Copper	1/1	mg/kg			20	20	20	D		20	m
Surface Soil (<0.5 ft)	11K630221	Iron	1/1	mg/kg			16600	16600	16600	D		16600	m
Surface Soil (<0.5 ft)	11K630221	Lead	1/1	mg/kg			52.1	52.1	52.1	D		52.1	m
Surface Soil (<0.5 ft)	11K630221	Lithium	1/1	mg/kg			5.9	5.9	5.9	D		5.9	m
Surface Soil (<0.5 ft)	11K630221	Magnesium	1/1	mg/kg			2700	2700	2700	D		2700	m
Surface Soil (<0.5 ft)	11K630221	Manganese	1/1	mg/kg			807	807	807	D		807	m
Surface Soil (<0.5 ft)	11K630221	Molybdenum	1/1	mg/kg			1.6	1.6	1.6	D		1.6	m
Surface Soil (<0.5 ft)	11K630221	Nickel	1/1	mg/kg			20.7	20.7	20.7	D		20.7	m
Surface Soil (<0.5 ft)	11K630221	Potassium	1/1	mg/kg			1470	1470	1470	D		1470	m
Surface Soil (<0.5 ft)	11K630221	Selenium	1/1	mg/kg			0.41	0.41	0.41	D		0.41	m
Surface Soil (<0.5 ft)	11K630221	Sodium	1/1	mg/kg			143	143	143	D		143	m
Surface Soil (<0.5 ft)	11K630221	Strontium	1/1	mg/kg			15.8	15.8	15.8	D		15.8	m
Surface Soil (<0.5 ft)	11K630221	Titanium	1/1	mg/kg			189	189	189	D		189	m
Surface Soil (<0.5 ft)	11K630221	Vanadium	1/1	mg/kg			25.2	25.2	25.2	D		25.2	m
Surface Soil (<0.5 ft)	11K630221	Zinc	1/1	mg/kg			72.7	72.7	72.7	D		72.7	m
Surface Soil (<0.5 ft)	11K630221	Benz(a)anthracene	1/1	mg/kg			0.059	0.059	0.059	D		0.059	m
Surface Soil (<0.5 ft)	11K630221	Benzo(a)pyrene	1/1	mg/kg			0.064	0.064	0.064	D		0.064	m
Surface Soil (<0.5 ft)	11K630221	Benzo(b)fluoranthene	1/1	mg/kg			0.057	0.057	0.057	D		0.057	m
Surface Soil (<0.5 ft)	11K630221	Benzo(ghi)perylene	1/1	mg/kg			0.061	0.061	0.061	D		0.061	m
Surface Soil (<0.5 ft)	11K630221	Benzo(k)fluoranthene	1/1	mg/kg			0.058	0.058	0.058	D		0.058	m
Surface Soil (<0.5 ft)	11K630221	Bis(2-ethylhexyl)phthalate	1/1	mg/kg			0.091	0.091	0.091	D		0.091	m
Surface Soil (<0.5 ft)	11K630221	Chrysene	1/1	mg/kg			0.11	0.11	0.11	D		0.11	m
Surface Soil (<0.5 ft)	11K630221	Fluoranthene	1/1	mg/kg			0.14	0.14	0.14	D		0.14	m
Surface Soil (<0.5 ft)	11K630221	Indeno(1,2,3-cd)pyrene	1/1	mg/kg			0.052	0.052	0.052	D		0.052	m
Surface Soil (<0.5 ft)	11K630221	Phenanthrene	1/1	mg/kg			0.048	0.048	0.048	D		0.048	m
Surface Soil (<0.5 ft)	11K630221	Pyrene	1/1	mg/kg			0.11	0.11	0.11	D		0.11	m
Surface Soil (<0.5 ft)	11K630221	Actinium-227	1/1	pCi/g			0.29	0.29	0.29	D		0.29	m
Surface Soil (<0.5 ft)	11K630221	Cesium-137	1/1	pCi/g			0.21	0.21	0.21	D		0.21	m
Surface Soil (<0.5 ft)	11K630221	Potassium-40	1/1	pCi/g			16.05	16.05	16.1	D		16.1	m
Surface Soil (<0.5 ft)	11K630221	Radium-226	1/1	pCi/g			0.84	0.84	0.84	D		0.84	m
Surface Soil (<0.5 ft)	11K630221	Radium-228	1/1	pCi/g			0.9	0.9	0.9	D		0.9	m
Surface Soil (<0.5 ft)	11K630221	Thorium-228	1/1	pCi/g			0.91	0.91	0.91	D		0.91	m
Surface Soil (<0.5 ft)	11K630221	Thorium-230	1/1	pCi/g			12.13	12.13	12.1	D		12.1	m
Surface Soil (<0.5 ft)	11K630221	Thorium-232	1/1	pCi/g			0.75	0.75	0.75	D		0.75	m
Soil - All Depths	Futura	Arsenic	1/1	mg/kg			320	320	320	D		320	m
Soil - All Depths	Futura	Barium	1/1	mg/kg			3480	3480	3480	D		3480	m
Soil - All Depths	Futura	Boron	1/1	mg/kg			182	182	182	D		182	m
Soil - All Depths	Futura	Cadmium	4/14	mg/kg	0.5	0.6	1.3	15.5	1.85	D	3.73	3.73	u
Soil - All Depths	Futura	Cobalt	6/6	mg/kg			42.4	14000	2460	X	7110	7110	u
Soil - All Depths	Futura	Copper	2/2	mg/kg			401	9090	4750	D	32200	9090	m
Soil - All Depths	Futura	Lead	1/1	mg/kg			529	529	529	D		529	m
Soil - All Depths	Futura	Magnesium	6/6	mg/kg			7360	43400	23400	N	35500	35500	u
Soil - All Depths	Futura	Molybdenum	5/14	mg/kg	9.9	12.95	20.9	947	83	D	201	201	u
Soil - All Depths	Futura	Nickel	1/1	mg/kg			17300	17300	17300	D		17300	m
Soil - All Depths	Futura	Selenium	1/14	mg/kg	9.8	12.95	1040	1040	84.6	D	215	215	u
Soil - All Depths	Futura	Vanadium	1/1	mg/kg			2180	2180	2180	D		2180	m
Soil - All Depths	Futura	Toluene	3/3	mg/kg			0.0015	0.015	0.00607	D	0.0191	0.015	m
Soil - All Depths	Futura	Trichlorofluoromethane	1/1	mg/kg			0.0013	0.0013	0.0013	D		0.0013	m
Soil - All Depths	Futura	Radium-226	359/361	pCi/g	1	1	0.4	2300	29.7	X	46	46	u
Soil - All Depths	Futura	Thorium-230	172/173	pCi/g	1.2	1.2	0.5	2000	68.9	X	102	102	u

Table 2-10. North County Surface Soil Data Summary (Cont'd)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc.[b]	
Soil - All Depths	Futura	Thorium-232	333/361	pCi/g	1	6	0.7	26	2.17	X	2.33	2.33	u
Soil - All Depths	Futura	Uranium-238	48/361	pCi/g	3	37	2.3	2500	37	D	54.2	54.2	u
Soil - All Depths	HISS	Nitrate	1/1	mg/kg			1030	1030	1030	D		1030	m
Soil - All Depths	HISS	Sulfate	1/1	mg/kg			824	824	824	D		824	m
Soil - All Depths	HISS	Antimony	1/13	mg/kg	5.4	7.8	242	242	24.8	D	57	57	u
Soil - All Depths	HISS	Arsenic	2/2	mg/kg			51.3	1010	531	D	3560	1010	m
Soil - All Depths	HISS	Barium	2/2	mg/kg			3010	4360	3690	D	7950	4360	m
Soil - All Depths	HISS	Boron	1/1	mg/kg			1010	1010	1010	D		1010	m
Soil - All Depths	HISS	Cadmium	5/13	mg/kg	0.45	0.65	1.2	26.6	2.91	D	6.44	6.44	u
Soil - All Depths	HISS	Cobalt	6/6	mg/kg			125	1470	374	X	817	817	u
Soil - All Depths	HISS	Copper	4/4	mg/kg			109	946	334	D	815	815	u
Soil - All Depths	HISS	Lead	1/1	mg/kg			464	464	464	D		464	m
Soil - All Depths	HISS	Magnesium	4/4	mg/kg			7690	11400	9520	D	11700	11400	m
Soil - All Depths	HISS	Molybdenum	4/13	mg/kg	9.05	13.05	19.1	1100	99.8	D	248	248	u
Soil - All Depths	HISS	Nickel	1/1	mg/kg			1780	1780	1780	D		1780	m
Soil - All Depths	HISS	Selenium	2/13	mg/kg	9	13.05	41.1	1020	91.1	D	229	229	u
Soil - All Depths	HISS	Silver	1/1	mg/kg			18.3	18.3	18.3	D		18.3	m
Soil - All Depths	HISS	Thallium	2/13	mg/kg	9	13.05	51.8	959	87.3	D	217	217	u
Soil - All Depths	HISS	Vanadium	1/1	mg/kg			712	712	712	D		712	m
Soil - All Depths	HISS	Zinc	1/1	mg/kg			308	308	308	D		308	m
Soil - All Depths	HISS	Toluene	2/2	mg/kg			0.0028	0.0029	0.00285	D	0.00317	0.0029	m
Soil - All Depths	HISS	Actinium-227	8/21	pCi/g	-0.01	0.58	0.29	5.36	1.06	D	1.68	1.68	u
Soil - All Depths	HISS	Cesium-137	1/21	pCi/g	-0.05	0.05	0.1	0.1	0.00667	D	0.0179	0.0179	u
Soil - All Depths	HISS	Potassium-40	9/9	pCi/g			13.67	16.89	15.8	N	16.4	16.4	u
Soil - All Depths	HISS	Radium-226	537/544	pCi/g	1	2	0.5	700	6.91	X	9.6	9.6	u
Soil - All Depths	HISS	Radium-228	20/21	pCi/g	0.78	0.78	0.29	1.16	0.915	X	0.986	0.986	u
Soil - All Depths	HISS	Thorium-228	20/21	pCi/g	0.78	0.78	0.29	1.16	0.915	X	0.986	0.986	u
Soil - All Depths	HISS	Thorium-230	215/228	pCi/g	-3.76	20.03	0.8	830	37.9	Z	51.9	51.9	u
Soil - All Depths	HISS	Thorium-232	481/544	pCi/g	0.78	4	0.29	5	1.73	X	1.79	1.79	u
Soil - All Depths	HISS	Uranium-238	62/543	pCi/g	-0.49	55	4	800	13.9	D	17.1	17.1	u
Surface Soil (<5 ft)	IA-1	Magnesium	2/2	mg/kg			6110	10200	8160	D	21100	10200	m
Surface Soil (<5 ft)	IA-1	Molybdenum	1/2	mg/kg	8.6	8.6	17.7	17.7	13.2	D	41.9	17.7	m
Surface Soil (<5 ft)	IA-1	TOX	1/2	UG/G	30.35	30.35	56.9	56.9	43.6	D	127	56.9	m
Surface Soil (<5 ft)	IA-1	PCB-1254	1/2	mg/kg	0.0205	0.0205	0.26	0.26	0.14	D	0.896	0.26	m
Surface Soil (<5 ft)	IA-1	Toluene	2/2	mg/kg			0.003	0.0031	0.00305	D	0.00337	0.0031	m
Surface Soil (<5 ft)	IA-1	Radium-226	7/13	pCi/g	1.6	3.9	1	2700	216	X	585	585	u
Surface Soil (<5 ft)	IA-1	Thorium-230	4/4	pCi/g			1.8	110	33.7	D	94.3	94.3	u
Surface Soil (<5 ft)	IA-1	Thorium-232	6/13	pCi/g	1	4.3	1.1	63	7.14	D	15.5	15.5	u
Surface Soil (<5 ft)	IA-1	Uranium-238	3/13	pCi/g	5	78.4	40	1200	128	D	287	287	u
Surface Soil (<0.5 ft)	IA-10	Aluminum	4/4	mg/kg			8200	9100	8510	D	8990	8990	u
Surface Soil (<0.5 ft)	IA-10	Arsenic	4/4	mg/kg			4.7	5.9	5.45	D	6.13	5.9	m
Surface Soil (<0.5 ft)	IA-10	Barium	4/4	mg/kg			127	149	140	D	151	149	m
Surface Soil (<0.5 ft)	IA-10	Beryllium	4/4	mg/kg			0.56	0.63	0.585	D	0.622	0.622	u
Surface Soil (<0.5 ft)	IA-10	Boron	4/4	mg/kg			5.8	7.7	6.48	D	7.48	7.48	u
Surface Soil (<0.5 ft)	IA-10	Calcium	4/4	mg/kg			6680	10200	8100	D	10100	10100	u
Surface Soil (<0.5 ft)	IA-10	Chromium	4/4	mg/kg			15.5	16.3	15.9	D	16.3	16.3	u
Surface Soil (<0.5 ft)	IA-10	Cobalt	4/4	mg/kg			6.5	7.2	6.73	D	7.11	7.11	u
Surface Soil (<0.5 ft)	IA-10	Copper	4/4	mg/kg			31.2	70.9	43.6	D	65.2	65.2	u
Surface Soil (<0.5 ft)	IA-10	Iron	4/4	mg/kg			14100	15900	14700	D	15700	15700	u
Surface Soil (<0.5 ft)	IA-10	Lead	4/4	mg/kg			52.8	73.5	60.2	D	71	71	u
Surface Soil (<0.5 ft)	IA-10	Lithium	4/4	mg/kg			5.1	5.9	5.38	D	5.8	5.8	u
Surface Soil (<0.5 ft)	IA-10	Magnesium	4/4	mg/kg			3320	5140	4030	D	5060	5060	u
Surface Soil (<0.5 ft)	IA-10	Manganese	4/4	mg/kg			407	577	512	D	600	577	m
Surface Soil (<0.5 ft)	IA-10	Molybdenum	3/4	mg/kg	0.55	0.55	1.2	1.6	1.24	D	1.82	1.6	m
Surface Soil (<0.5 ft)	IA-10	Nickel	4/4	mg/kg			14	17.1	15.5	D	17.1	17.1	u
Surface Soil (<0.5 ft)	IA-10	Potassium	4/4	mg/kg			968	1360	1170	D	1360	1360	u
Surface Soil (<0.5 ft)	IA-10	Selenium	4/4	mg/kg			0.44	0.7	0.543	D	0.687	0.687	u
Surface Soil (<0.5 ft)	IA-10	Sodium	4/4	mg/kg			91.3	101	95.7	D	101	101	u
Surface Soil (<0.5 ft)	IA-10	Strontium	4/4	mg/kg			18.3	22.7	20.1	D	22.3	22.3	u
Surface Soil (<0.5 ft)	IA-10	Titanium	4/4	mg/kg			124	168	148	D	169	168	m
Surface Soil (<0.5 ft)	IA-10	Vanadium	4/4	mg/kg			19.1	21.3	20.1	D	21.4	21.3	m
Surface Soil (<0.5 ft)	IA-10	Zinc	4/4	mg/kg			75	88.7	83	D	90.9	88.7	m
Surface Soil (<0.5 ft)	IA-10	Anthracene	2/4	mg/kg	0.21	0.215	0.046	0.14	0.153	D	0.246	0.14	m
Surface Soil (<0.5 ft)	IA-10	Benz(a)anthracene	4/4	mg/kg			0.06	0.76	0.325	D	0.696	0.696	u
Surface Soil (<0.5 ft)	IA-10	Benzo(a)pyrene	4/4	mg/kg			0.066	0.79	0.349	D	0.734	0.734	u
Surface Soil (<0.5 ft)	IA-10	Benzo(b)fluoranthene	4/4	mg/kg			0.065	0.69	0.316	D	0.647	0.647	u
Surface Soil (<0.5 ft)	IA-10	Benzo(ghi)perylene	4/4	mg/kg			0.071	0.95	0.435	D	0.903	0.903	u
Surface Soil (<0.5 ft)	IA-10	Benzo(k)fluoranthene	4/4	mg/kg			0.059	0.65	0.292	D	0.607	0.607	u
Surface Soil (<0.5 ft)	IA-10	Bis(2-ethylhexyl)phthalate	4/4	mg/kg			0.058	0.84	0.375	D	0.764	0.764	u
Surface Soil (<0.5 ft)	IA-10	Butyl benzyl phthalate	2/4	mg/kg	0.215	0.215	0.045	0.12	0.149	D	0.246	0.12	m
Surface Soil (<0.5 ft)	IA-10	Carbazole	1/4	mg/kg	0.21	0.215	0.048	0.048	0.172	D	0.269	0.048	m
Surface Soil (<0.5 ft)	IA-10	Chrysene	4/4	mg/kg			0.12	1.3	0.58	D	1.21	1.21	u
Surface Soil (<0.5 ft)	IA-10	Fluoranthene	4/4	mg/kg			0.12	1.3	0.583	D	1.2	1.2	u
Surface Soil (<0.5 ft)	IA-10	Indeno(1,2,3-cd)pyrene	4/4	mg/kg			0.059	0.82	0.372	D	0.777	0.777	u
Surface Soil (<0.5 ft)	IA-10	Phenanthrene	4/4	mg/kg			0.071	0.76	0.313	D	0.682	0.682	u
Surface Soil (<0.5 ft)	IA-10	Pyrene	4/4	mg/kg			0.14	1.6	0.693	D	1.47	1.47	u

Table 2-10. North County Surface Soil Data Summary (Cont'd)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	
Surface Soil (<0.5 ft)	IA-10	Cesium-137	4/4	pCi/g			0.13	0.21	0.163	D	0.203	0.203	u
Surface Soil (<0.5 ft)	IA-10	Potassium-40	4/4	pCi/g			14.99	16.54	15.7	D	16.5	16.5	u
Surface Soil (<0.5 ft)	IA-10	Radium-226	95/119	pCi/g	0	2	0.3	2.8	1.19	Z	1.29	1.29	u
Surface Soil (<0.5 ft)	IA-10	Radium-228	4/4	pCi/g			0.88	0.94	0.908	D	0.94	0.94	u
Surface Soil (<0.5 ft)	IA-10	Thorium-228	4/4	pCi/g			1.23	2.29	1.71	D	2.23	2.23	u
Surface Soil (<0.5 ft)	IA-10	Thorium-230	112/121	pCi/g	0	0.8	0.4	29	3.8	Z	4.44	4.44	u
Surface Soil (<0.5 ft)	IA-10	Thorium-232	88/119	pCi/g	0	2.8	0.5	4	1.39	Z	1.52	1.52	u
Surface Soil (<0.5 ft)	IA-13	Aluminum	6/6	mg/kg			8920	12900	10600	L	12000	12000	u
Surface Soil (<0.5 ft)	IA-13	Arsenic	6/6	mg/kg			5.1	19.9	11.6	L	24.9	19.9	m
Surface Soil (<0.5 ft)	IA-13	Barium	6/6	mg/kg			105	181	150	N	172	172	u
Surface Soil (<0.5 ft)	IA-13	Beryllium	3/6	mg/kg	0.335	0.37	0.63	0.78	0.521	D	0.682	0.682	u
Surface Soil (<0.5 ft)	IA-13	Boron	6/6	mg/kg			5.5	9.2	7.6	N	8.65	8.65	u
Surface Soil (<0.5 ft)	IA-13	Calcium	6/6	mg/kg			3110	68900	15000	X	36800	36800	u
Surface Soil (<0.5 ft)	IA-13	Chromium	6/6	mg/kg			11.9	18.3	15.5	N	17.3	17.3	u
Surface Soil (<0.5 ft)	IA-13	Cobalt	6/6	mg/kg			6.7	13.3	9.87	L	13.1	13.1	u
Surface Soil (<0.5 ft)	IA-13	Copper	6/6	mg/kg			19.3	29.7	23	L	27.1	27.1	u
Surface Soil (<0.5 ft)	IA-13	Iron	6/6	mg/kg			12400	21000	17200	N	19700	19700	u
Surface Soil (<0.5 ft)	IA-13	Lead	6/6	mg/kg			17.2	137	57.3	L	214	137	m
Surface Soil (<0.5 ft)	IA-13	Lithium	6/6	mg/kg			5.2	7.4	6.35	L	7.36	7.36	u
Surface Soil (<0.5 ft)	IA-13	Magnesium	6/6	mg/kg			1960	9210	3920	X	6090	6090	u
Surface Soil (<0.5 ft)	IA-13	Manganese	6/6	mg/kg			463	743	615	N	712	712	u
Surface Soil (<0.5 ft)	IA-13	Mercury	1/6	mg/kg	0.03	0.035	0.08	0.08	0.04	D	0.0562	0.0562	u
Surface Soil (<0.5 ft)	IA-13	Molybdenum	4/6	mg/kg	0.47	0.55	1.2	2.1	1.25	D	1.8	1.8	u
Surface Soil (<0.5 ft)	IA-13	Nickel	6/6	mg/kg			15.1	26.2	19.6	L	23.6	23.6	u
Surface Soil (<0.5 ft)	IA-13	Potassium	6/6	mg/kg			1230	1730	1470	N	1620	1620	u
Surface Soil (<0.5 ft)	IA-13	Selenium	3/6	mg/kg	0.165	0.195	0.66	0.78	0.447	D	0.692	0.692	u
Surface Soil (<0.5 ft)	IA-13	Sodium	6/6	mg/kg			66.7	145	114	N	139	139	u
Surface Soil (<0.5 ft)	IA-13	Strontium	6/6	mg/kg			14.9	79.4	30.6	X	50.5	50.5	u
Surface Soil (<0.5 ft)	IA-13	Thallium	1/6	mg/kg	0.345	0.95	1.4	1.4	0.734	D	1.05	1.05	u
Surface Soil (<0.5 ft)	IA-13	Titanium	6/6	mg/kg			155	303	221	L	305	303	m
Surface Soil (<0.5 ft)	IA-13	Uranium	1/6	mg/kg	4.3	9.05	10.2	10.2	7.32	D	9.31	9.31	u
Surface Soil (<0.5 ft)	IA-13	Vanadium	6/6	mg/kg			23.7	30.1	27.3	L	29.8	29.8	u
Surface Soil (<0.5 ft)	IA-13	Zinc	6/6	mg/kg			56.6	81.6	69.9	N	78.8	78.8	u
Surface Soil (<0.5 ft)	IA-13	Benz(a)anthracene	4/6	mg/kg	0.21	0.245	0.044	0.21	0.151	D	0.218	0.21	m
Surface Soil (<0.5 ft)	IA-13	Benzo(a)pyrene	4/6	mg/kg	0.21	0.245	0.049	0.12	0.137	D	0.199	0.12	m
Surface Soil (<0.5 ft)	IA-13	Benzo(b)fluoranthene	4/6	mg/kg	0.21	0.245	0.046	0.26	0.164	D	0.235	0.235	u
Surface Soil (<0.5 ft)	IA-13	Benzo(ghi)perylene	3/6	mg/kg	0.21	0.245	0.055	0.13	0.163	D	0.222	0.13	m
Surface Soil (<0.5 ft)	IA-13	Benzo(k)fluoranthene	3/6	mg/kg	0.21	0.245	0.044	0.092	0.15	D	0.218	0.092	m
Surface Soil (<0.5 ft)	IA-13	Bis(2-ethylhexyl)phthalate	3/6	mg/kg	0.21	0.245	0.11	0.13	0.17	D	0.219	0.13	m
Surface Soil (<0.5 ft)	IA-13	Butyl benzyl phthalate	1/6	mg/kg	0.205	0.245	0.061	0.061	0.192	D	0.246	0.061	m
Surface Soil (<0.5 ft)	IA-13	Chrysene	4/6	mg/kg	0.21	0.245	0.084	0.19	0.18	D	0.224	0.19	m
Surface Soil (<0.5 ft)	IA-13	Fluoranthene	6/6	mg/kg			0.094	0.3	0.179	N	0.25	0.25	u
Surface Soil (<0.5 ft)	IA-13	Indeno(1,2,3-cd)pyrene	4/6	mg/kg	0.21	0.245	0.046	0.35	0.177	D	0.269	0.269	u
Surface Soil (<0.5 ft)	IA-13	Phenanthrene	3/6	mg/kg	0.205	0.245	0.058	0.094	0.149	D	0.215	0.094	m
Surface Soil (<0.5 ft)	IA-13	Pyrene	4/6	mg/kg	0.21	0.245	0.098	0.32	0.216	D	0.275	0.275	u
Surface Soil (<0.5 ft)	IA-13	1,1,2,2-Tetrachloroethane	1/6	mg/kg	0.003	0.0035	0.006	0.006	0.00358	D	0.00457	0.00457	u
Surface Soil (<0.5 ft)	IA-13	1,1,2-Trichloroethane	1/6	mg/kg	0.003	0.0035	0.003	0.003	0.00308	D	0.00325	0.003	m
Surface Soil (<0.5 ft)	IA-13	2-Butanone	1/6	mg/kg	0.006	0.0075	0.014	0.014	0.00783	D	0.0104	0.0104	u
Surface Soil (<0.5 ft)	IA-13	4-Methyl-2-pentanone	1/6	mg/kg	0.006	0.0075	0.011	0.011	0.00733	D	0.00887	0.00887	u
Surface Soil (<0.5 ft)	IA-13	Bromoform	1/6	mg/kg	0.003	0.0035	0.004	0.004	0.00325	D	0.00359	0.00359	u
Surface Soil (<0.5 ft)	IA-13	Toluene	1/6	mg/kg	0.003	0.0035	0.002	0.002	0.00292	D	0.00332	0.002	m
Surface Soil (<0.5 ft)	IA-13	Actinium-227	26/38	pCi/g	0.02	0.19	0.2	0.71	0.328	X	0.382	0.382	u
Surface Soil (<0.5 ft)	IA-13	Americium-241	1/38	pCi/g	-0.02	0.07	0.06	0.06	0.0303	D	0.0358	0.0358	u
Surface Soil (<0.5 ft)	IA-13	Cesium-137	35/37	pCi/g	0	0	0.05	0.55	0.242	Z	0.281	0.281	u
Surface Soil (<0.5 ft)	IA-13	Potassium-40	37/37	pCi/g			3.69	17.61	14.2	X	15.2	15.2	u
Surface Soil (<0.5 ft)	IA-13	Protactinium-231	2/38	pCi/g	-0.34	1.03	1.55	1.92	0.391	D	0.514	0.514	u
Surface Soil (<0.5 ft)	IA-13	Radium-226	110/111	pCi/g	1	1	0.54	3.3	1.48	X	1.59	1.59	u
Surface Soil (<0.5 ft)	IA-13	Radium-228	37/37	pCi/g			0.14	1.13	0.844	X	0.911	0.911	u
Surface Soil (<0.5 ft)	IA-13	Thorium-228	38/38	pCi/g			0.39	2.14	1.11	N	1.2	1.2	u
Surface Soil (<0.5 ft)	IA-13	Thorium-230	108/109	pCi/g	1.2	1.2	0.42	110	11.4	L	15.4	15.4	u
Surface Soil (<0.5 ft)	IA-13	Thorium-232	103/112	pCi/g	1	1	0.44	4	1.44	L	1.54	1.54	u
Surface Soil (<0.5 ft)	IA-13	Uranium-235	11/38	pCi/g	-0.01	0.26	0.2	0.51	0.168	D	0.195	0.195	u
Surface Soil (<0.5 ft)	IA-13	Uranium-238	3/112	pCi/g	0.26	13	2.8	7	3.58	D	4.03	4.03	u
Surface Soil (<5 ft)	IA-2	Arsenic	2/2	mg/kg			205	237	221	D	322	237	m
Surface Soil (<5 ft)	IA-2	Cadmium	4/12	mg/kg	0.45	0.55	1	5.9	1.38	D	2.31	2.31	u
Surface Soil (<5 ft)	IA-2	Cobalt	4/4	mg/kg			46.7	228	144	D	245	228	m
Surface Soil (<5 ft)	IA-2	Copper	3/3	mg/kg			187	440	307	D	521	440	m
Surface Soil (<5 ft)	IA-2	Magnesium	5/5	mg/kg			8180	24900	12700	L	25500	24900	m
Surface Soil (<5 ft)	IA-2	Molybdenum	3/12	mg/kg	8.75	11.25	30.3	151	32.5	D	57.6	57.6	u
Surface Soil (<5 ft)	IA-2	Vanadium	2/2	mg/kg			782	862	822	D	1070	862	m
Surface Soil (<5 ft)	IA-2	Toluene	5/5	mg/kg			0.0025	0.0104	0.00716	N	0.0104	0.0104	u
Surface Soil (<5 ft)	IA-2	Actinium-227	11/13	pCi/g	0.1	0.19	0.18	130.4	13.1	X	30.9	30.9	u
Surface Soil (<5 ft)	IA-2	Americium-241	4/13	pCi/g	0	0.11	0.06	2.58	0.333	D	0.687	0.687	u
Surface Soil (<5 ft)	IA-2	Cesium-137	6/13	pCi/g	-0.04	0.04	0.03	3.09	0.278	D	0.697	0.697	u
Surface Soil (<5 ft)	IA-2	Potassium-40	12/13	pCi/g	8.43	8.43	5.69	17.74	13	N	14.8	14.8	u
Surface Soil (<5 ft)	IA-2	Protactinium-231	5/13	pCi/g	-0.03	0.7	2.66	179.3	17.1	D	41.4	41.4	u
Surface Soil (<5 ft)	IA-2	Radium-226	32/53	pCi/g	1.5	5	0.85	590	38.6	X	68.2	68.2	u

Table 2-10. North County Surface Soil Data Summary (Cont'd)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	
Surface Soil (<5 ft)	IA-2	Radium-228	13/13	pCi/g			0.38	4.82	1.19	X	1.74	1.74	u
Surface Soil (<5 ft)	IA-2	Thorium-228	13/13	pCi/g			0.5	4.82	1.39	X	1.92	1.92	u
Surface Soil (<5 ft)	IA-2	Thorium-230	30/30	pCi/g			0	14070	584	Z	1380	1380	u
Surface Soil (<5 ft)	IA-2	Thorium-232	23/53	pCi/g	2	13.4	0.44	4.82	2.71	D	3.15	3.15	u
Surface Soil (<5 ft)	IA-2	Uranium-235	10/13	pCi/g	-0.03	0.12	0.25	37.21	4.65	Z	9.68	9.68	u
Surface Soil (<5 ft)	IA-2	Uranium-238	14/54	pCi/g	0.33	304	6.02	706	67.8	D	98.1	98.1	u
Surface Soil (<5 ft)	IA-3	Aluminum	3/3	mg/kg			13100	23200	17000	D	26200	23200	m
Surface Soil (<5 ft)	IA-3	Antimony	2/7	mg/kg	1.65	6	5.3	53.2	11.3	D	24.9	24.9	u
Surface Soil (<5 ft)	IA-3	Arsenic	3/3	mg/kg			7.2	9	8.2	D	9.75	9	m
Surface Soil (<5 ft)	IA-3	Barium	3/3	mg/kg			152	209	178	D	227	209	m
Surface Soil (<5 ft)	IA-3	Beryllium	3/3	mg/kg			0.84	2.4	1.36	D	2.88	2.4	m
Surface Soil (<5 ft)	IA-3	Boron	3/3	mg/kg			8.4	9.6	9.07	D	10.1	9.6	m
Surface Soil (<5 ft)	IA-3	Cadmium	2/7	mg/kg	0.14	0.5	0.52	50.4	7.52	D	21.4	21.4	u
Surface Soil (<5 ft)	IA-3	Calcium	3/3	mg/kg			4860	29500	13400	D	36900	29500	m
Surface Soil (<5 ft)	IA-3	Chromium	4/4	mg/kg			18.6	3240	830	D	2720	2720	u
Surface Soil (<5 ft)	IA-3	Cobalt	3/3	mg/kg			8.3	11.8	10.1	D	13.1	11.8	m
Surface Soil (<5 ft)	IA-3	Copper	3/3	mg/kg			14.1	31.8	21.8	D	37.1	31.8	m
Surface Soil (<5 ft)	IA-3	Iron	3/3	mg/kg			19400	26800	21900	D	29100	26800	m
Surface Soil (<5 ft)	IA-3	Lead	4/4	mg/kg			19.6	1200	336	D	1010	1010	u
Surface Soil (<5 ft)	IA-3	Lithium	3/3	mg/kg			8.9	14.6	11.6	D	16.4	14.6	m
Surface Soil (<5 ft)	IA-3	Magnesium	5/5	mg/kg			3730	14700	7600	L	20000	14700	m
Surface Soil (<5 ft)	IA-3	Manganese	3/3	mg/kg			552	1330	852	D	1560	1330	m
Surface Soil (<5 ft)	IA-3	Molybdenum	3/7	mg/kg	0.415	10.05	2.5	58.9	13.3	D	28.3	28.3	u
Surface Soil (<5 ft)	IA-3	Nickel	3/3	mg/kg			20.2	66.9	36.4	D	81	66.9	m
Surface Soil (<5 ft)	IA-3	Potassium	3/3	mg/kg			1320	2070	1650	D	2300	2070	m
Surface Soil (<5 ft)	IA-3	Sodium	3/3	mg/kg			124	382	239	D	460	382	m
Surface Soil (<5 ft)	IA-3	Strontium	3/3	mg/kg			24.1	53.2	42.7	D	70	53.2	m
Surface Soil (<5 ft)	IA-3	Thallium	2/7	mg/kg	0.8	10.05	1.2	1.4	5.94	D	9.27	1.4	m
Surface Soil (<5 ft)	IA-3	Titanium	3/3	mg/kg			260	416	321	D	462	416	m
Surface Soil (<5 ft)	IA-3	Uranium	2/3	mg/kg	6.9	6.9	15.6	129	50.5	D	165	129	m
Surface Soil (<5 ft)	IA-3	Vanadium	3/3	mg/kg			35.6	57.2	43.6	D	63.6	57.2	m
Surface Soil (<5 ft)	IA-3	Zinc	4/4	mg/kg			49.8	4330	1130	D	3640	3640	u
Surface Soil (<5 ft)	IA-3	MCPP	1/3	mg/kg	4.5	4.7	11	11	6.73	D	13	11	m
Surface Soil (<5 ft)	IA-3	Benz(a)anthracene	2/3	mg/kg	0.19	0.19	0.09	0.18	0.153	D	0.246	0.18	m
Surface Soil (<5 ft)	IA-3	Benzo(a)pyrene	2/3	mg/kg	0.19	0.19	0.077	0.18	0.149	D	0.254	0.18	m
Surface Soil (<5 ft)	IA-3	Benzo(b)fluoranthene	1/3	mg/kg	0.185	0.19	0.083	0.083	0.153	D	0.254	0.083	m
Surface Soil (<5 ft)	IA-3	Benzo(ghi)perylene	1/3	mg/kg	0.19	0.195	0.19	0.19	0.192	D	0.197	0.19	m
Surface Soil (<5 ft)	IA-3	Benzo(k)fluoranthene	1/3	mg/kg	0.19	0.195	0.066	0.066	0.15	D	0.274	0.066	m
Surface Soil (<5 ft)	IA-3	Butyl benzyl phthalate	1/3	mg/kg	0.185	0.19	0.1	0.1	0.158	D	0.244	0.1	m
Surface Soil (<5 ft)	IA-3	Chrysene	1/3	mg/kg	0.19	0.195	0.21	0.21	0.198	D	0.216	0.21	m
Surface Soil (<5 ft)	IA-3	Fluoranthene	2/3	mg/kg	0.19	0.19	0.1	0.31	0.2	D	0.378	0.31	m
Surface Soil (<5 ft)	IA-3	Indeno(1,2,3-cd)pyrene	2/3	mg/kg	0.19	0.19	0.089	0.18	0.153	D	0.247	0.18	m
Surface Soil (<5 ft)	IA-3	Phenanthrene	2/3	mg/kg	0.19	0.19	0.042	0.19	0.141	D	0.285	0.19	m
Surface Soil (<5 ft)	IA-3	Pyrene	2/3	mg/kg	0.19	0.19	0.046	0.27	0.169	D	0.36	0.27	m
Surface Soil (<5 ft)	IA-3	1,2-Dichloroethene	1/3	mg/kg	0.003	0.003	0.003	0.003	0.003	D	0.003	0.003	u
Surface Soil (<5 ft)	IA-3	Dimethylbenzene	1/3	mg/kg	0.003	0.003	0.01	0.01	0.00533	D	0.0121	0.01	m
Surface Soil (<5 ft)	IA-3	Methylene chloride	1/3	mg/kg	0.003	0.004	0.13	0.13	0.0457	D	0.169	0.13	m
Surface Soil (<5 ft)	IA-3	Toluene	3/6	mg/kg	0.003	0.003	0.0015	0.055	0.0176	D	0.037	0.037	u
Surface Soil (<5 ft)	IA-3	Trichloroethene	1/3	mg/kg	0.003	0.003	0.005	0.005	0.00367	D	0.00561	0.005	m
Surface Soil (<5 ft)	IA-3	Actinium-227	11/15	pCi/g	0.12	0.24	0.19	47.16	4.99	X	10.7	10.7	u
Surface Soil (<5 ft)	IA-3	Americium-241	1/15	pCi/g	-0.02	0.37	2.09	2.09	0.185	D	0.428	0.428	u
Surface Soil (<5 ft)	IA-3	Cesium-137	10/15	pCi/g	-0.01	0.06	0.03	0.12	0.0507	Z	0.0662	0.0662	u
Surface Soil (<5 ft)	IA-3	Potassium-40	15/15	pCi/g			7.02	17.01	12.2	L	14.2	14.2	u
Surface Soil (<5 ft)	IA-3	Protactinium-231	6/15	pCi/g	-0.06	0.46	1.56	31.66	3.87	D	7.86	7.86	u
Surface Soil (<5 ft)	IA-3	Radium-226	59/74	pCi/g	1.5	4.7	0.7	208	10.1	X	15.9	15.9	u
Surface Soil (<5 ft)	IA-3	Radium-228	15/15	pCi/g			0.33	1.81	0.846	L	1.1	1.1	u
Surface Soil (<5 ft)	IA-3	Thorium-228	15/15	pCi/g			0.34	1.81	1.04	N	1.23	1.23	u
Surface Soil (<5 ft)	IA-3	Thorium-230	36/36	pCi/g			1.09	5335	226	X	482	482	u
Surface Soil (<5 ft)	IA-3	Thorium-232	51/74	pCi/g	0.5	7.5	0.4	5	1.96	L	2.27	2.27	u
Surface Soil (<5 ft)	IA-3	Uranium-235	11/15	pCi/g	-0.02	0.16	0.22	8.21	1.46	Z	2.61	2.61	u
Surface Soil (<5 ft)	IA-3	Uranium-238	18/74	pCi/g	0.9	173.4	3.04	270	23.6	D	31.4	31.4	u
Surface Soil (<5 ft)	IA-4	Fluoride	2/2	mg/kg			9.58	43.3	26.4	D	133	43.3	m
Surface Soil (<5 ft)	IA-4	Sulfide	1/2	mg/kg	13.6	13.6	21	21	17.3	D	40.7	21	m
Surface Soil (<5 ft)	IA-4	Aluminum	2/2	mg/kg			18500	19000	18800	D	20300	19000	m
Surface Soil (<5 ft)	IA-4	Arsenic	3/3	mg/kg			8.5	50.8	22.9	D	63.6	50.8	m
Surface Soil (<5 ft)	IA-4	Barium	4/4	mg/kg			266	3750	1340	D	3270	3270	u
Surface Soil (<5 ft)	IA-4	Beryllium	2/2	mg/kg			0.98	1	0.99	D	1.05	1	m
Surface Soil (<5 ft)	IA-4	Boron	1/2	mg/kg	4.45	4.45	11.9	11.9	8.18	D	31.7	11.9	m
Surface Soil (<5 ft)	IA-4	Cadmium	1/7	mg/kg	0.155	0.55	4.5	4.5	0.995	D	2.14	2.14	u
Surface Soil (<5 ft)	IA-4	Calcium	2/2	mg/kg			3610	3920	3770	D	4740	3920	m
Surface Soil (<5 ft)	IA-4	Chromium	2/2	mg/kg			20.6	20.8	20.7	D	21.3	20.8	m
Surface Soil (<5 ft)	IA-4	Cobalt	7/7	mg/kg			4.7	1510	313	L	120000	1510	m
Surface Soil (<5 ft)	IA-4	Copper	4/4	mg/kg			13.1	876	283	D	762	762	u
Surface Soil (<5 ft)	IA-4	Iron	2/2	mg/kg			22500	24200	23400	D	28700	24200	m
Surface Soil (<5 ft)	IA-4	Lead	4/4	mg/kg			8.6	408	176	D	406	406	u
Surface Soil (<5 ft)	IA-4	Lithium	2/2	mg/kg			8.9	9.6	9.25	D	11.5	9.6	m
Surface Soil (<5 ft)	IA-4	Magnesium	3/3	mg/kg			3510	13200	6820	D	16100	13200	m

Table 2-10. North County Surface Soil Data Summary (Cont'd)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	
Surface Soil (<5 ft)	IA-4	Manganese	2/2	mg/kg			172	692	432	D	2070	692	m
Surface Soil (<5 ft)	IA-4	Mercury	1/2	mg/kg	0.03	0.03	0.07	0.07	0.05	D	0.176	0.07	m
Surface Soil (<5 ft)	IA-4	Molybdenum	3/7	mg/kg	0.465	11.1	8.2	71.9	20.5	D	38.6	38.6	u
Surface Soil (<5 ft)	IA-4	Nickel	3/3	mg/kg			19	2010	684	D	2620	2010	m
Surface Soil (<5 ft)	IA-4	Potassium	2/2	mg/kg			1060	1350	1210	D	2120	1350	m
Surface Soil (<5 ft)	IA-4	Selenium	1/7	mg/kg	0.5	11.1	29.3	29.3	10.4	D	17.4	17.4	u
Surface Soil (<5 ft)	IA-4	Sodium	2/2	mg/kg			197	242	220	D	362	242	m
Surface Soil (<5 ft)	IA-4	Strontium	2/2	mg/kg			23.7	26.3	25	D	33.2	26.3	m
Surface Soil (<5 ft)	IA-4	Thallium	2/7	mg/kg	9.55	11.1	1	3.3	8.09	D	11.1	3.3	m
Surface Soil (<5 ft)	IA-4	Titanium	2/2	mg/kg			170	243	207	D	437	243	m
Surface Soil (<5 ft)	IA-4	Uranium	1/2	mg/kg	7.8	7.8	73.6	73.6	40.7	D	248	73.6	m
Surface Soil (<5 ft)	IA-4	Vanadium	2/2	mg/kg			29.5	39.1	34.3	D	64.6	39.1	m
Surface Soil (<5 ft)	IA-4	Zinc	2/2	mg/kg			52.3	59.3	55.8	D	77.9	59.3	m
Surface Soil (<5 ft)	IA-4	Toluene	4/5	mg/kg	0.003	0.003	0.0018	0.12	0.0273	D	0.0768	0.0768	u
Surface Soil (<5 ft)	IA-4	Actinium-227	6/6	pCi/g			0.23	4.76	1.61	L	108	4.76	m
Surface Soil (<5 ft)	IA-4	Americium-241	2/6	pCi/g	0.06	0.09	0.18	0.24	0.118	D	0.179	0.179	u
Surface Soil (<5 ft)	IA-4	Potassium-40	6/6	pCi/g			13.85	16.65	14.9	L	15.8	15.8	u
Surface Soil (<5 ft)	IA-4	Protactinium-231	3/6	pCi/g	-0.12	0.45	2.49	3.98	1.75	D	3.29	3.29	u
Surface Soil (<5 ft)	IA-4	Radium-226	20/40	pCi/g	1.2	4.4	0.82	1518	170	X	267	267	u
Surface Soil (<5 ft)	IA-4	Radium-228	6/6	pCi/g			0.95	1.2	1.04	L	1.13	1.13	u
Surface Soil (<5 ft)	IA-4	Thorium-228	6/6	pCi/g			1.02	2.2	1.4	L	1.86	1.86	u
Surface Soil (<5 ft)	IA-4	Thorium-230	15/15	pCi/g			1.1	2440	398	L	30800	2440	m
Surface Soil (<5 ft)	IA-4	Thorium-232	8/38	pCi/g	2	20.4	1.15	4	4.76	D	5.97	4	m
Surface Soil (<5 ft)	IA-4	Uranium-235	5/6	pCi/g	0.14	0.14	1.21	3.89	1.96	N	3.06	3.06	u
Surface Soil (<5 ft)	IA-4	Uranium-238	4/38	pCi/g	1.4	406	14.83	72.35	79.2	D	106	72.4	m
Surface Soil (<5 ft)	IA-5	Fluoride	2/2	mg/kg			4.42	21.1	12.8	D	65.4	21.1	m
Surface Soil (<5 ft)	IA-5	Aluminum	7/7	mg/kg			10700	17100	13600	L	15500	15500	u
Surface Soil (<5 ft)	IA-5	Arsenic	7/7	mg/kg			7.3	26.2	11	X	16	16	u
Surface Soil (<5 ft)	IA-5	Barium	8/8	mg/kg			166	4550	744	X	1770	1770	u
Surface Soil (<5 ft)	IA-5	Beryllium	6/7	mg/kg	0.375	0.375	0.7	1.4	0.865	N	1.09	1.09	u
Surface Soil (<5 ft)	IA-5	Boron	7/7	mg/kg			2.3	15.1	8.53	N	11.3	11.3	u
Surface Soil (<5 ft)	IA-5	Cadmium	3/18	mg/kg	0.155	0.55	0.63	4.2	0.66	D	1.03	1.03	u
Surface Soil (<5 ft)	IA-5	Calcium	7/7	mg/kg			2230	9310	5650	N	7290	7290	u
Surface Soil (<5 ft)	IA-5	Chromium	7/7	mg/kg			15.1	34.6	20.2	L	25.9	25.9	u
Surface Soil (<5 ft)	IA-5	Cobalt	13/13	mg/kg			7.6	308	107	L	653	308	m
Surface Soil (<5 ft)	IA-5	Copper	9/9	mg/kg			13.2	191	63.6	L	369	191	m
Surface Soil (<5 ft)	IA-5	Cyanide	1/3	mg/kg	0.3105	0.3225	0.772	0.772	0.468	D	0.912	0.772	m
Surface Soil (<5 ft)	IA-5	Iron	7/7	mg/kg			16100	21400	19300	N	20800	20800	u
Surface Soil (<5 ft)	IA-5	Lead	7/7	mg/kg			10.3	49	21	L	39.6	39.6	u
Surface Soil (<5 ft)	IA-5	Lithium	7/7	mg/kg			6	10.1	8.59	N	9.71	9.71	u
Surface Soil (<5 ft)	IA-5	Magnesium	9/9	mg/kg			2010	26900	7150	X	12200	12200	u
Surface Soil (<5 ft)	IA-5	Manganese	7/7	mg/kg			373	823	658	N	773	773	u
Surface Soil (<5 ft)	IA-5	Molybdenum	7/18	mg/kg	0.465	11.25	1.2	27.9	10.3	D	13.6	13.6	u
Surface Soil (<5 ft)	IA-5	Nickel	7/7	mg/kg			21.2	108	45.1	X	70.3	70.3	u
Surface Soil (<5 ft)	IA-5	Potassium	7/7	mg/kg			827	2820	1390	L	2080	2080	u
Surface Soil (<5 ft)	IA-5	Selenium	7/18	mg/kg	1	11.35	0.38	19.6	8.61	D	10.7	10.7	u
Surface Soil (<5 ft)	IA-5	Silver	1/7	mg/kg	0.315	0.385	0.81	0.81	0.421	D	0.549	0.549	u
Surface Soil (<5 ft)	IA-5	Sodium	7/7	mg/kg			69.5	201	134	L	194	194	u
Surface Soil (<5 ft)	IA-5	Strontium	7/7	mg/kg			14.8	243	79.5	X	154	154	u
Surface Soil (<5 ft)	IA-5	Thallium	4/18	mg/kg	0.6	11.35	1.9	2	6.97	D	8.85	2	m
Surface Soil (<5 ft)	IA-5	Titanium	7/7	mg/kg			99.1	338	225	N	284	284	u
Surface Soil (<5 ft)	IA-5	Uranium	3/7	mg/kg	4.95	7.85	11.1	45.1	14.5	D	25.1	25.1	u
Surface Soil (<5 ft)	IA-5	Vanadium	7/7	mg/kg			27.4	111	43.7	X	65.8	65.8	u
Surface Soil (<5 ft)	IA-5	Zinc	7/7	mg/kg			41.4	79.7	56.2	L	68.5	68.5	u
Surface Soil (<5 ft)	IA-5	MCPP	1/5	mg/kg	4.9	10.5	30	30	12.1	D	22	22	u
Surface Soil (<5 ft)	IA-5	Benz(a)anthracene	1/5	mg/kg	0.2	0.21	0.19	0.19	0.202	D	0.209	0.19	m
Surface Soil (<5 ft)	IA-5	Benzo(b)fluoranthene	1/5	mg/kg	0.2	0.21	0.36	0.36	0.237	D	0.303	0.303	u
Surface Soil (<5 ft)	IA-5	Bis(2-ethylhexyl)phthalate	1/5	mg/kg	0.2	0.295	0.21	0.21	0.224	D	0.262	0.21	m
Surface Soil (<5 ft)	IA-5	Butyl benzyl phthalate	1/5	mg/kg	0.2	0.21	0.31	0.31	0.226	D	0.271	0.271	u
Surface Soil (<5 ft)	IA-5	Chrysene	1/5	mg/kg	0.2	0.21	0.14	0.14	0.192	D	0.22	0.14	m
Surface Soil (<5 ft)	IA-5	Di-n-octylphthalate	1/5	mg/kg	0.2	0.21	0.13	0.13	0.19	D	0.222	0.13	m
Surface Soil (<5 ft)	IA-5	Fluoranthene	2/5	mg/kg	0.2	0.21	0.079	0.26	0.191	D	0.255	0.255	u
Surface Soil (<5 ft)	IA-5	Phenanthrene	1/5	mg/kg	0.2	0.21	0.078	0.078	0.18	D	0.234	0.078	m
Surface Soil (<5 ft)	IA-5	Pyrene	2/5	mg/kg	0.2	0.21	0.29	0.31	0.243	D	0.293	0.293	u
Surface Soil (<5 ft)	IA-5	Toluene	5/10	mg/kg	0.003	0.003	0.0024	0.9	0.116	X	0.281	0.281	u
Surface Soil (<5 ft)	IA-5	Actinium-227	34/43	pCi/g	0	0.27	0.19	292.7	10.4	Z	22	22	u
Surface Soil (<5 ft)	IA-5	Americium-241	3/43	pCi/g	-5.04	0.2	0.5	1.5	-0.000233	D	0.212	0.212	u
Surface Soil (<5 ft)	IA-5	Cesium-137	14/43	pCi/g	-0.03	0.09	0.04	2.35	0.0965	D	0.188	0.188	u
Surface Soil (<5 ft)	IA-5	Potassium-40	42/43	pCi/g	5.21	5.21	10.66	17.12	14.3	X	14.8	14.8	u
Surface Soil (<5 ft)	IA-5	Protactinium-231	12/43	pCi/g	-0.18	1.16	0.9	346.4	12.2	D	25.9	25.9	u
Surface Soil (<5 ft)	IA-5	Radium-226	107/160	pCi/g	1	4.8	0.6	900	18.8	X	29.4	29.4	u
Surface Soil (<5 ft)	IA-5	Radium-228	42/43	pCi/g	0.95	0.95	0.61	3.56	1.09	X	1.2	1.2	u
Surface Soil (<5 ft)	IA-5	Thorium-228	42/43	pCi/g	1.04	1.04	0.71	3.56	1.32	X	1.44	1.44	u
Surface Soil (<5 ft)	IA-5	Thorium-230	106/106	pCi/g			1	14680	419	X	662	662	u
Surface Soil (<5 ft)	IA-5	Thorium-232	88/160	pCi/g	1	7.2	0.64	7.5	2.45	X	2.63	2.63	u
Surface Soil (<5 ft)	IA-5	Uranium-235	30/43	pCi/g	-0.04	0.24	0.2	32.11	2.05	Z	3.45	3.45	u
Surface Soil (<5 ft)	IA-5	Uranium-238	34/160	pCi/g	0.89	256	6	1000	40	D	51.6	51.6	u

Table 2-10. North County Surface Soil Data Summary (Cont'd)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	
Surface Soil (<5 ft)	IA-6	Fluoride	1/1	mg/kg			62.9	62.9	62.9	D		62.9	m
Surface Soil (<5 ft)	IA-6	Cobalt	1/1	mg/kg			62.3	62.3	62.3	D		62.3	m
Surface Soil (<5 ft)	IA-6	Magnesium	1/1	mg/kg			12200	12200	12200	D		12200	m
Surface Soil (<5 ft)	IA-6	Actinium-227	1/1	pCi/g			17.89	17.89	17.9	D		17.9	m
Surface Soil (<5 ft)	IA-6	Potassium-40	1/1	pCi/g			13.87	13.87	13.9	D		13.9	m
Surface Soil (<5 ft)	IA-6	Protactinium-231	1/1	pCi/g			18.78	18.78	18.8	D		18.8	m
Surface Soil (<5 ft)	IA-6	Radium-226	11/24	pCi/g	1.6	2.6	1	39.4	5.98	D	9.62	9.62	u
Surface Soil (<5 ft)	IA-6	Radium-228	1/1	pCi/g			1.37	1.37	1.37	D		1.37	m
Surface Soil (<5 ft)	IA-6	Thorium-228	1/1	pCi/g			1.37	1.37	1.37	D		1.37	m
Surface Soil (<5 ft)	IA-6	Thorium-230	15/15	pCi/g			1.4	2100	211	X	464	464	u
Surface Soil (<5 ft)	IA-6	Thorium-232	8/24	pCi/g	2	4.9	1.2	7	3.04	D	3.45	3.45	u
Surface Soil (<5 ft)	IA-6	Uranium-235	1/1	pCi/g			4.33	4.33	4.33	D		4.33	m
Surface Soil (<5 ft)	IA-6	Uranium-238	7/24	pCi/g	6	127.4	12	32	33.6	D	42.9	32	m
Surface Soil (<5 ft)	IA-7	Aluminum	2/2	mg/kg			15500	15700	15600	D	16200	15700	m
Surface Soil (<5 ft)	IA-7	Arsenic	2/2	mg/kg			6.1	11.8	8.95	D	26.9	11.8	m
Surface Soil (<5 ft)	IA-7	Barium	4/4	mg/kg			195	13600	6700	D	15500	13600	m
Surface Soil (<5 ft)	IA-7	Beryllium	1/2	mg/kg	0.48	0.48	0.96	0.96	0.72	D	2.24	0.96	m
Surface Soil (<5 ft)	IA-7	Boron	2/2	mg/kg			9.4	11.6	10.5	D	17.4	11.6	m
Surface Soil (<5 ft)	IA-7	Cadmium	2/4	mg/kg	0.295	0.315	1.5	3.2	1.33	D	2.94	2.94	u
Surface Soil (<5 ft)	IA-7	Calcium	2/2	mg/kg			3540	5120	4330	D	9320	5120	m
Surface Soil (<5 ft)	IA-7	Chromium	2/2	mg/kg			20	22.1	21.1	D	27.7	22.1	m
Surface Soil (<5 ft)	IA-7	Cobalt	4/4	mg/kg			6.8	6050	2430	D	5910	5910	u
Surface Soil (<5 ft)	IA-7	Copper	4/4	mg/kg			15.4	4400	1810	D	4370	4370	u
Surface Soil (<5 ft)	IA-7	Iron	2/2	mg/kg			19800	24600	22200	D	37400	24600	m
Surface Soil (<5 ft)	IA-7	Lead	4/4	mg/kg			12.3	933	409	D	961	933	m
Surface Soil (<5 ft)	IA-7	Lithium	2/2	mg/kg			9	9.3	9.15	D	10.1	9.3	m
Surface Soil (<5 ft)	IA-7	Magnesium	2/2	mg/kg			3530	4120	3830	D	5690	4120	m
Surface Soil (<5 ft)	IA-7	Manganese	2/2	mg/kg			481	761	621	D	1500	761	m
Surface Soil (<5 ft)	IA-7	Molybdenum	2/4	mg/kg	0.75	0.8	170	255	107	D	256	255	m
Surface Soil (<5 ft)	IA-7	Nickel	4/4	mg/kg			21.2	7570	3040	D	7380	7380	u
Surface Soil (<5 ft)	IA-7	Potassium	2/2	mg/kg			916	1320	1120	D	2390	1320	m
Surface Soil (<5 ft)	IA-7	Selenium	2/4	mg/kg	0.2	0.215	96	183	69.9	D	173	173	u
Surface Soil (<5 ft)	IA-7	Sodium	2/2	mg/kg			119	135	127	D	178	135	m
Surface Soil (<5 ft)	IA-7	Strontium	2/2	mg/kg			20.6	23.6	22.1	D	31.6	23.6	m
Surface Soil (<5 ft)	IA-7	Titanium	2/2	mg/kg			256	267	262	D	296	267	m
Surface Soil (<5 ft)	IA-7	Vanadium	3/3	mg/kg			35	630	234	D	812	630	m
Surface Soil (<5 ft)	IA-7	Zinc	2/2	mg/kg			56.9	57.2	57.1	D	58	57.2	m
Surface Soil (<5 ft)	IA-7	1,2-Dichloroethane	1/2	mg/kg	0.0025	0.0025	0.001	0.001	0.00175	D	0.00649	0.001	m
Surface Soil (<5 ft)	IA-7	2-Butanone	1/2	mg/kg	0.005	0.005	0.001	0.001	0.003	D	0.0156	0.001	m
Surface Soil (<5 ft)	IA-7	Acetone	2/2	mg/kg			0.005	0.009	0.007	D	0.0196	0.009	m
Surface Soil (<5 ft)	IA-7	Actinium-227	9/19	pCi/g	-0.13	0.19	0.32	695.7	56.5	D	127	127	u
Surface Soil (<5 ft)	IA-7	Americium-241	1/19	pCi/g	-2.6	0.05	0.08	0.08	-0.216	D	0.0716	0.0716	u
Surface Soil (<5 ft)	IA-7	Potassium-40	18/19	pCi/g	11.07	11.07	13.87	16.6	15	X	15.5	15.5	u
Surface Soil (<5 ft)	IA-7	Protactinium-231	10/19	pCi/g	0.1	0.92	1.2	685.8	56.4	X	126	126	u
Surface Soil (<5 ft)	IA-7	Radium-226	87/92	pCi/g	1.5	5	0.7	1818	42.2	X	82.5	82.5	u
Surface Soil (<5 ft)	IA-7	Radium-228	19/19	pCi/g			0.81	7.54	1.67	X	2.46	2.46	u
Surface Soil (<5 ft)	IA-7	Thorium-228	19/19	pCi/g			1.02	7.54	1.95	X	2.71	2.71	u
Surface Soil (<5 ft)	IA-7	Thorium-230	70/71	pCi/g	0.05	0.05	1	37780	965	X	2010	2010	u
Surface Soil (<5 ft)	IA-7	Thorium-232	80/92	pCi/g	1	25.2	0.7	7.54	2.15	X	2.61	2.61	u
Surface Soil (<5 ft)	IA-7	Uranium-235	5/19	pCi/g	0.04	0.17	0.24	54.18	4.7	D	10.3	10.3	u
Surface Soil (<5 ft)	IA-7	Uranium-238	24/92	pCi/g	0.72	462	5	201.9	19.3	D	28.7	28.7	u
Surface Soil (<0.5 ft)	IA-8	Aluminum	1/1	mg/kg			4400	4400	4400	D		4400	m
Surface Soil (<0.5 ft)	IA-8	Arsenic	1/1	mg/kg			4.5	4.5	4.5	D		4.5	m
Surface Soil (<0.5 ft)	IA-8	Barium	1/1	mg/kg			105	105	105	D		105	m
Surface Soil (<0.5 ft)	IA-8	Boron	1/1	mg/kg			7.2	7.2	7.2	D		7.2	m
Surface Soil (<0.5 ft)	IA-8	Calcium	1/1	mg/kg			105000	105000	105000	D		105000	m
Surface Soil (<0.5 ft)	IA-8	Chromium	1/1	mg/kg			42.6	42.6	42.6	D		42.6	m
Surface Soil (<0.5 ft)	IA-8	Cobalt	1/1	mg/kg			23.2	23.2	23.2	D		23.2	m
Surface Soil (<0.5 ft)	IA-8	Copper	1/1	mg/kg			85.1	85.1	85.1	D		85.1	m
Surface Soil (<0.5 ft)	IA-8	Iron	1/1	mg/kg			13200	13200	13200	D		13200	m
Surface Soil (<0.5 ft)	IA-8	Lead	1/1	mg/kg			500	500	500	D		500	m
Surface Soil (<0.5 ft)	IA-8	Magnesium	1/1	mg/kg			10000	10000	10000	D		10000	m
Surface Soil (<0.5 ft)	IA-8	Manganese	1/1	mg/kg			352	352	352	D		352	m
Surface Soil (<0.5 ft)	IA-8	Mercury	1/1	mg/kg			0.08	0.08	0.08	D		0.08	m
Surface Soil (<0.5 ft)	IA-8	Molybdenum	1/1	mg/kg			3.2	3.2	3.2	D		3.2	m
Surface Soil (<0.5 ft)	IA-8	Nickel	1/1	mg/kg			37.5	37.5	37.5	D		37.5	m
Surface Soil (<0.5 ft)	IA-8	Potassium	1/1	mg/kg			481	481	481	D		481	m
Surface Soil (<0.5 ft)	IA-8	Selenium	1/1	mg/kg			0.62	0.62	0.62	D		0.62	m
Surface Soil (<0.5 ft)	IA-8	Silver	1/1	mg/kg			0.62	0.62	0.62	D		0.62	m
Surface Soil (<0.5 ft)	IA-8	Sodium	1/1	mg/kg			630	630	630	D		630	m
Surface Soil (<0.5 ft)	IA-8	Strontium	1/1	mg/kg			112	112	112	D		112	m
Surface Soil (<0.5 ft)	IA-8	Titanium	1/1	mg/kg			127	127	127	D		127	m
Surface Soil (<0.5 ft)	IA-8	Vanadium	1/1	mg/kg			20.6	20.6	20.6	D		20.6	m
Surface Soil (<0.5 ft)	IA-8	Zinc	1/1	mg/kg			284	284	284	D		284	m
Surface Soil (<0.5 ft)	IA-8	MCPA	1/1	mg/kg			25	25	25	D		25	m
Surface Soil (<0.5 ft)	IA-8	Silvex	1/1	mg/kg			0.03	0.03	0.03	D		0.03	m
Surface Soil (<0.5 ft)	IA-8	4,4'-DDT	1/1	mg/kg			0.0039	0.0039	0.0039	D		0.0039	m

Table 2-10. North County Surface Soil Data Summary (Cont'd)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL$_{95}$	Expos. Conc.[b]	
Surface Soil (<0.5 ft)	IA-8	2-Methylnaphthalene	1/1	mg/kg			0.36	0.36	0.36	D		0.36	m
Surface Soil (<0.5 ft)	IA-8	Acenaphthene	1/1	mg/kg			0.085	0.085	0.085	D		0.085	m
Surface Soil (<0.5 ft)	IA-8	Anthracene	1/1	mg/kg			0.28	0.28	0.28	D		0.28	m
Surface Soil (<0.5 ft)	IA-8	Benz(a)anthracene	1/1	mg/kg			1.4	1.4	1.4	D		1.4	m
Surface Soil (<0.5 ft)	IA-8	Benzo(a)pyrene	1/1	mg/kg			1.6	1.6	1.6	D		1.6	m
Surface Soil (<0.5 ft)	IA-8	Benzo(b)fluoranthene	1/1	mg/kg			2.1	2.1	2.1	D		2.1	m
Surface Soil (<0.5 ft)	IA-8	Benzo(ghi)perylene	1/1	mg/kg			0.91	0.91	0.91	D		0.91	m
Surface Soil (<0.5 ft)	IA-8	Benzo(k)fluoranthene	1/1	mg/kg			1	1	1	D		1	m
Surface Soil (<0.5 ft)	IA-8	Butyl benzyl phthalate	1/1	mg/kg			0.21	0.21	0.21	D		0.21	m
Surface Soil (<0.5 ft)	IA-8	Carbazole	1/1	mg/kg			0.21	0.21	0.21	D		0.21	m
Surface Soil (<0.5 ft)	IA-8	Chrysene	1/1	mg/kg			1.8	1.8	1.8	D		1.8	m
Surface Soil (<0.5 ft)	IA-8	Di-n-butyl phthalate	1/1	mg/kg			0.15	0.15	0.15	D		0.15	m
Surface Soil (<0.5 ft)	IA-8	Dibenz(a,h)anthracene	1/1	mg/kg			0.28	0.28	0.28	D		0.28	m
Surface Soil (<0.5 ft)	IA-8	Dibenzofuran	1/1	mg/kg			0.046	0.046	0.046	D		0.046	m
Surface Soil (<0.5 ft)	IA-8	Fluoranthene	1/1	mg/kg			3.3	3.3	3.3	D		3.3	m
Surface Soil (<0.5 ft)	IA-8	Fluorene	1/1	mg/kg			0.11	0.11	0.11	D		0.11	m
Surface Soil (<0.5 ft)	IA-8	Indeno(1,2,3-cd)pyrene	1/1	mg/kg			0.88	0.88	0.88	D		0.88	m
Surface Soil (<0.5 ft)	IA-8	Naphthalene	1/1	mg/kg			0.05	0.05	0.05	D		0.05	m
Surface Soil (<0.5 ft)	IA-8	Phenanthrene	1/1	mg/kg			1.6	1.6	1.6	D		1.6	m
Surface Soil (<0.5 ft)	IA-8	Pyrene	1/1	mg/kg			2.8	2.8	2.8	D		2.8	m
Surface Soil (<0.5 ft)	IA-8	Actinium-227	23/23	pCi/g			0.18	442.6	43	X	82.3	82.3	u
Surface Soil (<0.5 ft)	IA-8	Americium-241	3/23	pCi/g	-3.35	0.11	0.12	0.29	-0.323	D	0.00473	0.00473	u
Surface Soil (<0.5 ft)	IA-8	Cesium-137	21/23	pCi/g	-0.01	0.39	0.04	0.96	0.394	Z	0.472	0.472	u
Surface Soil (<0.5 ft)	IA-8	Potassium-40	23/23	pCi/g			5.85	18.46	13.9	X	15.1	15.1	u
Surface Soil (<0.5 ft)	IA-8	Protactinium-231	18/23	pCi/g	0	1.69	0.84	450.3	45.4	Z	86.5	86.5	u
Surface Soil (<0.5 ft)	IA-8	Radium-226	85/86	pCi/g	2.1	2.1	0.7	436.4	23.5	X	34.7	34.7	u
Surface Soil (<0.5 ft)	IA-8	Radium-228	23/23	pCi/g			0.28	4.76	1.29	X	1.64	1.64	u
Surface Soil (<0.5 ft)	IA-8	Thorium-228	23/23	pCi/g			0.49	4.76	1.49	L	1.82	1.82	u
Surface Soil (<0.5 ft)	IA-8	Thorium-230	83/84	pCi/g	0.36	0.36	2.9	20280	917	L	1750	1750	u
Surface Soil (<0.5 ft)	IA-8	Thorium-232	71/86	pCi/g	0	6.8	0.4	5	1.81	Z	2.03	2.03	u
Surface Soil (<0.5 ft)	IA-8	Uranium-235	21/23	pCi/g	0.09	0.19	0.32	38.87	5.35	L	20.2	20.2	u
Surface Soil (<0.5 ft)	IA-8	Uranium-238	29/86	pCi/g	0	160.2	6	190.4	19.9	D	25.9	25.9	u
Surface Soil (<0.5 ft)	IA-9	Aluminum	8/8	mg/kg			1770	11100	8230	N	10300	10300	u
Surface Soil (<0.5 ft)	IA-9	Antimony	1/8	mg/kg	2.1	3.5	4.3	4.3	2.93	D	3.42	3.42	u
Surface Soil (<0.5 ft)	IA-9	Arsenic	8/8	mg/kg			5.5	41	12.9	X	21.4	21.4	u
Surface Soil (<0.5 ft)	IA-9	Barium	8/8	mg/kg			29.8	532	190	L	609	532	m
Surface Soil (<0.5 ft)	IA-9	Beryllium	6/8	mg/kg	0.2	0.255	0.71	1.9	0.826	L	2.14	1.9	m
Surface Soil (<0.5 ft)	IA-9	Boron	6/8	mg/kg	1.1	1.3	4.2	9.2	5.59	N	7.81	7.81	u
Surface Soil (<0.5 ft)	IA-9	Cadmium	2/8	mg/kg	0.165	0.465	1.2	2	0.623	D	1.05	1.05	u
Surface Soil (<0.5 ft)	IA-9	Calcium	8/8	mg/kg			1980	194000	33900	L	630000	194000	m
Surface Soil (<0.5 ft)	IA-9	Chromium	8/8	mg/kg			7.5	22.1	15.1	N	18.3	18.3	u
Surface Soil (<0.5 ft)	IA-9	Cobalt	8/8	mg/kg			2	864	171	L	174000	864	m
Surface Soil (<0.5 ft)	IA-9	Copper	8/8	mg/kg			7.2	632	137	L	4660	632	m
Surface Soil (<0.5 ft)	IA-9	Iron	8/8	mg/kg			4150	20800	14700	N	18200	18200	u
Surface Soil (<0.5 ft)	IA-9	Lead	8/8	mg/kg			11.9	240	79.6	L	573	240	m
Surface Soil (<0.5 ft)	IA-9	Lithium	6/8	mg/kg	0.55	1.75	5.4	8.4	5.58	N	7.59	7.59	u
Surface Soil (<0.5 ft)	IA-9	Magnesium	8/8	mg/kg			1310	70100	12000	X	27800	27800	u
Surface Soil (<0.5 ft)	IA-9	Manganese	8/8	mg/kg			122	810	571	N	709	709	u
Surface Soil (<0.5 ft)	IA-9	Molybdenum	6/8	mg/kg	0.7	0.75	1.4	25.7	6.04	L	78	25.7	m
Surface Soil (<0.5 ft)	IA-9	Nickel	8/8	mg/kg			2.6	1080	219	L	46500	1080	m
Surface Soil (<0.5 ft)	IA-9	Potassium	7/8	mg/kg	119.5	119.5	786	1790	992	N	1310	1310	u
Surface Soil (<0.5 ft)	IA-9	Selenium	4/8	mg/kg	0.17	0.205	0.6	22.3	4.98	D	10.5	10.5	u
Surface Soil (<0.5 ft)	IA-9	Sodium	8/8	mg/kg			58.9	174	106	L	143	143	u
Surface Soil (<0.5 ft)	IA-9	Strontium	8/8	mg/kg			10.3	111	37	L	89.9	89.9	u
Surface Soil (<0.5 ft)	IA-9	Titanium	8/8	mg/kg			48	310	205	N	260	260	u
Surface Soil (<0.5 ft)	IA-9	Uranium	2/8	mg/kg	4.4	6.15	53.6	118	25.3	D	52.8	52.8	u
Surface Soil (<0.5 ft)	IA-9	Vanadium	8/8	mg/kg			10.7	185	53.5	L	191	185	m
Surface Soil (<0.5 ft)	IA-9	Zinc	8/8	mg/kg			24.2	131	71.7	L	131	131	u
Surface Soil (<0.5 ft)	IA-9	Silvex	3/8	mg/kg	0.0125	0.013	0.027	0.042	0.0201	D	0.0275	0.0275	u
Surface Soil (<0.5 ft)	IA-9	4,4'-DDE	1/8	mg/kg	0.0018	0.0025	0.012	0.012	0.00337	D	0.00571	0.00571	u
Surface Soil (<0.5 ft)	IA-9	4,4'-DDT	1/8	mg/kg	0.0018	0.0025	0.033	0.033	0.00599	D	0.0133	0.0133	u
Surface Soil (<0.5 ft)	IA-9	Anthracene	2/8	mg/kg	0.185	0.25	0.061	0.064	0.176	D	0.225	0.064	m
Surface Soil (<0.5 ft)	IA-9	Benz(a)anthracene	8/8	mg/kg			0.13	0.5	0.265	L	0.468	0.468	u
Surface Soil (<0.5 ft)	IA-9	Benzo(a)pyrene	8/8	mg/kg			0.062	0.59	0.238	L	0.8	0.59	m
Surface Soil (<0.5 ft)	IA-9	Benzo(b)fluoranthene	8/8	mg/kg			0.14	0.55	0.319	L	0.541	0.541	u
Surface Soil (<0.5 ft)	IA-9	Benzo(ghi)perylene	4/8	mg/kg	0.185	0.25	0.11	0.54	0.246	D	0.338	0.338	u
Surface Soil (<0.5 ft)	IA-9	Benzo(k)fluoranthene	4/8	mg/kg	0.185	0.25	0.13	0.43	0.232	D	0.297	0.297	u
Surface Soil (<0.5 ft)	IA-9	Bis(2-ethylhexyl)phthalate	3/8	mg/kg	0.185	0.25	0.25	0.32	0.238	D	0.266	0.266	u
Surface Soil (<0.5 ft)	IA-9	Butyl benzyl phthalate	3/8	mg/kg	0.185	0.21	0.17	0.23	0.201	D	0.214	0.214	u
Surface Soil (<0.5 ft)	IA-9	Carbazole	1/8	mg/kg	0.185	0.25	0.082	0.082	0.196	D	0.229	0.082	m
Surface Soil (<0.5 ft)	IA-9	Chrysene	5/8	mg/kg	0.185	0.215	0.11	0.91	0.373	L	0.885	0.885	u
Surface Soil (<0.5 ft)	IA-9	Di-n-butyl phthalate	1/8	mg/kg	0.185	0.25	0.049	0.049	0.193	D	0.234	0.049	m
Surface Soil (<0.5 ft)	IA-9	Di-n-octylphthalate	2/8	mg/kg	0.185	0.22	0.082	0.1	0.178	D	0.214	0.1	m
Surface Soil (<0.5 ft)	IA-9	Fluoranthene	8/8	mg/kg			0.085	1.1	0.468	L	3.16	1.1	m
Surface Soil (<0.5 ft)	IA-9	Indeno(1,2,3-cd)pyrene	5/8	mg/kg	0.185	0.215	0.057	0.47	0.22	L	0.457	0.457	u
Surface Soil (<0.5 ft)	IA-9	Phenanthrene	8/8	mg/kg			0.082	0.39	0.205	L	0.45	0.39	m
Surface Soil (<0.5 ft)	IA-9	Pyrene	8/8	mg/kg			0.12	0.94	0.408	L	1.29	0.94	m
Surface Soil (<0.5 ft)	IA-9	2-Butanone	4/8	mg/kg	0.005	0.0065	0.007	0.034	0.0141	D	0.0222	0.0222	u

Table 2-10. North County Surface Soil Data Summary (Cont'd)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	
Surface Soil (<0.5 ft)	IA-9	Dimethylbenzene	2/8	mg/kg	0.0025	0.003	0.001	0.015	0.00406	D	0.00706	0.00706	u
Surface Soil (<0.5 ft)	IA-9	Ethylbenzene	1/8	mg/kg	0.0025	0.003	0.002	0.002	0.00263	D	0.00286	0.002	m
Surface Soil (<0.5 ft)	IA-9	Toluene	4/8	mg/kg	0.0025	0.003	0.002	0.016	0.00431	D	0.00749	0.00749	u
Surface Soil (<0.5 ft)	IA-9	Actinium-227	26/61	pCi/g	-0.04	0.22	0.16	46.85	1.39	D	2.84	2.84	u
Surface Soil (<0.5 ft)	IA-9	Cesium-137	52/61	pCi/g	0	0.05	0.04	0.32	0.0844	Z	0.0955	0.0955	u
Surface Soil (<0.5 ft)	IA-9	Potassium-40	61/61	pCi/g			5.93	18.62	15.1	X	15.7	15.7	u
Surface Soil (<0.5 ft)	IA-9	Protactinium-231	25/61	pCi/g	-0.4	1.25	0.73	51.73	2.12	D	3.69	3.69	u
Surface Soil (<0.5 ft)	IA-9	Radium-226	451/478	pCi/g	0	0.6	0.5	29.27	1.53	Z	1.69	1.69	u
Surface Soil (<0.5 ft)	IA-9	Radium-228	61/61	pCi/g			0.26	1.29	0.924	X	0.964	0.964	u
Surface Soil (<0.5 ft)	IA-9	Thorium-228	61/61	pCi/g			0.6	2.1	1.25	L	1.33	1.33	u
Surface Soil (<0.5 ft)	IA-9	Thorium-230	510/523	pCi/g	0.1	0.8	0.51	2787	23.2	X	34.3	34.3	u
Surface Soil (<0.5 ft)	IA-9	Thorium-232	443/474	pCi/g	0	2	0.47	5	1.59	Z	1.65	1.65	u
Surface Soil (<0.5 ft)	IA-9	Uranium-235	13/61	pCi/g	-0.05	0.2	0.15	6.92	0.324	D	0.549	0.549	u
Surface Soil (<0.5 ft)	IA-9	Uranium-238	19/479	pCi/g	0	18	3.6	42	5.65	D	6.01	6.01	u
Soil - All Depths	ROAD ROW	Aluminum	1/1	mg/kg			15800	15800	15800	D		15800	m
Soil - All Depths	ROAD ROW	Arsenic	1/1	mg/kg			23.2	23.2	23.2	D		23.2	m
Soil - All Depths	ROAD ROW	Barium	1/1	mg/kg			350	350	350	D		350	m
Soil - All Depths	ROAD ROW	Beryllium	1/1	mg/kg			1.5	1.5	1.5	D		1.5	m
Soil - All Depths	ROAD ROW	Boron	1/1	mg/kg			18.8	18.8	18.8	D		18.8	m
Soil - All Depths	ROAD ROW	Calcium	1/1	mg/kg			5050	5050	5050	D		5050	m
Soil - All Depths	ROAD ROW	Chromium	1/1	mg/kg			19.8	19.8	19.8	D		19.8	m
Soil - All Depths	ROAD ROW	Cobalt	1/1	mg/kg			35.1	35.1	35.1	D		35.1	m
Soil - All Depths	ROAD ROW	Copper	1/1	mg/kg			22.9	22.9	22.9	D		22.9	m
Soil - All Depths	ROAD ROW	Iron	1/1	mg/kg			52100	52100	52100	D		52100	m
Soil - All Depths	ROAD ROW	Lead	1/1	mg/kg			39.5	39.5	39.5	D		39.5	m
Soil - All Depths	ROAD ROW	Lithium	1/1	mg/kg			9.1	9.1	9.1	D		9.1	m
Soil - All Depths	ROAD ROW	Magnesium	1/1	mg/kg			2770	2770	2770	D		2770	m
Soil - All Depths	ROAD ROW	Manganese	1/1	mg/kg			6320	6320	6320	D		6320	m
Soil - All Depths	ROAD ROW	Molybdenum	1/1	mg/kg			2.1	2.1	2.1	D		2.1	m
Soil - All Depths	ROAD ROW	Nickel	1/1	mg/kg			32.9	32.9	32.9	D		32.9	m
Soil - All Depths	ROAD ROW	Potassium	1/1	mg/kg			1160	1160	1160	D		1160	m
Soil - All Depths	ROAD ROW	Sodium	1/1	mg/kg			932	932	932	D		932	m
Soil - All Depths	ROAD ROW	Strontium	1/1	mg/kg			21.8	21.8	21.8	D		21.8	m
Soil - All Depths	ROAD ROW	Thallium	1/1	mg/kg			7.2	7.2	7.2	D		7.2	m
Soil - All Depths	ROAD ROW	Titanium	1/1	mg/kg			293	293	293	D		293	m
Soil - All Depths	ROAD ROW	Vanadium	1/1	mg/kg			65.3	65.3	65.3	D		65.3	m
Soil - All Depths	ROAD ROW	Zinc	1/1	mg/kg			73	73	73	D		73	m
Soil - All Depths	ROAD ROW	MCPP	1/1	mg/kg			120	120	120	D		120	m
Soil - All Depths	ROAD ROW	alpha-Chlordane	1/2	mg/kg	0.00115	0.00115	0.03	0.03	0.0156	D	0.107	0.03	m
Soil - All Depths	ROAD ROW	Fluoranthene	1/1	mg/kg			0.1	0.1	0.1	D		0.1	m
Soil - All Depths	ROAD ROW	Pyrene	1/1	mg/kg			0.32	0.32	0.32	D		0.32	m
Soil - All Depths	ROAD ROW	2-Butanone	1/1	mg/kg			0.024	0.024	0.024	D		0.024	m
Soil - All Depths	ROAD ROW	Acetone	1/1	mg/kg			0.077	0.077	0.077	D		0.077	m
Soil - All Depths	ROAD ROW	Toluene	1/1	mg/kg			0.004	0.004	0.004	D		0.004	m
Soil - All Depths	ROAD ROW	Actinium-227	2/4	pCi/g	0.14	0.16	0.27	0.29	0.215	D	0.304	0.29	m
Soil - All Depths	ROAD ROW	Americium-241	1/4	pCi/g	0.03	0.04	0.12	0.12	0.0575	D	0.107	0.107	u
Soil - All Depths	ROAD ROW	Cesium-137	4/4	pCi/g			0.04	0.2	0.138	D	0.221	0.2	m
Soil - All Depths	ROAD ROW	Potassium-40	4/4	pCi/g			12.81	16.18	14.5	D	16.1	16.1	u
Soil - All Depths	ROAD ROW	Radium-226	1730/1757	pCi/g	0.4	4	0.4	92	2.7	X	2.89	2.89	u
Soil - All Depths	ROAD ROW	Radium-228	4/4	pCi/g			0.8	1.02	0.925	D	1.04	1.02	m
Soil - All Depths	ROAD ROW	Thorium-228	4/4	pCi/g			1.14	1.51	1.39	D	1.59	1.51	m
Soil - All Depths	ROAD ROW	Thorium-230	2740/2784	pCi/g	0.3	1.5	0.3	5100	42.2	X	49.9	49.9	u
Soil - All Depths	ROAD ROW	Thorium-232	1520/1752	pCi/g	0	9	0.35	64	2.13	Z	2.22	2.22	u
Soil - All Depths	ROAD ROW	Uranium-235	1/4	pCi/g	0	0.17	0.24	0.24	0.133	D	0.251	0.24	m
Soil - All Depths	ROAD ROW	Uranium-238	47/1754	pCi/g	0	69	2.1	78	11.2	D	11.5	11.5	u
Surface Soil (<5 ft)	SLAPS	Fluoride	5/5	mg/kg			4.42	62.9	28.3	L	888	62.9	m
Surface Soil (<5 ft)	SLAPS	Sulfide	1/4	mg/kg	0.00655	13.6	21	21	10.3	D	20.9	20.9	u
Surface Soil (<5 ft)	SLAPS	Aluminum	14/14	mg/kg			10700	23200	15400	L	17100	17100	u
Surface Soil (<5 ft)	SLAPS	Antimony	2/52	mg/kg	0.19	6.8	5.3	53.2	5.99	D	7.6	7.6	u
Surface Soil (<5 ft)	SLAPS	Arsenic	17/17	mg/kg			6.1	237	37.1	X	66.9	66.9	u
Surface Soil (<5 ft)	SLAPS	Barium	19/19	mg/kg			152	13600	2030	X	3680	3680	u
Surface Soil (<5 ft)	SLAPS	Beryllium	12/14	mg/kg	0.375	0.48	0.7	2.4	0.968	L	1.26	1.26	u
Surface Soil (<5 ft)	SLAPS	Boron	13/14	mg/kg	4.45	4.45	2.3	15.1	8.88	N	10.4	10.4	u
Surface Soil (<5 ft)	SLAPS	Cadmium	12/52	mg/kg	0.14	0.55	0.52	50.4	1.83	D	3.45	3.45	u
Surface Soil (<5 ft)	SLAPS	Calcium	14/14	mg/kg			2230	29500	6860	X	10100	10100	u
Surface Soil (<5 ft)	SLAPS	Chromium	15/15	mg/kg			15.1	3240	236	X	614	614	u
Surface Soil (<5 ft)	SLAPS	Cobalt	32/32	mg/kg			4.7	6050	436	X	804	804	u
Surface Soil (<5 ft)	SLAPS	Copper	23/23	mg/kg			13.1	4400	432	X	807	807	u
Surface Soil (<5 ft)	SLAPS	Cyanide	1/6	mg/kg	0.3	0.3225	0.772	0.772	0.387	D	0.542	0.542	u
Surface Soil (<5 ft)	SLAPS	Iron	14/14	mg/kg			16100	26800	20900	L	22400	22400	u
Surface Soil (<5 ft)	SLAPS	Lead	19/19	mg/kg			8.6	1200	202	X	342	342	u
Surface Soil (<5 ft)	SLAPS	Lithium	14/14	mg/kg			6	14.6	9.4	L	10.5	10.5	u
Surface Soil (<5 ft)	SLAPS	Magnesium	27/27	mg/kg			2010	26900	8240	L	11000	11000	u
Surface Soil (<5 ft)	SLAPS	Manganese	14/14	mg/kg			172	1330	662	N	786	786	u
Surface Soil (<5 ft)	SLAPS	Mercury	1/14	mg/kg	0.03	0.035	0.07	0.07	0.0332	D	0.0383	0.0383	u
Surface Soil (<5 ft)	SLAPS	Molybdenum	19/52	mg/kg	0.415	11.25	1.2	255	24.7	D	35.8	35.8	u
Surface Soil (<5 ft)	SLAPS	Nickel	17/17	mg/kg			19	7570	860	X	1740	1740	u

Table 2-10. North County Surface Soil Data Summary (Cont'd)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc.[b]	
Surface Soil (<5 ft)	SLAPS	Potassium	14/14	mg/kg			827	2820	1380	L	1660	1660	u
Surface Soil (<5 ft)	SLAPS	Selenium	10/52	mg/kg	0.15	11.35	0.38	183	13.5	D	19.9	19.9	u
Surface Soil (<5 ft)	SLAPS	Silver	1/14	mg/kg	0.315	0.41	0.81	0.81	0.396	D	0.454	0.454	u
Surface Soil (<5 ft)	SLAPS	Sodium	14/14	mg/kg			69.5	382	168	L	218	218	u
Surface Soil (<5 ft)	SLAPS	Strontium	14/14	mg/kg			14.8	243	55.6	X	90.4	90.4	u
Surface Soil (<5 ft)	SLAPS	Thallium	8/52	mg/kg	0.6	11.35	1	3.3	7.78	D	8.72	3.3	m
Surface Soil (<5 ft)	SLAPS	Titanium	14/14	mg/kg			99.1	416	248	N	285	285	u
Surface Soil (<5 ft)	SLAPS	Uranium	6/14	mg/kg	4.95	8.35	11.1	129	25	D	41.9	41.9	u
Surface Soil (<5 ft)	SLAPS	Vanadium	17/17	mg/kg			27.4	862	168	X	288	288	u
Surface Soil (<5 ft)	SLAPS	Zinc	15/15	mg/kg			41.4	4330	343	X	844	844	u
Surface Soil (<5 ft)	SLAPS	TOX	1/2	UG/G	30.35	30.35	56.9	56.9	43.6	D	127	56.9	m
Surface Soil (<5 ft)	SLAPS	MCPP	2/11	mg/kg	4.5	10.5	11	30	8.74	D	12.8	12.8	u
Surface Soil (<5 ft)	SLAPS	PCB-1254	1/11	mg/kg	0.0185	0.1	0.26	0.26	0.0493	D	0.0896	0.0896	u
Surface Soil (<5 ft)	SLAPS	Benz(a)anthracene	3/11	mg/kg	0.19	0.225	0.09	0.19	0.192	D	0.212	0.19	m
Surface Soil (<5 ft)	SLAPS	Benzo(a)pyrene	2/11	mg/kg	0.19	0.225	0.077	0.18	0.193	D	0.215	0.18	m
Surface Soil (<5 ft)	SLAPS	Benzo(b)fluoranthene	2/11	mg/kg	0.185	0.225	0.083	0.36	0.208	D	0.243	0.243	u
Surface Soil (<5 ft)	SLAPS	Benzo(ghi)perylene	1/11	mg/kg	0.19	0.225	0.19	0.19	0.205	D	0.21	0.19	m
Surface Soil (<5 ft)	SLAPS	Benzo(k)fluoranthene	1/11	mg/kg	0.19	0.225	0.066	0.066	0.193	D	0.217	0.066	m
Surface Soil (<5 ft)	SLAPS	Bis(2-ethylhexyl)phthalate	1/11	mg/kg	0.185	0.295	0.21	0.21	0.212	D	0.228	0.21	m
Surface Soil (<5 ft)	SLAPS	Butyl benzyl phthalate	2/11	mg/kg	0.185	0.225	0.1	0.31	0.205	D	0.231	0.231	u
Surface Soil (<5 ft)	SLAPS	Chrysene	2/11	mg/kg	0.19	0.225	0.14	0.21	0.2	D	0.212	0.21	m
Surface Soil (<5 ft)	SLAPS	Di-n-octylphthalate	1/11	mg/kg	0.185	0.225	0.13	0.13	0.197	D	0.21	0.13	m
Surface Soil (<5 ft)	SLAPS	Fluoranthene	4/11	mg/kg	0.19	0.225	0.079	0.31	0.2	D	0.235	0.235	u
Surface Soil (<5 ft)	SLAPS	Indeno(1,2,3-cd)pyrene	2/11	mg/kg	0.19	0.225	0.089	0.18	0.194	D	0.214	0.18	m
Surface Soil (<5 ft)	SLAPS	Phenanthrene	3/11	mg/kg	0.19	0.225	0.042	0.19	0.179	D	0.211	0.19	m
Surface Soil (<5 ft)	SLAPS	Pyrene	4/11	mg/kg	0.19	0.225	0.046	0.31	0.215	D	0.253	0.253	u
Surface Soil (<5 ft)	SLAPS	1,2-Dichloroethane	1/11	mg/kg	0.0025	0.003	0.001	0.001	0.00277	D	0.0031	0.001	m
Surface Soil (<5 ft)	SLAPS	1,2-Dichloroethene	1/11	mg/kg	0.0025	0.003	0.003	0.003	0.00291	D	0.00302	0.003	m
Surface Soil (<5 ft)	SLAPS	2-Butanone	1/11	mg/kg	0.005	0.0065	0.001	0.001	0.00541	D	0.00625	0.001	m
Surface Soil (<5 ft)	SLAPS	Acetone	2/10	mg/kg	0.006	0.017	0.005	0.009	0.00985	D	0.0125	0.009	m
Surface Soil (<5 ft)	SLAPS	Dimethylbenzene	1/11	mg/kg	0.0025	0.003	0.01	0.01	0.00355	D	0.00472	0.00472	u
Surface Soil (<5 ft)	SLAPS	Methylene chloride	1/11	mg/kg	0.0025	0.0075	0.13	0.13	0.0155	D	0.0363	0.0363	u
Surface Soil (<5 ft)	SLAPS	Toluene	19/30	mg/kg	0.0025	0.003	0.0015	0.9	0.0483	X	0.1	0.1	u
Surface Soil (<5 ft)	SLAPS	Trichloroethene	1/11	mg/kg	0.0025	0.003	0.005	0.005	0.00309	D	0.00345	0.00345	u
Surface Soil (<5 ft)	SLAPS	Actinium-227	72/98	pCi/g	-0.13	2.6	0.18	695.7	18.3	Z	32.6	32.6	u
Surface Soil (<5 ft)	SLAPS	Americium-241	11/97	pCi/g	-5.04	0.37	0.06	2.58	0.0381	D	0.161	0.161	u
Surface Soil (<5 ft)	SLAPS	Cesium-137	30/97	pCi/g	-0.04	0.35	0.03	3.09	0.0926	D	0.159	0.159	u
Surface Soil (<5 ft)	SLAPS	Potassium-40	94/97	pCi/g	5.21	11.07	5.69	17.74	14	X	14.4	14.4	u
Surface Soil (<5 ft)	SLAPS	Protactinium-231	37/98	pCi/g	-0.18	5.2	0.9	685.8	19.5	D	34.1	34.1	u
Surface Soil (<5 ft)	SLAPS	Radium-226	323/456	pCi/g	1	5	0.6	2700	42.6	X	58.8	58.8	u
Surface Soil (<5 ft)	SLAPS	Radium-228	96/97	pCi/g	0.95	0.95	0.33	7.54	1.18	X	1.35	1.35	u
Surface Soil (<5 ft)	SLAPS	Thorium-228	96/97	pCi/g	1.04	1.04	0.34	7.54	1.42	X	1.59	1.59	u
Surface Soil (<5 ft)	SLAPS	Thorium-230	278/279	pCi/g	0.05	0.05	0	37780	530	Z	823	823	u
Surface Soil (<5 ft)	SLAPS	Thorium-232	264/454	pCi/g	0.5	25.2	0.4	63	2.7	X	2.98	2.98	u
Surface Soil (<5 ft)	SLAPS	Uranium-235	62/97	pCi/g	-0.04	0.24	0.2	54.18	2.84	Z	4.22	4.22	u
Surface Soil (<5 ft)	SLAPS	Uranium-238	104/455	pCi/g	0.33	462	3.04	1200	41.9	D	49.6	49.6	u

UCL95 = 95% upper confidence limit on the mean concentration

PRG = Preliminary Remediation Goal

[a] Distribution flags:

D = Not determined because fewer than 5 detects or < 50% detects; t-statistic used in calculations of UCL_{95}.

L = Lognormal; H-statistic used in calculations of UCL_{95}.

N = Normal; t-statistic used in calculations of UCL_{95}.

X = Neither normal nor lognormal; t-statistic used in calculations of UCL_{95}.

Z = Contains concentrations that are negative and/or zero; t-statistic used in calculations of UCL_{95}.

[b] Basis for determining the exposure concentration:

m = maximum detected concentration.

u = 95% upper confidence limit on the mean concentration.

Table 2-11. SLAPS Subsurface Soil Data Summary

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc.[b]	
09K220205/VP-54	Aluminum	10/10	mg/kg			4260	7880	5530	L	6180	6180	u
09K220205/VP-54	Arsenic	10/10	mg/kg			0.84	11.9	5.85	N	7.75	7.75	u
09K220205/VP-54	Barium	10/10	mg/kg			40.7	279	143	N	183	183	u
09K220205/VP-54	Beryllium	10/10	mg/kg			0.41	0.56	0.489	L	0.524	0.524	u
09K220205/VP-54	Calcium	10/10	mg/kg			2320	15500	5190	X	7590	7590	u
09K220205/VP-54	Chromium	10/10	mg/kg			10	12	10.7	N	11.1	11.1	u
09K220205/VP-54	Cobalt	10/10	mg/kg			5.5	9.6	7.41	L	8.39	8.39	u
09K220205/VP-54	Copper	10/10	mg/kg			9.6	16.4	13.4	N	14.5	14.5	u
09K220205/VP-54	Iron	10/10	mg/kg			7270	28200	12800	L	16900	16900	u
09K220205/VP-54	Lead	10/10	mg/kg			7.3	30.9	12.8	L	17.2	17.2	u
09K220205/VP-54	Magnesium	10/10	mg/kg			1610	9940	3550	X	5020	5020	u
09K220205/VP-54	Manganese	10/10	mg/kg			68.3	4690	1250	L	5960	4690	m
09K220205/VP-54	Molybdenum	10/10	mg/kg			6.3	22.7	10.5	L	13.5	13.5	u
09K220205/VP-54	Nickel	10/10	mg/kg			10.1	23.4	14.6	L	17.7	17.7	u
09K220205/VP-54	Potassium	10/10	mg/kg			436	827	634	N	711	711	u
09K220205/VP-54	Silver	1/10	mg/kg	1.25	1.3	2.6	2.6	1.39	D	1.64	1.64	u
09K220205/VP-54	Sodium	10/10	mg/kg			51.8	78	66.5	N	71.8	71.8	u
09K220205/VP-54	Vanadium	10/10	mg/kg			9.5	16.3	12.7	L	13.8	13.8	u
09K220205/VP-54	Zinc	10/10	mg/kg			30.6	52.8	40.6	L	44.8	44.8	u
09K220205/VP-54	Anthracene	1/10	mg/kg	0.205	0.22	0.031	0.031	0.194	D	0.227	0.031	m
09K220205/VP-54	Benz(a)anthracene	1/10	mg/kg	0.205	0.22	0.17	0.17	0.208	D	0.216	0.17	m
09K220205/VP-54	Benzo(a)pyrene	1/10	mg/kg	0.205	0.22	0.15	0.15	0.206	D	0.217	0.15	m
09K220205/VP-54	Benzo(b)fluoranthene	1/10	mg/kg	0.205	0.22	0.21	0.21	0.212	D	0.214	0.21	m
09K220205/VP-54	Benzo(ghi)perylene	1/10	mg/kg	0.205	0.22	0.084	0.084	0.199	D	0.222	0.084	m
09K220205/VP-54	Benzo(k)fluoranthene	1/10	mg/kg	0.205	0.22	0.18	0.18	0.209	D	0.215	0.18	m
09K220205/VP-54	Chrysene	1/10	mg/kg	0.205	0.22	0.19	0.19	0.21	D	0.214	0.19	m
09K220205/VP-54	Dibenz(a,h)anthracene	1/10	mg/kg	0.205	0.22	0.035	0.035	0.194	D	0.227	0.035	m
09K220205/VP-54	Fluoranthene	1/10	mg/kg	0.205	0.22	0.41	0.41	0.232	D	0.268	0.268	u
09K220205/VP-54	Indeno(1,2,3-cd)pyrene	1/10	mg/kg	0.205	0.22	0.13	0.13	0.204	D	0.219	0.13	m
09K220205/VP-54	Phenanthrene	1/10	mg/kg	0.205	0.22	0.18	0.18	0.209	D	0.215	0.18	m
09K220205/VP-54	Pyrene	1/10	mg/kg	0.205	0.22	0.34	0.34	0.225	D	0.248	0.248	u
09K220205/VP-54	Acetone	1/10	mg/kg	0.0065	0.0065	0.017	0.017	0.00755	D	0.00947	0.00947	u
09K220205/VP-54	Toluene	7/9	mg/kg	0.003	0.0065	0.002	0.11	0.0248	L	0.192	0.11	m
IA-1	Aluminum	1/1	mg/kg			8020	8020	8020	D		8020	m
IA-1	Arsenic	1/1	mg/kg			3.9	3.9	3.9	D		3.9	m
IA-1	Barium	1/1	mg/kg			89.2	89.2	89.2	D		89.2	m
IA-1	Beryllium	1/1	mg/kg			0.55	0.55	0.55	D		0.55	m
IA-1	Boron	1/1	mg/kg			6.6	6.6	6.6	D		6.6	m
IA-1	Calcium	1/1	mg/kg			26400	26400	26400	D		26400	m
IA-1	Chromium	1/1	mg/kg			13.9	13.9	13.9	D		13.9	m
IA-1	Cobalt	1/1	mg/kg			5.3	5.3	5.3	D		5.3	m
IA-1	Copper	1/1	mg/kg			9.7	9.7	9.7	D		9.7	m
IA-1	Iron	1/1	mg/kg			15300	15300	15300	D		15300	m
IA-1	Lead	1/1	mg/kg			8.4	8.4	8.4	D		8.4	m
IA-1	Lithium	1/1	mg/kg			5.4	5.4	5.4	D		5.4	m
IA-1	Magnesium	4/4	mg/kg			6110	15400	11000	D	15600	15400	m
IA-1	Manganese	1/1	mg/kg			601	601	601	D		601	m
IA-1	Molybdenum	2/8	mg/kg	8.6	11.6	1.3	17.7	9.82	D	12.8	12.8	u
IA-1	Nickel	1/1	mg/kg			13.4	13.4	13.4	D		13.4	m
IA-1	Potassium	1/1	mg/kg			691	691	691	D		691	m
IA-1	Sodium	1/1	mg/kg			286	286	286	D		286	m
IA-1	Strontium	1/1	mg/kg			24.2	24.2	24.2	D		24.2	m
IA-1	Titanium	1/1	mg/kg			239	239	239	D		239	m
IA-1	Vanadium	1/1	mg/kg			19.1	19.1	19.1	D		19.1	m
IA-1	Zinc	1/1	mg/kg			48.3	48.3	48.3	D		48.3	m
IA-1	Toluene	2/3	mg/kg	0.003	0.003	0.003	0.0031	0.00303	D	0.00313	0.0031	m
IA-1	Trichloroethene	1/2	mg/kg	0.003	0.003	0.0066	0.0066	0.0048	D	0.0162	0.0066	m
IA-1	trans-1,2-Dichloroethene	1/1	mg/kg			0.003	0.003	0.003	D		0.003	m
IA-1	Actinium-227	5/14	pCi/g	0.02	2.6	0.2	0.8	0.473	D	0.785	0.785	u
IA-1	Potassium-40	11/11	pCi/g			12.38	16.76	14.8	L	15.7	15.7	u
IA-1	Radium-226	26/35	pCi/g	1.6	3.9	0.8	2700	82	X	212	212	u
IA-1	Radium-228	11/11	pCi/g			0.64	1.01	0.857	N	0.921	0.921	u
IA-1	Thorium-228	11/11	pCi/g			0.7	1.63	1.21	L	1.42	1.42	u
IA-1	Thorium-230	20/20	pCi/g			0	120	14.2	Z	27.7	27.7	u
IA-1	Thorium-232	22/35	pCi/g	1	4.3	0.45	63	3.51	X	6.48	6.48	u
IA-1	Uranium-235	2/11	pCi/g	0	0.16	0.22	0.25	0.112	D	0.155	0.155	u
IA-1	Uranium-238	8/35	pCi/g	0.79	78.4	4.68	1200	52.9	D	110	110	u
IA-10	Aluminum	4/4	mg/kg			6630	8720	7570	D	8580	8580	u
IA-10	Antimony	1/14	mg/kg	1.7	7.5	195	195	18.7	D	42.7	42.7	u
IA-10	Arsenic	5/5	mg/kg			4.9	668	138	X	421	421	u
IA-10	Barium	4/4	mg/kg			136	156	146	D	157	156	m
IA-10	Boron	4/5	mg/kg	3.5	3.5	5.1	761	156	D	479	479	u

Table 2-11. SLAPS Subsurface Soil Data Summary (Cont'd)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	
IA-10	Cadmium	3/14	mg/kg	0.145	0.65	1.1	17.6	1.73	D	3.9	3.9	u
IA-10	Calcium	4/4	mg/kg			2850	7120	4040	D	6460	6460	u
IA-10	Chromium	4/4	mg/kg			10.7	12.7	11.7	D	12.8	12.7	m
IA-10	Cobalt	5/5	mg/kg			4.8	185	41.5	X	118	118	u
IA-10	Copper	4/4	mg/kg			11	12.5	12	D	12.9	12.5	m
IA-10	Iron	4/4	mg/kg			11600	13700	12700	D	13900	13700	m
IA-10	Lead	4/4	mg/kg			13	21.8	17.4	D	21.7	21.7	u
IA-10	Lithium	3/4	mg/kg	2.6	2.6	4.1	4.5	3.83	D	4.81	4.5	m
IA-10	Magnesium	5/5	mg/kg			1850	7650	3470	L	9370	7650	m
IA-10	Manganese	4/4	mg/kg			474	843	576	D	786	786	u
IA-10	Molybdenum	2/14	mg/kg	0.45	12.5	1.2	754	61.1	D	155	155	u
IA-10	Nickel	4/4	mg/kg			11.3	16.1	13.3	D	15.7	15.7	u
IA-10	Potassium	4/4	mg/kg			696	971	846	D	981	971	m
IA-10	Selenium	2/14	mg/kg	0.15	12.5	29.9	704	58.7	D	147	147	u
IA-10	Silver	1/5	mg/kg	0.35	0.38	13.9	13.9	3.08	D	8.84	8.84	u
IA-10	Sodium	4/4	mg/kg			61.7	494	179	D	427	427	u
IA-10	Strontium	4/4	mg/kg			13	15.9	14.8	D	16.2	15.9	m
IA-10	Thallium	2/14	mg/kg	0.375	12.5	1.3	726	59.1	D	150	150	u
IA-10	Titanium	4/4	mg/kg			208	243	229	D	248	243	m
IA-10	Vanadium	4/4	mg/kg			18.2	20.8	19.7	D	21	20.8	m
IA-10	Zinc	4/4	mg/kg			40.8	53.1	47.5	D	53.7	53.1	m
IA-10	Benzo(a)pyrene	1/4	mg/kg	0.19	0.205	0.11	0.11	0.178	D	0.231	0.11	m
IA-10	Benzo(b)fluoranthene	1/4	mg/kg	0.19	0.205	0.24	0.24	0.21	D	0.235	0.235	u
IA-10	Benzo(ghi)perylene	1/4	mg/kg	0.19	0.205	0.18	0.18	0.195	D	0.209	0.18	m
IA-10	Chrysene	1/4	mg/kg	0.19	0.205	0.15	0.15	0.188	D	0.218	0.15	m
IA-10	Fluoranthene	2/4	mg/kg	0.205	0.205	0.1	0.2	0.178	D	0.238	0.2	m
IA-10	Indeno(1,2,3-cd)pyrene	1/4	mg/kg	0.19	0.205	0.33	0.33	0.233	D	0.309	0.309	u
IA-10	Pyrene	1/4	mg/kg	0.19	0.205	0.3	0.3	0.225	D	0.284	0.284	u
IA-10	2-Butanone	1/4	mg/kg	0.0115	0.0125	0.013	0.013	0.0124	D	0.0131	0.013	m
IA-10	Toluene	7/10	mg/kg	0.003	0.003	0.002	0.048	0.0132	L	0.0521	0.048	m
IA-10	Radium-226	44/58	pCi/g	0	3	0.6	44	2.64	Z	4.36	4.36	u
IA-10	Thorium-230	60/63	pCi/g	0	1	0.4	46	6.04	Z	7.83	7.83	u
IA-10	Thorium-232	43/58	pCi/g	0	4.2	0.7	4	1.78	Z	2.04	2.04	u
IA-10	Uranium-238	2/58	pCi/g	0	57	43.9	45	8.23	D	10.9	10.9	u
IA-2	Fluoride	1/1	mg/kg			32.4	32.4	32.4	D		32.4	m
IA-2	Aluminum	5/5	mg/kg			7180	17200	10100	L	16100	16100	u
IA-2	Arsenic	7/7	mg/kg			3.3	237	68.2	X	145	145	u
IA-2	Barium	5/5	mg/kg			76.1	218	131	L	219	218	m
IA-2	Beryllium	3/5	mg/kg	0.295	0.39	0.67	0.88	0.609	D	0.854	0.854	u
IA-2	Boron	5/5	mg/kg			5.8	11.6	7.72	L	10.9	10.9	u
IA-2	Cadmium	6/26	mg/kg	0.155	0.6	0.32	5.9	0.879	D	1.31	1.31	u
IA-2	Calcium	5/5	mg/kg			4250	52900	17900	L	443000	52900	m
IA-2	Chromium	5/5	mg/kg			11.2	21.6	16	L	21.3	21.3	u
IA-2	Cobalt	9/9	mg/kg			3.7	228	67.5	L	2810	228	m
IA-2	Copper	8/8	mg/kg			10.7	440	124	X	235	235	u
IA-2	Iron	5/5	mg/kg			11700	22400	17000	N	21700	21700	u
IA-2	Lead	5/5	mg/kg			7.4	12.4	9.98	L	13.4	12.4	m
IA-2	Lithium	3/5	mg/kg	4	4.25	7.6	11.1	6.97	D	9.77	9.77	u
IA-2	Magnesium	10/10	mg/kg			3510	24900	10600	L	17300	17300	u
IA-2	Manganese	5/5	mg/kg			165	772	459	L	1630	772	m
IA-2	Molybdenum	6/26	mg/kg	0.465	12.05	1.2	151	19.2	D	30.8	30.8	u
IA-2	Nickel	5/5	mg/kg			13.2	20	16.6	L	19.8	19.8	u
IA-2	Potassium	5/5	mg/kg			680	1710	1070	L	1730	1710	m
IA-2	Selenium	1/26	mg/kg	0.165	12.05	2.1	2.1	8.57	D	9.94	2.1	m
IA-2	Sodium	5/5	mg/kg			114	285	196	L	362	285	m
IA-2	Strontium	5/5	mg/kg			15.2	46.9	25.7	L	47.9	46.9	m
IA-2	Titanium	5/5	mg/kg			238	312	273	L	313	312	m
IA-2	Uranium	2/5	mg/kg	7.65	7.9	18	155	39.3	D	101	101	u
IA-2	Vanadium	7/7	mg/kg			22	862	257	X	541	541	u
IA-2	Zinc	5/5	mg/kg			38.6	60.3	48.7	L	59.6	59.6	u
IA-2	Toxaphene	1/5	mg/kg	0.042	0.11	0.05	0.05	0.0709	D	0.105	0.05	m
IA-2	Benz(a)anthracene	1/5	mg/kg	0.205	0.215	0.1	0.1	0.188	D	0.235	0.1	m
IA-2	Benzo(a)pyrene	1/5	mg/kg	0.205	0.215	0.1	0.1	0.188	D	0.235	0.1	m
IA-2	Butyl benzyl phthalate	3/5	mg/kg	0.21	0.215	0.11	0.26	0.211	D	0.269	0.26	m
IA-2	Chrysene	1/5	mg/kg	0.205	0.215	0.051	0.051	0.178	D	0.246	0.051	m
IA-2	Fluoranthene	1/5	mg/kg	0.205	0.215	0.12	0.12	0.192	D	0.231	0.12	m
IA-2	Indeno(1,2,3-cd)pyrene	1/5	mg/kg	0.205	0.215	0.091	0.091	0.186	D	0.237	0.091	m
IA-2	Phenanthrene	1/5	mg/kg	0.205	0.215	0.087	0.087	0.185	D	0.238	0.087	m
IA-2	Pyrene	1/5	mg/kg	0.205	0.215	0.079	0.079	0.184	D	0.24	0.079	m
IA-2	1,2-Dichloroethene	1/5	mg/kg	0.003	0.003	0.022	0.022	0.0068	D	0.0149	0.0149	u
IA-2	2-Butanone	1/5	mg/kg	0.006	0.0125	0.013	0.013	0.0089	D	0.0123	0.0123	u

Table 2-11. SLAPS Subsurface Soil Data Summary (Cont'd)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	
IA-2	Toluene	9/12	mg/kg	0.003	0.003	0.0022	0.21	0.0225	X	0.0531	0.0531	u
IA-2	Trichloroethene	2/6	mg/kg	0.003	0.003	0.0018	0.058	0.012	D	0.0305	0.0305	u
IA-2	trans-1,2-Dichloroethene	1/1	mg/kg			0.0019	0.0019	0.0019	D		0.0019	m
IA-2	Actinium-227	44/57	pCi/g	0.04	0.25	0.18	130.4	3.27	X	7.14	7.14	u
IA-2	Americium-241	4/57	pCi/g	-0.03	0.13	0.06	2.58	0.0921	D	0.17	0.17	u
IA-2	Cesium-137	5/57	pCi/g	-0.02	0.08	0.07	3.09	0.0621	D	0.153	0.153	u
IA-2	Potassium-40	56/57	pCi/g	8.43	8.43	9.82	25.2	15.7	X	16.4	16.4	u
IA-2	Protactinium-231	5/57	pCi/g	-0.48	1.06	2.33	179.3	3.99	D	9.28	9.28	u
IA-2	Radium-226	93/130	pCi/g	0.3	5	0.5	590	17.2	X	28.4	28.4	u
IA-2	Radium-228	57/57	pCi/g			0.67	4.82	1.02	X	1.14	1.14	u
IA-2	Thorium-228	57/57	pCi/g			0.74	4.82	1.43	X	1.58	1.58	u
IA-2	Thorium-230	90/91	pCi/g	0	0	0	14070	198	Z	456	456	u
IA-2	Thorium-232	78/130	pCi/g	0.4	7.6	0.6	4.82	2.16	X	2.35	2.35	u
IA-2	Uranium-235	24/57	pCi/g	-0.04	0.25	0.19	37.21	1.16	D	2.28	2.28	u
IA-2	Uranium-238	26/128	pCi/g	0.33	260	3.99	706	36.6	D	49.9	49.9	u
IA-3	Aluminum	7/7	mg/kg			8660	23200	14200	L	19900	19900	u
IA-3	Antimony	3/25	mg/kg	1.65	11.9	3.8	53.2	7.63	D	11	11	u
IA-3	Arsenic	7/7	mg/kg			3.7	11.7	7.36	N	9.28	9.28	u
IA-3	Barium	7/7	mg/kg			70.4	232	154	N	195	195	u
IA-3	Beryllium	5/7	mg/kg	0.31	0.34	0.84	2.4	1.02	L	2.74	2.4	m
IA-3	Boron	7/7	mg/kg			6	14.8	9.27	L	12	12	u
IA-3	Cadmium	7/25	mg/kg	0.14	1	0.48	50.4	2.67	D	6.07	6.07	u
IA-3	Calcium	7/7	mg/kg			4090	81300	25800	L	237000	81300	m
IA-3	Chromium	8/8	mg/kg			14.7	3240	424	X	1190	1190	u
IA-3	Cobalt	10/10	mg/kg			4.8	770	111	X	251	251	u
IA-3	Copper	9/9	mg/kg			12.9	909	130	X	313	313	u
IA-3	Iron	7/7	mg/kg			11700	30200	21300	N	26000	26000	u
IA-3	Lead	9/9	mg/kg			10.3	1200	197	X	441	441	u
IA-3	Lithium	7/7	mg/kg			7	14.6	9.84	L	12.3	12.3	u
IA-3	Magnesium	13/13	mg/kg			21	20200	8720	N	11500	11500	u
IA-3	Manganese	7/7	mg/kg			281	1330	730	L	1570	1330	m
IA-3	Mercury	1/7	mg/kg	0.03	0.035	0.07	0.07	0.0364	D	0.0474	0.0474	u
IA-3	Molybdenum	6/25	mg/kg	0.415	19.85	1.7	74.7	14	D	20	20	u
IA-3	Nickel	8/8	mg/kg			15.4	1460	212	X	550	550	u
IA-3	Potassium	7/7	mg/kg			553	4230	1730	L	3880	3880	u
IA-3	Sodium	7/7	mg/kg			124	405	250	L	384	384	u
IA-3	Strontium	7/7	mg/kg			23.6	146	50.4	L	110	110	u
IA-3	Thallium	6/25	mg/kg	0.8	19.85	0.96	1.8	8.69	D	10.5	1.8	m
IA-3	Titanium	7/7	mg/kg			66.2	416	268	N	351	351	u
IA-3	Uranium	2/7	mg/kg	6.9	8.15	15.6	129	26.1	D	59.5	59.5	u
IA-3	Vanadium	7/7	mg/kg			18.9	57.2	33.9	L	49.6	49.6	u
IA-3	Zinc	9/9	mg/kg			46.7	4330	598	X	1470	1470	u
IA-3	MCPP	1/7	mg/kg	4.5	5.5	11	11	5.77	D	7.48	7.48	u
IA-3	Benz(a)anthracene	2/7	mg/kg	0.19	0.22	0.09	0.18	0.186	D	0.218	0.18	m
IA-3	Benzo(a)pyrene	2/7	mg/kg	0.19	0.22	0.077	0.18	0.184	D	0.22	0.18	m
IA-3	Benzo(b)fluoranthene	1/7	mg/kg	0.185	0.22	0.083	0.083	0.185	D	0.22	0.083	m
IA-3	Benzo(ghi)perylene	1/7	mg/kg	0.19	0.22	0.19	0.19	0.202	D	0.211	0.19	m
IA-3	Benzo(k)fluoranthene	1/7	mg/kg	0.19	0.22	0.066	0.066	0.184	D	0.224	0.066	m
IA-3	Butyl benzyl phthalate	1/7	mg/kg	0.185	0.22	0.1	0.1	0.188	D	0.218	0.1	m
IA-3	Chrysene	1/7	mg/kg	0.19	0.22	0.21	0.21	0.205	D	0.213	0.21	m
IA-3	Fluoranthene	2/7	mg/kg	0.19	0.22	0.1	0.31	0.206	D	0.251	0.251	u
IA-3	Indeno(1,2,3-cd)pyrene	2/7	mg/kg	0.19	0.22	0.089	0.18	0.186	D	0.219	0.18	m
IA-3	Phenanthrene	2/7	mg/kg	0.19	0.22	0.042	0.19	0.18	D	0.226	0.19	m
IA-3	Pyrene	2/7	mg/kg	0.19	0.22	0.046	0.27	0.192	D	0.243	0.243	u
IA-3	1,2-Dichloroethene	1/7	mg/kg	0.003	0.0035	0.003	0.003	0.00307	D	0.00321	0.003	m
IA-3	2-Butanone	1/7	mg/kg	0.0055	0.0065	0.006	0.006	0.00614	D	0.00642	0.006	m
IA-3	Dimethylbenzene	2/7	mg/kg	0.003	0.0035	0.006	0.01	0.0045	D	0.00645	0.00645	u
IA-3	Methylene chloride	2/7	mg/kg	0.003	0.004	0.13	0.13	0.0394	D	0.0849	0.0849	u
IA-3	Toluene	6/13	mg/kg	0.003	0.0035	0.0015	0.055	0.011	D	0.0193	0.0193	u
IA-3	Trichloroethene	6/11	mg/kg	0.003	0.0035	0.0016	0.054	0.00898	X	0.0174	0.0174	u
IA-3	trans-1,2-Dichloroethene	3/3	mg/kg			0.0013	0.0077	0.00403	D	0.0096	0.0077	m
IA-3	Actinium-227	37/54	pCi/g	0	0.51	0.19	99.15	3.58	Z	6.98	6.98	u
IA-3	Americium-241	5/53	pCi/g	-0.03	0.19	0.13	4.28	0.175	D	0.323	0.323	u
IA-3	Cesium-137	5/53	pCi/g	-0.02	0.21	0.03	0.12	0.0145	D	0.024	0.024	u
IA-3	Potassium-40	53/53	pCi/g			7.64	19.71	16	X	16.5	16.5	u
IA-3	Protactinium-231	7/54	pCi/g	-0.41	1.31	1.5	56.27	2.24	D	4.25	4.25	u
IA-3	Radium-226	132/167	pCi/g	1.5	4.7	0.7	5620	57.7	X	116	116	u
IA-3	Radium-228	53/53	pCi/g			0.42	1.61	0.973	X	1.01	1.01	u
IA-3	Thorium-228	53/53	pCi/g			0.59	1.79	1.18	N	1.24	1.24	u
IA-3	Thorium-230	96/97	pCi/g	0	0	0.6	7241	189	Z	347	347	u
IA-3	Thorium-232	114/166	pCi/g	0.5	50.4	0.4	5	2.23	X	2.74	2.74	u
IA-3	Uranium-235	33/53	pCi/g	-0.04	0.31	0.19	17.99	1.04	Z	1.7	1.7	u
IA-3	Uranium-238	47/167	pCi/g	0	212	3.04	1600	49.9	D	72.1	72.1	u

Table 2-11. SLAPS Subsurface Soil Data Summary (Cont'd)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	
IA-4	Fluoride	11/11	mg/kg			2.26	43.3	7.22	X	13.9	13.9	u
IA-4	Sulfide	3/11	mg/kg	6.4	13.6	13.8	23.8	10.8	D	14.3	14.3	u
IA-4	Aluminum	12/12	mg/kg			5990	19000	11500	L	14700	14700	u
IA-4	Arsenic	13/13	mg/kg			3.1	50.8	9.88	X	16.2	16.2	u
IA-4	Barium	14/14	mg/kg			58.5	3750	469	X	931	931	u
IA-4	Beryllium	2/12	mg/kg	0.245	0.405	0.98	1	0.442	D	0.577	0.577	u
IA-4	Boron	10/12	mg/kg	4.45	5.8	5.7	11.9	7.98	L	9.66	9.66	u
IA-4	Cadmium	4/24	mg/kg	0.155	0.65	0.45	4.5	0.585	D	0.888	0.888	u
IA-4	Calcium	12/12	mg/kg			3610	30200	13800	X	19700	19700	u
IA-4	Chromium	12/12	mg/kg			10.3	23.9	18.2	N	20.5	20.5	u
IA-4	Cobalt	17/17	mg/kg			4.7	1510	133	X	289	289	u
IA-4	Copper	14/14	mg/kg			9.8	876	89.5	X	200	200	u
IA-4	Iron	12/12	mg/kg			2600	24200	15100	N	18100	18100	u
IA-4	Lead	14/14	mg/kg			6.9	408	56.3	X	114	114	u
IA-4	Lithium	12/12	mg/kg			5.2	10.6	7.94	N	8.9	8.9	u
IA-4	Magnesium	17/17	mg/kg			2690	18500	10100	X	12700	12700	u
IA-4	Manganese	12/12	mg/kg			110	1760	472	L	934	934	u
IA-4	Mercury	1/12	mg/kg	0.03	0.035	0.07	0.07	0.0338	D	0.0397	0.0397	u
IA-4	Molybdenum	6/24	mg/kg	0.455	12.7	1.4	71.9	9.63	D	14.9	14.9	u
IA-4	Nickel	13/13	mg/kg			11.4	2010	170	X	443	443	u
IA-4	Potassium	12/12	mg/kg			562	1450	896	L	1090	1090	u
IA-4	Selenium	5/24	mg/kg	0.46	12.7	1.3	29.3	6.81	D	9.24	9.24	u
IA-4	Sodium	12/12	mg/kg			197	300	263	N	281	281	u
IA-4	Strontium	12/12	mg/kg			18.4	28.7	23.7	N	25.3	25.3	u
IA-4	Thallium	11/24	mg/kg	0.21	12.7	0.53	3.3	6.07	D	7.84	3.3	m
IA-4	Titanium	12/12	mg/kg			170	399	281	L	326	326	u
IA-4	Uranium	2/12	mg/kg	7.6	7.95	20.7	73.6	14.3	D	24.2	24.2	u
IA-4	Vanadium	12/12	mg/kg			18.2	39.3	30.7	N	34.2	34.2	u
IA-4	Zinc	12/12	mg/kg			31.8	59.3	44.4	L	49.5	49.5	u
IA-4	Fluoranthene	1/4	mg/kg	0.21	0.21	0.077	0.077	0.177	D	0.255	0.077	m
IA-4	Pyrene	1/4	mg/kg	0.21	0.21	0.28	0.28	0.228	D	0.269	0.269	u
IA-4	Toluene	5/9	mg/kg	0.003	0.003	0.0018	0.12	0.0165	X	0.0406	0.0406	u
IA-4	Actinium-227	26/41	pCi/g	0.08	0.39	0.16	16.18	0.797	X	1.47	1.47	u
IA-4	Americium-241	5/40	pCi/g	-0.02	0.09	0.06	4.69	0.162	D	0.357	0.357	u
IA-4	Cesium-137	1/40	pCi/g	-0.03	0.05	0.05	0.05	0.00225	D	0.00698	0.00698	u
IA-4	Potassium-40	40/40	pCi/g			12.32	17.85	16.1	N	16.4	16.4	u
IA-4	Protactinium-231	2/41	pCi/g	-0.48	2.72	2.49	3.98	0.41	D	0.628	0.628	u
IA-4	Radium-226	64/105	pCi/g	1.2	4.4	0.62	1740	74	X	118	118	u
IA-4	Radium-228	40/40	pCi/g			0.78	1.25	0.93	X	0.955	0.955	u
IA-4	Thorium-228	40/40	pCi/g			0.57	2.2	1.25	L	1.36	1.36	u
IA-4	Thorium-230	74/74	pCi/g			1.08	2440	107	X	182	182	u
IA-4	Thorium-232	50/103	pCi/g	2	18.9	0.56	7	3.18	D	3.69	3.69	u
IA-4	Uranium-235	21/40	pCi/g	-0.04	0.19	0.18	82.19	2.46	Z	5.91	5.91	u
IA-4	Uranium-238	12/104	pCi/g	0.76	352	3.34	1769	56.4	D	86.1	86.1	u
IA-5	Fluoride	16/16	mg/kg			2.54	21.1	4.9	X	6.84	6.84	u
IA-5	Sulfide	2/19	mg/kg	0.00655	14.1	19.4	23.5	8.83	D	11	11	u
IA-5	Aluminum	26/26	mg/kg			6680	17100	9950	L	11000	11000	u
IA-5	Arsenic	26/26	mg/kg			2.9	26.2	8.38	L	10.8	10.8	u
IA-5	Barium	27/27	mg/kg			40.6	4550	318	X	599	599	u
IA-5	Beryllium	8/26	mg/kg	0.255	0.4	0.75	1.4	0.51	D	0.617	0.617	u
IA-5	Boron	23/26	mg/kg	1.15	1.2	2.3	12.8	8.15	X	9.35	9.35	u
IA-5	Cadmium	4/48	mg/kg	0.155	0.8	0.79	4.2	0.491	D	0.64	0.64	u
IA-5	Calcium	26/26	mg/kg			4050	35600	18000	X	21900	21900	u
IA-5	Chromium	26/26	mg/kg			11.4	21.8	16.4	L	17.5	17.5	u
IA-5	Cobalt	33/33	mg/kg			5.1	308	54.2	X	81.2	81.2	u
IA-5	Copper	28/29	mg/kg	5.85	5.85	6.1	191	31.7	X	46.6	46.6	u
IA-5	Iron	26/26	mg/kg			9120	28300	18300	N	19800	19800	u
IA-5	Lead	26/26	mg/kg			6	25.7	10	X	11.3	11.3	u
IA-5	Lithium	26/26	mg/kg			5.1	10.1	7.65	L	8.2	8.2	u
IA-5	Magnesium	36/36	mg/kg			2730	26900	11700	X	13600	13600	u
IA-5	Manganese	26/26	mg/kg			109	1220	556	N	651	651	u
IA-5	Molybdenum	21/48	mg/kg	0.455	12.4	1	29.8	8.29	D	10.1	10.1	u
IA-5	Nickel	26/26	mg/kg			12.1	108	24.6	X	31.8	31.8	u
IA-5	Potassium	26/26	mg/kg			570	1400	921	N	990	990	u
IA-5	Selenium	22/48	mg/kg	0.165	12.4	0.38	19.6	6.18	D	7.47	7.47	u
IA-5	Silver	1/26	mg/kg	0.37	0.44	0.81	0.81	0.403	D	0.431	0.431	u
IA-5	Sodium	26/26	mg/kg			102	534	236	L	274	274	u
IA-5	Strontium	26/26	mg/kg			16.6	210	32.4	X	44.6	44.6	u
IA-5	Thallium	22/48	mg/kg	0.21	12.4	0.74	2.5	5.78	D	6.98	2.5	m
IA-5	Titanium	26/26	mg/kg			99.1	347	257	X	275	275	u
IA-5	Uranium	4/26	mg/kg	7.65	8.95	11.1	45.1	10.2	D	12.8	12.8	u
IA-5	Vanadium	25/26	mg/kg	10.1	10.1	22	111	32.4	X	38.1	38.1	u
IA-5	Zinc	26/26	mg/kg			26.7	67.9	46.5	N	49.8	49.8	u

Table 2-11. SLAPS Subsurface Soil Data Summary (Cont'd)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	
IA-5	Dalapon	1/12	mg/kg	0.0245	0.05	0.15	0.15	0.0378	D	0.0565	0.0565	u
IA-5	MCPA	2/12	mg/kg	4.9	23.5	19	49	11.4	D	18.3	18.3	u
IA-5	Silvex	4/12	mg/kg	0.012	0.026	0.049	0.083	0.0323	D	0.0468	0.0468	u
IA-5	2-Methylnaphthalene	1/12	mg/kg	0.205	0.215	0.1	0.1	0.2	D	0.217	0.1	m
IA-5	Benz(a)anthracene	2/12	mg/kg	0.205	0.215	0.19	0.26	0.212	D	0.221	0.221	u
IA-5	Bis(2-ethylhexyl)phthalate	1/12	mg/kg	0.205	0.295	0.17	0.17	0.214	D	0.229	0.17	m
IA-5	Butyl benzyl phthalate	2/12	mg/kg	0.205	0.215	0.31	0.31	0.226	D	0.246	0.246	u
IA-5	Chrysene	2/12	mg/kg	0.205	0.215	0.14	0.14	0.198	D	0.212	0.14	m
IA-5	Di-n-octylphthalate	2/12	mg/kg	0.205	0.215	0.13	0.15	0.198	D	0.213	0.15	m
IA-5	Fluoranthene	2/12	mg/kg	0.205	0.215	0.079	0.15	0.194	D	0.214	0.15	m
IA-5	Naphthalene	1/12	mg/kg	0.205	0.215	0.13	0.13	0.203	D	0.215	0.13	m
IA-5	Phenanthrene	3/12	mg/kg	0.205	0.215	0.069	0.23	0.189	D	0.217	0.217	u
IA-5	Pyrene	3/12	mg/kg	0.205	0.215	0.29	0.37	0.236	D	0.263	0.263	u
IA-5	Acetone	2/12	mg/kg	0.006	0.0215	0.016	0.023	0.0115	D	0.015	0.015	u
IA-5	Methylene chloride	1/12	mg/kg	0.003	0.018	0.001	0.001	0.00438	D	0.00667	0.001	m
IA-5	Toluene	8/18	mg/kg	0.003	0.003	0.0024	1.2	0.142	D	0.282	0.282	u
IA-5	Actinium-227	89/131	pCi/g	-0.09	0.32	0.16	292.7	3.54	Z	7.31	7.31	u
IA-5	Americium-241	7/131	pCi/g	-5.04	0.35	0.07	1.5	0.0227	D	0.091	0.091	u
IA-5	Cesium-137	3/131	pCi/g	-0.03	0.06	0.06	2.35	0.0192	D	0.049	0.049	u
IA-5	Potassium-40	130/131	pCi/g	5.21	5.21	11.42	17.84	15	X	15.2	15.2	u
IA-5	Protactinium-231	11/131	pCi/g	-0.42	1.16	1.21	346.4	4.03	D	8.48	8.48	u
IA-5	Radium-226	232/315	pCi/g	1	5.3	0.59	900	13.4	X	19.3	19.3	u
IA-5	Radium-228	130/131	pCi/g	0.95	0.95	0.71	3.56	0.944	X	0.983	0.983	u
IA-5	Thorium-228	130/131	pCi/g	1.04	1.04	0.61	3.56	1.24	X	1.28	1.28	u
IA-5	Thorium-230	246/246	pCi/g			0.78	14680	190	X	296	296	u
IA-5	Thorium-232	197/316	pCi/g	1	12	0.42	7.5	2.19	X	2.33	2.33	u
IA-5	Uranium-235	51/131	pCi/g	-0.05	0.26	0.17	32.11	0.715	D	1.18	1.18	u
IA-5	Uranium-238	41/316	pCi/g	0.37	256	5.08	1000	27.3	D	33.6	33.6	u
IA-6	Fluoride	2/2	mg/kg			40.7	62.9	51.8	D	122	62.9	m
IA-6	Cobalt	1/1	mg/kg			62.3	62.3	62.3	D		62.3	m
IA-6	Magnesium	1/1	mg/kg			12200	12200	12200	D		12200	m
IA-6	Actinium-227	2/5	pCi/g	0.11	0.15	0.22	17.89	3.7	D	11.3	11.3	u
IA-6	Potassium-40	5/5	pCi/g			13.87	16.42	15.4	N	16.4	16.4	u
IA-6	Protactinium-231	1/5	pCi/g	-0.19	0.14	18.78	18.78	3.74	D	11.8	11.8	u
IA-6	Radium-226	16/32	pCi/g	1.4	2.7	0.85	36	3.77	X	5.77	5.77	u
IA-6	Radium-228	5/5	pCi/g			0.84	1.37	1	L	1.24	1.24	u
IA-6	Thorium-228	5/5	pCi/g			1.33	1.67	1.46	L	1.61	1.61	u
IA-6	Thorium-230	25/25	pCi/g			0.6	2100	138	X	287	287	u
IA-6	Thorium-232	13/32	pCi/g	2	4	0.74	7	2.8	D	3.16	3.16	u
IA-6	Uranium-235	3/5	pCi/g	0.08	0.1	0.2	4.33	1.03	D	2.79	2.79	u
IA-6	Uranium-238	8/32	pCi/g	0.58	94.2	8.28	32	29	D	35.9	32	m
IA-7	Fluoride	1/1	mg/kg			2.68	2.68	2.68	D		2.68	m
IA-7	Aluminum	10/10	mg/kg			5810	15700	9740	L	12400	12400	u
IA-7	Arsenic	10/10	mg/kg			2	11.8	5.71	L	8.83	8.83	u
IA-7	Barium	12/12	mg/kg			54.4	13600	2310	X	4950	4950	u
IA-7	Beryllium	1/10	mg/kg	0.28	0.48	0.96	0.96	0.398	D	0.518	0.518	u
IA-7	Boron	10/10	mg/kg			3.8	11.6	6.62	L	8.69	8.69	u
IA-7	Cadmium	5/13	mg/kg	0.155	0.5	0.48	3.2	0.643	D	1.06	1.06	u
IA-7	Calcium	10/10	mg/kg			2450	37000	12500	L	47400	37000	m
IA-7	Chromium	10/10	mg/kg			11.6	22.1	16.5	L	19.4	19.4	u
IA-7	Cobalt	13/13	mg/kg			3.8	6050	755	X	1690	1690	u
IA-7	Copper	12/12	mg/kg			10.2	4400	612	X	1360	1360	u
IA-7	Iron	10/10	mg/kg			9540	24600	15900	L	19100	19100	u
IA-7	Lead	12/12	mg/kg			7.4	933	142	X	305	305	u
IA-7	Lithium	8/10	mg/kg	3	3.15	5.4	9.3	6.81	X	8.09	8.09	u
IA-7	Magnesium	11/11	mg/kg			2740	23000	8440	L	16700	16700	u
IA-7	Manganese	10/10	mg/kg			83.1	2030	672	L	2770	2030	m
IA-7	Mercury	5/10	mg/kg	0.03	0.035	0.08	2.1	0.468	X	0.876	0.876	u
IA-7	Molybdenum	5/13	mg/kg	0.46	10.15	1	255	34.1	D	74.2	74.2	u
IA-7	Nickel	12/12	mg/kg			8.7	7570	1020	X	2280	2280	u
IA-7	Potassium	10/10	mg/kg			436	1320	665	L	854	854	u
IA-7	Selenium	3/13	mg/kg	0.16	10.15	1.6	183	22.5	D	49.7	49.7	u
IA-7	Sodium	10/10	mg/kg			78.5	216	118	L	142	142	u
IA-7	Strontium	10/10	mg/kg			11.1	25.2	18.4	N	21.4	21.4	u
IA-7	Thallium	1/13	mg/kg	0.205	11.35	0.95	0.95	2.77	D	4.96	0.95	m
IA-7	Titanium	10/10	mg/kg			215	373	274	L	305	305	u
IA-7	Vanadium	11/11	mg/kg			17.2	630	82.4	X	182	182	u
IA-7	Zinc	10/10	mg/kg			34.3	57.2	42.4	L	47.7	47.7	u
IA-7	1,2-Dichloroethane	1/9	mg/kg	0.0025	0.003	0.001	0.001	0.00272	D	0.00314	0.001	m
IA-7	2-Butanone	1/9	mg/kg	0.005	0.0065	0.001	0.001	0.00567	D	0.00679	0.001	m
IA-7	Acetone	3/9	mg/kg	0.0065	0.0135	0.005	0.028	0.0111	D	0.0154	0.0154	u
IA-7	Toluene	1/9	mg/kg	0.0025	0.003	0.001	0.001	0.00267	D	0.00308	0.001	m
IA-7	Actinium-227	19/35	pCi/g	-0.13	0.32	0.19	0.68	0.269	Z	0.325	0.325	u

Table 2-11. SLAPS Subsurface Soil Data Summary (Cont'd)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	
IA-7	Americium-241	1/35	pCi/g	-0.03	0.08	0.08	0.08	0.0217	D	0.0296	0.0296	u
IA-7	Potassium-40	35/35	pCi/g			12.33	18.47	15.6	N	16	16	u
IA-7	Protactinium-231	8/35	pCi/g	-0.3	0.92	1.2	2.38	0.628	D	0.828	0.828	u
IA-7	Radium-226	86/90	pCi/g	1.5	1.8	0.65	27	2.05	X	2.62	2.62	u
IA-7	Radium-228	35/35	pCi/g			0.66	1.15	0.937	N	0.967	0.967	u
IA-7	Thorium-228	35/35	pCi/g			0.69	1.91	1.23	L	1.31	1.31	u
IA-7	Thorium-230	72/73	pCi/g	0.05	0.05	0.86	1400	70.9	X	113	113	u
IA-7	Thorium-232	80/90	pCi/g	1	3.5	0.59	4	1.61	X	1.75	1.75	u
IA-7	Uranium-235	4/35	pCi/g	-0.03	0.17	0.24	0.48	0.108	D	0.137	0.137	u
IA-7	Uranium-238	20/90	pCi/g	-1.76	31.2	5	39	8.12	D	9.59	9.59	u
IA-8	Sulfate	1/1	mg/kg			860	860	860	D		860	m
IA-8	Aluminum	4/4	mg/kg			6340	13500	8780	D	12600	12600	u
IA-8	Arsenic	4/4	mg/kg			4.4	8	6.23	D	7.99	7.99	u
IA-8	Barium	4/4	mg/kg			98.1	185	133	D	178	178	u
IA-8	Boron	3/3	mg/kg			4.3	6	5.27	D	6.74	6	m
IA-8	Cadmium	1/6	mg/kg	0.16	0.6	0.4	0.4	0.338	D	0.476	0.4	m
IA-8	Calcium	4/4	mg/kg			4460	21100	10800	D	20200	20200	u
IA-8	Chromium	4/4	mg/kg			12.2	17.7	14.2	D	17.1	17.1	u
IA-8	Cobalt	4/4	mg/kg			3.8	16.7	7.83	D	14.9	14.9	u
IA-8	Copper	4/4	mg/kg			10.9	28.6	19.7	D	30.1	28.6	m
IA-8	Iron	4/4	mg/kg			15100	18300	16300	D	17900	17900	u
IA-8	Lead	4/4	mg/kg			8.3	44.5	18.3	D	38.9	38.9	u
IA-8	Lithium	2/4	mg/kg	3.1	4.35	6.1	8.8	5.59	D	8.49	8.49	u
IA-8	Magnesium	4/4	mg/kg			3180	12700	7020	D	12500	12500	u
IA-8	Manganese	4/4	mg/kg			142	862	570	D	930	862	m
IA-8	Molybdenum	3/6	mg/kg	0.465	12.1	1.3	1.7	4.18	D	8.13	1.7	m
IA-8	Nickel	4/4	mg/kg			12.6	30	19.2	D	28.4	28.4	u
IA-8	Potassium	4/4	mg/kg			785	1180	932	D	1130	1130	u
IA-8	Selenium	3/6	mg/kg	0.165	12.1	0.52	1.2	3.82	D	7.99	1.2	m
IA-8	Silver	1/4	mg/kg	0.38	0.39	0.72	0.72	0.469	D	0.666	0.666	u
IA-8	Sodium	3/4	mg/kg	141.5	141.5	129	340	231	D	361	340	m
IA-8	Strontium	4/4	mg/kg			16.9	21.1	19.2	D	21.4	21.1	m
IA-8	Titanium	4/4	mg/kg			166	274	242	D	303	274	m
IA-8	Vanadium	3/4	mg/kg	11.7	11.7	22.1	25.1	20.8	D	28	25.1	m
IA-8	Zinc	4/4	mg/kg			39.8	75.6	58.2	D	75.5	75.5	u
IA-8	Benz(a)anthracene	1/4	mg/kg	0.21	0.215	0.2	0.2	0.209	D	0.216	0.2	m
IA-8	Benzo(a)pyrene	1/4	mg/kg	0.21	0.215	0.14	0.14	0.194	D	0.236	0.14	m
IA-8	Benzo(b)fluoranthene	1/4	mg/kg	0.21	0.215	0.29	0.29	0.231	D	0.277	0.277	u
IA-8	Butyl benzyl phthalate	2/4	mg/kg	0.21	0.215	0.18	0.27	0.219	D	0.263	0.263	u
IA-8	Chrysene	1/4	mg/kg	0.21	0.215	0.07	0.07	0.176	D	0.26	0.07	m
IA-8	Fluoranthene	1/4	mg/kg	0.21	0.215	0.24	0.24	0.219	D	0.236	0.236	u
IA-8	Indeno(1,2,3-cd)pyrene	1/4	mg/kg	0.21	0.215	0.049	0.049	0.171	D	0.267	0.049	m
IA-8	Phenanthrene	1/4	mg/kg	0.21	0.215	0.14	0.14	0.194	D	0.236	0.14	m
IA-8	Pyrene	1/4	mg/kg	0.21	0.215	0.25	0.25	0.221	D	0.244	0.244	u
IA-8	1,1,2-Trichloro-1,2,2-trifluoroethane	1/4	mg/kg	0.005	0.0065	0.005	0.005	0.00575	D	0.00677	0.005	m
IA-8	Methylene chloride	1/4	mg/kg	0.0025	0.003	0.091	0.091	0.0249	D	0.0767	0.0767	u
IA-8	Actinium-227	15/28	pCi/g	0.01	0.18	0.23	0.95	0.291	L	0.597	0.597	u
IA-8	Americium-241	1/28	pCi/g	-0.06	0.11	0.07	0.07	0.0271	D	0.0387	0.0387	u
IA-8	Cesium-137	2/28	pCi/g	-0.03	0.02	0.03	0.08	0.00179	D	0.00852	0.00852	u
IA-8	Potassium-40	28/28	pCi/g			13.91	18.26	15.9	L	16.3	16.3	u
IA-8	Protactinium-231	6/28	pCi/g	-0.56	0.65	1.28	2.63	0.567	D	0.798	0.798	u
IA-8	Radium-226	282/294	pCi/g	1	2.7	0.67	130	3.3	X	4.13	4.13	u
IA-8	Radium-228	28/28	pCi/g			0.81	1.15	0.948	X	0.973	0.973	u
IA-8	Thorium-228	28/28	pCi/g			0.68	1.98	1.27	N	1.38	1.38	u
IA-8	Thorium-230	303/303	pCi/g			0.9	15000	91.1	X	175	175	u
IA-8	Thorium-232	229/294	pCi/g	0.7	8	0.68	14	2.24	X	2.37	2.37	u
IA-8	Uranium-235	9/28	pCi/g	-0.01	0.18	0.19	0.44	0.165	D	0.208	0.208	u
IA-8	Uranium-238	24/294	pCi/g	0.54	58	3.87	66	12.7	D	13.6	13.6	u
IA-9	Sulfate	1/1	mg/kg			863	863	863	D		863	m
IA-9	Aluminum	40/40	mg/kg			5070	19600	10900	L	12100	12100	u
IA-9	Antimony	2/61	mg/kg	1.75	7.55	6.1	20.4	3.8	D	4.47	4.47	u
IA-9	Arsenic	41/41	mg/kg			1.8	98.4	9.88	X	13.7	13.7	u
IA-9	Barium	40/40	mg/kg			52.5	5830	434	X	702	702	u
IA-9	Beryllium	25/40	mg/kg	0.25	0.38	0.64	1.4	0.631	X	0.707	0.707	u
IA-9	Boron	39/40	mg/kg	2.6	2.6	4.1	11.5	6.92	N	7.46	7.46	u
IA-9	Cadmium	16/61	mg/kg	0.15	0.65	0.32	4.8	0.47	D	0.602	0.602	u
IA-9	Calcium	40/40	mg/kg			2110	34700	8200	X	10100	10100	u
IA-9	Chromium	40/40	mg/kg			10	21.7	15.3	L	16.1	16.1	u
IA-9	Cobalt	41/41	mg/kg			3.8	648	36.5	X	64.5	64.5	u
IA-9	Copper	40/40	mg/kg			10	599	37.1	X	62.5	62.5	u
IA-9	Iron	40/40	mg/kg			7760	26400	17900	N	18900	18900	u
IA-9	Lead	40/40	mg/kg			7	201	24.6	X	34.5	34.5	u
IA-9	Lithium	39/40	mg/kg	3.15	3.15	4.9	12.5	7.82	N	8.35	8.35	u

Table 2-11. SLAPS Subsurface Soil Data Summary (Cont'd)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	
IA-9	Magnesium	43/43	mg/kg			2150	21600	6090	X	7170	7170	u
IA-9	Manganese	40/40	mg/kg			97.9	1990	652	L	828	828	u
IA-9	Mercury	2/40	mg/kg	0.03	0.035	0.07	0.15	0.0344	D	0.0397	0.0397	u
IA-9	Molybdenum	18/61	mg/kg	0.44	12.6	1	59.1	5.79	D	7.66	7.66	u
IA-9	Nickel	40/40	mg/kg			11.8	843	53.5	X	89.7	89.7	u
IA-9	Potassium	40/40	mg/kg			459	1960	1140	L	1250	1250	u
IA-9	Selenium	7/61	mg/kg	0.155	12.6	0.45	134	6.49	D	10.2	10.2	u
IA-9	Sodium	40/40	mg/kg			82	310	152	L	166	166	u
IA-9	Strontium	40/40	mg/kg			14.9	79.2	24.9	X	27.7	27.7	u
IA-9	Thallium	7/61	mg/kg	0.195	12.6	0.46	148	6.51	D	10.6	10.6	u
IA-9	Titanium	40/40	mg/kg			174	506	277	L	297	297	u
IA-9	Uranium	3/40	mg/kg	4.8	8.1	36	112	11.6	D	16.3	16.3	u
IA-9	Vanadium	40/40	mg/kg			14.6	97.7	30.8	X	34.2	34.2	u
IA-9	Zinc	40/40	mg/kg			35.6	78.4	53	L	55.9	55.9	u
IA-9	Dalapon	1/39	mg/kg	0.024	0.0475	0.061	0.061	0.0265	D	0.0283	0.0283	u
IA-9	MCPP	2/39	mg/kg	4.75	9.5	19	62	6.91	D	9.44	9.44	u
IA-9	Silvex	1/39	mg/kg	0.012	0.0235	0.031	0.031	0.0133	D	0.0142	0.0142	u
IA-9	4,4'-DDD	2/39	mg/kg	0.00195	1.05	0.0022	0.003	0.0558	D	0.119	0.003	m
IA-9	4,4'-DDE	1/39	mg/kg	0.001	1.05	0.0035	0.0035	0.0558	D	0.119	0.0035	m
IA-9	Dieldrin	4/40	mg/kg	0.001	1.05	0.0039	0.23	0.0628	D	0.125	0.125	u
IA-9	PCB-1260	1/39	mg/kg	0.0195	10.5	0.041	0.041	0.559	D	1.19	0.041	m
IA-9	Benz(a)anthracene	3/39	mg/kg	0.195	0.22	0.22	0.25	0.208	D	0.211	0.211	u
IA-9	Benzo(a)pyrene	2/39	mg/kg	0.195	0.22	0.083	0.099	0.2	D	0.207	0.099	m
IA-9	Benzo(b)fluoranthene	5/39	mg/kg	0.195	0.22	0.073	0.24	0.199	D	0.207	0.207	u
IA-9	Benzo(ghi)perylene	4/39	mg/kg	0.195	0.22	0.13	0.18	0.201	D	0.205	0.18	m
IA-9	Bis(2-ethylhexyl)phthalate	20/39	mg/kg	0.195	0.21	0.024	0.32	0.202	X	0.223	0.223	u
IA-9	Butyl benzyl phthalate	8/39	mg/kg	0.195	0.215	0.29	0.31	0.224	D	0.234	0.234	u
IA-9	Chrysene	6/39	mg/kg	0.195	0.22	0.12	0.18	0.199	D	0.204	0.18	m
IA-9	Di-n-butyl phthalate	4/39	mg/kg	0.195	0.22	0.026	0.1	0.193	D	0.204	0.1	m
IA-9	Di-n-octylphthalate	1/39	mg/kg	0.195	0.22	0.069	0.069	0.202	D	0.208	0.069	m
IA-9	Fluoranthene	2/39	mg/kg	0.195	0.22	0.082	0.093	0.2	D	0.207	0.093	m
IA-9	Indeno(1,2,3-cd)pyrene	4/39	mg/kg	0.195	0.22	0.11	0.32	0.211	D	0.219	0.219	u
IA-9	Pyrene	6/39	mg/kg	0.195	0.22	0.16	0.24	0.208	D	0.212	0.212	u
IA-9	1,1,1-Trichloroethane	6/46	mg/kg	0.0025	0.0035	0.0013	0.0017	0.00279	D	0.00291	0.0017	m
IA-9	2-Butanone	7/40	mg/kg	0.005	0.0275	0.007	0.22	0.017	D	0.0267	0.0267	u
IA-9	Acetone	1/36	mg/kg	0.005	0.06	0.76	0.76	0.0312	D	0.0666	0.0666	u
IA-9	Carbon disulfide	2/40	mg/kg	0.0025	0.0035	0.016	0.021	0.00375	D	0.00468	0.00468	u
IA-9	Carbon tetrachloride	1/40	mg/kg	0.0025	0.0035	0.002	0.002	0.00295	D	0.00301	0.002	m
IA-9	Dimethylbenzene	1/40	mg/kg	0.0025	0.0035	0.004	0.004	0.00301	D	0.00307	0.00307	u
IA-9	Toluene	13/48	mg/kg	0.0025	0.0035	0.001	0.029	0.00422	D	0.00543	0.00543	u
IA-9	Trichloroethene	3/40	mg/kg	0.0025	0.0035	0.001	0.006	0.00298	D	0.00314	0.00314	u
IA-9	Actinium-227	106/140	pCi/g	-0.02	0.22	0.09	189.9	2.85	Z	5.3	5.3	u
IA-9	Americium-241	3/140	pCi/g	-2.29	0.44	0.06	0.12	0.017	D	0.0453	0.0453	u
IA-9	Cesium-137	16/140	pCi/g	-0.03	0.31	0.02	0.7	0.0191	D	0.0307	0.0307	u
IA-9	Potassium-40	140/140	pCi/g			1.51	25.96	15.3	X	15.6	15.6	u
IA-9	Protactinium-231	21/140	pCi/g	-0.46	1.1	1.02	217.1	3.23	D	6.05	6.05	u
IA-9	Radium-226	420/427	pCi/g	0	1	0.15	230.7	2.29	Z	3.28	3.28	u
IA-9	Radium-228	140/140	pCi/g			0.15	2.79	0.969	X	1	1	u
IA-9	Thorium-228	139/140	pCi/g	0.93	0.93	0.6	15.78	1.38	X	1.56	1.56	u
IA-9	Thorium-230	402/407	pCi/g	0.5	1.4	0.6	10140	57.2	X	105	105	u
IA-9	Thorium-232	404/427	pCi/g	0.2	2.25	0.5	10.93	1.65	L	1.7	1.7	u
IA-9	Uranium-235	30/140	pCi/g	-0.07	0.22	0.18	20.23	0.555	D	0.881	0.881	u
IA-9	Uranium-238	13/427	pCi/g	0	24	2	119.7	6.03	D	6.64	6.64	u
ROAD ROW	Aluminum	1/1	mg/kg			15800	15800	15800	D		15800	m
ROAD ROW	Arsenic	1/1	mg/kg			23.2	23.2	23.2	D		23.2	m
ROAD ROW	Barium	1/1	mg/kg			350	350	350	D		350	m
ROAD ROW	Beryllium	1/1	mg/kg			1.5	1.5	1.5	D		1.5	m
ROAD ROW	Boron	1/1	mg/kg			18.8	18.8	18.8	D		18.8	m
ROAD ROW	Calcium	1/1	mg/kg			5050	5050	5050	D		5050	m
ROAD ROW	Chromium	1/1	mg/kg			19.8	19.8	19.8	D		19.8	m
ROAD ROW	Cobalt	1/1	mg/kg			35.1	35.1	35.1	D		35.1	m
ROAD ROW	Copper	1/1	mg/kg			22.9	22.9	22.9	D		22.9	m
ROAD ROW	Iron	1/1	mg/kg			52100	52100	52100	D		52100	m
ROAD ROW	Lead	1/1	mg/kg			39.5	39.5	39.5	D		39.5	m
ROAD ROW	Lithium	1/1	mg/kg			9.1	9.1	9.1	D		9.1	m
ROAD ROW	Magnesium	1/1	mg/kg			2770	2770	2770	D		2770	m
ROAD ROW	Manganese	1/1	mg/kg			6320	6320	6320	D		6320	m
ROAD ROW	Molybdenum	1/1	mg/kg			2.1	2.1	2.1	D		2.1	m
ROAD ROW	Nickel	1/1	mg/kg			32.9	32.9	32.9	D		32.9	m
ROAD ROW	Potassium	1/1	mg/kg			1160	1160	1160	D		1160	m
ROAD ROW	Sodium	1/1	mg/kg			932	932	932	D		932	m
ROAD ROW	Strontium	1/1	mg/kg			21.8	21.8	21.8	D		21.8	m
ROAD ROW	Thallium	1/1	mg/kg			7.2	7.2	7.2	D		7.2	m

Table 2-11. SLAPS Subsurface Soil Data Summary (Cont'd)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc.[b]	
ROAD ROW	Titanium	1/1	mg/kg			293	293	293	D		293	m
ROAD ROW	Vanadium	1/1	mg/kg			65.3	65.3	65.3	D		65.3	m
ROAD ROW	Zinc	1/1	mg/kg			73	73	73	D		73	m
ROAD ROW	MCPP	1/1	mg/kg			120	120	120	D		120	m
ROAD ROW	alpha-Chlordane	1/2	mg/kg	0.00115	0.00115	0.03	0.03	0.0156	D	0.107	0.03	m
ROAD ROW	Fluoranthene	1/1	mg/kg			0.1	0.1	0.1	D		0.1	m
ROAD ROW	Pyrene	1/1	mg/kg			0.32	0.32	0.32	D		0.32	m
ROAD ROW	2-Butanone	1/1	mg/kg			0.024	0.024	0.024	D		0.024	m
ROAD ROW	Acetone	1/1	mg/kg			0.077	0.077	0.077	D		0.077	m
ROAD ROW	Toluene	1/1	mg/kg			0.004	0.004	0.004	D		0.004	m
ROAD ROW	Radium-226	1359/1381	pCi/g	0.7	4	0.4	39.9	1.99	X	2.07	2.07	u
ROAD ROW	Thorium-230	2328/2371	pCi/g	0.3	1.5	0.3	1100	11.7	X	13.4	13.4	u
ROAD ROW	Thorium-232	1199/1376	pCi/g	0.1	9	0.4	64	2.19	X	2.28	2.28	u
ROAD ROW	Uranium-238	11/1379	pCi/g	0	69	2.1	48.2	11.3	D	11.6	11.6	u
SLAPS	Fluoride	31/31	mg/kg			2.26	62.9	9.57	X	14.1	14.1	u
SLAPS	Sulfide	5/31	mg/kg	0.00655	14.1	13.8	23.8	9.46	D	11.2	11.2	u
SLAPS	Aluminum	61/61	mg/kg			5810	23200	10700	L	11500	11500	u
SLAPS	Antimony	3/149	mg/kg	0.19	11.9	3.8	53.2	4.94	D	5.57	5.57	u
SLAPS	Arsenic	64/64	mg/kg			2	237	14.6	X	22.6	22.6	u
SLAPS	Barium	66/66	mg/kg			40.6	13600	678	X	1160	1160	u
SLAPS	Beryllium	20/61	mg/kg	0.245	0.48	0.55	2.4	0.545	D	0.628	0.628	u
SLAPS	Boron	56/61	mg/kg	1.15	5.8	2.3	14.8	7.93	N	8.58	8.58	u
SLAPS	Cadmium	26/149	mg/kg	0.14	1	0.32	50.4	0.952	D	1.52	1.52	u
SLAPS	Calcium	61/61	mg/kg			2450	81300	17300	X	20500	20500	u
SLAPS	Chromium	62/62	mg/kg			10.3	3240	69.3	X	156	156	u
SLAPS	Cobalt	84/84	mg/kg			3.7	6050	186	X	328	328	u
SLAPS	Copper	72/73	mg/kg	5.85	5.85	6.1	4400	160	X	281	281	u
SLAPS	Iron	61/61	mg/kg			2600	30200	17500	N	18600	18600	u
SLAPS	Lead	67/67	mg/kg			6	1200	68.3	X	111	111	u
SLAPS	Lithium	57/61	mg/kg	3	4.25	5.1	14.6	7.73	N	8.17	8.17	u
SLAPS	Magnesium	92/92	mg/kg			21	26900	10500	X	11500	11500	u
SLAPS	Manganese	61/61	mg/kg			83.1	2030	571	L	723	723	u
SLAPS	Mercury	7/61	mg/kg	0.03	0.035	0.07	2.1	0.103	D	0.171	0.171	u
SLAPS	Molybdenum	46/149	mg/kg	0.415	19.85	1	255	13.8	D	17.9	17.9	u
SLAPS	Nickel	65/65	mg/kg			8.7	7570	260	X	491	491	u
SLAPS	Potassium	61/61	mg/kg			436	4230	976	L	1060	1060	u
SLAPS	Selenium	31/149	mg/kg	0.15	19.85	0.38	183	8.79	D	11.1	11.1	u
SLAPS	Silver	1/61	mg/kg	0.34	0.44	0.81	0.81	0.39	D	0.402	0.402	u
SLAPS	Sodium	61/61	mg/kg			78.5	534	221	X	240	240	u
SLAPS	Strontium	61/61	mg/kg			11.1	210	29.8	X	36	36	u
SLAPS	Thallium	40/149	mg/kg	0.205	19.85	0.53	3.3	6.86	D	7.54	3.3	m
SLAPS	Titanium	61/61	mg/kg			66.2	416	267	N	280	280	u
SLAPS	Uranium	10/61	mg/kg	6.9	8.95	11.1	155	14.8	D	20.3	20.3	u
SLAPS	Vanadium	63/64	mg/kg	10.1	10.1	17.2	862	65.2	X	97.9	97.9	u
SLAPS	Zinc	63/63	mg/kg			26.7	4330	124	X	239	239	u
SLAPS	Dalapon	1/38	mg/kg	0.0225	0.05	0.15	0.15	0.0292	D	0.0348	0.0348	u
SLAPS	MCPA	2/38	mg/kg	4.5	23.5	19	49	6.99	D	9.16	9.16	u
SLAPS	MCPP	1/38	mg/kg	4.5	10.5	11	11	5.29	D	5.65	5.65	u
SLAPS	Silvex	4/38	mg/kg	0.0115	0.026	0.049	0.083	0.0189	D	0.0237	0.0237	u
SLAPS	Toxaphene	1/36	mg/kg	0.042	0.5	0.05	0.05	0.112	D	0.131	0.05	m
SLAPS	2-Methylnaphthalene	1/38	mg/kg	0.185	0.225	0.1	0.1	0.205	D	0.211	0.1	m
SLAPS	Benz(a)anthracene	5/38	mg/kg	0.19	0.225	0.09	0.26	0.203	D	0.211	0.211	u
SLAPS	Benzo(a)pyrene	3/38	mg/kg	0.19	0.225	0.077	0.18	0.202	D	0.21	0.18	m
SLAPS	Benzo(b)fluoranthene	1/38	mg/kg	0.185	0.225	0.083	0.083	0.205	D	0.211	0.083	m
SLAPS	Benzo(ghi)perylene	1/38	mg/kg	0.19	0.225	0.19	0.19	0.208	D	0.21	0.19	m
SLAPS	Benzo(k)fluoranthene	1/38	mg/kg	0.19	0.225	0.066	0.066	0.205	D	0.212	0.066	m
SLAPS	Bis(2-ethylhexyl)phthalate	1/38	mg/kg	0.185	0.295	0.17	0.17	0.21	D	0.214	0.17	m
SLAPS	Butyl benzyl phthalate	6/38	mg/kg	0.185	0.225	0.1	0.31	0.211	D	0.221	0.221	u
SLAPS	Chrysene	4/38	mg/kg	0.19	0.225	0.051	0.21	0.201	D	0.209	0.209	u
SLAPS	Di-n-octylphthalate	2/38	mg/kg	0.185	0.225	0.13	0.15	0.205	D	0.209	0.15	m
SLAPS	Fluoranthene	6/38	mg/kg	0.19	0.225	0.077	0.31	0.198	D	0.21	0.21	u
SLAPS	Indeno(1,2,3-cd)pyrene	3/38	mg/kg	0.19	0.225	0.089	0.18	0.202	D	0.21	0.18	m
SLAPS	Naphthalene	1/38	mg/kg	0.185	0.225	0.13	0.13	0.206	D	0.21	0.13	m
SLAPS	Phenanthrene	6/38	mg/kg	0.19	0.225	0.042	0.23	0.195	D	0.207	0.207	u
SLAPS	Pyrene	7/38	mg/kg	0.19	0.225	0.046	0.37	0.214	D	0.227	0.227	u
SLAPS	1,2-Dichloroethane	1/38	mg/kg	0.0025	0.0035	0.001	0.001	0.00295	D	0.00304	0.001	m
SLAPS	1,2-Dichloroethene	2/38	mg/kg	0.0025	0.0035	0.003	0.022	0.00349	D	0.00433	0.00433	u
SLAPS	2-Butanone	3/38	mg/kg	0.005	0.0125	0.001	0.013	0.00649	D	0.00697	0.00697	u
SLAPS	Acetone	5/36	mg/kg	0.006	0.06	0.005	0.028	0.0127	D	0.0156	0.0156	u
SLAPS	Dimethylbenzene	2/38	mg/kg	0.0025	0.0035	0.006	0.01	0.00325	D	0.00359	0.00359	u
SLAPS	Methylene chloride	3/37	mg/kg	0.0025	0.018	0.001	0.13	0.0104	D	0.0185	0.0185	u
SLAPS	Toluene	31/64	mg/kg	0.0025	0.0035	0.001	1.2	0.0493	D	0.0886	0.0886	u
SLAPS	Trichloroethene	9/44	mg/kg	0.0025	0.0035	0.0016	0.058	0.00578	D	0.00863	0.00863	u

Table 2-11. SLAPS Subsurface Soil Data Summary (Cont'd)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	
SLAPS	trans-1,2-Dichloroethene	5/5	mg/kg			0.0013	0.0077	0.0034	L	0.0119	0.0077	m
SLAPS	Actinium-227	222/337	pCi/g	-0.13	2.6	0.16	292.7	2.7	Z	4.39	4.39	u
SLAPS	Americium-241	22/332	pCi/g	-5.04	0.35	0.06	4.69	0.0758	D	0.12	0.12	u
SLAPS	Cesium-137	14/332	pCi/g	-0.03	0.21	0.03	3.09	0.0206	D	0.0401	0.0401	u
SLAPS	Potassium-40	330/332	pCi/g	5.21	8.43	7.64	25.2	15.5	X	15.7	15.7	u
SLAPS	Protactinium-231	34/337	pCi/g	-0.48	5.2	1.2	346.4	2.8	D	4.76	4.76	u
SLAPS	Radium-226	649/874	pCi/g	0.3	5.3	0.5	5620	31	X	44.5	44.5	u
SLAPS	Radium-228	331/332	pCi/g	0.95	0.95	0.42	4.82	0.958	X	0.985	0.985	u
SLAPS	Thorium-228	331/332	pCi/g	1.04	1.04	0.57	4.82	1.26	X	1.3	1.3	u
SLAPS	Thorium-230	623/626	pCi/g	0	0.05	0	14680	159	Z	221	221	u
SLAPS	Thorium-232	554/872	pCi/g	0.4	50.4	0.4	63	2.32	X	2.5	2.5	u
SLAPS	Uranium-235	138/332	pCi/g	-0.05	0.31	0.17	82.19	0.975	D	1.47	1.47	u
SLAPS	Uranium-238	162/872	pCi/g	-1.76	352	3.04	1769	35.6	D	42.3	42.3	u

UCL95 = 95% upper confidence limit on the mean concentration

[a] Distribution flags:

D = Not determined because fewer than 5 detects or < 50% detects; t-statistic used in calculations of UCL_{95}

L = Lognormal; H-statistic used in calculations of UCL_{95}.

N = Normal; t-statistic used in calculations of UCL_{95}.

X = Neither normal nor lognormal; t-statistic used in calculations of UCL_{95}.

Z = Contains concentrations that are negative and/or zero; t-statistic used in calculations of UCL_{95}.

[b] Basis for determining the exposure concentration:

m = maximum detected concentration.

u = 95% upper confidence limit on the mean concentration.

Chemicals not associated with uranium manufacturing or processing activities are expected to be present at the North County Site. Substantial development has taken place at the site since the early 1940s. This development would certainly have affected, to some degree, the distribution of chemicals present in soil, sediment, surface water, and ground water at the North County Site. Because the site is located in an industrial area there is limited occurrence of some chemicals associated with industrial activities and vehicle emissions. USACE (and previously the DOE) conducted analyses for a wide range of chemical compounds in broad chemical groups from numerous locations. Materials to be addressed at the site are not expected to require management as hazardous or mixed wastes because the wastes do not exhibit RCRA characteristics. A review of records for industrial facilities surrounding the HISS/Latty area reveals the existence of processes generating RCRA listed waste. While there is no indication from characterization data that these wastes are co-located with radiological contaminants associated with uranium manufacturing and processing activities, the costing evaluation assumes some co-located mixed wastes may be found at HISS/Futura during remediation.

FUSRAP-related contaminants include those chemicals that may be reasonably associated with uranium processing activities and other contaminants which have been mixed or commingled with the wastes resulting from uranium manufacturing or processing activities. The criteria used to differentiate between areas contaminated through uranium manufacturing and processing and areas contaminated through other activities that are beyond the scope of this project are as follows:

FUSRAP-authorized

- Areas having elevated levels of radioactivity where the extent of contamination can be traced to uranium manufacturing and processing activities;

- Areas containing elevated levels of organic and non-radioactive inorganic chemicals traceable to known uranium processing activities in specific areas (no areas have been identified based on history and sampling data); and

- Elevated levels of radiation along haul roads and associated VPs due to transportation activities related to uranium manufacturing and processing activities.

Non-FUSRAP-authorized

- Areas exhibiting background levels of radioactivity and with no record of use of chemicals linked to uranium ore processing activities are considered free of any residual contamination associated with uranium processing activities.

Determination of North County Site contaminants of concern (COCs) is based on the EPA guidelines for data evaluation (EPA, 1989a) and for data usability in risk assessment (EPA, 1990) as described in the Baseline Risk Assessment (BRA) and Appendix D of this FS. The COCs that exceed regulatory standards, EPA's target carcinogenic risk range of 10^{-6} to 10^{-4}, and/or noncarcinogenic hazard rating of 1.0 may require remedial action.

The RI did not identify any radiologically contaminated soil at the North County Site that exhibited any RCRA hazardous waste characteristics. Processes that could generate listed wastes have been identified. There is, however, no documentation or other evidence to date to indicate that soils are contaminated with both radiological and listed wastes. Areas which had exceeded extraction procedure toxicity (EP-TOX) lead levels were reinvestigated including additional spatial coverage. These areas did not exceed toxicity characteristic leaching procedure (TCLP) regulatory thresholds based on this re-investigation (SAIC, 1995).

2.3.1 Nature and Extent of Contamination at the North County Site

The nature and extent of contamination is described in several reports including the RI Report (BNI, 1992a), the RI Addendum (SAIC, 1995), and the *SLAPS Implementation Report* (USACE, 2001).

2.3.1.1 SLAPS

Most surface soils at SLAPS are contaminated with Ra-226, Th-230, and U-238 in excess of background concentrations. Depths of contamination range from the ground surface up to 5.4 m (18 ft) but generally average between 1 to 2 m (4 to 8 ft).

Chemical sampling conducted in the early 1990s indicated that the radiologically contaminated soils do not exhibit RCRA-hazardous waste characteristics. Soil samples did not exceed regulatory thresholds for corrosivity, ignitability, reactivity, and EP-TOX. Of the 100 soil samples taken to re-investigate for compliance with TCLP requirements and to provide additional spatial coverage of the site, only one sample, when analyzed for TCLP, was found to exceed the TCLP regulatory threshold for one analyte (selenium). This sample had a selenium level which exceeded the regulatory threshold of 1.0 mg/L by 0.18 mg/L (BNI, 1992a).

In general, VOCs were detected in soil samples collected in the early 1990s in concentrations ranging from 1 to 1,200 micrograms per kilogram (µg/kg) and were unevenly distributed among soils at varying depths. As stated in the RI report, none of the VOCs are believed to have been associated with uranium processing. BNAE compounds were detected in 52 of 90 soil samples collected but VOCs and BNAEs were not found to pose unacceptable risks at SLAPS under current or future use scenarios. Metals found to exceed background levels appear to be confined to near-surface depths [0 to 2 m (0 to 7 ft)] (BNI, 1992a). Mobile ions, including sulfate, fluoride, and nitrate, were analyzed in soil samples because of their use in uranium processing at SLDS. Sulfate results showed one sample contained 250 milligrams per kilogram (mg/kg) above the soil background level of 610 mg/kg. Fluoride results were slightly higher (by as much as 30 mg/kg) than the background soil value of 31 mg/kg. All nitrate results (as measured by nitrogen) were below the soil background (BNI, 1990b).

Elevated levels of uranium were detected in shallow ground water. The highest activity levels were recorded on the west end of SLAPS near Coldwater Creek. Ground-water monitoring results indicate relatively stable levels of Ra-226 and Th-230 activity with annual ranges (DOE, 1994a). The highest detection of Th-230 is 6.3 pCi/L in HZ-A. Samples from only 4 of the 24 shallow wells show elevated levels of total uranium with activities ranging between 58 and 6,570 pCi/L (SAIC, 1998a). Background activity levels for total uranium range between 0.2 and 4 pCi/L. The wells exhibiting the highest activity levels are thought to be near pockets of buried radioactive residues, because adjacent wells show substantially lower concentrations. Ground-water samples had low concentrations (0.6 to 430 µg/kg) of five organics. At least eight metals (including arsenic, beryllium, and lead) were measured in ground-water samples at concentrations that exceed background (DOE, 1994a). Detections of organic compounds and background exceedances for radionuclides and metals are largely restricted to HZ-A, except for arsenic that appears to occur naturally in lower hydrostratigraphic units.

USACE performed additional characterization to provide data to support interim removal actions, to provide information on contaminant transport and limits of migration of contaminants, and to support contaminant boundary delineation (USACE, 2001). These data, along with historical data, are summarized in Tables 2-9 and 2-10. SLAPS data are summarized as both an aggregated unit and by IA. SLAPS is divided into seven investigation areas, IA-1 through IA-7 (refer to Figure 2-9 for the location of investigation areas). An aerial photograph of SLAPS and nearby properties, taken in October 1965, is shown in Figure 2-31. When compared to the photographs shown earlier in this chapter (Figures 2-5 and 2-6), one can see that activity inside the fence line at SLAPS was still occurring and buildings were still in place in 1965. A prominent scar in the drainage feature can be seen in the central area of the former ballfields. A small building has been built in the Eva Road load-out area.

Soil samples from the investigation areas (IAs 1 to 13) were collected and analyzed for radionuclides and various chemicals. TCLP analyses were performed on selected soil samples. Some monitoring wells were added and some were abandoned during this activity. Monitoring wells A, B, C, M13.5-8.5S, and M13.5-8.5D at the western end of SLAPS were decommissioned as part of a removal action performed in the fall of 1997.

Geophysical investigations were performed to determine the locations of subsurface features such as utilities, buried metal, and other objects that may be of concern during drilling and remediation activities. An electromagnetic terrain conductivity tool (EM31), a high sensitivity metal detector (EM61), and a cesium magnetometer were used. The results are shown in Figures 2-32 to 2-34.

The USACE investigations reconfirmed the presence of the radionuclides of interest including Ra-226, Th-230, and U-238. Data were also collected for radioactive decay products including protactinium-231 (Pa-231) and actinium-227 (Ac-227). Thorium-230 is present over the area and thus results in the largest widest extent and volume of impacted soil, as shown in Figures 2-35 and 2-36. Th-230 is present at depth in IA-1 to IA-6. Most of the elevated concentrations of radionuclides in IA-1 (west end of SLAPS) were removed during the former west end remediation. However, pockets of material with elevated Th-230 and other radionuclide concentrations remain beneath and around the remediated area. In addition, asbestos containing material has been found in subsurface soils at SLAPS. The extent of contamination around SLAPS is shown in more detail in Figures 2-39 and 2-40.

Four new piezometers (TW-1 to TW-4) were installed at the western end of SLAPS in September 1997 to measure ground-water levels. The piezometers were installed to a maximum depth of 20 ft (6 m) below ground surface. Wells F and M11-21S were abandoned in April 1998. Wells B53W10D, B53W12S, B53W13S, B53W11D, B53W15S, and B53W16S were abandoned in the last quarter of 1998 due to construction activity. Monitoring well locations are shown in Figure 2-41.

Soil samples were analyzed for metals and other inorganics. About 100 samples were analyzed for organics including VOCs, semi-volatile organic compounds (SVOCs), pesticides, herbicides, and polychlorinated biphenyls (PCBs). Chemicals were compared to EPA Region IX Preliminary Remediation Goals (PRGs) to identify chemicals which may contribute significantly to risks or hazards and the North County Site. Tables D-5 and D-6 in Appendix D show which chemicals exceeded their respective Region IX PRG for surface and subsurface soils. Chemicals detected in SLAPS soils above background and Region IX PRGs included many inorganics (sulfide, aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, molybdenum, nickel, selenium, thallium, titanium, uranium, vanadium, and zinc) and a handful or organics [1,2-dichloroethene (DCE), dimethylbenzene, PCB-1254, and 2-(2-methyl-4-chlorophenoxy) propionic acid (MCPP)]. No sources of VOCs were identified during the investigation. Appendix D compares ground-water samples against their respective Region IX PRGs. Several contaminants exceeded the PRG values. Contaminants detected in SLAPS deep ground water above background and EPA Region IX PRGs included fluoride, nitrate, ammonia, arsenic, barium, boron, chromium, manganese, molybdenum, thallium, uranium, and bis(2-ethylhexyl)phthalate. Ground-water sampling results for uranium, trichloroethene, nitrate, and selenium are shown in Figures 2-42 to 2-45.

To date, waste characterization analysis confirms that hazardous characteristics have not been measured with any of the radionuclide-impacted soils.

2.3.1.2 SLAPS Vicinity Properties

Levels of Ra-226, Th-230, Th-232, and U-238 well above background levels were detected on some VPs, with Th-230 detected in the highest concentrations. Historically, the highest concentrations of Th-230 were found on the Norfolk and Western Railroad property adjacent to 9200 Latty Avenue (26,000 pCi/g above background) and in the ditches adjacent to SLAPS (15,000 pCi/g above background). Many of the VPs have been completely or partially remediated by USACE or DOE. Of the remaining properties, the highest Th-230 concentration identified is approximately 20,000 pCi/g on IA-8 (under and along McDonnell Boulevard at SLAPS). Table 2-10 summarizes surface soil data for the VPs.

Historical data shows VOC concentrations at VPs range between 1.3 and 43 µg/kg. Only one soil sample analyzed for pesticides/PCBs had levels of dieldrin above the sample detection limit. Results from fluoride and nitrate analyses were within the background soil range. Sulfate was found in one sample at 253 mg/kg above the background soil value of 610 mg/kg (BNI, 1989; DOE, 1994a). In general, historical (pre-1997) non-radiological data for VPs is extremely limited. As part of the additional characterization effort, USACE collected samples for full suite analysis on IA-8, IA-9, IA-10, and IA-13. Results are summarized in Tables 2-10 and 2-11. Metals detected in soils at levels above background and EPA Region IX PRGs included antimony, arsenic, barium, chromium, cobalt, copper, lead, nickel, thallium, titanium, uranium, and vanadium. Organics detected in soils above background and PRGs included 2-methyl-4-chloro phenoxyacetic acid (MCPA), 2-methylnaphthalene, dieldrin, dimethylbenzene, and various PAHs.

2.3.1.3 Coldwater Creek

Historical analytical results for sediment samples collected from Coldwater Creek in the reach between SLAPS and HISS reveal elevated levels of radioactive material at numerous locations, typically in the top 15 cm (6 in) of sediment. Between 1986 and 1991, 939 sediment samples were collected from the center of the creek and the water's edge on both sides of the creek. In 1986 and 1987, sediment samples were collected between SLAPS and Pershall Road. In 1989, samples were collected downstream between Pershall Road and Bruce Drive, which is a reach of 2.4 km (1.5 mi) (Section B). A second survey in 1989 extended the sampling an additional 7.7 km (4.8 mi) to Old Halls Ferry Road and the mouth of the creek at the Missouri River (Section C). Samples at intervals varying from 15 to 150 m (50 to 500 ft) during the surveys, were collected to a depth of 15 cm (0.5 ft) along Section A and 0.9 to 1.2 m (3 to 4 ft) along part of Section B. Also, along the remainder of Sections B and C, the samples were collected to a depth of 0.9 m (3 ft); but only the 0.0 to 15 cm (0.0 to 0.5 ft) interval were analyzed at that time with the remainder of the samples being archived. An additional 23 sediment samples from the 0.3 to 0.6 m (1 to 2 ft) depth interval were retrieved from archive storage and analyzed to determine if radiological contaminants exist at depths below 15 cm (0.5 ft) in depositional areas along Coldwater Creek Sections B and C. Additional radiological data for sediments in Coldwater Creek were collected by SAIC in April 1998 and June 1999, as reported in the Ecological Risk Assessment (ERA) for the North County Site (SAIC, 2001).

Concentrations of Th-230 in sediment ranged from 0.2 to 1400 pCi/g, with the corresponding concentrations of U-238, and Ra-226 ranging from background to 10.9, and background to 25.1, respectively. Sediment with elevated levels of radioactive material is intermittently located in creek bends where natural settling would occur. Contamination levels are highest near SLAPS and HISS, but decrease greatly downstream. Four sediment samples taken from Coldwater Creek revealed four metals (arsenic, manganese, selenium, and thallium) that exceed background levels. Nine BNAE compounds (all PAHs) and one VOC were detected in the samples at less than three times the detection limits. Of these, six PAHs were detected at levels above EPA Region IX PRGs [benzo(a)athracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(k)fluoranthene; dibenzo(a,h)anthracene; and indeno(1,2,3-cd)pyrene].

2.3.1.4 HISS

Th-230 is the radionuclide present in the highest concentrations in soil at the HISS property, with lesser amounts of Ra-226 and U-238 present. The extent of contamination is shown in Figures 2-46 and 2-47 and summarized in Table 2-10 (surface soils only). Based on the results of the RI, the depth of contamination ranges from the surface to 2 m (6 ft) (BNI, 1992a).

Results from analytical tests performed in the early 1990s found that HISS soils did not exhibit characteristics of a RCRA-hazardous waste. Soil samples did not exceed regulatory thresholds for corrosivity, ignitability, reactivity, and EP-TOX. Because concentrations for non-radionuclide chemicals were found to be low, and no EP-TOX regulatory threshold limits were exceeded, no additional samples were collected at HISS for TCLP analysis.

Sixteen metals were detected in soil samples at varying concentrations ranging from below background to greater than background up to as high as 11,400 mg/kg (see Table 2-10). Only two samples submitted for VOC analysis exhibited concentrations exceeding detection limits. The samples contained toluene at 2.8 and 2.9 µg/kg, which may be indicative of a breakdown of petroleum products such as gasoline or diesel fuel. BNAE analyses of two samples contained unidentifiable hydrocarbon compounds. While the analyses failed to fully identify the compounds, it is assumed that the peaks represent breakdown products of substances from activities unrelated to those at the FUSRAP-eligible areas for this site and SLAPS, where one peak was identified as a benzene compound. It is most probable that chemical analyses have detected the weathered remains of the original substance (BNI, 1990b). After comparing HISS soil data against background and EPA Region IX PRGs, eleven inorganics remained after this screening: nitrate, antimony, arsenic, barium, boron, cadmium, molybdenum, nickel, selenium, thallium, and vanadium.

A comparison was made for deep HISS ground-water data against background and EPA Region IX PRG levels. Contaminants detected above these screening levels included ammonia, barium, manganese, thallium, uranium, and MCPP (an herbicide).

2.3.1.5 HISS Main and Supplemental Piles

Characterization of the two primary HISS piles was conducted in 1997 (BNI, 1997). The characterization included collection of radiological and chemical samples at various depth intervals and locations across both piles. Th-230 has an average concentration of 320 pCi/g in the main pile and 49 pCi/g in the supplemental pile. No samples exhibiting RCRA characteristics as specified in 40 CFR 261, Subpart C were identified. The HISS stock-piles were removed during CY00 as part of a removal action conducted at the Latty Avenue Properties.

2.3.1.6 Futura Soil

At Futura, Ra-226, Th-230, Th-232, and U-238 concentrations in soil exceeded background. Th-230 concentrations were detected at levels as high as 2,000 pCi/g above background. The depth of contamination ranges from the surface to 5 m (15 ft) (BNI, 1992a).

Twelve metals are present in soil samples at concentrations ranging from background concentrations to 17,000 mg/kg; two VOC compounds (toluene and trichlorofluoromethane) were detected at 15 µg/kg and 1.3 µg/kg, respectively (BNI, 1990b). The following chemicals were detected in Futura soils above background and EPA Region IX PRGs: arsenic, barium, cadmium, molybdenum, nickel, selenium, and vanadium.

Historical chemical sampling did not find any samples exhibiting RCRA-hazardous waste characteristics. Soil samples did not meet the regulatory definition of RCRA for corrosivity, ignitability, reactivity, and EP-TOX. Concentrations for non-radionuclide chemicals were found to be low, and EP-TOX results were below regulatory levels; therefore, no TCLP analysis was performed.

Documentation indicates that the following regulated hazardous substances have been used and/or stored on the Futura property in underground storage tanks [chemical abstract service (CAS) registration number listed in parenthesis]: Xylol (1330-20-7), Toluene (108-88-3), N-Butyl Acetate (123-86-4), P Naphtha (64-742-89-8), and Methyl Isobutyl Ketone (108-10-1). To date, no sampling has been conducted that confirms the presence of RCRA-listed contaminants (i.e., toluene, xylene, ketones) in soil that is radiologically contaminated.

2.3.1.7 Futura Air/Building Surfaces

Radon and air particulate monitoring were conducted in Futura buildings. No buildings at Futura were found to contain radon or air-particulate radioactive concentrations in excess of DOE guidelines in place at the time (SAIC, 1995). There is no evidence of encapsulated residual contamination (e.g., under painted surfaces) in the Futura buildings. Building surface beta-gamma surveys indicated all surfaces were well below the DOE guidelines in effect at the time of the survey.

2.3.1.8 HISS/Futura Ground Water

Five chemicals were identified in the upper hydrostratigraphic zone (HZ-A) at HISS. While data have been compared to maximum contaminant levels (MCLs), the uppermost hydrostratigraphic zone (HZ-A) is not considered a drinking water source. These five chemicals are total uranium, manganese, nitrate, selenium, and TCE. Of these, only manganese has been detected in the lower hydrostratigraphic zones, and concentrations were similar to results from background wells. Total uranium was detected above its MCL in four upper zone wells and above its background concentration in five additional upper zone monitoring wells. No other radionuclides were detected above their respective MCLs in site ground water in 1997.

Manganese concentrations exceeded background concentrations in shallow wells. Dissolved nitrate and selenium were detected above their respective MCLs and background concentrations in upper zone ground water. Nitrate was detected above its MCL in 11 wells. Selenium was detected above its MCL in ground water from nine wells. The highest concentrations of these two inorganics were detected in several wells in 1997.

TCE was detected above its MCL [5 micrograms per liter (µg/L)] in ground water from two wells located along the western site boundary, in wells B53W175 (screened in HZ-A and HZ-B) and HISS-9 (screened in HZ-A). This organic compound is common to many industrial settings and is not likely to be related to FUSRAP-related activities at HISS because expected daughter products are not present. If the result of FUSRAP-related activities, a range of TCE breakdown products would be expected to be present due to the length of time since those activities occurred.

In shallow ground water within the HZ-A unit at HISS, thirteen inorganics (fluoride, nitrate, nitrite, ammonia, arsenic, barium, cadmium, manganese, molybdenum, selenium, strontium, uranium, and vanadium) and four VOCs (chloroform, chloronethane, dimethylbenzene, and TCE) were detected at levels above background and EPA Region IX PRGs. Ground-water contaminants exceeding background and EPA Region IX PRGs in deep HISS ground water were: ammonia, barium, manganese, thallium, uranium, and MCPP.

2.3.1.9 Latty Avenue VPs

Radiological characterization of soil on six Latty Avenue VPs [designated 1(L) – 6(L) on Figure 2-11] indicates levels of Ra-226 and Th-230 well above background levels. Th-230 is present in the highest activity concentrations in Latty Avenue soils ranging to a maximum of about 1,200 pCi/g above background.

Potential areas of radiological contamination along transportation routes were identified and sampled. Samples from 28 intersections on these routes between HISS and the Westlake Landfill in western St. Louis County (231 samples) were collected and analyzed for Ra-226, Th-230, Th-232, and U-238. Only 2 out of 231 samples collected exhibited concentrations of Th-230 exceeding proposed criteria.

2.3.1.10 East Piles

The East Piles were formally located on 9150 Latty Avenue, Berkeley, Missouri, which is owned by the GIFREHC and is currently leased to the Stone Container Corporation. This property was extensively contaminated with radioactive isotopes of uranium, thorium, and the actinium series as a result of commercial activities by private parties which managed ores and other materials (BHE 1998a, 1998b, 1998c).

All materials in the piles originated from GIFREHC property pursuant to construction activities. Characterization of the piles was done by BHE Environmental, Inc. (BHE) with limited additional analysis for characterization by USACE (USACE, 2000). Chemical analyses indicate that the soils do not exhibit the characteristics that would define them as characteristically hazardous wastes as defined in 40 CFR 261 (BHE, 1998b). The East Piles were removed during CY00 as part of a removal action conducted at the Latty Avenue Properties.

2.3.1.11 Removal Actions at Latty Avenue

In 1998, USACE issued an EE/CA and selected a preferred removal alternative to mitigate risks from materials at the Latty Avenue properties. The removal action includes installation of the HISS rail spur, and removal of the piles. Construction of the railroad spur along the eastern boundary of HISS was completed in early 1999. Removal of the stockpiles began in March 2000 and was completed approximately 18 months later. Nearly 44,300 m^3 (58,000 yd^3) of material from the two spoil piles, two Eastern Piles, the HISS Supplemental Storage pile, and the HISS Main Pile were removed.

2.3.2 Chemicals Associated with Uranium Processing

As part of the evaluations, chemicals associated with the uranium processing activities at SLDS were identified. This information is used as part of the determination of COCs.

Chemicals associated with the various residues from processing uranium at SLDS include some metals and some radionuclides and their progeny. The inorganic constituents are major, minor, or trace constituents of the ores or chemicals used in processing of uranium and could be present in the residues that were stored at SLAPS or HISS/Futura. Organic chemicals are also associated with the process but are not expected to be present in the environment, as discussed later in this subsection.

In anticipation of their sale in the early 1960s, information about the composition of the major residues at SLAPS was included in the *Invitation to Bid* [AT-(23-2)-46, March 7, 1962]. These analyses identify the major and minor constituents of the residues that could contribute to residual risk. Major constituents that were present in the various residues include:

- Cobalt, nickel and copper which originated as major components of the ores that later became major constituents in the raffinate cakes (AM-7 and AM-10);
- Lead and radium which originated as constituents of pitchblende ore that later became major components of the K-65 residue as sulfate salts precipitated by adding sulfuric acid. (Note: This residue was stored at SLAPS for only a couple of years in drums, but never in bulk.); and
- Barium which was added to remove excess sulfate when processing pitchblende that later became a major constituent of AJ-4.

Minor constituents that could contribute to residual risk include:

- Uranium that became a trace component of all the residues;
- Lead and radium which originated as constituents of pitchblende ore that became trace components of the barium sulfate cake because they co-precipitated as sulfate salts when barium was added to remove excess sulfate ion;
- Thorium which originated as a constituent of pitchblende and Colorado ores that became a trace component of all the residues; and
- Metals such as manganese, molybdenum, selenium, and vanadium which were constituents of the pitchblende or Colorado ores that became trace components of the residues. (Note: Based on the analyses of the residues provided in the Invitation to Bid on March 7, 1962, arsenic, beryllium and zinc are not major or minor constituents. Arsenic, beryllium and zinc were among a group of 20 metals that were reported at < 0.1% in the Colorado raffinate cake and not mentioned at all for the analyses of the pitchblende raffinate cake).

Several inorganic chemicals were used in the uranium processing to produce uranium dioxide, uranium trioxide, uranium tetrafluoride, and uranium metal. These inorganic chemicals included nitric acid, sulfuric acid, hydrofluoric acid, barium carbonate, sodium carbonate, sodium hydroxide, calcium hydroxide and magnesium metal. Except for insoluble barium sulfate and magnesium fluoride (that became some of the residues stored at SLAPS), the by-products of these inorganic chemicals were primarily soluble inorganic salts. These soluble salts would have been either present as salts in the process waste-waters released at SLDS or as trace levels remaining in the residues placed at SLAPS. Later these salts would have leached from the residues during the open storage at SLAPS and HISS/Futura. These salts would likely remain in the environment as cations (e.g., sodium or calcium) and anions (e.g., nitrates, sulfates, or fluorides).

The only organic chemical used in the uranium processes at SLDS was diethyl ether. It was used as a solvent in the extraction of uranyl nitrate hexahydrate, but it is not expected to be in the environment impacted by the residues because it was not present in the aqueous solutions from which the residues were separated. Other residuals from organic chemicals such as VOCs (e.g., TCE) and BNAEs [including PAHs] and cyanide are not expected to be in the environment impacted by the residues because they were not used in the uranium processing steps. Although TCE is not known to have been used by any uranium processing activities conducted at SLAPS, TCE has been found on and off-site at SLAPS.

Organic compounds (e.g., PAHs) from industrial processing activities and vehicle emissions are present because the site is located in an industrial area. Industrial activities in the area of the airport are a potential source of organic and non-radioactive inorganic contamination (e.g., refueling, deicing and maintenance of aircraft) that is not related to the uranium manufacturing and processing activities at SLDS.

The COCs in the BRA were reevaluated in the supplemental risk assessment. Chemicals that exceed the background screen, are related to the ore processing, and are above risk screening levels are identified as COCs in the reevaluation. The supplemental risk assessment provided in Appendix D identifies eleven metals (in addition to radionuclides) as COCs. These COCs are selected because they produce an estimated carcinogenic risk or non-carcinogenic hazard above criteria within the North County Site to one of the modeled receptors. This list includes antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium. Of these, barium and nickel are identified as major constituents of the uranium process while selenium, uranium, and vanadium are identified as minor constituents. Although antimony, arsenic, cadmium, chromium, molybdenum, and thallium were only present at very low concentrations, they were found above risk criteria. Contaminants that exceed the background screen (e.g., 95% UTL value) and are above the site-specific risk screening level can only be omitted as COCs if they: (1) are explicitly not related to the ore processing for uranium or (2) have a low frequency of detection. Risk Assessment Guidance for Superfund (RAGS), Volume 1, Part A, provides guidance for omitting chemicals based on low frequency. Although not the same, the decision logic in RAGS could be used to omit a chemical with low frequency (e.g., five percent) at or near the risk screening level. None of the 11 metal COCs had a frequency of detection at or near risk screening levels that was less than 5%. For this reason, it was determined that none of the COCs could be omitted based on low frequency or because concentrations were close to background or risk-screening levels. A closer look at the site database lends additional insight on the relationship of identified metal COCs relative to FUSRAP-authorized activities.

When the concentrations of major constituents, barium and nickel, are plotted against radionuclide concentrations, the resulting plot shows a proportional relationship. That is, as the radionuclide concentrations increase, so do the concentrations of barium and nickel. However, very few samples were identified above risk screening levels indicating that the removal of radionuclide contaminants would remove barium and nickel to below risk screens.

Selenium, uranium, and vanadium (minor constituents) also show a proportional relationship when plotted against radionuclide concentrations. As with the major constituents, very few samples were identified near risk threshold criteria. Data for the minor constituents indicate that removal of radionuclide contaminants would remove selenium, uranium, and vanadium to below risk screens (noting that uranium is also considered as a COC for both its radionuclide and chemical properties).

None of the remaining metals show a relationship with radionuclides. In fact, some of these metals are present only at very low concentrations and were retained by the risk analysis only because one or two sample points over the entire site were identified near risk screening levels. Antimony was almost never detected, but a few detects near risk screening levels were identified. Arsenic concentrations were close to background levels or the risk screening level. Only one chromium sample was identified to have concentrations near risk screening levels. All other chromium results are at least an order of magnitude below screening levels. Similar statements can be made for cadmium, molybdenum, and thallium leading to the inference that of the hundreds of analyses, a few random samples identified metals associated with local industrial activities unrelated to uranium processing. However, these metals could not be eliminated as COCs because they were present in trace quantities in the ore and they were found above risk criteria at frequencies greater then 5%.

In conclusion, eleven metals are retained as COCs for soil. While the major and minor constituents do show a proportional relationship with radionuclides, the number of samples (including hundreds of analyses) with results near risk screening levels are minimal. Additionally, the data supports the conclusion that these metals would be remediated with the radionuclides. The data also appears to indicate that the remaining metals identified as COCs were present in trace quantities in the FUSRAP-authorized materials and are present because of natural processes and other activities not related to uranium manufacturing and processing at SLDS. There is no apparent correlation with radionuclide concentrations, and very few samples (with the exception of arsenic) approach risk screening levels. Metals identified as COCs will be subject to pre-design investigation if necessary due to limited data and to final status surveys to assure remediation goals (RGs) established in the ROD are met. Once adequate verification data has been collected to demonstrate co-location of metals with radiological contaminants, sampling of nonradiological COCs will be eliminated from future analysis.

Chemical sampling of one of the previously cleaned up VPs was recently completed to evaluate if cleanup of the radionuclides at a property also cleans up the non-radionuclides. Sixteen chemical samples were collected at one of the VPs (VP-56). The results are shown in Appendix E. An evaluation of the data against background, risk, and hazard criteria was performed for these samples. No COCs were identified. Therefore, the cleanup of VP-56 to the radiological criteria resulted in removal of any associated chemicals at this property.

2.4 CONTAMINANT FATE AND TRANSPORT

The fate and transport of COCs was assessed to identify the environmental media that could be impacted. Possible release mechanisms at the North County Site include the following:

- Potential external gamma irradiation from areas contaminated with radionuclides (i.e., areas of contaminated soil, building interiors, drains, and manholes);

- Radon gas generation from radium-contaminated soil, ground water, and building surfaces;

- Wind dispersal of contamination, including fugitive dust generated from contaminated site soil;

- Surface deposition of airborne particulates (e.g., pursuant to fugitive dust generation or release of building contaminants);

- Surface runoff over contaminated soil following precipitation, with transport to other on-site soil and drainage areas (e.g., Coldwater Creek);

- Leaching from contaminated surface and subsurface soil areas to ground water;

- Transport of contamination from surface and subsurface soil to ground water;

- Transport of contamination from ground water to surface water and sediment (e.g., Coldwater Creek); and

- Contaminant uptake by biota (i.e., animals and plants) from contaminated soil.

Due to site-specific environmental factors, some potential release mechanisms and receiving media do not play a primary role in contaminant fate and transport leading to current human exposure at the North County Site. These mechanisms include wind dispersal of building contamination and eventual surface deposition of such contaminants, and uptake by biota of contaminants from soil. Because of the industrial nature of the site, limited wildlife and vegetation are present, so uptake by biota is not an important release mechanism (ANL, 1993). The fate and transport of contaminated soil particles in ground water are naturally controlled by the low permeability of the site soils. Calculations have shown that the solute migration rate is very slow [e.g., 0.078 m/yr (0.26 ft/yr)].

Surface waters potentially impacted by site contaminants via runoff include Coldwater Creek adjacent to SLAPS and the Latty Avenue Properties (Coldwater Creek flows into the Missouri River). Coldwater Creek sediment contamination is minimal, and bank soil contamination is spotty. Levels of measured radionuclides in surface-water samples from Coldwater Creek were consistent with background levels and are lower than proposed guidelines (BNI, 1992a). Section A of Coldwater Creek is the portion of the creek that would be most affected by potential remediation activities.

Contaminated soil particles may be transported via surface-water or ground-water discharge from contaminated soil. Following remedial action, low levels of residual uranium may be left. The risk due to ground-water discharge to surface water is small without remediation. The risk of ground-water contamination following remedial action is expected to be within the Comprehensive Environmental Response, Compensation, and Liability Act

(CERCLA) risk range. Clean backfill soil will prevent surface-water and particulate contaminant migration.

In summary, the environmental release mechanisms and transport pathways that are considered most important for potential human exposures to site contaminants under current conditions are:

- External gamma radiation from radiologically-contaminated materials (including soil and structural surfaces);

- Radon gas generation from radium-contaminated soil and structural surfaces; and

- Wind dispersal of fugitive dust generated from contaminated site soil.

Other release mechanisms and transport pathways that become factors in future scenarios include leaching of soil contaminants to ground water, contaminated soil particle transport in ground water, and bio-uptake of soil contaminants by plants.

2.5 SUMMARY OF BASELINE RISK ASSESSMENT (BRA)

A BRA (ANL, 1993) was prepared to evaluate potential risks to human health and the environment from radiological and non-radiological contaminants at the St. Louis Site (including the North County Site and SLDS). The risk assessment used site characterization data available at that time to estimate exposure to current and hypothetical future receptors. Results from the BRA indicated the need for remedial action at the North County Site. A list of COCs was also provided in the BRA. The BRA made no distinction between chemicals related to uranium manufacturing and processing activities and chemicals not related to those activities (see Table 2-12). In addition, many of the chemicals were not subjected to cancer and non-cancer risk screens. Because significant additional information has become available since the BRA was issued (additional chemical samples, updated cancer slope factors, etc.), and the BRA does not provide site-specific RGs, a supplemental human health risk assessment is presented in Appendix D and summarized in the following subsections. This risk assessment is used to supplement the conclusions of the BRA. Results from the supplemental risk assessment supercede the COCs identified in the BRA and present site-specific RGs. Table 2-12 identifies some of the differences in the BRA results and the results from the Appendix D supplemental assessment.

The chemicals listed in Table 2-12 are presented by medium (soil, sediment, ground water, and surface water) and area grouping (SLAPS and contiguous areas, Latty Avenue properties, haul roads and remaining VPs, and Coldwater Creek). COCs are also broken into the following three categories:

- COCs identified in both the BRA and supplemental risk assessment;
- COCs that are identified in the BRA that are not COCs based on the supplemental assessment; and
- COCs that are not identified in the BRA, but are COCs according to the supplemental assessment.

Table 2-12. North County Site Contaminants of Concern Identified in the 1993 Baseline Risk Assessment

Soil		Sediment		Ground Water	Surface Water
SLAPS and Contiguous Areas (IAs 1-13)	Radionuclides [a], antimony[d], arsenic, cadmium, molybdenum, nickel, selenium, thallium, and uranium (*beryllium, cobalt, copper, lead*)[b] (*barium, chromium, and vanadium*)[c]	Coldwater Creek	Radionuclides [a] (*antimony, arsenic, beryllium, cadmium, cobalt, lead, molybdenum, nickel, selenium, thallium, zinc, carcinogenic PAHs*)[b] (Same as soils – BRA does not provide separate set for soils and sediments)	[*antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, thallium, uranium, vanadium, and zinc, bis(2-ethylhexyl)phthalate, 1,2-dichloroethene, endosulfan, toluene, and TCE*] [b]	Not evaluated in BRA
HISS/Futura and Latty Avenue VPs 2L and 10k530087	Radionuclides [a], arsenic, cadmium, molybdenum, nickel, selenium, and thallium (*antimony, beryllium, cobalt, copper, lead, and uranium*)[b] (*barium and vanadium*)[c]				
Haul Road Properties and Remaining VPs	Radionuclides [a]				
Coldwater Creek (within banks)	Radionuclides [a] (*antimony, arsenic, beryllium, cadmium, cobalt, lead, molybdenum, nickel, selenium, thallium, zinc, carcinogenic PAHs*)[b]				

[a] Radionuclides in the uranium, thorium, and actinium series
[b] Chemicals identified in the 1993 BRA as COCs which *were not* found to be COCs after reevaluation using additional data and guidance
[c] Chemicals not identified in the 1993 BRA as COCs which *were* found to be COCs after reevaluation using additional data and guidance
[d] Antimony was retained as a COC for IA-3 and IA-10.

Additional ecological assessments were also performed to supplement the assessment presented in the BRA. As with the human health assessment, the more recent ecological assessment uses additional data and supercedes the 1993 BRA as an evaluation of ecological health. Summaries of the supplemental ecological assessments are presented in Section 2.5.4.

2.5.1 Results of the 1999 Supplemental Human Health Risk Evaluations

A supplemental baseline human health risk evaluation was performed for the following reasons: additional analytical data (including radiological and non-radiological analytes) have been collected; site conditions have changed since the BRA was issued; the BRA does not distinguish between chemicals related to uranium manufacturing and processing activities and chemicals unrelated to those activities; and the BRA does not develop site-specific RGs. Details of the supplemental assessment are presented in Appendix D. The approach outlined in Appendix D varies slightly from that of the BRA. The most relevant differences include the following:

- As noted in the BRA, exposure to background concentrations of radon produce risks well above the EPA target risk range. Radon modeling is also extremely uncertain, and EPA guidelines for radon are based on concentration, not risk. Given these conditions, risk from radon was excluded from Appendix D calculations.

- The EPA target risk range is defined as 10^{-6} to 10^{-4}, where 10^{-6} is known as the point of departure. The EPA's stated position is that the upper boundary of the acceptable risk range is not a discrete line at 1×10^{-4}, although EPA generally uses 1×10^{-4} in making risk management decisions. A specific risk estimate around 10^{-4} may be considered acceptable if justified based on site-specific conditions (OSWER Directive 9200.4-18).

- Radiological doses would be limited to the "benchmark dose" as defined in the 10 CFR Part 40 Appendix A Criterion 6(6) in those areas where other radionuclides such as uranium and thorium are present in significant quantities. The benchmark dose is the dose resulting from exposure to average above background concentrations of 5 pCi/g of Ra-226 in the top 15 cm of soil or 15 pCi/g of Ra-226 in subsequent 15 cm layers of soil. Doses from exposure to all radiological contaminants would be limited to the benchmark value, as appropriate.

- The 100 mrem/yr criterion is used in the development of supplemental standards under 40 CFR Part 192 Subpart C. Benchmark doses which exceed 100 mrem/yr before application of ALARA require the approval of the NRC after consideration of the recommendations of the staff.

- COCs are identified in the BRA and in Appendix D of the FS.

- Radiological risk and dose estimates from Appendix D are projected over a 1,000 year period. Many regulations require projection of exposure over time even assuming baseline conditions.

The basic approach used in Appendix D to identify COCs, is first to subject site data to three screens. These screens are: a background screen; a risk screen against EPA Region IX PRGs; and a weight of evidence screen to eliminate essential human nutrients, and radionuclides like K-40 (from fertilizer or fly ash) that are unrelated to uranium manufacturing and processing activities. Any chemical that passes through these screens is identified as a contaminant of potential concern (COPC). The COPCs are then included in a site-specific risk calculation. If the total risk for a specified receptor (e.g., resident) and medium (e.g., soil) exceeds 10^{-4}, those individual COPCs with a risk greater than 10^{-6} and related to uranium manufacturing and processing activities at the SLDS, are identified as carcinogenic COCs for the North County Site. If the total hazard index (HI) for a specified receptor (e.g., resident) and medium (e.g., soil) exceeds 1.0, those individual COPCs with a HI greater than 0.1, that are related to the uranium ore processing activities, are identified as non-carcinogenic COCs for the North County Site. The list of COCs is then used in the development of site-specific RGs.

The excess lifetime cancer risk and dose for six land-use scenarios at the North County Site properties are summarized in Tables 2-13a and 2-13b. The data show that the non-radiological contaminants associated with FUSRAP-related activities are commingled with radiological contaminants and the risks from exposure to non-radionuclides are at least an order of magnitude lower than risks from exposure to radionuclides at most properties. As shown in

Table 2-13a, the risks due to radiological COCs at most properties at the North County Site for the current RME receptor scenario are within the CERCLA risk range (10^{-6} to 10^{-4}) while risks due to non-radiological COCs for the current RME receptor scenario are generally between 10^{-8} to 10^{-4}.

The radiological results from the supplemental human health risk evaluation are summarized in Table 2-13b. Table 2-13b includes risk and dose estimates for years zero and one thousand (1,000) for each potential receptor and property aggregate (e.g., group of properties). The 1,000-year values are presented because maximum doses or risks will occur in either the current or year 1,000 (given the mix of radiological contaminants present at this site). The potential receptors include residential, industrial, maintenance worker, recreational, utility worker, and construction worker. IAs represent subdivisions of SLAPS and contiguous properties and are shown in Figure 2-9. The current-use conditions at the North County Site are summarized as follows:

- Industrial, utility, and maintenance worker use is used for VPs including IA-9, IA-10, IA-11, and IA-13;
- Recreational/trespasser use is applicable for Coldwater Creek;
- Construction and trespasser use applies to SLAPS (including IA-1 through IA-7), and HISS/Futura; and
- Construction/utility and maintenance worker use is assumed for the railroads, including IA-12 (Railroad area south of SLAPS to Banshee Road), road right-of-ways, and IA-8 (under and along McDonnell Boulevard at SLAPS).

Under current use conditions (including existing restrictions), the radiological results shown in Table 2-13b indicate that the risks are often above the 10^{-6} point of departure, but are within the EPA target risk range for radionuclides[1]. Specifically, recreational/trespasser risks do not exceed the range for Coldwater Creek, SLAPS, HISS/Futura; maintenance worker risks do not exceed the range for VPs, railroads, and road right-of-ways; industrial worker risks do not exceed the range for VPs; and construction worker risks do not exceed the range for the railroads and road right-of-ways unless work is performed in areas with significantly elevated radionuclide concentrations (e.g., south ditch at SLAPS). Construction workers at SLAPS (IA-1 through IA-7) can exceed risk criteria. These current workers are trained for the conditions at SLAPS and are considered occupationally exposed rather than being considered members of the general public.

Given that conditions could change in the future, risk estimates are also evaluated considering reasonably anticipated future land uses. The likely future land use for most habitable properties is industrial, although residential results are also considered as a basis for comparison. The exceptions to industrial use include Coldwater Creek (recreational), transportation routes including roads, railroads and right-of-ways (construction) and existing residential properties. Construction and maintenance activities could occur on any property. Under a likely future land use scenario, several of the IA units, Futura, and SLAPS exhibit risks in excess of the EPA target risk range for an industrial scenario, as shown in Table 2-13b. The construction worker risk exceeds limits in IA-1 and IA-4 (north central portion of SLAPS, including former

1. Note that while EPA generally defines the CERCLA target risk range as 1×10^{-6} to 1×10^{-4} for non-radiological contaminants, EPA has stated that 3×10^{-4} may be considered an acceptable upper boundary for radionuclides.

barium/radium sulfate storage areas). If development is assumed, residential risks at HISS/Futura and the most contaminated of the VPs exceed limits.

The highest calculated dose results under current conditions are: 49 mrem/yr for the recreational/trespasser (IA-1); 28 mrem/yr for the maintenance worker (IA-8); 17.5 mrem/yr for the industrial worker (highest VP); and 325 mrem/yr for the construction worker (IA-8). When assessing potential future conditions, radiological doses for industrial and construction workers range from tens to several hundred mrem/yr. Doses could exceed 1,000 mrem/yr in IA-1 and IA-4 if these properties revert to residential use. (It is notable that external dose rates alone equate to annual doses of up to about 2,500 millirem (mrem) based on continuous exposure.).

A summary of surface soil non-radiological risks and hazards are shown for each property or property grouping (e.g., SLAPS, VPs, etc.) in Table 2-14. Eleven metals are identified as non-radiological surface soil COCs for SLAPS and HISS/Futura: antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium. Total non-radiological risks (i.e., risks across all non-radiological COPCs) exceeded 1×10^{-4} for the industrial worker at HISS and for the resident at HISS, Futura, and IA-2. No other risks exceeded 1×10^{-4}. The HI (i.e., sum of the hazard quotients across all appropriate pathways and across all COPCs) exceeded unity for the following receptor/properties: the maintenance worker and industrial worker at HISS/Futura; the construction worker at HISS/Futura, IA-2 to IA-4, IA-7, and SLAPS; and the resident at HISS/Futura, IA-2, IA-3, IA-7, and SLAPS. There were no HIs greater than 1.0 for the recreational/trespasser exposed to the surface soil.

Subsurface soil non-radiological risks and hazards are summarized in Table 2-15 by major area groupings (e.g., VPs, SLAPS, etc.). Five non-radionuclides in subsurface soil exceed risk criteria, based on the evaluation of the construction worker's exposure to subsurface soil: antimony (IA-10), arsenic (IA-2, IA-10, and road right-of-ways), manganese (road right-of-way), thallium (IA-10), and uranium (IA-2). Manganese was below the screening criteria and was not determined to be a COC at SLAPS or HISS. As ore concentrations for contamination in road right-of-ways would be much lower than at SLAPS and HISS, the manganese in road right-of-ways was determined to be unrelated to operations associated with FUSRAP. Removal of manganese as a COC results in elimination of arsenic as a COC as it would not exceed a HI of 1.0. Total risks across all COPCs were less than 1×10^{-4} for all properties, while total FUSRAP-related HIs exceed 1.0 for two areas (IA-2 and IA-10 have HIs of 2.4 and 8.1, respectively).

Table 2-13a. Supplemental Human Health Risk Summary Table

Radiological Reasonable Maximum Exposures - Current Receptors

Properties [a]	RME [b] Receptor	Minimum Dose (mrem/yr)	Maximum Dose (mrem/yr)	Average Dose [c] (mrem/yr)	Minimum Risk [d]	Maximum Risk [d]	Average Risk [c]
IAs 1-13	Maintenance	0.0	233	21	6E-10	5E-04	5E-05
HISS & Futura	Industrial	2.7	79	25	4E-05	8E-04	3E-04
Coldwater Creek	Construction	2.9	8.6	5.8	2E-06	3E-06	3E-06
Buildings/Roads/Bridges/Railroads	Construction	5.4	31	17	2E-06	1E-05	6E-06
VPs (worst-case) [d]	Industrial	15	18	17	2E-04	2E-04	2E-04
VPs (average) [e]	Industrial	0.8	1.3	1.1	2E-05	2E-05	2E-05

Radiological Reasonable Maximum Exposures - Future Receptors

Properties [a]	RME [b] Receptor	Minimum Dose (mrem/yr)	Maximum Dose (mrem/yr)	Average Dose [c] (mrem/yr)	Minimum Risk	Maximum Risk	Average Risk [c]
IAs 1-13	Resident	0.0	3407	311	1E-07	4E-02	4E-03
HISS & Futura	Resident	9.3	294	91	1E-04	3E-03	1E-03
Coldwater Creek	Construction	2.9	8.6	5.8	2E-06	3E-06	3E-06
Buildings/Roads/Bridges/Railroads	Construction	5.4	31	17	2E-06	1E-05	6E-06
VPs (worst-case) [d]	Resident	51	60	56	7E-04	9E-04	8E-04
VPs (average) [e]	Resident	2.7	4.3	3.5	6E-05	7E-05	7E-05

Non-radiological Reasonable Maximum Exposures - Current Receptors [f]

Properties [a]	RME [b] Receptor	Minimum HI [g]	Maximum HI	Average HI	Minimum Risk	Maximum Risk	Average Risk
IAs 1-13	Maintenance	< 0.1	0.5	< 0.2	2E-8	2E-5	3E-6
HISS & Futura	Industrial	1.4	3.5	2.5	9E-5	3E-4	2E-4
Coldwater Creek	Construction	-	-	-	-	-	-
Buildings/Roads/Bridges/Railroads [h]	Construction	1.3	1.3	1.3	2E-6	2E-6	2E-5
VPs [h]	Industrial	< 0.1	< 0.1	< 0.1	-	-	-

Non-radiological Reasonable Maximum Exposures - Future Receptors [f]

Properties [a]	RME [b] Receptor	Minimum HI	Maximum HI	Average HI	Minimum Risk	Maximum Risk	Average Risk
IAs 1-13	Resident	< 0.1	2.5	< 0.8	5E-7	3E-4	5E-5
HISS & Futura	Resident	4.7	13	9	4E-4	1E-3	7E-4
Coldwater Creek	Construction	-	-	-	-	-	-
Buildings/Roads/Bridges/Railroads [h]	Construction	1.3	1.3	1.3	2E-6	2E-6	2E-6
VPs [h]	Resident	0.2	0.2	0.2	-	-	-

[a] VP = vicinity property; IA = investigation area (includes SLAPS)

[b] RME = reasonable maximum exposure

[c] Averaged over year 0.0 and year 1,000 estimates for listed properties

[d] Minimum and maximum values listed for VP with worst-case source term

[e] Results when averaging across all VPs

[f] Results for all non-radionuclides including those that are non-FUSRAP-related

[g] HI = hazard index; only maximum values provided because total risks are dominated by radionuclides

[h] No non-radiological available data except where property also falls under an IA

Table 2-13b. Supplemental Human Health Risk Evaluation Summary Table

Property Name	RESIDENTIAL SCENARIO				INDUSTRIAL SCENARIO				CONSTRUCTION SCENARIO			
	Dose Year = 0.0	Dose Year = 1000	Risk Year = 0.0	Risk Year = 1000	Dose Year = 0.0	Dose Year = 1000	Risk Year = 0.0	Risk Year = 1000	Dose Year = 0.0	Dose Year = 1000	Risk Year = 0.0	Risk Year = 1000
VPs (highest value)	60	51	9E-04	7E-04	18	15	2E-04	2E-04	47	42	2E-05	2E-05
VPs (average value)	2.7	4.3	6E-05	7E-05	0.8	1.3	2E-05	2E-05	2.3	3.2	9E-07	2E-06
Coldwater Creek	not applicable				not applicable				8.6	2.9	3E-06	2E-06
Railroad	not applicable				not applicable				6.7	5.4	3E-06	2E-06
Road right-of-way	29	37	4E-04	5E-04	8.0	11	1E-04	1E-04	25	31	9E-06	1E-05
HISS	42	9.3	5E-04	1E-04	12	2.7	1E-04	4E-05	34	7.4	1E-05	3E-06
Futura	294	18	3E-03	3E-04	79	5.3	8E-04	7E-05	251	14	8E-05	6E-06
IA-1	3407	78	4E-02	1E-03	946	24	9E-03	3E-04	2801	56	1E-03	3E-05
IA-2	382	180	5E-03	3E-03	105	51	1E-03	7E-04	322	149	1E-04	6E-05
IA-3	492	65	6E-03	9E-04	144	18	2E-03	2E-04	369	54	2E-04	2E-05
IA-4	1159	315	2E-02	4E-03	337	90	4E-03	1E-03	890	262	4E-04	1E-04
IA-5	179	89	2E-03	1E-03	48	25	5E-04	3E-04	156	73	5E-05	3E-05
IA-6	84	68	9E-04	1E-03	21	20	2E-04	3E-04	80	55	2E-05	2E-05
IA-7	621	256	6E-03	4E-03	164	72	2E-03	9E-04	557	213	2E-04	8E-05
IA-8	341	221	3E-03	3E-03	87	63	8E-04	8E-04	325	184	8E-05	7E-05
IA-9	24	16	2E-04	2E-04	6.0	4.5	6E-05	6E-05	22	13	6E-06	5E-06
IA-10	24	5.0	3E-04	8E-05	6.5	1.5	7E-05	2E-05	20	3.6	7E-06	2E-06
IA-11	0.0	0.0	1E-07	4E-07	0.0	0.0	2E-08	1E-07	0.0	0.0	5E-10	1E-08
IA-12	30	42	4E-04	6E-04	7.6	12	9E-05	2E-04	30	35	7E-06	1E-05
IA-13	10	4.8	1E-04	8E-05	2.8	1.5	3E-05	2E-05	8.8	3.3	3E-06	2E-06
SLAPS	321	110	4E-03	2E-03	89	31	1E-03	4E-04	267	91	1E-04	4E-05

Property Name	MAINTENANCE SCENARIO				RECREATIONAL/TRESPASSER SCENARIO				UTILITY WORKER SCENARIO			
	Dose Year = 0.0	Dose Year = 1000	Risk Year = 0.0	Risk Year = 1000	Dose Year = 0.0	Dose Year = 1000	Risk Year = 0.0	Risk Year = 1000	Dose Year = 0.0	Dose Year = 1000	Risk Year = 0.0	Risk Year = 1000
VPs (highest value)	3.8	3.4	1E-05	8E-06	0.9	0.8	5E-06	4E-06	1.9	1.7	8E-07	7E-07
VPs (average value)	0.2	0.3	5E-07	7E-07	0.0	0.1	3E-07	3E-07	0.1	0.1	3E-08	6E-08
Coldwater Creek	0.7	0.2	1E-06	8E-07	0.1	0.1	5E-07	4E-07	0.3	0.1	1E-07	6E-08
Railroad	0.5	0.4	2E-06	1E-06	0.1	0.1	8E-07	6E-07	0.3	0.2	1E-07	1E-07
Road right-of-way	2.1	2.5	5E-06	6E-06	0.4	0.6	2E-06	3E-06	1.0	1.2	4E-07	5E-07
HISS	2.8	0.6	7E-06	2E-06	0.6	0.1	3E-06	7E-07	1.3	0.3	6E-07	1E-07
Futura	21	1.1	4E-05	3E-06	4.0	0.3	2E-05	1E-06	10	0.6	3E-06	2E-07
IA-1	233	4.2	5E-04	1E-05	49	1.3	2E-04	7E-06	112	2.2	4E-05	1E-06
IA-2	27	12	6E-05	3E-05	5.4	2.7	2E-05	1E-05	13	6.0	5E-06	2E-06
IA-3	29	4.3	8E-05	1E-05	7.6	1.0	4E-05	5E-06	15	2.1	7E-06	8E-07
IA-4	71	21	2E-04	5E-05	18	4.7	9E-05	2E-05	36	10	2E-05	4E-06
IA-5	13	6.0	3E-05	1E-05	2.5	1.3	1E-05	6E-06	6.2	2.9	2E-06	1E-06
IA-6	6.9	4.5	1E-05	1E-05	1.1	1.0	4E-06	5E-06	3.2	2.2	8E-07	9E-07
IA-7	48	17	8E-05	4E-05	8.3	3.8	3E-05	2E-05	22	8.5	7E-06	3E-06
IA-8	28	15	4E-05	4E-05	4.3	3.3	2E-05	2E-05	13	7.4	3E-06	3E-06
IA-9	1.9	1.0	3E-06	3E-06	0.3	0.2	1E-06	1E-06	0.9	0.5	2E-07	2E-07
IA-10	1.7	0.3	3E-06	9E-07	0.3	0.1	1E-06	4E-07	0.8	0.1	3E-07	7E-08
IA-11	0.0	0.0	6E-10	5E-09	0.0	0.0	2E-10	2E-09	0.0	0.0	2E-11	4E-10
IA-12	2.6	2.8	4E-06	7E-06	0.4	0.6	2E-06	3E-06	1.2	1.4	3E-07	5E-07
IA-13	0.7	0.3	1E-06	9E-07	0.1	0.1	6E-07	4E-07	0.4	0.1	1E-07	7E-08
SLAPS	22	7.4	5E-05	2E-05	4.6	1.6	2E-05	8E-06	11	3.6	4E-06	1E-06

Results for dose in mrem/yr.
VP = vicinity properties
IA = investigation area

Table 2-14. Summary of Non-radiological Surface Soil Risks and Hazards by Properties

Property Name	RESIDENTIAL		INDUSTRIAL		CONSTRUCTION		MAINTENANCE		RECREATIONAL TRESPASSER	
	Chemical Hazard	Chemical Risk	Chemical Hazard	Chemical Risk	Chemical Hazard	Chemical Risk	Chemical Hazard	Chemical Risk	Chemical Hazard	Chemical Risk
VPs (highest value)	0.2		<0.1		0.5		<0.1		<0.1	
VPs (average value)	0.2		<0.1		0.5		<0.1		<0.1	
Road right-of-way	0.9	3E-05	0.3	6E-06	1.3	2E-06	0.1	2E-06	<0.1	3E-07
HISS	12.6	1E-03	3.5	3E-04	20.0	1E-04	2.0	7E-05	0.5	1E-05
Futura	4.7	4E-04	1.4	9E-05	11.8	3E-05	1.2	2E-05	0.2	5E-06
IA-1	<0.1	5E-07	<0.1	2E-07	<0.1	4E-08	<0.1	2E-08	<0.1	1E-08
IA-2	1.8	3E-04	0.5	6E-05	4.6	2E-05	0.5	2E-05	<0.1	3E-06
IA-3	2.5	5E-06	0.9	1E-06	1.9	1E-07	0.1	8E-08	0.2	2E-08
IA-4	0.8	6E-05	0.2	1E-05	1.7	5E-06	0.2	4E-06	<0.1	7E-07
IA-5	0.3	2E-05	<0.1	4E-06	0.5	2E-06	<0.1	1E-06	<0.1	2E-07
IA-7	1.5		0.4		3.7		0.4		<0.1	
IA-8	0.1	2E-05	<0.1	4E-06	0.3	1E-06	<0.1	8E-07	<0.1	3E-07
IA-9	0.3	3E-05	0.1	7E-06	0.9	2E-06	<0.1	2E-06	<0.1	4E-07
IA-10		6E-06		2E-06		5E-07		3E-07		1E-07
IA-13	0.2	2E-05	<0.1	5E-06	0.3	2E-06	<0.1	1E-06	<0.1	3E-07
SLAPS	1.4	8E-05	0.5	2E-05	2.4	7E-06	0.2	5E-06	<0.1	1E-06

Table 2-15. Non-radiological Subsurface Soil Risks and Hazards by Properties

Property Name	Construction Worker	
	Chemical Hazard	Chemical Risk
VPs (highest value)	0.5	
VPs (average value)	0.5	
Road right-of-way	1.2	2E-06
IA-2	2.4	1E-05
IA-3	0.4	5E-08
IA-4	0.3	2E-06
IA-5	0.2	1E-06
IA-7	0.5	
IA-9	0.3	2E-06
IA-10	8.1	4E-05
SLAPS	0.5	2E-06

Ground-water non-radiological risks and hazards were evaluated using SLAPS and HISS data sets. Six metals (arsenic, barium, fluoride, manganese, thallium, and uranium) and two organics [bis(2-ethylhexyl)phthalate and MCPP] are initially identified above risk criteria for the drinking water pathway and the deep aquifer. The maximum detected concentrations of three of these contaminants [barium, fluoride, and bis(2-ethylhexyl)phthalate] in deep ground water are below their drinking water MCLs. In addition, the maximum detected concentration of uranium in the deep aquifer (0.0105 mg/L) is below the proposed uranium SDWA MCL of 0.020 mg/L. Risks and hazards in deep ground water are driven by the remaining four contaminants: MCPP, arsenic, manganese, and thallium. Their presence in deep ground water is not considered to be FUSRAP-related for the following reasons:

- MCPP is an herbicide with no ore-processing connection.
- Manganese was reportedly present in the ores in only trace amounts and was not identified above criteria in soils at either SLAPS or HISS. Additionally, the limited hydraulic connection between the HZ-A unit and deep aquifer precludes introduction into the deep aquifer as a FUSRAP-related COC.
- In the absence of manganese sufficient concentrations of arsenic did not exist to exceed an HI of 1.0 in ground water, thus it was not carried forward as a COC.
- Thallium is found naturally in soils and is widespread in the environment due to its use in many common industries (e.g., electronics, pharmaceuticals, and the manufacture of glass and alloys). The maximum concentration of thallium detected in deep ground water (0.0046 mg/L) is only slightly above its MCL (0.002 mg/L). Given both the lack of hydraulic connection and the fact that thallium is only present in trace amounts in the ores, there is no evidence that the presence of thallium in the deep aquifer is a result of uranium manufacturing or processing activities.

Although some contaminants are present in the shallow ground water, their presence does not require action because a complete pathway to receptors does not exist. Because the potential yield is very low for shallow ground water, it is not a source of potable drinking water therefore, no ground-water COCs are identified.

Since the surface-water total risk across all COPCs is less than 10^{-4} and the total HI across all COPCs is less than 1.0, no surface-water COCs are identified.

Remediation of the sediments is merited, based on potential future human health risk under a residential scenario. Risk estimates for the hot spot with the highest concentration of Th-230 indicate a maximum risk of 3×10^{-4} under the current recreational/trespasser scenario, but a future scenario where no restriction is placed on public use of creek sediments in residential areas would pose a higher, potentially unacceptable risk human health. The relocation of sediments from these hot spots to an adjacent residential property could result in risks exceeding the unrestricted use criteria. To ensure the protectiveness of Coldwater Creek under all future anticipated land use conditions, radionuclides are retained as COCs for Coldwater Creek sediments. Sediment potential carcinogenic risks and HI results for non-radiological contaminants indicate that one metal (arsenic) and five organics [benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene] exceed risk criteria. Arsenic is below background in Coldwater Creek adjacent to SLAPS and HISS (i.e., at Reach A). Arsenic concentrations increase in Coldwater Creek with distance downstream. Thus, elevated arsenic in Reaches B and C is most likely due to the heavy industrial activity in the area and is therefore not considered to be a COC for sediments. Similarly, none of the five organics were identified above risk criteria in Reach A. Therefore, given the heavy industrial activity in the area, these organics are not considered as sediment COCs. Only radionuclides are retained as COCs for Coldwater Creek sediments.

Table 2-16 summarizes the eleven metals and radionuclides that are COCs, showing where each analyte is a COC.

Table 2-16. Summary of Contaminants of Concern

Soil		Sediment		Ground Water [a]	Surface Water
SLAPS and Contiguous Areas[b, d]	Radionuclides [c], antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium	Coldwater Creek	Radionuclides [c]	None	None
HISS/Futura and Latty Avenue VPs 2L and 10k530087	Radionuclides [c], antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, and vanadium				
Haul Road Properties and Remaining VPs	Radionuclides [c]				
Coldwater Creek (within banks)	Radionuclides [c]				

[a] COPCs identified in HZ-A. However, no COCs identified because HZ-A is not a source of potable drinking water.
[b] IA-1 through IA-13
[c] Radionuclides in the uranium, thorium, and actinium series
[d] COCs are applicable only for soil within IAs 2 and 10 as there are no identified COCs for other areas.

The supplemental human health evaluation also developed site-specific RGs. Cleanup of the radiological COCs in the North County Site at the 10^{-6} level would not be achievable and/or would significantly increase cost without significant risk reductions. Movement away from 10^{-6} is based on factors such as technical limitations and uncertainty (i.e., inability to distinguish soil concentrations at the 10^{-6} level from background and limitations of field equipment). Given that movement away from the point of departure is justified, evaluations determined what concentrations were appropriate. The evaluations show that the cleanup goals required by applicable or relevant and appropriate requirement (ARAR) criteria for radionuclides would achieve protectiveness to levels within the CERCLA target risk range and below a HI of 1.0, and have been demonstrated to be implementable. The implementation of ARAR-based RGs for radionuclides would also require the evaluation of non-radiological COCs. Additional detail is provided in Appendix D.

Carcinogenic and non-carcinogenic site-specific RGs were developed. Non-radionuclide and radionuclide site-specific RGs for the North County COCs are provided in Table 2-17. ARAR-based RGs (including supplemental standards) developed in Appendix D are also shown. Note that because there were no COCs for ground water or surface water, no site-specific RGs are calculated for these media.

2.5.2 Results of the Baseline Ecological Risk Assessment

An ecological assessment was conducted to evaluate potential effects from contamination of the St. Louis Site. Due to the urban environment, the airport areas have limited habitat and biotic diversity. The Baseline Ecological Risk Assessment (BERA) compared contaminant concentrations detected in various media (soil, sediment, and water) at the site with literature on the toxicities of the contaminants to biota. This study indicated that only arsenic, thallium, and PAHs are at concentrations that could potentially impact biota. The BERA indicated that ecological effects do not warrant further evaluation given that the habitats and biota at the site are not unique, the biota are not necessary for continued propagation of key species, and they are not highly valued economically, recreationally, or aesthetically (ANL, 1993).

2.5.3 Results of the 1993 Supplemental Risk Assessment for Coldwater Creek

A supplemental risk assessment (SAIC, 1993a) was conducted to evaluate the risk associated with Coldwater Creek. People likely to be exposed to these risks included recreational users of the creek and community members periodically involved in the cleanup of the creek. Neither ingestion of fish nor swimming were considered activities for the recreational user because very few game fish populate the creek and swimming is unlikely due to low water levels and poor water quality. The exposure for recreational use and community cleanup was estimated. Exposure points were evaluated for each of the three segments on Coldwater Creek as shown earlier on Figure 2-14.

Table 2-17. Site-specific Remediation Goals (RGs) for Soil and Sediment in the North County Site

RGs for Unrestricted Release – Surface Soil/Sediment						
Description	**Analyte**	**Units**	**Hazard-Based**	**Risk-Based** [a]	**ARAR-Based**	**Basis**
Unrestricted release concentrations for surface soils. Unrestricted release concentrations for surface sediments above the mean water gradient of Coldwater Creek. Non-radiological RGs apply to SLAPS and Contiguous Areas (IAs 1-13), HISS/Futura, and Latty Avenue VPs 2L and 10k530087. Chromium and uranium (considered as a non-radionuclide) are not COCs at HISS/Futura.	Antimony	mg/kg	15	-	-	Corresponding to Cardiovascular and Respiratory HI = 0.08
	Arsenic	mg/kg	36	-	-	Corresponding to Cardiovascular HI = 0.23
	Barium	mg/kg	2,800	-	-	Corresponding to Cardiovascular HI = 0.08
	Cadmium	mg/kg	12	-	-	Corresponding to Kidney and Respiratory HI = 0.10
	Chromium	mg/kg	350	-	-	Corresponding to Respiratory HI = 0.10
	Molybdenum	mg/kg	1,000	-	-	Corresponding to Skeletal HI = 0.38
	Nickel	mg/kg	1,500	-	-	Corresponding to Immune and Respiratory HI = 0.14
	Selenium	mg/kg	300	-	-	Corresponding to Skin HI = 0.11
	Thallium	mg/kg	25	-	-	Corresponding to Skin and Central Nervous System HI = 0.15
	Uranium	mg/kg	150	-	-	Corresponding to Kidney HI = 0.09
	Vanadium	mg/kg	112	-	-	Corresponding to Respiratory HI = 0.10
	Ra-226	pCi/g	-	-	5.0	As defined by ARARs
	Ra-228	pCi/g	-	-	5.0	As defined by ARARs
	Th-230	pCi/g	-	-	14	Set to limit ingrowth of Ra-226 of 1,000 years
	U-238	pCi/g	-	-	50	Corresponds to benchmark dose for most restrictive receptor plus adjustments to conservatively account for residual decay products out of equilibrium.
RGs for Unrestricted Release – Subsurface Soil/Sediment						
Description	**Analyte**	**Units**	**Hazard-Based**	**Risk-Based** [a]	**ARAR-Based**	**Basis**
Unrestricted release concentrations for subsurface soils. Unrestricted release concentrations for subsurface sediments above the mean water gradient of Coldwater Creek. Non-radiological RGs apply to SLAPS and Contiguous Areas (IAs 1-13), HISS/Futura, and Latty Avenue VPs 2L and 10k530087. Uranium (considered as a non-radionuclide) is not a COC at all Latty Avenue properties.	Antimony	mg/kg	25	-	-	Corresponding to Respiratory HI = 0.14
	Arsenic	mg/kg	40	-	-	Corresponding to Skin HI = 0.23
	Thallium	mg/kg	30	-	-	Corresponding to Central Nervous System HI = 0.08
	Uranium	mg/kg	150	-	-	Corresponding to Kidney HI = 0.09
	Ra-226	pCi/g	-	-	15	As defined by ARARs
	Ra-228	pCi/g	-	-	15	As defined by ARARs
	Th-230	pCi/g	-	-	15	Set to Ra-226 RG to account for uncertainty in future land use, exposure pathways, etc.
	U-238	pCi/g	-	-	50	Set to surface soil RG to account for uncertainty in future land use, exposure pathways, etc.

Table 2-17. Site-specific Remediation Goals (RGs) for Soil and Sediment in the North County Site (Cont'd)

Description	Analyte	Units	Hazard-Based	Risk-Based [a]	ARAR-Based	Basis
RGs for Unrestricted Release – Sediment						
Description	**Analyte**	**Units**	**Hazard-Based**	**Risk-Based [a]**	**ARAR-Based**	**Basis**
RGs for sediment below the mean water gradient of Coldwater Creek.	Ra-226	pCi/g	-	-	15	Subsurface RG for unconditional release (3 times the surface RG) used for sediment below the mean water line.
	Ra-228	pCi/g	-	-	15	Subsurface RG for unconditional release (3 times the surface RG) used for sediment below the mean water line.
	Th-230	pCi/g	-	-	43	Set to limit ingrowth of Ra-226 of 1,000 years
	U-238	pCi/g	-	-	150	Set to 3 times the RG for unconditional release consistent with the approach for Ra-226.
Supplemental Standards for Restricted Use of Subsurface Soils						
Description	**Analyte**	**Units**	**Hazard-Based**	**Risk-Based [a]**	**ARAR-Based**	**Basis**
Supplemental standards for soils below the top 15 cm (6 inches).	Ra-226	pCi/g	-	-	25	Limits dose to less than 100 mrem/yr if controls are lost (equivalent to 5 times the unconditional release RG)
	Th-230	pCi/g	-	-	70	Set to limit ingrowth of Ra-226 of 1,000 years
	U-238	pCi/g	-	-	250	Scaled to 5 times the unconditional release RG for subsurface soil to be consistent with Ra-266 and Th-230 RGs.
Supplemental Standard for Restricted Use of Deep Soils						
Description	**Analyte**	**Units**	**Hazard-Based**	**Risk-Based [a]**	**ARAR-Based**	**Basis**
Supplemental standards for deep soils[b].	Ra-226	pCi/g	-	-	75	Limits dose to less than 100 mrem/yr if controls are lost
	Th-230	pCi/g	-	-	210	Set to limit ingrowth of Ra-226 of 1,000 years
	U-238	pCi/g	-	-	750	Scaled to a 15 times the unconditional release RG for subsurface soil to be consistent with Ra-266 and Th-230 RGs.

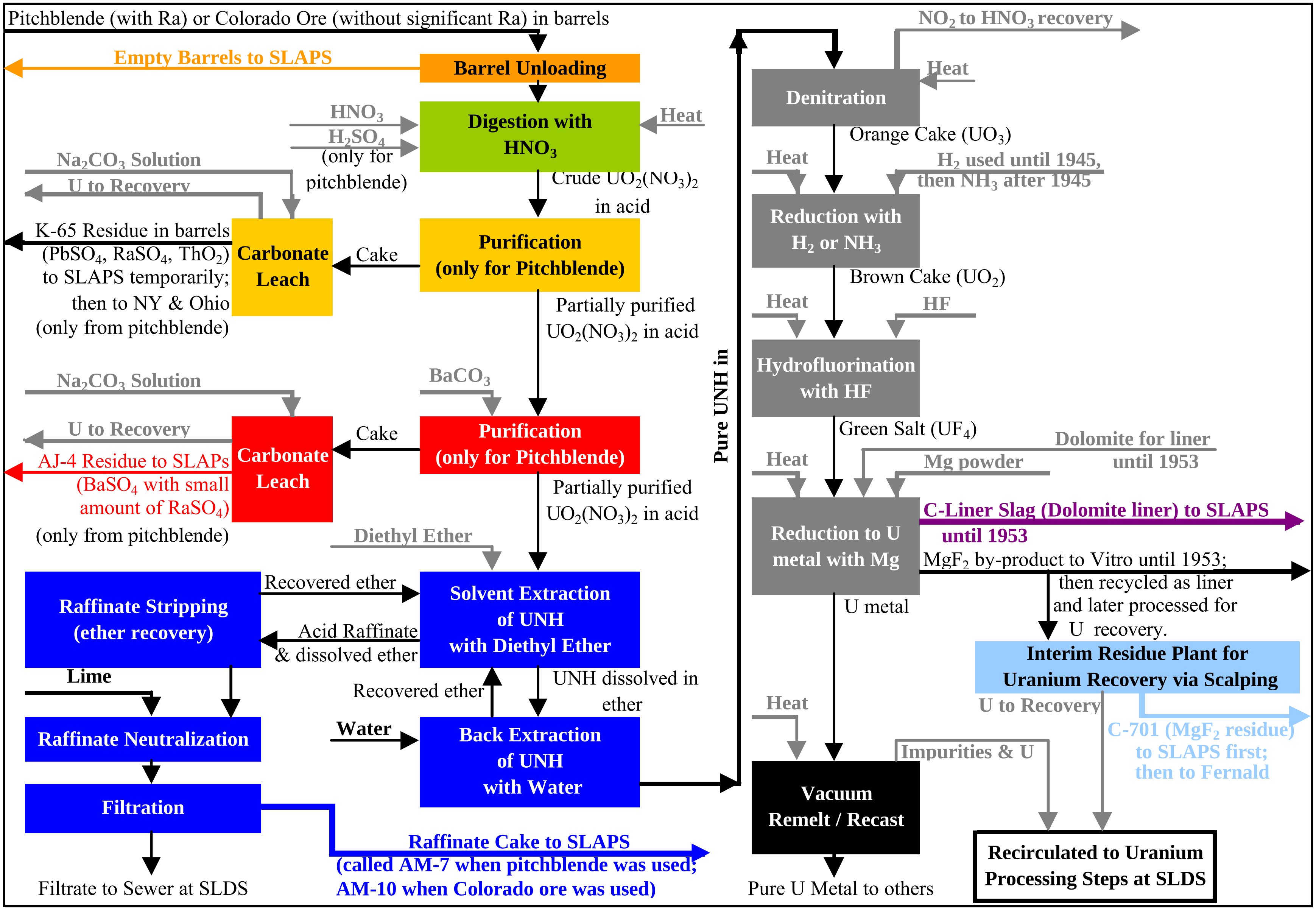
Table 2-17. Site-specific Remediation Goals (RGs) for Soil and Sediment in the North County Site (Cont'd)

RGs for Restricted Release – Surface Soil Non-radionuclides						
Description	**Analyte**	**Units**	**Hazard-Based**	**Risk-Based [a]**	**ARAR-Based**	**Basis**
Provided to limit risk from non-radionuclides assuming institutional controls are applied. RGs apply to SLAPS and Contiguous Areas (IAs 1-13), HISS/Futura, and Latty Avenue VPs 2L and 10k530087. Chromium and uranium (considered as a non-radionuclide) are not COCs at all Latty Avenue properties.	Antimony	mg/kg	15	-	-	Corresponding to Cardiovascular and Respiratory HI = 0.08
	Arsenic	mg/kg	36	-	-	Corresponding to Cardiovascular HI = 0.23
	Barium	mg/kg	2,800	-	-	Corresponding to Cardiovascular HI = 0.08
	Cadmium	mg/kg	12	-	-	Corresponding to Kidney and Respiratory HI = 0.10
	Chromium	mg/kg	350	-	-	Corresponding to Respiratory HI = 0.10
	Molybdenum	mg/kg	1,000	-	-	Corresponding to Skeletal HI = 0.38
	Nickel	mg/kg	1,500	-	-	Corresponding to Immune and Respiratory HI = 0.14
	Selenium	mg/kg	300	-	-	Corresponding to Skin HI = 0.11
	Thallium	mg/kg	25	-	-	Corresponding to Skin and Central Nervous System HI = 0.15
	Uranium	mg/kg	150	-	-	Corresponding to Kidney HI = 0.09
	Vanadium	mg/kg	112	-	-	Corresponding to Respiratory HI = 0.10
RGs for Restricted Release – Subsurface Soil Non-radionuclides						
Description	**Analyte**	**Units**	**Hazard-Based**	**Risk-Based [a]**	**ARAR-Based**	**Basis**
Provided to limit risk from non-radionuclides assuming institutional controls are applied. RGs apply to SLAPS and Contiguous Areas (IAs 1-13), HISS/Futura, and Latty Avenue VPs 2L and 10k530087. Uranium (considered as a non-radionuclide) is not a COC at all Latty Avenue properties.	Antimony	mg/kg	25	-	-	Corresponding to Respiratory HI = 0.14
	Arsenic	mg/kg	40	-	-	Corresponding to Skin HI = 0.23
	Thallium	mg/kg	30	-	-	Corresponding to Central Nervous System HI = 0.08
	Uranium	mg/kg	150	-	-	Corresponding to Kidney HI = 0.09

[a] No RGs for North County COCs are limited by carcinogenic risk.
[b] The deep soil criteria were not carried forth in any of the alternatives discussed in the FS, although they have been retained as potential remediation standards.

Figure 2-1 North County Site, looking South - 1998
(HISS shown in foreground)

Figure 2-2 SLAPS, looking East - 1998



The same colors have been used in Figure 2-8 for the areas where these residues were stored at SLAPS.

Figure 2-3 Uranium Production Process at SLDS

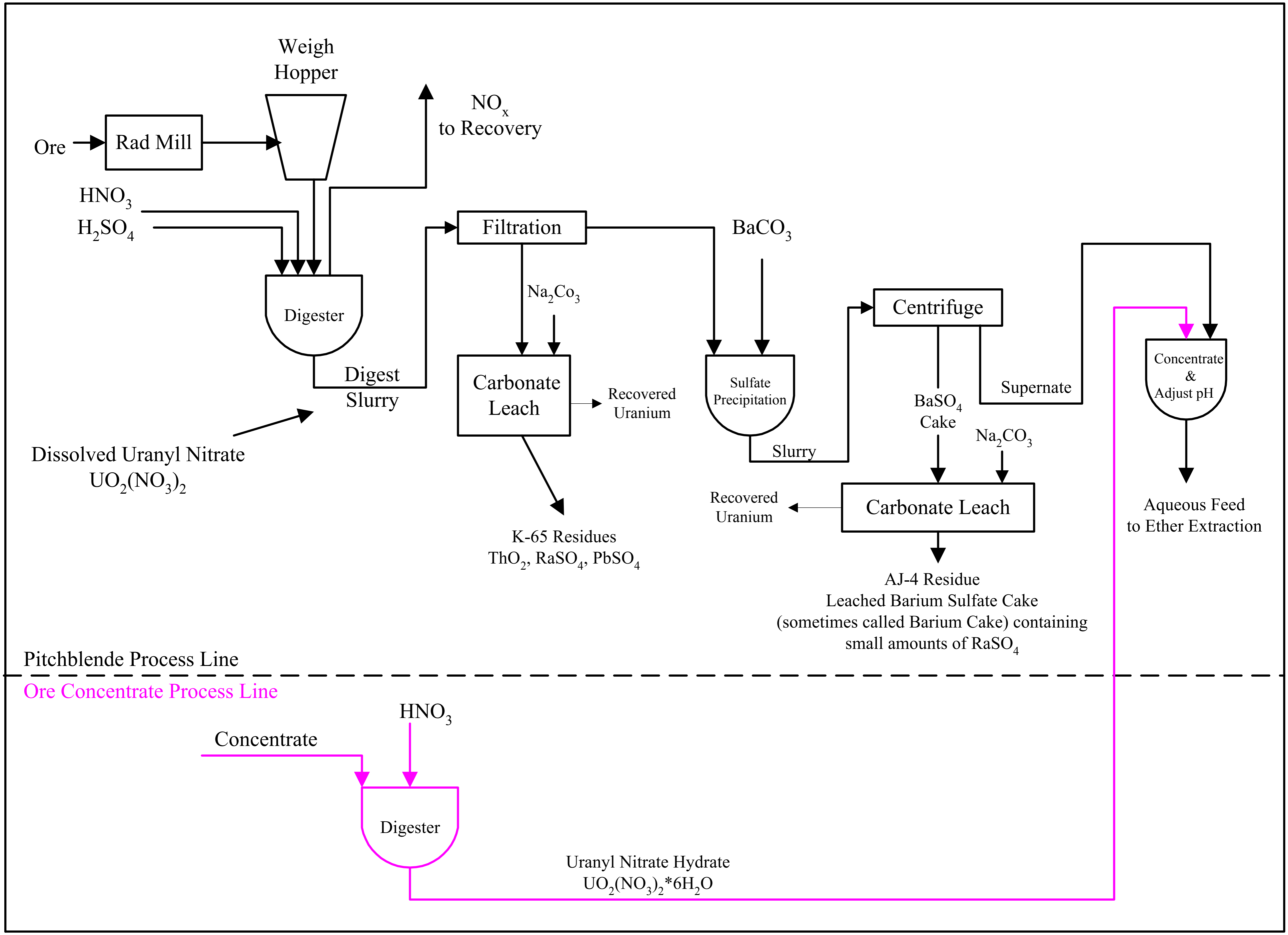


Figure 2-4. Mallinckrodt Ore Digestion Process

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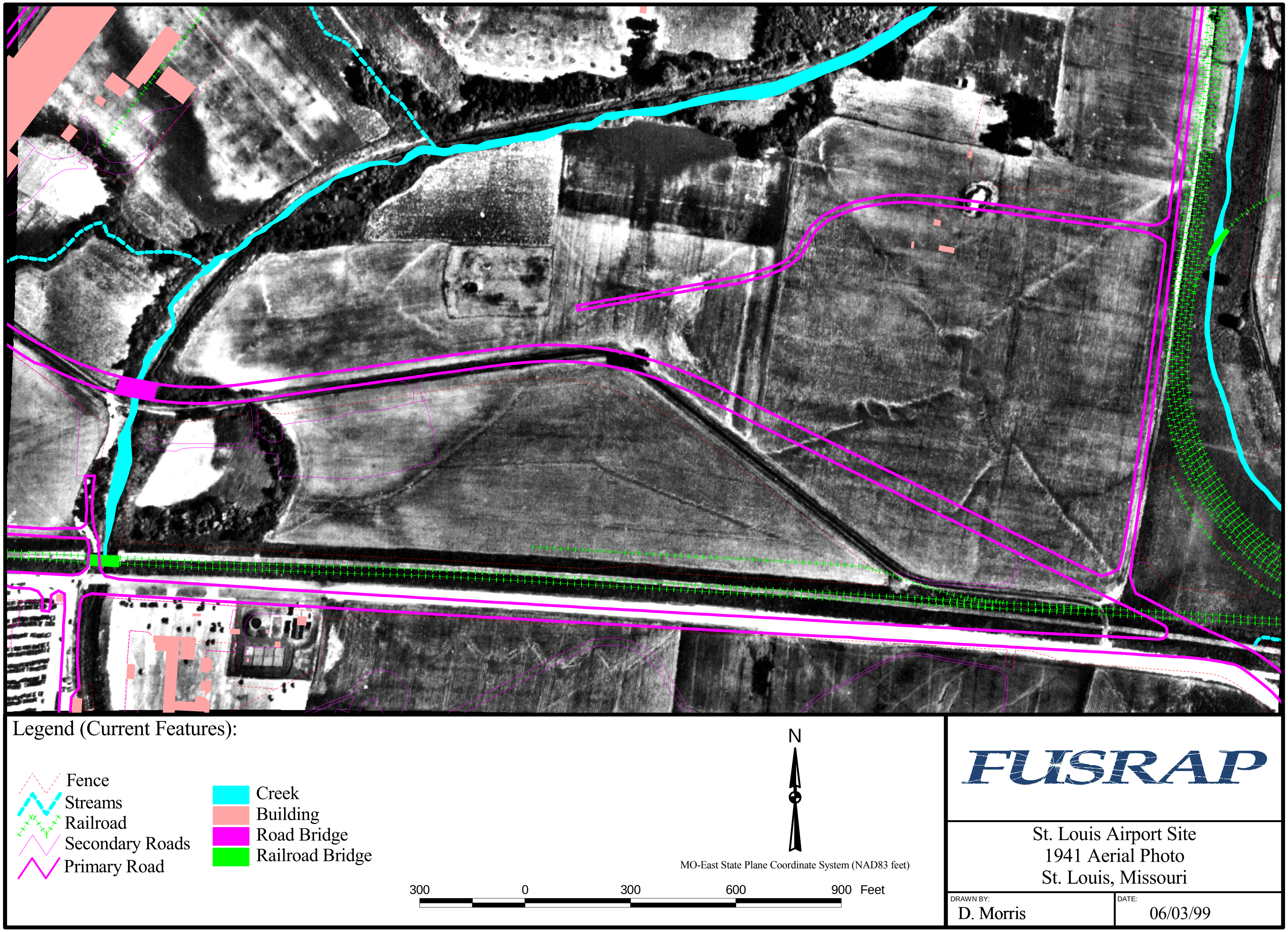
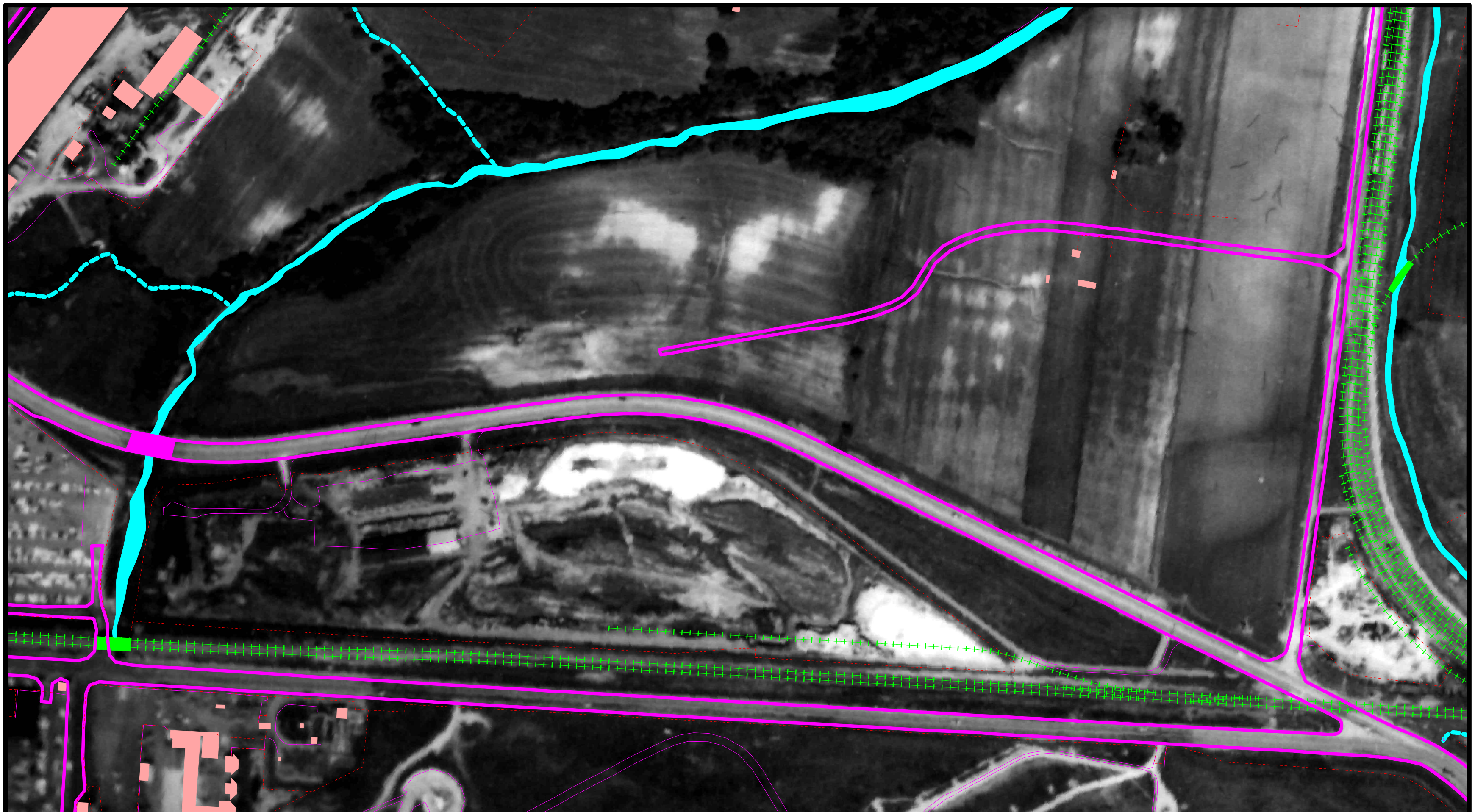


Figure 2-5. St. Louis 1941 Aerial Photo of SLAPS

U:\GIS\NORTHCO\PROJECTS\41&58AIRPHOTO.APR



Legend (Current Features):

Fence
Streams
Railroad
Secondary Roads
Primary Road

Creek
Building
Road Bridge
Railroad Bridge

N

MO-East State Plane Coordinate System (NAD83 feet)

300 0 300 600 900 Feet

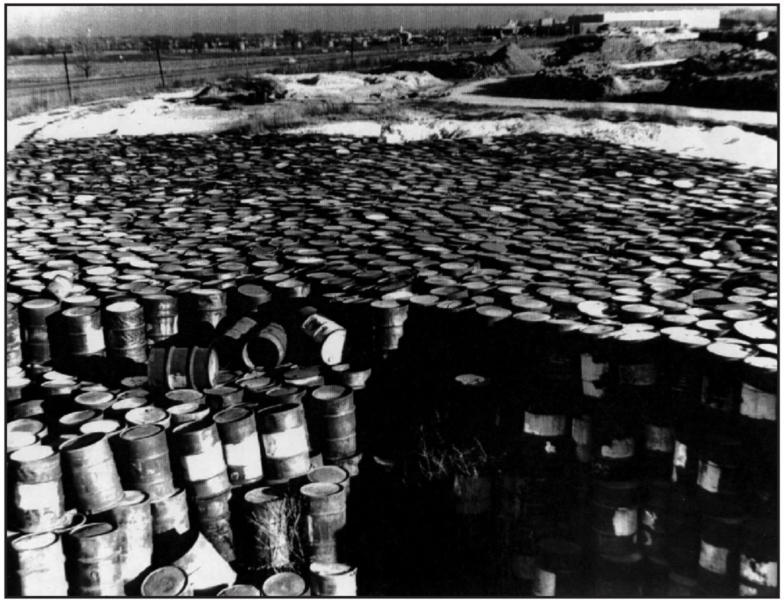
FUSRAP

St. Louis Airport Site
1958 Aerial Photo
St. Louis, Missouri

DRAWN BY: D. Morris

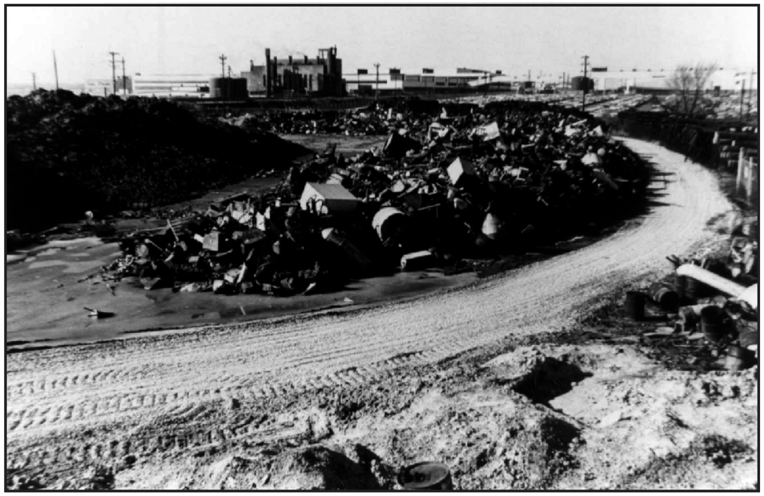
DATE: 06/03/99

Figure 2-6. St. Louis 1958 Aerial Photo of SLAPS



Drum Storage at North Side of SLAPS

Barium Sulfate Cake (AJ-4) Storage on North Side of SLAPS



Scrap Metal and Residue Storage Near the West End of SLAPS

Figure 2-7 Storage Operations at SLAPS
circa - 1950's

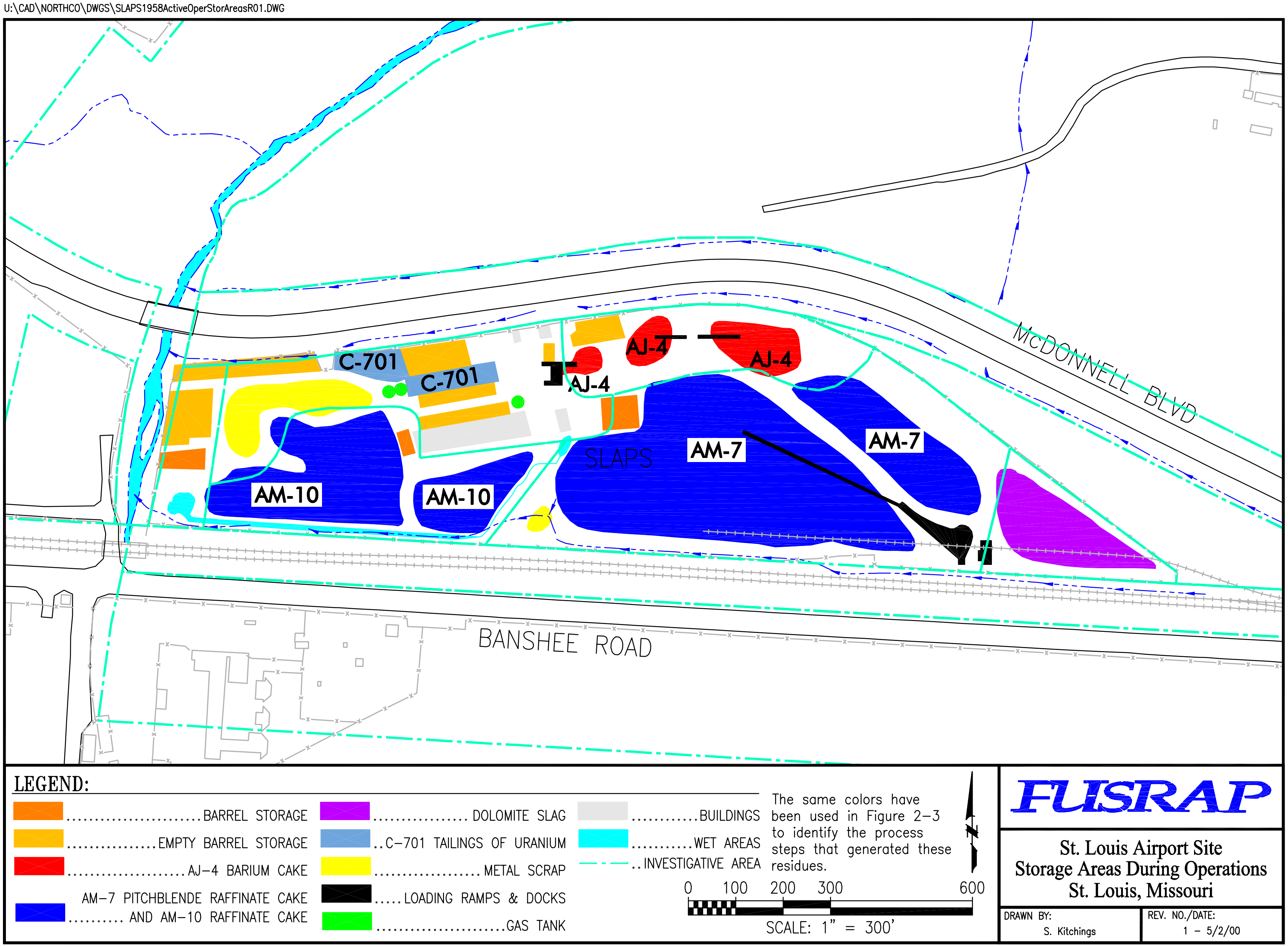


Figure 2-8. Schematic of Storage Areas During Active Operations at SLAPS - Circa 1958

U:\CAD\NORTHCO\DWGS\NorthCoInvestigationAreasR00.dwg

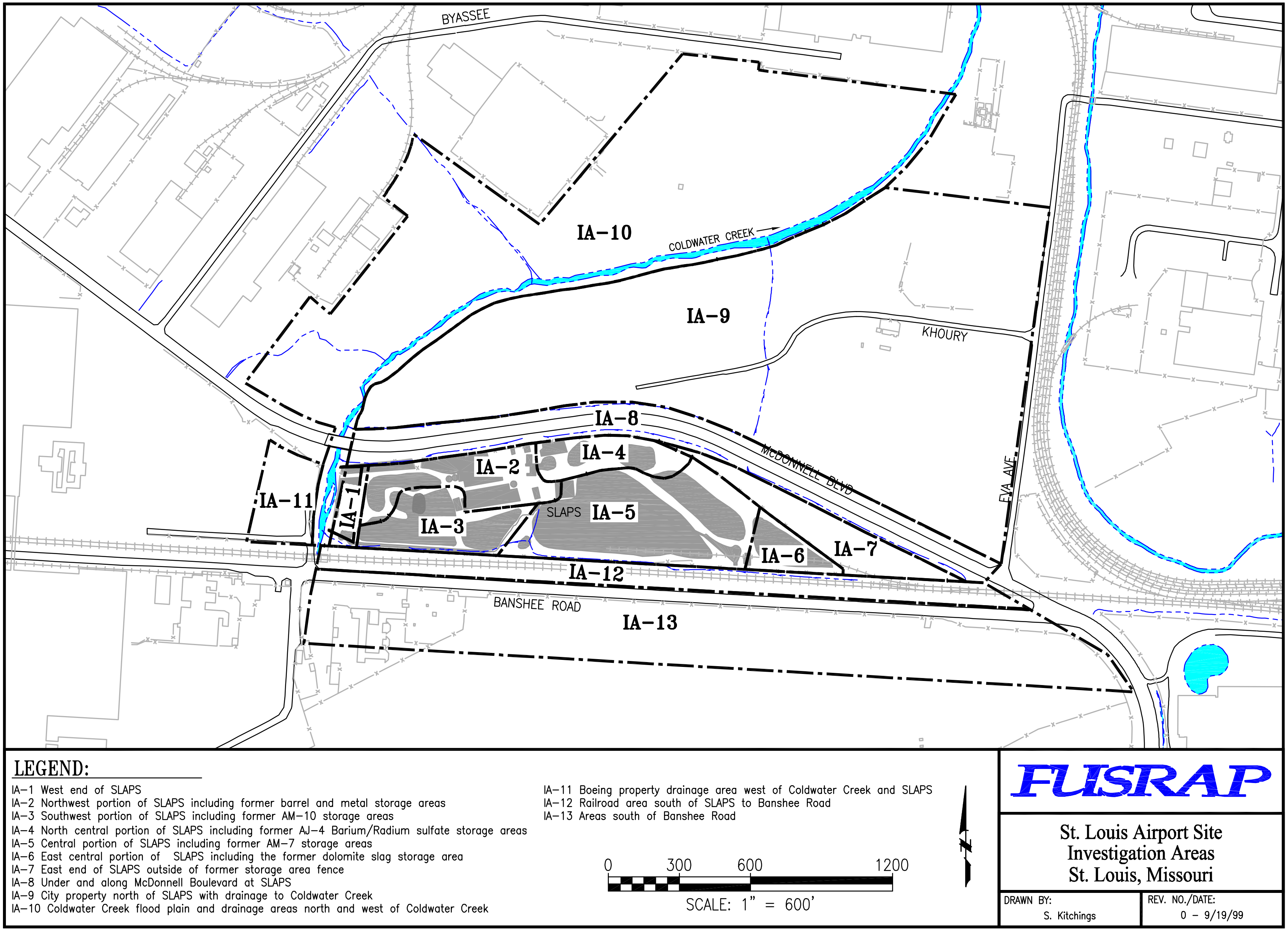
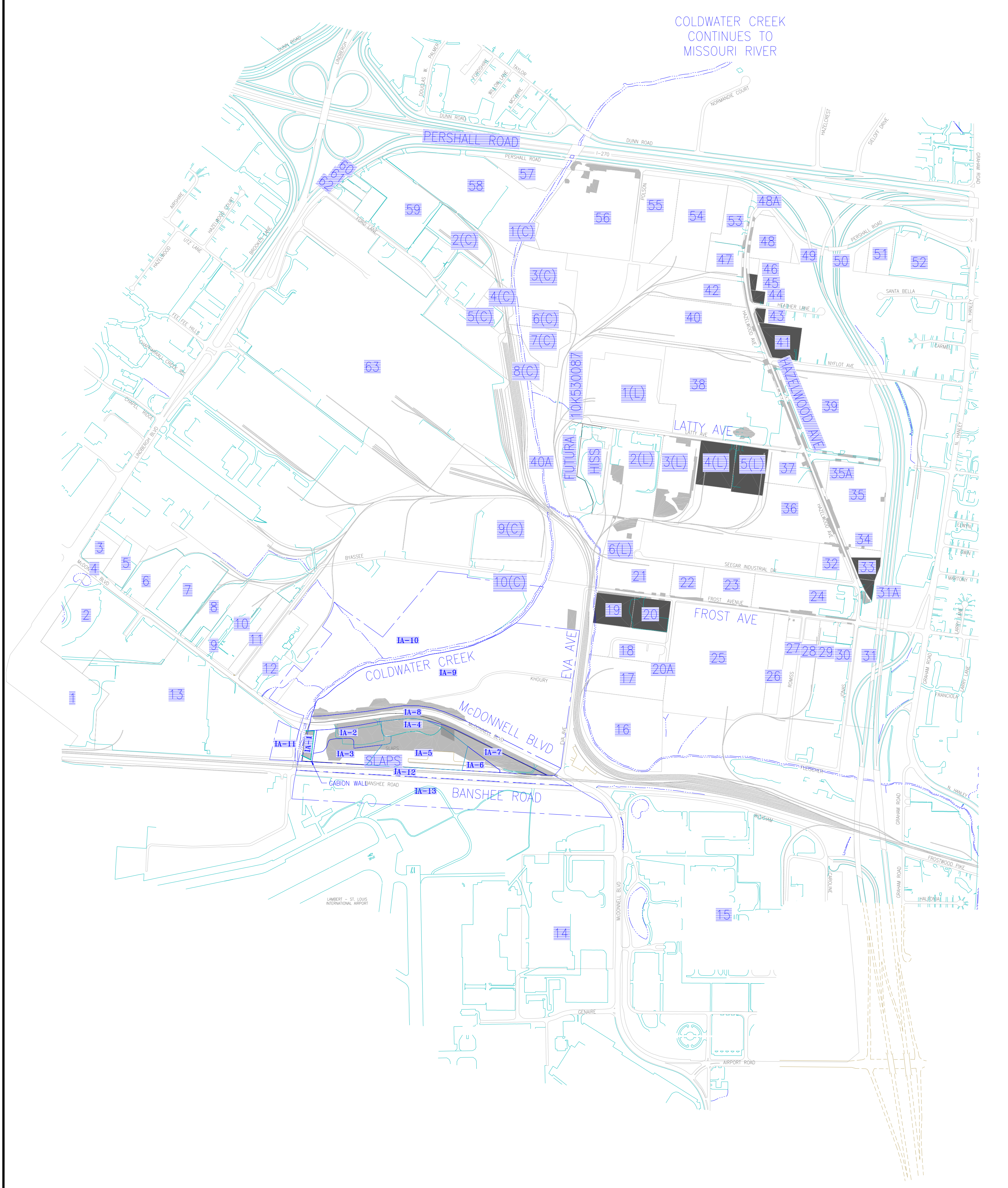


Figure 2-9. Investigation Areas for SLAPS and Contiguous Properties

U:\CAD\NORTHCO\DWGS\FSFIGURES\NorthCoRemediatedAreasR05.DWG



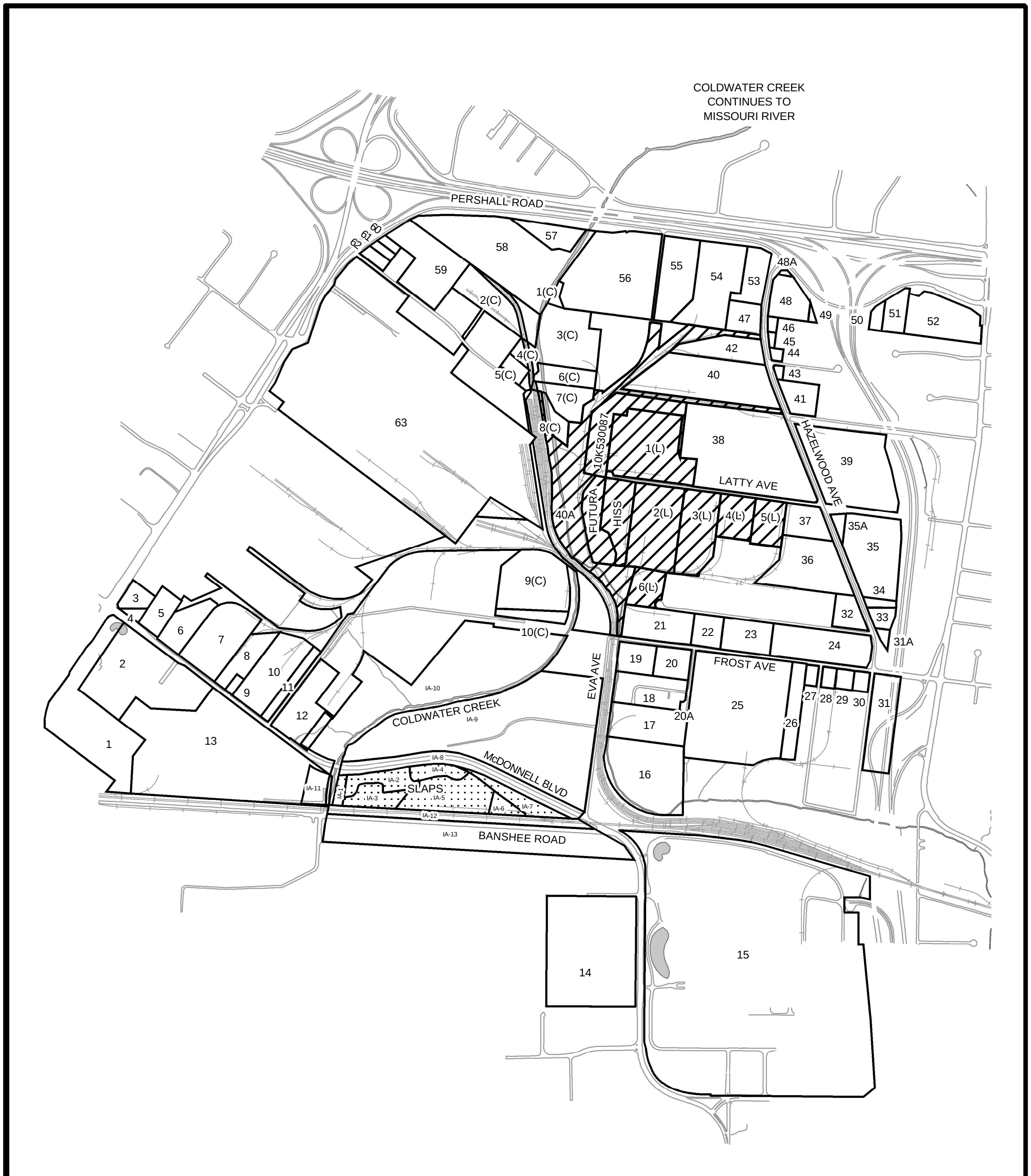
LEGEND:
EXCAVATION BOUNDARY
DOE FORMALLY RELEASED PROPERTY

FUSRAP

St. Louis Airport Site
Remediated Areas
St. Louis, Missouri

DRAWN BY:	REV. NO./DATE:
P. Hansen	5 - 01/25/2002

Figure 2-10. Location of Prior Response Actions within the North County Site



Legend:

SLAPS - Includes IAs* 1 thru 7

SLAPS VPs* - Includes designated haul road properties (VPs 1thru 63) Coldwater Creek designated properties (VPs 1C thru 10C), and SLAPS contiguous areas (IAs 8 thru 13).

LATTY AVE. PROPERTIES - Includes HISS/Futura and Latty Avenue VPs: 1L-6L, 40A, and 10K530087

*Notes: VP = Vicinity Property
IA = Investigative Area

Primary Road
Railroad
Pond
Streams

N

MO-East State Plane
(NAD 83, feet)

0 600 1200 2400
Feet

St. Louis North County Site
Locations of Vicinity Properties
St. Louis, Missouri

FUSRAP

DRAWN BY:	REV:	DATE:
Peter Hansen	0	01-15-2002

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Figure 2-11. Locations of Vicinity Properties

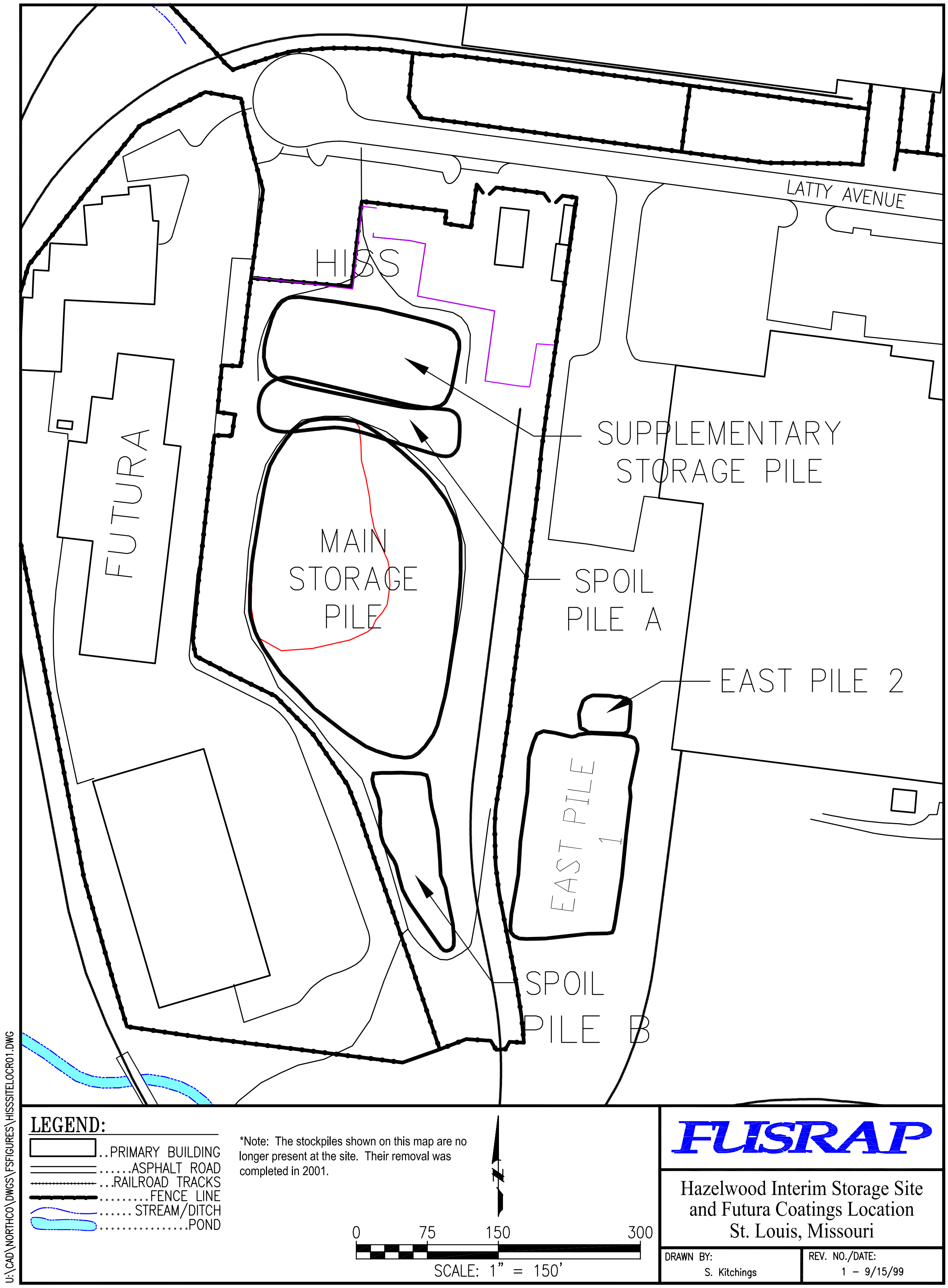


Figure 2-12. Location of Hazelwood Interim Storage Site (HISS) and Futura Coatings Property

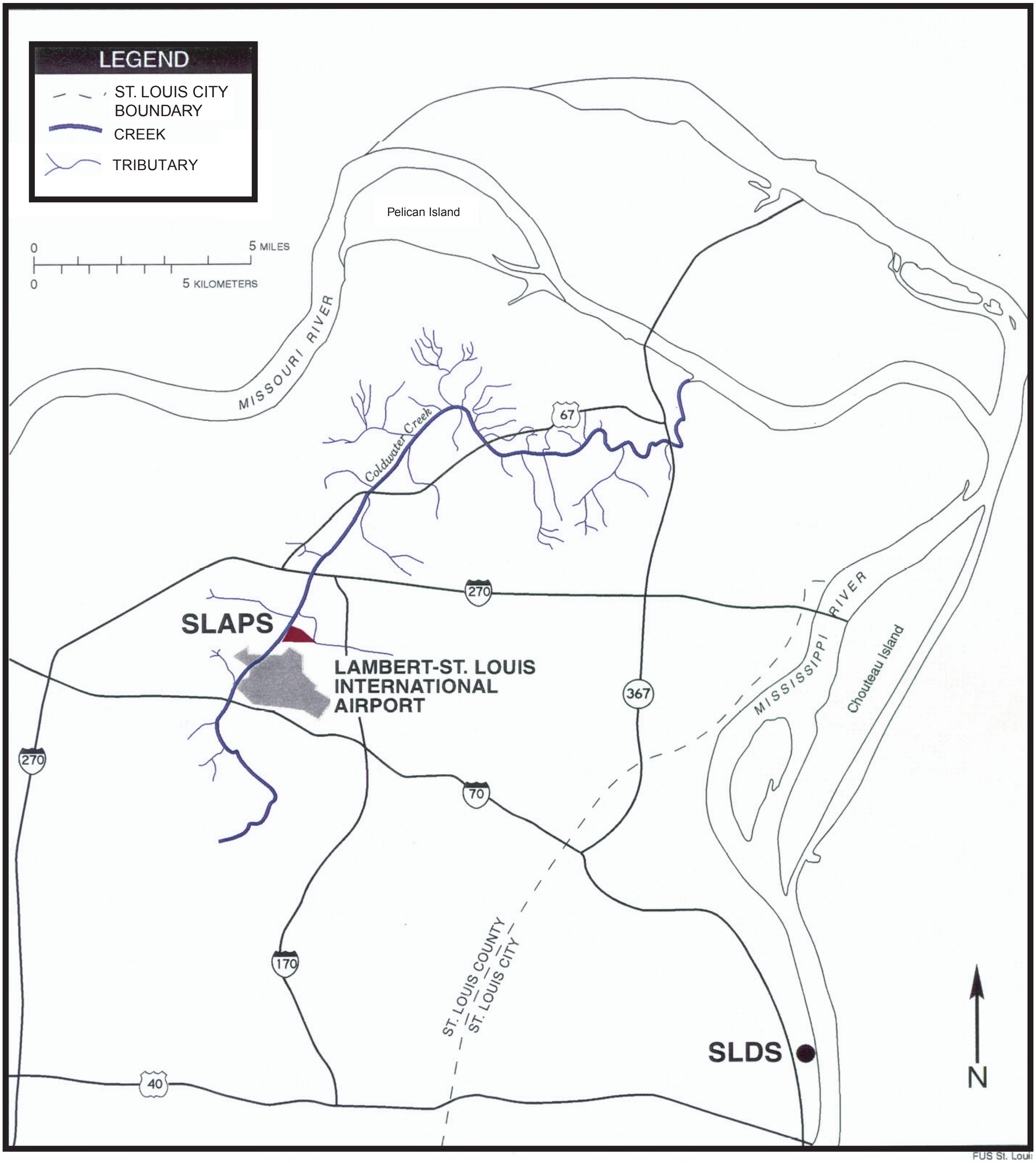


Figure 2-13 Location of Coldwater Creek and Tributaries

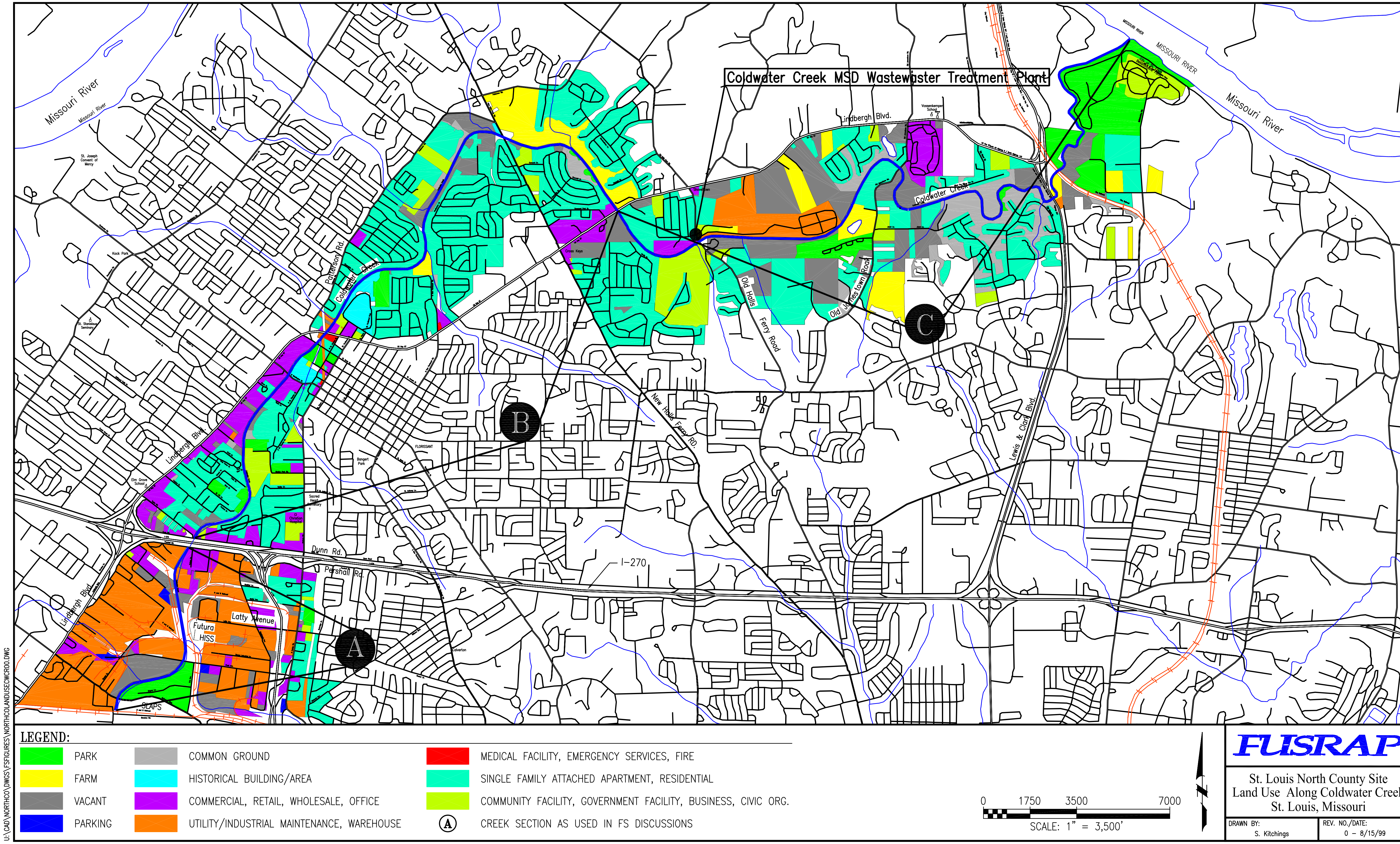


Figure 2-14. Land Use Along Coldwater Creek

System	Series	Group	Formation	Thickness (feet)	Aquifer Group
Quaternary	Holocene		Alluvium	0-150	1
	Pleistocene		Loess	0-110	
			Glacial Till	0-55	
Pennsylvanian	Missourian	Pleasanton	Undifferentiated	0-37	
	Desmonian	Marmaton	Undifferentiated	0-90	
		Cherokee	Undifferentiated	0-200	
	Atokan		Undifferentiated		
Mississippian	Chesterian		Ste. Genevieve	0-160	
	Meramecian		St. Louis Limestone	0-180	
			Salem	0-180	
			Warsaw	0-110	
	Osagean		Burlington-Keokuk Limestone	0-240	
			Fern Glen	0-105	
	Kinderhookian	Chouteau	Undifferentiated	0-122	
Devonian	Upper Devonian Series	Sulphur Springs	Bushberg Sandstone	0-60	
			Glen Park Limestone	0-60	
			Grassy Creek Shale	0-50	
Silurian			Undifferentiated	0-200	
Ordovician	Cincinnatian		Maquoketa Shale	0-163	-
			Cape Limestone	0-5	2
	Champlainian		Kimmswick	0-145	
			Decorah	0-50	
			Plattin	0-240	
			Rock Levee	0-93	
			Joachim Dolomite	0-135	
			St. Peter Sandstone	0-160	3
			Everton	0-130	
	Canadian		Powell Dolomite	0-150	4
			Cotter Dolomite	0-320	
			Jefferson City Dolomite	0-225	
			Roubidoux	0-177	
			Gasconade Dolomite	0-280	
Cambrian	Upper		Eminence Dolomite	0-172	5
			Potosi Dolomite	0-325	
		Elvins	Derby-Doerun Dolomite	0-165	
			Davis	0-150	
			Bonneterre	245-385	
			Lamotte Sandstone	235+	

Sources: USGS 1973, modified from Brill 1991, Howe and Koenig 1961, and MDNR 1993 stratigraphic column

Figure 2-15 Generalized Stratigraphic Column for the St. Louis Region

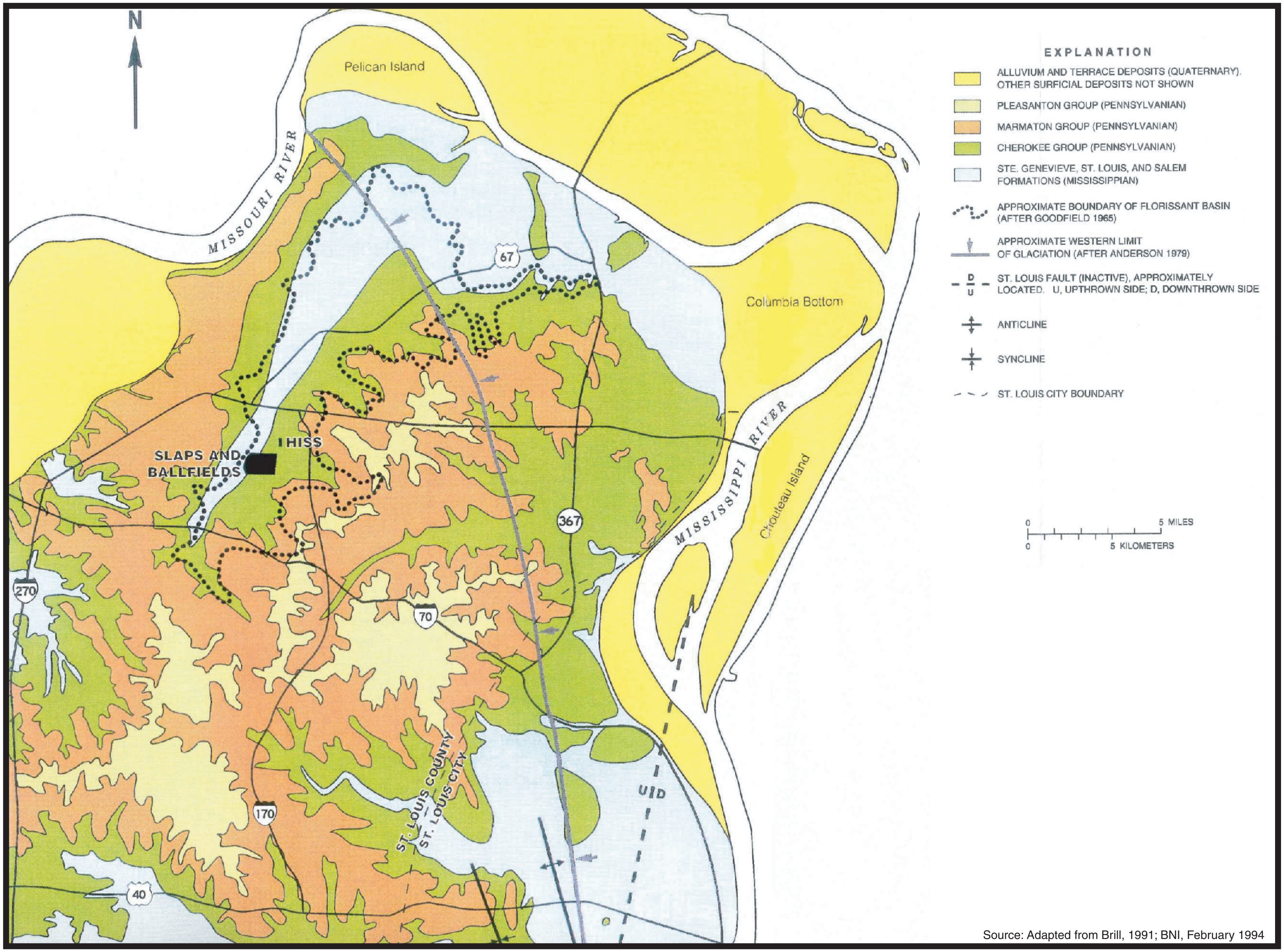
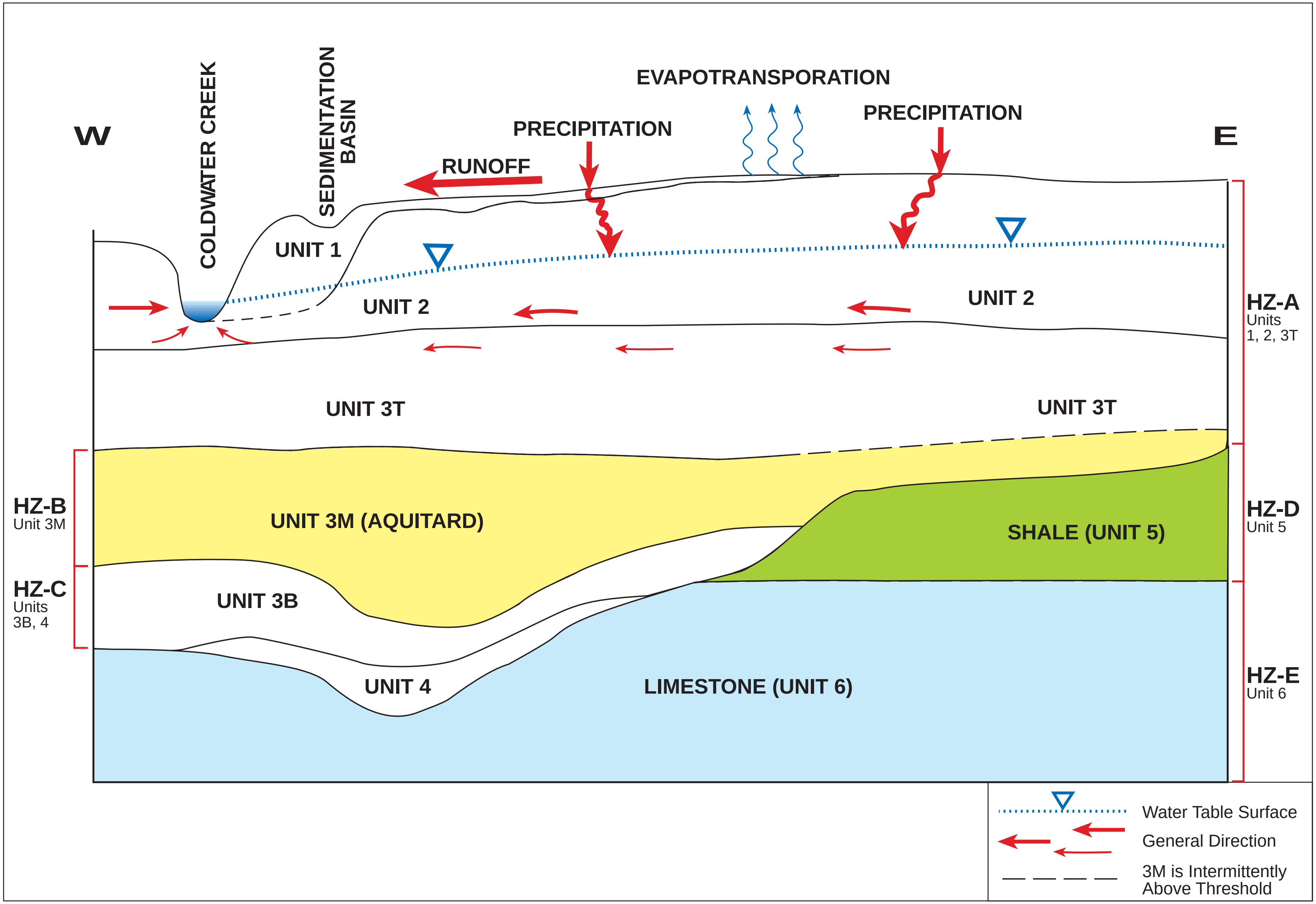


Figure 2-16 Generalized Surface Geologic Map of the St. Louis Region

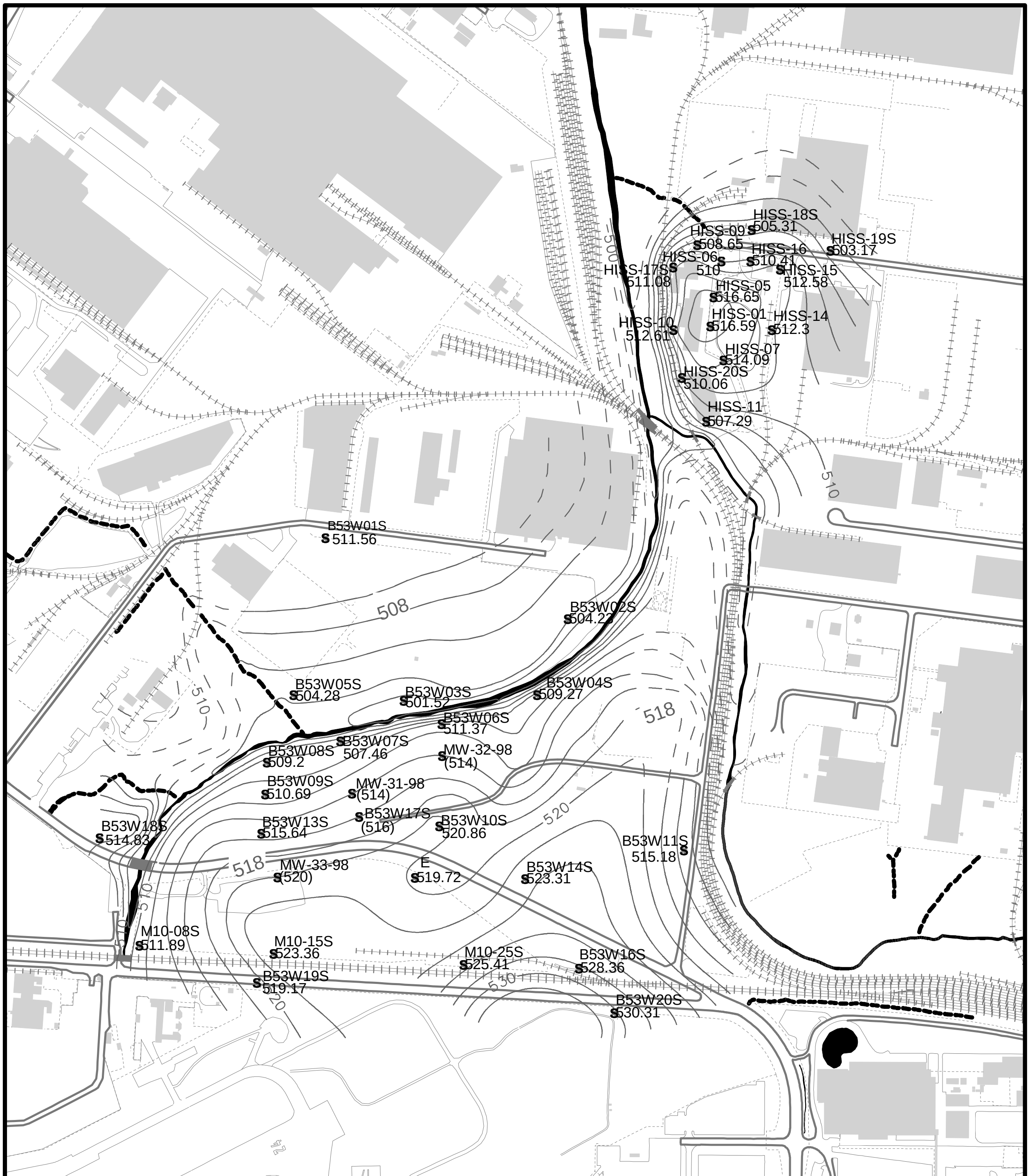
Zone	Period	Epoch	Stratigraphic	Thickness (ft.)	Description
Hydrostratigraphic zone (HZ)-A	Quaternary	Holocene	FILL/TOPSOIL	0-14	**Unit 1** Fill - Sand, silt, clay, concrete, rubble. Topsoil - Organic silts, clayey silts, wood, fine sand.
Hydrostratigraphic zone (HZ)-A	Quaternary	Pleistocene	LOESS (CLAYEY SILT)	11-32	**Unit 2** Clayey silts, fine sands, commonly mottled with iron oxide staining. Scattered roots and organic material, and a few fossils.
Hydrostratigraphic zone (HZ)-A	Quaternary	Pleistocene	GLACIO-LACUSTRINE SERIES: SILTY CLAY	19-75 (3) 9-27 (3T)	**UNIT 3** Silty clay with scattered organic blebs and peat stringers. Moderate plasticity. Moist to saturated. (3T)
Hydrostratigraphic zone (HZ)-B	Quaternary	Pleistocene	VARVED CLAY	0-8	Alternating layers of dark and light clay as much as 1/16 inch thick (3M)
Hydrostratigraphic zone (HZ)-B	Quaternary	Pleistocene	CLAY	0-26	Dense, stiff, moist, highly plastic clay. (3M)
Hydrostratigraphic zone (HZ)-C	Quaternary	Pleistocene	SILTY CLAY	0-29	Similar to upper silty clay. Probable unconformable contact with highly plastic clay. (3B)
Hydrostratigraphic zone (HZ)-C	Quaternary	Pleistocene	BASAL CLAYEY & SANDY GRAVEL	0-6	**UNIT 4** Glacial clayey gravels, sands, and sandy gravels. Mostly chert.
Hydrostratigraphic zone (HZ)-D	Pennsylvanian		Cherokee (?) group (undifferentiated)	0-35	**UNIT 5** BEDROCK: Interbedded silty clay/shale, lignite/coal, sandstone, and siltstone. Erosionally truncated by glaciolacustrine sequences. (Absent at HISS).
Hydrostratigraphic zone (HZ)-E	Mississippian		STE GENEVIEVE ST. LOUIS LIMESTONES	100+	**UNIT 6** BEDROCK: Hard, white to olive, well cemented, sandy limestone with interbedded shale laminations.

Figure 2-17 Generalized Hydrostratigraphic Column for SLAPS and HISS



FUS St. Louis 2 06/00 (09/95)

Figure 2-18. Conceptual Model of Ground-water Flow at SLAPS Showing Stratigraphic Units and Hydrostratigraphic Zones (HZs).



U:\GIS\NORTHCO\PROJECTS\NORTHCO\PIEZOMETRIC07.APR

Legend:

s Shallow Monitoring Well Location Where 3 Dec. 98 Water Level Measurement Was Taken (water level elevation in feet AMSL, in parenthesis where inferred).

Interpreted Shallow Piezometric Surface (based on measured water level elevations, surficial drainage, and topography). Dashed where inferred.
Two Foot Contour Interval.

300 0 300 600 Feet

N

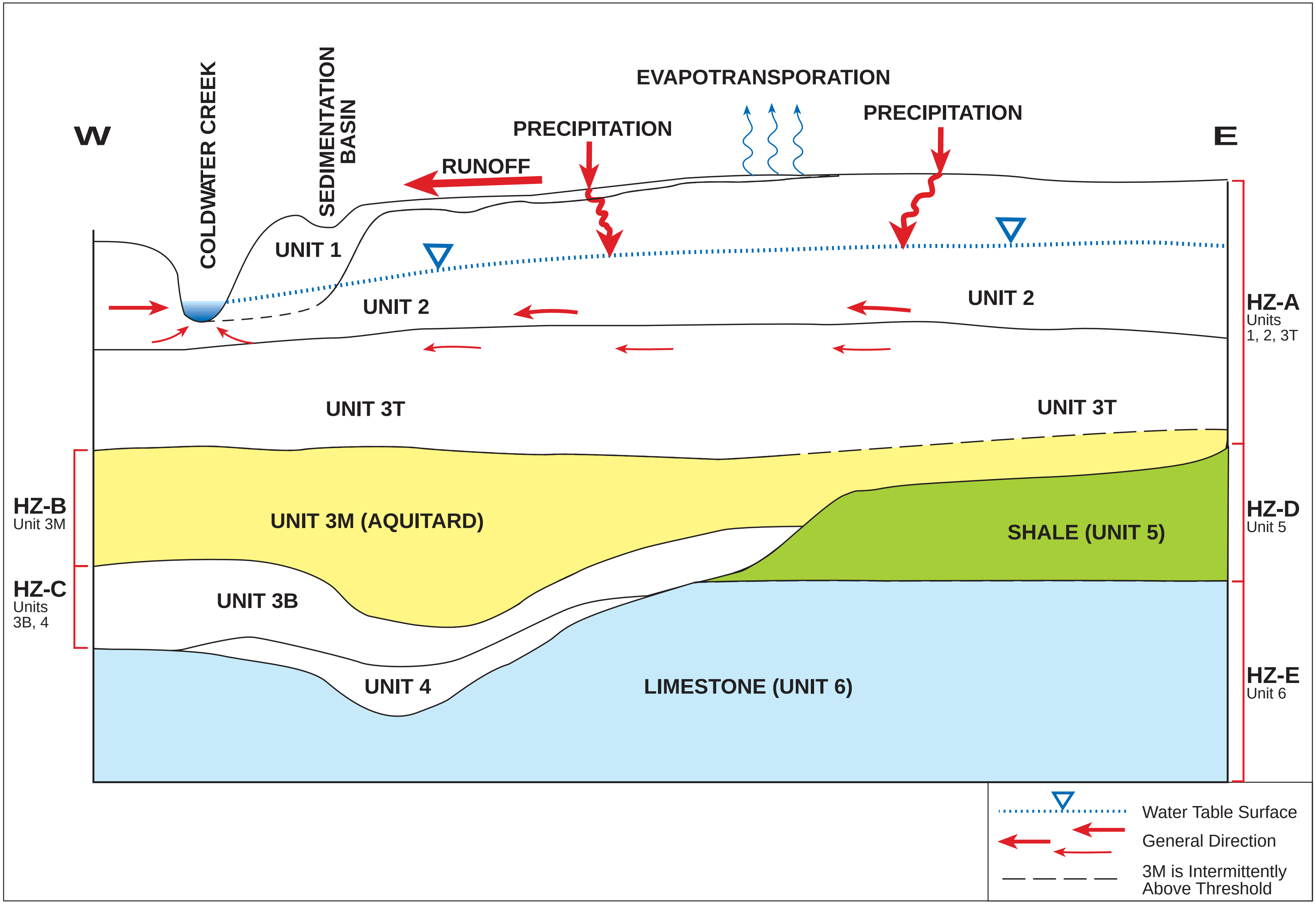
MO-East
State Plane
Coordinate System
(NAD83, feet)

FUSRAP

SLAPS & HISS/Futura
3 DEC 98 Shallow Piezometric Surface
St. Louis, Missouri

DRAWN BY:	REV. - DATE:
R. Smith / S. Kitchings	3 - 9/16/99

Figure 2-19. Potentiometric Surface for HZ-A at SLAPS and HISS/Futura



FUS St. Louis 2 06/00 (09/95)

Figure 2-18. Conceptual Model of Ground-water Flow at SLAPS Showing Stratigraphic Units and Hydrostratigraphic Zones (HZs).

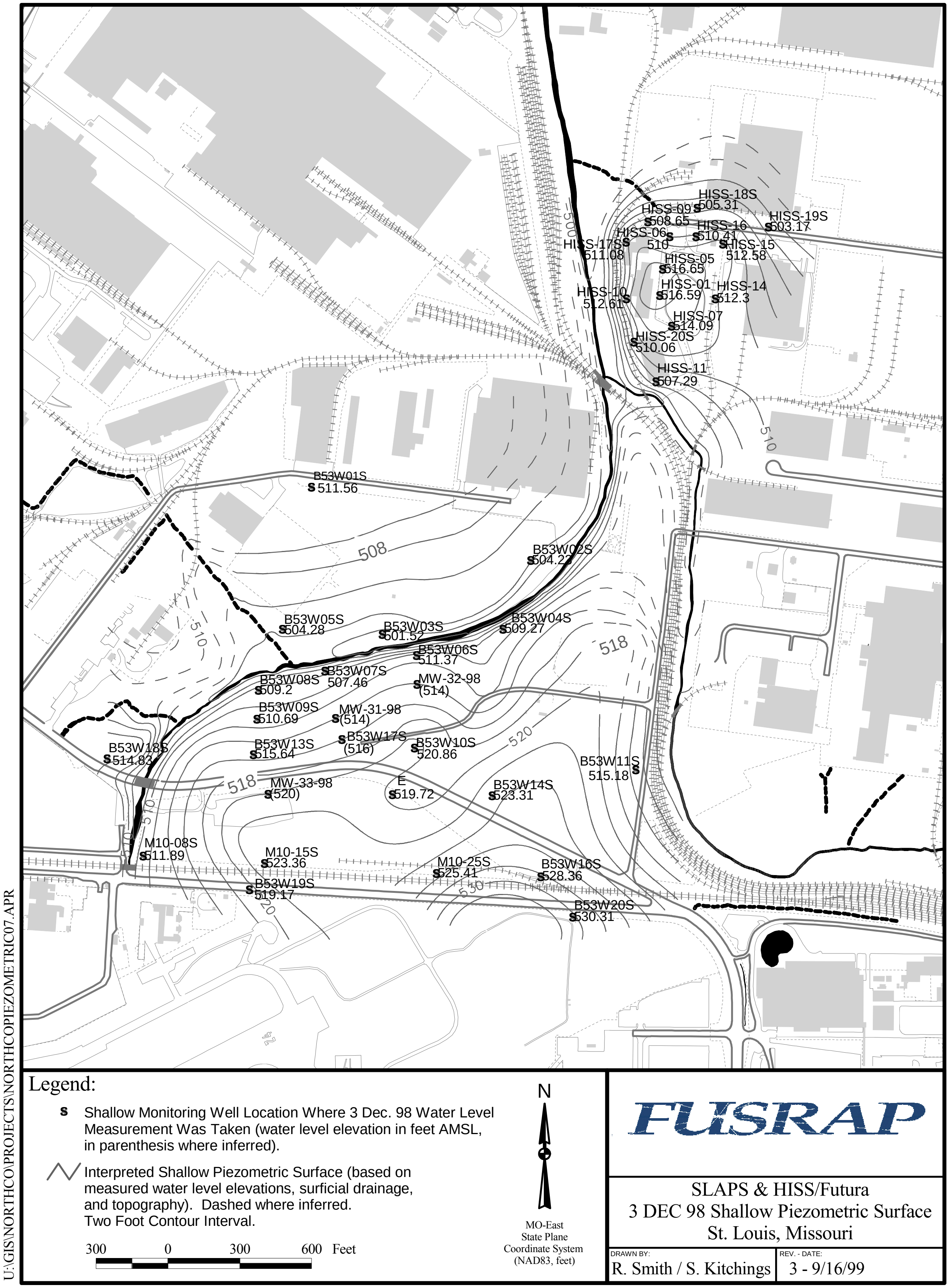
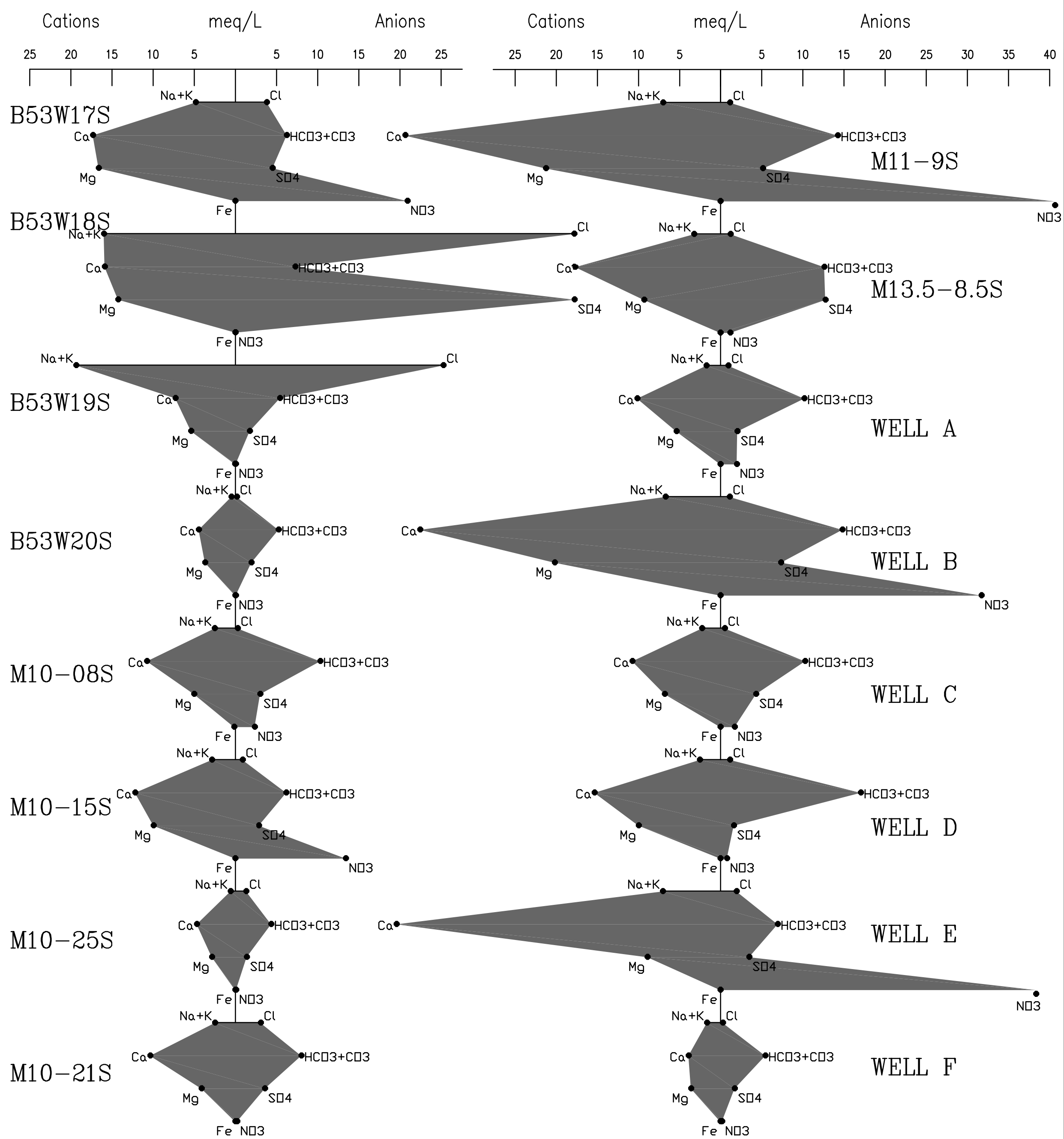


Figure 2-19. Potentiometric Surface for HZ-A at SLAPS and HISS/Futura



LEGEND:

CATIONS	ANIONS
Na – Sodium	Cl – Chloride
K – Potassium	HCO_3+CO_3 – Alkalinity
Ca – Calcium	SO_4 – Sulfate
Mg – Magnesium	NO_3 – Nitrate
Fe – Iron	meq/L – milliequivalents per liter

FUSRAP

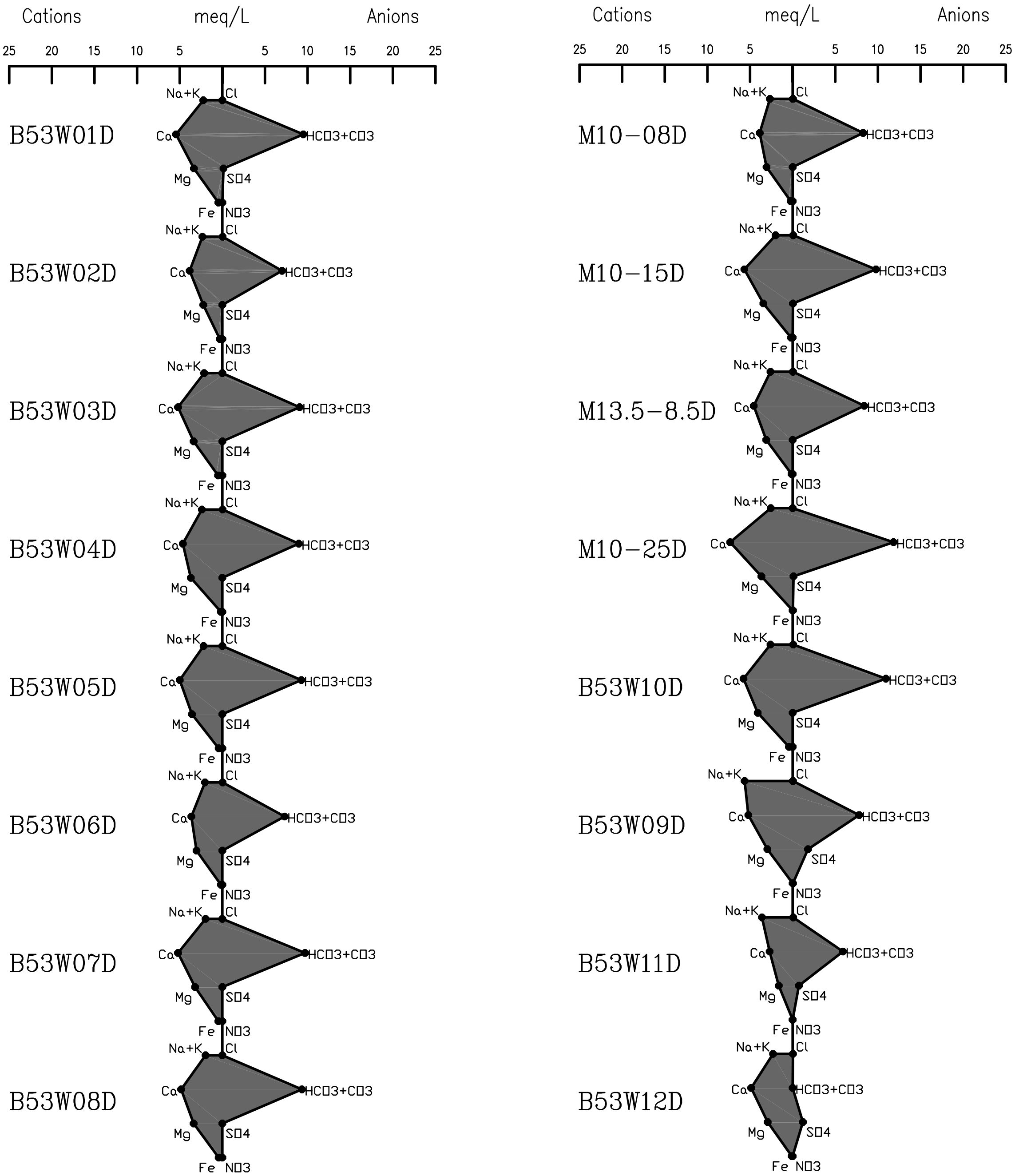
St. Louis Airport Site
Ground-Water Chemical
Composition St. Louis, Missouri

DRAWN BY: A. Mackey / S. Kitchings

REV. NO./DATE: 3 – 6/26/00

U:\CAD\NORTHCO\DWGS\FSFIGURES\SLAPSGWCHEMCOMPUPHYDROZONER02.DWG

Figure 2-20. Ground-Water Chemical Composition in HZ-A



LEGEND:

CATIONS	ANIONS
Na – Sodium	Cl – Chloride
K – Potassium	HCO_3+CO_3 – Alkalinity
Ca – Calcium	SO_4 – Sulfate
Mg – Magnesium	NO_3 – Nitrate
Fe – Iron	meq/L – milliequivalents per liter

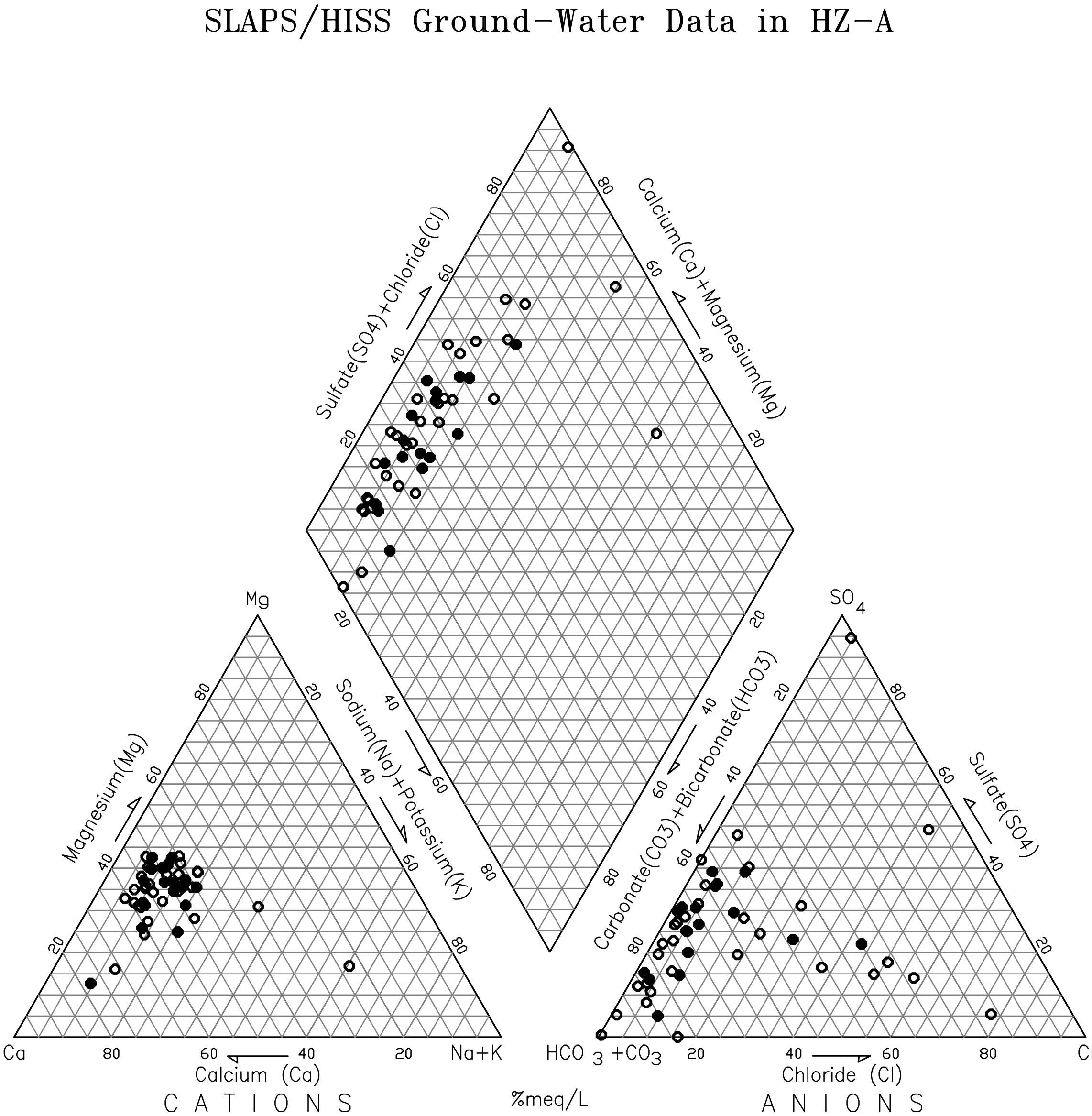
FUSRAP

St. Louis Airport Site
Ground-Water Chemical
Composition St. Louis, Missouri

DRAWN BY:	REV. NO./DATE:
A. Mackey / S. Kitchings	2 – 6/26/00

U:\CAD\NORTHCO\DWGS\FSFIGURES\SLAPSGWCHEMCOMPLOWHYDROZONER01.DWG

Figure 2-21. Ground-Water Chemical Composition in the Lower Hydrostratigraphic Zones Beneath HZ-A



LEGEND:

- ● Hazelwood Interim Storage Site (HISS)
- ○ St. Louis Airport Site (SLAPS)

meq/L – milliequivalents per liter

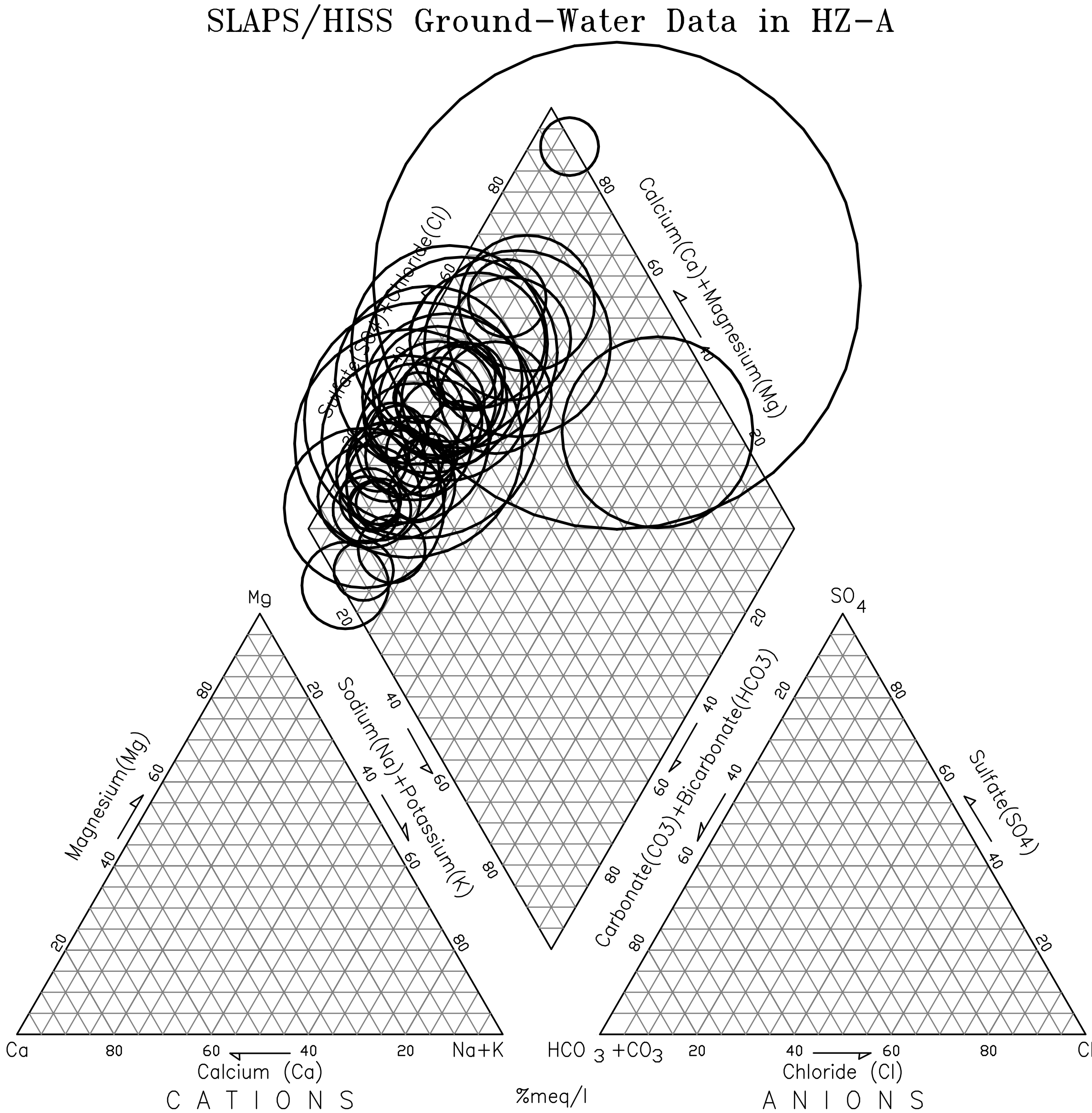
FUSRAP

St. Louis North County Sites
Piper Diagram for HZ-A
St. Louis, Missouri

DRAWN BY:	REV. NO./DATE:
P. Salpas / S. Kitchings	1 – 5/4/00

U:\CAD\NORTHCO\DWGS\FSFIGURES\NORTHCOPIPERSHALR01.DWG

Figure 2-22. Piper Diagram for HZ-A Showing Data Points



LEGEND:

0 1000 2000 3000 4000

Total Dissolved Solids
(Parts Per Million)

TDS – Total Dissolved Solids
meq/L – milliequivalents per liter

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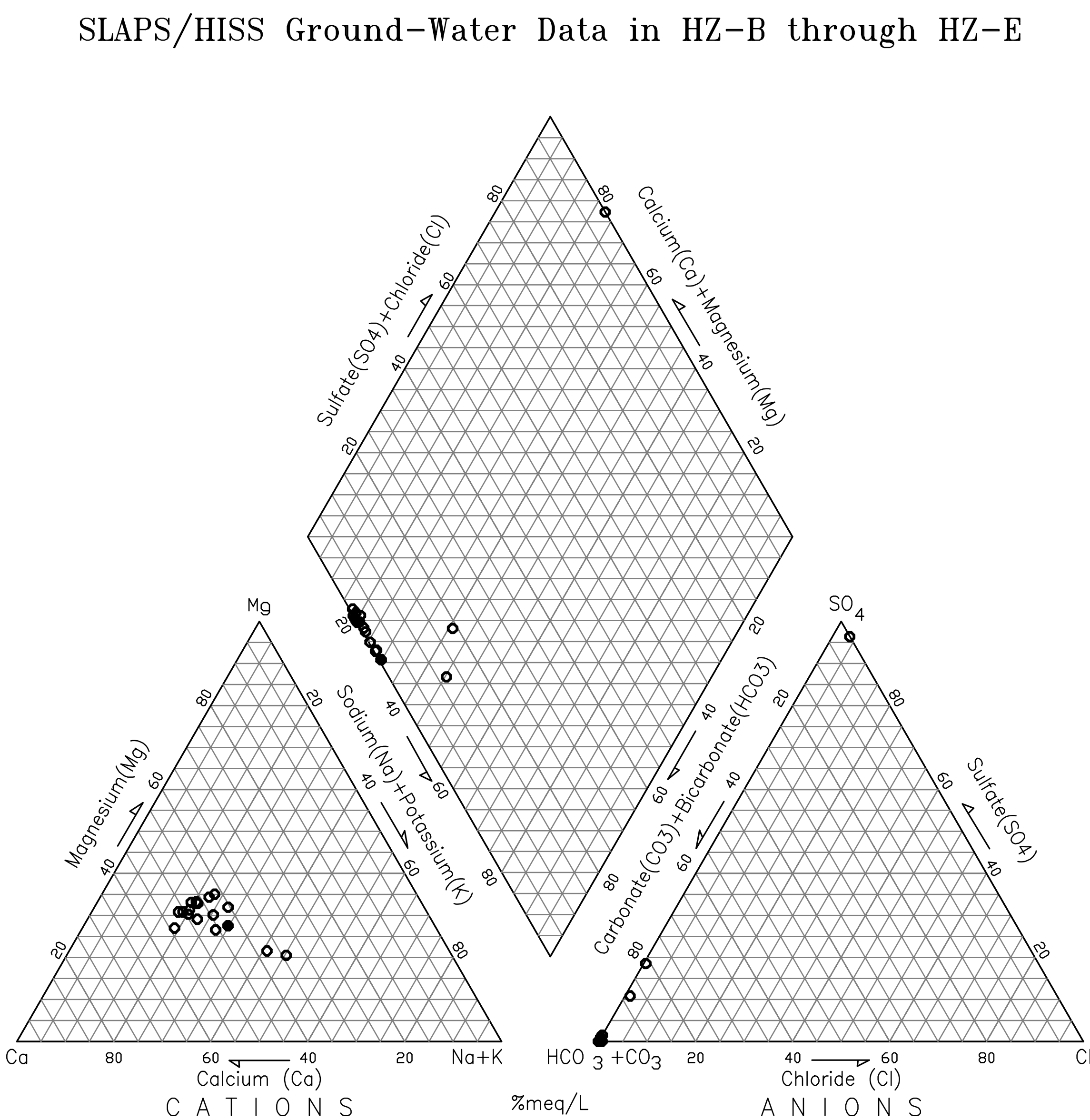
St. Louis North County Sites
Piper Diagram for HZ-A
St. Louis, Missouri

DRAWN BY: P. Salpas / S. Kitchings

REV. NO./DATE: 1 – 5/4/00

U:\CAD\NORTHCO\DWGS\FSFIGURES\NORTHCOPIPERSHALTDSR01.DWG

Figure 2-23. Piper Diagram for HZ-A Showing TDS



U:\CAD\NORTHCO\DWGS\FSFIGURES\NORTHCOPIPERDEEPRO1.DWG

LEGEND:

- ● Hazelwood Interim Storage Site (HISS)
- ○ St. Louis Airport Site (SLAPS)

meq/L – milliequivalents per liter

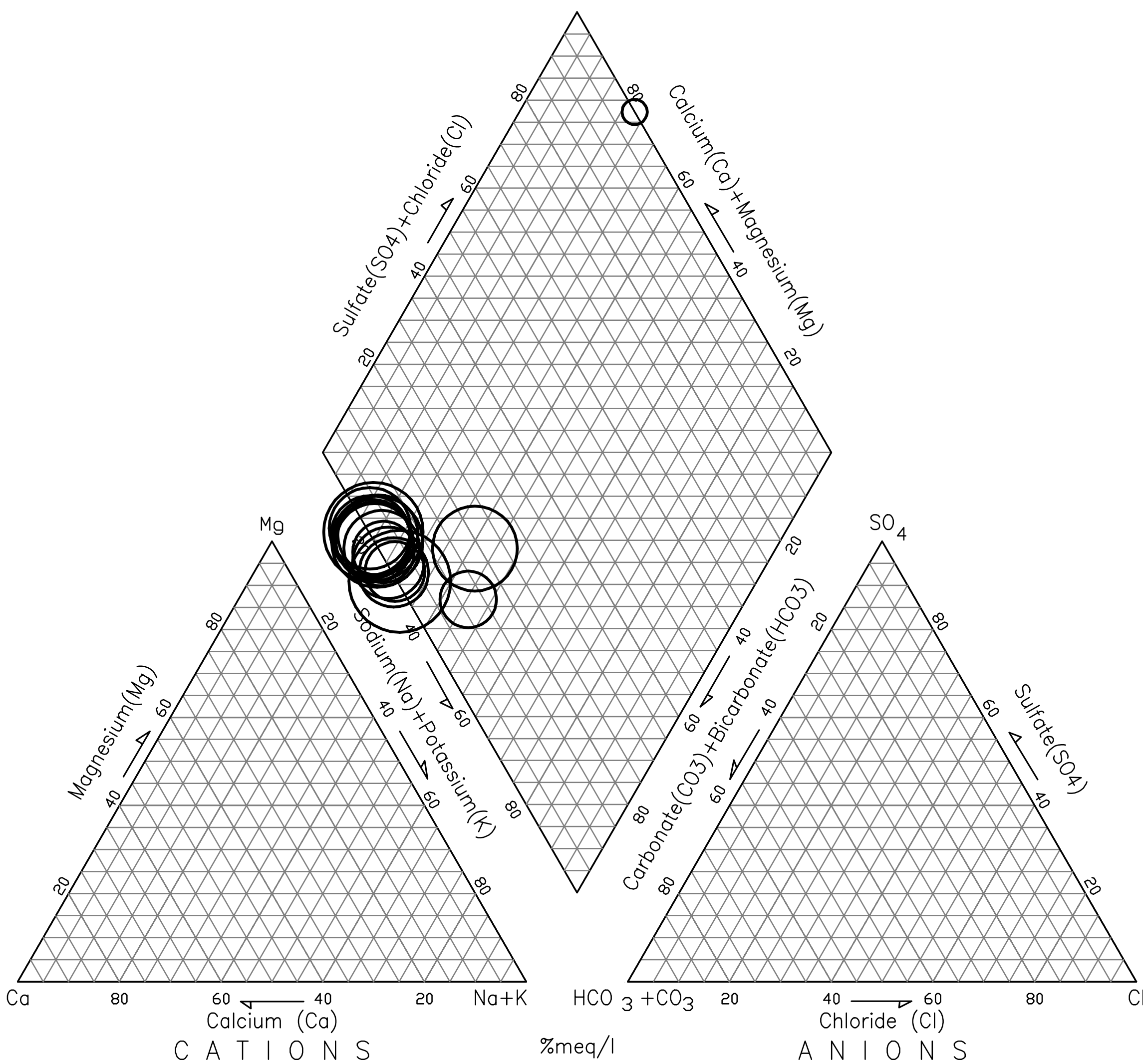
FUSRAP

St. Louis North County Sites
Piper Diagram for HZ-B - HZ-E
St. Louis, Missouri

DRAWN BY:	REV. NO./DATE:
P. Salpas / S. Kitchings	1 – 5/4/00

Figure 2-24. Piper Diagram for Lower HZs Showing Data Points

SLAPS/HISS Ground-Water Data in HZ-B through HZ-E



LEGEND:

0 1000 2000 3000 4000

Total Dissolved Solids (Parts Per Million)

TDS – Total Dissolved Solids

meq/L – milliequivalents per liter

FUSRAP

St. Louis North County Sites
Piper Diagram for HZ-B - HZ-E
St. Louis, Missouri

DRAWN BY:	REV. NO./DATE:
P. Salpas / S. Kitchings	1 – 5/4/00

U:\CAD\NORTHCO\DWGS\FSFIGURES\NORTHCOPIPERDEEPTDSR01.DWG

Figure 2-25. Piper Diagram for Lower HZs Showing TDS

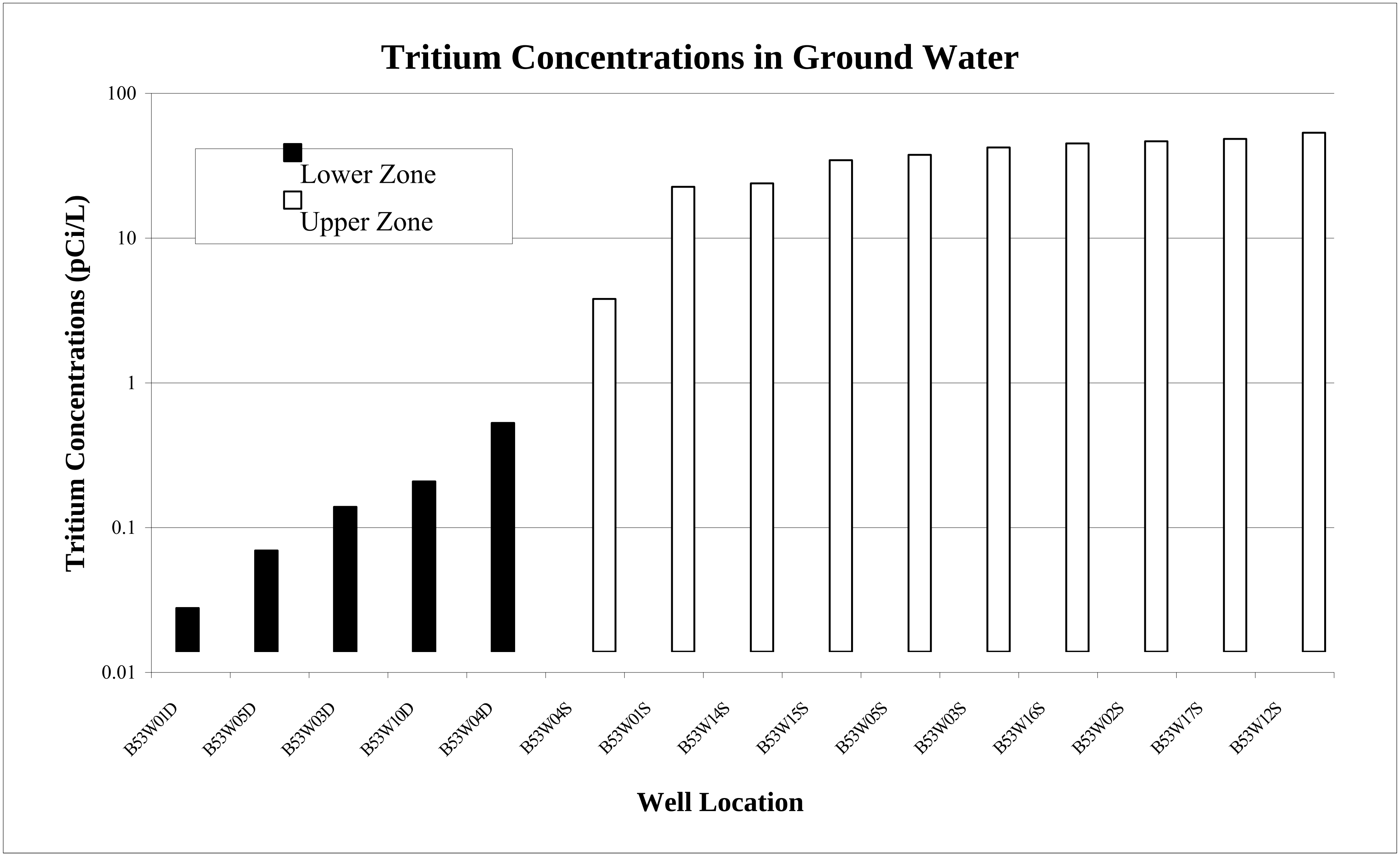
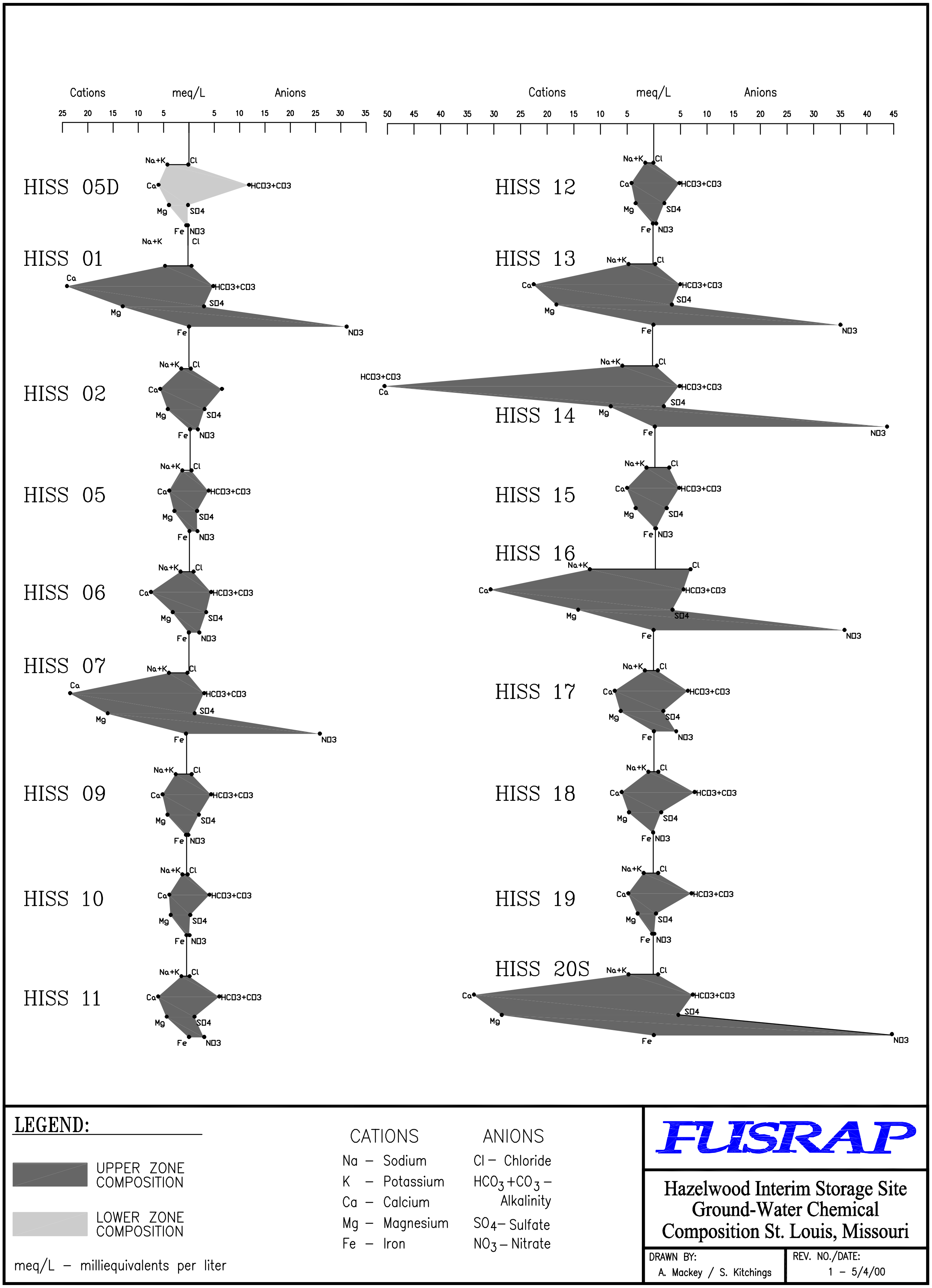


Figure 2-26. Distribution of Tritium Concentrations in Ground Water at SLAPS



U:\CAD\NORTHCO\DWGS\FSFIGURES\HISSGWCHEMCOMPHYDROZONESR01.DWG

Figure 2-27. Ground-Water Chemical Composition in the Hydrostratigraphic Zones

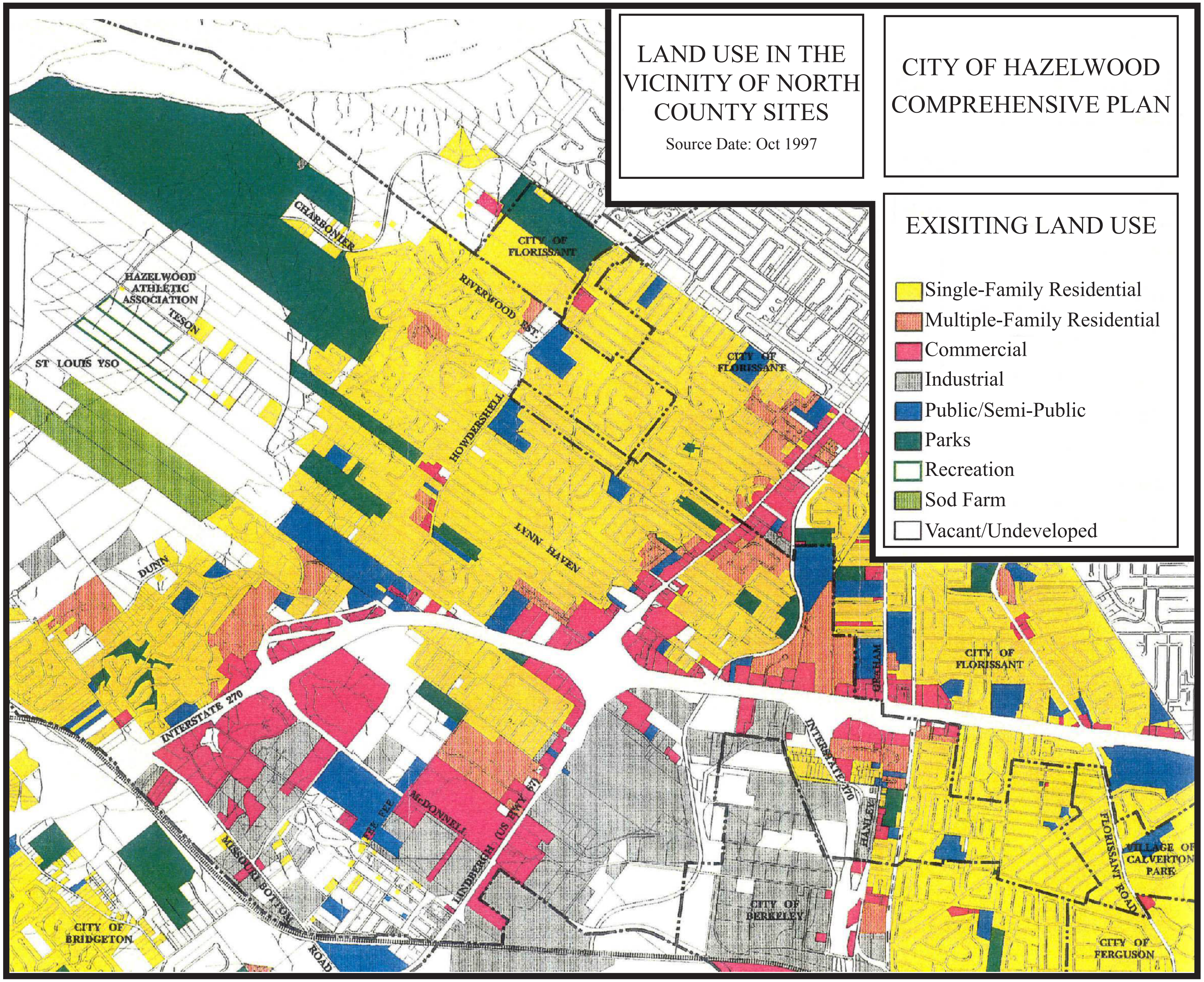
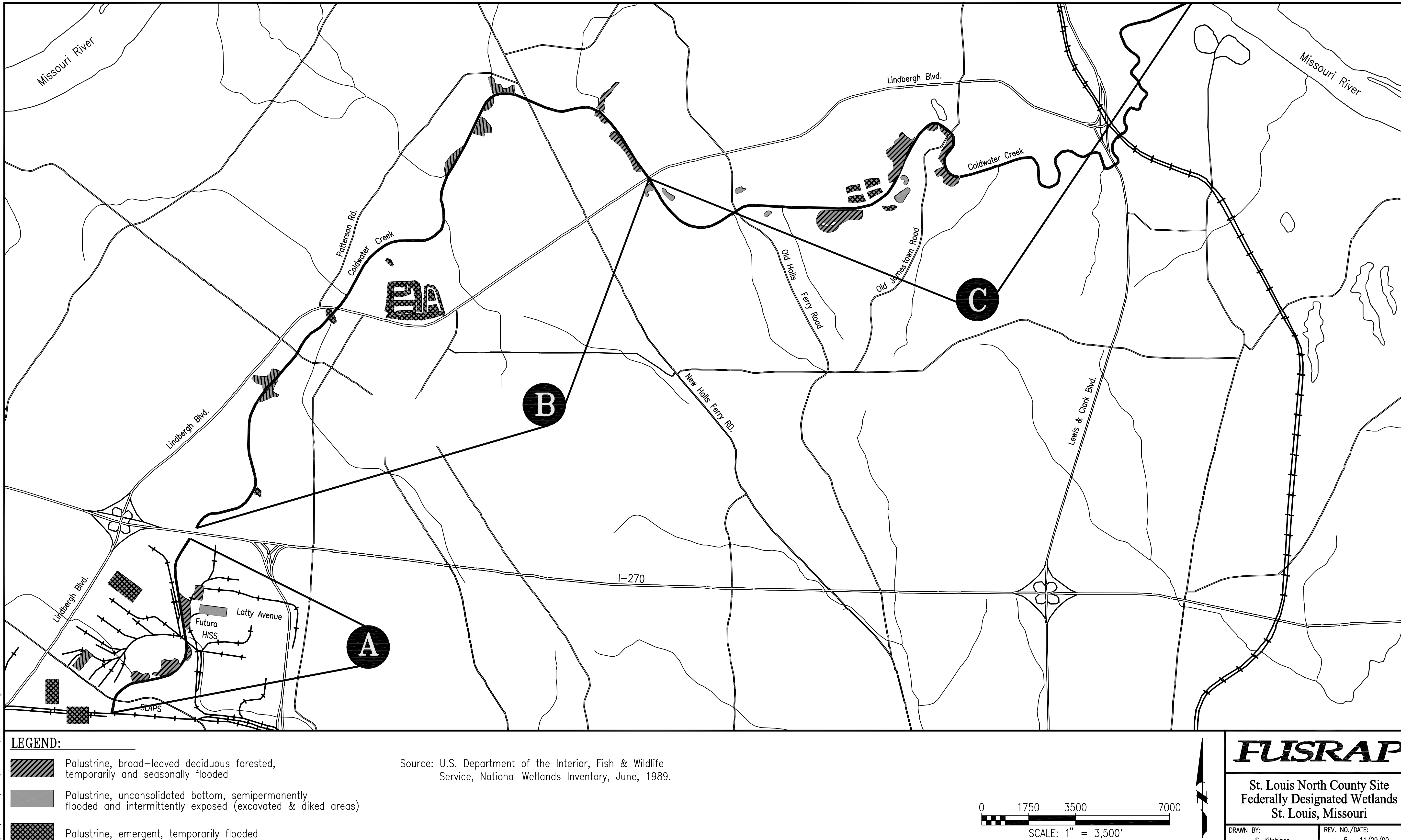


Figure 2-28 - Land Use in the Vicinity of North County Sites



U:\CAD\NORTHCO\DWGS\FSFIGURES\NorthCoFedDesignWetlandsCWCR06.DWG

Figure 2-29. Occurrence of Federally Designated Wetlands Along Coldwater Creek

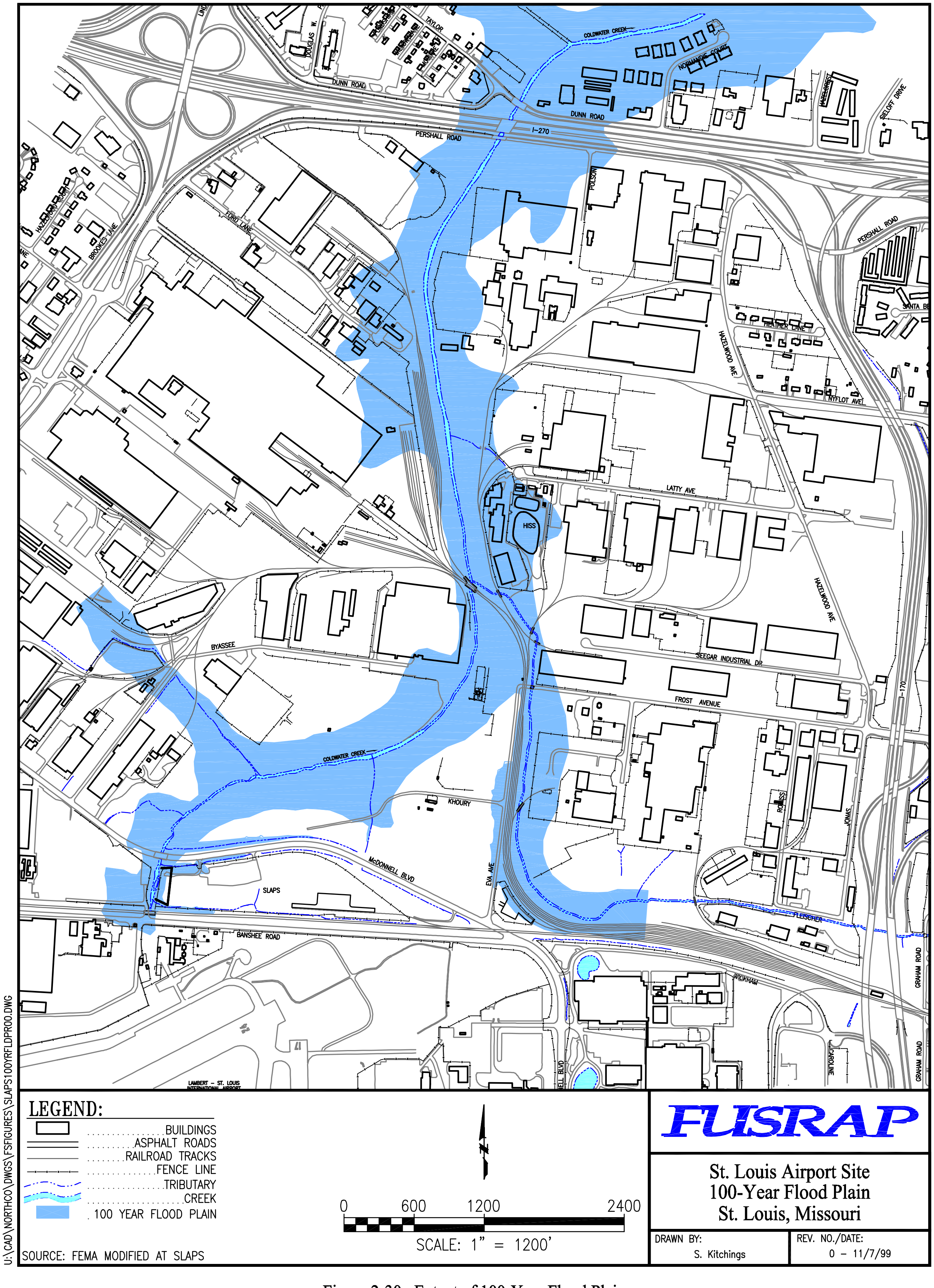
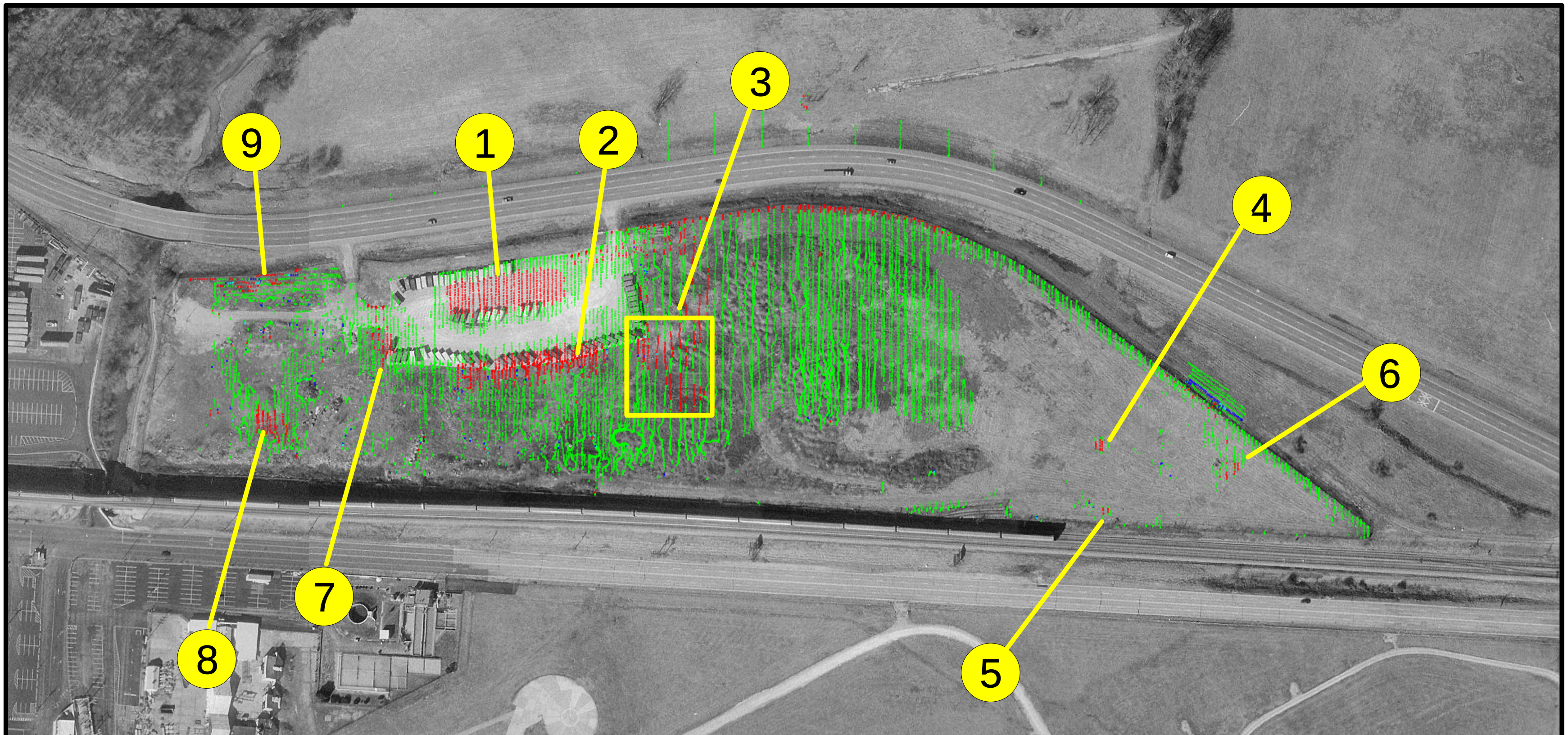


Figure 2-30. Extent of 100-Year Flood Plain

Figure 2-31 SLAPS, looking South - circa 1965

U:\GIS\NORTHCO\PROJECT\GEOPHYSICALR04.APR



Legend:

EM-31 Inphase Response (mM/M)

- -30 - -24
- -24 - -18
- -18 - -11
- -11 - -4
- 4 - 13
- 13 - 40

1. More conductive material possibly associated with building foundation
2. More conductive material possibly associated with building foundation
3. More conductive material associated with buried concrete pad
4. More conductive material - possibly buried metallic debris
5. More conductive material - possibly buried metallic debris
6. More conductive material - possibly buried metallic debris
7. Metallic features
8. More conductive material - associated with soil stockpile
9. Likely associated with fence

200 0 200 Feet

Aerial Photograph
Circa 1995 - 1997,
Provided by MSD

FUSRAP

Geophysical Survey
St. Louis Airport Site
St. Louis, Missouri

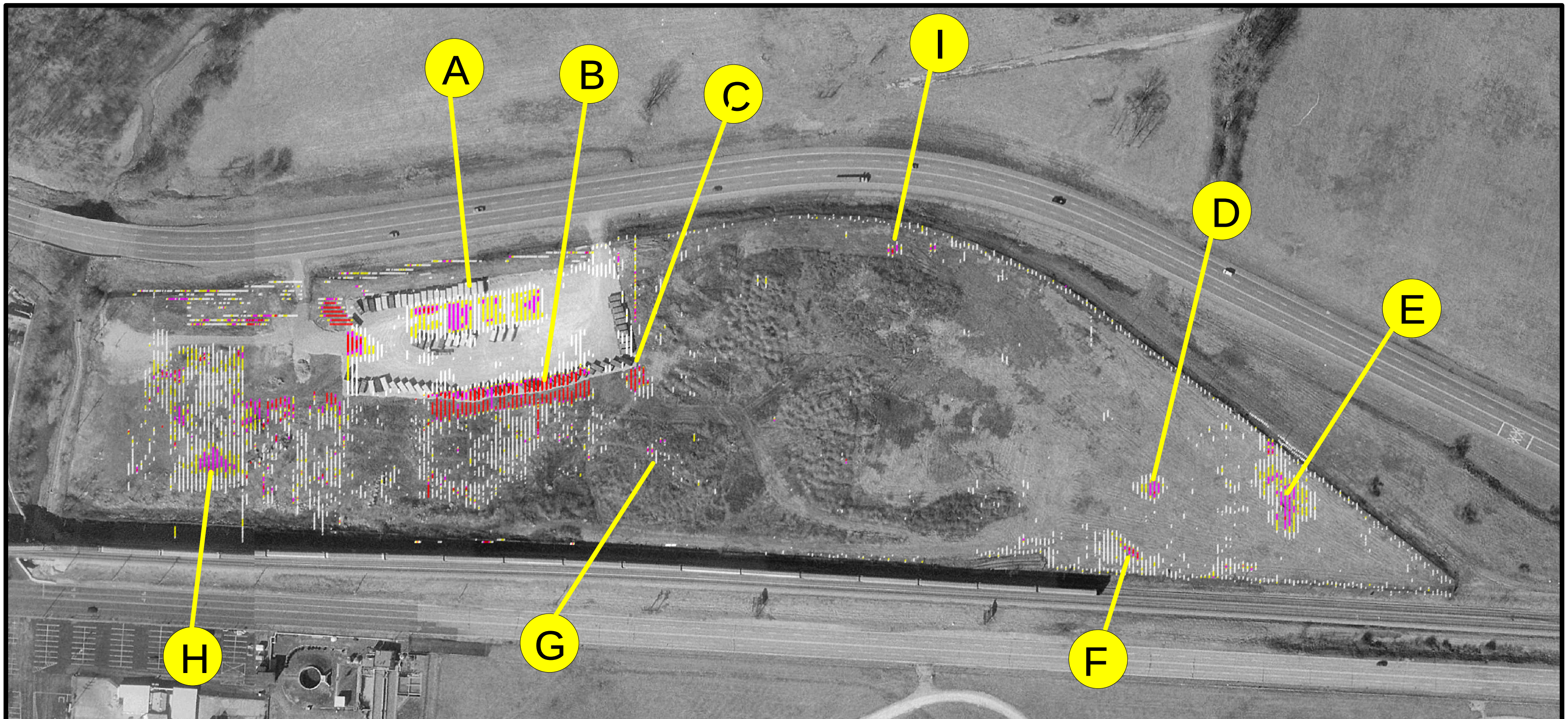
DRAWN BY:	REV. - DATE:
S. Kitchings	8 August 99

N

MO-East State Plane Coordinate System (NAD83 feet)

Figure 2-32. EM-31 Inphase Response Data at SLAPS

U:\GIS\NORTHCO\PROJECT\GEOPHYSICALR04.APR



EM61 Differential Response (mV)

-7,091 -	-100
-100 -	50
50 -	100
100 -	150
150 -	250
250 -	350
350 -	450
450 -	550
550 - 10,000	

Aerial Photograph
Circa 1995 - 1997,
Provided by MSD

- A Large metallic objects associated with former building foundations
- B Large metallic objects associated with former building foundations
- C Metallic object associated with the buried concrete pad
- D Area with smaller metallic objects
- E Area with large metallic objects
- F Area with smaller metallic objects
- G Metallic object associated with the buried concrete pad
- H Area associated with soil stockpile
- I Area with small metallic object

200 0 200 Feet

FUSRAP

Geophysical Survey
St. Louis Airport Site
St. Louis, Missouri

DRAWN BY: S. Kitchings

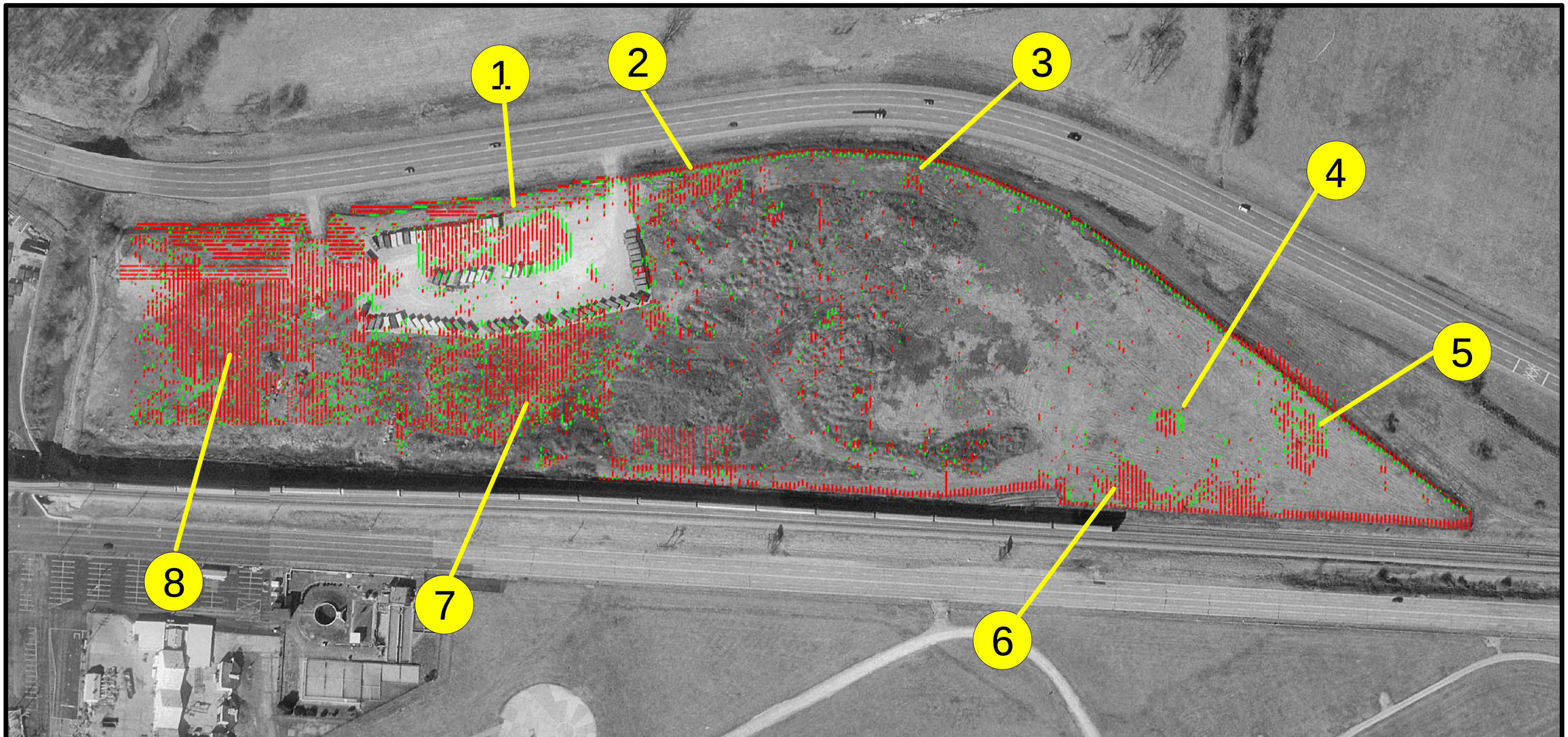
REV. - DATE: 8 August 99

N

MO-East State Plane Coordinate System (NAD83 feet)

Figure 2-33. EM-61 Differential Response Data at SLAPS

U:\GIS\NORTHCO\PROJECT\GEOPHYSICALR04.APR



Legend:

Magnetic Vertical Gradient (nT)

#	-20,000 - -10,000
#	-10,000 - -5,000
#	-5,000 - -200
	-200 - 200
#	200 - 500
#	500 - 1,000
#	1,000 - 5,000
#	5,000 - 10,000

Aerial Photograph
Circa 1995 - 1997,
Provided by MSD

1. More magnetic material - possibly associated with building foundation
2. More magnetic material - associated with debris pile
3. More magnetic buried material
4. More magnetic buried material
5. More magnetic buried material
6. More magnetic buried material
7. More magnetic buried material
8. More magnetic material - associated with soil stockpile

200 0 200 Feet

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Geophysical Survey
St. Louis Airport Site
St. Louis, Missouri

DRAWN BY: S. Kitchings

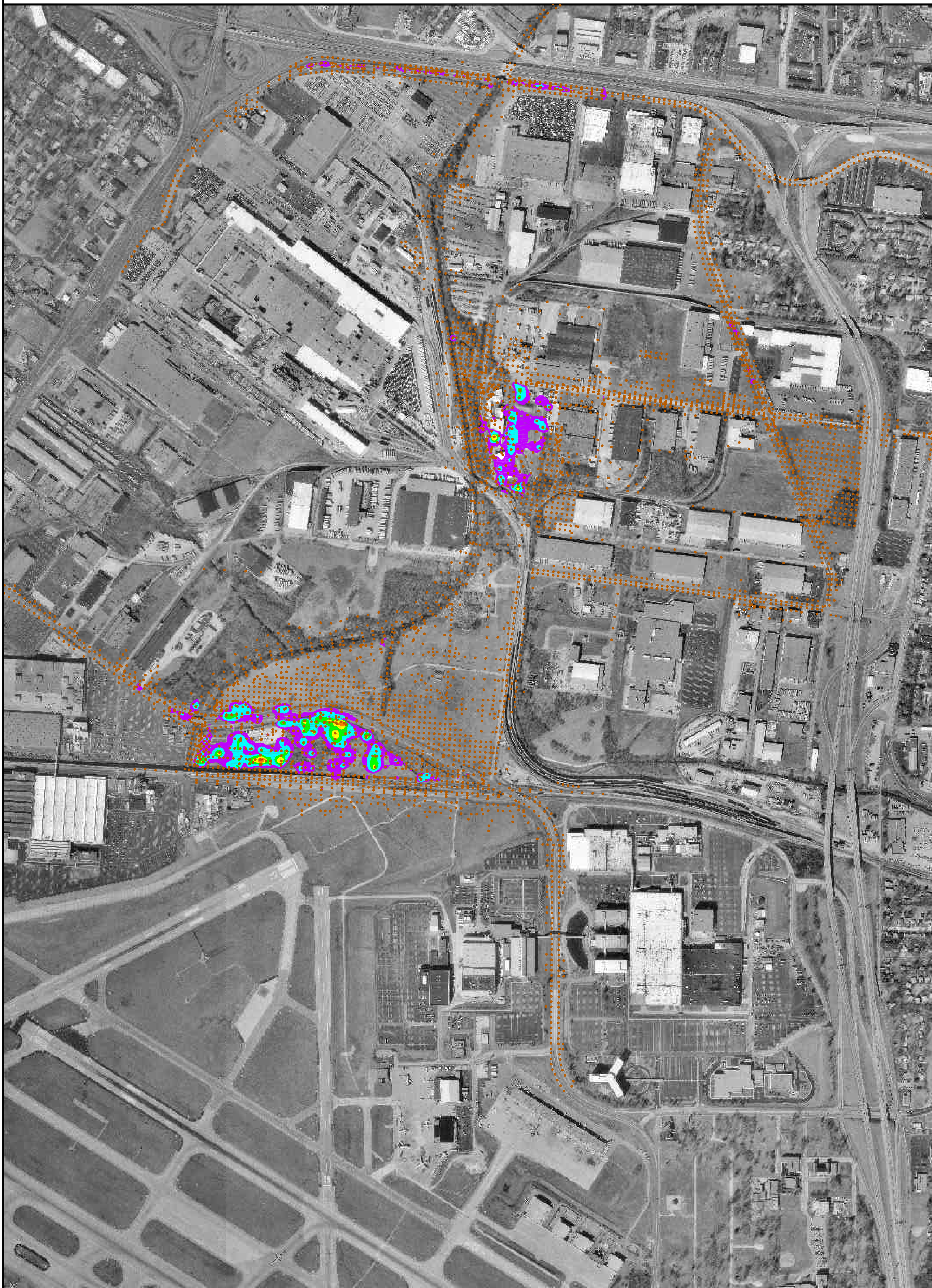
REV. - DATE: 8 August 99

N

MO-East State Plane Coordinate System (NAD83 feet)

Figure 2-34. Magnetic Vertical Gradient at SLAPS

U:\CAD\NORTHCO\DWGS\FSFIGURES\NORTHCORAD06SORRA226-005MAXR00.DWG



LEGEND:

RADIUM-226 ABOVE BACKGROUND
(MULTIPLES GREATER THAN
5 pCi/g AT ALL DEPTHS)

- .... 1 - 3
- .... 3 - 10
- .... 10 - 30
- .... 30 - 100
- .... 100 - 300
- .... >300
- .... SOIL SAMPLE LOCATION

NOTE: AERIAL PHOTOS CIRCA 1995-1997,
PROVIDED BY MSD

0 500 1000 2000

SCALE: 1" = 1000'

N

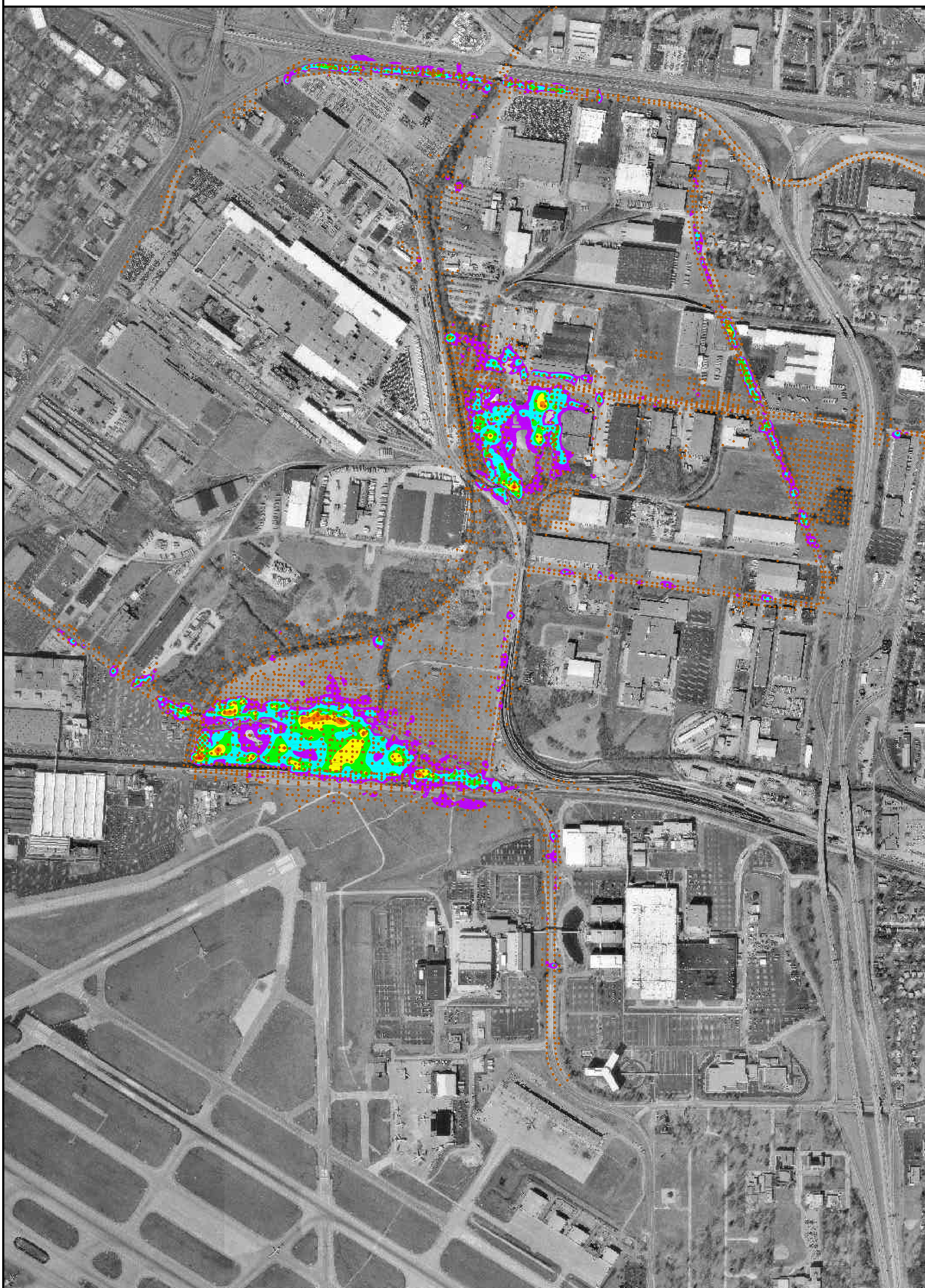
FUSRAP

St. Louis Airport Site
Projected Radium-226 Distribution
St. Louis, Missouri

DRAWN BY:	REV. NO./DATE:
R. Smith / S. Kitchings	0 - 11/7/99

Figure 2-35. Projected Radium-226 Distribution at the North County Site

U:\CAD\NORTHCO\DWGS\FSFIGURES\NorthCoRad06SORTh230-014MaxR00.DWG



LEGEND:

Th-230 − background
14

Multiples of Ratio

.... 1 − 3	.... 30 − 100
.... 3 − 10	.... 100 − 300
.... 10 − 30	.... >300
	.... SOIL SAMPLE LOCATION

NOTE: AERIAL PHOTOS CIRCA 1995−1997, PROVIDED BY MSD

0 500 1000 2000

SCALE: 1" = 1000'

N

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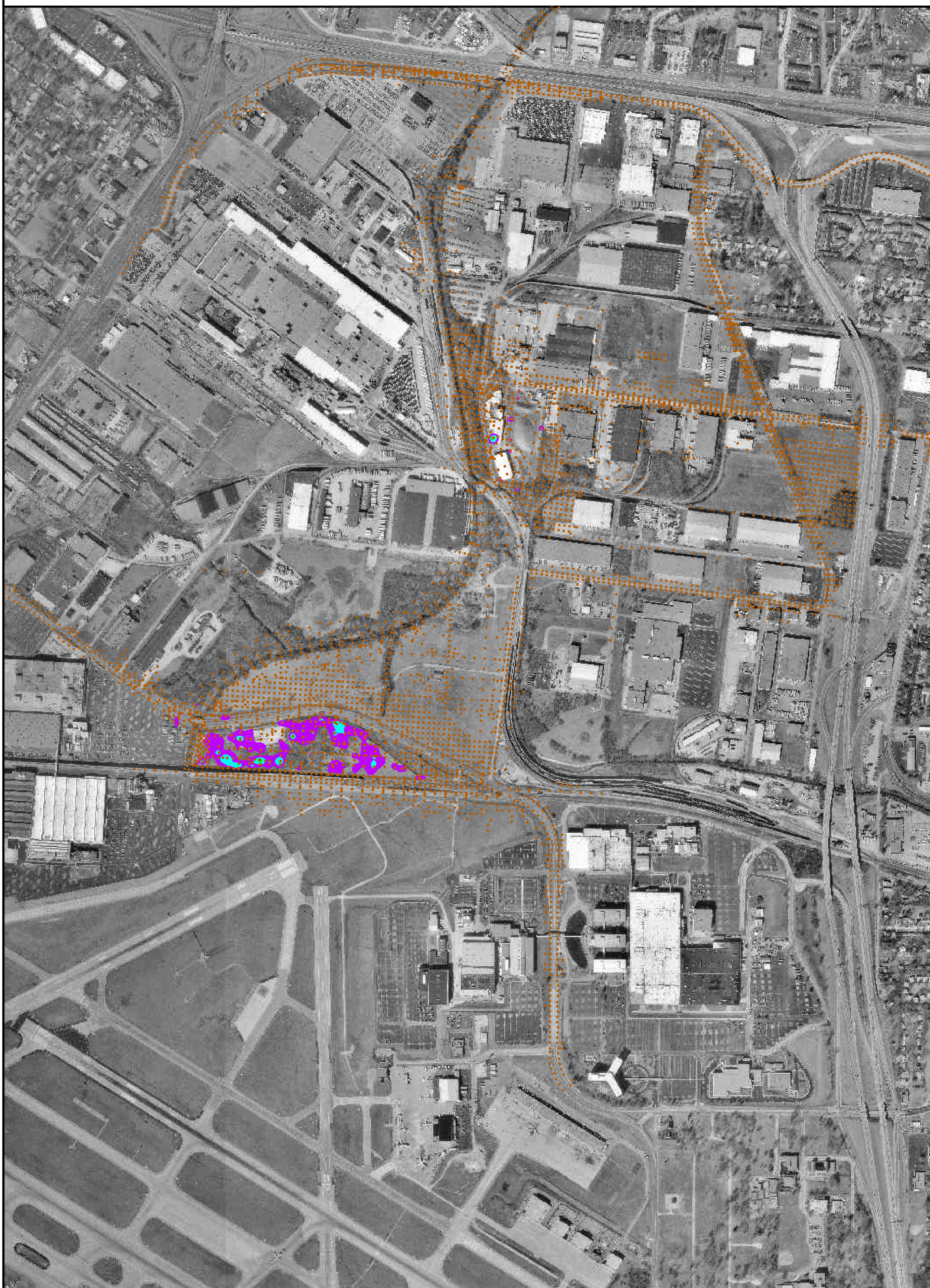
St. Louis Airport Site
Projected Thorium-230 Distribution
St. Louis, Missouri

DRAWN BY: R. Smith / S. Kitchings

REV. NO./DATE: 0 − 11/7/99

Figure 2-36. Projected Thorium-230 Distribution at the North County Site Before Removal Actions

U:\CAD\NORTHCO\DWGS\FSFIGURES\NorthCoRad06SORU238-050MaxR00.DWG



LEGEND:

U − background
50
Multiples of Ratio

(magenta)	1 − 3
(cyan)	3 − 10
(green)	10 − 30
(yellow)	30 − 100
(orange)	100 − 300
(red)	>300
●	SOIL SAMPLE LOCATION

NOTE: AERIAL PHOTOS CIRCA 1995−1997, PROVIDED BY MSD

0 500 1000 2000

SCALE: 1" = 1000'

N

FUSRAP

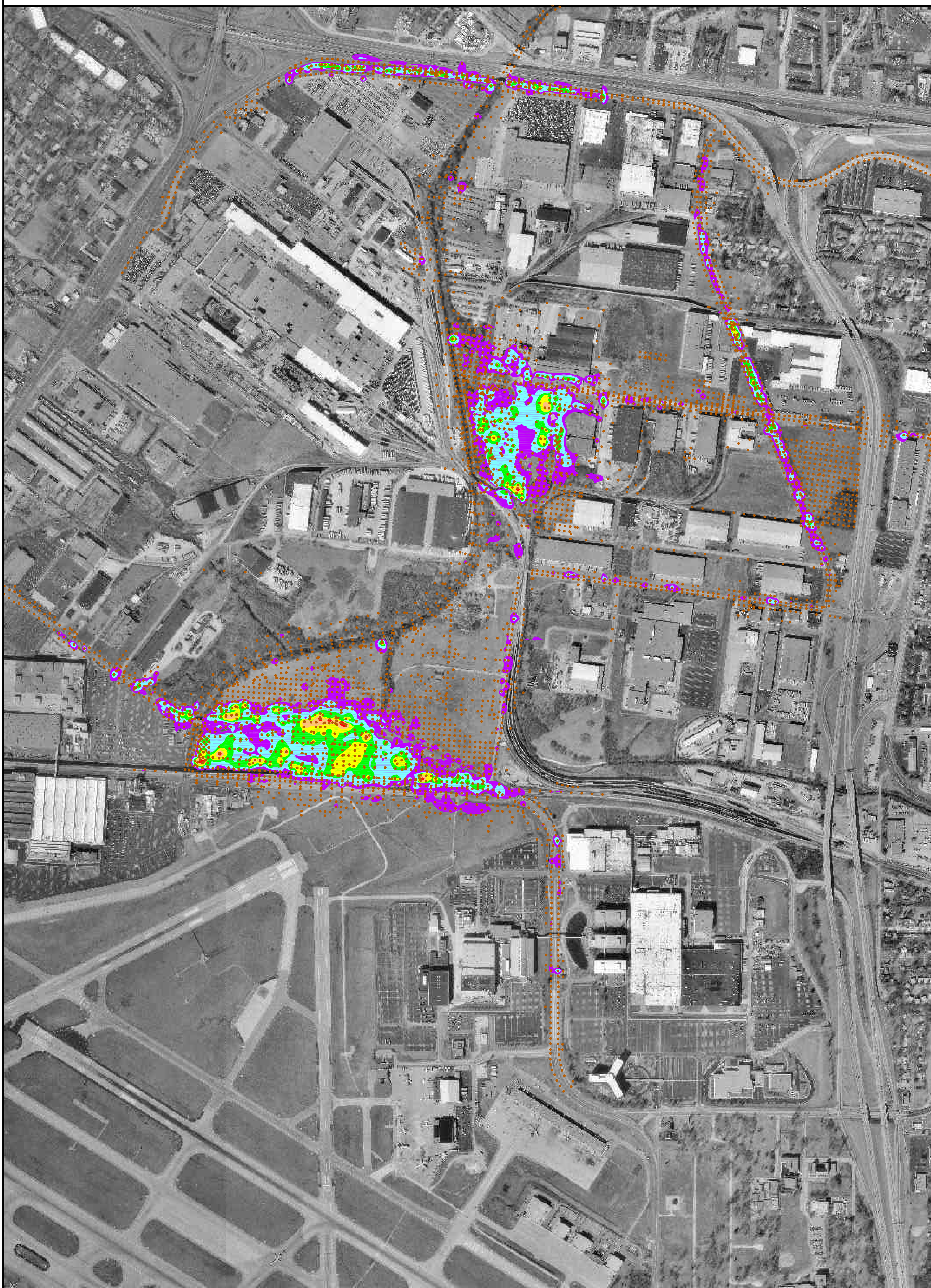
St. Louis Airport Site
Projected Uranium-238 Distribution
St. Louis, Missouri

DRAWN BY: R. Smith / S. Kitchings

REV. NO./DATE: 0 − 11/7/99

Figure 2-37. Projected Uranium-238 Distribution at the North County Site Before Removal Actions

U:\CAD\NORTHCO\DWGS\FSFIGURES\NorthCoRad06SOR-151550MaxR00.DWG



LEGEND:

$\frac{Ra - background}{5 \text{ or } 15} + \frac{Th - background}{15 \text{ or } 15} + \frac{U - background}{50 \text{ or } 50}$

Multiples of Sum of Ratios (SOR)

(purple)	1 – 3
(cyan)	3 – 10
(green)	10 – 30
(yellow)	30 – 100
(orange)	100 – 300
(red)	>300
●	SOIL SAMPLE LOCATION

NOTE: AERIAL PHOTOS CIRCA 1995–1997, PROVIDED BY MSD

0 500 1000 2000

SCALE: 1" = 1000'

FUSRAP

St. Louis Airport Site
Projected SOR 15, 15, 50
Distribution St. Louis, Missouri

DRAWN BY: R. Smith / S. Kitchings

REV. NO./DATE: 0 – 7/3/00

Figure 2-38. Projected Radioactivity Exceeding 5 pCi/g of Radium-226, 14 pCi/g of Thorium-230, 50 pCi/g of Uranium-238 or Combinations Such That the Sum of the Ratios =1 in Surface Soil and Exceeding 15 pCi/g of Radium-226, 15 pCi/g of Thorium-230, 50 pCi/g of Uranium-238 or Combinations Such That the Sum of the Ratios =1 in Subsurface Soil

U:\CAD\NORTHCO\DWGS\FSFIGURES\SLAPSRad06SOR-051450MaxR01.DWG

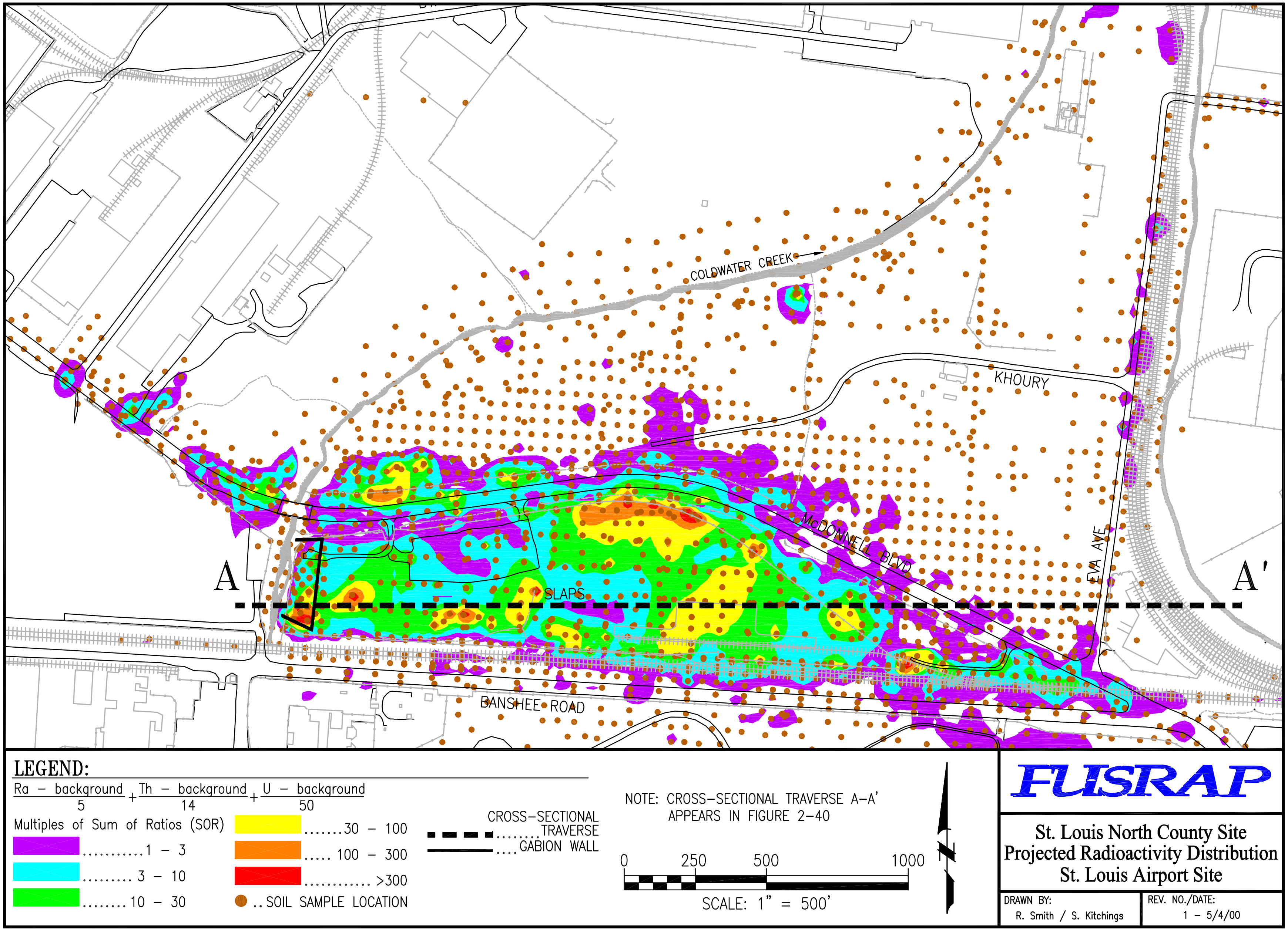


Figure 2-39. Projected Radioactivity Exceeding 5 pCi/g of Radium-226, 14 pCi/g of Thorium-230, 50 pCi/g of Uranium-238 or Combination Such That Sum of Ratio = 1 Around SLAPS

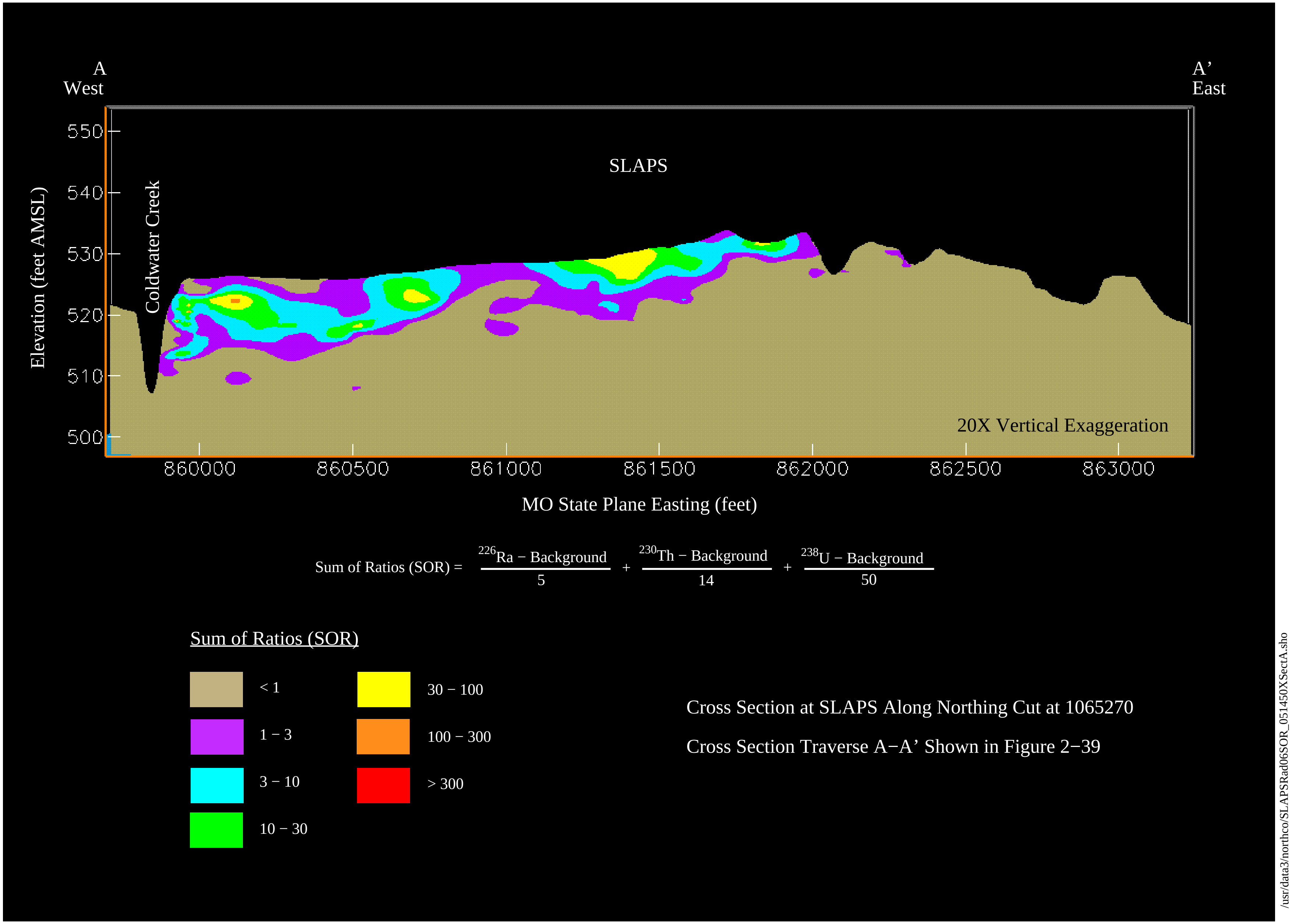


Figure 2−40. Cross Section at SLAPS of Projected Radioactivity Exceeding 5 pCi/g of Radium−226, 14 pCi/g of Thorium−230, and 50 pCi/g of Uranium−238

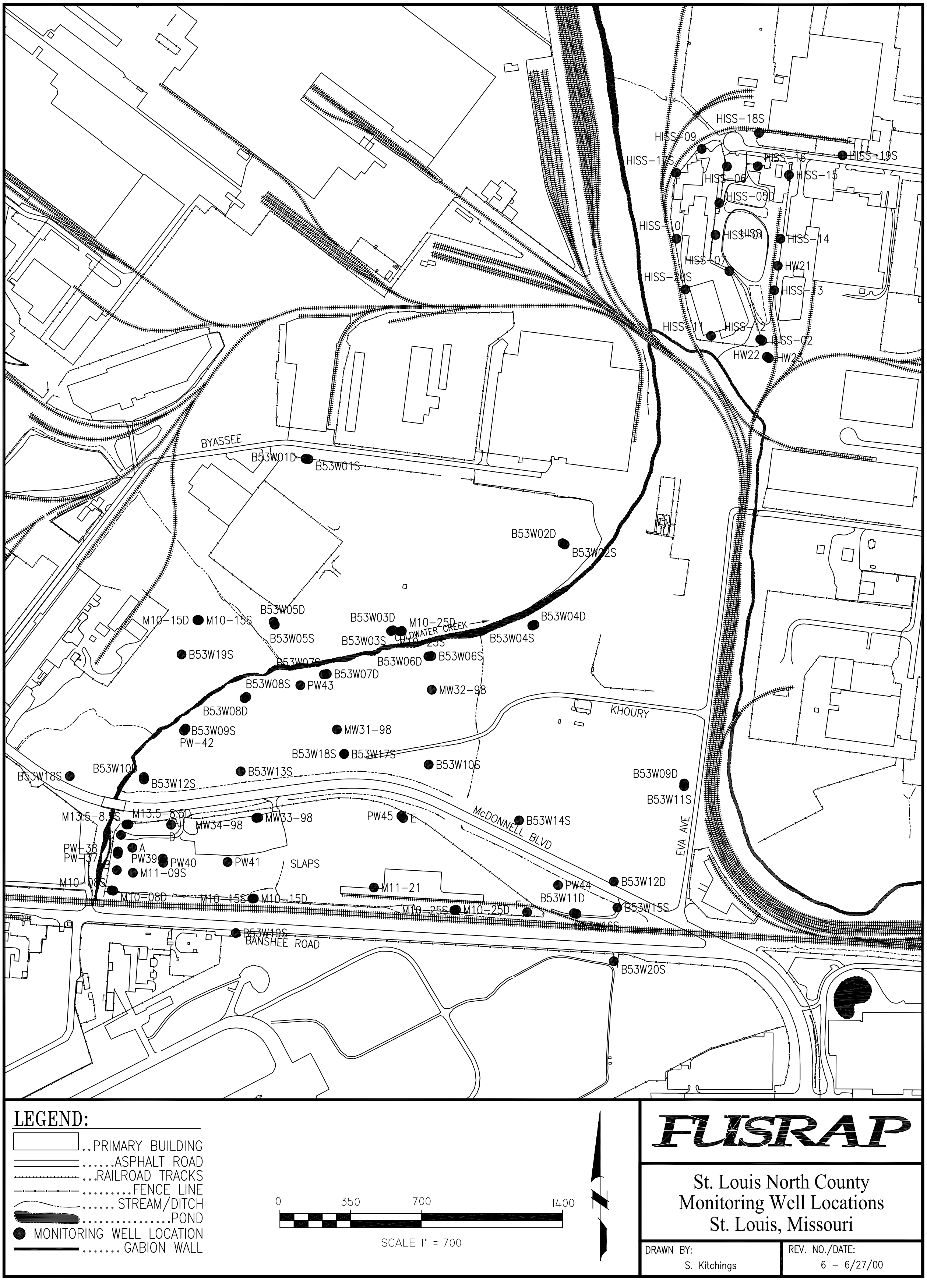
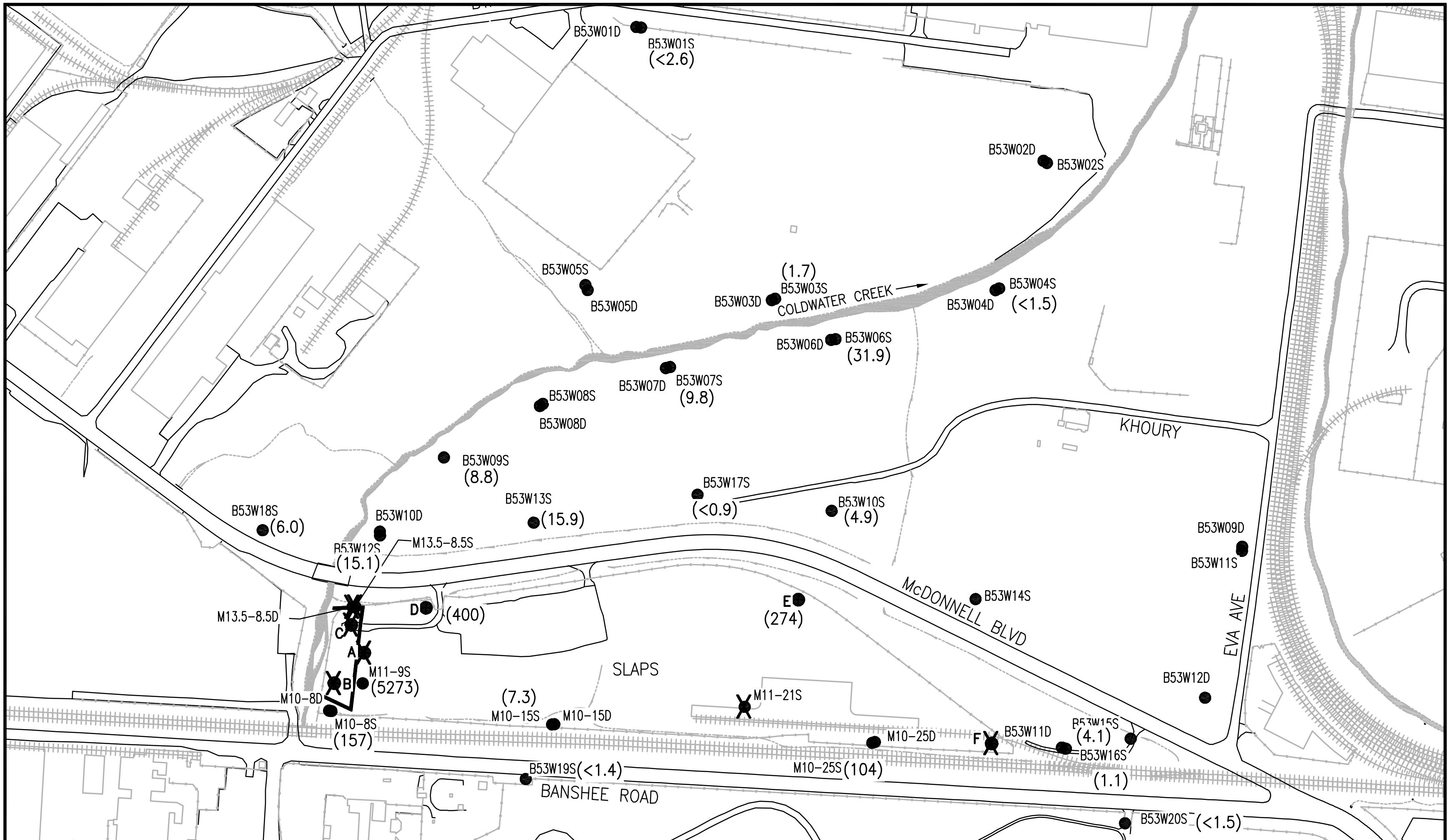


Figure 2-41. Monitoring Well Locations

U:\CAD\NORTHCO\DWGS\FSFIGURES\SLAPS1998TOTALURANIUMCONCSHALGWR03.DWG



LEGEND:

- ..PRIMARY BUILDING
- ......ASPHALT ROAD
- ..RAILROAD TRACKS
- ....FENCE LINE
- ......STREAM/DITCH
- ....POND
- MONITORING WELL
- DECOMMISSIONED WELL
- ....GABION WALL

(191) TOTAL URANIUM CONCENTRATION MICROGRAM(S) PER LITER (μg/L)

(NA) TOTAL URANIUM NOT ANALYZED

NOTES:

1.) BASE MAP PROVIDED BY BECHTEL SEPT. 1997.

2.) "S" WELLS INSTALLED IN UPPER HYDROSTRATIGRAPHIC ZONE. "D" WELLS INSTALLED IN LOWER STRATIGRAPHIC ZONE.

3.) URANIUM MAXIMUM CONTAMINANT LEVEL (MCL) IN GROUND WATER IS 20 μg/L

0 250 500 1000

SCALE: 1" = 500'

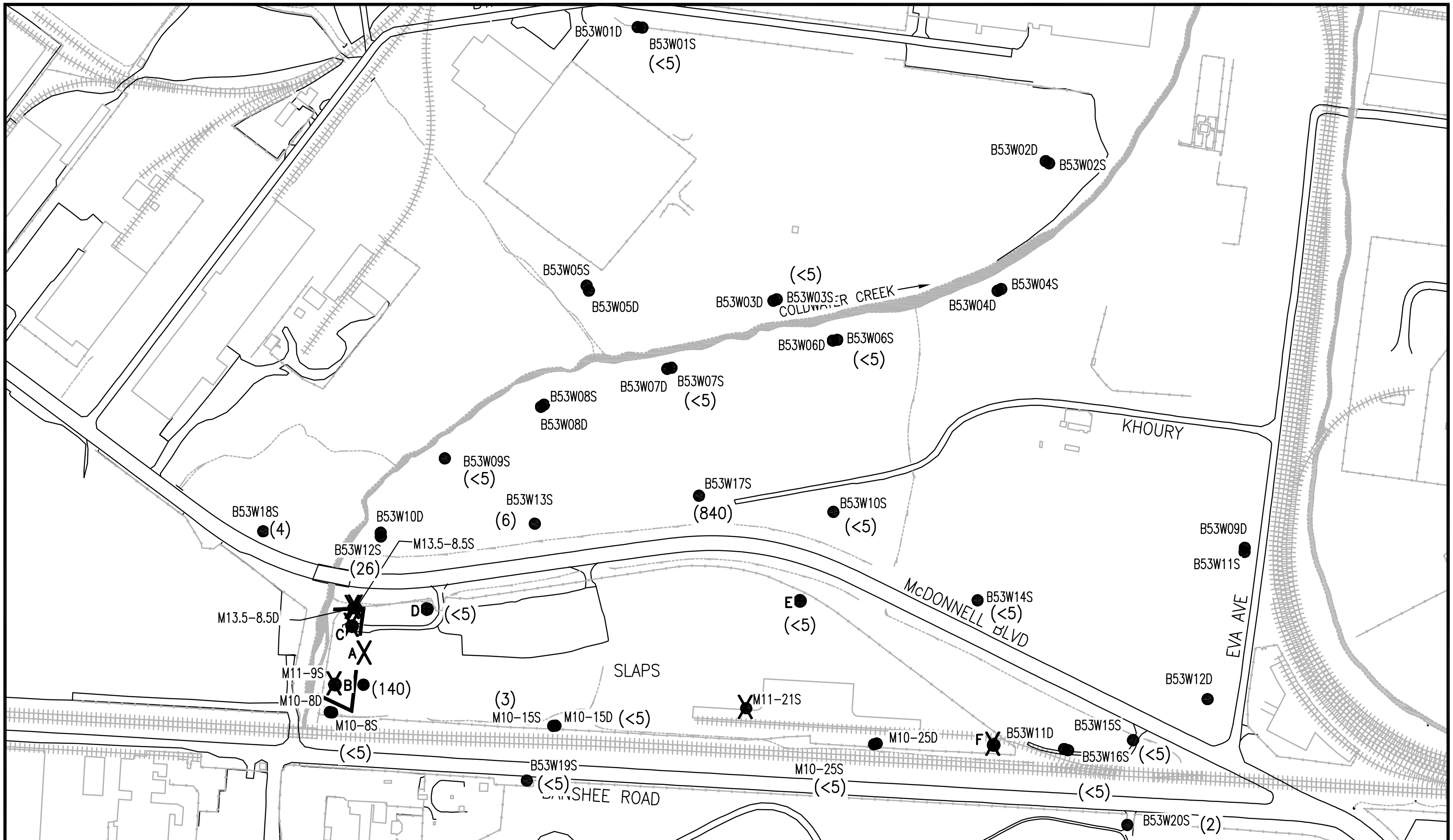
FUSRAP

1998 St. Louis Airport Site
Total Uranium in Ground Water
St. Louis, Missouri

DRAWN BY:	REV. NO./DATE:
S. Kitchings	3 – 6/26/00

Figure 2-42. 1998 Total Uranium Concentrations in Shallow Ground Water at SLAPS

U:\CAD\NORTHCO\DWGS\FSFIGURES\SLAPS1998TRICHLOROETHENECONCSHALGWR03.DWG



LEGEND:

- ..PRIMARY BUILDING
- ......ASPHALT ROAD
- ..RAILROAD TRACKS
- ....FENCE LINE
- ......STREAM/DITCH
- ....POND
- MONITORING WELL
- DECOMMISSIONED WELL
- ....GABION WALL

(91) TRICHLOROETHENE CONCENTRATION MICROGRAM(S) PER LITER (μg/L)

NOTES:

1.) BASE MAP PROVIDED BY BECHTEL SEPT. 1997.

2.) "S" WELLS INSTALLED IN UPPER HYDROSTRATIGRAPHIC ZONE. "D" WELLS INSTALLED IN LOWER STRATIGRAPHIC ZONE.

3.) TRICHLOROETHENE MAXIMUM CONTAMINANT LEVEL (MCL) IN GROUND WATER IS 5 μg/L

0 250 500 1000

SCALE: 1" = 500'

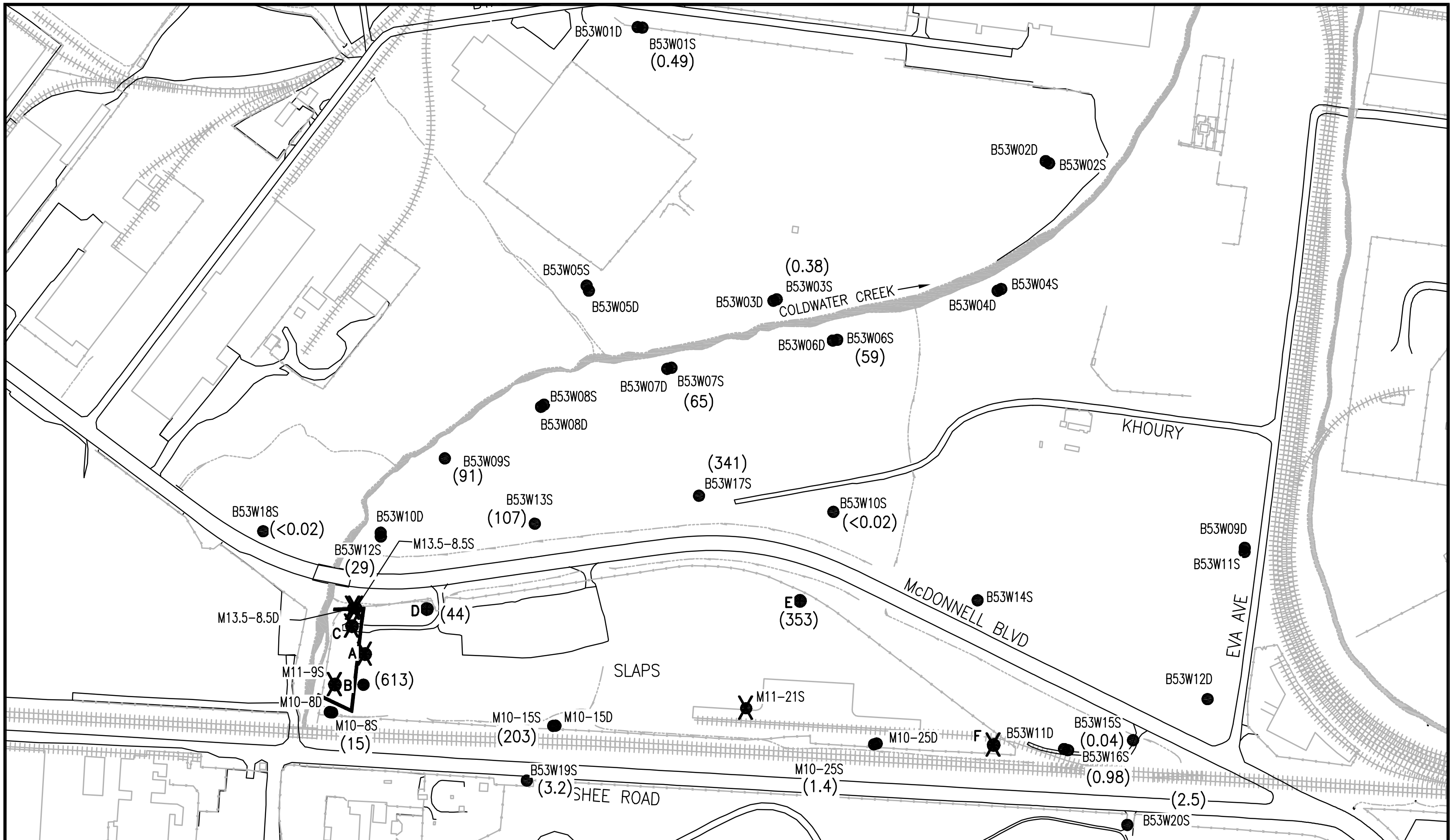
FUSRAP

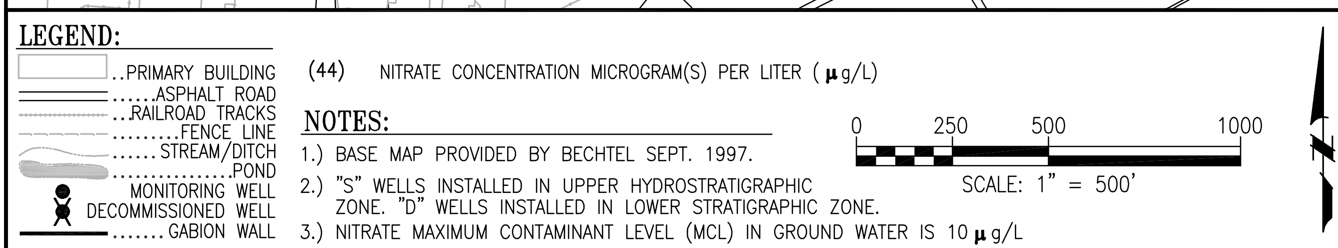
1998 St. Louis Airport Site
Trichloroethene in Ground Water
St. Louis, Missouri

DRAWN BY:	REV. NO./DATE:
S. Kitchings	3 – 6/26/00

Figure 2-43. 1998 Trichloroethene Concentrations in Shallow Ground Water at SLAPS

U:\CAD\NORTHCO\DWGS\FSFIGURES\SLAPS1998NITRATECONCSHALGWR03.DWG





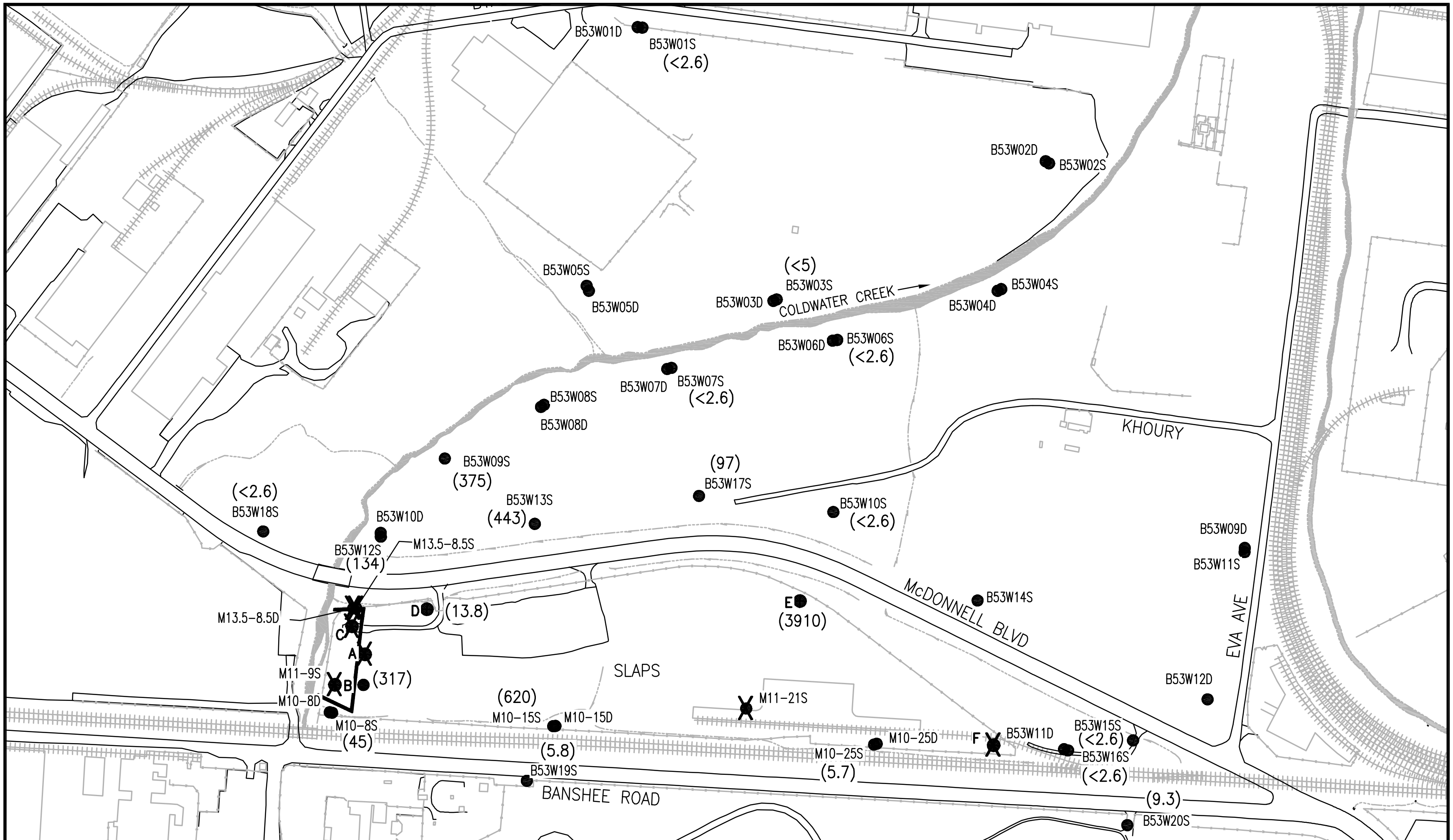
FUSRAP

1998 St. Louis Airport Site
Nitrate in Ground Water
St. Louis, Missouri

DRAWN BY:	REV. NO./DATE:
S. Kitchings	3 – 6/26/00

Figure 2-44. 1998 Nitrate Concentrations in Shallow Ground Water at SLAPS

U:\CAD\NORTHCO\DWGS\FSFIGURES\SLAPS1998SELENIUMCONCSHALGWR03.DWG



LEGEND:

..PRIMARY BUILDING
......ASPHALT ROAD
..RAILROAD TRACKS
.........FENCE LINE
......STREAM/DITCH
................POND
MONITORING WELL
DECOMMISSIONED WELL
.......GABION WALL

(725) SELENIUM CONCENTRATION MICROGRAM(S) PER LITER (μg/L)

NOTES:

1.) BASE MAP PROVIDED BY BECHTEL SEPT. 1997.
2.) "S" WELLS INSTALLED IN UPPER HYDROSTRATIGRAPHIC ZONE. "D" WELLS INSTALLED IN LOWER STRATIGRAPHIC ZONE.
3.) SELENIUM MAXIMUM CONTAMINANT LEVEL (MCL) IN GROUND WATER IS 50 μg/L

0 250 500 1000
SCALE: 1" = 500'

FUSRAP

1998 St. Louis Airport Site
Selenium in Ground Water
St. Louis, Missouri

DRAWN BY: S. Kitchings
REV. NO./DATE: 3 – 6/26/00

Figure 2-45. 1998 Selenium Concentrations in Shallow Ground Water at SLAPS

Figure 2-46. Projected Radioactivity Exceeding 5 pCi/g of Radium-226, 14 pCi/g of Thorium-230, 50 pCi/g of Uranium-238 or Combination Such That Sum of Ratio = 1 at HISS/Futura

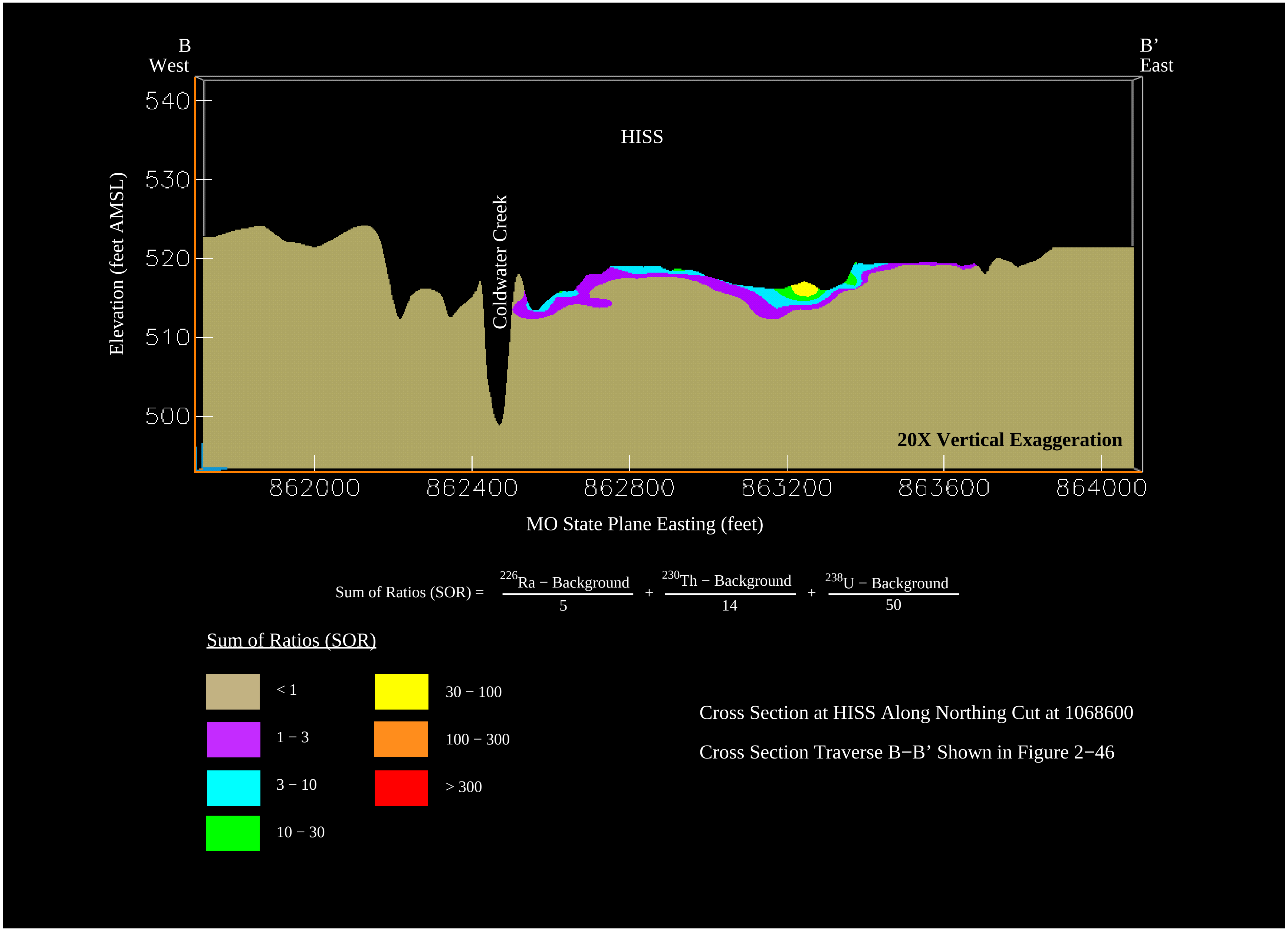


Figure 2−47. Cross Section at HISS of Projected Radioactivity Exceeding 5 pCi/g of Radium−226, 14 pCi/g of Thorium−230, and 50 pCi/g of Uranium−238

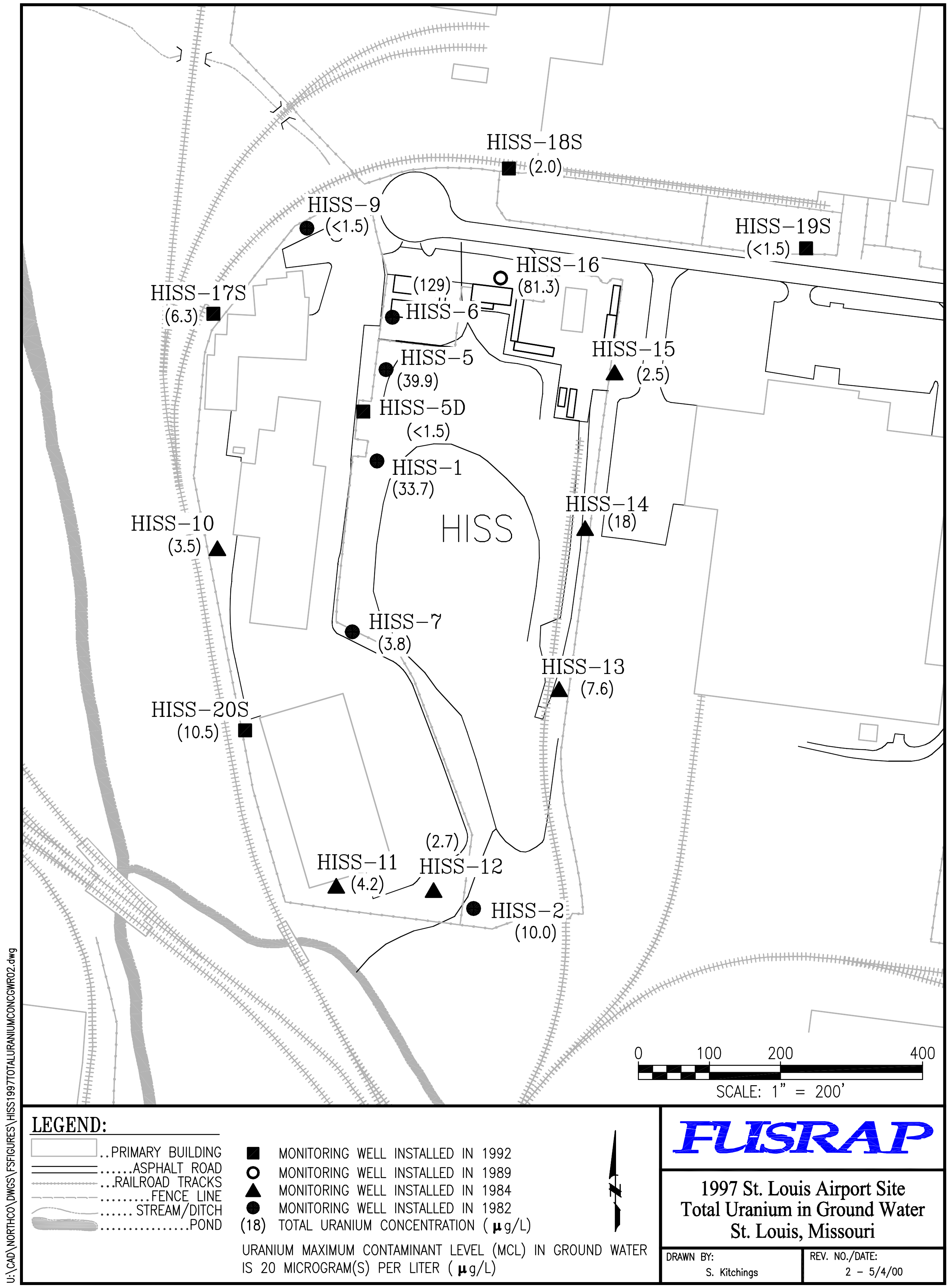


Figure 2-48. 1997 Total Uranium Concentrations in Ground Water at HISS/FUTURA

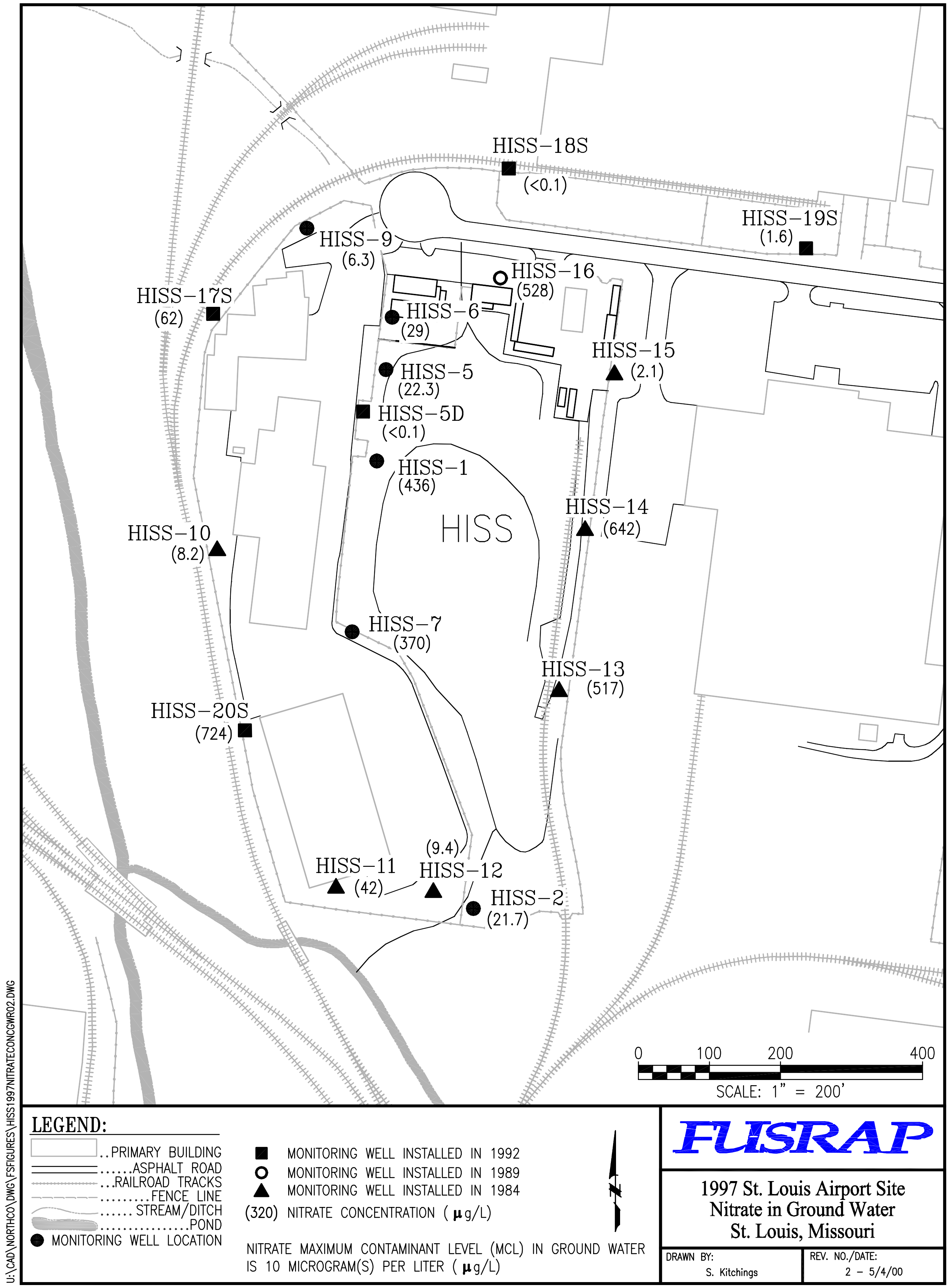


Figure 2-49. 1997 Nitrate Concentrations in Ground Water at HISS/FUTURA

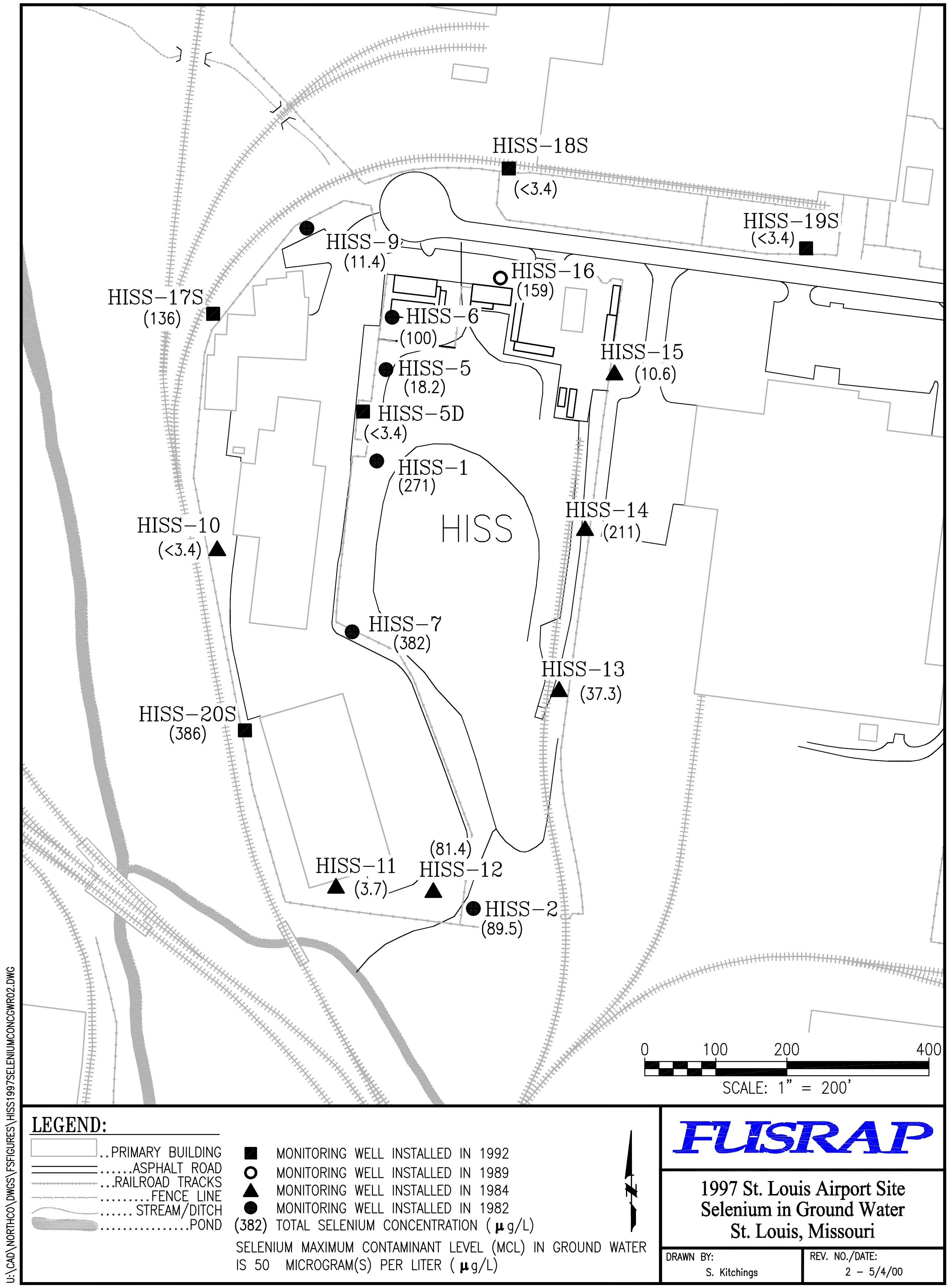


Figure 2-50. 1997 Selenium Concentrations in Ground Water at HISS/Futura

SECTION 3

IDENTIFICATION AND SCREENING OF REMEDIAL ACTION TECHNOLOGIES

3 IDENTIFICATION AND SCREENING OF REMEDIAL ACTION TECHNOLOGIES

This section focuses on identifying and screening remedial action technologies for the North County Site. Retained technologies are used to develop remedial action alternatives for the North County Site as discussed in Section 4.

3.1 INTRODUCTION

Identification of potential remedial action technologies involves the following steps:

- Identifying preliminary remedial action objectives (RAOs) specific to the contaminated environmental media;
- Identifying applicable or relevant and appropriate requirements (ARARs);
- Identifying general response actions (GRAs) (e.g., removal, treatment, and disposal) required to attain the RAOs;
- Identifying remedial action technologies and physical process options that can be applied for each of the GRAs and performing an initial screening to reduce the number of these options for further evaluation; and
- Evaluating retained technologies on the basis of effectiveness, implementability, and cost.

Section 3.2 develops RAOs for each medium of interest. Section 3.3 identifies ARARs. Section 3.4 identifies GRAs that satisfy RAOs for each medium of interest at the site. Section 3.5 identifies remediation goals (RGs) proposed for the North County Site. Section 3.6 presents a summary of remedial action technologies that address the contaminated media at the North County Site. Section 3.7 summarizes the evaluation and screening of remedial technologies.

3.2 REMEDIAL ACTION OBJECTIVES (RAOs)

3.2.1 General Process

RAOs developed in this Feasibility Study (FS) provide the basis for proposed remedial actions at the North County Site. RAOs are based on the nature and extent of contamination, threatened resources, the potential for human and environmental exposure, and reasonably anticipated future land uses. The RAOs for the North County Site are established, in general, to eliminate or minimize potential human exposure to soils and sediments contaminated with FUSRAP-related COCs at levels that exceed the standards established in the ARARs or the site-specific risk-based RGs. Although risk levels based on a commercial/industrial future anticipated land use are within the CERCLA risk range (10^{-6} to 10^{-4}) for most properties in the North County Site, action is required to comply with ARARs and site-specific RGs in order to produce residual site conditions that allow for unlimited use and unrestricted exposure. As such, portions of the St. Louis North County site require remediation.

Alternatives for site remediation must comply with ARARs. Compliance with individual chemical-specific ARARs is considered to be protective except where multiple chemicals and/or multiple exposure pathways are present. Similarly, ARARs may not exist for a specific chemical or pathway of concern. It may, therefore, be necessary to develop risk-based preliminary remediation goals (PRGs) using site-specific information.

The first step in formulating remedial alternatives is to identify potential exposure pathways, and PRGs that consider reasonable maximum exposure (RME) based on reasonably anticipated future land use. The goals are defined in terms of risk-based exposure levels that are protective of human health and the environment, and are developed by considering ARARs and the following factors [see 1990 National Contingency Plan (NCP) at Section 300.430(e)(2)(i)]:

- For noncarcinogenic toxicants, acceptable threshold levels are those concentrations that the most susceptible human population may be exposed to over a lifetime without adverse effects. The U.S. Environmental Protection Agency (EPA) hazard index (HI) is a measure of the potential for adverse non-carcinogenic health effects due to exposure to site-related chemicals. The HI is based on a comparison of the average daily intake of a receptor to the threshold level at which adverse effects are observed. A HI of one or greater indicates that there may be a concern for non-carcinogenic effects associated with exposure to site-related chemicals.

- For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess lifetime cancer incidence to an individual in the range of 10^{-6} (one in a million) to 10^{-4} (one in ten thousand). This range is intended to provide case-by-case flexibility, although the 10^{-6} risk level is the point of departure for determining goals for alternatives when ARARs are unavailable.

- Risk-based PRGs are developed in the case of multiple contaminants, where the attainment of ARARs will result in a cumulative risk in excess of 10^{-4}.

- Water quality criteria established under sections (sic) 303 or 304 of the Clean Water Act (CWA) shall be attained where relevant and appropriate under circumstances of the release.

- An alternate concentration limit (ACL) may be established in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121(d)(2)(B)(ii).

- Environmental evaluations shall be performed to assess threats to the environment, especially sensitive and critical habitats of species protected under the Endangered Species Act.

- Other factors may be related to technical limitations, uncertainty, reasonable future land use, and other pertinent information.

3.2.2 Development of Media-Specific RAOs for the North County Site

Media-specific RAOs were developed for the North County Site for soils, and sediments and to ensure continued protection of the surface water. In general, mitigation of the exposure pathways of concern and compliance with ARARs provide a framework for media-specific RAOs. Media-based RAOs are shown in Table 3-1. Potential environmental pathways include:

- Direct contact with soils through ingestion and dermal contact;
- External gamma radiation from the soil. Risks are usually dominated by risks from gamma-emitting radionuclides in surface soils;
- Inhalation of fugitive dust from contaminated soils and radon gas emissions due to the radioactive decay of radium-226 (Ra-226);
- Off-site migration of contamination carried by erosion (e.g., surface-water runoff);
- Uptake by biota (i.e., animals and plants) of contamination; and
- Potential transport from contaminated soils and sediments to surface water or drinking water.

Table 3-1. Remedial Action Objectives for Remediation of the North County Site

Media	Remedial Action Objectives
Soils and Sediments	Eliminate or minimize potential human exposure to soils and sediments contaminated with FUSRAP-related COCs at levels that exceed the standards established in the ARARs or the site-specific remediation goals. Prevent exposures from residual contamination in soils and sediments with concentrations greater than remediation goals Eliminate or minimize volume, toxicity, and mobility of contaminated soils and sediments Eliminate or minimize the potential migration of contaminants off-site including the potential for migration to ground water and surface water, by removing the sediment and soil sources.

3.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

3.3.1 Definition of CERCLA Requirements

Section 121(d)(2) of CERCLA sets requirements with respect to any hazardous substance, pollutant, or contaminant that will remain on-site. Remedial actions must, upon completion, achieve a level or standard of control that at least attains legally applicable or relevant and appropriate standards, requirements, criteria, or limitations under Federal environmental law. The actions must also meet any promulgated standard, requirement, criteria or limitation under a State environmental or facility siting law that is more stringent than any

Federal standard, requirement, criteria, or limitation (ARARs). These standards apply unless such standard, requirement, criteria, or limitation is waived in accordance with Section 121(d)(4).

Identifying ARARs involves determining whether a requirement is applicable, and if it is not applicable, then whether a requirement is relevant and appropriate. Individual ARARs for each site must be identified on a site-specific basis. Factors that assist in identifying ARARs include the physical circumstances of the site, contaminants present, and characteristics of the remedial action.

Applicable requirements are defined as "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site" (40 CFR 300.5). A law or rule is applicable if the jurisdictional prerequisites of the law or rule are satisfied. These jurisdictional prerequisites include:

- Who, as specified by the statute or regulation, is subject to its authority;
- The types of substances or activities listed as falling under the authority of the statute or regulation;
- The time period for which the statute or regulation is in effect; and
- The type of activities the statute or regulation requires, limits, or prohibits.

Only those state requirements that are (1) promulgated so that they are of general applicability and legally enforceable, (2) identified by a state in a timely manner, and (3) more stringent than federal standards, may be applicable.

The NCP states that a relevant and appropriate requirement is a standard, requirement, criteria, or limitation under a Federal environmental law or a more stringent State environmental or facility siting law, which is not legally applicable to the hazardous substance or pollutant or contaminant, but which is relevant and appropriate under the circumstances of the release of the hazardous substance or pollutant or contaminant.

Determining whether a requirement is relevant and appropriate is a two-step process that involves determining whether the rule is relevant, and, if so, whether it is appropriate. A requirement is relevant if it addresses problems or situations sufficiently similar to the circumstances of the remedial action contemplated. It is appropriate if it is well suited to the site. In determining whether a requirement is both relevant and appropriate, the following factors may be used to evaluate a requirement.

- The purpose of the requirement and the purpose of the response action;
- The medium regulated or affected by the requirement and the medium contaminated or affected at the site;
- The substances regulated by the requirement and the substances found at the site;
- The actions or activities regulated by the requirement and the remedial action contemplated at the site;

- Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the site;
- The type of place regulated and the type of place affected by the release or response action;
- The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the response action; and
- Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the site.

In addition, it should be considered whether another requirement is available that more fully matches the circumstances at the site.

Only applicable requirements are pertinent for off-site actions, whereas both applicable and relevant and appropriate requirements are pertinent for on-site actions. A determination of relevance and appropriateness may be applied to only portions of a requirement, whereas a determination of applicability is made for the requirement as a whole.

CERCLA Section 121(e) and 42 USC 9621(e) provide that no permit is required for the portion of any removal or remedial action conducted entirely on-site. Although no permit is required, on-site actions must comply with substantive requirements of ARARs, but not with related administrative and procedural requirements. For example, remedial actions conducted on-site would not require a permit but must be conducted in a manner consistent with permitted conditions as if a permit were required.

Subsection 3.3.2 discusses which statutes and regulations are ARARs, as that term is defined in CERCLA, for the cleanup of contamination present at the North County Site.

ARARs have been classified into three types: chemical-specific requirements, location-specific requirements, and action-specific requirements. Chemical-specific requirements are media-specific and health-based limits (criteria) developed for site-specific levels of contaminants in specific media. Location-specific standards are based on particular characteristics or locations of the site. Action-specific requirements are those with which design, performance, and other aspects of implementation of specific remedial activities must comply. No location-specific or action-specific ARARs are identified for the North County Site.

3.3.2 Chemical-Specific ARARs

Chemical-specific ARARs are health- or risk-based numerical values that, when applied to site-specific conditions, can be used to formulate PRGs. These values reflect potentially acceptable amounts or concentrations of a chemical that may remain in affected media or be discharged to the ambient environment. When determining the cleanup level criteria, chemical-specific ARARs are initially used to establish PRGs (55 FR 8715). If a chemical has more than one applicable requirement, then the most stringent generally should apply. The chemicals found with the highest concentrations and that produce the majority of the risks in the North County Site are radium, thorium, uranium and their associated decay products. The additional contaminants of concern (COCs) were described in Section 2.

For establishing cleanup levels for radionuclides in soil and buildings, two rules that establish numerical standards are relevant and appropriate requirements at the North County Site. These standards are: Title 40 Code of Federal Regulations, Part 192 Subparts A, B, and C, established by the EPA under the authority of Uranium Mill Tailings Radiation Control Act (UMTRCA), and 10 CFR Part 40 Appendix A Criterion 6(6), established by U.S. Nuclear Regulatory Commission (NRC) for source and by-product material and patterned to supplement the 40 CFR Part 192 standards. For remediation of the North County Site, 40 CFR Part 192 Subparts A, B, and C will be relied on as the primary standard for cleanup levels in soil, with 10 CFR Part 40 Appendix A Criterion 6(6) used as an ARAR for soils and buildings.

<u>40 CFR Part 192: Subpart A: Standards for Control of Residual Radioactive Materials from Inactive Uranium Processing Sites; Subpart B: Standards for Cleanup of Land and Buildings Contaminated with Residual Radioactive Materials from Inactive Uranium Processing Sites; Subpart C: Implementation:</u> 40 CFR Part 192 standards were promulgated to manage mill tailings and residual radioactive material from uranium and thorium processing activities. 40 CFR Part 192 Subparts A, B, and C apply to inactive sites designated either in Title I of UMTRCA or by the U.S. Department of Energy (DOE). 40 CFR Part 192 standards are not applicable to the North County Site because the North County Site is not designated in Title I or by the DOE, and the North County Site is not an active processing facility. However, the materials stored at the North County Site are the residuals from uranium ore processing and are the same kinds of materials as those regulated under UMTRCA. The radiological contaminants within the North County Site are pre-1978 11e(2) by-product materials that resulted from the extraction of uranium from the associated ores. The processing site as defined in 40 CFR Part 192 includes any site, including the mill, and any other "real property or improvement thereupon that is determined to be contaminated with residual radioactive material derived from the site." Each of the North County Site properties is "in the vicinity of such site" (i.e., SLDS). As such, given the type of contaminants, amount of activity, method of deposition, and operational relationship, 40 CFR Part 192 is taken as relevant and appropriate for the North County Site even though this site is physically separate from the ore processing site (i.e. SLDS). The standards in 40 CFR Part 192 Subparts A, B, and C are considered relevant and appropriate for these reasons and as per the following analysis:

- The goals and objectives of the 40 CFR Part 192 standards are to provide for stabilization, disposal, and control of uranium mill tailings located at active and inactive mill operations in a manner protective of human health and the environment. The goals and objectives of the remedial action at the North County Site are to stabilize or clean up residual radioactive material from mill tailings at an inactive site, so that the land is usable in a manner protective of human health and the environment.

- Waste materials at the North County Site derive from inactive uranium processing and are the same kinds of radionuclides as regulated under 40 CFR Part 192 Subparts A, B, and C.

- 40 CFR Part 192 regulates cleanup of radium in soil. Soil (containing elevated radium concentrations) is the primary medium of concern at the North County Site.

- 40 CFR Part 192 considers unrestricted future land use for land cleaned up under Subpart B and supplemental standards under Subpart C. Similarly, at the North County Site, lands will either be released for unrestricted use, or will be considered for remediation using supplemental standards.

- The soil conditions at the North County Site are not significantly different from those at the uranium mill sites for which the 40 CFR Part 192 standards were developed.

- Both the North County Site and the sites managed under UMTRCA are the result of radioactive ore processing activities, and include numerous vicinity properties (VPs) contaminated by relocation of contaminants from erosion, use of contaminated materials as fill material, and spillage during transportation. Although no ore processing took place within the North County Site, the site is in the vicinity of the processing site (i.e., SLDS) and, although physically separate, was an integral part of the overall ore processing operation.

- Both programs address identical contaminants at sites characterized by large volumes of contaminated soil, widely ranging soil contaminant concentrations, and land use ranging from residential to industrial.

- The distribution of radioactive contamination at the North County Site is similar to that at uranium mill tailings sites. Radioactive materials which eroded or were windblown from the site or spilled during transport are spread in thin layers, much the same as the windblown tailings at some uranium mill sites.

Therefore, USACE concludes that circumstances at the North County Site are sufficiently similar to inactive uranium processing sites designated under Section 102 of UMTRCA to warrant 40 CFR Part 192 Subparts A, B, and C being considered relevant and appropriate under CERCLA for surface soil in the North County Site.

The UMTRCA standards for inactive uranium processing sites are organized into standards for control of residual radioactive materials (Subpart A), standards for cleanup (Subpart B), and implementation including supplemental standards (Subpart C). Standards set forth in Subpart A apply to the control of residual radioactive materials at designated processing or depository sites and to the restoration of such sites. Standards set forth in Subpart B apply to the cleanup of residual radioactive materials from land for release without radiological restrictions. Subpart C sets forth supplemental standards that account for the presence of other (i.e., non-radium) radionuclides, and supplemental standards that may be applied under special circumstances that allow the selection and performance of remedial actions that come as close as reasonably achievable to meeting the more stringent standards of Subpart B.

The design period requirement of Subpart A is considered relevant and appropriate for the development of soil RGs for all action alternatives. The standards contained within Subpart A are also potentially relevant and appropriate at the North County Site for remedial actions involving capping or the construction of an on-site disposal cell. 40 CFR Subpart A defines the "standards for control of residual radioactive materials from inactive uranium processing sites." This section sets several standards that provide protection for stabilized residual materials disposal areas at uranium processing sites. Subpart A requires in §192.02(a) that controls for residual radioactive materials and listed constituents shall be effective for up to 1000 years to the extent reasonably achievable, and, in any case, for at least 200 years. To preclude the necessity for the government to take permanent legal possession of disposal cells and to avoid the presence of soils exceeding disposal cell risk criteria, use of supplemental standards which would result in shipment of higher activities soils off-site are required for Alternatives 2 and 3.

Subpart B identifies EPA's standards for remedial actions of land and buildings contaminated with residual radioactive materials at inactive uranium processing sites and provides cleanup standards for Ra-226 in soil, among other things. Requirements of Subpart B relevant and appropriate to the remedial action alternative include those for soil. Soil requirements specify that Ra-226 concentrations shall not exceed 5 picocuries per gram (pCi/g) above background in top 15 centimeters (cm) [6 inches (in)] and 15 pCi/g above background in lower 15 cm layers averaged over 100 square meter (m^2) [1076 square feet (ft^2)] areas.

Subpart C provides regulations for the implementation of standards established in Subparts A and B. Among other things, it sets forth conditions appropriate for the development of supplemental standards. Supplemental standards in 40 CFR 192.21-22 are relevant and appropriate for some contaminated soils. The standard of selection for a supplemental standard is one that comes as close to meeting the otherwise applicable standard as is reasonable under the circumstances. This type of determination has to be made on a site-by-site basis. Federal agencies may substitute "supplemental standards" subject to one of the following conditions:

- The remedial action would cause environmental harm that is clearly excessive compared to the health benefits to persons living on or near the site, now or in the future;
- The estimated cost of the remedial action is unreasonably high relative to the long-term benefits, and the residual radioactive materials do not pose a clear present or future hazard; and
- Radionuclides other than Ra-226 and its decay products are present in sufficient quantity and concentration to constitute a significant radiation hazard from residual radioactive materials.

In addition, 40 CFR 192.21 allows imposing supplemental standards as ARARs for establishing alternate limits to those specified in 40 CFR 192.12. Thus, supplemental standards may be considered ARARs for remediation of portions of the North County Site. For example, under a containment (capping) or on-site treatment involving the use of institutional controls, excavation of subsurface soils to unrestricted standards at the primary storage areas could result in unreasonably high remediation costs without achieving a significant reduction in risk. There also would be increased exposure to risk associated with general construction/excavation/demolition activities and increases in the length of time to complete remediation. Supplemental standards are appropriate for subsurface soils at the primary storage areas in accordance with 40 CFR 192.21(c) because radiological materials do not pose a current or future hazard and because use of the 40 CFR 192 Subpart B standards results in unreasonably high remediation costs relative to the benefits. Supplemental standards are derived for subsurface materials at the primary storage areas (i.e., SLAPS and HISS/Futura) in conjunction with the use of institutional controls. Appendix D explains the derivation of these supplemental standards.

Supplemental standards for other radionuclides (i.e., uranium and thorium) are appropriate in accordance with the following condition stated in 40 CFR 192.21 (h): "Radionuclides other than radium-226 and its decay products are present in sufficient quantity and concentration to constitute a significant radiation hazard from residual radioactive materials″.

<u>10 CFR Part 40 Appendix A Criterion 6(6):</u> Like 40 CFR Part 192, 10 CFR Part 40 Appendix A Criterion 6(6) provides standards for the remediation of uranium and thorium mill tailings sites. Until recently, the standards were the same, focusing mainly on limiting radium concentrations in soils. In July of 1999, the NRC amended Criterion 6(6) to include criteria for non-radium radiological contaminants in soils and radiological contaminants in buildings. Because non-radium contaminants such as thorium and uranium derived from the processing of uranium ores are present at the North County Site, Criterion 6(6) is considered for its relevance and appropriateness. [For the reasons presented for 40 CFR 192, 10 CFR 40 Appendix A Criterion 6(6) is not applicable].

Criterion 6(6) was amended specifically to address byproduct material containing concentrations of radionuclides other than radium in soil, and surface activity on remaining structures. (As defined in 10 CFR Part 40, byproduct material is the tailings or wastes produced by the extraction of uranium or thorium from any ore processed primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes.) Given that materials containing contamination other than Ra-226 are included in the list of North County Site wastes, Criterion 6(6) is relevant and appropriate for addressing the non-radium radionuclides that may be present in these materials.

Criterion 6(6) introduces the concept of a benchmark dose. The benchmark dose is the dose that would result from exposure to 5 pCi/g of Ra-226 in surface soils (top 15 cm) or 15 pCi/g of Ra-226 in subsurface soils (subsequent 15-cm layers). Non-radium contaminants are limited to the level that would produce the benchmark dose. For example, if the benchmark dose is 10 millirem per year (mrem/yr), thorium-230 (Th-230) must be limited to the concentration that would produce no more than 10 mrem/yr. If multiple contaminants such as Ra-226, Th-230, and uranium-238 (U-238) are present, the total dose must not exceed the benchmark dose (e.g., 10 mrem/yr). The benchmark also applies to building surfaces. Contamination on building surfaces must be limited to concentrations that would produce the benchmark dose. Criterion 6(6) is, therefore, used in the North County Site as an ARAR to derive surface soil cleanup goals for non-radium radionuclides, particularly uranium and thorium, which are not explicitly addressed by 40 CFR 192. These cleanup levels are based on doses derived from the 40 CFR 192 radium criteria. The concentration of Th-230 that corresponds to the benchmark dose resulting from exposure to 5 pCi/g Ra-226 in surface soils is 14 pCi/g. The concentration of U-238 that corresponds to the benchmark dose is 50 pCi/g.

<u>40 CFR Part 192: Subpart A: Standards for Control of Residual Radioactive Materials from Inactive Uranium Processing Sites</u>: The 1000-year time period specified in §192.02(a) is considered relevant and appropriate for the development of soil RGs for all action alternatives. The standards contained within Subpart A are also potentially relevant and appropriate at the North County Site for remedial actions involving containment (i.e., capping or the construction of an on-site disposal cell). Subpart A provides standards for the control of residual radioactive

material from inactive uranium processing sites. For reasons similar to those stated previously, the conditions at the North County Site are sufficiently similar to those at inactive uranium processing sites to consider portions of Subpart A as potentially relevant and appropriate requirements. The standard in §192.02(a) requires a cover design that will "be effective for up to 1000 years, to the extent reasonably achievable, and, in any case, for at least 200 years...". The standards specified in §192.02(b) require that the design provides reasonable assurance that release of radon from residual radioactive material to the atmosphere will not exceed an average release rate of 20 picocuries per square meter per second ($pCi/m^2/sec$) nor increase the annual average concentration of radon in the air at or above any location outside the disposal site by more than 0.5 picocuries per liter (pCi/L). For remedial actions involving the capping of contaminated soils or the construction of an on-site disposal cell at the North County Site, the requirements of Subpart A are considered ARARs and would ensure adequate protection of human health and the environment.

40 CFR Part 122, Clean Water Act (CWA) – National Pollutant Discharge Elimination System (NPDES): The NPDES Program is considered relevant and appropriate for actions evaluated in the FS. There is a storm water permit for Hazelwood Interim Storage Site (HISS) and a permit equivalent document for St. Louis Airport Site (SLAPS). In the National Pollutant Discharge Elimination System (NPDES) permit or equivalent document, certain limits are established for discharge of pollutants into waters of the state. In a CERCLA action, on-site activities do not require permits. However, activities must meet any substantive requirements for which permits would be otherwise required. Therefore, during remedial activities, any waste water or other water discharged from a point source into waters of the state must meet any limits that would have been established in the NPDES permit. Under 40 CFR § 122.44(i), the discharger must conduct monitoring to determine compliance with effluent limitations and to assist in the development of effluent limitations. The standards addressing site COCs at SLAPS are relevant and appropriate for this remedial action. The effluent limits are 100 ug/L total recoverable arsenic, 94 ug/L total recoverable cadmium, and 280 ug/l total recoverable chromium (both daily maximum and monthly average concentrations). Permit limitation reflects compliance with state water quality standards.

The EPA has developed a ground-water classification system to assess ground water on the basis of ground-water value and vulnerability to contamination. "For a CERCLA action, ground-water classification is used to help set goals for ground-water remediation and determine the appropriate level of remediation. When ground water is classified for a CERCLA action, that classification is only used to determine the scope of site-specific remedial actions and has no bearing outside of the CERCLA action" (55 FR 8733). Using the EPA ground-water classification system, the upper hydrostratigraphic units are most appropriately defined as Class IIIA. As such, the ground water from these zones is not considered a potential source of drinking water. Thus, the Safe Drinking Water Act (SDWA) is not an ARAR for the upper hydrostratigraphic units at the North County Site, because the United States Army Corps of Engineers (USACE) has determined that these units are Class IIIA by applying the EPA guidance.

3.4 GENERAL RESPONSE ACTIONS (GRAs)

GRAs that could be implemented to achieve the remedial action objectives described in Section 3.2 reflect the current understanding of contaminants and environmental conditions at the North County Site. These GRAs include no action, institutional controls, monitoring, containment, removal, and treatment. The GRAs are discussed in more detail in the following subsections.

3.4.1 No Further Action

The no-further-action response means that no new action would be taken. Controls that are in place at the present time, such as perimeter fencing with signs and existing environmental monitoring stations, would not be removed but would not be maintained under the no further action response. The no further action alternative is required by the NCP to provide a baseline for evaluating other GRAs, options, and alternatives. Although interim cleanup activities have previously been implemented at the site, no further action would be taken.

3.4.2 Institutional Controls and Monitoring

The primary goal of institutional controls is to prevent access to contaminated areas. Where active response measures, such as containment, removal, treatment, or beneficial use of source material are determined not to be practicable, the NCP allows the use of institutional controls to supplement engineering controls for short- and long-term management of hazardous substances, pollutants, or contaminants [(40 CFR 300.430(a)(1)(*iii)*(D)]. Zoning, easements, covenants, deed notices, and fee ownership are examples of institutional controls. Institutional controls, either alone or in combination with engineering controls, might be appropriate to achieve protection of human health and the environment.

Institutional controls are legal and administrative mechanisms that manage access to or use of affected property areas, or warn of a hazard. There are four categories of institutional controls: (1) Proprietary Controls, (2) Government Controls, (3) Enforcement and permit tools with institutional control components, and (4) Informational Devices. Details regarding these different types of institutional controls are provided in Section 3.6.3.

In accordance with 10 CFR 40, benchmark doses which exceed 100 mrem/yr before application of ALARA require the approval of the (NRC) Commission after consideration of the recommendation of the staff. This dose criterion is used in the development of supplemental standards in accordance with 40 CFR 192.21 and is consistent with exposure limits applicable to members of the public. Thus, any alternative that includes institutional controls should also be evaluated against this recommended limit in the absence of institutional controls.

The new guidance for remedy selection decision documents (EPA 540-R-98-031) (EPA, 1999a) states, "five-year reviews may be discontinued when no hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure." Using this guidance, five-year reviews (after a remediation alternative has been completed) will only be necessary when limited use or restricted exposure is part of an alternative. Environmental monitoring would be conducted in conjunction with all remedial alternatives to evaluate contaminant levels during ongoing remedial actions, to assess the effectiveness of remedial actions, and to ensure that off-site migration of contaminants is detected and mitigated. Environmental monitoring would be tailored to the selected remedial alternative so that monitoring objectives are realized. An adequate monitoring program considers periodic sampling of all media that would be affected by the continued presence of contaminants in environmental media. Periodic monitoring should be conducted for air (for radon emissions, particulates, and external gamma radiation), sediments (to measure surface runoff impacts and levels of contamination in creek sediments further downgradient from the site), and ground water at representative locations comprising the North County Site to assure the continued lack of migration of contaminants from the contaminated soils.

3.4.3 Containment

Containment can effectively reduce contaminant mobility and potential for exposure, but does not reduce contaminant volume or toxicity. The primary containment technologies considered for the North County Site include capping or encapsulation for soils. In addition, vertical or horizontal barriers such as slurry walls or grout injection are considered for protection of ground water and surface water. Although no radon problems have been identified, surface sealing and radon control for buildings are considered as ancillary containment technologies should radon contamination be discovered during the cleanup process.

Capping involves covering an area with a low-permeability material to reduce the migration of contaminants. Capping reduces the infiltration of surface water through contaminated media, but does not reduce the toxicity of source materials. Capping also can minimize the release of dust and vapors into the atmosphere. If side and bottom barriers are added, a full encapsulation of the contaminated material can be achieved. Various designs for disposal cells and containment structures have been developed for materials like those found at the North County Site.

3.4.4 Removal

Removal of contaminated material effectively limits the volume and mobility of COCs at the source area and can facilitate treatment and disposal. The appropriate removal technology and process option is a function of the physical properties of the material.

Excavation with conventional earth-moving equipment (such as excavators, scrapers, and bucket loaders) is used to remove bulk material such as soil. Manual excavation may be required in areas where access is limited. Coldwater Creek sediment can be removed with earth-moving equipment or dredging equipment. Although there are no COCs for ground water, remedial design must consider contamination of HZ-A to prevent off-site release of contaminated water from excavation areas.

3.4.5 Treatment

Treatment can often be used to reduce the contaminant volume, toxicity and/or mobility. Treatment encompasses a wide range of physical, chemical, biological, and thermal technologies. Many of the technologies can be applied both in-situ and ex-situ. The treatment technologies evaluated for the media at the North County Site are described below.

Physical treatment technologies include dewatering, size reduction, soil separation, soil sorting, soil washing and immobilization. Dewatering technologies (such as filtration and evapotranspiration) are used to reduce the water content of the waste materials. Size reduction involves physically reducing the size, and potentially the volume, of a waste material through the use of shredders, grinders, or compactors. Size reduction is most applicable to construction debris. Dewatering and size reductions do not directly treat the contaminant, but may be used to reduce the waste volume and improve material handling characteristics. Soil separation involves removing large pieces of debris and rock (often referred to as oversized material) from the soils through the use of screens. Soil sorting systems mechanically separate soils containing radioactive particles through the use of gamma radiation detectors. Soil washing involves washing the soils with water (and possibly other additives) to remove the radioactive contaminants. Soil separation, soil sorting and soil washing are used to reduce the volume of soils requiring management as low level radioactive waste. Immobilization processes physically bind the contaminants within a stabilized mass to reduce the mobility of the contaminants.

Chemical processes include chemical stabilization and chemical extraction. Chemical stabilization uses chemicals to cause reactions between the contaminants and the stabilizing agent to reduce their mobility. Chemical extraction uses various chemicals to extract or leach contaminants from the waste to reduce the volume of the radioactive materials requiring management as low level radioactive waste. These technologies are primarily applicable to soils and sediments.

Bioremediation is the use of microorganisms (i.e., fungi, bacteria, and other microbes) to degrade organic contaminants in the soil and/or ground water. Although bioremediation cannot degrade inorganic contaminants such as those in the North County Site soils, it may be able to convert the inorganic contaminants into a stable form.

Thermal treatment processes use high temperatures to volatilize, decompose, or melt the contaminants. Incineration and vitrification are the primary thermal treatment processes. Incineration uses high temperatures to volatilize and combust organics in waste materials. Incineration would not be effective for the inorganic contaminants present in the North County Site soils. Vitrification uses high temperatures to melt soils to form a glasslike matrix. Vitrification is effective in reducing the mobility of the contaminants within the media.

Ancillary treatment technologies that may be used to support the primary remedial actions include ground-water and surface-water treatment, which would be used to treat water that becomes contaminated during removal operations. Air stripping uses air to remove water-borne organics and radon gas. Liquid-phase carbon adsorption is used as a polishing step to treat hard-to-remove organics and radionuclides. Ion exchange and reverse osmosis (membrane filtration) can remove radionuclides and concentrate the radionuclides from the aqueous stream. Ion exchange involves the interchange (or adsorption) of ions between the aqueous solution and a solid resin. Reverse osmosis can be used to remove radioactive contaminants by taking advantage of the differential movement of dissolved material across a membrane. Evaporative recovery uses the distillation process to produce distillate and a waste concentrated stream. It can be a pretreatment step before ion exchange.

Decontamination techniques are retained as ancillary treatment technologies should building contamination be encountered during the remediation. Although the Remedial Investigation (RI) has not identified building contamination, these technologies could be used if building contamination were found during remediation. Physical procedures include vacuuming, scrubbing, scraping, sanding, grinding, scabbling, and blasting. These methods use physical force to achieve mechanical separation of the contaminant from the surface being treated. Chemical procedures involve the use of chemicals (solvents, complexing agents, acids) to dissolve or suspend the contaminant in the decontamination fluid for removal from the surface being treated.

Metals from the buildings and structures can also be sent to qualified vendors for melting and recycle.

3.5 REMEDIATION GOALS (RGs)

The remediation goals proposed for the North County Site comply with ARARs, are protective of human health and environment and are consistent with the NCP. They are protective under conditions of RME for residential site conditions (see Preamble to the final rule for 40 CFR 192 as specified in 48 FR 600 and the Final Environmental Impact Assessment). No directly applicable chemical-specific requirements are identified. Relevant and appropriate requirements are identified for radioactive contaminants in soil. Remediation goals for other contaminants in soil are derived using site-specific evaluations. Risk and dose assessments were also performed to assure protectiveness in light of multiple contaminants and multiple pathways (e.g., inhalation, ingestion, and direct exposure) at the North County Site. The remediation goal for Ra-226 is set forth in 40 CFR 192, Subpart B. Site-specific remediation goals for U-238 and Th-230 are derived in accordance with 10 CFR 40, Appendix A, Criterion 6(6) and 40 CFR 192, Subpart A. Table D-11 lists concentrations that produce the radium benchmark doses for the key St Louis North County Site radionuclides for a range of potential receptors. The remediation goal for Th-230 accounts for the in-growth of Ra-226 which is the limiting risk consideration.

No chemical-specific requirements were identified for non-radiological contaminants. Remediation goals were derived based on site-specific exposure assumptions, and with the objective of meeting the acceptable risk range as provided in the NCP (See Appendix D, Section D.2.2.2). According to the NCP, acceptable exposure levels to known or suspected carcinogens are levels that represent an excess upper bound lifetime cancer risk to an individual of between one in 1,000,000 (10^{-6}) and one in 10,000 (10^{-4}). The EPA establishes preliminary remediation goals (PRGs) for all carcinogenic chemicals at the 10^{-6} level, also known as the point of departure. Final remediation goals may be different based on factors such as uncertainty, technical limitations on detection, or other considerations consistent with the remedy selection criteria defined in the NCP. In this case, practical limits on the ability to distinguish between naturally occurring background levels and very small increments above background require the use of final remediation goals that exceed the 10^{-6} level for some of the non-radiological contaminants; however, final cleanup levels remain within the acceptable risk range. Aggregate risks from final cleanup levels are also within the risk range. Remediation goals for non-carcinogens were developed to ensure that the cumulative toxic effects would result in a HI < 1.0.

The soil cleanup standards found in 40 CFR 192, Subpart B, were developed specifically for the cleanup of uranium mill tailings sites designated under Section 102 (a)(1) of the Uranium Mill Tailings Radiation Control Act (UMTRCA). These standards are intended to provide for unrestricted use of remediated properties. These standards address contaminants and circumstances similar to those found at the North County Site and are, therefore, considered relevant and appropriate to soil cleanup at the North County Site. The surface and subsurface soil criteria in 40 CFR 192, Subpart B for radium–226 are 5 and 15 pCi/g, respectively. The surface remediation goal applies to the 100 m^2 areal average concentration above background in the top 15 cm (6 in.) layer. The subsurface remediation goal applies to the 100m^2 areal average concentration above background in any subsequent 15 cm (6 in) layer. The Ra-226 remediation goal of 5 and 15 pCi/g in surface and subsurface soils has been used with St Louis sites pursuant to the Record of Decision for the St Louis Downtown Site and to Engineering Evaluation/Cost Analyses for the St Louis North County Site. Implementation of the subsurface remediation criterion for Ra-226 results in actual average residual concentrations of Ra-226 significantly less than 5 pCi/g. This is based on cleanup results of a number of different areas and properties within the St Louis North County Site and St Louis Downtown Site, using cleanup goals of 15 pCi/g subsurface criterion for Ra-226 in combination with subsurface cleanup goals of 15 and 50 pCi/g for Th-230 and U-238, respectively. Table D-9 (Section D.2.1) lists the residual radionuclide concentrations at properties where response actions have been completed.

The site-specific Th-230 and U-238 remediation goals are derived based on the 10 CFR 40, Appendix A, Criterion 6(6), also referred to as the benchmark dose approach. These requirements supplement the standards found in 40 CFR 192.

The U-238 goal was established using U-238 as a surrogate for all of the uranium isotopes (including U-234 and U-235) and certain uranium decay products. Using the U-238 as a surrogate, the residual concentration was determined to be about 81 pCi/g. However, since some of the decay products are present above the natural abundance, the site-specific remediation goal of 50 pCi/g for U-238 is considered appropriate. Site experience shows that a 50 pCi/g limit is reasonably achievable at little extra cost. This limit has been used on the St Louis North County Site for removal actions conducted by USACE and the DOE since 1991 and is the site-specific Remediation Goal for U-238 established in the Record of Decision for the St Louis Downtown Site.

Table D-11 of Appendix D, presents the calculation resulting from 10 CFR 40, Criterion A, Criterion 6(6), and lists the most restrictive Th-230 concentration as 330 pCi/g. This concentration, although protective with respect to Th-230, would result in the in-growth of Ra-226 such that future concentrations of Ra-226 would exceed the limits specified in ARARs. 40 CFR 192.02(a) requires that the selected remedial action be designed to be effective for up to 1000 years to the extent reasonably achievable, and in any case, for at least 200 years. To ensure ARAR is met, the ingrowth of Ra-226 from the Th-230 decay process must be calculated and examined. A soil concentration of 14 pCi/g of Th-230 would result in the in-growth of 5 pCi/g Ra-226 concentration at the end of the 1000-year time period stated in 40 CFR 192.02(a). Although a subsurface soil concentration of 43 pCi/g would result in the in-growth of 15 pCi/g Ra-226, EPA's guidance documents for the cleanup of CERCLA sites using 40 CFR 192 as ARAR set forth EPA's expectation that remediation of subsurface soil contamination will, in practice, achieve the surface cleanup criterion of 5 pCi/g for Ra-226. (See OSWER 9200.4-25, "Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA Sites). EPA approval of the ROD is contingent upon satisfying EPA's expectations for cleanup of CERCLA sites; therefore, USACE has adopted, on a site-specific basis, Th-230 surface and subsurface soil cleanup levels that are consistent with a residual Ra-226 concentration of 5 pCi/g. Constraining the concentration of Th-230 in surface soils to 14 pCi/g and subsurface soils to 15 pCi/g along with the use of the unity rule assures that the concentration of Ra-226 does not exceed 5 pCi/g during the 1000-year time period.

No remediation goal is developed for Th-232. Removal of Th-230 to the remediation goals will effectively remove Th-232 present in site soils. Analytical data indicate that Th-232 is co-located with Th-230 and is present at relatively low concentrations. Removal of soils to the radionuclide criteria results in Th-232 concentrations of less than 1.5 pCi/g including background for SLAPS, SLDS, and North County VPs. Residual concentrations do not produce risks significantly above background.

Remediation goals for radiological contaminants of concern for the St Louis North County Site soils are 5/14/50 pCi/g for Ra-226, Th-230 and U-238 in surface soils and 15/15/50 pCi/g for subsurface soils. These remediation goals are consistent with the remediation standards used in Engineering Evaluation/Cost Analyses (EE/CAs) by DOE prior to transfer of FUSRAP execution to USACE, in USACE EE/CAs, and in local Records of Decision both at the St Louis Downtown Site and by DOE at the Weldon Spring Site Remedial Action Project. These remediation goals meet the threshold criteria of overall protection of human health and the environment and compliance with ARARs and will achieve a final status that requires no restrictions on land use.

For the North County Site, Ra-226, Th-230, and U-238 have been used as surrogates for other radionuclides. Applying this approach, Th-230 is a surrogate for Th-232 and Th-228 and U-238 is a surrogate for other uranium isotopes (U-234 and U-235) and certain decay products [protactinium-231 (Pa-231) and actinium-227 (Ac-227)].

Supplemental cleanup standards have been developed for subsurface materials at the primary storage areas (SLAPS and HISS/Futura) under the containment and treatment alternatives (Alternatives 2 and 3) to ensure protectiveness under commercial/industrial use. These supplemental standards are appropriate in accordance with criteria specified in 40 CFR 192.21 (c), which states that supplemental standards may be applied under circumstances where removal would result in excessive remedial action costs relative to the long-term benefits and the residual radioactive materials do not pose a clear present or future hazard, given the design configuration and appropriate institutional controls. The supplemental standards for subsurface materials at the primary storage areas are to be used in conjunction with institutional controls. For those remedial alternatives involving land use restrictions at SLAPS and HISS/Futura (Alternatives 2 and 3), supplemental standards of 25/70/250 pCi/g above background for Ra-226/Th-230/U-238 would be used for subsurface soils. These supplemental standards would protect the most likely current and future receptors (e.g., construction and utility workers) and ensure that doses to the general public would be limited to less than 100 mrem/yr if institutional controls were lost.

The benchmark dose approach defined in Criterion 6(6) was applied using EPA methods and exposure factors in development of the Coldwater Creek subsurface sediment remediation goals. The remediation goal derived for subsurface sediments (i.e., 15 pCi/g of Ra-226, 43 pCi/g of Th-230 and 150 pCi/g of U-238 above background) is implemented for soils and sediments under the mean water gradient for Coldwater Creek. This remediation goal assures protectiveness of Coldwater Creek under all future anticipated land use conditions (e.g., recreational/trespasser, maintenance, construction, and utility uses) and minimizes adverse environmental impact associated with greater excavation in Coldwater Creek.

Other site contaminants derived from the uranium ores tend to be co-located with the principal radionuclides such that remediation of the contaminated soil to the cleanup levels described above is expected to adequately remove all ore-related contaminants. Supporting information is presented in Appendix D (Section D.2.1 and Table D-10). To verify that removal of radiological contaminants achieve remediation goals for non-radiological contaminants associated with the uranium processing activities, chemical sampling will be conducted as required during pre-design investigation and as part of the final status survey pending confirmation of co-location with radiological contaminants.

No ARARs have been identified for the non-radiological contaminants in soils at the North County Site. The remediation goals for non-radiological COCs were developed based on site-specific risk assessments and hazard evaluations. At the North County Site, eleven non-radionuclides are identified as COCs for soils: antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium. These noncarcinogens have different effects on different organs or systems in the body. The remediation goals for noncarcinogens were developed to ensure that the cumulative effect of the chemical levels of the COCs produces a HI < 1.0 for each target organ/system affected. In addition, remediation goals were selected at levels above detection limits and background levels.

Toxicologists evaluated the primary effects of the 11 metals in the soils at North County. The HIs were calculated for all six different types of receptors – residential, industrial, construction worker, maintenance worker, recreational/trespasser, and utility worker. Generally, the construction worker was identified as the most sensitive receptor, except for a few cases where the residential receptor was the most sensitive or restrictive scenario. The remediation goals for all non-radionuclides were calculated based on the HIs for the different primary target organs. The protectiveness to each primary organ was tested by adding up the HIs of the corresponding COCs targeted to that primary organ. In each case, the HI value was less than one.

Remediation goals have been derived for the 11 surface soils and 4 subsurface soil non-radiological COCs, based on their noncarcinogenic effects. These proposed remediation goals are presented in Table ES-6. Surface and subsurface soil remediation goals for antimony, arsenic, thallium, and uranium are 15/25 mg/kg, 36/40 mg/kg, 25/30 mg/kg, and 150/150 mg/kg, respectively. Seven additional non-radiological COCs were identified for surface soil only. The applicable remediation goals are as follows: 2800 mg/kg barium, 12 mg/kg cadmium, 350 mg/kg chromium, 1,000 mg/kg molybdenum, 1,500 mg/kg nickel, 300 mg/kg selenium, and 112 mg/kg vanadium. Antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium are identified as COCs for SLAPS and contiguous areas; and antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, and vanadium are identified as COCs for HISS/Futura and Latty Avenue VPs 2L and 10k530087. The non-radiological COCs will be evaluated in the final status survey pending confirmation of their co-location with radiological COCs to verify that risk and hazard criteria are fully protective under CERCLA and have been satisfied.

The proposed remediation goals (summarized in Table ES-4 for radionuclides and Table ES-5 for other chemicals) are protective based on the future anticipated land use, are achievable, and can be implemented. Further cleanup goals comply with the ARAR criteria for radionuclides and would achieve protectiveness to levels within the CERCLA risk range and below a HI of 1.0.

3.6 REMEDIAL ACTION TECHNOLOGIES AND PROCESSES IDENTIFIED FOR THE NORTH COUNTY SITE

3.6.1 Overview of the Identification of Technologies

Remedial action technologies were identified and evaluated in detail in the Initial Screening of Alternatives (ISA) Report for the St. Louis Site (SAIC, 1992) and were updated during the preparation of this FS. Table 3-2 summarizes the potentially applicable remedial action technologies that were identified. Table 3-3 provides a summary of potential technologies sorted by medium. Technologies and process options for each response action are discussed in more detail in the following subsections.

Table 3-2. Potential Technologies and Process Options for the North County Site

Response Action	Potential Technology	Process Options
Access Controls	Site security	Physical barriers, signs, security patrols, guards
Institutional Controls	Zoning restrictions	Zoning restrictions
	Land use restrictions, notices, and ownership	Land use notices, deed notices, easements, well use advisories, well drilling prohibitions, government ownership
Containment	On site full encapsulation cells	UMTRCA, UMTRCA like, Subtitle C or D
	Cap	Multi-media, clay, asphalt, concrete, synthetic
	Soil and vegetation cover	
	Storage pile covers	Geotextile, spray coatings, tarps
	Dust mitigation	Water spray, foam
Removal	Excavation	
	Dredging	Hydraulic, pneumatic
Treatment	Immobilization & stabilization	Asphalt, resins, bitumen, cementation, silicate based mixtures
	Soil washing	Size separation, chemical separation, gravity separation, magnetic separation
	Vitrification	Microwave, melter, in-situ
	Recycle to uranium mill	
	Solvent extraction	
	Soil sorting	Physical sorting, radionuclide detection
	Size reduction	Crushing, cutting, shredding
	Bioremediation	
	Phytoremediation	Rhizofiltration, phytoaccumulation
	Dewatering	
	Incineration	

Table 3-3. Potential Technologies Sorted by Media Where COCs Were Identified

General Response Action	Soils	Sediments in Coldwater Creek
Institutional Controls and Access Controls	Zoning restrictions Easements, covenants, deed notices, and ownership	Zoning restrictions Easements, covenants, deed notices, and ownership
Containment	Cap Full encapsulation cell Soil cover Revegetation	Revegetation Combine with soils
Removal of Contamination Sources	Excavation	Dredging of channel
Treatment	Immobilization Vitrification Soil washing Recycle to uranium mill Soil sorting Biological techniques Phytoremediation Dewatering Incineration	Dewatering Phytoremediation Soil washing Combine with soils

3.6.2 No Further Action

No further action provides a baseline for comparison with other alternatives as is required under CERCLA. No further action provides no additional protection of human health and the environment. No remedial actions would be taken to reduce, contain, or remove contaminated soils, and no effort would be taken to prevent or minimize human and environmental exposure to residual contaminants. Off-site migration of contaminants would not be mitigated under a no further action alternative. Five-year reviews would be conducted pursuant to CERCLA for areas in which contamination is such that conditions do not allow for unlimited use and unrestricted exposure.

3.6.3 Technologies and Process Options for Institutional Controls (All Media)

Institutional controls are legal and administrative mechanisms that manage access to or use of property, or warn of a hazard. There are four categories of Institutional controls: (1) Proprietary Controls, (2) Government Controls, (3) Enforcement and permit tools with institutional control components, and (4) Informational Devices.

The implementability of institutional controls depends on arrangements that can be achieved with public and private owners in different government jurisdictions. The NCP has outlined certain criteria to help evaluate whether or not the use of institutional controls would be acceptable in lieu of treatment. The specific characteristics of each site determine which institutional controls are appropriate. The legal impediments and financial costs would affect the implementability and schedule. Several kinds of institutional controls are considered including land-use restrictions through zoning, easements, covenants, advisories and notices, and site ownership. It would still be necessary to continue with monitoring and five-year reviews of any properties that contain residual contamination above levels acceptable for unrestricted use.

In accordance with 10 CFR 40, benchmark doses which exceed 100 mrem/yr before application of ALARA require the approval of the (NRC) Commission after consideration of the recommendation of the staff. This dose criterion is the basis for development of supplemental standards in accordance with 40 CFR 192.21, and is consistent with exposure limits applicable to members of the public. Thus, any alternative that includes institutional controls should also be evaluated against this recommended limit in the absence of institutional controls.

3.6.3.1 Proprietary Controls

A proprietary control is a private contractual mechanism contained in the deed. Proprietary controls involve placement of restrictions on land through use of easements, covenants, and reversionary interests. Easements, covenants, and reversionary interests are nonpossessory interests which give their holders the right to use or restrict the use of land, but not to possess it.

A landowner can impose restrictions on the deed to his property, such as an easement, a covenant, or a reversionary interest. Some restrictions that could be considered for the North County Site include the following requirements:

- the property would not be used for residential purposes, now or in the future;
- ground water would not be used for any purpose;
- gardens would not be planted on the property;
- any buildings placed on the property must be properly ventilated for radon; and
- no construction of any type would be allowed without the written approval of the government.

Restrictions need to exist in perpetuity and the restrictive language must effectively "run with the land". Recordable and permanent interests (easements) are necessary to ensure proper notice to the public until such time as "clean-site" releases are authorized and granted.

Easements allow the holder to use the land of another or to restrict the uses of the land. For example, a conservation easement restricts the owner to uses compatible with conservation of the environment. If an owner violates an easement, the holder may bring suit against the owner.

An appurtenant easement provides a specific benefit to a particular piece of land, such as allowing a neighbor to walk across your land to get to a beach. An easement in gross benefits an individual or company, such as allowing a utility company access to land to lay a gas line.

An affirmative easement allows the holder to use another’s land in a way that, without the easement, would be unlawful. A negative easement prohibits a lawful use of land such as creating a restriction on the type of development that can be conducted on the land.

Covenants are promises that certain actions have been taken, will be taken, or will not be taken. Covenants can bind subsequent owners.

An affirmative covenant is a promise that the owner will do something that the landowner might not otherwise be obligated to do, such as maintain a fence around a landfill. A negative covenant is a promise that an owner will not do something that may otherwise be done, such as restricting the use of ground water on a property.

A reversionary interest places a condition on the transferee's right to own and occupy the land and if the condition is violated, the property is returned to the original owner or successor. Each owner in the chain of title must comply with the conditions that are placed on the property, and if violated, the property returns to the original owner, despite intervening property transfers.

The costs associated with imposition of institutional controls would be expected to include the legal costs and the actual payment to landowners for the legal "taking" of their rights with respect to their properties. The projected costs for such a taking are difficult to project, but could be substantial. Elevated costs would be anticipated for future management of soils not meeting unrestricted release criteria. In the event USACE decides to purchase properties outright, it would have the right to include restrictions to restrict access or use of the property. Such restrictions could last indefinitely.

3.6.3.2 Governmental Control

Governmental controls are restrictions that are within the traditional police powers of state and local governments. Permit programs and planning and zoning limits are examples of governmental controls (U.S. Army, 1997).

Zoning use restrictions are imposed through a local zoning authority and may discourage uses that conflict with a CERCLA remedy. Land use restriction through zoning provides restrictions on the types of land use allowed. Zoning restrictions are intended to prohibit activities that could disturb certain aspects of a remedy or to control certain exposures not otherwise protected under a remedy. Zoning restrictions have inherent weaknesses. Zoning laws can be repealed or exceptions to them can be granted by the government. Also, they are not effective unless a government commits the resources to monitor and enforce the restrictions over the long term.

Pre-existing uses that violate the terms of a new zoning resolution are called non-conforming uses. Frequently, non-conforming uses are excused from the new zoning requirements and are allowed to continue until the use is terminated or abandoned by the property owner. Once the non-conforming use is terminated or abandoned, the new zoning restrictions would apply to any land use. Generally, a non-conforming land use is considered abandoned when there has been a cessation in the land use for a period of about two years.

Other examples of governmental controls include siting restrictions, which control land use in areas subject to natural hazards such as flooding. These restrictions are created by state statutory authority or by local laws and ordinances.

3.6.3.3 Enforcement and Permit Tools with Institutional Controls Component

Under sections 104 and 106(a) of CERCLA, Unilateral Administrative Orders (UAOs) and Administrative Order of Consent (AOCs) can be issued or negotiated to compel the land owner (usually a potentially responsible party) to limit certain site activities at both Federal and private sites; Consent Decrees (CDs) can also be negotiated at private sites under 122(d). Similarly, EPA can enforce permits, conditions and/or issue orders under RCRA sections 3004(u) and (v), 3008(h), or 7003. These tools can have shortcomings that can jeopardize the protectiveness of the remedy. For example, most enforcement agreements are only binding on the signatories, and the property restrictions are not transferred through a property transaction. In order to prevent loss of protectiveness, the enforcement tool should contain provisions requiring oversight agency notification and/or approval prior to a property transfer. This provision would allow negotiation of an agreement with new owner.

3.6.3.4 Informational Devices

Informational tools provide information or notification that residual or capped contamination exists on-site. Common examples include state registries of contaminated properties, deed notices, and advisories. Due to the nature of some informational devices and their potential nonenforceability, it is important to carefully consider the objective of this category of institutional controls. Informational devices are most likely to be used as a secondary "layer" to help ensure the overall reliability of other institutional controls.

3.6.4 Site Security Measures

Site security measures can be used in conjunction with institutional controls. These measures include the use of fences, berms, and warning signs around a contaminated site to prevent unauthorized access. Security personnel can be used to deter unauthorized access to the site. All of these measures are designed to minimize the potential for direct human contact with contaminated media. Because properties are not owned by USACE, it would be necessary to negotiate an agreement with the property owners, or to negotiate land or resource restrictions with the appropriate local governments.

3.6.5 Short- and Long-Term Environmental Monitoring

Environmental monitoring would be conducted in conjunction with all remedial alternatives in order to evaluate contaminant levels during ongoing remedial actions, to assess the effectiveness of remedial actions, and to ensure that off-site migration of contaminants is detected and mitigated. Environmental monitoring is sometimes considered an institutional control, but monitoring is analyzed separately for this evaluation. Environmental monitoring would be tailored to the selected remedial alternative so that monitoring objectives are realized. An adequate monitoring program considers periodic sampling of all media that would be affected by the continued presence of contaminants on the site. Periodic monitoring should be conducted for air (for radon emissions, particulates, and external gamma radiation), sediments (to measure surface runoff impacts and measure levels of contamination in creek sediments further downgradient from the site), and ground water at representative locations comprising the North County Site.

Air Monitoring

Short-term monitoring of unremediated soil areas would consist of radiation surveys to determine if radon, contaminated particulate, or gamma levels are exceeding proposed levels protective of human health.

Sediment Monitoring

Periodic monitoring of sediments in ditches or in Coldwater Creek would determine whether contaminants are being transported to the creek via surface water runoff or ground water discharges. Contaminant concentrations would be monitored downstream in areas of known sediment deposition and quiescent flow conditions and would be compared with background samples. The degree of monitoring required, whether a short-term assessment or long-term monitoring of creek sediments, would be determined by the selected remedial action.

Ground-Water Monitoring

Ground-water monitoring would consist of radiological and chemical analyses of samples collected from ground water underlying and surrounding the site. Monitoring would be implemented using upgradient and downgradient wells in order to assess potential impacts from contaminated soils and sediments.

Surface-Water Monitoring

Surface-water monitoring includes chemical and radiological monitoring of surface waters in order to determine whether dissolved contamination is present and whether it has any adverse environmental or health safety impact.

3.6.6 Technologies and Process Options for Containment

Containment actions include technologies that protect human health and the environment by physically blocking contact with the contamination. The contaminated media are neither chemically nor physically changed, nor are the volumes of contaminated media reduced. Containment response actions prevent contaminant migration and eliminate exposure paths.

Engineered cells and engineered multi-layered caps with soil covers can be used to cover the contaminated soils and sediment. Applying a sealant can contain the radionuclides present on the surface of buildings and structures. For ground-water containment, actions involve separating the contamination source from the water and controlling migration of ground water from the site through the installation of vertical or horizontal barriers.

3.6.6.1 Engineered Cell

An engineered cell would have to be constructed on land owned or acquired by USACE. Additional acreage would be needed for monitoring wells, a buffer zone, and retention ponds. For a disposal cell, all wastes present at SLAPS would be excavated and set aside in a temporary storage area while an impervious base is built on-site. The disposal facility would incorporate engineered barriers into the design of the bottom clay liner and multilayer cover systems which would provide isolation of the waste from the environment.

Typical operations and maintenance (O&M) requirements for the disposal facility would include:

- *Environmental Monitoring* – Ground water would be monitored as required. This monitoring system must provide early warning of radionuclide release from the disposal site before the material is transported beyond the site boundary.

- *Regular Maintenance of Cover* – Mowing, tree removal, and prevention of human or animal intrusion into stored wastes would be required to maintain the integrity of the disposal facility.

- *Maintenance of Institutional Controls* – Access controls, such as, fences, and signs, and institutional controls would be inspected regularly and maintained as required to control accidental intrusion into the stored waste.

The effectiveness of a disposal cell would be monitored through several systems. During active operation, any runoff generated from the waste placed in the engineered on-site disposal cell would be captured by the passive runoff system, directed to sumps, and treated in the water treatment plant. Percolation through the cell cover due to precipitation would also be captured by the passive runoff system. The disposal cell cover would be visually inspected periodically to identify and repair any areas of erosion, animal burrowing activities, or deep root growth. Radon emanation would also be monitored after closure in order to minimize the potential for exposure. Survey markers would be placed on the disposal cell to aid in assessing settling. Ground-water monitoring wells would be installed to detect changes in ground-water quality. If contamination were detected in the monitoring wells, a thorough inspection and repair program would be initiated. The monitoring system associated with the on-site disposal cell would provide the information needed to determine whether corrective action should be taken to prevent the migration of contaminants into the environment.

3.6.6.2 Engineered Caps

Specific design issues for the cap would be studied and addressed in detail during the remedial design phase. The proposed capping system would be designed and constructed to:

- promote long-term minimization of surface-water infiltration through the waste matrix;
- reduce external gamma radiation and radon emissions;
- function with minimal maintenance; and
- accommodate settling and subsidence to ensure the integrity of the cover.

Native soil, clay, a synthetic liner, or a multimedia cap can provide containment of contaminants in soils. The availability and cost of the material required to construct the cap needs to be considered when planning the final design.

Geotechnical analyses, including permeability testing, density testing, and moisture content would be required if clay or native soil were used as the capping material. Geotechnical logs have shown that in-situ contaminated soil would require compaction to control subsidence. Excavation of contaminated material, screening out of deleterious materials, then spreading and compacting the waste could be used to ensure the viability of a cap. Another approach to addressing subsidence would be to use a temporary cover until the in-situ contaminated soil is stable and the cap could be applied.

3.6.6.3 Ancillary Containment Technologies

Current data indicate that response action alternatives for application to buildings are not required. Although no problems have been found, there is a potential for elevated levels of radon (a decay product of Ra-226) to be discovered during the cleanup process. For that reason, containment technologies for buildings (surface sealing and radon control) are retained as contingencies. Radon controls systems can be either passive or active collection systems. Both containment and removal type systems are described here. Active and passive collection systems around building structures and ventilation systems inside buildings are effective in controlling radon gas from underlying soils. Sealing basement walls and floors will also reduce radon entry into buildings. This method will only be effective if the surfaces are continuous (no cracks or open spaces) and can be completely coated with a nonporous sealant. Electrostatic precipitators are effective in minimizing particulates (e.g., dust), including radon decay products inside buildings.

Remedial actions for addressing surface water and ground water as contaminant source media are not required. However, in order to prevent contact of uncontaminated ground water or surface water with contaminated soils, and in order to prevent migration of contaminated ground water or surface water, surface-water and ground-water containment technologies have been retained as contingency options. Potential containment technologies for ground water include horizontal and vertical hydraulic barriers. Based on the site hydrology, hydraulic barriers for control were determined to be potentially viable. Potential surface water control technologies include grading, revegetation, and diversion controls. Dikes and berms are well-compacted earthen ridges or ledges constructed immediately upslope from, or along the perimeter of, contaminated areas. These structures serve as a diversion for surface-water flow, and are generally designed to provide temporary protection (usually one year) of critical areas by diverting surface runoff around areas of contamination. Dikes and berms could possibly be implemented along Coldwater Creek until contaminated sediments are remediated. This technology could also be implemented at the drainage ditches leading from the site to Coldwater Creek.

3.6.7 Technologies and Process Options for Removal

3.6.7.1 Excavation

Contaminated soil at the site can be partially or completely excavated with conventional earth-moving equipment including backhoes, bulldozers, front-end loaders, and manual techniques. Equipment to be used is determined by many factors, including the area to be remediated, the area available for operations, the depth of the excavation, and the capabilities of the equipment. Manual excavation techniques are used where insufficient space precludes the use of conventional equipment. Conventional construction techniques would be employed to minimize impacts to ground water and surface water during excavation.

Contaminated surface soils that cover smaller areas may be excavated using digging equipment such as backhoes. Bulldozers or front-end loaders can remove relatively shallow, wide areas of contaminated soil. Bulldozers are versatile machines used on a variety of projects such as moving earth for short haul distances, spreading earth fill, backfilling trenches and pits, clearing sites of debris, and pushing debris into loading areas. Front-end loaders are used extensively in construction to load bulk material such as soil, rocks, and rubble into dump trucks;

to move earth forward for short distances; and to excavate. Self-loading scrapers could be used for wide, shallow contaminated soil areas.

Generally effective to a depth of 1 to 2 feet (ft) [0.3 to 0.6 meters (m)], front-end loaders can scoop surface soils either into a temporary pile that can then be loaded in dump trucks, or some other similar container for transport, or directly into the transport container. Loaders are generally most effective on coarse, noncohesive soils. The depth of excavation must be taken into account because there is a physical limitation on the reach of hydraulic arms. If soil removal must extend beyond 1- or 2-ft depths, hoes usually work better because of their greater depth-handling capacity. The term "hoe" applies to any excavating machine of the power-shovel type (e.g., hoe, backhoe, back shovel, or pull shovel). Hoes are most suited to excavating trenches and pits, and to general grading work that requires precise control of excavation depth. They are superior to drag lines for close-range work, and for loading excavated material into dump trucks. Hoes can work from a clean area, contaminating only their buckets. Contaminated soil in certain locations, such as next to buildings or culverts, can be accessed with backhoes using smaller buckets, or with smaller earth removal equipment.

Dump trucks are used to haul soil, rock, aggregate, and other material. Because of their speed, they provide high earth-moving capacity at relatively low hauling cost. They also provide a high degree of flexibility because the number and types of trucks in service may easily be increased or decreased to modify the total hauling capacity of a fleet.

In some cases, it may be necessary to reroute drainage culverts to gain access to soils under them, or to use smaller equipment, possibly to the extent of using shovels to remove soil manually. Excavation and removal of contaminated sewer and drain lines would involve tracing a line through a variety of techniques (dyes, smoke, radio transmitters).

Field monitoring would be conducted during soil excavation to ensure that all contaminated soils have been removed to the specified remediation level. As required, samples may be collected from the excavation side walls and bottom for laboratory analyses to confirm the results obtained during field monitoring.

3.6.7.2 Dredging (Coldwater Creek Sediments)

The process of removing sediments from a water body is known as dredging. There are several types of dredging, but three dredging technologies commonly used in the removal of contaminated sediment are mechanical, hydraulic, and pneumatic.

Mechanical dredging is an excavation operation similar to conventional earth moving. Hydraulic dredging technologies use suction to dislodge, capture, and transport contaminated sediment to the staging area. The third type, pneumatic dredging, is similar to hydraulic dredging, but uses compressed air to pneumatically lift the sediment. Pnuematic dredges pick up less water than hydraulic dredges, but they do not work well in shallow areas. Hydraulic dredging was selected for Coldwater Creek because the technique is applicable in relatively calm streams with very shallow depths. In Coldwater Creek, extended areas of contaminated sediment could be vacuum-dredged with a horizontal auger dredge or a modified cutterhead dredge capable of removing contaminated cohesive sediments at a rate of 10 to 30 cubic yards per hour (yd^3/hr) with minimal disturbance. Hand-held hydraulic dredges controlled by wading operators could be used in small isolated locations where shallow sewer lines are known to exist as well as in shallow sections of the creek. Slurried sediment could be piped to a mobile filtration system for dewatering.

3.6.8 Technologies and Process Options for Treatment

3.6.8.1 Dewatering (Soil and Sediments)

Dewatering techniques can be used to reduce the water content of the soils and sediments which in turn will reduce the volume and allow easier materials handling. Potential dewatering processes considered for the North County Site soils were filter presses and evapotranspiration.

Filter presses can produce a relatively dry filter cake with up to 60 percent solids. The water removed through the filtration process is likely to have acceptable contaminant concentration levels to allow discharge back into the creek. Evapotranspiration is accomplished by land farming the soils and sediment onto a liner to allow the water to naturally evaporate. With both dewatering processes, the dewatered solids would be transported in dump trucks to the SLAPS staging areas to be consolidated with other soils.

3.6.8.2 Size Reduction

Concrete crushing, metal shredding, and compaction are size reduction techniques that have been successfully used at other FUSRAP Sites. These processes make the materials easier to handle, transport, and dispose, and in some cases reduce the waste volume.

3.6.8.3 Soil Separation

Separation can be accomplished by screening the soils to remove large objects and debris. This process can be used alone or as a pretreatment step for soil washing or soil sorting. The oversized materials removed by the screen are likely to be non-contaminated. Non-contaminated oversized materials could be placed back on the site or disposed of as non-radioactive industrial waste. The remaining soils would be consolidated with other site soils. Soil separation could reduce the volume of soils requiring management as radioactive materials.

3.6.8.4 Soil Sorting

Soil sorting involves the mechanical sorting of soils based on radionuclide concentrations to separate contaminated soils from the clean soils. The most prevalent soil sorting systems use gamma radiation detectors to identify the contaminated soils. Field testing of this technology would be required to ensure its effectiveness due to the presence of Th-230 (an alpha emitter) in the North County Site soils. Two primary advantages of soil sorting as compared to other technologies (such as soil washing) are that this technology does not produce any secondary waste (such as process waste water) and does not require process additives.

3.6.8.5 Soil Washing

Soil washing can achieve volume reduction of the soils and sediments in two ways: (1) by dissolving or suspending the contaminants in the wash solution or (2) by concentrating the contaminants into a smaller volume through particle size separation. Soil washing systems that incorporate both techniques achieve the greatest success with soils contaminated with radioactive, heavy metal, and organic constituents. Soils containing large amounts of clay and silt, such as those at the North County Site, are typically not effectively treated by conventional soil washing systems. However, soil washing can be enhanced by incorporating other physical and chemical processes to more effectively treat these types of soils. Laboratory characterization and technology screening tests on the North County Site soils indicate that soil washing, enhanced by or combined with chemical extraction, could reduce the volume of soils requiring management as radioactive waste.

Following treatment, the smaller volume contaminated soil fraction could be processed through an additional treatment process (such as stabilization), or could be dewatered and disposed. The clean soils from the treatment process could be placed back on the site, or could be reused at another site. During operation the majority of the soil washing process water is filtered and recycled back into the treatment system. A small volume of this water stream would require periodic discharge.

3.6.8.6 Immobilization

Immobilization technologies use various cement- and silicate-based mixtures to act as binding agents to minimize the migration of the contaminants. However, as discussed in Section 2.2.4.2 of this FS, the contaminants in the North County Site soils are not very mobile, primarily because the clayey soils tend to bind the radionuclides. Most immobilization processes result in a significant increase in volume (up to double the original waste volume). Immobilization was eliminated from further consideration because of the volume and cost increases associated with this technology.

3.6.8.7 Chemical Stabilization

Chemical stabilization is similar to immobilization, except that the decrease in contaminant mobility is achieved by a chemical reaction between the contaminant and the stabilizing agent. Because the contaminants in the St. Louis soils are not very mobile, treatment by chemical stabilization would not be cost effective. Like immobilization, chemical stabilization was eliminated from further consideration because of the volume and cost increases associated with this technology.

3.6.8.8 Chemical Extraction

Chemical extraction technologies use chemicals to leach contaminants from the soil and create a treatable liquid waste stream. The extraction agent is separated from the contaminant, usually in ways that enable the extraction agent to be fully reconstituted and reused. Extracting contaminants from fine soil particles, such as those at the St. Louis Site, may require longer leaching times than would coarser-grained soils. Laboratory testing has been performed on the St. Louis soils to evaluate the use of chemical extraction combined with soil washing. The results of the tests showed that chemical extraction provided significant removals of the radioactive contaminants. Additional discussions regarding chemical extraction are included in the discussions on soil washing.

3.6.8.9 Bioremediation

Bioremediation technologies are destruction or transformation techniques directed towards stimulating microorganisms to grow and use the contaminants as a food and energy source by creating a favorable environment for the microorganisms. Bioremediation is not generally applicable for the treatment of inorganic contaminants, such as those at the St. Louis Site. Therefore, bioremediation was eliminated from further consideration.

3.6.8.10 Phytoremediation

Phytoremediation is an emerging technology that uses metal-accumulating plants to remove toxic contaminants from soils. The plants are harvested and disposed, leaving the soil available for reuse. Phytoremediation is most effective for shallow isolated areas with moderate levels of contamination.

3.6.8.11 Incineration

Incineration uses high temperatures to volatilize and combust (in the presence of oxygen) organics in waste materials. Incineration would not be effective in treating the radioactive contaminants present in the St. Louis soils. Therefore, incineration was eliminated from further consideration.

3.6.8.12 Vitrification

Vitrification uses high temperature to heat and melt contaminated soil, dewatered sludge, and/or sediments into a glasslike matrix. The vitrification process involves blending glassmaking constituents (e.g., silicon and aluminum oxides) and the waste in a high-temperature furnace. The waste materials are melted in the molten glass; upon cooling, a solid mass forms that contains the immobilized waste. Small quantities of organics, heavy metals, and/or radionuclide contaminants may be volatilized during the melting process and require treatment through an off gas system.

Typically, the residual product is a slag approximately ten times stronger than unreinforced concrete, both in tension and compression, with decreased contaminant mobility. It is usually not affected by either wet/dry or freeze/thaw cycling.

Due to the high temperatures required, vitrification requires an enormous amount of costly energy to melt and vitrify the soil. Consequently, vitrification is most appropriately suited for applications where mobile contaminants pose a very significant risk to human health (i.e., high-level radioactive waste), where contamination is highly concentrated, or where the total volume of waste is relatively small.

3.6.8.13 Recycle to Uranium Mill

Often, soils and waste materials contain uranium or other resource materials. These materials can be sent to a licensed uranium mill as an alternate source material. The value of the recovered uranium can offset the price of processing the material and disposing of the resulting waste.

3.6.8.14 Metals Recycling

Several commercial facilities accept metals contaminated with radioactive materials for recycling. The ability and costs to recycle the metal will depend on the type and level of the contamination present, and on the type and configuration of the metal.

3.6.8.15 Ancillary Treatment Technologies

Although no buildings have been identified that require remedial action, decontamination methods are retained as a contingency treatment technology that could be used if building contamination is discovered during the cleanup process or final status surveys. Both physical methods (vacuuming, scrubbing, scraping, sanding, grinding, scabbling, and blasting) and chemical methods (solvents, complexing agents, acids) are retained.

Treatment options for addressing surface water or ground water as contaminant source media are not required. However, because surface water could contact contaminated soils during remediation work and because ground water could seep into the excavation, water treatment technologies have been retained as ancillary options. Treatment technologies considered for ground water and surface water include air stripping, carbon adsorption, ion exchange, reverse osmosis, and evaporative recovery. Precipitation/flocculation/sedimentation, aeration, filtration, soil dewatering, and sludge dewatering are pretreatment technologies that may be required for these water treatment options. Surface water at the site could be collected for treatment through interceptor trenches. Ground water at the site could be collected for treatment by passive interceptor systems or pumping well systems. Passive interceptor systems consist of trenches or drains that are excavated to a depth below the water table and are connected to a collection pipe. The ground water could then be treated and discharged. Pumping well systems could be used for hydrodynamic control of the ground water by manipulating the hydraulic gradient through the injection or extraction of water.

Reaction walls could be used as an in-situ treatment technology to prevent migration of contamination from soil via ground water. Reaction walls are permeable barriers across the ground water flow path that allow the passage of water while prohibiting the movement of contaminants by employing such agents as chelators, sorbents, microbes, etc., within the barriers. The contaminants would either be degraded or retained in a concentrated form by the barrier material. This option has been retained as a contingency should monitoring data indicate significant increases in the migration of contaminants via ground water.

3.6.9 Technologies and Process Options for Disposal

A summary of potential disposal options considered for the North County Site is provided in Table 3-4.

Table 3-4. Summary of Disposal Options

Disposal Options				
In-State FUSRAP Disposal Facility	**FUSRAP-Dedicated Facility**	**Existing Commercial Facility**	**Existing DOE Facility**	**Beneficial Reuse**
USACE would have to purchase property; siting studies would have to be completed; permits would have to be obtained; cell would have to be constructed.	USACE would have to purchase property; siting studies would have to be completed; permits would have to be obtained; cell would have to be constructed.	Multiple facilities are available and being used by USACE for FUSRAP.	Approval for disposal would be required; implementability affected by the availability of capacity. Waste containerization may be required.	Requires siting and design criteria study; modeling done to determine acceptable contaminant levels; must evaluate impact on ground water; approvals would be necessary.

3.6.9.1 New Disposal Facilities

Although new facilities were considered, the implementation of these options is affected by the need for siting studies, facility design, environmental assessments and/or environmental impact statements, and public review. Delays caused by these requirements, individually or collectively, could make implementation untimely by postponing operations beyond the time for remedial action to begin. During the site selection process, activities related to the construction and operation of the facility would be analyzed, and site selection would be performed to eliminate or minimize unacceptable impacts.

3.6.9.2 Licensed or Permitted Disposal Facilities

Under this option, contaminated materials would be excavated and transported off-site to a commercially-licensed disposal facility for permanent disposal. All of the existing commercial disposal facilities for soil and debris use shallow land burial technology (i.e., trenches). Long-term maintenance would be the responsibility of the receiving facility for this disposal option. The receiving facility would need to have all appropriate permits or licenses. Water would be discharged to a publicly owned treatment works (POTW) or surface water as permitted.

3.6.9.3 Beneficial Reuse (All Media)

One alternative to disposing of contaminated soil in a radioactive waste disposal facility is to recycle the soil, using it for activities that would limit the potential for human exposure to within acceptable levels. Examples of beneficial reuse include construction of highways and airport runways. Beneficial reuse has been used previously for the Elza Gate FUSRAP Site, where the soil was used as cover material for another disposal site on the DOE Oak Ridge Reservation. There are other industry examples, such as incorporating fly ash (which also has metals and radioactivity) into concrete. For these uses, the soils would have to meet engineering specifications for the beneficial residue being considered.

As an alternative to disposal, beneficial reuse of the soils is also a possibility at the nuclear sites as a cover for highly contaminated structures and/or wastes. At low-level radioactive waste facilities, North County Site soil could be used as fill material to cover layers of more highly contaminated waste such as retired nuclear reactors. At major construction projects, this soil could be used as fill material for road construction or other uses where exposure to the public would be limited. One possible beneficial reuse of North County Site soils would be as backfill material for the Lambert-St. Louis International Airport runway expansion. Major modifications, including the construction/refurbishing of four new runways, are planned to occur over the next 10 to 15 years.

3.7 SCREENING OF REMEDIAL TECHNOLOGIES

3.7.1 Evaluation Criteria Used for Screening

Remedial action technologies have been developed for the North County Site in accordance with NCP and EPA guidance and on the basis of GRAs and remedial technologies identified for the specific conditions at the North County Site. As summarized in Table 3-5, the remedial action technologies were evaluated and screened by using the criteria of effectiveness, implementability, and cost, which are three of the NCP's primary balancing criteria for evaluating remedial alternatives. Criteria are defined below:

- Effectiveness is evaluated in terms of protecting human health and the environment in both the short term and the long term and in reducing contaminant toxicity, mobility and/or volume;
- Implementability is evaluated in terms of technical feasibility, administrative feasibility, and resource availability; and
- Cost is evaluated in a comparative manner (i.e., low, moderate, or high) for technologies of similar effectiveness or implementability.

3.7.1.1 Effectiveness

The criterion of effectiveness measures the ability effectively to protect human health and the environment by reducing the toxicity, mobility, or volume of contaminants. Short-term protection involves reducing existing risks to the community and workers during implementation of remedial actions. The ability of a technology to meet RGs was evaluated. The time required for the technology to achieve the RGs was also considered, including the potential length of exposure to which the local public may be subjected. The criterion also includes long-term protectiveness and addresses the magnitude of residual risk and the long-term reliability. The technologies were also evaluated for their effectiveness in preventing further exposure to residual contamination.

3.7.1.2 Implementability

Each technology was evaluated in terms of implementability, including technical feasibility, administrative feasibility, and availability of necessary remedial materials, equipment, and work force. The assessment of short-term technical feasibility considered the ability to construct the given technology and the short-term reliability of the technology. Long-term technical feasibility factors considered include the ease of undertaking additional remedial action if necessary, monitoring the effectiveness of the given remedy; O&M administrative feasibility for implementing a given technology was evaluated by reviewing the ability to obtain approvals from other agencies, the likelihood of favorable community response, and the need to coordinate with other agencies.

Table 3-5. Summary of Technology Screening at the North County Site

Response Action	Potential Technology	Process Options	Effectiveness	Implementability	Cost
Access Controls	Site security	Physical barriers, signs, security patrols, guards	Effective for short term in reducing exposure.	Easily implemented	Low to Moderate
Institutional Controls	Zoning restrictions	Zoning restrictions	Effective for short term.	Easily implemented	Low
	Land use restrictions, notices, and ownership	Land use notices, easements, deed notices, well use advisories, well drilling prohibitions, government ownership	Effective for short term. Government ownership has good potential for long term effectiveness.	Easily implemented at government owned properties	Low to Moderate
Monitoring: Short and Long Term	Air	Particulates, radon	Documents site conditions, but does not reduce risk.	Easily implemented	Low
	Sediment	Chemicals, radioactivity	Documents site conditions, but does not reduce risk.	Easily implemented	Low
	Surface water	Chemicals, radioactivity	Documents site conditions, but does not reduce risk.	Easily implemented	Low
	Ground water	Chemicals, radioactivity	Documents site conditions, but does not reduce risk.	Easily implemented	Low to Moderate
Containment	Engineered Cell	UMTRCA, UMTRCA like, Subtitle C or D	Effective, but requires maintenance.	Easily implemented	High
	Cap	Multi-media, clay, asphalt, concrete, synthetic	Effective, but requires maintenance. Multi-media is the most effective option.	Easily implemented	Moderate
	Cover	Soil & vegetation cover	Effective, but requires maintenance.	Easily implemented	Low
Removal	Excavation		Effective	Easily implemented in most areas	Moderate to high
	Dredging	Hydraulic, pneumatic, mechanical	Effective	Easily implemented	Low
	Demolition (of roads)	Wrecking, dismantling, blasting, cutting, crushing	Effective	Easily implemented	Low to moderate
Treatment	Immobilization & stabilization	Asphalt, resins, bitumen, cementation, silicate-based mixtures, polymers	Effective in stabilizing contaminants but likely to increase volumes	Easy to moderate	Moderate
	Soil washing and Chemical extraction	Size separation, chemical separation, gravity separation, magnetic separation	Effective in removing contaminants, but may not achieve unrestricted cleanup criteria	Easily implemented	Moderate
	Vitrification	Microwave, melter, in-situ	Effective	Moderate to difficult to implement for rubble and metal	High
	Recycle to uranium mill and metals recycling		Effective for most soil streams	Easily implemented	Low to moderate

Table 3-5. Screening of Technologies and Process Options for the North County Site (Cont'd)

Response Action	**Potential Technology**	**Process Options**	**Effectiveness**	**Implementability**	**Cost**
Treatment (cont'd)	Soil sorting	Physical sorting, radionuclide detection	Effective for volume reduction	Easy to moderate	Low to moderate
	Size reduction	Crushing, cutting, shredding	Effective	Easily implemented	Low
	Bioremediation				Low
	Phytoremediation		Effective for uranium and some metals	Easily implemented	Low
	Dewatering		Effective	Easily implemented	Moderate
	Incineration		Effective for some contaminants	Moderate to difficult	Moderate to high
Transportation	Rail	Covered gondolas, bimodal containers	Effective	Easily implemented	Low
	Truck	Covered trucks, bimodal containers	Effective	Easily implemented	Moderate
	Barge	Covered transport via barges	Effective	Requires use in conjunction with truck or rail	High, requires transfer to truck or rail.
Off-site Disposal	Licensed or permitted off-site cell		Effective	Easily implemented	Low
	Beneficial reuse of soils	St. Louis Airport, disposal cells	Effective	May be difficult	Low

3.7.1.3 Cost

The cost criterion includes capital costs and O&M costs. O&M costs are estimated for a 30-year period where there are hazardous substances, pollutants, or contaminants that may pose a threat to human health or the environment remaining at the site. Costs for each technology are rated qualitatively on the basis of engineering judgment as high, moderate, or low by comparison to the costs of similar technologies.

3.7.1.4 Recommendations of the St. Louis Task Force

The St. Louis Task Force formed a Technologies Working Group to screen and recommend technologies that might have potential application for the St. Louis Site (Task Force, 1996). They screened size separation, density separation, and attrition scrubbing because of St. Louis soil characteristics. Soil washing and chemical extraction were identified as technologies for further investigation. They also recommended ex-situ microwave vitrification coupled with gamma ray spectroscopy, and indicated that laser ablation nebulization spectroscopy deserved further consideration. They also recommended that the use of barrier technologies be investigated to prevent contamination of underground and surface water. These technologies recommended by the Task Force are evaluated as part of the evaluation of candidate technologies discussed below.

3.7.2 No Further Action

The no further action alternative provides a baseline for comparison with other alternatives, as required under CERCLA. This alternative provides no additional protection of human health and the environment. No remedial actions would be taken to reduce, contain, or remove contaminated soils. No effort would be taken to prevent or minimize human and environmental exposure to residual contaminants on-site. Off-site migration of contaminants would not be mitigated under the no further action alternative.

Potential effects on human health and the environment under this alternative are presented in the BRA (ANL, 1993), supplemental risk evaluations for Coldwater Creek (SAIC, 1993a), Ecological Risk Assessment (SAIC, 2001), and Appendix D of this FS. These studies showed that the radiological risk for current use (maintained by USACE with controls in place) at the North County Site properties is within EPA's acceptable risk range of 10^{-6} to 10^{-4}. However, future uses could lead to unacceptable risk because this alternative provides no controls to limit exposure to contaminants or long-term management measures. For that reason, the overall objective of any remedial action implemented at the North County Site is to comply with ARARs and site-specific RGs, resulting in site conditions that allow for unlimited use and unrestricted exposure. Under the no further action alternative, there would be no reduction in the mobility, volume, or toxicity of site-related contaminants. No unacceptable current or future ecological risk has been identified at the site. Five-year reviews would be conducted under the no further action alternative.

3.7.3 Institutional Control Technologies

3.7.3.1 Institutional Controls for Soils

The selection of a remedy that leaves residual soil contamination at levels that exceed the concentrations specified in ARARs for residential use would necessitate the use of institutional controls.

Effectiveness

Institutional controls are used to either prevent or limit access to contaminated areas, and include a wide variety of security, legal, and administrative controls. SLAPS and HISS/Futura are currently fenced with signs and other security measures.

Institutional controls increase protection of human health and the environment over baseline conditions by limiting direct access to the site using site security measures, and by limiting use of the site using deed or land-use restrictions. Although there would be no reduction in volume, toxicity, or mobility of contaminants in the soil, future risk would be maintained at acceptable levels as a result of access and use restrictions. That is, acceptable risk conditions would be maintained for the North County Site properties in the future by controlling future property uses. To accomplish this, the Federal Government would need to purchase property outright, negotiate deed restrictions with property owners, or negotiate land-use restrictions to be imposed by local zoning jurisdictions.

Implementability

Deed restrictions can be implemented, but may require extensive negotiations with property owners. Implementing deed restrictions at SLAPS would require negotiations with its owner, the City of St. Louis. It would be possible to secure land-use restrictions through the various zoning jurisdictions in the area, but present uses would not be affected; only future uses would be governed by new land-use regulations. Security measures can limit site access and potential exposure. Institutional controls would be more difficult to implement at the VPs because there are multiple private owners and different municipal jurisdictions.

Deed notices or land use restrictions can be applied to prevent, limit, or require permits for excavation, construction, or any other activity that can disturb soils. If the Federal Government purchases the property, it can place conditions, covenants, or restrictions in the deed as it deems appropriate, so long as the restrictions are compatible with state laws. However, currently USACE must negotiate deed restrictions with the owner. The deed restrictions would exist in perpetuity. Land-use restrictions secured from local governments could limit or bar future site development or use by rezoning the property.

Cost

The cost estimate for implementing the institutional controls and site maintenance alternative includes low to moderate capital and low O&M costs. The costs associated with imposition of institutional controls would be expected to include the costs of legally "taking" landowners' property rights whenever landowners do not want to convey them. Potential legal fees and compensation for implementing deed restrictions and property purchases could increase the costs of this alternative. Deed restrictions negotiated with property owners could generate significant legal fees, depending on the length of negotiations. The lower bounding cost would be only legal fees; however, the upper bounding cost would be full purchase of properties at fair market value.

3.7.3.2 Institutional Controls for Coldwater Creek Sediments

Effectiveness

Institutional controls would maintain acceptable protection of human health and the environment under current use scenarios. If institutional controls and site maintenance are implemented, use limitation restrictions would limit activity within the creek and prevent uncontrolled dredging for residential or industrial use. Disposal of dredged material could be controlled through a joint agreement between USACE and local government agencies. If needed, access to properties for erosion control can be negotiated. These restrictions would control the potential for exposure to contaminated sediments from the creek.

Implementability

Institutional controls would require negotiation with property owners, state/local governments, and USACE to implement restrictions on dredging in limited areas of the creek. Restrictions on future dredging activities would be coordinated with state/local governments.

Cost

This control imposes low O&M costs.

3.7.3.3 Institutional Controls for Ground Water and Surface Water

Effectiveness

Institutional controls would ensure that groundwater will not be available for future use at the site. Restrictions on ground water use offer a means of institutional control for property that is transferred to another owner or operator. Ground water is not presently a source of drinking water, and its potential future use could be prohibited by denying all permits to install new wells.

As described in the no further action alternative, the fate and transport of contaminated soil particles in ground water is naturally controlled by the low permeability of the aquifer soils. This technology would prohibit ground-water well installation or ground water use through deed restrictions. Similar use restrictions could be placed on surface water if determined necessary based on monitoring.

Implementability

Implementing deed restrictions to restrict ground-water use at SLAPS, HISS/Futura, and the ballfields would require negotiation with the responsible public authorities. Coordination between state and local authorities would be required to enforce well permitting restrictions. Ongoing monitoring of ground water would be used to identify any spread of contamination that would require imposing new deed restrictions. Coordination with the public health department, state, and local governments would be required to restrict the issuance of well installation permits. Personnel and resources to implement the necessary institutional controls are available.

Cost

Capital costs are low to moderate. The costs are those required to develop and negotiate, if necessary, restrictions on water use. Such costs can range widely, depending on the need for and amount of compensation.

3.7.3.4 Screening Results

Physical barrier signs, access restrictions, land use notices, easements, deed notices, well use advisories, well drilling prohibitions, zoning restrictions, and government ownership are retained as institutional control technologies.

3.7.4 Containment Technologies

Containment technologies protect human health and the environment by physically separating the contaminated materials from potential receptors. Two soil containment options were considered (1) construction of an engineered, on-site disposal cell and (2) placement of a multi-layer cap over the contaminated soils.

3.7.4.1 On-Site Engineered Disposal Cell

Under this option, an encapsulated, above-ground disposal cell incorporating a bottom clay liner and a multilayer cover would be constructed at SLAPS and on a portion of the ballfields. Contaminated soils at the proposed disposal site would be excavated and replaced with fill material. The excavated materials would then be set aside in a temporary storage area while a bulldozer and sheepsfoot roller would be used to recompact the fill to ensure a stable base for the disposal cell. A 0.9 m- (3 ft-) thick, low permeability clay liner would be constructed to isolate the wastes from the underlying water-bearing units. The waste soils from the other North County Site properties would be transported to the SLAPS area and added to the disposal cell as they are excavated from their current locations. During active operation, any runoff generated from the waste placed in the cell would be captured by a passive runoff system, directed to sumps, and treated prior to discharge.

At closure, wastes would be covered by a multimedia cap to control erosion and minimize generation of leachate resulting from rain-water infiltration. The cap would consist of an upper vegetative layer, a drainage layer composed of coarse material (sand, gravel, and rip-rap), and a low permeability clay layer with a maximum vertical permeability of 1×10^{-7} cm/sec. The layers of sand, rip-rap, and topsoil overlying the disposal facility would protect the underlying clay layer and divert surface-water drainage away from the site. The area around the cap would be contoured or graded, and vegetation would be used to control runoff and reduce erosion. Percolation through the cover due to precipitation would be captured by the passive runoff system. The cover would be visually inspected periodically to identify and repair any areas of erosion, animal burrowing activities, or deep root growth. Survey markers would be placed on the disposal cell to aid in assessing the effects of subsidence on the long-term integrity of the cap.

The disposal cell would be constructed to meet UMTRCA design standards specified in 40 CFR 192. The disposal cell must be effective for up to one thousand years, to the extent reasonably achievable, and in any case, for at least 200 years. At completion, the disposal facility must provide reasonable assurance that radon-222 from residual radioactive material will not exceed an average release rate of 20 $pCi/m^2/s$, or increase the annual average concentration of radon-222 in air at or above any location outside the site perimeter by more than 0.5 pCi/L.

Effectiveness

The engineered on-site disposal cell, if installed, operated, and maintained properly, would provide an effective and reliable means of isolating the wastes at SLAPS and would reduce the potential for human exposure to site contaminants. Implementation of this option would be effective in reducing the mobility of the contaminants in the disposal cell because the cap and liner would limit water infiltration through the unit, thereby preventing further leaching of contaminants into the ground water. The cap also would provide a direct reduction in the mobility of surface contamination (i.e., minimizing or eliminating the potential for wind transport and sediment transport through runoff).

USACE would have to obtain land from the Cities of St. Louis, Hazelwood, and Berkeley for construction of the disposal cell. The cell would require approximately 13 ha (33 acres) of land at SLAPS and the ballfields, and a possible additional 4 ha (10 acres) would be required to house support facilities during the remedial action. The spatial requirements for the cap would require the partial relocation of McDonnell Boulevard onto Banshee Road, which is south of SLAPS. In addition, this option would require land-use restrictions at the proposed disposal site to eliminate risks associated with direct contact with the waste in the future. The long-term reliability and effectiveness of these controls depends upon a number of factors, including cooperation and enforcement efforts of federal, state, and local governments and the affected populations. Potential risk under the intruder scenario would be a concern due to the proximity of the disposal cell to the city, and might require management using additional access controls.

Perpetual maintenance of the site would be required because the waste would retain its low-level radioactivity for thousands of years. The cap would require visual inspections periodically to identify and repair any damage to the cap due to erosion, deep root growth, animal burrowing, or other factors. Radon would be monitored after closure to ensure compliance with ARARs. Ground-water monitoring would be conducted during and after remediation to track any changes to ground-water quality. The length of the monitoring program would be based on the results of five-year reviews and could be in perpetuity.

Short-term risks to workers and the community resulting from excavation and construction activities would occur. Risk to the public due to construction of the on-site disposal cell would not be expected to be significant because public access to SLAPS is limited. The construction activities would cause short-term impacts to surrounding land uses (such as traffic delays and additional noise and dust), and could negatively affect some local businesses located near the area. Mitigation measures, such as identifying alternative routes to businesses, providing traffic control personnel, and scheduling work to avoid rush-hour periods, would lower impacts to the affected businesses. The construction of the cell and the installation of the cap would also increase the potential for construction workers to be exposed to COCs in the short term. Potential exposure pathways include ingestion, inhalation of particulates, dermal absorption, and external exposure to ionizing radiation. The short-term risks to a worker resulting from excavation activities, transport of wastes, and construction of an on-site cell are not expected to exceed acceptable limits due to implementation of a site health and safety plan and the use of mitigation measures such as dust suppression methods.

Implementability

Implementation of the on-site disposal cell option is technically feasible. Construction of an on-site disposal cell is very feasible because materials for construction are commercially available and because no specialized equipment is necessary for installation. Additionally, no specialized workers are necessary for implementation of this action. Other aspects of the alternative, such as truck transport of soil, construction of temporary roads, use of staging area for loading and unloading, soil erosion control, excavation dewatering, and clearing and grubbing, are conventional activities in construction projects of this kind. Special engineering techniques involving precautions on excavation near buildings and structures would be observed during remediation.

An assessment of the suitability of SLAPS for use as a location for the waste disposal cell was performed in support of the FS/Environmental Impact Statement prepared by DOE in 1994. The assessment evaluated the potential effects of an earthquake in the area, the ability of site soils to support a disposal facility, the potential for contaminant transport from the site, and the potential for flooding at the site. The conclusion of the Site Suitability Study (DOE, 1994a) was that SLAPS is a suitable location for a waste disposal facility.

Cost

This option would have high capital and moderate O&M costs. The cost of constructing and maintaining a new cell is similar to the cost of disposal at an offsite licensed or permitted disposal facility with similar features and performance. Information concerning costs for an onsite disposal cell is included in Appendix C of this FS.

3.7.4.2 Engineered Cap

A multilayer cap is another potential containment technology that could be utilized at the North County Site. Contaminated soils would be consolidated and covered with a low permeability cap at a suitable location on-site. The cap would have low permeability and would consist of all-natural materials (no synthetic liners or other man-made materials). The multilayer cap would reduce the potential for human exposure to underlying contaminated materials; it would also reduce both the migration of contaminants into surface water and ground water and the generation of fugitive dust. Remedies to prevent uncontrolled subsidence would be employed as required to stabilize the cap area.

Effectiveness

A multilayer cap is a proven, effective technology that provides a physical barrier between receptors and contaminated soils. The cap would reduce the potential for direct contact (absorption, ingestion, or inhalation) and would minimize potential exposure to external gamma radiation and radon gas. It would also minimize water infiltration and would reduce the mobilization of contaminants by leaching from soil to ground water. Mitigation measures and proper safety procedures would control the possible short-term increased risk from fugitive dust emissions during construction.

This option would require both institutional controls to limit use of or access to the site and environmental monitoring to detect breaching of the cap and contaminant migration. The Federal Government would acquire the property, build the cap, and provide site maintenance and monitoring.

Implementability

Although no technical problems are anticipated that would limit the implementability, containment options have been opposed by several local stakeholders, including government officials. In addition, capping would require perpetual maintenance. Nevertheless, capping is a well-established technology and would be implementable at the site. Some clearing and grubbing, rerouting of utilities and other site preparation activities would be required before the cap could be constructed. Site monitoring would be required for as long as the media under the cap represent a threat to human health and the environment.

Cost

Capping would have lower capital and O&M costs than the on-site disposal cell option. The capital costs of capping would be higher than institutional controls, but lower than excavation and disposal. The capital costs include soil excavation, transportation, and installation of a cap. O&M costs would be a function of the degree of activity needed to address soil subsidence, and of the long-term monitoring requirements.

3.7.4.3 Screening Results

The ability of USACE to obtain the property needed for the disposal cell and the potential negative public reaction to the siting of the disposal cell at the SLAPS area would limit implementability of the on-site disposal cell option. In addition, the time required to acquire the property, and to obtain design approval for the disposal cell, could potentially cause delays in implementation of that option. The capping option has been shown to be an effective means of preventing human exposure to underlying contaminated materials, but is less disruptive to the community and less costly than the on-site fully encapsulated cell. Therefore, multimedia caps are retained as an option, but on-site engineered disposal cells are not.

3.7.5 Removal Technologies

3.7.5.1 Soil

Effectiveness

Soil removal is protective of human health and the environment. It protects human health and the environment more than the previously outlined technologies, and it achieves RAOs. The future residual risk would be reduced and compliance with ARARs would be achieved. Exposure from fugitive dust, radon gas, external gamma radiation, contaminants leaching into ground water, and contaminated surface-water runoff would be greatly reduced. Short-term risks, including non-radiological occupational injuries and risk of fatalities as well as transportation risk, would increase as the volume of soil being handled and moved increases.

During implementation, there would be possible short-term risk from fugitive dust emissions, which would be readily manageable by means of implementation of a health and safety plan and an environmental protection plan. Although air quality could be adversely affected by release of particulates and radon gas during excavation, mitigation measures, such as dust suppression methods and proper safety procedures, would be implemented to minimize any increased risk to the community or to on-site workers during implementation. Excavation can be more effective when controlled with characterization technologies to limit over-excavation of material.

Implementability

Soil excavation uses readily available resources and conventional earth-moving equipment. Some ancillary construction of temporary roads, a staging area for loading and unloading, soil erosion control, excavation dewatering, water treatment, and additional clearing and grubbing may be necessary. Transportation and disposal of wastes are technologies that are generally combined with excavation.

Cost

Costs related to soil removal are moderate to high.

3.7.5.2 Sediments

Effectiveness

Hydraulic dredging appears to be a good technique for Coldwater Creek because the technique is applicable for moderate-volume projects in relatively calm streams with very shallow depths. Hydraulic dredges are also the most effective dredging technique currently available for minimizing over-dredging and minimizing re-suspension of sediment while operating. Precision dredging is important because lateral sewer lines are known to cross under the contaminated sections of the creek at shallow depths, and to run along creek banks. This technique will be effective in dredging the sediments without damaging the lateral sewer lines. Also, by vacuuming the sediments, the threat of further environmental harm through re-suspension of contaminants will be minimized. In addition, costs associated with hydraulic dredging technologies are generally less than mechanical and pneumatic dredging technologies.

Dredging includes the removal of sediment and dewatering of the sediment. Where contaminated sediment levels are such that the dredged sediment will exceed the ARARs, the sediment could be hydraulically dredged to remove it from these channel bottom areas. The slurry would be dewatered to facilitate handling and disposal. During the dewatering process, the separated water would be tested and, if needed, treated before discharge back into the creek. The dewatered sediment could be transported by truck to SLAPS to be combined with excavated accessible soils. Consistent with CWA regulations, dredging discharge operations would be controlled by complying with the substantive requirements of dredging and discharge for permitting. Monitoring and security measures would be implemented during dredging operations.

Implementability

Dredging is a commonly used technique for remediating contaminated sediments. At Coldwater Creek, a hydraulic dredge would be used to reduce the risk of damaging the lateral sewer lines that run beneath and along the creek bed. Dredging, dewatering, water treatment, clearing, and hauling equipment would be required. A staging area would be required that is large enough to accommodate the equipment, sediment, and separated water handling. Before startup, the remedial activities would require coordination with the affected property owners, utility companies, Missouri Department of Natural Resources (MDNR), and EPA Region VII. The substantive requirements of permitting would need to be satisfied. Clearing and grubbing activities would be required along the creek before dredging. After dredging, disturbed areas would be restored, where appropriate. Dredging could be conducted safely and practically because only standard procedures and equipment readily adaptable to Coldwater Creek conditions are involved.

Cost

This technology has moderately high capital costs and low O&M costs.

3.7.5.3 Screening Results

Excavation using earth-moving equipment, dredging (with a preference for hydraulic dredging), precision excavation, and road demolition are retained.

3.7.6 Treatment Technologies

With the exception of soil washing, site-specific laboratory or pilot scale data are not available to assess the effectiveness of the technologies. Published literature, previous experience at other FUSRAP Sites, and vendor information was used to judge the technologies effectiveness, implementability, and costs.

3.7.6.1 Immobilization (Soils and Sediments)

Effectiveness

Ex-situ immobilization is one of the most mature remediation technologies. It has been successfully used on radioactive waste to reduce the mobility of the contaminants. Treatment of the soils and sediments by immobilization processes would pose minimum risks to the local community and workers. Some dust may be generated during the excavation operations; however, the amount generated would be equivalent to that generated with any alternative requiring excavation and soils handling (for example, soil sorting and soil washing).

Implementability

The soils/sediments would require excavation and transport to a centralized staging area for on-site treatment. The solidified materials would be significantly greater in volume than the original waste material. The immobilized waste would be sent off-site for disposal. Qualified vendors and equipment are readily available to perform this treatment operation.

Cost

Medium to high. The disposal costs would be significantly increased with this treatment alternative due to the increased volume of the waste requiring disposal.

3.7.6.2 Soil Washing (Soils and Sediments)

Effectiveness

Soil washing enhanced with chemical extraction has been proven effective for reducing the levels of contamination in the North County Site soils. Laboratory and conceptual design studies were conducted on soils from the North County Site to investigate treatment processes which would provide a volume reduction and reduce the remediation costs. The primary focus of the investigation was soil washing, including both physical and chemical processes (Clemson Technical Center, 1996). A bench scale selective chemical extraction process was developed that was able consistently to meet the RGs for the North County Site. Removal efficiencies of the radionuclides of interest, particularly Th-230, were consistently greater than 96 percent, and frequently in excess of 98 percent. It is expected that all of the site soils containing less than 500 pCi/g of Th-230 could be treated to meet the cleanup goals with this process. Based on limited evaluations of higher activity soils, the process may even be able to successfully treat soils containing Th-230 activities as high as 2,000 pCi/g. Based on the results of these tests, a (conceptual) process design and cost estimate for a full-scale system was developed. The conceptual cost estimates show that treatment by soil washing could be cost effective if process improvements were incorporated to minimize the amount of reagents/chemical required, and to treat the un-recycled process waste water.

The soil washing treatment system would be located on-site. The clean soils from the treatment operations could be placed back on-site or beneficially reused at another location. The smaller volume contaminated stream would be sent off-site for disposal. Much of the water used for the soil washing system will be recycled back into the system. A disposal alternative will be required for any waste water removed from the system during operation and for the balance of the waste water at the completion of the treatment process. Approval will be required from the local regulatory agencies to discharge any water generated from the soil washing process. The time required to treat the St. Louis materials by soil washing is anticipated to be shorter than the treatment times required for soil sorting and vitrification.

Implementability

A soil washing system could be located at the airport area, and soils could be trucked from the surrounding areas to the treatment system for processing. Qualified vendors and equipment are readily available to perform this treatment operation.

Cost

Moderate (assuming that the treatment is conducted on-site and the cleaned soil from the treatment operation can be directly placed back onto the site as backfill).

3.7.6.3 Recycle to Uranium Mill (Soils and Sediments)

Effectiveness

This technology would remove contaminated soils and sediments from the North County Site and so would be very effective in meeting the RGs. The recycling technology allows for the recovery of uranium and other valuable minerals that would otherwise be disposed of as wastes, resulting in a reduction in the volume of contaminants. This is consistent with the intent of CERCLA 121 (b), which states a preference for remedial actions that utilize “permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable”.

USACE has used value engineering techniques to evaluate various alternatives for the disposition of FUSRAP materials. The recycling of FUSRAP materials as alternate feed in a licensed uranium mill has been identified as a feasible alternative to direct disposal. It reduces the radioactivity and the volume of material to be disposed of, thus satisfying the preference for treatment that reduces volume, toxicity, or mobility as a principal element [40 CFR §300.430(f)(1)(c)]. The treatment and disposal are performed at a single location, and residuals from recycling are disposed of in an NRC-compliant disposal system.

Implementability

Implementation of this technology is relatively easy. Recycle to a uranium mill has been implemented at other FUSRAP Sites and so is a proven technology for processing and disposing of these materials. In addition, the regulatory framework for this option is already in place. The International Uranium Corporation has been licensed to accept St. Louis FUSRAP soils containing low levels of radioactivity as alternate feed material (i.e., an input material for uranium extraction that is different from natural ores containing uranium).

Cost

Costs related to recycling at a licensed uranium mill are moderate. In some cases, disposal at the mill results in lower disposal costs than direct disposal at other types of facilities, in part because of the benefits of recycling. For the North County Site soils, the recycle option has not yet been proven to be more cost-effective than off-site disposal alternatives (such as shipment by rail gondolas using USACE disposal contracts). However, this option can be used when and if it is determined to be more cost-effective.

3.7.6.4 Vitrification (Soils and Sediments)

Effectiveness

Vitrification is effective at immobilizing contaminants and thereby minimizing the migration of contaminants. Vitrification is typically used on highly concentrated mobile contaminants unlike those present at the St. Louis Site. Vitrification poses a much higher risk to on-site workers as compared to the other treatment operations due to the extremely high temperatures and specialized equipment used.

Implementability

Vitrification has been used successfully to treat radioactive contaminants on other projects, but generally for much higher concentrations of contaminants, and for much smaller quantities of wastes. While some volume reduction occurs during the melting, the total volume of the final waste material often increases due to the addition of glass formers. Qualified vendors and equipment are readily available to perform this treatment operation.

Cost

High.

3.7.6.5 Phytoremediation

Effectiveness

Phytoremediation is effective for treating shallow contamination [less than 2 ft (0.6 m) in depth] which is low to moderate in concentration. The technology has been shown to be somewhat effective for uranium, but much less so for thorium. Several sequential crops of plants may be needed to reduce the radionuclide concentrations to acceptable levels.

Implementability

Easily implemented. Qualified vendors and equipment are available to perform this treatment operation. Phytoremediation is likely to be more pleasing to the local community than other ex-situ treatment processes due to its aesthetic appeal.

Cost

Low to moderate.

3.7.6.6 Dewatering (Soils and Sediments)

Effectiveness

Dewatering techniques have been successfully used as part of the St. Louis FUSRAP removal actions.

Implementability

Easily implemented. Equipment is readily available to perform this treatment operation. Approval will be required from local regulatory agencies to discharge any water generated from the dewatering processes.

Cost

Moderate.

3.7.6.7 Size Reduction (Debris)

Effectiveness

Size reduction has been successfully used as an ancillary technology in support of activities at other FUSRAP Sites to reduce waste material volumes, and to provide easier materials handling and transport. Size reduction technologies would be an option if contamination of buildings is discovered during the remedial action of final status surveys.

Implementability

Easily implementable. Qualified vendors and equipment are readily available to perform this treatment operation.

Cost

Moderate

3.7.6.8 Soil Sorting (Soils and Sediments)

Effectiveness

Soil sorting has been used successfully to treat radioactive waste contaminated primarily with gamma emitters such as uranium. Its effectiveness may be limited due to the presence of Th-230. Field tests would be required to determine the volume reduction achievable and treatment times. Due to the slower processing rate (as compared to soil washing) multiple soil sorting systems may be required, operating in parallel. No process additives are required for the soil sorting system, and no process water would be generated.

Implementability

Adequate space exists to locate the soil sorting system. Soils would be transported to a centralized area for staging and processing. Soils that are too moist would require drying prior to processing. Clean soils from the sorting operation would be placed back on site or reused at another location. The smaller volume of contaminated soil would be sent off site for disposal. Qualified vendors and equipment are available for this treatment operation.

Cost

Moderate.

Screening Results

Enhanced soil washing, recycle to uranium mill, soil sorting, size reduction, phytoremediation, and dewatering are retained. Immobilization and stabilization, simple soil washing, vitrification, solvent extraction, and bioremediation were screened out.

3.7.7 Transportation Technologies (Soils, Sediments, and Debris)

Effectiveness

Truck and rail transportation have proven to be very effective in transporting contaminated materials for disposal during previous FUSRAP cleanup actions.

Implementability

Transportation and disposal of contaminated soils, sediments, and debris would use specially lined dump trucks, rail cars or inter-model containers (which can be transported by truck or rail). If soil were moved out of state, coordination would need to be provided ahead of time to allow the waste to cross state lines. Because not all rail lines and highways can be used to transport waste material, a shipping route would need to be carefully laid out, and an emergency response procedure would need to be developed. The administrative feasibility of an out-of-state shipment would require coordination with the appropriate state and federal agencies. Barge access is not available unless truck transport is also used.

Cost

Low to moderate.

Screening Results

Rail, truck, and barge transportation are retained.

3.7.8 Off-site Disposal Technologies (Soils and Sediments)

Effectiveness

USACE has reviewed the disposal practices used on previous cleanups, and has established contracts with multiple licensed or permitted disposal facilities. Off-site disposal options would be effective in terms of containing wastes generated at the North County Site remediation.

Implementability

The implementability of the disposal options would vary in terms of design, siting, and construction. A number of properly permitted facilities are available within the United States that could serve as locations for disposal of some or all St. Louis FUSRAP wastes. This option would, therefore, be readily implemented. The St. Louis Task Force evaluated potential disposal sites in their report (Task Force, 1996). This information supports the conclusion that existing facilities are more implementable than a new facility for disposal.

A number of commercial facilities have or are likely to have permits or licenses to receive the waste materials at this site. The material that can be accepted by the facilities varies with the terms and conditions in their license or permit.

Cost

The cost of disposal at a licensed or permitted disposal facility is low compared to the cost of constructing a new cell with similar features and performance.

Screening results

Disposal of soils and sediments at licensed or permitted facilities is retained.

3.7.9 Summary

The results of the screening are summarized in Table 3-6.

Table 3-6. Results of Technology Screening

Response Action	Potential Technology	Process Options	Screening Results
Access Controls	Site security	Physical barriers, signs, security patrols, guards	Retained
Institutional Controls	Zoning restrictions	Zoning restrictions	Retained
	Land use restrictions, notices, and ownership	Land use notices, deed notices, easements, well use advisories, well drilling prohibitions, government ownership	Retained, but government ownership would require transfer to DOE or other government agency
Monitoring	Air	Particulates, radon	Retained
	Sediment	Chemicals, radioactivity	Retained
	Surface water	Chemicals, radioactivity	Retained
	Ground water	Chemicals, radioactivity	Retained
Containment	On-site full encapsulation cells	UMTRCA, UMTRCA like, Subtitle C or D	Screened out.
	Cap	Multi-media, clay, asphalt, concrete, synthetic	Synthetic screened out
	Soil & vegetation cover		Retained
	Storage pile covers	Geotextile, spray coatings, tarps,	Retained as temporary measures.
	Dust mitigation	Water spray, foam,	Retained
Removal	Conventional excavation		Retained
	Precision excavation & characterization		Retained
	Dredging	Hydraulic, pneumatic,	Retained (hydraulic preferred)
	Demolition	Wrecking, dismantling, blasting, cutting, crushing	Retained to obtain access to difficult to access soils
Treatment	Immobilization & stabilization	Asphalt, resins, bitumen, cementation, silicate-based mixtures	Eliminated due to potential to increase volume and the moderate to high cost
	Soil Washing	Size separation, chemical separation, gravity separation, magnetic separation	Enhance soil washing retained.
	Vitrification	Microwave, melter, in-situ	Screened out
	Recycle to uranium mill		Retained
	Solvent extraction		Screened out
	Soil sorting	Physical sorting, radionuclide detection	Retained
	Size reduction	Crushing, cutting, shredding	Retained
	Bioremediation		Screened out
	Phytoremediation	Rhizofiltration Phytoaccumulation	Retained for sediments in Coldwater Creek
	Dewatering		Retained

Table 3-6. Results of Technology Screening (Cont'd)

Response Action	Potential Technology	Process Options	Screening Results
Treatment (Cont'd)	Incineration		Screened out except for some mixed wastes that are not expected, but could be encountered.
Transportation	Rail	Covered gondolas, bimodal containers,	Retained
	Truck	Covered trucks, bimodal containers	Retained
	Barge		Screened out due to high cost.
Disposal	On-site disposal cell	UMTRCA, UMTRCA like, Subtitle C or D	Screened out
	Licensed or permitted off-site cell	Radioactive wastes, hazardous wastes, solid wastes	Retained.
	New FUSRAP disposal cell		Screened out
	Beneficial reuse of soils	St. Louis Airport, Other disposal cells	Screened out

SECTION 4

DEVELOPMENT OF REMEDIAL ALTERNATIVES

4 DEVELOPMENT OF REMEDIAL ALTERNATIVES

4.1 INTRODUCTION

This section describes the development of site-wide remedial action alternatives. Emphasis was placed on identifying technologies that could be combined to provide alternatives that ensure adequate protection of human health and the environment, achieve applicable or relevant and appropriate requirements (ARARs), and permanently and significantly reduce the volume, toxicity, or mobility of site-related contaminants.

4.2 DEVELOPMENT OF SITE-WIDE ALTERNATIVES

Site-wide alternatives were formulated using the technologies retained after the screening discussed in Section 3. The alternatives cover a broad range, from no further action to complete removal of the contaminated materials. Site-wide alternatives for the North County Site are summarized in Table 4-1. This table shows the general response actions (GRAs), technologies, and process options that were combined to create six site-wide alternatives. Additional descriptions of each alternative are provided in the following text. Table 4-2 summarizes the excavation and dredging actions incorporated into each alternative. Table 4-3 summarizes the six site-wide alternatives developed for the North County Site. Tables 4-4 and 4-5 summarize the cleanup criteria considered for various property units. Details concerning the derivation of the proposed remediation goals (RGs) are presented in Appendix D. Table 4-6 provides a summary of current and future land use assumptions by property and the removal status of each property.

The rationale for combining response actions, technologies, and process options is briefly summarized below. The no-further-action response required under the National Contingency Plan (NCP) is used to form Alternative 1.

Removal technologies form the main basis for Alternative 6 and supplement other technologies in Alternatives 2, 3, and 5. Dredging is used for Coldwater Creek. However, in Alternative 2 the sediment removal is proposed to be done in conjunction with other non-Formerly Utilized Sites Remedial Action Program (FUSRAP) projects, such as flood control actions planned by the St. Louis Metropolitan Sewer District (MSD) or the United States Army Corps of Engineers (USACE) for Coldwater Creek.

Alternatives 2, 3, and 5 combine institutional controls with other removal, treatment, and containment technologies to form alternatives. Alternative 4 relies only on institutional controls. Short-term monitoring is included for Alternatives 2, 3, 5, and 6. Long-term monitoring and five-year reviews are included whenever enough contamination is left to preclude unrestricted use of the property. Long-term monitoring of HZ-A and long-term monitoring of Unit 4 in HZ-C (as a surrogate for HZ-E) would be required for Alternatives 2, 3, and 4. Long-term monitoring is not expected in Alternative 5, but short-term monitoring will determine whether long-term monitoring of HZ-A is required.

Table 4-1. Summary of Technology Screening at the North County Site

Response Action	Technologies	Process Options	Used in the North County Alternatives				
			Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Access Controls	Site security	Signs	X	X	X	X	
		Physical barriers, e.g., fencing		X			
Institutional Controls	Land use restrictions and notices	Land use restrictions	X	X	X	X	
		• SLAPS	Industrial	Industrial	Industrial	None	None
		• HISS/Futura	Industrial	None	Industrial	None	None
		• Roads, bridges, railroads, and other permanent structures	Utility	Utility	Utility	Utility	None
		• Creek (within banks)	Rec.	None	Rec.	None	None
		• Remaining VPs	None	None	All	None	None
		Deed notices	X	X	X	X[b]	
		Well drilling prohibitions	X	X	X		
		Commercial/industrial zoning	X	X	X	X[b]	
Monitoring	Long-term monitoring[a]	Air, sediment, ground water, surface water	Ground water	Ground water	Ground water	Ground water (unlikely)	
Containment	Cap	Multi-media cap	SLAPS, HISS/Futura				
		Asphalt or concrete	Roads	Roads	Roads	Roads	
Removal	Excavation		Limited for SLAPS, HISS/Futura, roads, bridges, railroads and other permanent structures	Limited for SLAPS, roads, bridges, railroads, and other permanent structures	None	Limited for roads, bridges, railroads, and other permanent structures	All Areas
Treatment	Soil sorting			X		Option	
	Soil washing	Enhanced soil washing		X			
	Phytoremediation	Rhizofiltration, phytoaccumulation		X			
Technologies Common to Alternatives 2 through 6							
Monitoring	Short-term monitoring (During remedial action)	Air, sediment, ground water, surface water	X	X		X	X
Containment	Revegetation		X	X		X	
	Dust mitigation	Water spray, foam	X	X		X	X
	Storage pile covers	Geotextile, spray coatings, tarps	X	X		X	X
Removal	Dredging	Hydraulic	Creek	Creek		Creek	Creek
Treatment	Recycle to uranium mill	Permitted facilities	Option	Option		Option	Option
	Size reduction	Crushing, cutting	X	X		X	X
	Dewatering	Evapotranspiration, filters, drying	X	X		X	X
Transportation	Rail	Covered rail cars, containers	X	X		X	X
	Truck	Covered trucks, containers	X	X		X	X
Disposal	Licensed or permitted off-site facility	Radioactive wastes, hazardous wastes, solid wastes	X	X		X	X

[a] In areas where contamination remains above unrestricted levels in sufficient quantities to significantly impact ground-water quality, ground-water monitoring could continue until terminated as part of the 5-year reviews. Long-term monitoring of HZ-A and long-term monitoring of Unit 4 in HZ-C (as a surrogate for HZ-E) is proposed for Alternatives 2, 3, and 4. For Alternative 5, the results of short-term monitoring would be used to determine whether long-term ground-water monitoring is required to assess potential contaminant migration from contaminated soils remaining beneath roads, bridges, railroads, and other permanent structures.

[b] May be needed until areas under buildings at Futura are made accessible.

Table 4-2. Removals Included in the Site-wide Alternatives

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Removals by Property Units						
HISS/Futura	Leave remaining materials in place	Excavate soils above subsurface soil supplemental limit with institutional controls and add multi-media cap.	Excavate for release without restrictions	Institutional controls with no further excavation	Excavate for release without restrictions	Excavate for release without restrictions
Roadside	No additional removals; leave remaining materials in place	Excavate for release without restrictions	Excavate for release without restrictions	Institutional controls with no further excavation	Excavate for release without restrictions	Excavate for release without restrictions
Directly under roads, bridges, railroads, and other permanent structures	Leave remaining material in place	Defer excavation and use institutional controls	Defer excavation and use institutional controls	Institutional controls with no further excavation	Defer excavation and use institutional controls	Excavate for release without restrictions
Coldwater Creek	Leave remaining material in place	Sort material during removals for projects such as flood control	Excavate to Coldwater Creek criteria below mean water gradient for release without restrictions.	Institutional controls with no further excavation	Excavate to Coldwater Creek criteria below mean water gradient for release without restrictions.	Excavate to Coldwater Creek criteria below mean water gradient for release without restrictions
SLAPS	Leave remaining material in place	Excavate soils above subsurface soil supplemental limit with institutional controls and add multi-media cap	Excavate soils above subsurface soil supplemental limit with institutional controls and consolidate other soils here for treatment	Institutional controls with no further excavation	Excavate for release without restrictions	Excavate for release without restrictions
All other vicinity properties	No additional vicinity property removals	Excavate for release without restrictions	Excavate for release without restrictions	Institutional controls with no further excavation	Excavate for release without restrictions	Excavate for release without restrictions
Total Soil Removal, Thousands						
[a]Impacted volume to be excavated, yd^3	0	150	190	0	230	300
Excavation volume, yd^3	The in-situ volume of soil plus the excavation allowance needed to remove the impacted volume; (about 20%) i.e., the size of the hole; generally 20% larger than impacted volume.					
Ex-situ, yd^3	The volume after soil swelling as a result of excavation; generally 25% larger than the excavation volume.					

[a] Impacted volume to be excavated: in-situ volume of soil above the cleanup criteria rounded to two significant figures.

Table 4-3. Site-wide Alternatives Considered in the Feasibility Study (FS)

Alternative 1	No Further Action
Alternative 2	Partial Excavation and Capping at SLAPS and HISS/Futura; Land Use A
Alternative 3	Partial Excavation and Treatment at SLAPS; Land Use B
Alternative 4	Institutional Controls (No Further Excavation); Land Use C
Alternative 5	Excavation with Institutional Controls Under Roads, Bridges, Railroads, and Other Permanent Structures; Land Use D
Alternative 6	Excavation at all Properties; Land Use E
LAND USE COMBINATIONS FOR ALTERNATIVE ANALYSIS	
Land Use A	Commercial/industrial use of SLAPS and HISS/Futura; Recreational use of Coldwater Creek; Continued use of roads, bridges, and railroads as transportation/utility corridors; and Unrestricted use of all other properties.
Land Use B	Commercial/industrial use of SLAPS; Continued use of roads, bridges, and railroads as transportation/utility corridors; and Unrestricted use of all other properties.
Land Use C	Recreational use of Coldwater Creek; Continued use of roads, bridges, and railroads as transportation/utility corridors; and Restricted use of all other properties.
Land Use D	Continued use of roads, bridges, and railroads as transportation/utility corridors; and Unrestricted use of all other properties.
Land Use E	Unrestricted use of all properties.

Table 4-4. Summary of Proposed Remediation Goals

Remediation Goals for Unrestricted Land Use	Remediation Goals for Use with Institutional Controls At SLAPS and HISS/Futura
Surface soils would be remediated if the radionuclide concentrations above background averaged over 100 m^2 exceed 5 pCi/g of Ra-226, 14 pCi/g of Th-230, or 50 pCi/g of U-238 in the top 15 cm (6 in). Subsurface soils would be remediated if the radionuclide concentrations above background averaged over 100 m^2 exceed 15 pCi/g of Ra-226, 15 pCi/g of Th-230, or 50 pCi/g of U-238 in any subsequent 15 cm (6 in) layer. Soils and sediments below the mean water gradient of Coldwater Creek would be remediated if the radionuclide concentrations above background averaged over 100m^2 exceed 15 pCi/g of Ra-226, 43 pCi/g of Th-230, or 150 pCi/g of U-238. Soil remediation goals apply to soils above the mean water gradient of Coldwater Creek. Confirmation would include surveys and residual risk calculations to ensure that total residual site risk is within the CERCLA risk range. Final status surveys compatible with MARSSIM would be used to document achievement of the remediation goals for radiological COCs.	Supplemental standards are developed for Alternatives 2 and 3 in accordance with 40 CFR 192, Subpart C. These supplemental standards are used in conjunction with institutional controls at SLAPS and HISS/Futura (the primary areas used for storage of FUSRAP materials). Supplemental standards are appropriate for the primary storage areas under the containment and treatment alternatives because excavation to the RGs for unrestricted use would result in excessive remediation costs relative to the long-term benefits, and because the residual materials will not pose a present or future hazard. The supplemental criteria constrain doses so that public exposure limits would not be exceeded should the institutional controls be lost. The supplemental criteria for subsurface soil limit contamination to average above background concentrations of 25 pCi/g of Ra-226, 70 pCi/g of Th-230, and 250 pCi/g of U-238 or combinations of radionuclides. Institutional controls are implemented to ensure that future land use is fully protective. Supporting information concerning the derivation of these RGs is presented in Appendix D of the Feasibility Study (Section D.2.2).

Table 4-5 Proposed Remediation Goals (RGs) for Non-radionuclide Contaminants of Concern (COCs)[a]

Analyte	Units	Proposed RG[b]
Surface		
Antimony	mg/kg	15
Arsenic	mg/kg	36
Barium	mg/kg	2,800
Cadmium	mg/kg	12
Chromium	mg/kg	350
Molybdenum	mg/kg	1,000
Nickel	mg/kg	1,500
Selenium	mg/kg	300
Thallium	mg/kg	25
Uranium	mg/kg	150
Vanadium	mg/kg	112
Subsurface		
Analyte	Units	Proposed RG
Antimony	mg/kg	25
Arsenic	mg/kg	40
Thallium	mg/kg	30
Uranium	mg/kg	150

[a] Non-radionuclide COCs were identified for SLAPS and contiguous areas (IAs 1-13), HISS/Futura, and Latty Avenue VPs 2L and 10k530087. Remediation of non-FUSRAP related wastes based on the RGs for non-radionuclide COCs will be conducted in areas where they are co-located with FUSRAP COCs.

[b] The calculated HIs for different primary target organs were based on the construction worker. Thus the same RGs are proposed for unrestricted use and for use with institutional controls.

Table 4-6. Land Use by Property

Property ID [a]	Current Receptor	RME Receptor	Removal Status
Primary Areas Used for Storage			
Futura	Industrial	Industrial	
HISS	Construction	Industrial	Piles removed
IA-1 (Part of SLAPS)	Construction	Industrial	Partial Removal
IA-2 (Part of SLAPS)	Construction	Industrial	Partial Removal
IA-3 (Part of SLAPS)	Construction	Industrial	Partial Removal
IA-4 (Part of SLAPS)	Construction	Industrial	Removal Action
IA-5 (Part of SLAPS)	Construction	Industrial	Partial Removal
IA-6 (Part of SLAPS)	Construction	Industrial	Removal Action
IA-7 (Part of SLAPS)	Construction	Industrial	Removal Action
Areas Immediately Adjacent to Storage Areas			
VP-1(L)[c]	Industrial	Industrial	
10K530087, west of VP-1(L)	Industrial	Industrial	
VP-2(L)[c]	Industrial	Industrial	Removal Action
IA-9	Construction	Recreational	Partial Removal
IA-11	Industrial	Industrial	
IA-13	Industrial	Industrial	
VP-40(A)	Industrial	Industrial	
Properties with Small Amounts of Contamination			
VP-1 (C)[b]	Industrial	Industrial	
VP-2(C)[b]	Industrial	Industrial	
VP-3 (C)[b]	Industrial	Industrial	
VP-4 (C)[b]	Industrial	Industrial	
VP-5 (C)[b]	Industrial	Industrial	
VP-7	Industrial	Industrial	
VP-8 (C)[b]	Industrial	Industrial	
VP-9	Industrial	Industrial	
VP-10	Industrial	Industrial	
VP-11	Industrial	Industrial	
VP-12	Industrial	Industrial	
VP-13	Industrial	Industrial	
VP-15	Industrial	Industrial	
VP-35(A)	Construction	Industrial	
VP-38	Industrial	Industrial	Partial Removal
VP-57	Industrial	Industrial	
VP-58	Industrial	Industrial	
VP-59	Industrial	Industrial	
IA-10	Recreational	Recreational	
10K620452, south of Latty East	Industrial	Industrial	
Coldwater Creek, inside banks	Recreational	Recreational	
Roads, Bridges, Railroads			
Norfolk Southern	Industrial	Industrial	
Roads, bridges and railroads	Utility	Utility	
IA-8	Utility	Utility	Partial Removal
VP-14(A)	Utility	Utility	

Table 4-6. Land Use by Property (Cont'd)

Property ID [a]	Current Receptor	RME Receptor	Removal Status
Properties with No Expected Removal Volume			
10k620412, north of Latty east	Industrial	Industrial	
11k630221, NE of McDonnell rail siding	Industrial	Industrial	
11L520011, airport south of IA-13	Industrial	Industrial	
10k530076, north of VP-1(L)	Industrial	Industrial	
10k520165, southeast of VP-3(L)	Industrial	Industrial	
10k240182, north of VP-23	Industrial	Industrial	
10k240207, west of VP-27	Industrial	Industrial	
09k220029, east of VP-44	Residential	Residential	
VP-1	Industrial	Industrial	
VP-2	Industrial	Industrial	
VP-3	Industrial	Industrial	
VP-4	Industrial	Industrial	
VP-5	Industrial	Industrial	
VP-6	Industrial	Industrial	
VP-6 (C)[b]	Industrial	Industrial	
VP-7 (C)[b]	Industrial	Industrial	
VP-8	Industrial	Industrial	
VP-9 (C)[b]	Industrial	Industrial	
VP-10(C)[b]	Industrial	Industrial	
VP-14	Industrial	Industrial	
VP-16	Industrial	Industrial	
VP-17	Industrial	Industrial	
VP-18	Industrial	Industrial	
VP-19	Residential	Residential	Removal Action
VP-20	Residential	Residential	Removal Action
VP-21	Industrial	Industrial	Removal Action
VP-22	Industrial	Industrial	Removal Action
VP-23	Industrial	Industrial	Removal Action
VP-25	Industrial	Industrial	
VP-26	Industrial	Industrial	Removal Action
VP-27	Industrial	Industrial	Removal Action
VP-28	Industrial	Industrial	
VP-29	Residential	Residential	
VP-30	Industrial	Industrial	Removal Action
VP-31	Industrial	Industrial	
VP-36	Industrial	Industrial	Removal Action
VP-37	Industrial	Industrial	Removal Action
VP-41	Residential	Residential	Removal Action
VP-45	Industrial	Industrial	Removal Action
VP-46	Industrial	Industrial	
VP-48(A)	Industrial	Industrial	Removal Action
VP-49	Residential	Residential	
VP-50	Industrial	Industrial	
VP-51	Industrial	Industrial	
VP-52	Industrial	Industrial	
VP-54	Industrial	Industrial	

Table 4-6. Land Use by Property (Cont'd)

Property ID [a]	Current Receptor	RME Receptor	Removal Status
VP-55	Industrial	Industrial	
VP-56	Industrial	Industrial	Removal Action
VP-60	Industrial	Industrial	
VP-61	Industrial	Industrial	
VP-62	Industrial	Industrial	
VP-63	Industrial	Industrial	
VP-63(A)	Industrial	Industrial	
Properties with previous DOE removal actions that will require additional investigation			
VP-3(L)[c]	Industrial	Industrial	Removal Action
VP-4(L)[c]	Industrial	Industrial	Removal Action
VP-5(L)[c]	Industrial	Industrial	Removal Action
VP-6(L)[c]	Industrial	Industrial	Removal Action
VP-24	Industrial	Industrial	Removal Action
VP-31(A)	Industrial	Industrial	Removal Action
VP-32	Industrial	Industrial	Removal Action
VP-33	Industrial	Industrial	Removal Action
VP-34	Construction	Industrial	Removal Action
VP-35	Construction	Industrial	Removal Action
VP-39	Industrial	Industrial	Removal Action
VP-40	Industrial	Industrial	Removal Action
VP-42	Industrial	Industrial	Removal Action
VP-43	Residential	Residential	Removal Action
VP-44	Residential	Residential	Removal Action
VP-47	Industrial	Industrial	Removal Action
VP-48	Industrial	Industrial	Removal Action
VP-53	Industrial	Industrial	Removal Action

[a] All properties designated into FUSRAP and any additional property for which analytical data are available.

[b] Coldwater Creek VP

[c] Latty Avenue VP

Containment technologies are used for Alternative 2, and are combined with soil washing and soil sorting in Alternative 3. Containment provided by existing roads is included in Alternatives 2-5. Revegetation and temporary storage are included in the alternatives that use removal technologies (i.e., excavation or dredging).

Treatment using soil washing and soil sorting is a major component of Alternative 3. The option for off-site recycle to a uranium mill is maintained for all alternatives that use removal technologies. Stabilization or immobilization technologies are included as an option in Alternative 3, which emphasizes treatment technologies as a major component of the remedial action.

Truck and rail technologies are included in all alternatives using removal technologies. Permitted off-site disposal or recycle is used for soils and debris. Wastewater generated during the remedial actions would be discharged into either a publicly owned treatment works (POTW) or surface waters.

USACE may use one or more licensed or permitted recycle or disposal facilities. A more detailed description is given in the following sections. No buildings have been identified that require decontamination or radon mitigation. Decontamination and radon mitigation technologies are retained as ancillary technologies, and could be used if building contamination is discovered during this investigation or during the cleanup process.

Institutional controls are used to ensure protectiveness for alternatives at areas in which the residual soil contamination exceeds the concentrations specified in ARARs for residential use.

Technologies and Processes Common to Alternatives 2 Through 6

Alternatives 2 through 6 share certain features. In order to avoid duplicate discussions of the details of these features under each alternative, similar elements are discussed in the following text.

<u>Excavation:</u> Consistent with the scope defined in the FFA, for alternatives that involve excavation, remediation of soils containing non-radionuclide contaminants would be conducted in those areas where they are co-located with North County Site COCs. Non-radiological COCs include antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium for SLAPS and contiguous areas; and antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, and vanadium for HISS/Futura and Latty Avenue VPs 2L and 10k530087. To verify that removal of radiological contaminants also achieves the RGs for non-radiological COCs, chemical sampling will be conducted, as required, during pre-design investigation, and as part of the final status survey, pending confirmation of co-location with radiological contamination.

<u>Supplemental Limit for Deep Soils</u>: A supplemental standard for deep soils was assessed during development of the FS alternatives as a potential option for addressing deep (greater than 8 ft bgs) soil contamination at SLAPs and HISS/Futura. The deep soil criteria were not carried forth in any of the alternatives discussed in the FS, though they have been retained as potential remediation standards.

Under the Deep Soils Option, a "deep" supplemental standard of 75/210/750 pCi/g [or combination of the radionuclides such that the sum of ratios (SOR) is not greater than 1] would be substituted at depths greater than 8 ft bgs. It is considered unlikely that exposure to contaminated soils deeper than 8 ft in depth will occur. Therefore, the risk to the reasonably likely future receptor would be near the lower end of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) risk range. Other than the remediation worker, the only exposure scenario would involve industrial/utility workers involved in deep (> 8 ft) excavation in areas where elevated radionuclide concentrations remain. If institutional controls were lost and the materials were excavated, the worker exposure scenario would likely be similar to the utility worker scenario and would be less than 10 mrem/yr. If the material were transferred to use in a residential setting, the dose would be less than the 100 mrem/yr standard for cases where institutional controls are lost. (Details concerning the derivation of these supplemental standards are presented in Appendix D of this FS).

On-going Removal Actions: Removal actions started under the engineering evaluation/cost analyses (EE/CAs) are complete at the time the Record of Decision (ROD) is approved. The ROD criteria would supersede commitments to cleanup criteria in previously issued documents (e.g., EE/CAs). Excavation under buildings would be done when the areas are made available by the owner. Final status surveys would be conducted to ensure that remediated areas meet the cleanup criteria. Final status surveys performed pursuant to EE/CAs prior to the Multi-Agency Radiation Site Survey and Investigation Manual (MARSSIM) effective date would be compared to ROD criteria using the existing confirmation approaches.

Institutional Controls: For alternatives that use institutional controls, a long-term stewardship plan would be developed. It would address requirements to notify property owners of changes in land use. It would also address future monitoring and maintenance requirements. The plan would also include provisions addressing the process by which property owners can contact the federal government agency responsible for long-term control of impacted areas and periodic reviews, maintenance, and monitoring. Institutional controls are used to ensure protectiveness for alternatives at areas in which the residual soil contamination exceeds the concentrations specified in ARARs for residential use.

These institutional controls will:

1) Be enforceable against any owner of the affected property and any person who subsequently acquires the property or acquires any rights to use the property;
2) Be enforceable by parties, other than the landowner, who have the legal authority to enforce the restriction;
3) Include provisions to delegate or transfer enforcement authority;
4) Indicate procedures for enforcement of restrictions;
5) Remain in place for the duration they are needed; and
6) Be recorded, including in the deed and in land records, as appropriate.

Transportation and Waste Management: Local transportation of contaminated materials [e.g., from vicinity properties (VPs) to rail spurs] would use sealed or covered trucks. On-site movement would be performed using open trucks and conventional construction equipment. Long distance shipment would be primarily by rail from the rail spurs to off-site licensed or permitted disposal facilities. Trucking may also be used for long distance shipping. Rubble and similar materials would be crushed as appropriate for disposal. Site soils could be used as backfill if they are unimpacted or if they meet the cleanup criteria for surface soils.

Uranium would be recycled if the costs are similar to the cost for disposal of the materials.

As necessary, pre-remedial design investigation sampling for contaminants of concern (COCs) would be conducted to define the extent of contamination. Those properties where current or past activities unrelated to uranium processing have resulted in Resource Conservation and Recovery Act (RCRA) characteristic or listed waste being co-located with radioactive waste will be evaluated and sampled, as necessary, prior to remediation to facilitate treatment and disposal.

Monitoring**:** Short-term monitoring would be continued during the remedial actions. Monitoring would be used to ensure that contamination from the soils and the unusable ground water zone (HZ-A) does not significantly impact surface water or potable ground water. The results of the short-term monitoring of surface water, sediment, and HZ-A ground water would be used to assess any potential impacts to Coldwater Creek resulting from the remedial actions, and would assist in evaluating the effectiveness of the remedial actions. In addition, monitoring will support evaluation of impacts resulting from the remaining soils unavailable for remedial action (not in Alternative 6), or from residual contamination left in place. The ability of existing geologic deposits to resist vertical water passage would not be changed by any FUSRAP remedial alternatives. Radon monitoring will be conducted as necessary in appropriate Futura buildings to ensure that radon concentrations comply with the standards in 40 CFR 192.12(b).

Remedial Action Control Measures: Water encountered during remedial actions will be characterized, treated (if necessary), and released to either a POTW or Coldwater Creek or its tributaries, as permitted. The treatment would address chemicals and radionuclides consistent with relevant and appropriate federal and state regulations. Excavation waters contaminated with TCE or its degradation products will not be released off-site above appropriate levels. Supporting technologies would be used, as required during the excavation process, to prevent the spread of contamination. These could include revegetation, dust mitigation, storage pile covers, sedimentation basins, and dewatering Backfill would be added, and the site would be graded to ensure appropriate surface water drainage. Erosion and sediment controls would be used.

Wetlands: Any wetlands designated using the 1987 Corps of Engineers Wetlands Delineation Manual that are impacted during removals would be restored, or equivalent wetlands would be created.

Federal Aviation Administration (FAA) Restrictions: USACE construction activities during remedial action would comply with the FAA restriction of air space around the airport, such as limits on the height of structures and equipment.

4.2.1 Alternative 1, No Further Action

Under this alternative, no additional remedial actions are implemented at the North County Site. The no-further-action alternative is required by the NCP, which requires a no-action baseline to which all other remedial alternatives are compared. The rail spurs at the St. Louis Airport Site (SLAPS) and Hazelwood Interim Storage Site (HISS) would be left in place. Accessible soils would remain at current locations, and difficult to access contaminated soils under roads, bridges, railroads, and other permanent structures would be left in place. Sediments in Coldwater Creek and depositional material in the flood plain would not be removed. The limited site security, such as fencing, would be left in place, but would not be maintained by USACE. Continued routine monitoring of air, buildings, ground water, and storm water would not be performed. Five-year reviews would be conducted, pursuant to CERCLA, for areas which are too contaminated to allow unlimited use and unrestricted exposure.

4.2.2 Alternative 2, Partial Excavation and Capping at SLAPS and HISS/Futura

Capping: A multi-layer cover (cap) would be constructed at SLAPS and HISS/Futura to provide a barrier to limit exposures. SLAPS and HISS/Futura would be contoured and covered with 1-ft of stone intrusion barrier and 3 ft of clean soil.

Excavation: Surface and subsurface soil would be excavated to the RGs for unrestricted release at all properties except SLAPS, HISS/Futura, and roads, bridges, railroads, and other permanent structures. For surface soils, these RGs are 5/14/50 pCi/g above background for Ra-226/Th-230/U-238 (or combinations of the radionuclides such that the SOR is not greater than 1). For subsurface soils (i.e., soils below 6 inches in depth), the RGs for unrestricted release are 15/15/50 pCi/g above background for Ra-226/Th-230/U-238. At SLAPS and HISS/Futura, soils exceeding the supplemental standards for subsurface soils would be shipped off-site to a permitted disposal facility. (See Appendix D for a description of the derivation of the supplemental criteria). The subsurface soil supplemental standards are 25/70/250 pCi/g above background for Ra-226/Th-230/U-238. Those soils achieving the supplemental standards for subsurface soil would be disposed of on-site beneath a multilayer cover at SLAPS and HISS/Futura. The supplemental standards would be used in conjunction with institutional controls to allow commercial/industrial use of SLAPS and HISS/Futura. Inaccessible soils under roads, bridges, railroads, and other permanent structures would be left in place. When and as the inaccessible soils become available as a result of decisions made by entities that control their accessibility, new decision documents will identify the response action to address the inaccessible soils as appropriate. Inaccessible soils for the North County Site are identified in Figure ES-3. Additional soils may be identified as inaccessible during implementation and will be deferred for separate action as documented in the post remedial action report. Remediation of radiological contaminants is expected to address associated chemical contaminants based on the results of post-remedial action sampling conducted on previously remediated North County properties.

Dredging: Dredging of contaminated sediments from Coldwater Creek is not part of Alternative 2. However, Coldwater Creek sediments removed as part of the separate projects, such as the planned flood control project (USACE, 1987a), would be monitored; any sediment exceeding criteria would be shipped for off-site disposal at a permitted facility.

Institutional Controls: No institutional controls would be required for accessible soils at SLAPS VPs or Latty Avenue VPs. However, institutional controls would be imposed to restrict land use at SLAPS, HISS/Futura, Coldwater Creek, and for areas beneath roads, bridges, railroads, and other permanent structures as appropriate. The controls could include deed notices to ensure that future owners are made aware of the presence of residual contamination; land use restrictions to limit activities that could disturb soils; and well-drilling prohibitions. Controls could also include zoning restrictions at SLAPS and HISS/Futura. Land use would be restricted to commercial/industrial uses at SLAPS and HISS/Futura, recreational uses at Coldwater Creek, and transportation/utility uses for roads, bridges, and railroad beds.

Alternative 2 includes shipment and off-site disposal of excavated soils. On-site movement of soils and contaminated material would be accomplished using conventional construction equipment. Local transportation would be performed using sealed or covered trucks. Long-distance shipment would be primarily by rail from the HISS and SLAPS (and possibly the

Eva Avenue) spurs to off-site permitted disposal facilities. Absorbers and other conditioning would be used, as necessary, to comply with the transportation and disposal requirements.

Alternative 2 also includes use of road cover, use of short and long-term monitoring, short-term containment technologies, and demolition of buildings (option). The following bullets present additional specific components of this alternative:

- Monitoring would be conducted during the remedial actions; long-term monitoring of ground water would be needed as part of this alternative, until determined to be no longer required as part of the five-year review process. Long-term monitoring of HZ-A and long-term monitoring of Unit 4 in HZ-C (as a surrogate for HZ-E) would be required.

- Water collected during remedial actions would be treated, if required, and released to a POTW or to Coldwater Creek or its tributaries.

- Supporting technologies would be used to prevent the spread of contamination. These include revegetation, dust mitigation, storage pile covers, sedimentation basins, and dewatering.

- A long-term stewardship plan would be developed to address notification requirements for property owners, as well as to provide monitoring and maintenance requirements for the future. This plan would include provisions addressing how property owners should contact the agency responsible for long-term control of impacted areas, and how these areas would be reviewed, maintained, and monitored by the federal government.

4.2.3 Alternative 3, Partial Excavation and Treatment at SLAPS

Alternative 3 involves treatment at SLAPS, in combination with excavation, dredging, and institutional controls:

On-site Treatment: Excavated soils and sediments would be consolidated at SLAPS for treatment (soil sorting and enhanced soil washing). Pursuant to the National Oil and Hazardous Substances Contingency Plan (NCP), "on-site" is defined as "the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action" [40 CFR300.5]. CERCLA Section 104(d)(4) states that, where two or more noncontiguous facilities are reasonably related on the basis of geography or of threat to public health or the environment, and where wastes at these sites are compatible for a selected treatment or disposal approach, these related facilities may be treated as one site for response purposes. Therefore, treatment at SLAPS would be appropriately classified as “on-site”. Treated soils that meet the ARAR-based criteria for subsurface soil would be used as backfill at SLAPS, and would be covered with clean soils. Any materials not meeting the subsurface soil supplemental criteria listed in Table 4-4 would be shipped off-site to a permitted disposal facility. Limited phytoremediation (using plants to draw contamination from soils) would be conducted for two seasons in Coldwater Creek in areas where sediments accumulate downstream of Pershall Road.

Excavation: All soils exceeding the RGs for unrestricted land use would be excavated at SLAPS VPs, Latty Avenue VPs, and HISS/Futura, with the exception of soils beneath roads, bridges, railroads, and other permanent structures. Soils exceeding the subsurface soil supplemental standards would be excavated at SLAPS. Inaccessible soils under roads, bridges, railroads, and other permanent structures would be left in place. When and as the inaccessible soils become available as a result of decisions made by entities that control their accessibility, new decision documents will identify the response action to address the inaccessible soils as appropriate. Inaccessible soils for the North County Site are identified in Figure ES-3. Additional soils may be identified as inaccessible during implementation and will be deferred for separate action as documented in the post remedial action report. Remediation of radiological contaminants is expected to address associated chemical contaminants based on the results of post-response sampling conducted on other North County properties.

Dredging: Soils and sediments above the Coldwater Creek criteria listed in Table 4-4 would be dredged from Coldwater Creek and would be consolidated at SLAPS for treatment.

Institutional Controls: No institutional controls would be required for accessible soils at SLAPS VPs, Latty Avenue VPs, and HISS/Futura. Institutional controls would be used to restrict land use at SLAPS and beneath roads, bridges, railroads, and other permanent structures as appropriate. The controls could include deed notices to ensure that future owners are made aware of the presence of residual contamination; land use restrictions to limit activities that could disturb soils; and well-drilling prohibitions. Controls could also include zoning restrictions at SLAPS. Land use would be restricted to commercial/industrial uses at SLAPS, and to transportation/utility uses for roads, bridges, and railroad beds. If institutional controls are lost at properties where contaminants are left above levels acceptable for unlimited and unrestricted use, potential exposures for the general public will be less than 100 mrem/yr.

Five-year reviews and long-term ground-water monitoring are included as part of this alternative. Use of road cover, short-term monitoring, short-term containment technologies, long-term containment at SLAPS, truck and rail transportation, and demolition of buildings (option) are also included. The following bullets describe some additional components of this alternative:

- The soils and excavated materials above the criteria after treatment would be shipped primarily by rail from the HISS and SLAPS (and possibly Eva Avenue) spurs to off-site permitted disposal facilities.
- Monitoring would be conducted during the remedial actions, and long-term monitoring of HZ-A and Unit 4 in HZ-C (as a surrogate for HZ-E) would be performed as part of this alternative.
- Site controls would include land surveillance, restricted ground-water use, and environmental monitoring of affected media.
- Water collected during remedial actions would be treated, if required, and released to a POTW or to Coldwater Creek or its tributaries.
- Supporting technologies would be used to prevent the spread of contamination. These include revegetation, dust mitigation, storage pile covers, sedimentation basins, and dewatering. Surface water control and water treatment would be provided, as required, during excavations.

Alternative 3 would remove contamination from most properties at the North County Site. The material would be transferred to SLAPS for treatment rather than being shipped directly for off-site disposal. At SLAPS, the materials would be processed using sorting or enhanced soil washing techniques to remove contamination that could result in risks to a commercial/industrial receptor that exceed the CERCLA risk range. The materials above the subsurface soil supplemental criteria used with institutional controls would be shipped to a permitted disposal facility. The materials below the ARAR-based criteria for subsurface soil would be used as backfill at SLAPS. Areas at SLAPS backfilled with treated soils would be covered with a minimum of one foot of clean soil obtained from a commercial source. Surface water flow would be directed to Coldwater Creek, and flood control measures would be provided as part of the regrading. USACE would comply with FAA air space restrictions during the remedial actions.

Local transportation would be performed using sealed or covered trucks. On-site movement of soils and contaminated materials would be accomplished using conventional construction equipment. Long distance shipment would be by rail or truck, or by a combination that provides cost-effective transportation and disposal. Absorbers and other material conditioning agents would be used, as necessary, to comply with the transportation and disposal requirements.

A long-term stewardship plan would be developed to address notification requirements for property owners, as well as to provide monitoring and maintenance requirements for the future. This plan would include provisions addressing how property owners should contact the agency responsible for long-term control of impacted areas, and how these areas would be reviewed, maintained, and monitored by the federal government.

4.2.4 Alternative 4, Institutional Controls (No Further Excavation)

Alternative 4 emphasizes the use of institutional controls and is protective as long as the controls are in place. It consists of the following:

- *Institutional Controls:* Institutional controls would be imposed to limit land use at SLAPS, HISS/Futura, roads, bridges, railroads, and other permanent structures, Coldwater Creek, and the VPs. Other than specific areas zoned for commercial and industrial uses and FAA limitations, no known land use controls or restrictive easements exist on the subject properties. Potential administrative problems are anticipated with enforcement, access and monitoring, and voluntary compliance with regulatory controls. Further, property owners are often less than willing participants in subordinating their fee title interests for residual site contamination. Missouri real estate law is amenable and supportive of restrictive land use controls, conveyance by quitclaim, and zoning overlay districts. The controls would vary by property and could include deed notices to assure future owners are made aware of the presence of residual contamination, land use restrictions to limit activities that could disturb soils, and well-drilling prohibitions. Zoning restrictions at SLAPS, HISS/Futura, and Vicinity Properties are also potential institutional controls. Land use would be restricted to commercial/industrial uses at SLAPS, HISS/Futura, and vicinity properties, recreational uses at Coldwater Creek, and transportation/utility uses for roads, bridges, and railroad beds. Although the implementation of institutional controls at SLAPS, HISS/Futura, under buildings, roads, bridges, and railroads, and at the VPs is technically feasible, it involves complex administrative requirements. Maintaining controls at numerous properties would be difficult. The controls would have to be maintained for a considerable period of time and would have to be enforced through a government or municipal entity. A requirement that land use restrictions "run with the land" despite ownership changes would be used to help assure that controls are not lost. Details of institutional controls will be documented in the site long-term stewardship plan.

The following bullets describe the remaining components Alternative 4:

- Five-year reviews are included for areas where contaminants are left above levels acceptable for unrestricted use. Final status surveys of remediated areas would be performed.
- Long-term monitoring would be provided under this alternative at those properties that are not released for unrestricted use. Long-term monitoring of HZ-A and long-term monitoring of Unit 4 in HZ-C (as a surrogate for HZ-E) would be required until terminated as part of the five-year review process.

Alternative 4 would involve leaving in place some contamination above the unrestricted use criteria. This alternative will impose institutional controls to reduce the potential for exposure and human intrusion.

4.2.5 Alternative 5, Excavation with Institutional Controls Under Roads, Bridges, Railroads, and Other Permanent Structures

Alternative 5 includes excavation/dredging with off-site disposal for all property units except inaccessible soils beneath roads, bridges, railroads, and other permanent structures. Institutional controls may be used as appropriate to restrict land use.

Excavation: All soils exceeding the RGs for unrestricted land use would be excavated and shipped for off-site disposal or recycle, with the exception of soils beneath roads, bridges, railroads, and other permanent structures. Soils under roads, bridges, railroads, and other permanent structures are inaccessible and will not be remediated as a part of this response action. When and as the inaccessible soils become available as a result of decisions made by entities that control their accessibility, new decision documents will identify the response action to address the inaccessible soils as appropriate. Inaccessible soils for the North County Site are identified in Figure ES-3. Additional soils may be identified as inaccessible during implementation and will be deferred for separate action as documented in the post remedial action report.

Dredging: Coldwater Creek sediments below the mean water gradient that exceed the Coldwater Creek criteria for unrestricted use defined in Table 4-4 would be dredged and disposed.

Institutional Controls: Institutional controls are used to ensure protectiveness for alternatives at areas in which the residual soil contamination exceeds the concentrations specified in ARARs for residential use. No institutional controls would be required for accessible soils. Institutional controls would be used to restrict land use beneath roads, bridges, railroads, and other permanent structures as appropriate. The controls could include deed notices to ensure that future owners are made aware of the presence of residual contamination, and land use restrictions to limit activities that could disturb soil. Controls could also include zoning restrictions at Futura. Roads, bridges, and railroad beds would be limited to use as transportation/utility corridors.

Monitoring: For those areas where contaminants are present at levels that allow for unlimited use and unrestricted exposure, short-term ground-water monitoring is proposed where appropriate to ensure the effectiveness of the source removal, and to verify that no significant migration of contamination to useable ground water is occurring. Monitoring could be performed at those areas where contamination remains above unrestricted levels (roads, bridges, railroads, and other permanent structures), until authorized to be discontinued or modified pursuant to the 5-year reviews. Long-term monitoring is not required for the limestone aquifer (HZ-E). Under this alternative, the majority of the contaminant sources and all highly contaminated soils at the site will be removed. The few contaminant sources remaining in HZ-A soils, unavailable for remedial action at the present, are separated from HZ-E by a low hydraulic conductivity clay aquitard, Unit 3M, and the low conductivity of Unit 3 in general. The potential for contaminant migration to HZ-E is very small, as noted by prior study. In addition, although HZ-E meets the definition of a potential source of drinking water (Class IIB), it is not a current source of drinking water in the area, so an exposure pathway from HZ-E ground water to receptors does not exist. Short-term ground-water monitoring of Unit 4 of HZ-C is proposed to ensure continued protection of the limestone aquifer. Short-term monitoring of HZ-A ground-water would be used to assess the effects of the remedial action on HZ-A ground-water quality, and to assess the approximate contaminant transport rate through HZ-A ground water to Coldwater Creek. Short-term surface water and sediment monitoring of Coldwater will be conducted to provide additional data to assess whether Coldwater Creek is being significantly impacted by contaminant migration from HZ-A, and to determine whether remedial actions are having any adverse impacts on the creek. Long-term monitoring for Unit 2 of HZ-A may be required, depending upon the contamination of the post-remedial action HZ-A ground water and the rate of contaminant delivery to Coldwater Creek. HZ-A long-term monitoring is not anticipated. Short-term monitoring of HZ-A ground water after removal/remedial actions and base flow contaminant evaluation of Coldwater Creek will resolve whether long-term monitoring of HZ-A is warranted.

Five-year reviews would be conducted only for those areas in which the residual soil contamination exceeds the concentrations specified in ARARs for residential use (i.e., roads, bridges, railroads, and other permanent structures).

Treatment is not proposed under this alternative, except where needed for release water. State-of-the-art treatment relative to radioactivity-contaminated soil is advancing rapidly, and while current treatment costs for the North County Site soils are greater than excavation and off-site disposal costs, technological advances could narrow or reverse this balance. Implementation of soil washing and/or phytoremediation may be considered under this alternative during the remedial design phase. If implementation of these technologies is determined to be appropriate based on new developments, a change to the remedy may be recommended, in which case appropriate environmental documentation would be issued.

Additional components of this alternative include the following:

- Supporting technologies are used to prevent the spread of contamination. These include revegetation, dust mitigation, storage pile covers, sedimentation basins, and dewatering.
- Water collected during remedial actions would be treated, if required, and released to a POTW or to Coldwater Creek or its tributaries.
- All of the removal actions started under the existing EE/CAs are complete at the time the ROD is approved.
- Post-remedial action surveys would be conducted to assure that remediated areas met the cleanup criteria.
- USACE would comply with the airport restrictions for air space.
- Any wetland areas designated using the 1987 Corps of Engineers Wetlands Delineation Manual that are impacted during the removals would be restored, or equivalent wetland areas would be created.
- Backfill from approved sources would be added and the site would be graded to provide for surface water flow to Coldwater Creek and flood control.

Other technologies included in Alternative 5 include short-term containment technologies, truck and rail transportation, precision excavation and characterization, use of road cover, demolition of buildings (option) and disposal at permitted facilities. Preference would be given to recycling if the cost is similar to the cost for disposal of the materials.

Local transportation would be done using sealed or covered trucks. On-site movement of soils and contaminated materials would use conventional construction equipment. Long distance shipment would be primarily by rail from the rail spurs at HISS and SLAPS to off-site permitted disposal or recycle facilities. The Eva Avenue rail spur may also be used. Absorbers and other conditioning would be used, as necessary, to comply with the transportation and disposal requirements.

4.2.6 Alternative 6, Excavation at all Properties

Alternative 6 includes excavation and dredging, plus off-site disposal, to remove contamination from all areas. All soils exceeding the RGs for unrestricted land use would be removed for all property units. Unlike other alternatives, roads, bridges, railroads, and other permanent structures would be removed, as required, to allow excavation of soils that exceed the unrestricted use criteria. Five-year reviews would not be conducted.

Under Alternative 6, all soils that exceed the criteria for use without radiological restrictions for all property units, regardless of current or likely future land use, would be removed. Contaminated soils and sediments would be removed so that no institutional controls are required for any property. Remediation of radiological contaminants is expected to address associated chemical contaminants based on the results of post-response sampling conducted on other North County properties. All areas of the site would be released for use without radiological or chemical restrictions.

Additional components of this alternative include the following:

- Roads, bridges, and railroads would be removed as required to allow excavation of soils that exceed unrestricted land use.
- Institutional controls would be used for areas under buildings, until the areas are made available by the owner for remediation.
- Monitoring of air, surface water, and sediments would be conducted during the remedial action, but no long-term monitoring after completion of the action is included.
- Final status surveys would be conducted to ensure that remediated areas met the cleanup criteria.
- The excavated materials would be shipped primarily by rail from the rail spurs at HISS and SLAPS to off-site permitted disposal or recycle facilities.
- Water collected during remedial actions would be treated, if required, and released to a POTW or to Coldwater Creek or its tributaries. Preference would be given to recycling if the cost is similar to the cost for disposal of the materials.
- Supporting technologies would be used to prevent the spread of contamination during remedial action. These include revegetation, storage pile covers, and sedimentation basins. Dewatering, surface-water control, and water treatment would be provided as required during the excavation process. Dust mitigation and control would be maintained by using water, mulch, straw, or similar measures.
- USACE would comply with the airport restrictions of air space.
- Any wetland areas designated using the 1987 Corps of Engineers Wetlands Delineation Manual that are impacted during the removals would be restored, or equivalent wetland areas would be created.
- Backfill from approved sources would be used, and the site would be graded to provide for surface water flow to Coldwater Creek, as well as for flood control.

Other technologies include demolition, short-term containment technologies, truck and rail transportation, and disposal at permitted facilities. Local transportation would use sealed or covered trucks. On-site movement of soils and contaminated materials would use conventional construction equipment. Long distance shipment would be by rail or truck, or by a combination that provides a cost-effective method of transportation and disposal. Absorbers and other material conditioning agents would be used, as necessary, to comply with the transportation and disposal requirements. Bulk concrete and crushed concrete, or similar rubble materials, would be decontaminated, if necessary, before disposal.

SECTION 5

DETAILED ANALYSIS OF ALTERNATIVES

5 DETAILED ANALYSIS OF ALTERNATIVES

5.1 INTRODUCTION

The detailed analysis of remedial alternatives provides the basis for identifying a preferred remedial alternative. This section presents the detailed analysis of alternatives using Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) criteria. The detailed and comparative analysis of the site-wide remedial alternatives includes evaluations of overall protection; compliance with applicable or relevant and appropriate requirements (ARARs); long- and short-term effectiveness; reduction in contaminant volume, toxicity, or mobility; implementability; and cost. The preferred alternative will be discussed in the Proposed Plan (PP).

In accordance with statutory requirements under CERCLA, remedial actions (EPA, 1988b) must:

- be protective of human health and the environment;
- attain ARARs or provide grounds for justifying a waiver;
- be cost-effective;
- use permanent solutions and alternative treatment technologies to the maximum extent practicable; and
- satisfy the preference for treatment that reduces volume, toxicity, or mobility as a principal element [40 CFR §300.430(f)(1)(c)].

In addition, long-term effectiveness and other considerations must be taken into account in evaluating each of the alternative remedial actions. These considerations include:

- long-term uncertainties associated with land disposal;
- goals, objectives, and requirements of the Solid Waste Disposal Act;
- persistence, toxicity, and mobility of radionuclides and other hazardous substances and their propensity to bioaccumulate;
- long- and short-term potential for adverse health effects from human exposure;
- potential threat to human health and the environment associated with excavation, transportation, and disposal;
- long-term maintenance costs; and
- potential for future remedial action costs if the alternative being discussed were to fail [40 CFR §300.430(e)(9)].

Accordingly, retained remedial alternatives will undergo detailed comparative analysis using the criteria discussed in the following paragraphs.

CERCLA Threshold Criteria

<u>Overall protection of human health and the environment and compliance with ARARs</u> are "threshold criteria" that any remedial alternative must meet before being considered for implementation. During the detailed analysis of remedial alternatives, each alternative must be evaluated to determine how the alternative achieves and maintains protection of human health

and the environment. Similarly, each remedial alternative must be assessed to determine how the alternative complies with ARARs or, if a waiver is required, an explanation of why the variance is justified.

CERCLA Balancing Criteria

Long-term effectiveness; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost are referred to as “balancing criteria.” These represent the primary selection criteria for alternatives determined to be protective of human health and the environment and in compliance with ARARs.

Long-term effectiveness and permanence is an evaluation of the magnitude of residual risk (risk remaining after implementation of the alternative) and the adequacy and reliability of controls used to manage the remaining waste (untreated waste and treatment residuals) over the long-term. Alternatives that afford the highest degrees of long-term effectiveness and permanence leave little or no untreated waste at the site, make long-term maintenance and monitoring unnecessary, and minimize the need for institutional controls.

Reduction of volume, toxicity, or mobility through treatment is an evaluation of the ability of the alternative to reduce the volume, toxicity, or mobility of the waste. The irreversibility of the treatment process and the type and quantity of residuals remaining after treatment are also assessed by this criterion.

Short-term effectiveness addresses the protection of workers and the community during the remedial action, the environmental effects of implementing the action, and the time required to achieve cleanup goals.

Implementability addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation. Technical feasibility assesses the ability to construct and operate a technology, the reliability of the technology, the ease in undertaking additional remedial actions, and the ability to monitor the effectiveness of the alternative. Administrative feasibility is addressed in terms of the ability to obtain approval from federal and state agencies.

Cost of an alternative provides an estimate of the Fiscal Year 2000 (FY00) dollar cost of each alternative. The costs estimated in this report are based on historical costs incurred in previous Formerly Utilized Sites Remedial Action Program (FUSRAP) actions, quotes from suppliers, generic unit costs, vendor information, conventional cost-estimating guides, and other information. The cost estimates are developed for FY00 dollars. The cost estimates have been prepared from the information available at the time of the estimate. They are for guidance in project evaluation and implementation, and are believed to be accurate within a range between -30 percent and +50 percent of actual costs, in accordance with the U.S. Environmental Protection Agency (EPA) guidance (EPA, 1988b). The actual costs for these actions could be higher than estimated because of unexpected site conditions and the potential for delays in taking action.

CERCLA Modifying Criteria

The two modifying criteria described below will be evaluated as part of the Record of Decision (ROD), after the public has had the opportunity to comment.

State Acceptance: This criterion will consider comments received by the State of Missouri on Remedial Investigation/Feasibility Study (RI/FS) documents. The decision-making process for remediation of the North County Site has been developed in consultation with the EPA and the State of Missouri. Because final comments will not be received until after the RI/FS has been issued, this criterion will be addressed in the responsiveness summary of the ROD. Comments received on previous documents were considered in the formulation of alternatives. The State's comments are requested on the PP, in accordance with Section 117 of CERCLA.

CERCLA provides an opportunity for the State to concur or not concur with the selection of the remedial alternative. If the President proposes to select a remedial action that does not attain ARARs and the State desires to have the remedial action conform to such standard, requirement, criteria, or limitation, the State may bring an action for the sole purpose of determining whether the finding of the President is supported by substantial evidence, in accordance with CERCLA 121 (f) (3)(B) (iii). If the court determines that the remedial action need not conform to such standard, requirement, criteria, or limitation, and the State pays or assures the payment of the additional costs attributable to meeting such standard, requirement, criteria, or limitation, the remedial action shall be so modified.

Community Acceptance: This criterion will address the comments made by the community on the alternatives being considered. Because public comments will not be received until after the alternatives have been evaluated in the FS and the preferred alternative has been presented in the PP, this criterion will be addressed in the responsiveness summary and the ROD. However, previous comments and the input from the Task Force were considered in the formulation of the alternatives.

5.2 DETAILED ANALYSIS OF SITE-WIDE ALTERNATIVES

This section presents a detailed analysis of site-wide alternatives. Each alternative is described and evaluated against the criteria outlined in Section 5.1.

5.2.1 Alternative 1, No Further Action

This alternative assumes that no additional remedial actions would be implemented at the North County Site. The no-further-action alternative is required by the National Contingency Plan (NCP) and CERCLA guidance to provide a no-further-action baseline to which all other remedial alternatives are compared. Under Alternative 1, the rail spurs at St. Louis Airport Site (SLAPS) and Hazelwood Interim Storage Site (HISS) would be left in place. Accessible soils would remain at current locations. Difficult-to-access contaminated soils under roads, bridges, railroads, and other permanent structures would be left in place. Sediments in Coldwater Creek and depositional material in the floodplain would not be removed. The limited site security and fencing would be left in place, but would not be maintained by the United States Army Corps of Engineers (USACE). Continued routine monitoring of air, buildings, ground water, and storm water would not be performed. Five-year reviews would be conducted pursuant to CERCLA for areas that are too contaminated to allow unlimited use and unrestricted exposure.

5.2.1.1 Overall Protection of Human Health and the Environment

Alternative 1 is not protective of human health or the environment for the long-term. The Baseline Risk Assessment (BRA) and the risk analysis presented in Appendix D indicate that potential future risks at the North County Site could exceed the CERCLA target risk range. The risk levels for current receptor conditions are in the 10^{-6} to 10^{-4} range, assuming that site access restrictions apply (including fences, zoning restrictions, etc.), but the risk levels for future receptors could exceed 10^{-4}.

This alternative provides no additional protection to human health and the environment over baseline conditions. The risks from direct contact, ingestion, and inhalation would continue and could increase over time, for current access control measures, such as fencing and the cover on waste piles, would not be maintained. Existing buildings, structures, and paved surfaces that deter human access to underlying soils would also undergo eventual deterioration, thereby increasing the potential for human exposure to site-related contamination. The potential for human exposure to contaminants and the potential for off-site migration could increase over time as a result of disturbances by humans and natural processes. Under Alternative 1, North County Site soils and sediments that pose potentially unacceptable risks under future-use scenarios would not be remediated.

Coldwater Creek sediments do not pose unacceptable risks to human health and the environment under current land use scenarios. However, no control is placed on public use of sediments under this alternative. If contaminated sediments are dredged from the creek, they could pose a potentially unacceptable risk to human health under some future scenarios.

Current risks associated with exposure to contaminated ground water are minimal because the site-related contaminants reside in a non-potable hydrostratigraphic zone (HZ-A). In addition, sample data show that zones that could be used as a source of drinking water do not contain unprotective levels of contamination originating from FUSRAP-related activities. The hydrologic and chemical data also show that the water in the contaminated zone (HZ-A) is not connected and is not likely to migrate to the lower water-bearing units. Ground water from HZ-A at SLAPS migrates towards Coldwater Creek. The hydrological characteristics and modeling studies of SLAPS indicate the slow discharge of ground water to Coldwater Creek is not significantly impacting the creek.

5.2.1.2 Compliance with ARARs

Alternative 1 does not comply with chemical-specific ARARs. The residual radionuclide concentrations in soil would continue to exceed the ARAR for unrestricted use. There are no location- or action-specific ARARs considered under Alternative 1, because no remedial action would take place.

5.2.1.3 Long-Term Effectiveness and Permanence

Alternative 1 includes no long-term management measures to prevent exposures or spread of contamination. All potential future risks remain at levels that exceed the CERCLA target risk range because none of the contaminants of concern (COCs) would be removed. Although existing site security could provide limited control over exposure to site contaminants, this alternative does not ensure that controls remain in place, and provides no additional controls to prevent exposure to contaminants. Under future land-use scenarios, there are potential unacceptable risks to human health and the environment if the contaminated soils and sediments remain in place. Potentially unacceptable risks could arise under future-use scenarios involving the disposal of dredged sediments.

Under Alternative 1, contamination in ground water in HZ-A would remain, but would not pose a risk to human health. The concentration of radiological contaminants in ground water would not significantly decrease in the near future because no remedial actions would be taken. However, ground-water modeling studies have indicated that the rate of migration for these contaminants is low due to low ground-water velocities and relatively high distribution ratios in the soils. Consequently, the potential for human exposure under future-use scenarios is low. The water-bearing units are not used as a source of drinking water and are not likely to become a source of drinking water.

Pursuant to the Superfund Amendments and Reauthorization Act (SARA), a site review would be conducted every 5-years because radioactive contaminants would remain on-site above health-based levels for unrestricted use. Five-year reviews permit evaluation of data obtained from ongoing monitoring, and provide information on the presence and behavior of contaminants in soils, sediments, ground water, and air.

5.2.1.4 Reduction of Contaminant Volume, Toxicity, or Mobility Through Treatment

No reduction in contaminant volume, toxicity, or mobility through treatment is achieved because no treatment process is proposed under this alternative.

5.2.1.5 Short-Term Effectiveness

There are no significant short-term risks associated with the Alternative 1 beyond baseline conditions. There would be no additional short-term health risks to the community, because no remedial actions would be implemented. Workers would not be exposed to any additional health risks.

5.2.1.6 Implementability

Five-year evaluations of site remedy effectiveness can be easily implemented. No other actions are taken for this alternative.

5.2.1.7 Cost

Under this alternative, there are no capital costs. The cost for the five-year reviews is $1.5 million over the 30-year costing period due to the cost of conducting recurrent 5-year reviews. These costs could continue indefinitely.

5.2.2 Alternative 2, Partial Excavation and Capping at SLAPS and HISS/Futura

Alternative 2 includes excavation, dredging, and off-site disposal in conjunction with capping and institutional controls. Institutional controls would be used at SLAPS, HISS/Futura, Coldwater Creek, and under roads, bridges, railroads, and other permanent structures. Table 5-1 provides a summary of the institutional controls required under each alternative. Contamination present above supplemental standards at SLAPS and HISS/Futura would be removed. SLAPS and HISS/Futura would be capped with stone and clean soil after excavation is complete. The cap would reduce the radon emanation to less than the standards specified in 10 CFR 40 and 40 CFR 192. Institutional controls would be implemented to restrict future use of SLAPS and HISS/Futura, preclude any use of ground water, and prevent any activities that could result in exposure to COCs or compromise the integrity of the caps. Coldwater Creek sediments removed as part of separate projects, such as flood control, would be monitored, and any sediments exceeding criteria would be shipped for off-site disposal. Soils under roads, bridges, railroads, and other permanent structures are inaccessible and will not be remediated as part of this response action. Institutional controls would be used in areas under roads, bridges, railroads, and other permanent structures where the actual residual concentrations exceed unrestricted criteria and site-specific remedial design confirms the need for institutional controls. Vicinity properties (VPs) would be remediated to remove contamination from all areas containing soils that exceed CERCLA risk levels and the remediation goals (RGs) for unrestricted use criteria so that no institutional controls are required.

5.2.2.1 Overall Protection of Human Health and the Environment

Alternative 2 includes removal of soil to meet the unconditional release concentrations in surface soil and subsurface soil at SLAPS VPs and Latty Avenue VPs, with the exception of soils beneath roads, bridges, railroads, and other permanent structures. For SLAPS and HISS/Futura, removing soils containing radiological contamination above the supplemental standards for subsurface soil would limit risks to within the CERCLA target risk range and to below dose-based limits for as long as institutional controls are maintained. In fact, the multimedia cap at SLAPS and HISS/Futura would likely reduce residual risks and doses to well below limits. Institutional controls are used to prevent or mitigate potential exposures to COCs at SLAPS; HISS/Futura; under roads, bridges, railroads, and other permanent structures; and within the banks of Coldwater Creek. Land use restrictions would prevent inadvertent intrusion into soils with residual concentrations of COCs. Well-drilling prohibitions would prevent direct exposure to contaminated ground water so that a high degree of risk reduction would be achieved.

Table 5-1. Summary of Institutional Controls Under Each Alternative

Properties	Alternative 2, Partial Excavation and Capping at SLAPS and HISS/Futura	Alternative 3, Partial Excavation and Treatment at SLAPS	Alternative 4, Institutional Controls (No Further Excavation)	Alternative 5, Excavation with Institutional Controls Under Roads, Bridges, Railroads, and Other Permanent Structures	Alternative 6, Excavation at all Properties
SLAPS	Zoning restrictions (commercial/industrial) Land use restrictions[2] Deed notices to warn future property owners about the extent of remediation and any residual contamination that may remain.	Zoning restrictions (commercial/industrial) Land use restrictions[2] Deed notices to warn future property owners about the extent of remediation and any residual contamination that may remain.	Zoning restrictions (commercial/industrial) Land use restrictions[2] Deed notices to warn future property owners about the extent of remediation and any residual contamination that may remain.	None	None
HISS/Futura	Zoning restrictions (commercial/industrial) Land use restrictions[2] Deed notices to warn future property owners about the extent of remediation and any residual contamination that may remain.	None	Zoning restrictions (commercial/industrial) Land use restrictions[2] Deed notices to warn future property owners about the extent of remediation and any residual contamination that may remain.	Zoning restrictions (commercial/industrial) Land use restrictions[2] Deed notices to warn future property owners about the extent of remediation and any residual contamination that may remain.	None
Coldwater Creek	Land use restrictions[1] (recreational)	None	Land use restrictions[1] (recreational)	None	None
Roads, bridges, railroads[3]	Land use restrictions[1] (transportation/utility) Well-drilling prohibitions	Land use restrictions[1] (transportation/utility) Well-drilling prohibitions	Land use restrictions[1] (transportation/utility) Well-drilling prohibitions	Land use restrictions[1] (transportation/ utility)	None
Vicinity Properties	None	None	Zoning restrictions (commercial/industrial) Land use restrictions[2] Deed notices to warn future property owners about the extent of remediation and any residual contamination that may remain.	None	None

Note: Alternative 1 (no action) would allow continuation of existing institutional controls (current fencing and zoning restrictions would be left in place).
Note: All alternatives would comply with FAA height restrictions.

[1] Land use restrictions may take the form of zoning restrictions or easements to restrict the owner to uses that are compatible with the intended use (i.e. transportation/utility corridor for roads/bridges/railroads or recreational uses for Coldwater Creek).

[2] Land use restrictions could include the following:
a). The property can not be used for residential purposes;
b). The ground water can not be used;
c). A garden can not be planted on the property;
d). Any buildings on the property must be properly ventilated for radon; and
e). No construction of any type is allowed without the written approval of the government.

[3] Institutional controls would be used for areas under roads, bridges, railroads, and other permanent structures only where actual residual concentrations of radionuclides exceed the ARAR-based unrestricted criteria and the site-specific remedial design confirms the need for institutional controls to assure protectiveness.

Remedial activities under Alternative 2 would address both non-radiological and radiological contaminants of concern. By doing so, risks would not exceed the CERCLA target risk range, a hazard index (HI) of 1.0 for each primary target organ, or doses above ARAR-based limits, as appropriate. Therefore, the alternative is protective of human health at all properties. The evaluation of risk-based and dose-based criteria is located in Appendix D.

5.2.2.2 Compliance with ARARs

Location-, action-, and chemical-specific ARARs would be achieved at all properties. Institutional controls would be used to maintain risks to within the CERCLA target risk range at SLAPS; HISS/Futura; under roads, bridges, railroads, and other permanent structures; and within the banks of Coldwater Creek.

5.2.2.3 Long-Term Effectiveness and Permanence

Alternative 2 is protective in the long-term. Long-term effectiveness and permanence is good for all of the VPs. For the areas at SLAPS, HISS/Futura, Coldwater Creek, and roads, bridges, railroads, and other permanent structures, this alternative is less permanent because institutional controls could be lost. The excavation and removal of contaminated soils would result in a permanent reduction in site risks. However, some contaminated material would remain at SLAPS, HISS/Futura, Coldwater Creek, and under roads, bridges, railroads, and other permanent structures, requiring continued institutional controls and maintenance of caps and monitoring. The institutional controls would have to be maintained over the long-term to prevent unauthorized and/or inappropriate use of the site. The effectiveness of the institutional controls would be monitored through the CERCLA 5-year review process. For the purpose of this FS, it is assumed that the current environmental monitoring program would continue for 30 years. However, the actual length of the monitoring program would be based on the results of 5-year reviews.

5.2.2.4 Reduction of Contaminant Volume, Toxicity, or Mobility Through Treatment

No reduction in contaminant volume, toxicity, or mobility through treatment is achieved.

5.2.2.5 Short-Term Effectiveness

Small short-term effects on the community could occur during excavation of contaminated soils, transportation of waste materials, and disposal activities. Air quality could be affected by release of particulates and radon during soil excavation. Other short-term impacts to the local community include traffic and property disruptions during excavation of difficult-to-access soils beneath local roads, bridges, railroads, and other permanent structures. Land at SLAPS and HISS/Futura would be restricted, and the economic benefit to the local community would likely be reduced. Alternative 2 makes use of institutional controls at SLAPS; HISS/Futura; under roads, bridges, railroads, and other permanent structures; and within the banks of Coldwater Creek. These controls result in a reduction in short-term impacts due to construction or transportation accidents that otherwise might be expected to occur for alternatives involving more extensive soil removals.

5.2.2.6 Implementability

There are no technical problems that would limit the implementability of this alternative, but administratively it would be difficult. The Missouri Department of Natural Resources (MDNR) has objected to placement of radioactive material on land in Missouri. Excavation of contaminated soils, construction of temporary roads, and truck transport of soil are conventional activities in construction projects of this kind. Condemnation may be required to obtain the necessary real estate interests. On-site remedies have received strong opposition from local stakeholders in the past.

Construction and operation of the components of Alternative 2 would be straightforward. Resources are readily available for removing contaminated soil and sediment, and constructing an on-site cap. Standard excavation/construction equipment would be used to remove contaminated material and construct the disposal facility. Special engineering techniques involving precautions on excavation near buildings and structures would be observed during remediation.

Mitigation measures would be used to ensure minimization of short-term impacts. Borrow sites for backfill, cap, and soil cover material have not been selected, but are locally available. However, implementation of the planned Lambert-St. Louis International Airport expansion would result in a demand for several million cubic meters (2 to 3 million cubic yards) of backfill soil that could impact local backfill availability.

5.2.2.7 Cost

The total costs for 30 years are $205 million. There would be continuing costs for monitoring and review beyond the 30-year costing period.

5.2.3 Alternative 3, Partial Excavation and Treatment at SLAPS

Alternative 3 includes excavation and dredging combined with on-site treatment (soil sorting, soil washing, and limited phytoremediation) plus off-site disposal. The actions would allow commercial/industrial use of SLAPS, continued use of the roads, bridges, railroads, and other permanent structures as transportation/utility corridors, and unrestricted use of all other properties. Demolition, land use and zoning restrictions, deed notices, well-drilling prohibitions, use of road cover, short-term monitoring, short-term containment technologies, long-term containment at SLAPS, and truck and rail transportation are also included. For Alternative 3, all soils that exceed the RGs for unrestricted release would be removed at all property units except the roads, bridges, railroads, other permanent structures, and SLAPS. Soils exceeding the supplemental standards for subsurface soil would be excavated at SLAPS. Soils under roads, bridges, railroads, and other permanent structures are inaccessible and will not be remediated as part of this response action. Institutional controls would be used to ensure protectiveness of the areas under roads, bridges, railroads, and other permanent structures under all future anticipated land use conditions. Excavated materials above the supplemental standards for subsurface soil would be shipped to a permitted disposal facility. Treated soils meeting the ARAR-based criteria for subsurface soil would be used as backfill at SLAPS.

Institutional controls such as deed notices, would be imposed to limit land use for SLAPS. Institutional controls would also be implemented for those areas under roads, bridges, railroads, and other permanent structures in which residual concentrations would exceed unrestricted criteria if moved to the surface and if remedial design indicates the need for controls. Table 5-1 provides a list of the institutional controls required for this alternative at SLAPS and under roads, bridges, railroads, and other permanent structures.

Soil sorting and soil washing would take place at SLAPS. The materials would be processed using sorting or enhanced soil washing techniques to remove contamination exceeding the supplemental standard for subsurface soil. Phytoremediation is included for areas in the Coldwater Creek flood plain.

5.2.3.1 Overall Protection of Human Health and the Environment

Alternative 3 includes removal of soil to meet the unconditional release concentrations in surface soil and subsurface soil at SLAPS VPs, Latty Avenue VPs, and HISS/Futura, and the supplemental standards for subsurface soil at SLAPS. For SLAPS, removing soils above the supplemental standards for subsurface soil would limit risks to within the CERCLA target risk range and ARAR-based limits for as long as institutional controls are maintained. Soils under roads, bridges, railroads, and other permanent structures are inaccessible and will not be remediated as part of this response action. Institutional controls would be used to ensure protectiveness of the areas under roads, bridges, railroads, and other permanent structures under all future anticipated land use conditions. The implementation of land use restrictions and well-drilling prohibitions at SLAPS and under roads, bridges, railroads, and other permanent structures would increase overall protectiveness by preventing or reducing exposures to COCs. HISS/Futura and the VPs would be remediated to the unrestricted release concentrations. Soils and sediments in Coldwater Creek would be remediated to the Coldwater Creek criteria. The Coldwater Creek criteria limits soils and sediments above the mean water gradient in Coldwater Creek to the unrestricted land-use RGs, and limits sediments below the mean water gradient in Coldwater Creek to the subsurface standard of 15/43/150 pCi/g above background of Ra-226/Th-230/U-238. Therefore, both the CERCLA risk and ARAR-based limits would be satisfied.

Remedial activities under Alternative 3 would address both non-radiological and radiological contaminants of concern. By doing so, risks would not exceed the CERCLA target risk range, a HI of 1.0 for each target organ, or doses above ARAR-based limits, as appropriate. Therefore, the alternative is protective of human health at all properties. The evaluation of risk-based and dose-based criteria is located in Appendix D.

5.2.3.2 Compliance with ARARs

Location-, action-, and chemical-specific ARARs would be achieved at all properties. Institutional controls would be used to maintain risks below criteria at SLAPS, and under roads, bridges, railroads, and other permanent structures.

5.2.3.3 Long-Term Effectiveness and Permanence

The long-term effectiveness and permanence is good at all of the VPs. For the areas at SLAPS and roads, bridges, railroads, and other permanent structures, this alternative is less permanent because institutional controls could be lost and future development at SLAPS could be restricted. The excavation and treatment of some contaminated soils and sediment would result in a permanent reduction in site risks, but contaminated materials remaining on-site would require continued monitoring and institutional controls. Institutional controls are used for SLAPS, and under roads, bridges, railroads, and other permanent structures. For the purpose of this FS, it is assumed that the current environmental monitoring program would continue for 30 years. However, the actual length of the monitoring program would be based on the results of 5-year reviews, and may be in perpetuity. Site reviews would be conducted.

5.2.3.4 Reduction of Contaminant Volume, Toxicity, or Mobility Through Treatment

Soil washing and soil sorting concentrate the contaminants into a smaller volume. However, the "clean stream" still contains some low levels of residual radioactive materials. The total volume of the clean and concentrated stream is larger than the original volume of contaminated soil before processing. Toxicity and mobility could be affected by changing the chemical composition of the constituents in the soil. Although soil washing mobilizes constituents in order to remove and concentrate them, the process also stabilizes the products of both the clean and concentrated stream. Therefore, the changes to toxicity and mobility are small. Phytoremediation will concentrate some contaminants that are present in the sediments of Coldwater Creek. Phytoremediation has been shown to be effective for uranium and some other metals, but less effective for radium and thorium.

5.2.3.5 Short-Term Effectiveness

Short-term effectiveness of Alternatives 2, 3, 5, and 6 are similar. The impacts are described in more detail under the evaluation of Alternative 2.

5.2.3.6 Implementability

The implementation of enhanced soil washing and soil sorting would require development efforts as part of the implementation. Soil washing enhanced with chemical extraction has been proven effective for reducing the levels of some contaminants in North County Site soils. Laboratory and conceptual design studies were conducted on soils from the North County Site to investigate treatment processes that would provide a volume reduction and reduce the remediation costs. The primary focus of the investigation was soil washing, including both physical and chemical processes (Clemson Technical Center, 1996). A bench scale selective chemical extraction process was developed that was able consistently to meet the RGs for the North County Site. Removal efficiencies of the radionuclides of interest, particularly Th-230, were consistently greater than 96 percent, and frequently in excess of 98 percent. It is expected that all of the site soils containing less than 500 pCi/g of Th-230 could be treated to meet the cleanup goals with this process. Based on limited evaluations of higher activity soils, the process may even be able successfully to treat soils containing Th-230 activities as high as 2,000 pCi/g. Based on the results of these tests a (conceptual) process design and cost estimate for a full-scale system were developed. The conceptual cost estimates show that treatment by soil washing could be cost effective if process improvements were incorporated to minimize the amount of reagents/chemical required, and to treat the unrecycled process wastewater. Treatment of process water is, however, particularly problematic. Other aspects of the alternative, such as excavation of contaminated soils and truck transport of soil, are conventional activities in construction projects of this kind.

Administrative implementation of this alternative would be difficult. MDNR has objected to placement of radioactive materials on land in Missouri. It is likely the real estate instrument would need to be obtained through condemnation. Although the implementation of institutional controls at SLAPS and under roads, bridges, railroads, and other permanent structures is technically feasible, it involves complex administrative requirements.

Construction and operation of the components of Alternative 3 would be straightforward. Resources are readily available for removing contaminated soil and sediment and providing backfill over treated soils. Standard excavation/construction equipment would be used to remove contaminated material.

Minimal sediment dredging from Coldwater Creek can be accomplished using conventional hydraulic dredging equipment (i.e., vacuum dredged with a horizontal auger dredge or modified cutterhead dredge). Hydraulic dredging would use suction to dislodge, capture, and transport contaminated sediment to the staging area. This is a well-developed technology that has been extensively used. Hand-held hydraulic dredges controlled by wading operators would be used in small isolated locations where shallow sewer lines are known to exist as well as in shallow sections of the creek. A temporary staging area for dewatering and hauling equipment would be constructed, and additional clearing activities would be required at some locations along the creek. The wastewater from dredged sediment dewatering would be tested prior to discharge. On-site screening would minimize turn-around-time on releasing wastewater for discharge. Attempts would be made to schedule creek dredging during the dry season, when less flow is in the creek.

Mitigation measures would be used to ensure minimization of short-term impacts. Borrow sites for backfill and soil cover material have not been selected, but are locally available. However, implementation of the planned Lambert-St. Louis International Airport expansion would result in a demand for several million cubic meters (2 to 3 million cubic yards) of backfill soil, which could impact local backfill availability.

5.2.3.7 Cost

The total cost for 30 years is $284 million. There would be continuing costs for monitoring and review beyond the 30-year period.

5.2.4 Alternative 4, Institutional Controls (No Further Excavation)

Alternative 4 consists of institutional controls at HISS/Futura, SLAPS, Coldwater Creek, VPs, and roads, bridges, railroads, and other permanent structures. Table 5-1 provides a summary of the institutional controls required under Alternative 4. Institutional controls are used to prevent inadvertent intrusion into soils with residual concentrations of COCs. A deed restriction prohibiting well drilling would provide additional protection by limiting direct exposure to contaminated ground water. Alternative 4 also includes long-term monitoring, use of road cover, and 5-year reviews.

5.2.4.1 Overall Protection of Human Health and the Environment

The overall protection of human health and the environment is good at all properties for as long as institutional controls are in place. Institutional controls in the form of land use restrictions would be established to prevent unrestricted use of the site. Potential future ground-water exposure pathways are eliminated through the use of well-drilling prohibitions and land use restrictions prohibiting ground-water use. Controls may also include soil excavation restrictions.

Alternative 4 is less permanent than other alternatives because the institutional controls could be lost. The risks under Alternative 4 could exceed the CERCLA target risk range, and doses could exceed 100 mrem/yr if controls are lost. To avoid loss of controls, Alternative 4 includes requirements to verify the maintenance of the institutional controls through the CERCLA 5-year review process.

5.2.4.2 Compliance with ARARs

Alternative 4 does not achieve either the 40 CFR 192, Subpart B or C standards. In addition, Alternative 4 does not comply with 40 CFR 192 Subpart A standards for the control of residual radioactive materials from inactive uranium processing sites. Subpart A requires that controls be maintained for at least 200 years and up to 1,000 years. Inability to meet the threshold criteria of compliance with ARARs is a significant problem with this alternative. Section 121(d) of CERCLA and the NCP § 300(f)(l)(ii)(B) require that remedial actions at CERCLA sites attain ARARs, unless such ARARs are waived under CERCLA Section 121(d)(4).

5.2.4.3 Long-Term Effectiveness and Permanence

Alternative 4 may not be protective in the long term. It relies on institutional controls to eliminate or reduce exposures to site contaminants. Examples of these institutional controls are detailed in Table 5-1. The institutional controls could include land use restrictions to limit activities that could disturb soils under roads, bridges, and railroads and beneath buildings. Controls could also include zoning restrictions and deed notices to ensure that future owners are made aware of the presence of residual contamination. These controls would involve continuation of current land-use restrictions to limit use of roads, bridges, and railroad beds as transportation/utility corridors. The areas under roads, bridges, and railroad rights-of-way presently have institutional controls in place in the form of easements for these uses. The most likely use of additional institutional controls is a system by which notice would be provided by utilities or other entities to the government prior to performance of any construction or maintenance work in contaminated areas remaining beneath roads, bridges, railroads, and other permanent structures so that the necessary remediation can be conducted prior to and in conjunction with this work.

The effectiveness of this alternative is directly related to the adequacy and reliability of the institutional controls. The controls would have to be enforced through a government or municipal entity. It is reasonably expected that institutional controls can be implemented and would be effective in protecting human health and the environment, but they would not result in a permanent reduction in site risks. Title to the properties with residual contamination would remain with current landowners and would not be transferred to the federal or state government. Institutional controls will be effective in providing a degree of human health protection to the extent they minimize the potential for direct contact with contaminated media. The institutional controls would have to be maintained for a considerable period of time to prevent unauthorized and/or inappropriate use of the site. The materials (e.g., uranium, thorium, and vanadium) left in place will remain for multiple lifetimes because they have very long half-lives and are not typically removed by natural means. A requirement that land use restrictions “run with the land” despite ownership changes would be used to help ensure that controls are not lost. Compliance with land use restrictions would be monitored after cleanup certification through the 5-year review process.

5.2.4.4 Reduction of Contaminant Volume, Toxicity, or Mobility Through Treatment

No reduction of volume, toxicity, or mobility of contaminants through treatment would be obtained under this alternative.

5.2.4.5 Short-Term Effectiveness

There would be no additional short-term risks to the community, worker, or the environment. Because Alternative 4 makes use of institutional controls rather than active remediation to minimize exposures, it avoids adverse short-term impacts due to potential construction or transportation accidents associated with active remedial technologies.

5.2.4.6 Implementability

Administratively this alternative would be difficult to implement. Maintaining controls at numerous properties would be difficult. Condemnation may be required to obtain some land rights. On-site remedies have received strong objection from local stakeholders in the past.

5.2.4.7 Cost

The total costs for the 30-year costing period for Alternative 4 are $129 million. Additional cost for reviews and maintenance of institutional controls would continue indefinitely. The costs associated with establishing institutional controls would be expected to include legal costs and the actual payment to landowners for the legal “taking” of their rights with respect to their properties.

5.2.5 Alternative 5, Excavation with Institutional Controls Under Roads, Bridges, Railroads, and Other Permanent Structures

Alternative 5 includes excavation and dredging plus off-site disposal to allow unrestricted use at all properties except for roads, bridges, railroads, and other permanent structures. Soils under roads, bridges, railroads, and other permanent structures are inaccessible and will not be remediated as part of this response action. Other responses include institutional controls, short-term monitoring, short-term containment technologies, truck and rail transportation, and disposal at licensed or permitted facilities. Coldwater Creek sediments that exceed the Coldwater Creek criteria would be dredged and disposed. The Coldwater Creek criteria limit soils and sediments above the mean water gradient in Coldwater Creek to the unrestricted land-use RGs, and limits sediments below the mean water gradient in Coldwater Creek to the subsurface standard of

15/43/150 pCi/g of Ra-226/Th-230/U-238. Institutional controls would only be necessary to restrict land use under current roads, bridges, railroads, and other permanent structures. Institutional controls would be maintained on a given property until unrestricted remediation goals are achieved.

5.2.5.1 Overall Protection of Human Health and the Environment

In general, the long-term protectiveness of this alternative is high. However, at roads, bridges, railroads, and other permanent structures it is less permanent because institutional controls could be lost. Alternative 5 includes removal of soil to meet the unconditional release concentrations in surface soil and subsurface soil. SLAPS, HISS/Futura, and the VPs would be remediated to the unrestricted release concentrations. Soils and sediments above the mean water gradient in Coldwater Creek would be remediated to the RGs for unrestricted use. Soil and sediments below the mean water gradient in Coldwater Creek would be removed if they exceed 15/43/150 pCi/g of Ra-226/Th-230/U-238. Therefore, both the CERCLA risk and ARAR-based limits would be satisfied. Institutional controls would be used to ensure protectiveness of the areas under roads, bridges, railroads, and other permanent structures under all future anticipated land use conditions.

Remedial activities under Alternative 5 would address both non-radiological and radiological contaminants of concern. By doing so, risks would not exceed the CERCLA target risk range, a HI of 1.0 for each primary target organ, or doses above ARAR-based limits, as appropriate. Therefore, the alternative is protective of human health at all properties. The evaluation of risk-based and dose-based criteria is located in Appendix D.

5.2.5.2 Compliance with ARARs

Location-, action-, and chemical-specific ARARs would be achieved at all properties. Institutional controls would be used to maintain risks below criteria under roads, bridges, railroads, and other permanent structures.

5.2.5.3 Long-Term Effectiveness and Permanence

Alternative 5 is protective in the long-term. This alternative uses a combination of excavation and institutional controls to manage future risk and achieve long-term effectiveness. By removing the most highly contaminated soils from the site, Alternative 5 minimizes the need for institutional controls to areas under roads, bridges, railroads, and other permanent structures. Institutional controls would be maintained in a given area until unrestricted goals are achieved. The excavation of contaminated soils and sediments would result in a permanent reduction in risks.

5.2.5.4 Reduction of Contaminant Volume, Toxicity, or Mobility Through Treatment

Treatment is not proposed under this alternative, except where needed for dewatering and treatment of release water. Therefore, a reduction in the toxicity, mobility, or volume of the contaminated soils through treatment would not occur.

5.2.5.5 Short-Term Effectiveness

Short-term effectiveness is similar to other alternatives. The impacts are described in more detail under the evaluation of Alternative 2.

5.2.5.6 Implementability

Technically and administratively this alternative is highly implementable. There are no technical problems that would limit the implementability of Alternative 5. Excavation of contaminated soils, construction of temporary roads, and truck transport of soil are conventional activities in construction projects of this kind.

Construction and operation of the components of Alternative 5 would be straightforward. Resources are readily available for removing contaminated soil and sediment. Standard excavation/construction equipment would be used to remove contaminated material. Special engineering techniques involving precautions on excavation near buildings and structures would be observed during remediation.

Minimal sediment dredging from Coldwater Creek can be accomplished as described earlier under Alternative 3. Mitigation measures would be used to ensure minimization of short-term impacts.

Borrow sites for backfill material have not been selected, but are locally available. However, implementation of the planned Lambert-St. Louis International Airport expansion would result in a demand for several million cubic meters (2 to 3 million cubic yards) of backfill soil, which could impact local backfill availability.

5.2.5.7 Cost

The total costs for the 30-year costing period are $223 million. There would be very limited continuing costs for monitoring and reviews beyond the 30-year costing period. However, there could be additional costs for removal of areas under roads, bridges, railroads, and other permanent structures once they become accessible beyond the 30-year costing period.

5.2.6 Alternative 6, Excavation at all Properties

Alternative 6 includes excavation and dredging plus off-site disposal to remove contamination from all areas so that no institutional controls are required. This alternative includes excavating soils contaminated above the criteria for unrestricted use. All difficult-to-access soils under roads, bridges, railroads, and other permanent structures would also be excavated under this alternative.

Contaminated sediments would be dredged from Coldwater Creek to the subsurface soil criteria. Contaminated soils would also be excavated from floodplain areas along the Creek. Dredged sediments would be dewatered and transported to a staging area at SLAPS for ultimate disposal. Water from these activities would be collected and treated as necessary before disposal.

5.2.6.1 Overall Protection of Human Health and the Environment

Alternative 6 includes removal of all soil to meet the unconditional release concentrations in the surface and subsurface. Therefore, both the risk-based and dose-based limits would be satisfied at all properties. This alternative has the highest long-term permanence.

Remedial activities under Alternative 6 would address both non-radiological and radiological contaminants of concern. By doing so, risks would not exceed the CERCLA target risk range, a HI of 1.0 for each primary target organ, or doses above ARAR-based limits, as appropriate. Therefore, the alternative is protective of human health at all properties. The evaluation of risk-based and dose-based criteria is located in Appendix D.

5.2.6.2 Compliance with ARARs

Location-, action-, and chemical-specific ARARs would be achieved.

5.2.6.3 Long-Term Effectiveness and Permanence

Removing the soils to the RGs for unrestricted use would be protective of human health under future-use scenarios without dependence upon institutional controls. This alternative is permanent because all materials that pose an unacceptable health risk would be removed and placed in a permanent disposal facility. Therefore, no long-term management of soils or sediment would be required.

5.2.6.4 Reduction of Contaminant Volume, Toxicity, or Mobility Through Treatment

Treatment is not proposed under this alternative, except where needed for dewatering and treatment of release water. Therefore, a reduction in the toxicity, mobility, or volume of the contaminated soils through treatment would not occur. However, the complete removal and disposal of all contaminated material will eliminate sources of runoff, infiltration, fugitive dust, and emissions at the North County Site.

5.2.6.5 Short-Term Effectiveness

Most short-term impacts are described in more detail under the evaluation of Alternative 2. However, removal of difficult-to-access soil under McDonnell Boulevard, Interstate 270, and other roads, bridges, and railroads could have significant negative impacts on local traffic congestion and could increase the risk of traffic accidents. The removal of material from roads, bridges, railroads, and other permanent structures would significantly increase the potential for accidents.

5.2.6.6 Implementability

This alternative would be technically implementable, but removal of roads, bridges, railroads, and other permanent structures would be difficult. Construction and operation of the components of Alternative 6 would be straightforward. Resources are readily available for removing contaminated soil and sediment. Standard excavation/construction equipment would be used to remove contaminated material. Special engineering techniques involving precautions on excavation near buildings and structures would be observed during remediation.

Administratively this alternative would require considerable coordination with federal, state, and local departments of transportation and with railroads.

Borrow sites for backfill material have not been selected, but are locally available. However, implementation of the planned Lambert-St. Louis International Airport expansion would result in a demand for several million cubic meters (2 to 3 million cubic yards) of backfill soil, which could impact local backfill availability.

5.2.6.7 Cost

The total costs for the 30-year costing period are $286 million. There would not be continuing costs beyond the 30-year costing period.

5.3 MONITORING AND MITIGATION MEASURES

The primary monitoring and mitigation measures that would be used at the North County Site are described below. These measures would be effective in minimizing the potential adverse effects associated with implementation of the alternatives.

<u>Construction Activities:</u> Construction practices such as sediment barriers, dikes, siltation ponds, surface grading, and vegetation would be used. Habitat would be restored and mufflers and barriers would be used for noise abatement. Wetting and other dust control measures would be used.

<u>Monitoring Activities</u>: Short-term ground-water, surface-water, air, and sediment monitoring would be conducted during the remedial action to ensure that contamination from the soils and the unusable ground-water zone (HZ-A) does not significantly impact surface water or potable ground water. The results of the short-term monitoring of surface-water, sediment, and HZ-A ground water would be used to assess any potential impacts to Coldwater Creek resulting from the remedial actions, and would assist in evaluating the effectiveness of the remedial actions. The results of the short-term monitoring would also be used to determine whether long-term monitoring is required to assess potential contaminant migration from contaminated soils remaining beneath roads, bridges, railroads, and other permanent structures.

<u>Transportation:</u> Waste would be covered during long distance transport across public roads. Vehicles would be decontaminated and inspected before leaving contaminated areas.

<u>Worker Protection:</u> Activities would be in accordance with approved health and safety plans. Worker monitoring programs would be implemented.

<u>Protection of the General Public:</u> Site air monitoring would be conducted, and access to construction areas would be controlled.

<u>Environmental Restoration:</u> Wetlands and floodplain would be restored or replaced.

5.4 IMPACTS OF POTENTIAL LOSS OF INSTITUTIONAL CONTROLS

For Alternative 1, changes in land use could, in the long-term, result in the release of contaminants, and could cause potential future impacts on human health and the environment. No institutional controls are necessary for the implementation of Alternative 6 because all properties are excavated to meet the unrestricted land use criteria. Institutional controls are used as part of Alternatives 2 through 5. Where supplemental criteria are used (Alternatives 2 and 3), they were developed to limit risk and dose to current users and to limit dose in the event of loss of control to less than 100 mrem/yr to all modeled receptors. However, for Alternative 4, total reliance is placed on institutional controls to limit risk and dose to current users. The loss of these controls could then result in risks in excess of the CERCLA target risk range and doses in excess of 100 mrem/yr.

5.5 SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Implementation of any of the site-wide alternatives would require the use of SLAPS and HISS to support cleanup activities and the use of depletable resources such as construction materials and petroleum-based products. All alternatives that include excavation would require the long-term commitment of land for waste disposal at an off-site facility. Only Alternative 6 releases all properties at the North County Site without any restrictions on land use.

5.6 COMPARATIVE ANALYSIS OF SITE-WIDE ALTERNATIVES

Site-wide alternatives undergo comparative analysis for the purpose of identifying relative advantages and disadvantages of retained alternatives on the basis of the previous detailed analysis (Sections 5.2 and 5.3). The comparative analysis provides a means by which remedial alternatives can be directly compared to one another with respect to common criteria. Overall protection and compliance with ARARs are threshold criteria that must be met by an alternative for it to be eligible for selection. The other five criteria, consisting of short- and long-term effectiveness; reduction of contaminant volume, toxicity, and mobility through treatment; ease of implementation; and cost are the primary balancing criteria used to select a preferred remedy among alternatives satisfying threshold criteria. The community and state acceptance criteria have been considered, but will be fully addressed after the public comment period.

5.6.1 Comparison of the Alternatives Using the CERCLA Threshold and Balancing Criteria

Table 5-2 summarizes the results of the comparative analysis of the seven criteria for the six site-wide alternatives.

5.6.1.1 Overall Protection of Human Health and the Environment

Each of the alternatives, except Alternative 1, is protective of human health and the environment. No further remedial action is required to protect the environment because there is judged to be little to no probability of significant adverse impacts on ecological receptors from chemical and radiological wastes resulting from uranium manufacturing or processing activities.

The degree of protection and permanence of the protectiveness are a function of whether, and to what extent, an alternative uses dedicated engineering containment, removal strategy, or land use and institutional control strategies. Alternative 6 removes the most soil and provides the greatest long-term protection to human health because soil is removed from all areas including roads, bridges, railroads, and other permanent structures. However, the short-term risk due to accidents is greatly increased because of the difficulty in removing soils from under roads, bridges, railroads, and other permanent structures, and because of the need to re-route traffic. Alternatives 2, 3, and 5 better balance the short-term cost and long-term protection benefit by using soil removals to provide an effective and permanent remedy for portions of the site. They also depend on the continued maintenance of institutional controls to provide protectiveness for areas where contamination remains above unrestricted levels. For these alternatives, human health and the environment are protected for as long as institutional controls can be implemented. Alternative 4 results in the highest levels of contamination remaining on the site. Alternative 4 is effective by preventing access to COCs for the institutional control period, but should institutional controls be lost, the long-term effectiveness of the alternative would be compromised.

5.6.1.2 Compliance with ARARs

A summary of the key potential ARARs are presented in Table 5-3. A summary of removal actions is presented in Table 5-4. All of the alternatives except Alternative 1 and Alternative 4 comply with ARARs (sometimes with the use of supplemental standards). Alternatives 2 through 5 use institutional controls as part of the compliance. Table 5-1 provides a summary of possible institutional controls required under each alternative. Alternative 4 does not achieve the 40 CFR 192 Subpart A, B, or C standards and relies totally on use of institutional controls to achieve restricted release.

5.6.1.3 Long-Term Effectiveness and Permanence

The most permanent alternative is Alternative 6, which ships all contaminated soils to an off-site disposal location. Next in terms of permanence is Alternative 5, followed by 2, 3, and 4. The least permanent is Alternative 1. Alternatives 2, 3, 4 and 5 are dependent in varying degrees upon the long-term maintenance of institutional controls to ensure the effectiveness and permanence of the remedy. Alternatives, 2, 3, and 5 are more effective than Alternative 4 in that the most contaminated soils are either removed from the site (Alternative 5), contained (Alternative 2), or treated (Alternative 3). However, these alternatives also rely to some degree on maintenance of institutional controls to ensure continued long-term effectiveness. Alternative 5 is considered the most effective and permanent of these 3 alternatives in the long term because the majority of the contaminated soil above soil RGs is removed and disposed off-site. In addition, fewer areas require institutional controls than for the remaining alternatives, other than Alternative 6.

No area of the North County Site would sustain a long-term impact as a result of this cleanup action.

Pursuant to the SARA, site remedy reviews would be conducted every 5 years for alternatives where radioactive contaminants (i.e., soil and/or ground water) would remain on-site above criteria for unrestricted use.

Table 5-2. Summary of Detailed Analysis of Site-wide Alternatives

Criteria	Alternative 1, No Further Action	Alternative 2, Partial Excavation and Capping at SLAPS and HISS/Futura	Alternative 3, Partial Excavation and Treatment at SLAPS	Alternative 4, Institutional Controls (No Further Excavation)	Alternative 5, Excavation with Institutional Controls Under Roads, Bridges, Railroads, and Other Permanent Structures	Alternative 6, Excavation at all Properties
Overall Protection						
• Human Health	Not protective	Protective. Complete removal at SLAPS VPs and removal of high concentration soils at remaining properties. Uses institutional controls at SLAPS, HISS/Futura, Coldwater Creek, under roads, bridges, railroads, and other permanent structures.	Protective. Complete removal at SLAPS VPs and HISS/Futura, and removal of high concentration soils at remaining properties. Uses institutional controls at SLAPS, under roads, bridges, railroads, and other permanent structures.	Protective. Reliance on successful use of institutional controls in both accessible areas, and areas under roads, bridges, railroads, and other permanent structures.	Protective. Complete removal at all properties except roads, bridges, railroads, and other permanent structures. Uses institutional controls under roads, bridges, railroads, and other permanent structures.	Protective. Complete removal at all properties.
• Environment	Not protective	Protective	Protective	Protective	Protective	Protective
Compliance With ARARs						
• Chemical-specific	Not compliant for soils or sediments	Compliant	Compliant	Does not achieve 40 CFR 192, Subpart A, B, or C standards.	Compliant	Compliant
• Action-Specific	Not applicable	Compliant	Compliant	Compliant	Compliant	Compliant
• Location-Specific	Not applicable	Compliant	Compliant	Compliant	Compliant	Compliant
Long-Term Effectiveness and Permanence						
• Magnitude of Remaining Risk	Medium. Current and future risks could exceed CERCLA risk range if control measures were not in place or land use changes.	Low. Meets risk range without restrictions on future land use for most properties. Remaining risks at SLAPS, HISS, and Futura controlled by installation and maintenance of clean cap and institutional controls. Roads, bridges, railroads, other permanent structures, and Coldwater Creek protective with institutional controls.	Low. Meets risk range without restrictions on future land use for most properties. Remaining risks at SLAPS controlled by maintenance of clean cover and institutional controls. Roads, bridges, railroads, and other permanent structures, protective with institutional controls.	Medium. Current and future risks could exceed CERCLA risk range if control measures were not in place or land use changes.	Very low. Meets risk range without restrictions on future land use for most properties. Roads, bridges, railroads, and other permanent structures, protective with institutional controls.	Very low. Meets risk range without restrictions on future land use.
• Adequacy of Controls	None provided	Good. Properties requiring land use restrictions to commercial/industrial use are unlikely to receive residential development pressure due to proximity to airport and continued commercial/industrial expansion of area.	Good. Property requiring land use restriction to commercial/industrial use is already prohibited from residential use due to location adjacent to airport.	Okay	Very good – limited areas require long term controls	No long term controls required
• Reliability of Controls	None provided	Reliable.	Reliable.	Reliability declines for long-term period.	Very Reliable.	Very Reliable.

Table 5-2. Summary of Detailed Analysis of Site-wide Alternatives (Cont'd)

Criteria	Alternative 1, No Further Action	Alternative 2, Partial Excavation and Capping at SLAPS and HISS/Futura	Alternative 3, Partial Excavation and Treatment at SLAPS	Alternative 4, Institutional Controls (No Further Excavation)	Alternative 5, Excavation with Institutional Controls Under Roads, Bridges, Railroads, and Other Permanent Structures	Alternative 6, Excavation at all Properties
• Long Term Management	5-year review	5-year remedial review; long-term management of caps and environmental monitoring at SLAPS and HISS/Futura necessary.	5-year remedial review; environmental monitoring; and long-term management of soil cover and land use restrictions at SLAPS necessary.	5-year remedial review; environmental monitoring; and maintenance of land use restrictions at SLAPS, HISS, and Futura necessary.	5-year remedial review; only required to ensure continued use of roads, bridges, railroads, and other permanent structures as transportation/utility corridors.	No long-term management required.
<u>Reduction of Contaminant (overall)</u>						
Toxicity, Mobility, or Volume by Treatment	None	None	Volume of soils requiring disposal reduced by soil sorting and soil washing	None	None	None
<u>Short-Term Effectiveness</u>						
• Protection of Community	No additional health effect in the short-term due to no action taken.	Small additional short-term risk to community due to construction and transportation activities. Risks of exposure to contaminated soils protective with use of standard controls such as dust control and use of covered trucks.	Small additional short-term risk to community due to construction and transportation activities. Risks of exposure to contaminated soils protective with use of standard controls such as dust control and use of covered trucks.	No additional short-term risk to community.	Small additional short-term risk to community due to construction and transportation activities. Risks of exposure to contaminated soils protective with use of standard controls such as dust control and use of covered trucks.	Significant increased risk due to removing materials under roads, bridges, railroads, and other permanent structures, which will involve more complete construction techniques and traffic re-routing.
• Protection of Workers	No additional health effect in the short-term due to no action taken.	Short-term occupational risk to workers Protective with controls	Short-term occupational risk to workers Protective with controls	No additional short-term occupational risk to workers Protective with controls	Short-term occupational risk to workers Protective with controls	Short-term occupational risk to workers increased due to removing materials under roads, bridges, railroads, and other permanent structures, which will involve more complete construction techniques and traffic re-routing. Protective with controls
• Environmental Impacts	No additional impacts in the short-term due to no action taken.	Short-term impacts to urban ecosystem Long-term benefit	Short-term impacts to urban ecosystem Long-term benefit	No additional short-term impacts to urban ecosystem	Short-term impacts to urban ecosystem Long-term benefit	Short-term impacts to urban ecosystem Long-term benefit
• Geology and Soils	Continued uncontrolled migration of contaminants	Short-term soil disturbance during excavation	Short-term soil disturbance during excavation	No short-term impacts.	Short-term soil disturbance during excavation	Short-term soil disturbance during excavation
<u>Implementability</u>						
• Technical Feasibility	Feasible	Feasible	Feasible	Feasible	Feasible	Feasible
• Administrative Feasibility	Feasible	Feasible. Possible objection by state regulators and public due to contaminated soils remaining in place at SLAPS and HISS/Futura.	Feasible. Possible objection by state to use of treated soil as backfill at SLAPS.	Feasible. Likely objection by state regulators and public due to contaminated soils remaining in place.	Feasible. Limited objection expected due to location and concentration of remaining contaminants.	Feasible. No objections expected. Administratively complex for roads, bridges, railroads, and other permanent structures.
			<u>Cost (Present Worth)</u>			
• Total Cost	$1.5 million	$205 million	$284 million	$129 million	$223 million	$286 million

Table 5-3. Documentation of ARARs

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Chemical-Specific						
40 CFR 192, Subpart A	Not ARAR	Will comply	Will comply	Will not comply	Will comply	Will comply
40 CFR Part 192 Subpart B	Will not comply	Will comply Supplemental standards will be used	Will comply Supplemental standards will be used	Will not comply	Will comply Supplemental standards will be used	Will comply.
10 CFR 40 Appendix A Criterion 6(6)	Will not comply	Will comply.	Will comply.	Will comply.	Will comply.	Will comply.
40 CFR Parts 122 CWA, NPDES	Will not comply	Will comply with substantive requirements	Will comply with substantive requirements	Will comply with substantive requirements	Will comply with substantive requirements	Will comply with substantive requirements
40 CFR Part 192 Subpart C	Will not comply	Will comply	Will comply	Will not comply	Will comply	Will comply

Table 5-4. Summary of Removal Actions

Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Removals by Property Unit						
Removal actions started under EE/CAs	Stop removal actions after ROD	Removal actions continue for this alternative	Removal actions continue for this alternative – soils consolidated to SLAPS for treatment	Removal actions continue for this alternative	Removal actions continue for this alternative using unrestricted land use criteria.	Removal actions continue for this alternative using unrestricted land use criteria.
HISS/Futura	Cease pile removal and leave materials in place	Excavate soils above supplemental limit for subsurface soil (for use with institutional controls) and add cover	Excavate for release without radiological restrictions	No additional removals	Excavate for release without radiological restrictions	Excavate for release without radiological restrictions
Roadside	No additional removals. Leave remaining materials in place	Excavate for release without radiological restrictions	Excavate for release without radiological restrictions	No additional removals	Excavate for release without radiological restrictions	Excavate for release without radiological restrictions
Inaccessible areas directly under Roads, Bridges, Railroads, and other Permanent Structures	Leave material in place	Defer excavation and use institutional controls	Defer excavation and use institutional controls	No additional removals	Defer excavation and use institutional controls	Excavate for release without radiological restrictions
Coldwater Creek	Leave material in place	Sort material during removals for flood control project being made as part of a separate project	Excavate to Coldwater creek criteria below the mean water gradient for release without restrictions	No additional removals	Excavate to Coldwater creek criteria below the mean water gradient for release without restrictions	Excavate to Coldwater creek criteria below the mean water gradient for release without restrictions
SLAPS	Leave material in place	Excavate soils above supplemental limit for subsurface soil (for use with institutional controls) and add cover	Excavate soils above supplemental limit for subsurface soil (for use with institutional controls) and consolidate other soils here for treatment	No additional removals	Excavate for release without radiological restrictions	Excavate for release without radiological restrictions
All other VPs	No additional vicinity properties removals	Excavate for release without radiological restrictions	Excavate for release without radiological restrictions	No additional removals	Excavate for release without radiological restrictions	Excavate for release without radiological restrictions

5.6.1.4 Reduction in Contaminant Volume, Toxicity, and Mobility Through Treatment

Alternative 3 provides a reduction in contaminant volume and mobility through treatment.

5.6.1.5 Short-Term Effectiveness

The biggest difference in short-term effectiveness is due to the potential for accidents if soil is removed from beneath roads, bridges, railroads, and other permanent structures in Alternative 6. The potential for increased accidents for workers and the general public is greatly increased. Because Alternatives 2, 3, 5, and 6 involve disposal of various volumes of contaminated soils off-site, they have short-term risks associated with traffic accidents. Alternative 4 (Institutional Controls) would not involve any remedial actions; therefore, there would be no short-term impacts to workers or to natural and cultural resources.

Short-term negative impacts to the environment are likely to occur with soil excavation and sediment dredging considered as part of Alternatives 2, 3, 5, and 6. Excavation and dredging potentially redistribute wastes into new uncontaminated areas; potentially destroy animals and plants residing at the excavated locations; and potentially destroy existing features of the environment that provide habitat or food to plants and animals. The degree of short-term damage to the environment increases with the amount of surface area subjected to removal in each of the alternatives. Phytoremediation of sediments in Coldwater Creek as part of Alternative 3 may have a positive impact on the environment. Although the implementation of Alternatives 2, 3, 5, and 6 may temporarily impact wetlands, temporarily affect surface drainage in the floodplain, and create non-point source surface water discharges, all of these impacts will be managed in compliance with the substantive requirements of applicable laws and regulations, and are not considered to be significant obstacles to the implementation of these remedial alternatives.

5.6.1.6 Implementability

Materials and services for removal of contamination and environmental monitoring activities for the various alternatives are readily available. The degree of difficulty in implementing alternatives increases with the amount and type (i.e., access-restricted soils) of contaminated soils to be excavated, the level of the design/transportation required to dispose soils in accordance with regulations, and the time/coordination involved in completing the alternative. Disposal at an existing commercial facility is considered more implementable than disposal at new disposal facilities, which were eliminated during screening.

Implementability of alternatives involving placement of radioactive materials (Alternatives 2 and 3) will be administratively difficult to achieve. MDNR has objected to leaving or placing radionuclides on land in Missouri. Condemnation may be required to obtain the necessary real estate interests where institutional controls are required. On-site remedies (Alternatives 2 and 3) have received strong objection from stakeholders in the past.

5.6.1.7 Cost

The comparative analysis of costs gives the differences in cost in terms of undiscounted FY03 dollars. Costs for each alternative, itemization of individual components, and the sensitivity analysis for each alternative may be found in Appendix C. The total 30-year cost for the alternatives are:

Alternative	Cost
1	$1.5 million
2	$205 million
3	$284 million
4	$129 million
5	$223 million
6	$286 million

5.6.2 Analysis of the Advantages and Disadvantages of Using the Various Technologies at Individual Property Groups

This section focuses the evaluation on the technologies used for individual property groups. The purpose is to highlight the advantages and disadvantages of technologies that could be combined to develop a preferred plan.

5.6.2.1 The Impact of Institutional Controls and Land Use Restrictions

Institutional controls are used to ensure protectiveness for alternatives at areas in which the residual soil contamination exceeds the concentrations specified in ARARs for residential use. The controls are used in conjunction with supplemental standards for subsurface soil for the two primary areas where wastes were stored: SLAPS and HISS/Futura. Alternative 4 relies primarily on institutional controls. Although the implementation of institutional controls at SLAPS, HISS/Futura, under buildings, roads, bridges, and railroads, and at the VPs is technically feasible, it involves complex administrative requirements. Maintaining controls at numerous properties would be difficult. The controls would have to be maintained for a considerable period of time, and would have to be enforced through a government or municipal entity. A requirement that land use restrictions "run with the land" despite ownership changes would be used to help ensure that controls are not lost. Signs, barriers and other standard controls are retained for use during the remediation.

Land use restrictions are implemented in conjunction with the removal technologies to provide protection while limiting the amount of excavation in areas so that the risk of traffic accidents, environmental impact, or cost are reduced. Restrictions on future land use vary among the alternatives. The balance among risks, benefits, and costs varies dependent on the property group.

Alternatives 5 and 6 allow use without restrictions at SLAPS; while Alternatives 2, 3, and 4 impose commercial/industrial land use restrictions at SLAPS. All of the alternatives are protective for the expected future land use for as long as the institutional controls are effective. Cost is increased for the unrestricted alternatives due to the increased volume of soil that is removed. Additional long-term effectiveness for the unrestricted use alternatives is provided in the event that subsurface soils with residual levels of COCs were excavated in the future. Alternative 3, which uses treatment, reduces the land use restrictions to only SLAPS because all of the soils are brought to a central treatment location. HISS/Futura could be an alternate location for centralized treatment.

The use of land use restrictions for the roads, bridges, railroads, and other permanent structures balance the cost and the operational risks (e.g., from traffic accidents) with the benefit of removal of the contaminated materials. Comparing Alternatives 5 and 6 shows the impacts. The increase in cost and operational risk is very large for removals from areas under major traffic corridors, and the risk of potential health effect would only be slightly reduced. The benefit of removing materials from under roads, bridges, railroads, and other permanent structures is limited because the risks from taking no action under roads, bridges, railroads, and other permanent structures are small, except for a few limited locations.

Restrictions on land use at the other VPs is included in Alternative 4, and in the no-further-action alternative. Maintaining controls at numerous properties under control of private and governmental agencies would be required.

5.6.2.2 The Relative Advantages and Disadvantages of Soil and Sediment Removals

Removal of soils to an off-site disposal location provides a cost-effective improvement in overall protection compared to treatment and containment for the majority of the site properties. Removal actions provide an increase in protection by moving material from the current location to a more controlled location. Although surface soils at residential properties show the greatest risk for a given concentration of contaminants, removals at residences were conducted under previous removal actions. Surface soils at active industrial and commercial facilities would be next. Higher concentrations of subsurface materials where construction workers could be exposed are next. The least benefit in terms of risk and hazard reduction is from areas where the potential for exposure is limited, including deeper areas at SLAPS and HISS/Futura; areas under roads, bridges, railroads, and other permanent structures; and material within the banks of Coldwater Creek.

The removals in Alternatives 2, 3, 5, and 6 will reduce radionuclide contaminant migration. Although no quantitative model has been developed for water-borne pathways following remedial action, backfill of clean surface soils will eliminate particulate transport of radionuclides both in surface water and at locations of ground-water discharge following remedial actions. The primary radionuclide before remedial action in shallow ground water is dissolved uranium. The risk for ground-water use before and after remedial action is nonexistent without a pathway. Ground water in the near surface zone will not be used for a water supply. Deep potential aquifers have not been impacted. There are several reasons why there will be no change to the dissolved uranium content of the Class IIB limestone aquifer following remedial action. The remedial action will lower the residual uranium source within Unit 2 soil. Ground-water transport of dissolved uranium in HZ-A will remain at low velocity. Transport of dissolved uranium across Units 3 (lacustrine deposits) and 5 (Pennsylvanian shale) will require centuries of time with consistent high potentiometric head. The long duration, high potentiometric head from HZ-A to HZ-C or HZ-E does not exist. The reducing water chemistry environment below HZ-A limits the dissolution of uranium. Lastly, heavy metals, including uranium, tend to be bound to clay particles within Units 3 and 5. The remedial action's contaminant removal in soil and the native geologic environment at the sites are protective of the Class IIB limestone aquifer. Treatment of HZ-A ground water is not required, except for excavation water being discharged at the surface. Monitoring of Unit 4 ground water will be used as a post-remedial action tool to ensure the protective nature of this remedial action, and of the native geologic environment.

Removal of sediment and soils within the banks of Coldwater Creek can be disruptive to the ecosystem of the creek. The ecosystem is highly impacted by local industry, and activities such as limited dredging should not cause long-term detriment to the ecosystems or loss of habitat important to the survival of the species using the creek.

The removal of soil under the roads, bridges, railroads, and other permanent structures would increase the potential for accidents. The high cost of excavation of material under major thoroughfares such as the Interstate and McDonnell Bridge would result in only minor reductions in the potential health effects due to exposure to contamination in these areas. Removal from the ditches along roadways is more similar to removals from VPs.

For all remedial actions, all soils that meet the unrestricted use criteria for surface soils may be used for backfill in deeper areas. Surface cover will be from authorized backfill locations. Revegetation is cost-effective, and will help stabilize the areas impacted by removal of contaminated soil and sediment. Demolition and crushing of materials facilitates more efficient transportation and disposal while having very little impact on protectiveness.

5.6.2.3 Monitoring

Air, sediment, ground-water, and surface-water monitoring is retained for all of the alternatives during remedial actions (except for the no-further-action alternative). After remediation, monitoring of the ground water is included to ensure that remedial actions are effective, and that no significant migration of contamination to surface water or useable ground water is occurring. Long-term monitoring of HZ-A and long-term monitoring of Unit 4 in HZ-C (as a surrogate for HZ-E) are proposed for Alternatives 2, 3, and 4. For Alternative 5, short-term monitoring of surface water, sediment, and HZ-A (Unit 2) ground water is proposed to assess whether the remedial action is significantly impacting contaminant transport through HZ-A ground water into Coldwater Creek. Short-term monitoring of Unit 4 of HZ-C is proposed to ensure continued protection of the limestone aquifer (HZ-E). The results of the short-term monitoring would be used to determine whether long-term monitoring is required to assess potential contaminant migration from contaminated soils remaining beneath roads, bridges, railroads, and other permanent structures. Long-term monitoring would continue until determined to be no longer required as part of the five-year review process. Long-term monitoring is not considered necessary for Alternative 6 because all of the source material is removed to levels protective for unrestricted use. Monitoring locations would focus on the detection of materials moving toward the creek from the areas around SLAPS and HISS/Futura.

5.6.2.4 Containment

Materials that could result in a dose to a member of the general public above 100 mrem/yr are removed as part of all alternatives, except the no-further-action alternative and Alternative 4 (Institutional Controls). Therefore, the materials that could cause high risks are shipped off-site in most of the alternatives. The effectiveness, implementability, and cost of an on-site disposal cell is discussed as part of the technology screening, where the use of an on-site cell was eliminated from further evaluation. The multi-layer cover used in Alternative 2 reduces the dose to potential receptors because it eliminates exposure pathways and provides a barrier to intrusion.

5.6.2.5 Treatment

Soil washing, which is used in Alternative 3, concentrates the contamination and primarily changes the volume of material requiring off-site disposal. The treatment does not destroy the radioactive materials or the metal COCs. The treatment may change the toxicity or the mobility by changing the chemical forms of the compounds. The costs of the treatment process are likely to more than offset the reduction in the cost of transportation and off-site disposal of the contaminated soils for on-site processes. Recycle to a uranium mill combines the materials with other similar feed materials in an attempt to recover some of the uranium or other materials. In previous procurements, recycle to a uranium mill has sometimes (but not always) been less expensivethan the cost for off-site disposal.

The cost effectiveness of soil sorting depends on how much mixing of the contaminated soils has occurred. If the soils are heterogeneous, then soil sorting removes the material below the unrestricted release criteria rather than sending the material for expensive transportation and off-site disposal. Because most of the contamination is sent off-site, the improvement to protectiveness at the site is similar with or without sorting.

Dewatering and water treatment would be done as part of the soil removal and remediation activities. Sedimentation basins and treatment are cost-effective processes that are retained for all of the alternatives.

Phytoremediation is only effective for some metals. Although uranium is not generally the primary risk driver, phytoremediation may be beneficial and cost-effective for removing uranium from sediments or limited areas of soil.

5.6.2.6 Transportation and Disposal

Both rail and truck transportation are protective. The balancing criteria of cost and implementability will be determined as part of the procurement process. These are used for all of the alternatives, except the no-further-action alternative.

All licensed or permitted facilities are retained for off-site disposal. All of the facilities are protective, and the balancing criteria of cost and implementability will be determined as part of the procurement process. Discharge to a POTW or to surface water is retained and used for all of the alternatives, except the no-further-action alternative.

5.6.3 State and Community Acceptance

This evaluation will be completed after the receipt of comments. However, public input has been encouraged by the USACE (and previously by DOE) to ensure that the remedy selected for the North County Site meets the needs of the local community.

The Administrative Record, which contains the documentation used to prepare this FS, is available at the following locations:

Government Information Section
St. Louis Public Library - Central Library
1301 Olive Street
St. Louis, Missouri 63134

USACE Public Information Center
8945 Latty Avenue
Berkeley, Missouri 63134

The DOE published a Notice of Intent in the Federal Register on January 9, 1992, to present pertinent background on the scope and content of the St. Louis Site RI/FS. The comments, concerns, and written statements from a January 28, 1992, public scoping meeting held at Berkeley Senior High School, Berkeley, Missouri, were published in a Responsiveness Summary and made part of the St. Louis Work Plan for the RI/FS. In addition, the relevant comments from a December 6, 1990, scoping meeting on the Programmatic Environmental Impact Statement were also included in the work plan.

A copy of the Administrative Record File for Actions at the North County Site has been maintained by USACE at the Public Information Center, and at the St. Louis Public Library, and is updated regularly. The community relations program interacts with the public through news releases, public meetings, availability sessions, site tours, public workshops, meetings with local officials and interest groups, and receiving and responding to public comments through correspondence and the information center. The documents describing the results of the integrated process for the North County Site have been made available to the public for review and comment at the information repositories noted above.

From September 1994 through December 1996, a task force known as the St. Louis Site Remediation Task Force studied all aspects of the St. Louis FUSRAP Sites, including the North County Site. They formally transmitted the results of their deliberations to the DOE in the *St. Louis Site Remediation Task Force Report* (Task Force, 1996). Specific areas of focus included: 1) identification of alternative disposal sites, 2) health risk/cleanup standards, 3) development of local priorities with respect to cleanup of the site, 4) identification of remedial action alternatives, 5) a screening of technologies that may be applied at the site, and 6) the development of a communications and public awareness plan. The Task Force was composed of members appointed by the City and County of St. Louis, adjacent communities, the EPA, MDNR, concerned citizens, public utility and local business representatives, representatives of Congressmen, and representatives of local environmental groups.

5.7 PROPOSED PLAN (PP) AND RECORD OF DECISION (ROD)

5.7.1 Proposed Plan

As part of this FS process, a PP will be prepared to solicit public input on the site-wide alternatives and the specific, preferred approach to remediating the North County Site. The PP will present all of the alternatives evaluated in the FS together with the preferred alternative. The PP will review the FS results, select the preferred alternative, and identify the PP for remediating the North County Site. The draft PP will be submitted to both the EPA and the MDNR for their review. Public comments received on the PP will be used to evaluate the CERCLA criteria of "community acceptance".

5.7.2 Record of Decision

The ROD will select the remedy for the North County Site. Comments received from both the regulators and the public on the PP will be considered in drafting the ROD. The ROD will describe the CERCLA selection process and will provide a brief summary of history, characteristics, risks, and alternatives for site remediation. The ROD will include a responsiveness summary to address public comments.

SECTION 6

REFERENCES

6 REFERENCES

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FINAL

VOLUME II: APPENDICES

FEASIBILITY STUDY FOR THE ST. LOUIS NORTH COUNTY SITE

ST. LOUIS, MISSOURI

May 1, 2003

U.S. Army Corps of Engineers
St. Louis District Office
Formerly Utilized Sites Remedial Action Program

FINAL

VOLUME II: APPENDICES

FEASIBILITY STUDY FOR THE ST. LOUIS NORTH COUNTY SITE

ST. LOUIS, MISSOURI

May 1, 2003

prepared by

U.S. Army Corps of Engineers, St. Louis District Office, Formerly Utilized Sites Remedial Action Program

with assistance from

Science Applications International Corporation

under Contract No. DACW43-00-D-0515, Task Order 0005

LIST OF APPENDICES

APPENDIX A

ARARS IDENTIFIED BY THE STATE OF MISSOURI

SEP 21 REC'D

STATE OF MISSOURI

Mel Carnahan, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL QUALITY

P.O. Box 176 Jefferson City, MO 65102-0176

September 17, 1998

Ms. Sharon Cotner, Project Manager
Formerly Utilized Sites Remedial Action Project
Department of the Army
St. Louis District, Corps of Engineers
9170 Latty Avenue
Berkeley, MO 63134

RE: Request for ARARs and TBCs for the North County Record of Decision

Dear Ms. Cotner:

The Federal Facilities Section is enclosing a list of Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBCs) guidances for the North County Record of Decision. We believe that the list covers most of the pertinent laws and regulations. If other ARAR's are identified, we will forward those to you.

Other TBC's that are not listed, but may be added, are establishment of cleanup levels, radiological and chemical, and risk assessments associated with the remediation. These issues will need to be coordinated in conjunction with this office and the Missouri Department of Health.

Thank you for accepting these Record of Decision considerations for the North County sites. If you have any questions, or need further information, you may contact Mr. Scott Honig of my staff at (573) 751-3087.

Sincerely,

HAZARDOUS WASTE PROGRAM

Larry V. Erickson

Larry V. Erickson, DOE Unit Chief
Federal Facilities Section

LE:shg

Enclosure

c: Dan Wall, EPA

DRAFT LIST OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

CITATION	TITLE	APPLICABILITY
USEPA OSWER No. 9200.4-18 "EPA policy on using 40 CFR Part 192 for CERCLA cleanup criteria at radioactive sites, including radium and thorium." USEPA OSWER No. 9200.4-23 "EPA policy for ARAR determination for radioactive sites."	EPA policy directives for CERCLA Sites with Radioactive Contamination.	SLAPS/HISS are CERCLA sites. Use policies to develop cleanup levels for SLAPS/HISS.
10 CSR 20-7.031(5)(D)	Missouri Effluent Regulations, Groundwater (1996)	Groundwater contamination has been documented so it will have to be addressed to meet the requirements of this regulation.
16 USC § 470 40 CFR § 6.301(b) 36 CFR Part 800	National Historic Preservation Act	Act establishes the appropriate procedures for preservation of National Historic Sites.
Sections 253.408 to 253.412 of the Revised Statutes of Missouri (RSMo)	State Historic Preservation Act	Act establishes the appropriate procedures for preservation of State Historic Sites if necessary.
16 USC § 469 40 CFR § 6.301(c)	Archeological and Historical Preservation Act	Act establishes the appropriate procedures for preservation of National Historic Sites if necessary.
16 USC § 470(a)	Archeological Resources Protection Act	Act establishes the appropriate procedures for protection of archeological resources if necessary.
25 USC § § 3001-3013	Native American Graves Protection and Repatriation Act	Act establishes the appropriate procedures for protection of native American graves if necessary.
Executive Order N. 11988	Floodplain Management and Protection	Portions of SLAPS and HISS are within a floodplain of Coldwater Creek.

CITATION	TITLE	APPLICABILITY
40 CFR 6.302(a) and (b), Appendix A	Floodplain Management and Protection	Portions of SLAPS and HISS are within a floodplain of Coldwater Creek.
40 CFR Part 230 and 231 33 CFR 320-330	Dredge or Fill Requirements (Section 404)	Any work within the waters of U.S. or areas designated, as waters of U.S. need to follow the appropriate requirements. Could be applicable to Coldwater Creek.
COE Engineer Regulation (ER) 1165-2-26, March 30, 1984	COE Implementation of Executive Order 11988 on Flood Plain Management	Portions of SLAPS and HISS are within a floodplain of Coldwater Creek.
Executive Order No. 82-19	Governor's Executive Order, Flood plains	Portions of SLAPS and HISS are within a floodplain of Coldwater Creek.
40 CFR Part 61 Subpart I	Clean Air Act - National Emission Standards for Radionuclide Emissions from Facilities Licensed by the Nuclear Regulatory Commission and Federal Facilities Not Covered by Subpart H.	Establishes limits of radionuclides, which can be emitted to ambient air from facilities owned or operated by any Federal agency other than the Department of Energy.
40 CFR Part 61 Subpart Q	Clean Air Act - National Emission Standards for Radon Emissions from Department of Energy Facilities	Regulation is specific to Department of Energy Facilities only but does establish radon limits for radium containing material. This would apply to any piles on HISS or SLAPS. Establish safe environment for workers and public.

CITATION	TITLE	APPLICABILITY
USEPA, Office of Groundwater Protection, December 1986	Guidelines for Groundwater Classification under the EPA Groundwater Protection Strategy	Establishes the guidelines for classifying the groundwater beneath SLAPS/HISS. Also establish requirements of either monitoring or cleanup levels for the groundwater.
33 CFR Part 230	Procedures for Implementing NEPA: Environmental Assessments and Categorical Exclusions	NPL sites under CERCLA. Also USACE is required to follow the **National Environmental Protection Act**
40 CFR Part 262, as incorporated by reference in 10 CSR 25-5-262	RCRA Generator Requirements	There is a possibility of the generation of mixed or hazardous waste.
40 CFR Parts 260 and 261, as incorporated by reference in 10 CSR 25-4.261	RCRA Hazardous Waste Characterization	Requirements of characterization of Hazardous waste.
40 CFR 268.7 and 268.32, as incorporated by reference in 10 CSR 25.7.268	RCRA Land Disposal Restrictions	Establishes land disposal restrictions for hazardous waste or mixed waste.
10 CFR Part 40 Subpart A	Criteria for Disposal of Wastes from Processing Source Material	NRC requirements for disposal of radioactive waste. Waste from SLAPS/HISS will be disposed of at a Licensed NRC facility. USACE is responsible for the appropriate disposal of the waste from SLAPS/HISS.
10 CFR Part 61 Subpart C and Subpart D	NRC Licensing Requirements for Land Disposal of Radioactive Waste: Performance Objectives (Subpart C) and Technical Requirements for Land Disposal Facilities (Subpart D)	Envirocare or other disposal site will have to meet these requirements. USACE is responsible for the appropriate disposal of the waste from SLAPS/HISS.

CITATION	TITLE	APPLICABILITY
10 CSR 10-5.090	Restriction of Emission of Visible Air Contaminants	Used to control particulate matter emissions from the remediation activities.
10 CSR 10-6.170	Restriction of Particulate Matter to the Ambient Air Beyond the Premise of Origin	Used to control particulate matter emissions from the remediation activities.
10 CSR 20-7.031(4)(I) 10 CSR 20-7.031(5) and Table A	Missouri Water Quality Standards	Regulation establishes a water quality standard for contaminates of concern.
10 CSR 20-6.200	Storm Water Regulations: Surface Runoff and Erosion Control	Implementation of appropriate best management practices.
10 CSR 25-4.261	Methods for Identifying Hazardous Waste	Test procedures, etc. which will identify if the remediation was is hazardous and regulated under RCRA.
10 CSR 25-5.262	Standards Applicable to Generators of Hazardous Waste	If the remediation waste is classified as hazardous than there are specific requirement which must be followed by USACE.
10 CSR 25-7.268	Land Disposal Restrictions	There are land disposal restrictions, which will apply if the remediation waste is characterized as hazardous.
10 CSR 80-3.010(3)	State Sanitary Landfill Design and Operation: Disposal of Low-Level Radioactive Material in Missouri	Low-Level radioactive material can't be disposed of in Missouri Sanitary Landfills.

CITATION	TITLE	APPLICABILITY
10 CSR 80-3.010(4)	State Sanitary Landfill Design and Operation: Sanitary Landfill Siting Requirements	Necessary design requirements if one of the alternative to be proposed in the Feasibility Study is on-site disposal.
10 CSR 80-3.010(17)	State Sanitary Landfill Design and Operation: Sanitary Landfill Cover Requirements	Necessary design requirements if one of the alternative to be proposed in the Feasibility Study is on-site disposal.
29 CFR Part 1910	OSHA - General Industry Standards	Standard Health and Safety requirements for remediation activities. Either these requirements or appropriate USACE requirements must be documented.
29 CFR Part 1926	OSHA - Safety and Health Standards	Standard Health and Safety requirements for remediation activities. Either these requirements or appropriate USACE requirements must be documented.
29 CFR Part 1904	OSHA - Recordkeeping, Reporting, and Related Regulations	Standard Health and Safety requirements for remediation activities. Either these requirements or appropriate USACE requirements must be documented.
49 CFR Part 171	Hazardous Material Transportation Regulations (HMTR)	Waste will be shipped from St. Louis to Utah or other disposal site.
49 CFR Part 172	HMTR	Waste will be shipped from St. Louis to Utah or other disposal site.

CITATION	TITLE	APPLICABILITY
COE Engineer Regulation (ER) 385-1-80, May 30, 1997	COE Ionizing Radiation Protection	Dealing with radiation and radiological contamination at SLAPS/HISS.
COE Engineer Regulation (ER) 385-1-92, March 18, 1994	COE Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waster (HTRW) and Ordnance and Explosive Waste (OEW) Activities	Possibility of other contamination on-site besides radioactive contamination.
19 CSR 20-10.040	Maximum Permissible Exposure Limits for Radiation	Establishes limits for radon emissions.
29 CFR 1910: 1910.1000 Subpart Z, Toxic and Hazardous Substances	Occupational Safety and Health Administration Standards	Health and Safety required training for remediation workers, etc.
10 CFR 835	Occupational Radiation Protection	Establishes exposure limits to workers.
19 CSR 20-10.050	Missouri Radiation Regulations; Protection Against Ionizing Radiation Personnel Monitoring and Radiation Surveys	Establishes procedures for personnel monitoring and radiation surveys.
29 CFR 1910; 1910.96 Subpart G, Ionizing Radiation	Occupational Safety and Health Administration Standards Occupational Health and Environmental Control	Regulations which establishes procedures for minimizing exposure to radiation.
19 CSR 20-10.090	Missouri Radiation Regulations; Protection Against Ionizing Radiation, Disposal of Radioactive Wastes	Establishes appropriate exposure limits from radiation.

CITATION	TITLE	APPLICABILITY
19 CSR 20-10.070	Missouri Radiation Regulations; Protection Against Ionizing Radiation, Storage of Radioactive Materials	Establishes appropriate exposure limits from radiation.
19 CSR 20-10.080	Missouri Radiation Regulations; Protection Against Ionizing Radiation, Control of Radioactive Contamination	Establishes appropriate exposure limits from radiation.
10 CSR 10-5.180, Emission of Visible air Contaminants from Internal Combustion Engines	Missouri Air Pollution Control Regulations; Air Quality Standards and Air Pollution Control Regulations for the St. Louis Metropolitan Area	Establishes limits on particulate matter emissions from Internal Combustion Engines.
10 CSR 20-6.010	Missouri Construction and Operating Permit Regulations	Necessary for any asphalt plant or crusher used on-site.
10 CSR 23-4.050	Missouri General Protection of Groundwater Quality and Resources	USACE must protect the groundwater with respect to AEC/MED activities and contaminates.
10 CSR 20-6.010(13)	Missouri Stormwater Discharge Regulations	Any stormwater collected during remedial activities must meet the discharge regulations.

CITATION	TITLE	APPLICABILITY
40 CFR Part 192	Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings Subpart D, Standards for Management of Uranium Byproduct Materials Pursuant to Section 84 of the Atomic Energy Act of 1954, as amended; Subpart E, Standards for Management of Thorium Byproduct Materials Pursuant to Section 84 of the Atomic Energy Act of 1954, as amended.	Establishes cleanup levels for radioactive contamination specific radium, thorium, and daughter products.
40 CFR 141; 56 FR 33050 July 18, 1991	Safe Drinking Water Act, Proposed National Primary Drinking Water Regulations	Establishes a limit of contaminates in drinking water. Groundwater beneath SLAPS/HISS is available as a drinking water source.
40 CFR 192.02	Groundwater Standards for Remedial Actions at Inactive Uranium Processing Sites	SLAPS/HISS have similar waste as to what is found at Inactive Uranium Processing Sites and establishes levels of contaminate in groundwater.
40 CFR 121.11 and 141.62 10 CSR 60-4.030	Safe Drinking Water Act; National Primary Drinking Water Regulations; Maximum Contaminant Levels; Missouri Drinking Water Regulations, Maximum Inorganic Chemical Contaminant Levels	Establishes contaminate limits in groundwater; uranium, radium, alpha, beta, and radon.
16 USC 469 PL 93-291; 88 Stat. 174	Archeological and Historic Preservation Act	Establishes procedures for archeological and historic preservation.

CITATION	TITLE	APPLICABILITY
10 CSR 23-1.010 through 1.060	Definitions Application to All Wells Type of Wells Qualifications Application for a Permit	Requirements for construction, and abandonment of groundwater monitoring wells.
10 CSR 23-1.090	Permit Requirement Well Registration	Requirements for construction, and abandonment of groundwater monitoring wells.
10 CSR 23-1.105	Permit Renewal	Requirements for construction, and abandonment of groundwater monitoring wells.
10 CSR 23-1.140	Placement of Registration Number	Requirements for construction, and abandonment of groundwater monitoring wells.
10 CSR 23-1.155	Well drilling and Pump Installation Machine Registration	Requirements for construction, and abandonment of groundwater monitoring wells.
10 CSR 23-1.160	Mail and Notification Procedures	Requirements for construction, and abandonment of groundwater monitoring wells.
10 CSR 23-3.020 through 3.080	General Protection of Groundwater Quality & Resources Standards for Construction of Wells Well Casing Seals and Connections Pump Installation Certification and Registration Reports Plastic Well Casing Liners	Requirements for construction, and abandonment of groundwater monitoring wells.
10 CSR 23-3.110	Plugging of Wells	Requirements for construction, and abandonment of groundwater monitoring wells.

CITATION	TITLE	APPLICABILITY
10 CSR 23-4.010-4.08	Monitoring Well Construction Code	Requirements for construction, and abandonment of groundwater monitoring wells.
10 CSR 25-6.263	Standards for Transporters of Hazardous Waste	State requirements for transporters to follow if transporting hazardous waste.
10 CSR 30-2.030	General Land Surveying Requirements	Surveying before and after remediation activities will be done and must follow appropriate standard procedures and be performed by a licensed surveyor.
RSMo 327	Missouri Law Regulating the Practice of Architecture, Professional Engineering and Land Surveying	Engineering Plans and Specifications or Land Surveys need to be performed by a licensed professional.
10 CSR 80-2.010	Definitions Solid Waste Management	Disposal restriction on radioactive material in sanitary landfills.
40 CFR Part 122-125	Clean Water Act - National Pollutant Discharge Elimination System (NPDES)	Water Pollution Control Program is supplying ARARs for SLAPS similar ARARs will be needed for HISS.

APPENDIX B

CORRESPONDENCE

101417

United States Department of the Interior

TAKE PRIDE IN AMERICA

FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Columbia Field Office
608 East Cherry Street
Columbia, Missouri 65201

IN REPLY REFER TO

FWS/AES-CMFO

'93 MAR -8 PM 1:40

MAR 5 1993

Mr. Dave G. Adler
Department of Energy
Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831-8723

Dear Mr. Adler:

This responds to your December 10, 1993, letter requesting information regarding the baseline environmental conditions in the vicinity of the St. Louis Site, for the management and clean-up of radioactive contamination, in St. Louis, St. Louis County, Missouri. We regret not replying sooner, as we have been short staffed.

We have enclosed copies of the National Wetlands Inventory Maps for all three sites based on our understanding of specific locations taken from directions you outlined in your letter. We found some forested wetlands which lie within or adjacent to the properties and have highlighted them for your review.

No federally-listed endangered or threatened species occur in the proposed project areas. However, please contact the Missouri Department of Conservation (P.O. Box 180, Jefferson City, Missouri 65101) concerning state-listed rare and endangered species.

We regret that, without a site visit and a tremendous amount of field evaluation, it is impossible to assist in a detailed description of the local aquatic and terrestrial flora and fauna, existing ecosystems, and the range and habitats of the ecosystem inhabitants. We suggest a thorough review of the properties by your team followed by discussions with local Missouri Department of Conservation personnel.

We appreciate the opportunity to review this project. Should you have questions concerning these comments, or if we can be of further assistance, please contact Ms. Kelly Srigley Werner at the above address, or by telephone at (314)876-1911.

Sincerely,

Jerry J. Brabander
Field Supervisor

089094

MISSOURI DEPARTMENT OF CONSERVATION

MAILING ADDRESS
P.O. Box 180
Jefferson City, Missouri 65102-0180

STREET LOCATION
2901 West Truman Boulevard
Jefferson City, Missouri

Telephone: 314/751-4115
JERRY J. PRESLEY, Director

May 7, 1992

Mr. David G. Adler
Site Manager
Former Sites Restoration Division
Department of Energy
P. O. Box 2001
Oak Ridge, TN 37831

Dear Mr. Adler:

In response to your April 24, 1992 request for information on local aquatic and terrestrial flora and fauna at the St. Louis site, we queried the Heritage Data Base.

Enclosed are printouts from the database that include lists of rare and endangered species likely to occur in St. Louis County, and known fish and wildlife species likely to occur in St. Louis County. The lists include 37 rare and endangered species and 538 fish and wildlife species. In addition, I have enclosed a list of sensitive species and high quality natural communities known from St. Louis County.

The absence of further occurrences of sensitive species and natural communities does not mean that they do not occur within the impacted area, merely that no additional information is known at this time. This report should not be regarded as a final statement on the presence or absence of rare or endangered species or high quality natural communities; only an on-site inspection can verify the absence of existence of such species or communities.

I hope this response meets your needs.

Sincerely,

W. H. Dieffenbach

WILLIAM H. DIEFFENBACH
ASST. PLANNING DIVISION CHIEF

WHD:jct

Enclosure

089094

Department of Energy - St. Louis County

Two species occur in/along the Mississippi River and Missouri River in the vicinity of the sites identified by the Department of Energy.

Pallid sturgeon (Scaphirhynchus albus) is state and federal listed Endangered.

Overwintering bald eagles (Haliaeetus leucocephalus) are state and federal listed Endangered.

A complete list of sensitive species and high-quality natural communities is also provided. Except for the two species listed above, it is unlikely that any other Rare or Endangered species would be affected at these project sites.

In addition, a Procedures printout of all animals of St. Louis County is included.

Note: The list of animals of St. Louis is not included in this document due to the length of the list. Anyone may view this list by accessing the Heritage Database or by contacting Science Applications International Corporation, St. Ann, Missouri.

APPENDIX C

COST ANALYSIS

Costs of the Alternatives in 2003 Dollars
(Includes Monitoring if Required During 30 Year Evaluation Period)

Millions of 2003$	
Alternative 1	$1.5
Alternative 2	$205
Alternative 3	$284
Alternative 4	$129
Alternative 5	$223
Alternative 6	$286

Note: Cost estimates were prepared using Micro Computer Aided Cost Engineering System (MCACES).

Contents:

- Summary of Removal Actions
- Comparison of Total Cost of Remedial Alternatives
- Cost Estimate Summary for Remedial Alternatives 1, 2, 3, 4, and 6
- Present Worth Analysis
- Cost Detail for Alternative 5
- Cost Assumption Summary for Alternative 5
- Volume Calculations

Table C-1. Summary of Removals Included in the Site-wide Alternatives for the North County Site

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Removals by Property Units						
HISS/Futura	Leave remaining materials in place	Excavate soils above subsurface soil supplemental limit with institutional controls and add multi-media cap.	Excavate for release without restrictions	Institutional controls with no further excavation	Excavate for release without restrictions	Excavate for release without restrictions
Roadside	No additional removals; leave remaining materials in place	Excavate for release without restrictions	Excavate for release without restrictions	Institutional controls with no further excavation	Excavate for release without restrictions	Excavate for release without restrictions
Directly under roads, bridges, railroads, and other permanent structures	Leave remaining material in place	Defer excavation and use institutional controls	Defer excavation and use institutional controls	Institutional controls with no further excavation	Defer excavation and use institutional controls	Excavate for release without restrictions
Coldwater Creek	Leave remaining material in place	Sort material during removals for projects such as flood control	Excavate to Coldwater Creek criteria below mean water level for release without restrictions.	Institutional controls with no further excavation	Excavate to Coldwater Creek criteria below mean water level for release without restrictions.	Excavate to Coldwater Creek criteria below mean water level for release without restrictions
SLAPS	Leave remaining material in place	Excavate soils above subsurface soil supplemental limit with institutional controls and add multi-media cap	Excavate soils above subsurface soil supplemental limit with institutional controls and consolidate other soils here for treatment	Institutional controls with no further excavation	Excavate for release without restrictions	Excavate for release without restrictions
All other vicinity properties	No additional vicinity property removals	Excavate for release without restrictions	Excavate for release without restrictions	Institutional controls with no further excavation	Excavate for release without restrictions	Excavate for release without restrictions
Total Soil Removal, Thousands						
[a]Impacted volume to be excavated, yd^3	0	150	190	0	230	300
Excavation volume, yd^3	The in-situ volume of soil plus the excavation allowance needed to remove the impacted volume; (about 20%) i.e., the size of the hole; generally 20% larger than impacted volume.					
Ex-situ, yd^3	The volume after soil swelling as a result of excavation; generally 25% larger than the excavation volume.					

[a] Impacted volume to be excavated: in-situ volume of soil above the remediation goal rounded to two significant figures.

COMPARISON OF TOTAL COST OF REMEDIAL ALTERNATIVES (in 2003 Dollars)

	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**	**Alternative 6**
Alternative Description	No Action	Partial Excavation and Capping at SLAPS and HISS/Futura	Partial Excavation and Treatment at SLAPS	Institutional Controls (No Further Excavation)	Excavation with Institutional Controls Under Buildings, Roads, Bridges, and Railroads	Excavation at All Properties
Total Project Duration (yrs)	0	30[1]	30[1]	30[1]	30[1]	30
Capital Costs[2]						
Real Estate Analysis/Documents	$0	$279,000	$279,000	$0	$279,000	$279,000
Project Management & Pre-remedial Action	$113,000	$13,621,422	$21,038,772	$2,309,600	$18,045,000	$20,507,484
HTRW Remedial Action (Construct)	$0	$104,501,170	$161,557,710	$57,740,000	$147,452,000	$170,616,698
Annual O & M Costs[3]						
Long Term Monitoring	$0	$12,350,000	$6,669,000	$15,369,000	$686,000	$0
Post Remedial Site Supervision	$76,000	$4,269,000	$2,143,000	$4,773,000	$237,000	$0
Periodic O & M Costs[4]						
Final Status Surveys & Post Remedial Action Reports (One time)	$0	$8,776,000	$8,776,000	$8,776,000	$8,776,000	$8,776,000
Five Year Reviews	$952,000	$714,000	$357,000	$793,000	$40,000	$0
Utility/Construction Support	$0	$0	$0	$1,278,000	$0	$0
Subtotal	**$1,141,000**	**$144,510,592**	**$200,820,482**	**$91,038,600**	**$175,515,000**	**$201,888,139**
Contingency (25%)	$285,000	$36,000,000	$50,200,000	$13,700,000	$31,611,000[5]	$50,500,000
Escalation (7.3%)	$83,300	$10,500,000	$14,700,000	$6,650,000	$14,711,000[6]	$14,700,000
Subtotal	**$1,509,300**	**$191,100,000**	**$265,700,000**	**$120,400,000**	**$222,837,000**	**$267,100,000**
E.D. & C. (1%)	N/A	$1,910,000	$2,660,000	$1,200,000	N/A	$2,670,000
C.M. (6%)	N/A	$11,500,000	$15,900,000	$7,220,000	N/A	$16,000,000
TOTAL COST	**$1,509,300**	**$204,510,000**	**$284,260,000**	**$128,820,000**	**$222,837,000**	**$285,770,000**

Notes:

[1]Need for institutional controls for this alternative is likely to extend beyond 30 year period included in this evaluation.

[2]Capital costs are those expenditures that are required to construct a remedial action and consist primarily of expenditures initially incurred to build, install, or execute the remedial action.

[3]Annual O & M costs are operation and maintenance costs that occur post construction and are necessary to ensure or verify the continued effectiveness of a remedial action.

[4]Periodic O & M costs are operation and maintenance costs that occur only once every few years (e.g., five year reviews, equipment replacement) or expenditures that occur only once during the entire O & M period.

[5]Contingencies for the MCACES calculations include 5% for design and 15% for construction. These assumptions are built into the MCACES calculations.

[6]The escalation rates for the MCACES calculations include 7.3% (calculated based upon the midpoint of construction effort) for construction costs and 25.6% (calculated based upon the midpoint of post remedial action) for post remedial action costs. These escalation determinations were made using the Composite Civil Works Construction Index from EM 1110-2-1304, Civil Works Construction Cost Index System dated September 30, 2000.

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: FUSRAP - North County Feasibility Study DATE: 20-Nov-2002

SUBJECT: Alternative 1, No Further Action FILE: NCFSPPAlt.xls

Account No.	ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
32XXX	PROJ. MANG. & PRE-REMEDIAL ACTION				
20	Investigation	1	LS		113,000
34XXX	POST-REMEDIAL ACTION				
20	Operation, Maint. & Monitoring				
20.03	Five Year Review	1	LS		952,000
20.04	Post Remedial Site Supervision	1	LS		76,000

SUBTOTAL:		$1,141,000
* CONTINGENCIES: (in %)----	25	$285,000
ESCALATION: (in %)	7.3	$83,300
SUBTOTAL:-------------------		$1,509,300
E.D. & C. (in %)------------------	0	$0
C.M. (in %)----------------------	0	$0
TOTAL COST		**$1,509,300**

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: FUSRAP - North County Feasibility Study   DATE: 29-Apr-2003

SUBJECT: Alternative 2, Containment at SLAPS and HISS/Futura   FILE: NCFSPPRAlt.xls

Account No.	ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
01XXX	REAL ESTATE ANALYSIS/DOCUMENTS				
G	Rights of Entry/Temporary Permit				
G.01	Rights of Entry Acquisition	279	EA	500.00	139,500
G.02	Damages	279	EA	500.00	139,500
32XXX	PROJ. MANG. & PRE-REMEDIAL ACTION				
10	Project Management	1	LS		3,143,405
20	Investigation (PRP)	1	LS		1,047,802
30	Remedial Design	1	LS		8,382,414
40	Remedial Action Contracting	1	LS		1,047,802
331XX	HTRW REMEDIAL ACTION (CONSTRUCT)				
01	Mobilize and Preparatory Work	1	LS		416,000
01.08	Institutional Controls	1	LS		359,000
02	Monitor'g, Sampling, Test & Analysis				
02.90	Environmental Monitoring	1	LS		3,622,000
02.91	Additional Labor & Services	1	LS		7,732,000
03	Site Work				
03.03	Earthwork	185,500	CY	15.30	2,838,150
03.04	Roads	11,300	SY	41.30	466,690
03.90	Railroads	3,900	LF	81.60	318,240
03.91	Sheetpile Shoring	18,300	SF	10.80	197,640
03.92	Additional Labor & Services	1	LS		607,600
05	Surface Water Collect & Control				
05.92	Additional Labor & Services	1	LS		3,341,800
08	Solids Collect and Containment				
08.01	Contaminated Soil Collection	185,500	CY	16.30	3,023,650
08.05	Capping Contaminated Areas/Waste Pile	30	ACR	166,000.00	4,980,000
19	Disposal (Commercial)				
19.21	Transport to Storage/Disp Facility	231,900	CY	130.00	30,147,000
19.22	Disposal Fees and Taxes	231,900	CY	126.00	29,219,400
19.90	Transportation & Disposal of Building Decon. Material	1	LS		16,615,000
20	Site Restoration	1	LS		213,000
21	Demobilization	1	LS		404,000
34XXX	POST-REMEDIAL ACTION				
20	Operation, Maint. & Monitoring				
20.01	Final Status Surveys	1	LS		8,776,000
20.02	Monitoring	1	LS		12,350,000
20.03	Five Year Review	1	LS		714,000
20.04	Post Remedial Site Supervision	1	LS		4,269,000
		SUBTOTAL:			$144,510,592
		* CONTINGENCIES: (in %)-		25	$36,000,000
		ESCALATION: (in %)		7.3	$10,500,000
		SUBTOTAL:-------------------			$191,100,000
		E.D.C. (in %)------------------		1	$1,910,000
		C.M. (in %)-------------------		6	$11,500,000
		TOTAL COST			**$204,510,000**

*Contingencies Exclude Institutional Controls

02.90	Environmental Monitoring (5yrs)	used cost from SAIC + 31.98% OH from MCACES
02.91	Additional Labor & Services	cost prorated based on MCACES for alt 5
03.03	Earthwork	unit cost includes swell quantity for backfill used in MCACES details (351,565cy) see detail page 35 per SAIC volume notes, it is assummed that grading & moving overburden at the containment sites will result in exc. equivalent to volume of unrestricted release criteria. More material is excated then disposed
03.92	Additional Labor & Services	cost prorated based on quantity, backfill only ($2.00/cy)
05.92	Additional Labor & Services	cost prorated based on quantity ($11.00/cy)

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: FUSRAP - North County Feasibility Study DATE: 29-Apr-2003

SUBJECT: Alternative 3, Treatment at SLAPS FILE: NCFSPPRAlt.xls

Account No.	ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
01XXX	REAL ESTATE ANALYSIS/DOCUMENTS				
G	Rights of Entry/Temporary Permit				
G.01	Rights of Entry Acquisition	279	EA	500.00	139,500
G.02	Damages	279	EA	500.00	139,500
32XXX	PROJ. MANG. & PRE-REMEDIAL ACTION				
10	Project Management	1	LS		4,855,101
20	Investigation (PRP)	1	LS		1,618,367
30	Remedial Design	1	LS		12,946,937
40	Remedial Action Contracting	1	LS		1,618,367
331XX	HTRW REMEDIAL ACTION (CONSTRUCT)				
01	Mobilize and Preparatory Work	1	LS		416,000
01.08	Institutional Controls	1	LS		128,000
02	Monitor'g, Sampling, Test & Analysis				
02.90	Environmental Monitoring	1	LS		2,173,000
02.91	Additional Labor & Services	1	LS		4,639,000
03	Site Work				
03.03	Earthwork	229,300	CY	7.50	1,719,750
03.04	Roads	11,300	SY	41.30	466,690
03.90	Railroads	3,900	LF	81.60	318,240
03.91	Sheetpile Shoring	18,300	SF	10.80	197,640
03.92	Additional Labor & Services	1	LS		401,600
05	Surface Water Collect & Control				
05.92	Additional Labor & Services	1	LS		2,208,800
08	Solids Collect and Containment				
08.01	Contaminated Soil Collection	229,300	CY	16.30	3,737,590
08.05	Capping Contaminated Areas/Waste Pile	10	ACR	48,000.00	480,000
13	Physical Treatment				
13.09	Soil Washing	229,300	CY	420.00	96,306,000
13.90	Soil Sorting	286,700	CY	66.00	18,922,200
19	Disposal (Commercial)				
19.21	Transport to Storage/Disp Facility	47,700	CY	130.00	6,201,000
19.22	Disposal Fees and Taxes	47,700	CY	126.00	6,010,200
19.90	Transportation & Disposal of Building Decon. Material	1	LS		16,615,000
20	Site Restoration	1	LS		213,000
21	Demobilization	1	LS		404,000
34XXX	POST-REMEDIAL ACTION				
20	Operation, Maint. & Monitoring				
20.01	Final Status Surveys	1	LS		8,776,000
20.02	Monitoring	1	LS		6,669,000
20.03	Five Year Review	1	LS		357,000
20.04	Post Remedial Site Supervision	1	LS		2,143,000
		SUBTOTAL:			$200,820,482
		* CONTINGENCIES: (in %)		25	$50,200,000
		ESCALATION: (in %)		7.3	$14,700,000
		SUBTOTAL:-------------------			$265,700,000
		E.D.C. (in %)-----------------		1	$2,660,000
		C.M. (in %)-------------------		6	$15,900,000
			TOTAL COST		**$284,260,000**

*Contingencies Exclude Institutional Controls

02.90	Environmental Monitoring (3yrs)	used cost from SAIC + 31.98% OH from MCACES
02.91	Additional Labor & Services	cost prorated based on MCACES for alt 5
03.03	Earthwork	unit cost includes swell quantity for backfill used in MCACES details (351,565cy) see detail page 35 per SAIC volume notes, because the material is to be treated onsite the cost for borrow and 50% of the cost for hauling has been subtracted (-$7.80)
03.92	Additional Labor & Services	cost prorated based on quantity, backfill only ($2.00/cy)
05.92	Additional Labor & Services	cost prorated based on quantity ($11.00/cy)
08.05	Soil Cap	used cost from SAIC + 31.98% OH from MCACES
13.09	Soil Washing	used cost from SAIC + 31.98% OH from MCACES
13.90	Soil Sorting	used cost from SAIC + 31.98% OH from MCACES

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: FUSRAP - North County Feasibility Study | DATE: 29-Apr-2003

SUBJECT: Alternative 4, Institutional Controls (No Further Excavation) | FILE: NCFSPPRAlt.xls

Account No.	ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
32XXX	PROJ. MANG. & PRE-REMEDIAL ACTION				
10	Project Management	1	LS		1,732,200
20	Investigation (PRP)	1	LS		577,400
331XX	HTRW REMEDIAL ACTION (CONSTRUCT)				
01.08	Institutional Controls	1	LS		36,370,000
02	Monitor'g, Sampling, Test & Analysis				
02.90	Environmental Monitoring	1	LS		1,449,000
02.91	Additional Labor & Services	1	LS		3,093,000
19	Disposal (Commercial)				
19.90	Transportation & Disposal of Building Decon. Material	1	LS		16,615,000
20	Site Restoration	1	LS		213,000
22	General Requirements				
22.90	Utility Radiiological Support	1	LS		1,278,000
34XXX	POST-REMEDIAL ACTION				
20	Operation, Maint. & Monitoring				
20.01	Final Status Surveys	1	LS		8,776,000
20.02	Monitoring	1	LS		15,369,000
20.03	Five Year Review	1	LS		793,000
20.04	Post Remedial Site Supervision	1	LS		4,773,000

SUBTOTAL:		$91,038,600
* CONTINGENCIES: (in %)-	25	$13,700,000
ESCALATION: (in %)	7.3	$6,650,000
SUBTOTAL:-------------------		$120,400,000
E.D.C. (in %)------------------	1	$1,200,000
C.M. (in %)--------------------	6	$7,220,000
TOTAL COST		**$128,820,000**

*Contingencies Exclude Institutional Controls

02.90	Environmental Monitoring (2yrs)	used cost from SAIC + 31.98% OH from MCACES
02.91	Additional Labor & Services	cost prorated based on MCACES for alt 5
22.90	Utility Radiiological Support	based on WAD 11(2001) $42,600 x 30year project life

GOVERNMENT ESTIMATE WORK SHEET

PROJECT: FUSRAP - North County Feasibility Study DATE: 29-Apr-2003

SUBJECT: Alternative 6, Excavation at all Properties FILE: NCFSPPRAlt.xls

Account No.	ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
01XXX	REAL ESTATE ANALYSIS/DOCUMENTS				
G	Rights of Entry/Temporary Permit				
G.01	Rights of Entry Acquisition	279	EA	500.00	139,500
G.02	Damages	279	EA	500.00	139,500
32XXX	PROJ. MANG. & PRE-REMEDIAL ACTION				
10	Project Management	1	LS		5,126,871
20	Investigation (PRP)	1	LS		1,708,957
30	Remedial Design	1	LS		13,671,656
40	Remedial Action Contracting	1	LS		1,708,957
331XX	HTRW REMEDIAL ACTION (CONSTRUCT)				
01	Mobilize and Preparatory Work	1	LS		416,000
02	Monitor'g, Sampling, Test & Analysis				
02.90	Environmental Monitoring	1	LS		4,347,000
02.91	Additional Labor & Services	1	LS		9,280,000
03	Site Work				
03.03	Earthwork	360,100	CY	15.30	5,509,530
03.04	Roads	104,300	SY	41.30	4,307,590
03.90	Railroads	41,630	LF	81.60	3,397,008
03.91	Sheetpile Shoring	18,300	SF	10.80	197,640
03.92	Additional Labor & Services	1	LS		743,800
05	Surface Water Collect & Control				
05.92	Additional Labor & Services	1	LS		4,090,900
08	Solids Collect and Containment				
08.01	Contaminated Soil Collection	360,100	CY	16.30	5,869,630
19	Disposal (Commercial)				
19.21	Transport to Storage/Disp Facility	450,100	CY	130.00	58,513,000
19.22	Disposal Fees and Taxes	450,100	CY	126.00	56,712,600
19.90	Transportation & Disposal of Building Decon. Material	1	LS		16,615,000
20	Site Restoration	1	LS		213,000
21	Demobilization	1	LS		404,000
34XXX	POST-REMEDIAL ACTION				
20	Operation, Maint. & Monitoring				
20.01	Final Status Surveys	1	LS		8,776,000

SUBTOTAL:		$201,888,139
CONTINGENCIES: (in %)	25	$50,500,000
ESCALATION: (in %)	7.3	$14,700,000
SUBTOTAL:-------------------		$267,100,000
E.D.C. (in %)-----------------	1	$2,670,000
C.M. (in %)-------------------	6	$16,000,000
TOTAL COST		**$285,770,000**

St. Louis North County FS - Present Worth Analysis

Alt. 1

Project Life Cycle Discount Factor - 7.0%*

Costs in Thousands of FY03$

Year	Capital Costs ($)	O&M Costs ($)	Total Cost (Capital + O&M)	Discount Factor at 7.0%	Present Worth at 7.0% ($)
0			0	1.000	0
1	149		149	0.935	139
2		3	3	0.873	3
3		3	3	0.816	2
4		4	4	0.763	3
5		214	214	0.713	153
6		3	3	0.666	2
7		3	3	0.623	2
8		3	3	0.582	2
9		4	4	0.544	2
10		214	214	0.508	109
11		4	4	0.475	2
12		3	3	0.444	1
13		3	3	0.415	1
14		4	4	0.388	2
15		214	214	0.362	78
16		3	3	0.339	1
17		3	3	0.317	1
18		3	3	0.296	1
19		4	4	0.277	1
20		214	214	0.258	55
21		3	3	0.242	1
22		3	3	0.226	1
23		3	3	0.211	1
24		4	4	0.197	1
25		214	214	0.184	39
26		3	3	0.172	1
27		3	3	0.161	0
28		3	3	0.150	0
29		4	4	0.141	1
30		214	214	0.131	28
Total	**149**	**1,360**	**1,509**		**632**

* 7.0% Discount rate is in accordance with NCP (55 FR 8722)
Total cost only includes costs incured for 30 Year project duration

St. Louis North County FS - Present Worth Analysis
Alt.2
Project Life Cycle Discount Factor - 7.0%*
Costs in Thousands of FY03$

Year	Capital Costs ($)	O&M Costs ($)	Total Cost (Capital + O&M)	Discount Factor at 7.0%	Present Worth at 7.0% ($)
0			0	1.000	0
1	33,522		33,522	0.935	31,329
2	33,522		33,522	0.873	29,279
3	33,522		33,522	0.816	27,364
4	33,522		33,522	0.763	25,574
5	33,522		33,522	0.713	23,901
6		7,154	7,154	0.666	4,767
7		7,154	7,154	0.623	4,455
8		943	943	0.582	549
9		943	943	0.544	513
10		1,147	1,147	0.508	583
11		943	943	0.475	448
12		944	944	0.444	419
13		943	943	0.415	391
14		943	943	0.388	366
15		1,147	1,147	0.362	416
16		943	943	0.339	319
17		943	943	0.317	299
18		943	943	0.296	279
19		943	943	0.277	261
20		1,147	1,147	0.258	296
21		943	943	0.242	228
22		944	944	0.226	213
23		943	943	0.211	199
24		943	943	0.197	186
25		1,147	1,147	0.184	211
26		943	943	0.172	162
27		943	943	0.161	152
28		943	943	0.150	142
29		943	943	0.141	133
30		1,147	1,147	0.131	151
Total	**167610**	**37,019**	**204,629**		**153,584**

* 7.0% Discount rate is in accordance with NCP (55 FR 8722)
Total cost only includes costs incured for 30 Year project duration

St. Louis North County FS - Present Worth Analysis
Alt. 3

Project Life Cycle Discount Factor - 7.0%*
Costs in Thousands of FY03$

Year	Capital Costs ($)	O&M Costs ($)	Total Cost (Capital + O&M)	Discount Factor at 7.0%	Present Worth at 7.0% ($)
0			0	1.000	0
1	64,720		64,720	0.935	60,486
2	64,720		64,720	0.873	56,529
3	64,720		64,720	0.816	52,831
4	64,720		64,720	0.763	49,375
5		6,689	6,689	0.713	4,769
6		6,689	6,689	0.666	4,457
7		476	476	0.623	296
8		476	476	0.582	277
9		578	578	0.544	314
10		476	476	0.508	242
11		476	476	0.475	226
12		476	476	0.444	211
13		476	476	0.415	198
14		578	578	0.388	224
15		476	476	0.362	173
16		476	476	0.339	161
17		476	476	0.317	151
18		476	476	0.296	141
19		578	578	0.277	160
20		476	476	0.258	123
21		476	476	0.242	115
22		476	476	0.226	107
23		476	476	0.211	100
24		578	578	0.197	114
25		476	476	0.184	88
26		477	477	0.172	82
27		476	476	0.161	77
28		477	477	0.150	72
29		578	578	0.141	81
30		476	476	0.131	63
Total	**258880**	**25,314**	**284,194**		**232,242**

* 7.0% Discount rate is in accordance with NCP (55 FR 8722)
Total cost only includes costs incured for 30 Year project duration

St. Louis North County FS - Present Worth Analysis
Alt. 4
Project Life Cycle Discount Factor - 7.0%*
Costs in Thousands of FY03$

Year	Capital Costs ($)	O&M Costs ($)	Total Cost (Capital + O&M)	Discount Factor at 7.0%	Present Worth at 7.0% ($)
0			0	1.000	0
1	42,511		42,511	0.935	39,730
2	42,510		42,510	0.873	37,130
3		7,290	7,290	0.816	5,951
4		7,290	7,290	0.763	5,562
5		1,080	1,080	0.713	770
6		1,081	1,081	0.666	720
7		1,306	1,306	0.623	813
8		1,080	1,080	0.582	629
9		1,081	1,081	0.544	588
10		1,080	1,080	0.508	549
11		1,081	1,081	0.475	514
12		1,306	1,306	0.444	580
13		1,081	1,081	0.415	449
14		1,080	1,080	0.388	419
15		1,081	1,081	0.362	392
16		1,080	1,080	0.339	366
17		1,306	1,306	0.317	413
18		1,081	1,081	0.296	320
19		1,080	1,080	0.277	299
20		1,081	1,081	0.258	279
21		1,080	1,080	0.242	261
22		1,306	1,306	0.226	295
23		1,080	1,080	0.211	228
24		1,081	1,081	0.197	213
25		1,080	1,080	0.184	199
26		1,081	1,081	0.172	186
27		1,305	1,305	0.161	210
28		1,080	1,080	0.150	162
29		1,081	1,081	0.141	152
30		1,080	1,080	0.131	142
Total	**85,021**	**43,799**	**128,820**		**98,519**

* 7.0% Discount rate is in accordance with NCP (55 FR 8722)
Total cost only includes costs incured for 30 Year project duration

St. Louis North County FS - Present Worth Analysis
Alt.5
Project Life Cycle Discount Factor - 7.0%*
Costs in Thousands of FY03$

Year	Capital Costs ($)	O&M Costs ($)	Total Cost (Capital + O&M)	Discount Factor at 7.0%	Present Worth at 7.0% ($)
0		0	0	1.000	0
1	42,100		42,100	0.935	39,346
2	42,100		42,100	0.873	36,772
3	42,100		42,100	0.816	34,366
4	42,100		42,100	0.763	32,118
5	42,100		42,100	0.713	30,017
6		5,594	5,594	0.666	3,728
7		5,594	5,594	0.623	3,484
8		46	46	0.582	27
9		46	46	0.544	25
10		57	57	0.508	29
11		46	46	0.475	22
12		47	47	0.444	21
13		47	47	0.415	20
14		47	47	0.388	18
15		57	57	0.362	21
16		46	46	0.339	16
17		47	47	0.317	15
18		47	47	0.296	14
19		47	47	0.277	13
20		57	57	0.258	15
21		46	46	0.242	11
22		47	47	0.226	11
23		47	47	0.211	10
24		46	46	0.197	9
25		57	57	0.184	11
26		46	46	0.172	8
27		47	47	0.161	8
28		47	47	0.150	7
29		47	47	0.141	7
30		57	57	0.131	7
Total	**210500**	**12,312**	**222,812**		**180,171**

* 7.0% Discount rate is in accordance with NCP (55 FR 8722)
Total cost only includes costs incured for 30 Year project duration

St. Louis North County FS - Present Worth Analysis
Alt.6

Project Life Cycle Discount Factor - 7.0%*
Costs in Thousands of FY03$

Year	Capital Costs ($)	O&M Costs ($)	Total Cost (Capital + O&M)	Discount Factor at 7.0%	Present Worth at 7.0% ($)
0			0	1.000	0
1	45,569		45,569	0.935	42,588
2	45,569		45,569	0.873	39,802
3	45,569		45,569	0.816	37,198
4	45,569		45,569	0.763	34,764
5	45,569		45,569	0.713	32,490
6	45,569		45,569	0.666	30,365
7		6,211	6,211	0.623	3,868
8		6,211	6,211	0.582	3,615
9		0	0	0.544	0
10		0	0	0.508	0
11		0	0	0.475	0
12		0	0	0.444	0
13		0	0	0.415	0
14		0	0	0.388	0
15		0	0	0.362	0
16		0	0	0.339	0
17		0	0	0.317	0
18		0	0	0.296	0
19		0	0	0.277	0
20		0	0	0.258	0
21		0	0	0.242	0
22		0	0	0.226	0
23		0	0	0.211	0
24		0	0	0.197	0
25		0	0	0.184	0
26		0	0	0.172	0
27		0	0	0.161	0
28		0	0	0.150	0
29		0	0	0.141	0
30		0	0	0.131	0
Total	**273,414**	**12,422**	**285,836**		**224,689**

* 7.0% Discount rate is in accordance with NCP (55 FR 8722)
Total cost only includes costs incured for 30 Year project duration

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Revised FSPP - North County
Formerly Utilized Sites Remedial
Action Program(FUSRAP)
North County Feasibility Study
Alt.5-Exc.&Institutional Control

Designed By:
Estimated By: Gregory Dyn

Prepared By: U.S ARMY CORPS OF ENGINEERS
St. Louis District

Preparation Date: 06/27/01
Effective Date of Pricing: 10/01/00
Est Construction Time: 1825 Days

Sales Tax: 0.0%

PROJECT BREAKDOWN:

This estimate is structured for remedial action construction as follows using a 5 digit number at Level 1 and a 2 digit number at all remaining levels. The numbers for the first 3 title levels are taken from the Standard Interagency HTRW Remedial Action Work Breakdown Structure (RA-WBS). The 2 digit numbers for the remaining title levels are user defined. The detail items are at Level 5.

Level 1 - WBS Level 1 (Account)
Level 2 - WBS Level 2 (System)
Level 3 - WBS Level 3 (Subsystem)
Level 4 - WBS Level 4 (Assembly Category or Other)
Level 5 - Detail
Level 6 - Not Used

PROJECT DESCRIPTION:

The North County site is part of the St. Louis Formerly Utilized Sites Remedial Action Program (FUSRAP) Site, which is comprised of multiple properties. The North County Site properties are located in northern St. Louis County near Lambert-St. Louis International Airport. Specific sites include the St. Louis Airport Site (SLAPS), Latty Avenue Properties (HISS/Futura and Latty Avenue VP's), and SLAPS VP's. The SLAPS VP's include properties near SLAPS and areas along Coldwater Creek, which drains the North County Site. A total of more than 87 properties are involved. The North County Site includes three properties on EPA's National Priority List (NPL): SLAPS, HISS and Futura Coatings.
This estimate only considers Alternative 5 of the Proposed Plan, Excavation with Institutional Controls at Roads, Bridges, and Railroads

PRODUCTIVITY:

Production rates, as a baseline and as taken from the Unit Price Book (UPB) Database, assumes a non-contaminated working environment with no level of protection productivity reduction factors. When required, productivity for appropriate activities will be adjusted for this project as follows:

1. Level of Protection B - Productivity 48%
2. Level of Protection C - Productivity 55%
3. Level of Protection D Modified - Productivity 82%
4. Level of Protection D - Productivity 96%

Notes in the estimate detail will show when each level applies.

The following daily time breakdown was assumed as taken from the Corps of Engineers "Productivity Study for HTRW Remedial Action Projects".

Example: Light Work with ave. temperature >70 but <85 degrees.

Level B Level C Level D Level D Normal

`			Mod		
Paid Time (minutes)	480	480	480	480	480
- Non-Productive Time (minutes):					
Standard Losses	140	128	76	32	20
Scheduled/Heat Stress Breaks	65	63	47	33	30
Dexterity Losses	69	51	4	5	0
Productive Time (minutes)	206	238	353	410	430
Productivity:	206/430 X100%	238/430 X100%	353/430 X100%	410/430 X100%	430/430 X100%
	48%	55%	82%	96%	100%
Example:					
Normal Production Rate (CY/HR)	250	250	250	250	250
X Productivity	.48	.55	.82	.96	1.00
=Reduced Production Rate(CY/HR)	120	138	205	240	250

ESCALATION:

Escalation determinations were made using the Composite Civil Works Construction Index from EM 1110-2-1304, Civil Works Construction Cost Index System(CWCCIS) Dated 30 September 2000. Index projections are based on the current annual Office of Management and Budget (OMB) inflation factors.

For this estimate, the effective date of pricing is October 2000. The anticipated project duration is 1,825 calendar days. The midpoint of remedial action is March 2003. Post remidial action is anticipated to begin immediatly following the completion of remedial action. The midpoint of post remedial action is March 2008.

Remedial Action Escalation Calculation:
Remedial Action Midpoint (March 2003) Index = 545.38
Effective Date of Pricing (October 2000) Index = 507.97

Escalation % = (545/508)-1 X 100% = 7.3%

PostRemedial Action Escalation Calculation:
PostRemedial Action Midpoint (March 2008) Index = 638.40
Effective Date of Pricing (October 2000) Index = 507.97

Escalation % = (638/508)-1 X 100% = 25.6%

CONTINGENCY:

Contingencies are shown for both Design Contingencies and Construction Contingencies. Contingency rates are variable and are applied at Level 2 of the estimate (HTRW RA-WBS Level 2, System). Design contingencies are based on the EI01D010 reasonable guide table for remedial action projects. Construction contingencies are based on the consensus of a CEMVS PM/ED group analysis.

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** PROJECT OWNER SUMMARY - ACCOUNT (Rounded to 1000's) **

		QUANTITY	UOM	CONTRACT	DES CONT	ESCALATN	CON CONT	TOTAL COST	UNIT COST
01XXX	REAL ESTATE ANALYSIS/DOCUMENTS			279,000	14,000	21,000	0	314,000	
32XXX	PROJ. MANG.& PRE-REMEDIAL ACTION			18,045,000	902,000	1,383,000	0	20,330,000	
331XX	HTRW REMEDIAL ACTION (CONSTRUCT)			137,735,000	7,834,000	10069000	20733000	176,370,000	
332XX	ENGINEERING DURING CONSTRUCTION			1,388,000	69,000	106,000	235,000	1,798,000	
333XX	CONSTRUCTION MANAGEMENT (S&A)			8,329,000	416,000	638,000	1,408,000	10,791,000	
34XXX	POST-REMEDIAL ACTION			9,739,000	0	2,493,000	0	12,232,000	
TOTAL	Revised FSPP - North County			175,515,000	9,236,000	14711000	22375000	221,837,000	

	QUANTITY UOM	CONTRACT	DES CONT	ESCALATN	CON CONT	TOTAL COST	UNIT COST
01XXX REAL ESTATE ANALYSIS/DOCUMENTS							
01XXX. G Rights of Entry/Temporary Permit		279,000	14,000	21,000	0	314,000	
TOTAL REAL ESTATE ANALYSIS/DOCUMENTS		279,000	14,000	21,000	0	314,000	
32XXX PROJ. MANG.& PRE-REMEDIAL ACTION							
32XXX.10 Project Management		4,164,000	208,000	319,000	0	4,691,000	
32XXX.20 Investigations (PRP)		1,388,000	69,000	106,000	0	1,564,000	
32XXX.30 Remedial Design		11,105,000	555,000	851,000	0	12,511,000	
32XXX.40 Remedial Action Contracting		1,388,000	69,000	106,000	0	1,564,000	
TOTAL PROJ. MANG.& PRE-REMEDIAL ACTION		18,045,000	902,000	1,383,000	0	20,330,000	
331XX HTRW REMEDIAL ACTION (CONSTRUCT)							
331XX.01 Mobilize and Preparatory Work		418,000	21,000	32,000	71,000	542,000	
331XX.02 Monitor'g,Samplng,Test &Analysis		13,069,000	653,000	954,000	1,960,000	16,636,000	
331XX.03 Site Work		6,190,000	309,000	452,000	928,000	7,880,000	
331XX.05 Surface Water Collect & Control		3,408,000	170,000	261,000	576,000	4,415,000	
331XX.08 Solids Collect and Containment		4,736,000	1,184,000	346,000	710,000	6,977,000	
331XX.19 Disposal (Commercial)		109,292,000	5,465,000	7,978,000	16394000	139,128,000	
331XX.20 Site Restoration		214,000	11,000	16,000	32,000	273,000	
331XX.21 Demobilization		407,000	20,000	30,000	61,000	518,000	
TOTAL HTRW REMEDIAL ACTION (CONSTRUCT)		137,735,000	7,834,000	10069000	20733000	176,370,000	
332XX ENGINEERING DURING CONSTRUCTION							
332XX.01 Engineering During Construction		1,388,000	69,000	106,000	235,000	1,798,000	
TOTAL ENGINEERING DURING CONSTRUCTION		1,388,000	69,000	106,000	235,000	1,798,000	
333XX CONSTRUCTION MANAGEMENT (S&A)							
333XX.01 CONSTRUCTION MANAGEMENT (S&A)		8,329,000	416,000	638,000	1,408,000	10,791,000	
TOTAL CONSTRUCTION MANAGEMENT (S&A)		8,329,000	416,000	638,000	1,408,000	10,791,000	
34XXX POST-REMEDIAL ACTION							
34XXX.20 Operation, Maint. & Monitoring		9,739,000	0	2,493,000	0	12,232,000	

** PROJECT OWNER SUMMARY - SYSTEM (Rounded to 1000's) **

	QUANTITY UOM	CONTRACT	DES CONT	ESCALATN	CON CONT	TOTAL COST	UNIT COST
TOTAL POST-REMEDIAL ACTION		9,739,000	0	2,493,000	0	12,232,000	
TOTAL Revised FSPP - North County		175,515,000	9,236,000	14711000	22375000	221,837,000	

** PROJECT OWNER SUMMARY - SUBSYSTM (Rounded to 1000's) **

	QUANTITY UOM	CONTRACT	DES CONT	ESCALATN	CON CONT	TOTAL COST	UNIT COST
01XXX REAL ESTATE ANALYSIS/DOCUMENTS							
01XXX. G Rights of Entry/Temporary Permit							
01XXX. G.01 Rights of Entry Aquisition		140,000	7,000	11,000	0	157,000	
01XXX. G.02 Damages		140,000	7,000	11,000	0	157,000	
TOTAL Rights of Entry/Temporary Permit		279,000	14,000	21,000	0	314,000	
TOTAL REAL ESTATE ANALYSIS/DOCUMENTS		279,000	14,000	21,000	0	314,000	
32XXX PROJ. MANG.& PRE-REMEDIAL ACTION							
32XXX.10 Project Management		4,164,000	208,000	319,000	0	4,691,000	
32XXX.20 Investigations (PRP)		1,388,000	69,000	106,000	0	1,564,000	
32XXX.30 Remedial Design		11,105,000	555,000	851,000	0	12,511,000	
32XXX.40 Remedial Action Contracting		1,388,000	69,000	106,000	0	1,564,000	
TOTAL PROJ. MANG.& PRE-REMEDIAL ACTION		18,045,000	902,000	1,383,000	0	20,330,000	
331XX HTRW REMEDIAL ACTION (CONSTRUCT)							
331XX.01 Mobilize and Preparatory Work							
331XX.01.01 Mob Construction Equip & Fac		240,000	12,000	18,000	41,000	311,000	
331XX.01.03 Submittals/Implementation Plans		109,000	5,000	8,000	18,000	141,000	
331XX.01.04 Setup/Construct Temp Facilities		55,000	3,000	4,000	9,000	71,000	
331XX.01.05 Construct Temporary Utilities		15,000	1,000	1,000	3,000	19,000	
TOTAL Mobilize and Preparatory Work		418,000	21,000	32,000	71,000	542,000	
331XX.02 Monitor'g,Samplng,Test &Analysis							
331XX.02.90 Environmental Monitoring		4,169,000	208,000	304,000	625,000	5,307,000	
331XX.02.91 Additional Labor & Services		8,899,000	445,000	650,000	1,335,000	11,329,000	
TOTAL Monitor'g,Samplng,Test &Analysis		13,069,000	653,000	954,000	1,960,000	16,636,000	
331XX.03 Site Work							
331XX.03.03 Earthwork	278416.00 CY	4,291,000	215,000	313,000	644,000	5,462,000	19.62
331XX.03.04 Roads	11307.00 SY	470,000	23,000	34,000	70,000	598,000	52.87
331XX.03.90 Railroads	2900.00 LF	238,000	12,000	17,000	36,000	303,000	104.52
331XX.03.91 Sheetpile Shoring	18265.00 SF	199,000	10,000	15,000	30,000	253,000	13.84
331XX.03.92 Additional Labor & Services		661,000	33,000	48,000	99,000	841,000	

	QUANTITY UOM	CONTRACT	DES CONT	ESCALATN	CON CONT	TOTAL COST	UNIT COST
331XX.03.93 Misc. Utility Relocations		332,000	17,000	24,000	50,000	423,000	
TOTAL Site Work		6,190,000	309,000	452,000	928,000	7,880,000	
331XX.05 Surface Water Collect & Control							
331XX.05.92 Additional Labor & Services		3,408,000	170,000	261,000	576,000	4,415,000	
TOTAL Surface Water Collect & Control		3,408,000	170,000	261,000	576,000	4,415,000	
331XX.08 Solids Collect and Containment							
331XX.08.01 Contaminated Soil Collection	278416.00 CY	4,736,000	1,184,000	346,000	710,000	6,977,000	25.06
TOTAL Solids Collect and Containment		4,736,000	1,184,000	346,000	710,000	6,977,000	
331XX.19 Disposal (Commercial)							
331XX.19.21 Transport to Storage/Disp Facil	348020.00 CY	45,629,000	2,281,000	3,331,000	6,844,000	58,086,000	166.90
331XX.19.22 Disposal Fees and Taxes	348020.00 CY	46,936,000	2,347,000	3,426,000	7,040,000	59,749,000	171.68
331XX.19.90 Transportation and Disposal of		16,727,000	836,000	1,221,000	2,509,000	21,293,000	
TOTAL Disposal (Commercial)		109,292,000	5,465,000	7,978,000	16394000	139,128,000	
331XX.20 Site Restoration							
331XX.20.01 Earthwork		55,000	3,000	4,000	8,000	69,000	
331XX.20.04 Revegetation And Planting		130,000	6,000	9,000	19,000	165,000	
331XX.20.92 Site Cleanup		30,000	1,000	2,000	4,000	38,000	
TOTAL Site Restoration		214,000	11,000	16,000	32,000	273,000	
331XX.21 Demobilization							
331XX.21.01 Removal Of Temporary Facilities		55,000	3,000	4,000	8,000	70,000	
331XX.21.02 Removal Of Temporary Utilities		14,000	1,000	1,000	2,000	18,000	
331XX.21.04 Demob of Construction Equip/Facl		318,000	16,000	23,000	48,000	405,000	
331XX.21.06 Submittals		20,000	1,000	1,000	3,000	25,000	
TOTAL Demobilization		407,000	20,000	30,000	61,000	518,000	
TOTAL HTRW REMEDIAL ACTION (CONSTRUCT)		137,735,000	7,834,000	10069000	20733000	176,370,000	
332XX ENGINEERING DURING CONSTRUCTION							

	QUANTITY UOM	CONTRACT	DES CONT	ESCALATN	CON CONT	TOTAL COST	UNIT COST
332XX.01 Engineering During Construction		1,388,000	69,000	106,000	235,000	1,798,000	
TOTAL ENGINEERING DURING CONSTRUCTION		1,388,000	69,000	106,000	235,000	1,798,000	
333XX CONSTRUCTION MANAGEMENT (S&A)							
333XX.01 CONSTRUCTION MANAGEMENT (S&A)		8,329,000	416,000	638,000	1,408,000	10,791,000	
TOTAL CONSTRUCTION MANAGEMENT (S&A)		8,329,000	416,000	638,000	1,408,000	10,791,000	
34XXX POST-REMEDIAL ACTION							
34XXX.20 Operation, Maint. & Monitoring							
34XXX.20.01 Final Status Surveys		8,776,000	0	2,247,000	0	11,023,000	
34XXX.20.02 Monitoring		686,000	0	176,000	0	862,000	
34XXX.20.03 Five Year Review		40,000	0	10,000	0	50,000	
34XXX.20.04 Post Remedial Site Supervision		237,000	0	61,000	0	298,000	
TOTAL Operation, Maint. & Monitoring		9,739,000	0	2,493,000	0	12,232,000	
TOTAL POST-REMEDIAL ACTION		9,739,000	0	2,493,000	0	12,232,000	
TOTAL Revised FSPP - North County		175,515,000	9,236,000	14711000	22375000	221,837,000	

	QUANTITY	UOM	CONTRACT	DES CONT	ESCALATN	CON CONT	TOTAL COST	UNIT COST
01XXX REAL ESTATE ANALYSIS/DOCUMENTS								
01XXX. G Rights of Entry/Temporary Permit								
01XXX. G.01 Rights of Entry Aquisition			140,000	7,000	11,000	0	157,000	
01XXX. G.02 Damages			140,000	7,000	11,000	0	157,000	
TOTAL Rights of Entry/Temporary Per			279,000	14,000	21,000	0	314,000	
TOTAL REAL ESTATE ANALYSIS/DOCUMENT			279,000	14,000	21,000	0	314,000	
32XXX PROJ. MANG.& PRE-REMEDIAL ACTION								
32XXX.10 Project Management			4,164,000	208,000	319,000	0	4,691,000	
32XXX.20 Investigations (PRP)			1,388,000	69,000	106,000	0	1,564,000	
32XXX.30 Remedial Design			11,105,000	555,000	851,000	0	12,511,000	
32XXX.40 Remedial Action Contracting			1,388,000	69,000	106,000	0	1,564,000	
TOTAL PROJ. MANG.& PRE-REMEDIAL ACT			18,045,000	902,000	1,383,000	0	20,330,000	
331XX HTRW REMEDIAL ACTION (CONSTRUCT)								
331XX.01 Mobilize and Preparatory Work								
331XX.01.01 Mob Construction Equip & Fac								
331XX.01.01.05 Permits			5,000	0	0	1,000	7,000	
331XX.01.01.07 Construction Equipment			235,000	12,000	18,000	40,000	304,000	
TOTAL Mob Construction Equip & Fac			240,000	12,000	18,000	41,000	311,000	
331XX.01.03 Submittals/Implementation Plans								
331XX.01.03.04 Environmental Protection Plan	8.00	EA	22,000	1,000	2,000	4,000	28,000	3556.84
331XX.01.03.05 Sedimintation Control Plan	8.00	EA	17,000	1,000	1,000	3,000	22,000	2747.05
331XX.01.03.08 Site Safety and Health Plan	8.00	EA	39,000	2,000	3,000	7,000	51,000	6393.52
331XX.01.03.13 General Site Work Plan	8.00	EA	11,000	1,000	1,000	2,000	14,000	1812.04
331XX.01.03.14 Quality Control Plan	8.00	EA	12,000	1,000	1,000	2,000	15,000	1870.01
331XX.01.03.38 Permits	8.00	EA	8,000	0	1,000	1,000	10,000	1291.17
TOTAL Submittals/Implementation Pla			109,000	5,000	8,000	18,000	141,000	
331XX.01.04 Setup/Construct Temp Facilities								
331XX.01.04.01 Office Trailers (contractor)	8.00	EA	16,000	1,000	1,000	3,000	21,000	2582.34
331XX.01.04.02 Storage Facilities	2.00	EA	13,000	1,000	1,000	2,000	17,000	8607.79

	QUANTITY UOM	CONTRACT	DES CONT	ESCALATN	CON CONT	TOTAL COST	UNIT COST
331XX.01.04.10 Toilets	16.00 EA	2,000	0	0	0	3,000	172.16
331XX.01.04.11 Barricades		16,000	1,000	1,000	3,000	21,000	
331XX.01.04.28 Signs	16.00 EA	7,000	0	1,000	1,000	10,000	593.94
TOTAL Setup/Construct Temp Faciliti		55,000	3,000	4,000	9,000	71,000	
331XX.01.05 Construct Temporary Utilities							
331XX.01.05.02 Power Connection/Distribution		5,000	0	0	1,000	7,000	
331XX.01.05.03 Telephone/Communication Dist.		1,000	0	0	0	1,000	
331XX.01.05.04 Water Connection/Distribution		5,000	0	0	1,000	7,000	
331XX.01.05.05 Sewer Connection/Distribution		3,000	0	0	1,000	4,000	
TOTAL Construct Temporary Utilities		15,000	1,000	1,000	3,000	19,000	
TOTAL Mobilize and Preparatory Work		418,000	21,000	32,000	71,000	542,000	
331XX.02 Monitor'g,Samplng,Test &Analysis							
331XX.02.90 Environmental Monitoring		4,169,000	208,000	304,000	625,000	5,307,000	
331XX.02.91 Additional Labor & Services		8,899,000	445,000	650,000	1,335,000	11,329,000	
TOTAL Monitor'g,Samplng,Test &Analy		13,069,000	653,000	954,000	1,960,000	16,636,000	
331XX.03 Site Work							
331XX.03.03 Earthwork							
331XX.03.03.03 Backfill	348020.00 CY	433,000	22,000	32,000	65,000	551,000	1.58
331XX.03.03.04 Borrow	278416.00 CY	1,480,000	74,000	108,000	222,000	1,884,000	6.77
331XX.03.03.05 Hauling	348020.00 CY	1,779,000	89,000	130,000	267,000	2,264,000	6.51
331XX.03.03.08 Compaction	348020.00 CY	599,000	30,000	44,000	90,000	763,000	2.19
TOTAL Earthwork	278416.00 CY	4,291,000	215,000	313,000	644,000	5,462,000	19.62
331XX.03.04 Roads							
331XX.03.04.01 Bituminous Surfacing	3645.00 TON	162,000	8,000	12,000	24,000	206,000	56.48
331XX.03.04.02 Prime Coat	2604.00 GAL	4,000	0	0	1,000	5,000	2.00
331XX.03.04.05 Base Course	3720.00 TON	48,000	2,000	4,000	7,000	62,000	16.53
331XX.03.04.06 Geotextile Fabric	9300.00 SY	26,000	1,000	2,000	4,000	33,000	3.60
331XX.03.04.11 Striping	12210.00 LF	3,000	0	0	0	4,000	0.33
331XX.03.04.90 Pavement Removal	9300.00 SY	107,000	5,000	8,000	16,000	136,000	14.64
331XX.03.04.91 Hauling of Pavement for Dispo	4030.00 CY	112,000	6,000	8,000	17,000	142,000	35.25
331XX.03.04.92 Traffic Control		7,000	0	1,000	1,000	9,000	
TOTAL Roads	11307.00 SY	470,000	23,000	34,000	70,000	598,000	52.87

	QUANTITY UOM	CONTRACT	DES CONT	ESCALATN	CON CONT	TOTAL COST	UNIT COST
331XX.03.90 Railroads							
331XX.03.90. 5 Railroad Track Removal		121,000	6,000	9,000	18,000	154,000	
331XX.03.90.10 Railroad Track Reinstallation		117,000	6,000	9,000	18,000	149,000	
TOTAL Railroads	2900.00 LF	238,000	12,000	17,000	36,000	303,000	104.52
331XX.03.91 Sheetpile Shoring	18265.00 SF	199,000	10,000	15,000	30,000	253,000	13.84
331XX.03.92 Additional Labor & Services							
331XX.03.92.15 Backfill		661,000	33,000	48,000	99,000	841,000	
TOTAL Additional Labor & Services		661,000	33,000	48,000	99,000	841,000	
331XX.03.93 Misc. Utility Relocations		332,000	17,000	24,000	50,000	423,000	
TOTAL Site Work		6,190,000	309,000	452,000	928,000	7,880,000	
331XX.05 Surface Water Collect & Control							
331XX.05.92 Additional Labor & Services							
331XX.05.92. 5 Water Management		1,167,000	58,000	89,000	197,000	1,512,000	
331XX.05.92.10 Water Treatment		2,241,000	112,000	172,000	379,000	2,903,000	
TOTAL Additional Labor & Services		3,408,000	170,000	261,000	576,000	4,415,000	
TOTAL Surface Water Collect & Contr		3,408,000	170,000	261,000	576,000	4,415,000	
331XX.08 Solids Collect and Containment							
331XX.08.01 Contaminated Soil Collection							
331XX.08.01.02 Excavation	278416.00 CY	1,226,000	307,000	90,000	184,000	1,807,000	6.49
331XX.08.01.03 Hauling	348020.00 CY	889,000	222,000	65,000	133,000	1,310,000	3.76
331XX.08.01.90 Additional Labor & Services		2,621,000	655,000	191,000	393,000	3,860,000	
TOTAL Contaminated Soil Collection	278416.00 CY	4,736,000	1,184,000	346,000	710,000	6,977,000	25.06
TOTAL Solids Collect and Containmen		4,736,000	1,184,000	346,000	710,000	6,977,000	
331XX.19 Disposal (Commercial)							
331XX.19.21 Transport to Storage/Disp Facil							
331XX.19.21.01 Loading of Solids	348020.00 CY	6,027,000	301,000	440,000	904,000	7,673,000	22.05

	QUANTITY UOM	CONTRACT	DES CONT	ESCALATN	CON CONT	TOTAL COST	UNIT COST
331XX.19.21.90 Transportation Costs	348020.00 CY	39,602,000	1,980,000	2,891,000	5,940,000	50,413,000	144.86
TOTAL Transport to Storage/Disp Fac	348020.00 CY	45,629,000	2,281,000	3,331,000	6,844,000	58,086,000	166.90
331XX.19.22 Disposal Fees and Taxes							
331XX.19.22.01 Landfill/Burial Grounds	348020.00 CY	46,936,000	2,347,000	3,426,000	7,040,000	59,749,000	171.68
TOTAL Disposal Fees and Taxes	348020.00 CY	46,936,000	2,347,000	3,426,000	7,040,000	59,749,000	171.68
331XX.19.90 Transportation and Disposal of							
331XX.19.90.01 VP-1L (Wagner Brake)		5,613,000	281,000	410,000	842,000	7,145,000	
331XX.19.90.02 VP-2L (GIFREHC)		3,986,000	199,000	291,000	598,000	5,074,000	
331XX.19.90.03 VP-3L		3,266,000	163,000	238,000	490,000	4,158,000	
331XX.19.90.04 VP-4L		1,829,000	91,000	133,000	274,000	2,328,000	
331XX.19.90.05 VP-5L		2,033,000	102,000	148,000	305,000	2,588,000	
TOTAL Transportation and Disposal o		16,727,000	836,000	1,221,000	2,509,000	21,293,000	
TOTAL Disposal (Commercial)		109,292,000	5,465,000	7,978,000	16394000	139,128,000	
331XX.20 Site Restoration							
331XX.20.01 Earthwork							
331XX.20.01.07 Grading	65.00 ACR	55,000	3,000	4,000	8,000	69,000	1068.11
TOTAL Earthwork		55,000	3,000	4,000	8,000	69,000	
331XX.20.04 Revegetation And Planting							
331XX.20.04.01 Seeding/Mulch/Fertilizer	65.00 ACR	87,000	4,000	6,000	13,000	110,000	1699.55
331XX.20.04.02 Miscelaneous Landscaping	65.00 ACR	43,000	2,000	3,000	6,000	55,000	845.73
TOTAL Revegetation And Planting		130,000	6,000	9,000	19,000	165,000	
331XX.20.92 Site Cleanup		30,000	1,000	2,000	4,000	38,000	
TOTAL Site Restoration		214,000	11,000	16,000	32,000	273,000	
331XX.21 Demobilization							
331XX.21.01 Removal Of Temporary Facilities							
331XX.21.01.01 Office Trailers (contr.'s onl	8.00 EA	8,000	0	1,000	1,000	10,000	1268.60

	QUANTITY UOM	CONTRACT	DES CONT	ESCALATN	CON CONT	TOTAL COST	UNIT COST
331XX.21.01.02 Storage Facilities	2.00 EA	7,000	0	0	1,000	8,000	4228.66
331XX.21.01.05 Decon. Fac. for Const. Equip		20,000	1,000	1,000	3,000	25,000	
331XX.21.01.10 Toilets	16.00 EA	2,000	0	0	0	3,000	169.15
331XX.21.01.11 Barricades		16,000	1,000	1,000	2,000	20,000	
331XX.21.01.28 Signs	16.00 EA	2,000	0	0	0	3,000	169.15
TOTAL Removal Of Temporary Faciliti		55,000	3,000	4,000	8,000	70,000	
331XX.21.02 Removal Of Temporary Utilities							
331XX.21.02.02 Power Connection/Distribution		5,000	0	0	1,000	7,000	
331XX.21.02.03 Telephone/Communication Dist.		1,000	0	0	0	1,000	
331XX.21.02.04 Water Connection/Distribution		5,000	0	0	1,000	7,000	
331XX.21.02.05 Sewer Connection/Distribution		3,000	0	0	0	4,000	
TOTAL Removal Of Temporary Utilitie		14,000	1,000	1,000	2,000	18,000	
331XX.21.04 Demob of Construction Equip/Facl							
331XX.21.04.05 Permits		5,000	0	0	1,000	7,000	
331XX.21.04.07 Demob. of Construction Equipm		142,000	7,000	10,000	21,000	181,000	
331XX.21.04.90 Decon. of Construction Equipm		171,000	9,000	12,000	26,000	218,000	
TOTAL Demob of Construction Equip/F		318,000	16,000	23,000	48,000	405,000	
331XX.21.06 Submittals							
331XX.21.06.03 Project Acceptance	8.00 EA	20,000	1,000	1,000	3,000	25,000	3146.37
TOTAL Submittals		20,000	1,000	1,000	3,000	25,000	
TOTAL Demobilization		407,000	20,000	30,000	61,000	518,000	
TOTAL HTRW REMEDIAL ACTION (CONSTRU		137,735,000	7,834,000	10069000	20733000	176,370,000	
332XX ENGINEERING DURING CONSTRUCTION							
332XX.01 Engineering During Construction		1,388,000	69,000	106,000	235,000	1,798,000	
TOTAL ENGINEERING DURING CONSTRUCTI		1,388,000	69,000	106,000	235,000	1,798,000	
333XX CONSTRUCTION MANAGEMENT (S&A)							
333XX.01 CONSTRUCTION MANAGEMENT (S&A)		8,329,000	416,000	638,000	1,408,000	10,791,000	
TOTAL CONSTRUCTION MANAGEMENT (S&A)		8,329,000	416,000	638,000	1,408,000	10,791,000	

** PROJECT OWNER SUMMARY - ASSY CAT (Rounded to 1000's) **

	QUANTITY UOM	CONTRACT	DES CONT	ESCALATN	CON CONT	TOTAL COST	UNIT COST
34XXX POST-REMEDIAL ACTION							
34XXX.20 Operation, Maint. & Monitoring							
34XXX.20.01 Final Status Surveys							
34XXX.20.01. 5 North County Properties		3,563,000	0	912,000	0	4,475,000	
34XXX.20.01.10 Coldwater Creek		3,590,000	0	919,000	0	4,510,000	
34XXX.20.01.15 North County Buildings		963,000	0	247,000	0	1,209,000	
34XXX.20.01.20 Roads		660,000	0	169,000	0	829,000	
TOTAL Final Status Surveys		8,776,000	0	2,247,000	0	11,023,000	
34XXX.20.02 Monitoring		686,000	0	176,000	0	862,000	
34XXX.20.03 Five Year Review		40,000	0	10,000	0	50,000	
34XXX.20.04 Post Remedial Site Supervision		237,000	0	61,000	0	298,000	
TOTAL Operation, Maint. & Monitorin		9,739,000	0	2,493,000	0	12,232,000	
TOTAL POST-REMEDIAL ACTION		9,739,000	0	2,493,000	0	12,232,000	
TOTAL Revised FSPP - North County		175,515,000	9,236,000	14711000	22375000	221,837,000	

** PROJECT INDIRECT SUMMARY - ACCOUNT (Rounded to 1000's) **

	QUANTITY UOM	DIRECT	FIELD OF	G&A	FEE	TOTAL COST	UNIT COST
01XXX REAL ESTATE ANALYSIS/DOCUMENTS		279,000	0	0	0	279,000	
32XXX PROJ. MANG.& PRE-REMEDIAL ACTION		18,045,000	0	0	0	18,045,000	
331XX HTRW REMEDIAL ACTION (CONSTRUCT)		103,659,000	12157000	11929000	9,990,000	137,735,000	
332XX ENGINEERING DURING CONSTRUCTION		1,388,000	0	0	0	1,388,000	
333XX CONSTRUCTION MANAGEMENT (S&A)		8,329,000	0	0	0	8,329,000	
34XXX POST-REMEDIAL ACTION		9,739,000	0	0	0	9,739,000	
TOTAL Revised FSPP - North County		141,440,000	12157000	11929000	9,990,000	175,515,000	
Design Contingencies						9,236,000	
SUBTOTAL						184,751,000	
Escalation to Const. Midpoint						14,711,000	
SUBTOTAL						199,462,000	
Construction Contingencies						22,375,000	
TOTAL INCL OWNER COSTS						221,837,000	

** PROJECT INDIRECT SUMMARY - SYSTEM (Rounded to 1000's) **

	QUANTITY UOM	DIRECT	FIELD OF	G&A	FEE	TOTAL COST	UNIT COST
01XXX REAL ESTATE ANALYSIS/DOCUMENTS							
01XXX. G Rights of Entry/Temporary Permit		279,000	0	0	0	279,000	
TOTAL REAL ESTATE ANALYSIS/DOCUMENTS		279,000	0	0	0	279,000	
32XXX PROJ. MANG.& PRE-REMEDIAL ACTION							
32XXX.10 Project Management		4,164,000	0	0	0	4,164,000	
32XXX.20 Investigations (PRP)		1,388,000	0	0	0	1,388,000	
32XXX.30 Remedial Design		11,105,000	0	0	0	11,105,000	
32XXX.40 Remedial Action Contracting		1,388,000	0	0	0	1,388,000	
TOTAL PROJ. MANG.& PRE-REMEDIAL ACTION		18,045,000	0	0	0	18,045,000	
331XX HTRW REMEDIAL ACTION (CONSTRUCT)							
331XX.01 Mobilize and Preparatory Work		315,000	37,000	36,000	30,000	418,000	
331XX.02 Monitor'g,Samplng,Test &Analysis		9,836,000	1,153,000	1,132,000	948,000	13,069,000	
331XX.03 Site Work		4,659,000	546,000	536,000	449,000	6,190,000	
331XX.05 Surface Water Collect & Control		2,565,000	301,000	295,000	247,000	3,408,000	
331XX.08 Solids Collect and Containment		3,565,000	418,000	410,000	344,000	4,736,000	
331XX.19 Disposal (Commercial)		82,253,000	9,646,000	9,466,000	7,927,000	109,292,000	
331XX.20 Site Restoration		161,000	19,000	19,000	16,000	214,000	
331XX.21 Demobilization		306,000	36,000	35,000	30,000	407,000	
TOTAL HTRW REMEDIAL ACTION (CONSTRUCT)		103,659,000	12157000	11929000	9,990,000	137,735,000	
332XX ENGINEERING DURING CONSTRUCTION							
332XX.01 Engineering During Construction		1,388,000	0	0	0	1,388,000	
TOTAL ENGINEERING DURING CONSTRUCTION		1,388,000	0	0	0	1,388,000	
333XX CONSTRUCTION MANAGEMENT (S&A)							
333XX.01 CONSTRUCTION MANAGEMENT (S&A)		8,329,000	0	0	0	8,329,000	
TOTAL CONSTRUCTION MANAGEMENT (S&A)		8,329,000	0	0	0	8,329,000	
34XXX POST-REMEDIAL ACTION							
34XXX.20 Operation, Maint. & Monitoring		9,739,000	0	0	0	9,739,000	

** PROJECT INDIRECT SUMMARY - SYSTEM (Rounded to 1000's) **

	QUANTITY UOM	DIRECT	FIELD OF	G&A	FEE	TOTAL COST	UNIT COST
TOTAL POST-REMEDIAL ACTION		9,739,000	0	0	0	9,739,000	
TOTAL Revised FSPP - North County		141,440,000	12157000	11929000	9,990,000	175,515,000	
Design Contingencies						9,236,000	
SUBTOTAL						184,751,000	
Escalation to Const. Midpoint						14,711,000	
SUBTOTAL						199,462,000	
Construction Contingencies						22,375,000	
TOTAL INCL OWNER COSTS						221,837,000	

** PROJECT INDIRECT SUMMARY - SUBSYSTM (Rounded to 1000's) **

	QUANTITY	UOM	DIRECT	FIELD OF	G&A	FEE	TOTAL COST	UNIT COST
01XXX REAL ESTATE ANALYSIS/DOCUMENTS								
01XXX. G Rights of Entry/Temporary Permit								
01XXX. G.01 Rights of Entry Aquisition			140,000	0	0	0	140,000	
01XXX. G.02 Damages			140,000	0	0	0	140,000	
TOTAL Rights of Entry/Temporary Permit			279,000	0	0	0	279,000	
TOTAL REAL ESTATE ANALYSIS/DOCUMENTS			279,000	0	0	0	279,000	
32XXX PROJ. MANG.& PRE-REMEDIAL ACTION								
32XXX.10 Project Management			4,164,000	0	0	0	4,164,000	
32XXX.20 Investigations (PRP)			1,388,000	0	0	0	1,388,000	
32XXX.30 Remedial Design			11,105,000	0	0	0	11,105,000	
32XXX.40 Remedial Action Contracting			1,388,000	0	0	0	1,388,000	
TOTAL PROJ. MANG.& PRE-REMEDIAL ACTION			18,045,000	0	0	0	18,045,000	
331XX HTRW REMEDIAL ACTION (CONSTRUCT)								
331XX.01 Mobilize and Preparatory Work								
331XX.01.01 Mob Construction Equip & Fac			181,000	21,000	21,000	17,000	240,000	
331XX.01.03 Submittals/Implementation Plans			82,000	10,000	9,000	8,000	109,000	
331XX.01.04 Setup/Construct Temp Facilities			41,000	5,000	5,000	4,000	55,000	
331XX.01.05 Construct Temporary Utilities			11,000	1,000	1,000	1,000	15,000	
TOTAL Mobilize and Preparatory Work			315,000	37,000	36,000	30,000	418,000	
331XX.02 Monitor'g,Samplng,Test &Analysis								
331XX.02.90 Environmental Monitoring			3,138,000	368,000	361,000	302,000	4,169,000	
331XX.02.91 Additional Labor & Services			6,698,000	785,000	771,000	645,000	8,899,000	
TOTAL Monitor'g,Samplng,Test &Analysis			9,836,000	1,153,000	1,132,000	948,000	13,069,000	
331XX.03 Site Work								
331XX.03.03 Earthwork	278416.00	CY	3,229,000	379,000	372,000	311,000	4,291,000	15.41
331XX.03.04 Roads	11307.00	SY	353,000	41,000	41,000	34,000	470,000	41.53
331XX.03.90 Railroads	2900.00	LF	179,000	21,000	21,000	17,000	238,000	82.10
331XX.03.91 Sheetpile Shoring	18265.00	SF	149,000	18,000	17,000	14,000	199,000	10.88
331XX.03.92 Additional Labor & Services			497,000	58,000	57,000	48,000	661,000	

	QUANTITY UOM	DIRECT	FIELD OF	G&A	FEE	TOTAL COST	UNIT COST
331XX.03.93 Misc. Utility Relocations		250,000	29,000	29,000	24,000	332,000	
TOTAL Site Work		4,659,000	546,000	536,000	449,000	6,190,000	
331XX.05 Surface Water Collect & Control							
331XX.05.92 Additional Labor & Services		2,565,000	301,000	295,000	247,000	3,408,000	
TOTAL Surface Water Collect & Control		2,565,000	301,000	295,000	247,000	3,408,000	
331XX.08 Solids Collect and Containment							
331XX.08.01 Contaminated Soil Collection	278416.00 CY	3,565,000	418,000	410,000	344,000	4,736,000	17.01
TOTAL Solids Collect and Containment		3,565,000	418,000	410,000	344,000	4,736,000	
331XX.19 Disposal (Commercial)							
331XX.19.21 Transport to Storage/Disp Facil	348020.00 CY	34,340,000	4,027,000	3,952,000	3,309,000	45,629,000	131.11
331XX.19.22 Disposal Fees and Taxes	348020.00 CY	35,324,000	4,143,000	4,065,000	3,404,000	46,936,000	134.87
331XX.19.90 Transportation and Disposal of		12,589,000	1,476,000	1,449,000	1,213,000	16,727,000	
TOTAL Disposal (Commercial)		82,253,000	9,646,000	9,466,000	7,927,000	109,292,000	
331XX.20 Site Restoration							
331XX.20.01 Earthwork		41,000	5,000	5,000	4,000	55,000	
331XX.20.04 Revegetation And Planting		98,000	11,000	11,000	9,000	130,000	
331XX.20.92 Site Cleanup		23,000	3,000	3,000	2,000	30,000	
TOTAL Site Restoration		161,000	19,000	19,000	16,000	214,000	
331XX.21 Demobilization							
331XX.21.01 Removal Of Temporary Facilities		41,000	5,000	5,000	4,000	55,000	
331XX.21.02 Removal Of Temporary Utilities		11,000	1,000	1,000	1,000	14,000	
331XX.21.04 Demob of Construction Equip/Facl		239,000	28,000	28,000	23,000	318,000	
331XX.21.06 Submittals		15,000	2,000	2,000	1,000	20,000	
TOTAL Demobilization		306,000	36,000	35,000	30,000	407,000	
TOTAL HTRW REMEDIAL ACTION (CONSTRUCT)		103,659,000	12157000	11929000	9,990,000	137,735,000	

332XX ENGINEERING DURING CONSTRUCTION

** PROJECT INDIRECT SUMMARY - SUBSYSTM (Rounded to 1000's) **

	QUANTITY UOM	DIRECT	FIELD OF	G&A	FEE	TOTAL COST	UNIT COST
332XX.01 Engineering During Construction		1,388,000	0	0	0	1,388,000	
TOTAL ENGINEERING DURING CONSTRUCTION		1,388,000	0	0	0	1,388,000	
333XX CONSTRUCTION MANAGEMENT (S&A)							
333XX.01 CONSTRUCTION MANAGEMENT (S&A)		8,329,000	0	0	0	8,329,000	
TOTAL CONSTRUCTION MANAGEMENT (S&A)		8,329,000	0	0	0	8,329,000	
34XXX POST-REMEDIAL ACTION							
34XXX.20 Operation, Maint. & Monitoring							
34XXX.20.01 Final Status Surveys		8,776,000	0	0	0	8,776,000	
34XXX.20.02 Monitoring		686,000	0	0	0	686,000	
34XXX.20.03 Five Year Review		40,000	0	0	0	40,000	
34XXX.20.04 Post Remedial Site Supervision		237,000	0	0	0	237,000	
TOTAL Operation, Maint. & Monitoring		9,739,000	0	0	0	9,739,000	
TOTAL POST-REMEDIAL ACTION		9,739,000	0	0	0	9,739,000	
TOTAL Revised FSPP - North County		141,440,000	12157000	11929000	9,990,000	175,515,000	
Design Contingencies						9,236,000	
SUBTOTAL						184,751,000	
Escalation to Const. Midpoint						14,711,000	
SUBTOTAL						199,462,000	
Construction Contingencies						22,375,000	
TOTAL INCL OWNER COSTS						221,837,000	

	QUANTITY	UOM	DIRECT	FIELD OF	G&A	FEE	TOTAL COST	UNIT COST
01XXX REAL ESTATE ANALYSIS/DOCUMENTS								
01XXX. G Rights of Entry/Temporary Permit								
01XXX. G.01 Rights of Entry Aquisition			140,000	0	0	0	140,000	
01XXX. G.02 Damages			140,000	0	0	0	140,000	
TOTAL Rights of Entry/Temporary Per			279,000	0	0	0	279,000	
TOTAL REAL ESTATE ANALYSIS/DOCUMENT			279,000	0	0	0	279,000	
32XXX PROJ. MANG.& PRE-REMEDIAL ACTION								
32XXX.10 Project Management			4,164,000	0	0	0	4,164,000	
32XXX.20 Investigations (PRP)			1,388,000	0	0	0	1,388,000	
32XXX.30 Remedial Design			11,105,000	0	0	0	11,105,000	
32XXX.40 Remedial Action Contracting			1,388,000	0	0	0	1,388,000	
TOTAL PROJ. MANG.& PRE-REMEDIAL ACT			18,045,000	0	0	0	18,045,000	
331XX HTRW REMEDIAL ACTION (CONSTRUCT)								
331XX.01 Mobilize and Preparatory Work								
331XX.01.01 Mob Construction Equip & Fac								
331XX.01.01.05 Permits			4,000	0	0	0	5,000	
331XX.01.01.07 Construction Equipment			177,000	21,000	20,000	17,000	235,000	
TOTAL Mob Construction Equip & Fac			181,000	21,000	21,000	17,000	240,000	
331XX.01.03 Submittals/Implementation Plans								
331XX.01.03.04 Environmental Protection Plan	8.00	EA	17,000	2,000	2,000	2,000	22,000	2745.22
331XX.01.03.05 Sedimintation Control Plan	8.00	EA	13,000	1,000	1,000	1,000	17,000	2120.21
331XX.01.03.08 Site Safety and Health Plan	8.00	EA	30,000	3,000	3,000	3,000	39,000	4934.61
331XX.01.03.13 General Site Work Plan	8.00	EA	8,000	1,000	1,000	1,000	11,000	1398.56
331XX.01.03.14 Quality Control Plan	8.00	EA	9,000	1,000	1,000	1,000	12,000	1443.30
331XX.01.03.38 Permits	8.00	EA	6,000	1,000	1,000	1,000	8,000	996.54
TOTAL Submittals/Implementation Pla			82,000	10,000	9,000	8,000	109,000	
331XX.01.04 Setup/Construct Temp Facilities								
331XX.01.04.01 Office Trailers (contractor)	8.00	EA	12,000	1,000	1,000	1,000	16,000	1993.09
331XX.01.04.02 Storage Facilities	2.00	EA	10,000	1,000	1,000	1,000	13,000	6643.62

	QUANTITY	UOM	DIRECT	FIELD OF	G&A	FEE	TOTAL COST	UNIT COST
331XX.01.04.10 Toilets	16.00	EA	2,000	0	0	0	2,000	132.87
331XX.01.04.11 Barricades			12,000	1,000	1,000	1,000	16,000	
331XX.01.04.28 Signs	16.00	EA	6,000	1,000	1,000	1,000	7,000	458.41
TOTAL Setup/Construct Temp Faciliti			41,000	5,000	5,000	4,000	55,000	
331XX.01.05 Construct Temporary Utilities								
331XX.01.05.02 Power Connection/Distribution			4,000	0	0	0	5,000	
331XX.01.05.03 Telephone/Communication Dist.			1,000	0	0	0	1,000	
331XX.01.05.04 Water Connection/Distribution			4,000	0	0	0	5,000	
331XX.01.05.05 Sewer Connection/Distribution			2,000	0	0	0	3,000	
TOTAL Construct Temporary Utilities			11,000	1,000	1,000	1,000	15,000	
TOTAL Mobilize and Preparatory Work			315,000	37,000	36,000	30,000	418,000	
331XX.02 Monitor'g,Samplng,Test &Analysis								
331XX.02.90 Environmental Monitoring			3,138,000	368,000	361,000	302,000	4,169,000	
331XX.02.91 Additional Labor & Services			6,698,000	785,000	771,000	645,000	8,899,000	
TOTAL Monitor'g,Samplng,Test &Analy			9,836,000	1,153,000	1,132,000	948,000	13,069,000	
331XX.03 Site Work								
331XX.03.03 Earthwork								
331XX.03.03.03 Backfill	348020.00	CY	326,000	38,000	37,000	31,000	433,000	1.24
331XX.03.03.04 Borrow	278416.00	CY	1,114,000	131,000	128,000	107,000	1,480,000	5.31
331XX.03.03.05 Hauling	348020.00	CY	1,339,000	157,000	154,000	129,000	1,779,000	5.11
331XX.03.03.08 Compaction	348020.00	CY	451,000	53,000	52,000	43,000	599,000	1.72
TOTAL Earthwork	278416.00	CY	3,229,000	379,000	372,000	311,000	4,291,000	15.41
331XX.03.04 Roads								
331XX.03.04.01 Bituminous Surfacing	3645.00	TON	122,000	14,000	14,000	12,000	162,000	44.37
331XX.03.04.02 Prime Coat	2604.00	GAL	3,000	0	0	0	4,000	1.57
331XX.03.04.05 Base Course	3720.00	TON	36,000	4,000	4,000	4,000	48,000	12.99
331XX.03.04.06 Geotextile Fabric	9300.00	SY	20,000	2,000	2,000	2,000	26,000	2.83
331XX.03.04.11 Striping	12210.00	LF	2,000	0	0	0	3,000	0.26
331XX.03.04.90 Pavement Removal	9300.00	SY	81,000	9,000	9,000	8,000	107,000	11.50
331XX.03.04.91 Hauling of Pavement for Dispo	4030.00	CY	84,000	10,000	10,000	8,000	112,000	27.69
331XX.03.04.92 Traffic Control			6,000	1,000	1,000	1,000	7,000	
TOTAL Roads	11307.00	SY	353,000	41,000	41,000	34,000	470,000	41.53

** PROJECT INDIRECT SUMMARY - ASSY CAT (Rounded to 1000's) **

	QUANTITY UOM	DIRECT	FIELD OF	G&A	FEE	TOTAL COST	UNIT COST
331XX.03.90 Railroads							
331XX.03.90. 5 Railroad Track Removal		91,000	11,000	10,000	9,000	121,000	
331XX.03.90.10 Railroad Track Reinstallation		88,000	10,000	10,000	8,000	117,000	
TOTAL Railroads	2900.00 LF	179,000	21,000	21,000	17,000	238,000	82.10
331XX.03.91 Sheetpile Shoring	18265.00 SF	149,000	18,000	17,000	14,000	199,000	10.88
331XX.03.92 Additional Labor & Services							
331XX.03.92.15 Backfill		497,000	58,000	57,000	48,000	661,000	
TOTAL Additional Labor & Services		497,000	58,000	57,000	48,000	661,000	
331XX.03.93 Misc. Utility Relocations		250,000	29,000	29,000	24,000	332,000	
TOTAL Site Work		4,659,000	546,000	536,000	449,000	6,190,000	
331XX.05 Surface Water Collect & Control							
331XX.05.92 Additional Labor & Services							
331XX.05.92. 5 Water Management		879,000	103,000	101,000	85,000	1,167,000	
331XX.05.92.10 Water Treatment		1,686,000	198,000	194,000	163,000	2,241,000	
TOTAL Additional Labor & Services		2,565,000	301,000	295,000	247,000	3,408,000	
TOTAL Surface Water Collect & Contr		2,565,000	301,000	295,000	247,000	3,408,000	
331XX.08 Solids Collect and Containment							
331XX.08.01 Contaminated Soil Collection							
331XX.08.01.02 Excavation	278416.00 CY	923,000	108,000	106,000	89,000	1,226,000	4.40
331XX.08.01.03 Hauling	348020.00 CY	669,000	79,000	77,000	65,000	889,000	2.56
331XX.08.01.90 Additional Labor & Services		1,972,000	231,000	227,000	190,000	2,621,000	
TOTAL Contaminated Soil Collection	278416.00 CY	3,565,000	418,000	410,000	344,000	4,736,000	17.01
TOTAL Solids Collect and Containmen		3,565,000	418,000	410,000	344,000	4,736,000	
331XX.19 Disposal (Commercial)							
331XX.19.21 Transport to Storage/Disp Facil							
331XX.19.21.01 Loading of Solids	348020.00 CY	4,536,000	532,000	522,000	437,000	6,027,000	17.32

** PROJECT INDIRECT SUMMARY - ASSY CAT (Rounded to 1000's) **

	QUANTITY	UOM	DIRECT	FIELD OF	G&A	FEE	TOTAL COST	UNIT COST
331XX.19.21.90 Transportation Costs	348020.00	CY	29,804,000	3,495,000	3,430,000	2,872,000	39,602,000	113.79
TOTAL Transport to Storage/Disp Fac	348020.00	CY	34,340,000	4,027,000	3,952,000	3,309,000	45,629,000	131.11
331XX.19.22 Disposal Fees and Taxes								
331XX.19.22.01 Landfill/Burial Grounds	348020.00	CY	35,324,000	4,143,000	4,065,000	3,404,000	46,936,000	134.87
TOTAL Disposal Fees and Taxes	348020.00	CY	35,324,000	4,143,000	4,065,000	3,404,000	46,936,000	134.87
331XX.19.90 Transportation and Disposal of								
331XX.19.90.01 VP-1L (Wagner Brake)			4,224,000	495,000	486,000	407,000	5,613,000	
331XX.19.90.02 VP-2L (GIFREHC)			3,000,000	352,000	345,000	289,000	3,986,000	
331XX.19.90.03 VP-3L			2,458,000	288,000	283,000	237,000	3,266,000	
331XX.19.90.04 VP-4L			1,376,000	161,000	158,000	133,000	1,829,000	
331XX.19.90.05 VP-5L			1,530,000	179,000	176,000	147,000	2,033,000	
TOTAL Transportation and Disposal o			12,589,000	1,476,000	1,449,000	1,213,000	16,727,000	
TOTAL Disposal (Commercial)			82,253,000	9,646,000	9,466,000	7,927,000	109,292,000	
331XX.20 Site Restoration								
331XX.20.01 Earthwork								
331XX.20.01.07 Grading	65.00	ACR	41,000	5,000	5,000	4,000	55,000	839.05
TOTAL Earthwork			41,000	5,000	5,000	4,000	55,000	
331XX.20.04 Revegetation And Planting								
331XX.20.04.01 Seeding/Mulch/Fertilizer	65.00	ACR	65,000	8,000	8,000	6,000	87,000	1335.07
331XX.20.04.02 Miscelaneous Landscaping	65.00	ACR	33,000	4,000	4,000	3,000	43,000	664.36
TOTAL Revegetation And Planting			98,000	11,000	11,000	9,000	130,000	
331XX.20.92 Site Cleanup			23,000	3,000	3,000	2,000	30,000	
TOTAL Site Restoration			161,000	19,000	19,000	16,000	214,000	
331XX.21 Demobilization								
331XX.21.01 Removal Of Temporary Facilities								
331XX.21.01.01 Office Trailers (contr.'s onl	8.00	EA	6,000	1,000	1,000	1,000	8,000	996.54

** PROJECT INDIRECT SUMMARY - ASSY CAT (Rounded to 1000's) **

	QUANTITY	UOM	DIRECT	FIELD OF	G&A	FEE	TOTAL COST	UNIT COST
331XX.21.01.02 Storage Facilities	2.00	EA	5,000	1,000	1,000	0	7,000	3321.81
331XX.21.01.05 Decon. Fac. for Const. Equip			15,000	2,000	2,000	1,000	20,000	
331XX.21.01.10 Toilets	16.00	EA	2,000	0	0	0	2,000	132.87
331XX.21.01.11 Barricades			12,000	1,000	1,000	1,000	16,000	
331XX.21.01.28 Signs	16.00	EA	2,000	0	0	0	2,000	132.87
TOTAL Removal Of Temporary Faciliti			41,000	5,000	5,000	4,000	55,000	
331XX.21.02 Removal Of Temporary Utilities								
331XX.21.02.02 Power Connection/Distribution			4,000	0	0	0	5,000	
331XX.21.02.03 Telephone/Communication Dist.			0	0	0	0	1,000	
331XX.21.02.04 Water Connection/Distribution			4,000	0	0	0	5,000	
331XX.21.02.05 Sewer Connection/Distribution			2,000	0	0	0	3,000	
TOTAL Removal Of Temporary Utilitie			11,000	1,000	1,000	1,000	14,000	
331XX.21.04 Demob of Construction Equip/Facl								
331XX.21.04.05 Permits			4,000	0	0	0	5,000	
331XX.21.04.07 Demob. of Construction Equipm			107,000	13,000	12,000	10,000	142,000	
331XX.21.04.90 Decon. of Construction Equipm			129,000	15,000	15,000	12,000	171,000	
TOTAL Demob of Construction Equip/F			239,000	28,000	28,000	23,000	318,000	
331XX.21.06 Submittals								
331XX.21.06.03 Project Acceptance	8.00	EA	15,000	2,000	2,000	1,000	20,000	2471.62
TOTAL Submittals			15,000	2,000	2,000	1,000	20,000	
TOTAL Demobilization			306,000	36,000	35,000	30,000	407,000	
TOTAL HTRW REMEDIAL ACTION (CONSTRU			103,659,000	12157000	11929000	9,990,000	137,735,000	
332XX ENGINEERING DURING CONSTRUCTION								
332XX.01 Engineering During Construction			1,388,000	0	0	0	1,388,000	
TOTAL ENGINEERING DURING CONSTRUCTI			1,388,000	0	0	0	1,388,000	
333XX CONSTRUCTION MANAGEMENT (S&A)								
333XX.01 CONSTRUCTION MANAGEMENT (S&A)			8,329,000	0	0	0	8,329,000	
TOTAL CONSTRUCTION MANAGEMENT (S&A)			8,329,000	0	0	0	8,329,000	

** PROJECT INDIRECT SUMMARY - ASSY CAT (Rounded to 1000's) **

	QUANTITY UOM	DIRECT	FIELD OF	G&A	FEE	TOTAL COST	UNIT COST
34XXX POST-REMEDIAL ACTION							
34XXX.20 Operation, Maint. & Monitoring							
34XXX.20.01 Final Status Surveys							
34XXX.20.01. 5 North County Properties		3,563,000	0	0	0	3,563,000	
34XXX.20.01.10 Coldwater Creek		3,590,000	0	0	0	3,590,000	
34XXX.20.01.15 North County Buildings		963,000	0	0	0	963,000	
34XXX.20.01.20 Roads		660,000	0	0	0	660,000	
TOTAL Final Status Surveys		8,776,000	0	0	0	8,776,000	
34XXX.20.02 Monitoring		686,000	0	0	0	686,000	
34XXX.20.03 Five Year Review		40,000	0	0	0	40,000	
34XXX.20.04 Post Remedial Site Supervision		237,000	0	0	0	237,000	
TOTAL Operation, Maint. & Monitorin		9,739,000	0	0	0	9,739,000	
TOTAL POST-REMEDIAL ACTION		9,739,000	0	0	0	9,739,000	
TOTAL Revised FSPP - North County		141,440,000	12157000	11929000	9,990,000	175,515,000	
Design Contingencies						9,236,000	
SUBTOTAL						184,751,000	
Escalation to Const. Midpoint						14,711,000	
SUBTOTAL						199,462,000	
Construction Contingencies						22,375,000	
TOTAL INCL OWNER COSTS						221,837,000	

** PROJECT DIRECT SUMMARY - ACCOUNT (Rounded to 1000's) **

	QUANTITY	UOM	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
01XXX REAL ESTATE ANALYSIS/DOCUMENTS			0	0	0	0	279,000	279,000	
32XXX PROJ. MANG.& PRE-REMEDIAL ACTION			0	0	0	0	18045000	18,045,000	
331XX HTRW REMEDIAL ACTION (CONSTRUCT)			108,000	7,348,000	2,894,000	3,561,000	89857000	103,659,000	
332XX ENGINEERING DURING CONSTRUCTION			0	0	0	0	1,388,000	1,388,000	
333XX CONSTRUCTION MANAGEMENT (S&A)			0	0	0	0	8,329,000	8,329,000	
34XXX POST-REMEDIAL ACTION			0	0	0	0	9,739,000	9,739,000	
TOTAL Revised FSPP - North County			108,000	7,348,000	2,894,000	3,561,000	127637000	141,440,000	
Field Ofc. Overhead								12,157,000	
SUBTOTAL								153,596,000	
General and Administrative Overhead								11,929,000	
SUBTOTAL								165,525,000	
Fee								9,990,000	
TOTAL INCL INDIRECTS								175,515,000	
Design Contingencies								9,236,000	
SUBTOTAL								184,751,000	
Escalation to Const. Midpoint								14,711,000	
SUBTOTAL								199,462,000	
Construction Contingencies								22,375,000	
TOTAL INCL OWNER COSTS								221,837,000	

** PROJECT DIRECT SUMMARY - SYSTEM (Rounded to 1000's) **

	QUANTITY	UOM	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
01XXX REAL ESTATE ANALYSIS/DOCUMENTS									
01XXX. G Rights of Entry/Temporary Per			0	0	0	0	279,000	279,000	
TOTAL REAL ESTATE ANALYSIS/DOCUMENT			0	0	0	0	279,000	279,000	
32XXX PROJ. MANG.& PRE-REMEDIAL ACTION									
32XXX.10 Project Management			0	0	0	0	4,164,000	4,164,000	
32XXX.20 Investigations (PRP)			0	0	0	0	1,388,000	1,388,000	
32XXX.30 Remedial Design			0	0	0	0	11105000	11,105,000	
32XXX.40 Remedial Action Contracting			0	0	0	0	1,388,000	1,388,000	
TOTAL PROJ. MANG.& PRE-REMEDIAL ACT			0	0	0	0	18045000	18,045,000	
331XX HTRW REMEDIAL ACTION (CONSTRUCT)									
331XX.01 Mobilize and Preparatory Work			4,000	166,000	87,000	0	62,000	315,000	
331XX.02 Monitor'g,Samplng,Test &Analy			0	0	0	0	9,836,000	9,836,000	
331XX.03 Site Work			34,000	1,452,000	1,121,000	1,401,000	685,000	4,659,000	
331XX.05 Surface Water Collect & Contr			0	1,484,000	0	65,000	1,016,000	2,565,000	
331XX.08 Solids Collect and Containmen			18,000	2,212,000	900,000	0	453,000	3,565,000	
331XX.19 Disposal (Commercial)			46,000	1,845,000	646,000	2,045,000	77717000	82,253,000	
331XX.20 Site Restoration			1,000	52,000	26,000	50,000	33,000	161,000	
331XX.21 Demobilization			4,000	137,000	114,000	0	56,000	306,000	
TOTAL HTRW REMEDIAL ACTION (CONSTRU			108,000	7,348,000	2,894,000	3,561,000	89857000	103,659,000	
332XX ENGINEERING DURING CONSTRUCTION									
332XX.01 Engineering During Constructi			0	0	0	0	1,388,000	1,388,000	
TOTAL ENGINEERING DURING CONSTRUCTI			0	0	0	0	1,388,000	1,388,000	
333XX CONSTRUCTION MANAGEMENT (S&A)									
333XX.01 CONSTRUCTION MANAGEMENT (S&A)			0	0	0	0	8,329,000	8,329,000	
TOTAL CONSTRUCTION MANAGEMENT (S&A)			0	0	0	0	8,329,000	8,329,000	
34XXX POST-REMEDIAL ACTION									
34XXX.20 Operation, Maint. & Monitorin			0	0	0	0	9,739,000	9,739,000	

** PROJECT DIRECT SUMMARY - SYSTEM (Rounded to 1000's) **

	QUANTITY	UOM	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
TOTAL POST-REMEDIAL ACTION			0	0	0	0	9,739,000	9,739,000	
TOTAL Revised FSPP - North County			108,000	7,348,000	2,894,000	3,561,000	127637000	141,440,000	
Field Ofc. Overhead								12,157,000	
SUBTOTAL								153,596,000	
General and Administrative Overhead								11,929,000	
SUBTOTAL								165,525,000	
Fee								9,990,000	
TOTAL INCL INDIRECTS								175,515,000	
Design Contingencies								9,236,000	
SUBTOTAL								184,751,000	
Escalation to Const. Midpoint								14,711,000	
SUBTOTAL								199,462,000	
Construction Contingencies								22,375,000	
TOTAL INCL OWNER COSTS								221,837,000	

** PROJECT DIRECT SUMMARY - SUBSYSTM (Rounded to 1000's) **

	QUANTITY	UOM	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
01XXX REAL ESTATE ANALYSIS/DOCUMENTS									
01XXX. G Rights of Entry/Temporary Per									
01XXX. G.01 Rights of Entry Aquisition			0	0	0	0	140,000	140,000	
01XXX. G.02 Damages			0	0	0	0	140,000	140,000	
TOTAL Rights of Entry/Temporary			0	0	0	0	279,000	279,000	
TOTAL REAL ESTATE ANALYSIS/DOCUM			0	0	0	0	279,000	279,000	
32XXX PROJ. MANG.& PRE-REMEDIAL ACTION									
32XXX.10 Project Management			0	0	0	0	4,164,000	4,164,000	
32XXX.20 Investigations (PRP)			0	0	0	0	1,388,000	1,388,000	
32XXX.30 Remedial Design			0	0	0	0	11105000	11,105,000	
32XXX.40 Remedial Action Contracting			0	0	0	0	1,388,000	1,388,000	
TOTAL PROJ. MANG.& PRE-REMEDIAL			0	0	0	0	18045000	18,045,000	
331XX HTRW REMEDIAL ACTION (CONSTRUCT)									
331XX.01 Mobilize and Preparatory Work									
331XX.01.01 Mob Construction Equip & F			2,000	90,000	87,000	0	4,000	181,000	
331XX.01.03 Submittals/Implementation			2,000	76,000	0	0	6,000	82,000	
331XX.01.04 Setup/Construct Temp Facil			0	0	0	0	41,000	41,000	
331XX.01.05 Construct Temporary Utilit			0	0	0	0	11,000	11,000	
TOTAL Mobilize and Preparatory W			4,000	166,000	87,000	0	62,000	315,000	
331XX.02 Monitor'g,Samplng,Test &Analy									
331XX.02.90 Environmental Monitoring			0	0	0	0	3,138,000	3,138,000	
331XX.02.91 Additional Labor & Service			0	0	0	0	6,698,000	6,698,000	
TOTAL Monitor'g,Samplng,Test &An			0	0	0	0	9,836,000	9,836,000	
331XX.03 Site Work									
331XX.03.03 Earthwork	278416.00	CY	27,000	1,025,000	1,021,000	1,183,000	0	3,229,000	11.60
331XX.03.04 Roads	11307.00	SY	3,000	101,000	45,000	140,000	67,000	353,000	31.26
331XX.03.90 Railroads	2900.00	LF	3,000	119,000	25,000	35,000	0	179,000	61.79
331XX.03.91 Sheetpile Shoring	18265.00	SF	2,000	77,000	30,000	42,000	0	149,000	8.18
331XX.03.92 Additional Labor & Service			0	130,000	0	0	368,000	497,000	

	QUANTITY	UOM	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.03.93 Misc. Utility Relocations			0	0	0	0	250,000	250,000	
TOTAL Site Work			34,000	1,452,000	1,121,000	1,401,000	685,000	4,659,000	
331XX.05 Surface Water Collect & Contr									
331XX.05.92 Additional Labor & Service			0	1,484,000	0	65,000	1,016,000	2,565,000	
TOTAL Surface Water Collect & Co			0	1,484,000	0	65,000	1,016,000	2,565,000	
331XX.08 Solids Collect and Containmen									
331XX.08.01 Contaminated Soil Collecti	278416.00	CY	18,000	2,212,000	900,000	0	453,000	3,565,000	12.80
TOTAL Solids Collect and Contain			18,000	2,212,000	900,000	0	453,000	3,565,000	
331XX.19 Disposal (Commercial)									
331XX.19.21 Transport to Storage/Disp	348020.00	CY	46,000	1,845,000	646,000	2,045,000	29804000	34,340,000	98.67
331XX.19.22 Disposal Fees and Taxes	348020.00	CY	0	0	0	0	35324000	35,324,000	101.50
331XX.19.90 Transportation and Disposa			0	0	0	0	12589000	12,589,000	
TOTAL Disposal (Commercial)			46,000	1,845,000	646,000	2,045,000	77717000	82,253,000	
331XX.20 Site Restoration									
331XX.20.01 Earthwork			1,000	26,000	15,000	0	0	41,000	
331XX.20.04 Revegetation And Planting			0	10,000	5,000	50,000	33,000	98,000	
331XX.20.92 Site Cleanup			0	16,000	6,000	0	0	23,000	
TOTAL Site Restoration			1,000	52,000	26,000	50,000	33,000	161,000	
331XX.21 Demobilization									
331XX.21.01 Removal Of Temporary Facil			0	0	0	0	41,000	41,000	
331XX.21.02 Removal Of Temporary Utili			0	0	0	0	11,000	11,000	
331XX.21.04 Demob of Construction Equi			3,000	122,000	114,000	0	4,000	239,000	
331XX.21.06 Submittals			1,000	15,000	0	0	0	15,000	
TOTAL Demobilization			4,000	137,000	114,000	0	56,000	306,000	
TOTAL HTRW REMEDIAL ACTION (CONS			108,000	7,348,000	2,894,000	3,561,000	89857000	103,659,000	

332XX ENGINEERING DURING CONSTRUCTION

** PROJECT DIRECT SUMMARY - SUBSYSTM (Rounded to 1000's) **

	QUANTITY	UOM	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
332XX.01 Engineering During Constructi			0	0	0	0	1,388,000	1,388,000	
TOTAL ENGINEERING DURING CONSTRU			0	0	0	0	1,388,000	1,388,000	
333XX CONSTRUCTION MANAGEMENT (S&A)									
333XX.01 CONSTRUCTION MANAGEMENT (S&A)			0	0	0	0	8,329,000	8,329,000	
TOTAL CONSTRUCTION MANAGEMENT (S			0	0	0	0	8,329,000	8,329,000	
34XXX POST-REMEDIAL ACTION									
34XXX.20 Operation, Maint. & Monitorin									
34XXX.20.01 Final Status Surveys			0	0	0	0	8,776,000	8,776,000	
34XXX.20.02 Monitoring			0	0	0	0	686,000	686,000	
34XXX.20.03 Five Year Review			0	0	0	0	40,000	40,000	
34XXX.20.04 Post Remedial Site Supervi			0	0	0	0	237,000	237,000	
TOTAL Operation, Maint. & Monito			0	0	0	0	9,739,000	9,739,000	
TOTAL POST-REMEDIAL ACTION			0	0	0	0	9,739,000	9,739,000	
TOTAL Revised FSPP - North Count			108,000	7,348,000	2,894,000	3,561,000	127637000	141,440,000	
Field Ofc. Overhead								12,157,000	
SUBTOTAL								153,596,000	
General and Administrative Overhead								11,929,000	
SUBTOTAL								165,525,000	
Fee								9,990,000	
TOTAL INCL INDIRECTS								175,515,000	
Design Contingencies								9,236,000	
SUBTOTAL								184,751,000	
Escalation to Const. Midpoint								14,711,000	
SUBTOTAL								199,462,000	
Construction Contingencies								22,375,000	
TOTAL INCL OWNER COSTS								221,837,000	

** PROJECT DIRECT SUMMARY - ASSY CAT (Rounded to 1000's) **

	QUANTITY	UOM	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
01XXX REAL ESTATE ANALYSIS/DOCUMENTS									
01XXX. G Rights of Entry/Temporary Per									
01XXX. G.01 Rights of Entry Aquisition			0	0	0	0	140,000	140,000	
01XXX. G.02 Damages			0	0	0	0	140,000	140,000	
TOTAL Rights of Entry/Tempora			0	0	0	0	279,000	279,000	
TOTAL REAL ESTATE ANALYSIS/DO			0	0	0	0	279,000	279,000	
32XXX PROJ. MANG.& PRE-REMEDIAL ACTION									
32XXX.10 Project Management			0	0	0	0	4,164,000	4,164,000	
32XXX.20 Investigations (PRP)			0	0	0	0	1,388,000	1,388,000	
32XXX.30 Remedial Design			0	0	0	0	11105000	11,105,000	
32XXX.40 Remedial Action Contracting			0	0	0	0	1,388,000	1,388,000	
TOTAL PROJ. MANG.& PRE-REMEDI			0	0	0	0	18045000	18,045,000	
331XX HTRW REMEDIAL ACTION (CONSTRUCT)									
331XX.01 Mobilize and Preparatory Work									
331XX.01.01 Mob Construction Equip & F									
331XX.01.01.05 Permits			0	0	0	0	4,000	4,000	
331XX.01.01.07 Construction Equipment			2,000	90,000	87,000	0	0	177,000	
TOTAL Mob Construction Equip			2,000	90,000	87,000	0	4,000	181,000	
331XX.01.03 Submittals/Implementation									
331XX.01.03.04 Environmental Protectio	8.00	EA	0	17,000	0	0	0	17,000	2066.06
331XX.01.03.05 Sedimintation Control P	8.00	EA	0	13,000	0	0	0	13,000	1595.68
331XX.01.03.08 Site Safety and Health	8.00	EA	1,000	30,000	0	0	0	30,000	3713.80
331XX.01.03.13 General Site Work Plan	8.00	EA	0	8,000	0	0	0	8,000	1052.56
331XX.01.03.14 Quality Control Plan	8.00	EA	0	9,000	0	0	0	9,000	1086.23
331XX.01.03.38 Permits	8.00	EA	0	0	0	0	6,000	6,000	750.00
TOTAL Submittals/Implementati			2,000	76,000	0	0	6,000	82,000	
331XX.01.04 Setup/Construct Temp Facil									
331XX.01.04.01 Office Trailers (contra	8.00	EA	0	0	0	0	12,000	12,000	1500.00
331XX.01.04.02 Storage Facilities	2.00	EA	0	0	0	0	10,000	10,000	5000.00

** PROJECT DIRECT SUMMARY - ASSY CAT (Rounded to 1000's) **

		QUANTITY	UOM	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.04.10	Toilets	16.00	EA	0	0	0	0	2,000	2,000	100.00
331XX.01.04.11	Barricades			0	0	0	0	12,000	12,000	
331XX.01.04.28	Signs	16.00	EA	0	0	0	0	6,000	6,000	345.00
	TOTAL Setup/Construct Temp Fa			0	0	0	0	41,000	41,000	
331XX.01.05	Construct Temporary Utilit									
331XX.01.05.02	Power Connection/Distri			0	0	0	0	4,000	4,000	
331XX.01.05.03	Telephone/Communication			0	0	0	0	1,000	1,000	
331XX.01.05.04	Water Connection/Distri			0	0	0	0	4,000	4,000	
331XX.01.05.05	Sewer Connection/Distri			0	0	0	0	2,000	2,000	
	TOTAL Construct Temporary Uti			0	0	0	0	11,000	11,000	
	TOTAL Mobilize and Preparator			4,000	166,000	87,000	0	62,000	315,000	
331XX.02	Monitor'g,Samplng,Test &Analy									
331XX.02.90	Environmental Monitoring			0	0	0	0	3,138,000	3,138,000	
331XX.02.91	Additional Labor & Service			0	0	0	0	6,698,000	6,698,000	
	TOTAL Monitor'g,Samplng,Test			0	0	0	0	9,836,000	9,836,000	
331XX.03	Site Work									
331XX.03.03	Earthwork									
331XX.03.03.03	Backfill	348020.00	CY	4,000	170,000	155,000	0	0	326,000	0.94
331XX.03.03.04	Borrow	278416.00	CY	0	0	0	1,114,000	0	1,114,000	4.00
331XX.03.03.05	Hauling	348020.00	CY	17,000	654,000	685,000	0	0	1,339,000	3.85
331XX.03.03.08	Compaction	348020.00	CY	5,000	201,000	181,000	70,000	0	451,000	1.30
	TOTAL Earthwork	278416.00	CY	27,000	1,025,000	1,021,000	1,183,000	0	3,229,000	11.60
331XX.03.04	Roads									
331XX.03.04.01	Bituminous Surfacing	3645.00	TON	0	16,000	5,000	101,000	0	122,000	33.39
331XX.03.04.02	Prime Coat	2604.00	GAL	0	0	0	3,000	0	3,000	1.18
331XX.03.04.05	Base Course	3720.00	TON	0	8,000	5,000	23,000	0	36,000	9.77
331XX.03.04.06	Geotextile Fabric	9300.00	SY	0	7,000	1,000	12,000	0	20,000	2.13
331XX.03.04.11	Striping	12210.00	LF	0	1,000	0	1,000	0	2,000	0.19
331XX.03.04.90	Pavement Removal	9300.00	SY	1,000	56,000	25,000	0	0	81,000	8.66
331XX.03.04.91	Hauling of Pavement for	4030.00	CY	0	8,000	9,000	0	67,000	84,000	20.84
331XX.03.04.92	Traffic Control			0	5,000	1,000	0	0	6,000	
	TOTAL Roads	11307.00	SY	3,000	101,000	45,000	140,000	67,000	353,000	31.26

	QUANTITY	UOM	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.03.90 Railroads									
331XX.03.90. 5 Railroad Track Removal			2,000	70,000	21,000	0	0	91,000	
331XX.03.90.10 Railroad Track Reinstal			1,000	49,000	4,000	35,000	0	88,000	
TOTAL Railroads	2900.00	LF	3,000	119,000	25,000	35,000	0	179,000	61.79
331XX.03.91 Sheetpile Shoring	18265.00	SF	2,000	77,000	30,000	42,000	0	149,000	8.18
331XX.03.92 Additional Labor & Service									
331XX.03.92.15 Backfill			0	130,000	0	0	368,000	497,000	
TOTAL Additional Labor & Serv			0	130,000	0	0	368,000	497,000	
331XX.03.93 Misc. Utility Relocations			0	0	0	0	250,000	250,000	
TOTAL Site Work			34,000	1,452,000	1,121,000	1,401,000	685,000	4,659,000	
331XX.05 Surface Water Collect & Contr									
331XX.05.92 Additional Labor & Service									
331XX.05.92. 5 Water Management			0	879,000	0	0	0	879,000	
331XX.05.92.10 Water Treatment			0	605,000	0	65,000	1,016,000	1,686,000	
TOTAL Additional Labor & Serv			0	1,484,000	0	65,000	1,016,000	2,565,000	
TOTAL Surface Water Collect &			0	1,484,000	0	65,000	1,016,000	2,565,000	
331XX.08 Solids Collect and Containmen									
331XX.08.01 Contaminated Soil Collecti									
331XX.08.01.02 Excavation	278416.00	CY	9,000	365,000	558,000	0	0	923,000	3.32
331XX.08.01.03 Hauling	348020.00	CY	9,000	327,000	342,000	0	0	669,000	1.92
331XX.08.01.90 Additional Labor & Serv			0	1,520,000	0	0	453,000	1,972,000	
TOTAL Contaminated Soil Colle	278416.00	CY	18,000	2,212,000	900,000	0	453,000	3,565,000	12.80
TOTAL Solids Collect and Cont			18,000	2,212,000	900,000	0	453,000	3,565,000	
331XX.19 Disposal (Commercial)									
331XX.19.21 Transport to Storage/Disp									
331XX.19.21.01 Loading of Solids	348020.00	CY	46,000	1,845,000	646,000	2,045,000	0	4,536,000	13.03

	QUANTITY	UOM	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.19.21.90 Transportation Costs	348020.00	CY	0	0	0	0	29804000	29,804,000	85.64
TOTAL Transport to Storage/Di	348020.00	CY	46,000	1,845,000	646,000	2,045,000	29804000	34,340,000	98.67
331XX.19.22 Disposal Fees and Taxes									
331XX.19.22.01 Landfill/Burial Grounds	348020.00	CY	0	0	0	0	35324000	35,324,000	101.50
TOTAL Disposal Fees and Taxes	348020.00	CY	0	0	0	0	35324000	35,324,000	101.50
331XX.19.90 Transportation and Disposa									
331XX.19.90.01 VP-1L (Wagner Brake)			0	0	0	0	4,224,000	4,224,000	
331XX.19.90.02 VP-2L (GIFREHC)			0	0	0	0	3,000,000	3,000,000	
331XX.19.90.03 VP-3L			0	0	0	0	2,458,000	2,458,000	
331XX.19.90.04 VP-4L			0	0	0	0	1,376,000	1,376,000	
331XX.19.90.05 VP-5L			0	0	0	0	1,530,000	1,530,000	
TOTAL Transportation and Disp			0	0	0	0	12589000	12,589,000	
TOTAL Disposal (Commercial)			46,000	1,845,000	646,000	2,045,000	77717000	82,253,000	
331XX.20 Site Restoration									
331XX.20.01 Earthwork									
331XX.20.01.07 Grading	65.00	ACR	1,000	26,000	15,000	0	0	41,000	631.47
TOTAL Earthwork			1,000	26,000	15,000	0	0	41,000	
331XX.20.04 Revegetation And Planting									
331XX.20.04.01 Seeding/Mulch/Fertilize	65.00	ACR	0	10,000	5,000	50,000	0	65,000	1004.78
331XX.20.04.02 Miscelaneous Landscapin	65.00	ACR	0	0	0	0	33,000	33,000	500.00
TOTAL Revegetation And Planti			0	10,000	5,000	50,000	33,000	98,000	
331XX.20.92 Site Cleanup			0	16,000	6,000	0	0	23,000	
TOTAL Site Restoration			1,000	52,000	26,000	50,000	33,000	161,000	
331XX.21 Demobilization									
331XX.21.01 Removal Of Temporary Facil									
331XX.21.01.01 Office Trailers (contr.	8.00	EA	0	0	0	0	6,000	6,000	750.00

	QUANTITY	UOM	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.21.01.02 Storage Facilities	2.00	EA	0	0	0	0	5,000	5,000	2500.00
331XX.21.01.05 Decon. Fac. for Const.			0	0	0	0	15,000	15,000	
331XX.21.01.10 Toilets	16.00	EA	0	0	0	0	2,000	2,000	100.00
331XX.21.01.11 Barricades			0	0	0	0	12,000	12,000	
331XX.21.01.28 Signs	16.00	EA	0	0	0	0	2,000	2,000	100.00
TOTAL Removal Of Temporary Fa			0	0	0	0	41,000	41,000	
331XX.21.02 Removal Of Temporary Utili									
331XX.21.02.02 Power Connection/Distri			0	0	0	0	4,000	4,000	
331XX.21.02.03 Telephone/Communication			0	0	0	0	0	0	
331XX.21.02.04 Water Connection/Distri			0	0	0	0	4,000	4,000	
331XX.21.02.05 Sewer Connection/Distri			0	0	0	0	2,000	2,000	
TOTAL Removal Of Temporary Ut			0	0	0	0	11,000	11,000	
331XX.21.04 Demob of Construction Equi									
331XX.21.04.05 Permits			0	0	0	0	4,000	4,000	
331XX.21.04.07 Demob. of Construction			0	16,000	91,000	0	0	107,000	
331XX.21.04.90 Decon. of Construction			3,000	106,000	23,000	0	0	129,000	
TOTAL Demob of Construction E			3,000	122,000	114,000	0	4,000	239,000	
331XX.21.06 Submittals									
331XX.21.06.03 Project Acceptance	8.00	EA	1,000	15,000	0	0	0	15,000	1860.14
TOTAL Submittals			1,000	15,000	0	0	0	15,000	
TOTAL Demobilization			4,000	137,000	114,000	0	56,000	306,000	
TOTAL HTRW REMEDIAL ACTION (C			108,000	7,348,000	2,894,000	3,561,000	89857000	103,659,000	
332XX ENGINEERING DURING CONSTRUCTION									
332XX.01 Engineering During Constructi			0	0	0	0	1,388,000	1,388,000	
TOTAL ENGINEERING DURING CONS			0	0	0	0	1,388,000	1,388,000	
333XX CONSTRUCTION MANAGEMENT (S&A)									
333XX.01 CONSTRUCTION MANAGEMENT (S&A)			0	0	0	0	8,329,000	8,329,000	
TOTAL CONSTRUCTION MANAGEMENT			0	0	0	0	8,329,000	8,329,000	

** PROJECT DIRECT SUMMARY - ASSY CAT (Rounded to 1000's) **

	QUANTITY	UOM	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
34XXX POST-REMEDIAL ACTION									
34XXX.20 Operation, Maint. & Monitorin									
34XXX.20.01 Final Status Surveys									
34XXX.20.01. 5 North County Properties			0	0	0	0	3,563,000	3,563,000	
34XXX.20.01.10 Coldwater Creek			0	0	0	0	3,590,000	3,590,000	
34XXX.20.01.15 North County Buildings			0	0	0	0	963,000	963,000	
34XXX.20.01.20 Roads			0	0	0	0	660,000	660,000	
TOTAL Final Status Surveys			0	0	0	0	8,776,000	8,776,000	
34XXX.20.02 Monitoring			0	0	0	0	686,000	686,000	
34XXX.20.03 Five Year Review			0	0	0	0	40,000	40,000	
34XXX.20.04 Post Remedial Site Supervi			0	0	0	0	237,000	237,000	
TOTAL Operation, Maint. & Mon			0	0	0	0	9,739,000	9,739,000	
TOTAL POST-REMEDIAL ACTION			0	0	0	0	9,739,000	9,739,000	
TOTAL Revised FSPP - North Co			108,000	7,348,000	2,894,000	3,561,000	127637000	141,440,000	
Field Ofc. Overhead								12,157,000	
SUBTOTAL								153,596,000	
General and Administrative Overhead								11,929,000	
SUBTOTAL								165,525,000	
Fee								9,990,000	
TOTAL INCL INDIRECTS								175,515,000	
Design Contingencies								9,236,000	
SUBTOTAL								184,751,000	
Escalation to Const. Midpoint								14,711,000	
SUBTOTAL								199,462,000	
Construction Contingencies								22,375,000	
TOTAL INCL OWNER COSTS								221,837,000	

0. 5. Prime Contract	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
0. 5. Prime Contractor											
0. 5. 0. Overhead Items - PM											
0. 5. 0. 3. General Requirements											
USR Operations Sup					0.00	42.48	0.00	0.00	0.00	42.48	
ervisor	10400			0.00	0	441,792	0	0	0	441,792	42.48
TOTAL General Requir					0	441,792	0	0	0	441,792	

0. 5. Prime Contract		QUANTY UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
	0. 5. 0. 4. Field Office Expenses										
USR	Office Lease				0.00	0.00	0.00	0.00	35595.00	35595.00	
		5.00 YR		0.00	0	0	0	0	177,975	177,975	35595.00
USR	Site Security				0.00	0.00	0.00	0.00	76500.00	76500.00	
		5.00 YR		0.00	0	0	0	0	382,500	382,500	76500.00
USR	Sanatary Servi				0.00	0.00	0.00	0.00	6900.00	6900.00	
	ces	5.00 YR		0.00	0	0	0	0	34,500	34,500	6900.00
USR	Trash Removal				0.00	0.00	0.00	0.00	3600.00	3600.00	
		5.00 YR		0.00	0	0	0	0	18,000	18,000	3600.00
USR	Training				0.00	0.00	0.00	0.00	4543.00	4543.00	
		5.00 YR		0.00	0	0	0	0	22,715	22,715	4543.00
USR	Janitorial Ser				0.00	0.00	0.00	0.00	62400.00	62400.00	
	vice	5.00 YR		0.00	0	0	0	0	312,000	312,000	62400.00
USR	General Office				0.00	0.00	0.00	18000.00	0.00	18000.00	
	Supplies	5.00 YR		0.00	0	0	0	90,000	0	90,000	18000.00
USR	Utilities				0.00	0.00	0.00	11700.00	0.00	11700.00	
		5.00 YR		0.00	0	0	0	58,500	0	58,500	11700.00
USR	Ice/Water Drin				0.00	0.00	0.00	14900.00	0.00	14900.00	
	king	5.00 YR		0.00	0	0	0	74,500	0	74,500	14900.00
USR	Software				0.00	0.00	0.00	10000.00	0.00	10000.00	
		5.00 YR		0.00	0	0	0	50,000	0	50,000	10000.00
USR	Postage/UPS/Et				0.00	0.00	0.00	16800.00	0.00	16800.00	
	c...	5.00 YR		0.00	0	0	0	84,000	0	84,000	16800.00
USR	Safety Incenti				0.00	0.00	0.00	12000.00	0.00	12000.00	
	ves	5.00 YR		0.00	0	0	0	60,000	0	60,000	12000.00
USR	Project Vehicl				0.00	0.00	12580.00	0.00	0.00	12580.00	
	e Lease	5.00 YR		0.00	0	0	62,900	0	0	62,900	12580.00
USR	Project Vehicl				0.00	0.00	3000.00	0.00	0.00	3000.00	
	e Maint/Fuel/E tc	5.00 YR		0.00	0	0	15,000	0	0	15,000	3000.00

0. 5. Prime Contract		QUANTY UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
USR	Project Vehicl				0.00	0.00	1200.00	0.00	0.00	1200.00	
	e Registration	5.00 YR		0.00	0	0	6,000	0	0	6,000	1200.00
	/Ins										
USR	Trailer Rental				0.00	0.00	31500.00	0.00	0.00	31500.00	
		5.00 YR		0.00	0	0	157,500	0	0	157,500	31500.00
USR	Convex Box Ren				0.00	0.00	9400.00	0.00	0.00	9400.00	
	tal	5.00 YR		0.00	0	0	47,000	0	0	47,000	9400.00
USR	Computer				0.00	0.00	7500.00	0.00	0.00	7500.00	
		5.00 YR		0.00	0	0	37,500	0	0	37,500	7500.00
USR	Telephone/Radi				0.00	0.00	40800.00	0.00	0.00	40800.00	
	o/Comm/Etc	5.00 YR		0.00	0	0	204,000	0	0	204,000	40800.00
USR	Office Equip/M				0.00	0.00	2400.00	0.00	0.00	2400.00	
	aint/Service	5.00 YR		0.00	0	0	12,000	0	0	12,000	2400.00
USR	Office Furnitu				0.00	0.00	2500.00	0.00	0.00	2500.00	
	re	5.00 YR		0.00	0	0	12,500	0	0	12,500	2500.00
TOTAL	Field Office E				0	0	554,400	417,000	947,690	1,919,090	

0. 5. Prime Contract		QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
	0. 5. 0. 5. Field Office Personnel											
USR	Project Manage					0.00	59.86	0.00	0.00	0.00	59.86	
	r	10400	HR	N/A	0.00	0	622,544	0	0	0	622,544	59.86
USR	Construction M					0.00	47.16	0.00	0.00	0.00	47.16	
	anager	10400	HR	N/A	0.00	0	490,464	0	0	0	490,464	47.16
USR	Construction S					0.00	27.08	0.00	0.00	0.00	27.08	
	upt. (3ea)	31200	HR	N/A	0.00	0	844,896	0	0	0	844,896	27.08
USR	QCQ Manager					0.00	36.32	0.00	0.00	0.00	36.32	
		10400	HR	N/A	0.00	0	377,728	0	0	0	377,728	36.32
USR	QCQ Engineer					0.00	35.57	0.00	0.00	0.00	35.57	
		10400	HR	N/A	0.00	0	369,928	0	0	0	369,928	35.57
USR	Site S&H Offic					0.00	27.94	0.00	0.00	0.00	27.94	
	er	10400	HR	N/A	0.00	0	290,576	0	0	0	290,576	27.94
USR	Safety Enginee					0.00	18.05	0.00	0.00	0.00	18.05	
	r	10400	HR	N/A	0.00	0	187,720	0	0	0	187,720	18.05
USR	Rad Safety Off					0.00	47.29	0.00	0.00	0.00	47.29	
	icer	10400	HR	N/A	0.00	0	491,816	0	0	0	491,816	47.29
USR	Rad Safety Eng					0.00	40.29	0.00	0.00	0.00	40.29	
	ineer (3ea)	31200	HR	N/A	0.00	0	1,257,048	0	0	0	1,257,048	40.29
USR	Compliance Man					0.00	32.13	0.00	0.00	0.00	32.13	
	ager	10400	HR	N/A	0.00	0	334,152	0	0	0	334,152	32.13
USR	T&D Coordinato					0.00	25.95	0.00	0.00	0.00	25.95	
	r	10400	HR	N/A	0.00	0	269,880	0	0	0	269,880	25.95
USR	Project Contro					0.00	35.99	0.00	0.00	0.00	35.99	
	l Engineer	10400	HR	N/A	0.00	0	374,296	0	0	0	374,296	35.99
USR	Project Accoun					0.00	46.39	0.00	0.00	0.00	46.39	
	tant	10400	HR	N/A	0.00	0	482,456	0	0	0	482,456	46.39

	0. 5. Prime Contract	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
USR	Purshasing Man					0.00	41.36	0.00	0.00	0.00	41.36	
	ager	10400	HR	N/A	0.00	0	430,144	0	0	0	430,144	41.36
USR	Sr. Purshasing					0.00	27.08	0.00	0.00	0.00	27.08	
	Agent	10400	HR	N/A	0.00	0	281,632	0	0	0	281,632	27.08
USR	Sr. Adin Asst.					0.00	21.16	0.00	0.00	0.00	21.16	
		10400	HR	N/A	0.00	0	220,064	0	0	0	220,064	21.16
USR	Network Admin.					0.00	26.49	0.00	0.00	0.00	26.49	
		10400	HR	N/A	0.00	0	275,496	0	0	0	275,496	26.49
USR	Database Desig					0.00	26.49	0.00	0.00	0.00	26.49	
	ner	10400	HR	N/A	0.00	0	275,496	0	0	0	275,496	26.49
USR	Regulatory Spe					0.00	35.90	0.00	0.00	0.00	35.90	
	cialist	10400	HR	N/A	0.00	0	373,360	0	0	0	373,360	35.90
TOTAL	Field Office P					0	8,249,696	0	0	0	8,249,696	

0. 5. Prime Contract		QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
	0. 5. 0. 6. Home Office Personnel											
USR	Project Manager (432hrs/yr)	2160.00	HR		0.00	0.00 0	54.16 116,986	0.00 0	0.00 0	0.00 0	54.16 116,986	54.16
USR	Contract Manager (416hrs/yr)	2080.00	HR		0.00	0.00 0	39.32 81,786	0.00 0	0.00 0	0.00 0	39.32 81,786	39.32
USR	Subcontract Admin. (208hrs/yr)	1040.00	HR		0.00	0.00 0	44.89 46,686	0.00 0	0.00 0	0.00 0	44.89 46,686	44.89
USR	QCQ Manager (124hrs/yr)	620.00	HR		0.00	0.00 0	49.10 30,442	0.00 0	0.00 0	0.00 0	49.10 30,442	49.10
USR	H&S Manager (248hrs/yr)	1240.00	HR		0.00	0.00 0	40.62 50,369	0.00 0	0.00 0	0.00 0	40.62 50,369	40.62
USR	Regulatory Specialist (208hrs/yr)	1040.00	HR		0.00	0.00 0	35.90 37,336	0.00 0	0.00 0	0.00 0	35.90 37,336	35.90
USR	Records Admin. (208hrs/yr)	1040.00	HR		0.00	0.00 0	16.76 17,430	0.00 0	0.00 0	0.00 0	16.76 17,430	16.76
TOTAL	Home Office Pe					0	381,034	0	0	0	381,034	

0. 5. Prime Contract	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
0. 5. 0.10. PPE - Level D Modified											
In addition to PPE a crew will be considered for 1day/wk for decontamination purposes. 8hrs x 52wks x 5.5yrs = 2288hrs											
USR PPE Safety Sup					1.00	0.00	0.00	0.00	233000.00	233000.00	
plies	5.00	YR	N/A	0.00	5	0	0	0	1,165,000	1,165,000	233000.00
TOTAL PPE - Level D					5	0	0	0	1,165,000	1,165,000	
TOTAL Overhead Items					5	9,072,522	554,400	417,000	2,112,690	12,156,612	

01XXX. G. Rights of Entr	QUANTY UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST

01XXX. REAL ESTATE ANALYSIS/DOCUMENTS

01XXX. G. Rights of Entry/Temporary Permit

This alternative is assumed to have no real estate interest other than Right's of Entry per memo dated 4 Apr 01; Generic Cost Estimate for North County Feasibility Study.

The following Rights of Entry (ROE) are considered;
- 17 ROE for 28 properties with some removal action
- 39 ROE for 40 properties with no expected removal but not yet evaluated in accordance with MARSSIM
- 11 ROE 21 properties previously remediated by DOE requiring additional investigation
- 212 ROE for 212 properties along suspect haul routes not yet investigated and along CWC Reaches B and C

01XXX. G.01. Rights of Entry Aquisition

USR	Rights of Entr				0.00	0.00	0.00	0.00	500.00	500.00	
	y	279.00 EA		0.00	0	0	0	0	139,500	139,500	500.00
	TOTAL Rights of Entr				0	0	0	0	139,500	139,500	

01XXX. REAL ESTATE ANALYSIS/DOCUMENTS

01XXX. G. Rights of Entr	QUANTY UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
01XXX. G.02. Damages										
USR Damages				0.00	0.00	0.00	0.00	500.00	500.00	
	279.00 EA		0.00	0	0	0	0	139,500	139,500	500.00
TOTAL Damages				0	0	0	0	139,500	139,500	
TOTAL Rights of Entr				0	0	0	0	279,000	279,000	
TOTAL REAL ESTATE AN				0	0	0	0	279,000	279,000	

32XXX.10. Project Manage	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
32XXX. PROJ. MANG.& PRE-REMEDIAL ACTION											
32XXX.10. Project Management											
USR Project Manage					0.00	0.00	0.00	0.00	4164000	4164000.00	
ment (3%)	1.00	LS		0.00	0	0	0	0	4,164,000	4,164,000	4164000.00
TOTAL Project Manage					0	0	0	0	4,164,000	4,164,000	

32XXX.20. Investigations	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
32XXX.20. Investigations (PRP)											
USR PRP (1%)					0.00	0.00	0.00	0.00	1388000	1388000.00	
	1.00	LS		0.00	0	0	0	0	1,388,000	1,388,000	1388000.00
TOTAL Investigations					0	0	0	0	1,388,000	1,388,000	

32XXX.30. Remedial Desig	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
32XXX.30. Remedial Design											
USR Remedial Desig					0.00	0.00	0.00	0.00	11105000	11105000.00	
n (8%)	1.00	LS		0.00	0	0	0	0	11105000	11,105,000	11105000.00
TOTAL Remedial Desig					0	0	0	0	11105000	11,105,000	

32XXX.40. Remedial Actio	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
32XXX.40. Remedial Action Contracting											
USR Remedial Actio					0.00	0.00	0.00	0.00	1388000	1388000.00	
n Contracting (1%)	1.00	LS		0.00	0	0	0	0	1,388,000	1,388,000	1388000.00
TOTAL Remedial Actio					0	0	0	0	1,388,000	1,388,000	
TOTAL PROJ. MANG.& P					0	0	0	0	18045000	18,045,000	

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST

331XX. HTRW REMEDIAL ACTION (CONSTRUCT)

Account 33XXX includes HTRW remedial action (construction) work for all programs and includes operation which occurs during construction (remedial action). Account 33XXX excludes project management at all phases and excludes pre construction investigations and remedial design which are all in Account 32XXX. Account 33XXX excludes post construction Operation and Maintenance (O&M) which is in Account 34XXX.

331XX.01. Mobilize and Preparatory Work

Assumptions:

Assume 8 contracts for the purpose of mobilization, 6 contracts for the SLAPS VP's and 2 contracts for HISS/Futura. No additional Mob. is considered for the SLAPS contract which is already in place. Allthough the type of equipment to be mobilized for each contract will most likely be different, for estimating purposes assume the same equipment to be mobilized. Pile driving equipment assumed to be mobed to two sites only. Equipment is assumed to be mobilized from the St. Louis area.

Use 40hrs per each mobilzation event including setup time. Use 8hrs/pc of const. equip./ea. mob. event for operating time and 32hrs standby. Use full operating time for all other equipment and labor.

Const. Equip. -
Operating time = 8hrs/pc x 8ea = 64hrs/ea
Standby time = 32hrs/pc x 8ea = 256hrs/ea

Mobilization crew - (crew to be used for operating time only)

Truck w/Lowboy	Truck Driver
Mechanics truck	Mechanic
Pickup truck	Operator
	Laborer

Duration = 8hrs x 8-contracts x 7pc's of equip. = 448hrs

331XX.01.01. Mob Construction Equip & Fac

331XX.01.01.05. Permits

Assume 8 contracts, 6 contracts for the SLAPS VP's and 2 contracts for HISS/Futura. No additional Mob. is considered for the SLAPS contract which is already in place. Cost per contract is assumed to cover all permits required for mobilization.

	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
USR PM Permits (all i					0.00	0.00	0.00	0.00	500.00	500.00	
nclusive)	8.00	EA		0.00	0	0	0	0	4,000	4,000	500.00
TOTAL Permits					0	0	0	0	4,000	4,000	

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.01.07. Construction Equipment											
UPB PM TRK,WTR,OF-HY,					0.00	0.00	61.38	0.00	0.00	61.38	
6000GAL,W/CAT	64.00	HR	T60KI002	1.00	0	0	3,928	0	0	3,928	61.38
621E											
UPB PM TRK,WTR,OF-HY,					0.00	0.00	15.28	0.00	0.00	15.28	
6000GAL,W/CAT	256.00	HR	T60KI002	1.00	0	0	3,911	0	0	3,911	15.28
621E											
UPB PM HYD EXCAV, CRW					0.00	0.00	134.41	0.00	0.00	134.41	
LR, 3.125CY BK	64.00	HR	H25CA008	0.00	0	0	8,602	0	0	8,602	134.41
T											
UPB PM HYD EXCAV, CRW					0.00	0.00	36.79	0.00	0.00	36.79	
LR, 3.125CY BK	256.00	HR	H25CA008	0.00	0	0	9,419	0	0	9,419	36.79
T											
MIL PM ROLLER,VIB,SD,					0.00	0.00	29.67	0.00	0.00	29.67	
S/P,13.0T,66"W	64.00	HR	R50DY002	1.00	0	0	1,899	0	0	1,899	29.67
,PAD											
MIL PM ROLLER,VIB,SD,					0.00	0.00	6.41	0.00	0.00	6.41	
S/P,13.0T,66"W	256.00	HR	R50DY002	1.00	0	0	1,642	0	0	1,642	6.41
,PAD											
MAP PM DOZER,CWLR, D-					0.00	0.00	49.71	0.00	0.00	49.71	
6H PS,W/BLADE	64.00	HR	T15CA010	1.00	0	0	3,182	0	0	3,182	49.71
(ADD ATTACHMENTS)											
MAP PM DOZER,CWLR, D-					0.00	0.00	10.52	0.00	0.00	10.52	
6H PS,W/BLADE	256.00	HR	T15CA010	1.00	0	0	2,694	0	0	2,694	10.52
(ADD ATTACHMENTS)											
MAP PM DOZER,CWLR, D-					0.00	0.00	60.94	0.00	0.00	60.94	
8R PS,W/BLADE	64.00	HR	T15CA016	1.00	0	0	3,900	0	0	3,900	60.94
(ADD ATTACHMENTS)											
MAP PM DOZER,CWLR, D-					0.00	0.00	15.62	0.00	0.00	15.62	
8R PS,W/BLADE	256.00	HR	T15CA016	1.00	0	0	3,998	0	0	3,998	15.62
(ADD ATTACHMENTS)											
UPB PM LDR,FE, WH, 4.					0.00	0.00	60.99	0.00	0.00	60.99	
50 CY, ARTIC,	128.00	HR	L40CA006	1.00	0	0	7,807	0	0	7,807	60.99
966E											
(2ea)											

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
UPB PM LDR,FE, WH, 4.					0.00	0.00	15.67	0.00	0.00	15.67	
50 CY, ARTIC, 966E (2ea)	512.00	HR	L40CA006	1.00	0	0	8,021	0	0	8,021	15.67
USR PM CR,ME,CWLR,LIF					0.00	0.00	91.24	0.00	0.00	91.24	
TING, 85T/160' BOOM	16.00	HR	C85AM010	1.00	0	0	1,460	0	0	1,460	91.24
USR PM CR,ME,CWLR,LIF					0.00	0.00	30.43	0.00	0.00	30.43	
TING, 85T/160' BOOM	64.00	HR	C85AM010	1.00	0	0	1,947	0	0	1,947	30.43
USR PM PILE HAMMER,VI					0.00	0.00	63.45	0.00	0.00	63.45	
B,116T FORCE D RIVE (ADD LEADS & CRANE)	16.00	HR	P30MK003	1.00	0	0	1,015	0	0	1,015	63.45
USR PM PILE HAMMER,VI					0.00	0.00	11.95	0.00	0.00	11.95	
B,116T FORCE D RIVE (ADD LEADS & CRANE)	64.00	HR	P30MK003	1.00	0	0	765	0	0	765	11.95
UPB PM TRLR,LOWBOY, 4					0.00	0.00	6.88	0.00	0.00	6.88	
0T, 3 AXLE (ADD TOWING TRUCK)	448.00	HR	T45XX015	1.00	0	0	3,084	0	0	3,084	6.88
UPB PM TRK,HWY, 46,00					0.00	0.00	35.40	0.00	0.00	35.40	
0 GVW, 6X4, 3 AXLE	448.00	HR	T50FO018	1.00	0	0	15,860	0	0	15,860	35.40
MIL PM TRK,HWY,10,000					0.00	0.00	7.97	0.00	0.00	7.97	
GVW,4X2, 1T-PI CKUP	448.00	HR	T50FO005	1.00	0	0	3,571	0	0	3,571	7.97
MIL PM Outside Equip.					1.00	44.95	0.00	0.00	0.00	44.95	
Operators, He avy	448.00	HR	X-EQOPRHVY	1.00	448	20,139	0	0	0	20,139	44.95
MIL PM Outside Equip.					1.00	42.23	0.00	0.00	0.00	42.23	
Operators, Mechanic	448.00	HR	X-EQOPRMED	1.00	448	18,921	0	0	0	18,921	42.23
MIL PM Outside Truck					1.00	37.59	0.00	0.00	0.00	37.59	
Drivers, Heavy	448.00	HR	X-TRKDVRHV	1.00	448	16,839	0	0	0	16,839	37.59

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
MIL PM Outside Labore					1.00	37.86	0.00	0.00	0.00	37.86	
rs, (Semi-Skil led) - 2ea	896.00	HR	X-LABORER	1.00	896	33,922	0	0	0	33,922	37.86
TOTAL Construction E					2,240	89,822	86,705	0	0	176,527	
TOTAL Mob Constructi					2,240	89,822	86,705	0	4,000	180,527	

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST

331XX.01.03. Submittals/Implementation Plans

Submittal/implementation plans is work incurred during remedial action for obtaining all necessary plans and permits. These include QA/QC plans, work plans, shop drawings, demolition plans, environmental control plans, pollution control plans, site safety and health plans, site security plan, materials handling/transportation/disposal plan and all local, state, and federal permits.

Assume one of each plan per contract. (2ea)

331XX.01.03.04. Environmental Protection Plan

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
FOP PM Engineers, Civ					1.00	26.31	0.00	0.00	0.00	26.31	
il	320.00	HR	FC-ENGCI	1.00	320	8,420	0	0	0	8,420	26.31
RAD PM Certified Indu					1.00	50.68	0.00	0.00	0.00	50.68	
strial Hygieni st	160.00	HR	FH-CIDEYG	1.00	160	8,108	0	0	0	8,108	50.68
TOTAL Environmental	8.00	EA			480	16,528	0	0	0	16,528	2066.06

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.03.05. Sedimintation Control Plan											
FOP PM Engineers, Civ					1.00	26.31	0.00	0.00	0.00	26.31	
il	320.00	HR	FC-ENGCI	1.00	320	8,420	0	0	0	8,420	26.31
FOP PM Geologist					1.00	27.16	0.00	0.00	0.00	27.16	
	160.00	HR	FC-ENCGE	1.00	160	4,345	0	0	0	4,345	27.16
TOTAL Sedimintation	8.00	EA			480	12,765	0	0	0	12,765	1595.68

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.03.08. Site Safety and Health Plan											
RAD PM Site Safety &					1.00	44.60	0.00	0.00	0.00	44.60	
Health Officer	448.00	HR	FH-HEALTO	1.00	448	19,981	0	0	0	19,981	44.60
RAD PM Certified Indu					1.00	50.68	0.00	0.00	0.00	50.68	
strial Hygieni	192.00	HR	FH-CIDEYG	1.00	192	9,730	0	0	0	9,730	50.67
st											
TOTAL Site Safety an	8.00	EA			640	29,710	0	0	0	29,710	3713.80

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.03.13. General Site Work Plan											
FOP PM Engineers, Civ					1.00	26.31	0.00	0.00	0.00	26.31	
il	320.00	HR	FC-ENGCI	1.00	320	8,420	0	0	0	8,420	26.31
					-------	---------	---------	---------	---------	-----------	
TOTAL General Site W	8.00	EA			320	8,420	0	0	0	8,420	1052.56

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.03.14. Quality Control Plan											
FOP PM Engineers, Qua					1.00	27.16	0.00	0.00	0.00	27.16	
lity Control	320.00	HR	FC-ENGQC	1.00	320	8,690	0	0	0	8,690	27.16
TOTAL Quality Contro	8.00	EA			320	8,690	0	0	0	8,690	1086.23

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.03.38. Permits											
USR PM Site Permits (					0.00	0.00	0.00	0.00	750.00	750.00	
all inclusive)	8.00	EA		0.00	0	0	0	0	6,000	6,000	750.00
TOTAL Permits	8.00	EA			0	0	0	0	6,000	6,000	750.00
TOTAL Submittals/Imp					2,240	76,115	0	0	6,000	82,115	

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.04. Setup/Construct Temp Facilities											
Setup/construct temporary facilities during remedial action includes procurement, setup, and construction of office trailers, storage areas, fencing, access roads, decontamination facilities, decontamination staging areas and other temporary facilities.											
331XX.01.04.01. Office Trailers (contractor)											
Assume one setup/hookup per each contract.											
USR PM Deliver and Se					0.00	0.00	0.00	0.00	1500.00	1500.00	
tup/Hookup	8.00	EA		0.00	0	0	0	0	12,000	12,000	1500.00
TOTAL Office Trailer	8.00	EA			0	0	0	0	12,000	12,000	1500.00

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.04.02. Storage Facilities											
Assume that a staging area will be set up for a an office trailer, tool trailer and any other equipment or materials to be left onsite											
This item is considered a one time cost @ 2 locations to be utilized for alll contracts.											
USR PM Staging Area					0.00	0.00	0.00	0.00	5000.00	5000.00	
	2.00	EA		0.00	0	0	0	0	10,000	10,000	5000.00
TOTAL Storage Facili	2.00	EA			0	0	0	0	10,000	10,000	5000.00

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.04.10. Toilets											
Assume 2 portable toilets to be delivered per each contract. (16ea)											
USR PM Portable Toile					0.00	0.00	0.00	0.00	100.00	100.00	
ts	16.00	EA		0.00	0	0	0	0	1,600	1,600	100.00
TOTAL Toilets	16.00	EA			0	0	0	0	1,600	1,600	100.00

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.04.11. Barricades											
Assume a lump sum cost per contract.											
USR PM Barricades					0.00	0.00	0.00	0.00	1500.00	1500.00	
	8.00	EA		0.00	0	0	0	0	12,000	12,000	1500.00
TOTAL Barricades					0	0	0	0	12,000	12,000	

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.04.28. Signs											
Assume two construction signs per contract.											
USR PM Project Signs					0.00	0.00	0.00	0.00	345.00	345.00	
	16.00	EA		0.00	0	0	0	0	5,520	5,520	345.00
TOTAL Signs	16.00	EA			0	0	0	0	5,520	5,520	345.00
TOTAL Setup/Construc					0	0	0	0	41,120	41,120	

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.05. Construct Temporary Utilities											
Temporary utilities are power and lighting, telephone, water and sewer services that will be in place only during construction or remedial action. It is assumed that all utilities are presently in-place on site and only a temp. hookup fee will be charged for each utility .											
331XX.01.05.02. Power Connection/Distribution											
USR PM Temp. power ho					0.00	0.00	0.00	0.00	500.00	500.00	
okup/contract	8.00	EA		0.00	0	0	0	0	4,000	4,000	500.00
TOTAL Power Connecti					0	0	0	0	4,000	4,000	

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.05.03. Telephone/Communication Dist.											
USR PM Connection Fee					0.00	0.00	0.00	0.00	100.00	100.00	
(per contract)	8.00	EA		0.00	0	0	0	0	800	800	100.00
TOTAL Telephone/Comm					0	0	0	0	800	800	

331XX.01. Mobilize and P	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.05.04. Water Connection/Distribution											
USR PM Connection Fee					0.00	0.00	0.00	0.00	500.00	500.00	
	8.00	EA		0.00	0	0	0	0	4,000	4,000	500.00
TOTAL Water Connecti					0	0	0	0	4,000	4,000	

331XX.01. Mobilize and P	QUANTY UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.01.05.05. Sewer Connection/Distribution										
USR PM Connection Fee				0.00	0.00	0.00	0.00	300.00	300.00	
	8.00 EA		0.00	0	0	0	0	2,400	2,400	300.00
TOTAL Sewer Connecti				0	0	0	0	2,400	2,400	
TOTAL Construct Temp				0	0	0	0	11,200	11,200	
TOTAL Mobilize and P				4,480	165,936	86,705	0	62,320	314,961	

331XX.02. Monitor'g,Samp	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.02. Monitor'g,Samplng,Test &Analysis											
Costs considered are based on historical data for previous fiscal years and include but are not limited to, air particle sampling, ground water sampling, storm water sampling, surface water sampling, sediment sampling, and all reqired environmental reports/documentation.											
331XX.02.90. Environmental Monitoring											
USR PM Environmental					0.00	0.00	0.00	0.00	627560.00	627560.00	
Monitoring	5.00	YR		0.00	0	0	0	0	3,137,800	3,137,800	627560.00
TOTAL Environmental					0	0	0	0	3,137,800	3,137,800	

331XX.02. Monitor'g,Samp	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.02.91. Additional Labor & Services											
USR PM Lab. Sampling					0.00	0.00	0.00	0.00	48000.00	48000.00	
Services	5.00	YR		0.00	0	0	0	0	240,000	240,000	48000.00
USR PM EDI - HP Techs					0.00	0.00	0.00	0.00	1083638	1083638.00	
	5.00	YR		0.00	0	0	0	0	5,418,190	5,418,190	1083638.00
USR PM Rad Instrument					0.00	0.00	0.00	0.00	207905.00	207905.00	
& Supplies	5.00	YR		0.00	0	0	0	0	1,039,525	1,039,525	207905.00
TOTAL Additional Lab					0	0	0	0	6,697,715	6,697,715	
TOTAL Monitor'g,Samp					0	0	0	0	9,835,515	9,835,515	

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST

331XX.03. Site Work

Construction during remedial action. Includes stripping topsoil, excavation, backfill, compaction, fine grading, hauling spoil, importation of borrow material and topsoil. Excludes any work involving contaminated or hazardous materials.

Personal protection is not required for any of the site work. Production rates assume normal productivity for these items.

331XX.03.03. Earthwork

Assumptions:

It is assumed that all required borrow will come from Ft. Bell Quarry which is located near Hwy. 67 and the Missouri River. Overburden material from this quarry has been used for previous contracts. The quantity of borrow material required takes into consideration 20% over-excavation and a material swell factor of 25% . Compaction of fill material is assumed to be placed in loose lifts not to exceed 8-inches thick and compacted to at least 95% of the Standard Proctor max. dry density.

Factors:
Over-Excavation = 20%
Swell = 25%

Volumes -
Excavation(including over-excavation) = 278,416cy
Borrow Required = 348,020cy
*For quantity details reference notes under 08 Solids Collect and Containment

331XX.03.03.03. Backfill

	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
AF PM Fill, spread b					0.01	0.49	0.45	0.00	0.00	0.94	
orrow w/dozer	348020	CY	CODTB10B	125.00	4,176	170,286	155,252	0	0	325,538	0.94
TOTAL Backfill	348020	CY			4,176	170,286	155,252	0	0	325,538	0.94

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST

331XX.03.03.04. Borrow

For the basis of borrow costs reference government estimates for the following WAD's; (cost basis for in-siti quantity)

Contract No. DACW45-96-D-0007
Task Order # KC-01/WAD 10, FY2000
$498,000/120,000cy's = $4.16/cy (includes some development)
Task Order # KC-01/WAD 10, FY2001
$199,400/50,000cy's = $3.99/cy

USE $4.00/cy for borrow material FOB quarry

	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
USR PM Borrow Materia					0.00	0.00	0.00	4.00	0.00	4.00	
l	278416	CY		0.00	0	0	0	1,113,664	0	1,113,664	4.00
TOTAL Borrow	278416	CY			0	0	0	1,113,664	0	1,113,664	4.00

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.03.03.05. Hauling											
AF PM Hauling, hwy h					0.05	1.88	1.97	0.00	0.00	3.85	
aulers, 12 CY, 12 mile round trip @ base wide rate	348020	CY	COEIB34B	20.00	17,401	654,069	684,695	0	0	1,338,763	3.85
TOTAL Hauling	348020	CY			17,401	654,069	684,695	0	0	1,338,763	3.85

331XX.03. Site Work		QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
	331XX.03.03.08. Compaction											
AF PM	Compaction, ri					0.01	0.20	0.13	0.00	0.00	0.33	
	ding, 8" lifts	348020	CY	COFCB32F	600.00	1,740	68,247	45,382	0	0	113,629	0.33
	, 2											
	passes, sheepsfoot/wobbly wheel											
	roller											
USR PM	Compaction Wat					0.01	0.38	0.39	0.20	0.00	0.97	
	er Price $.005	348020	CY	COFWK	174.25	3,480	132,387	135,484	69,604	0	337,475	0.97
	/Gal											
	($0.454/100 Liters)											
TOTAL	Compaction	348020	CY			5,220	200,634	180,866	69,604	0	451,104	1.30
TOTAL	Earthwork	278416	CY			26,798	1,024,989	1,020,812	1,183,268	0	3,229,069	11.60

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST

331XX.03.04. Roads

This Item is for replacing asphalt roads at Slaps VP's. Assume the following for replacement cross-section; 3" Wearing Coarse, 4" Binder Coarse, and 9" Base w/Geotextile. Road to be replaced is based on the action level. Action Level = 100 285 1775

Pershall Road	1,865sy
Hazelwood Road	1,417sy
Latty Road	1,186sy
Frost Avenue	1,475sy
McDonnell Boulavard	4,410sy
Banshee Road	954sy
Total	11,307sy

331XX.03.04.01. Bituminous Surfacing

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
MIL PM Asphaltic conc					0.10	4.05	1.17	26.67	0.00	31.90	
pavement,	2083.00	TON	COKCB25	106.25	216	8,441	2,445	55,554	0	66,440	31.90
highway, binder course, 4" thic											
MIL PM Asphaltic conc					0.12	4.73	1.65	29.00	0.00	35.38	
pavement,	1562.00	TON	COKCB25B	100.00	187	7,385	2,584	45,298	0	55,268	35.38
highway, wearing course, 3" thick											
TOTAL Bituminous Sur	3645.00	TON			403	15,827	5,029	100,852	0	121,707	33.39

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.03.04.02. Prime Coat											
MIL PM Surface treatm					0.01	0.27	0.17	3.25	0.00	3.68	
ent, prime coa	837.00	CSF	COKBB45	300.00	6	223	140	2,720	0	3,083	3.68
t,											
bituminous, 0.28 gal/SY											
TOTAL Prime Coat	2604.00	GAL			6	223	140	2,720	0	3,083	1.18

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.03.04.05. Base Course											
B MIL PM Base course, c					0.02	0.86	0.55	2.50	0.00	3.91	
ompacted to 9" deep, crushed 3/4" stone, large areas	9300.00	SY	COFGB36B	375.00	198	7,964	5,148	23,250	0	36,361	3.91
TOTAL Base Course	3720.00	TON			198	7,964	5,148	23,250	0	36,361	9.77

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.03.04.06. Geotextile Fabric											
CIV PM Geotextile fab					0.02	0.74	0.10	1.29	0.00	2.13	
ric, 120 mil	9300.00	SY	ULABA2	150.00	186	6,863	925	11,997	0	19,786	2.13
thick, non-woven polypropylene											
TOTAL Geotextile Fab	9300.00	SY			186	6,863	925	11,997	0	19,786	2.13

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.03.04.11. Striping											
MIL PM Lines on pvmt,					2.40	90.11	14.61	90.00	0.00	194.72	
acrylic	12.21	MLF	CLABB78	2.50	29	1,100	178	1,099	0	2,378	194.72
waterborne, white or yellow, 4" wide											
TOTAL Striping	12210	LF			29	1,100	178	1,099	0	2,378	0.19

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.03.04.90. Pavement Removal											
Remove and dispose of offsite 9,300sy of asphalt with some base at approx. 1' thick = 3,100cy											
L MIL PM Site dml, bitu					0.15	6.02	2.64	0.00	0.00	8.66	
minous, paveme nt removal, roads	9300.00	SY	CLADB38	32.34	1,438	56,005	24,514	0	0	80,518	8.66
TOTAL Pavement Remov	9300.00	SY			1,438	56,005	24,514	0	0	80,518	8.66

331XX.03. Site Work	QUANTY UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.03.04.91. Hauling of Pavement for Disposal										
AF PM Hauling, hwy h				0.05	1.88	1.97	0.00	0.00	3.85	
aulers, 12 CY, 12 mile round trip @ base wide rate	4030.00 CY	COEIB34B	20.00	202	7,574	7,929	0	0	15,503	3.85
USR PM Landfill Tippi				0.05	1.88	1.97	0.00	200.00	203.85	
ng Fee for Const. Debris/Truck Load	336.00 EA	COEIB34B	20.00	17	631	661	0	67,200	68,493	203.85
TOTAL Hauling of Pav	4030.00 CY			218	8,205	8,590	0	67,200	83,995	20.84

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.03.04.92. Traffic Control											
Assume traffic control to be required for a 3 month duration or 520hrs. Database crew only considers 25% actual work time.											
USR PM Flag Crew W/Pi					0.25	9.46	1.28	0.00	0.00	10.74	
ckup	520.00	HRS	XFLAC	1.00	130	4,922	663	0	0	5,585	10.74
TOTAL Traffic Contro					130	4,922	663	0	0	5,585	
TOTAL Roads	11307	SY			2,608	101,108	45,188	139,918	67,200	353,414	31.26

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST

331XX.03.90. Railroads

Based on information provided by the field it appears there are 14 locations with approximately 41,630lf of railroad track to be removed and reinstalled. Some of the locations have multiple tracks. Material prices consider 75% salvage on track and 50% reuse of the ballast.
Tthe amount of track to be replaced for this alternative is based on a volume fraction of 7% . The volume fration has been determined using supplemental criteria relative to free release criteria.

331XX.03.90. 5. Railroad Track Removal

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
MIL PM Railroad, remo					0.62	24.23	7.23	0.00	0.00	31.45	
ve existing tr ack	2900.00	LF	CLABB13	11.25	1,804	70,253	20,963	0	0	91,216	31.45
TOTAL Railroad Track					1,804	70,253	20,963	0	0	91,216	

331XX.03. Site Work	QUANTY UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.03.90.10. Railroad Track Reinstallation										
M MIL PM Railroad, 115				0.04	1.68	0.50	2.99	0.00	5.17	
lb prime rail,	2900.00 LF	CLABB13	162.50	125	4,864	1,451	8,671	0	14,986	5.17
ARA-A & AREA										
M AF PM Railroad, ball				0.40	15.22	0.86	4.09	0.00	20.17	
ast, crushed	2900.00 LF	CLABB14	15.00	1,160	44,126	2,505	11,861	0	58,492	20.17
stone, alternate pricing method										
USR PM Miscellaneous				0.00	0.00	0.00	5.00	0.00	5.00	
Materials and	2900.00 LF		0.00	0	0	0	14,500	0	14,500	5.00
Supplies										
TOTAL Railroad Track				1,285	48,989	3,956	35,032	0	87,978	
TOTAL Railroads	2900.00 LF			3,089	119,242	24,919	35,032	0	179,193	61.79

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST

331XX.03.91. Sheetpile Shoring

Current assumptions are that sheetpile shoring will be required at two locations along McDonnell Blvd. From Sta. 9+00 to 10+50 and Sta.13+00 to 20+00.

Sheetpile Quantities for PZ22 -
Sta. 9+00 to 10+50 = 150' x 20.6' = 3090sf
Sta. 13+00 to 17+50 = 450' x 20' = 9000sf
Sta. 17+50 to 19+00 = 150' x 27.5' = 4125sf
Sta. 19+00 to 20+00 = 100' x 20.5' = 2050sf

Total = 18265sf

	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
L MIL PM Sheet piling,					8.86	383.66	149.58	210.82	0.00	744.06	
stl,drive,extr ct&salvage no	200.92	TON	CPIDB40	0.90	1,781	77,083	30,053	42,357	0	149,494	744.06
TOTAL Sheetpile Shor	18265	SF			1,781	77,083	30,053	42,357	0	149,494	8.18

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.03.92. Additional Labor & Services											
331XX.03.92.15. Backfill											
USR PM Engineering Ma					0.00	52.09	0.00	0.00	0.00	52.09	
nager (100hrs/ yr)	500.00	HR		0.00	0	26,045	0	0	0	26,045	52.09
USR PM Lead Engineer					0.00	46.23	0.00	0.00	0.00	46.23	
(280hrs/yr)	1400.00	HR		0.00	0	64,722	0	0	0	64,722	46.23
USR PM Engineer (230h					0.00	34.05	0.00	0.00	0.00	34.05	
rs/yr)	1150.00	HR		0.00	0	39,158	0	0	0	39,158	34.05
USR PM Surveying Serv					0.00	0.00	0.00	0.00	50000.00	50000.00	
ices	5.00	YR		0.00	0	0	0	0	250,000	250,000	50000.00
USR PM Compaction Tes					0.00	0.00	0.00	0.00	23500.00	23500.00	
ting	5.00	YR		0.00	0	0	0	0	117,500	117,500	23500.00
TOTAL Backfill					0	129,925	0	0	367,500	497,425	
TOTAL Additional Lab					0	129,925	0	0	367,500	497,425	

331XX.03. Site Work	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.03.93. Misc. Utility Relocations Based on current field data assume one event/year for the 5year project duration for RA work.											
USR PM Site Utility R					0.00	0.00	0.00	0.00	50000.00	50000.00	
elocations	5.00	EA		0.00	0	0	0	0	250,000	250,000	50000.00
TOTAL Misc. Utility					0	0	0	0	250,000	250,000	
TOTAL Site Work					34,276	1,452,347	1,120,972	1,400,575	684,700	4,658,594	

331XX.05. Surface Water	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.05. Surface Water Collect & Control											
331XX.05.92. Additional Labor & Services											
331XX.05.92. 5. Water Management											
USR PM Engineering Ma					0.00	52.09	0.00	0.00	0.00	52.09	
nager (100hrs/ yr)	500.00	HR		0.00	0	26,045	0	0	0	26,045	52.09
USR PM Engineer (330h					0.00	34.05	0.00	0.00	0.00	34.05	
rs/yr)	1650.00	HR		0.00	0	56,182	0	0	0	56,182	34.05
USR PM Lead Engineer					0.00	46.23	0.00	0.00	0.00	46.23	
(480hrs/yr)	2400.00	HR		0.00	0	110,952	0	0	0	110,952	46.23
USR PM Construction E					0.00	36.56	0.00	0.00	0.00	36.56	
ngineer (1250hrs/yr)	6250.00	HR		0.00	0	228,500	0	0	0	228,500	36.56
USR PM Principle Engi					0.00	69.65	0.00	0.00	0.00	69.65	
neer (200hrs/y r)	1000.00	HR		0.00	0	69,650	0	0	0	69,650	69.65
USR PM Support Engine					0.00	64.00	0.00	0.00	0.00	64.00	
er (1210hrs/yr)	6050.00	HR		0.00	0	387,200	0	0	0	387,200	64.00
TOTAL Water Manageme					0	878,530	0	0	0	878,530	

331XX.05. Surface Water	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.05.92.10. Water Treatment											
USR PM Engineering Manager (100hrs/yr)					0.00	52.09	0.00	0.00	0.00	52.09	
	500.00	HR		0.00	0	26,045	0	0	0	26,045	52.09
USR PM Lead Engineer (480hrs/yr)					0.00	46.23	0.00	0.00	0.00	46.23	
	2400.00	HR		0.00	0	110,952	0	0	0	110,952	46.23
USR PM Consulting Services					0.00	0.00	0.00	0.00	10000.00	10000.00	
	5.00	YR		0.00	0	0	0	0	50,000	50,000	10000.00
USR PM Testing & Analysis					0.00	0.00	0.00	0.00	20000.00	20000.00	
	5.00	YR		0.00	0	0	0	0	100,000	100,000	20000.00
USR PM EDI - HP Tech					0.00	0.00	0.00	0.00	14758.00	14758.00	
	5.00	YR		0.00	0	0	0	0	73,790	73,790	14758.00
USR PM Insitu. lining sed. basin discharge pipe					0.00	0.00	0.00	0.00	20000.00	20000.00	
	5.00	YR		0.00	0	0	0	0	100,000	100,000	20000.00
USR PM Permit Coordinator (400hrs/yr)					0.00	65.00	0.00	0.00	0.00	65.00	
	2000.00	HR		0.00	0	130,000	0	0	0	130,000	65.00
USR PM Chemical Engineer (1040hrs/yr)					0.00	65.00	0.00	0.00	0.00	65.00	
	5200.00	HR		0.00	0	338,000	0	0	0	338,000	65.00
USR PM Resin Change Out					0.00	0.00	0.00	0.00	128500.00	128500.00	
	5.00	YR		0.00	0	0	0	0	642,500	642,500	128500.00
USR PM Bag Filters					0.00	0.00	0.00	1000.00	0.00	1000.00	
	5.00	YR		0.00	0	0	0	5,000	0	5,000	1000.00
USR PM Misc. Pvc/Hose Ftg.'s etc...					0.00	0.00	0.00	12000.00	0.00	12000.00	
	5.00	YR		0.00	0	0	0	60,000	0	60,000	12000.00
USR PM Freeze Protection					0.00	0.00	0.00	0.00	10000.00	10000.00	
	5.00	YR		0.00	0	0	0	0	50,000	50,000	10000.00

331XX.05. Surface Water	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
TOTAL Water Treatmen					0	604,997	0	65,000	1,016,290	1,686,287	
TOTAL Additional Lab					0	1,483,527	0	65,000	1,016,290	2,564,817	
TOTAL Surface Water					0	1,483,527	0	65,000	1,016,290	2,564,817	

331XX.08. Solids Collect	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST

331XX.08. Solids Collect and Containment

Parameters/Assumptions:

Beneficial reuse is not considered for this estimate, therefore all excavated material is assumed to be disposed offsite. Material excavated at the SLAPS site is assumed to be hauled to the rail spur by scrapers. All other excavated material will be loaded into trucks, hauled to the rail spur and stockpiled on loading pad for loading into rail cars.

Factors:
Over-Excavation = 20%
Swell = 25%

Excavation:
Impacted InSiti Volume to be Removed -

Location	Insitu Volume	Excav. Volume (+20 overexcavation)	Trans/Disposal/ Backfill Volume (+25% swell)
SLAPS	102,618	123,142	153,927
SLAPS VP's	27,871	33,445	41,806
HISS/Futura	55,808	66,970	83,712
- Piles	0	0	0
- Futura Buildings	0	0	0
LATTY VP's	41,751	50,101	62,627
SLAPS VP Roads	718	862	1,077
SLAPS VP Railroads	353	424	530
Latty Roads	0	0	0
Latty Railroads	0	0	0
Coldwater Creek VP's	2,377	2,852	3,565
Coldwater Creek	517	620	776
Total	232,013	278,416	348,020

Total Excavated Volume (InSitu) = 278,416 cy (incl. over-excavation)
Total Excavated Volume (ExSitu) = 348,020 cy

InSitu Volume used for excavation
ExSitu Volume used for, hauling, loading into rail cars, spreading & compaction of backfill.

Production Rate:
Due to ineffeciencies assumed for this type of work, production rates are adjusted by an efficiency factor as well as the HTRW productivity factor.
Database production rates for excavation are based on BCY's.(InSiti)
Assume level of protection to be Level D Modified
Efficiency Factor = 75%
HTRW Productivity factor = 82%

331XX.08. Solids Collect	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST

331XX.08.01. Contaminated Soil Collection

Includes the removal during remedial action of solid contaminated soil HTRW waste by front end loader, backhoe, gradall, clamshell, dragline or other mechanical means.
Assume bulk excavation to be acomplished using scrapers and dozers(SLAPS).
All other material will be loaded directly into trucks and hauled to the rail spur for disposal.
PPE is not considered for hauling.

331XX.08.01.02. Excavation

Production rates:
Excavation by Hyd.Excavator = 162.5cy/hr x .75 x .82 = 100cy/hr
Excavation by Scraper = 112.5cy/hr x .75 x.82 = 69cy/hr
Excavation by Dozer = 115cy/hr x .75 x .82 = 71cy/hr

USE 70cy/hr for scapers & dozers

		QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
L CIV PM	Excavate & loa					0.02	0.82	1.25	0.00	0.00	2.07	
	d, hydr excava tor, 3.5 CY, medium matl	155274	CY	CODEB12D	100.00	3,105	127,682	194,341	0	0	322,023	2.07
L MIL PM	Excavation, bu					0.03	1.05	1.76	0.00	0.00	2.82	
	lk, scraper, 25 BCY	123142	CY	CODSB33E	70.00	3,165	129,890	217,247	0	0	347,137	2.82
L CIV PM	Excavating, bu					0.02	0.87	1.19	0.00	0.00	2.06	
	lk, medium mat l, 300' push, dozer, open site, 335 HP	123142	CY	CODTB10M	70.00	2,635	107,601	146,243	0	0	253,845	2.06
TOTAL	Excavation	278416	CY			8,905	365,173	557,831	0	0	923,005	3.32

331XX.08. Solids Collect	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.08.01.03. Hauling											
MIL PM Hauling, hwy h					0.03	0.94	0.98	0.00	0.00	1.92	
aulers, 12 CY, 1 mi round trip @ 20 MPH (4.2 cyc/hr)	348020	CY	COEIB34B	40.00	8,701	327,034	342,347	0	0	669,382	1.92
TOTAL Hauling	348020	CY			8,701	327,034	342,347	0	0	669,382	1.92

331XX.08. Solids Collect	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.08.01.90. Additional Labor & Services											
USR PM Engineering Manager (100hrs/yr)					0.00	52.09	0.00	0.00	0.00	52.09	
	500.00	HR		0.00	0	26,045	0	0	0	26,045	52.09
USR PM Lead Engineer (280hrs/yr)					0.00	46.23	0.00	0.00	0.00	46.23	
	1400.00	HR		0.00	0	64,722	0	0	0	64,722	46.23
USR PM Principle Engineer (330hrs/yr)					0.00	34.05	0.00	0.00	0.00	34.05	
	1650.00	HR		0.00	0	56,182	0	0	0	56,182	34.05
USR PM Field Engineer (2080hrs/yr)					0.00	66.00	0.00	0.00	0.00	66.00	
	10400	HR		0.00	0	686,400	0	0	0	686,400	66.00
USR PM Field Engineer (2080hrs/yr)					0.00	66.00	0.00	0.00	0.00	66.00	
	10400	HR		0.00	0	686,400	0	0	0	686,400	66.00
USR PM Surveying Services					0.00	0.00	0.00	0.00	70000.00	70000.00	
	5.00	YR		0.00	0	0	0	0	350,000	350,000	70000.00
USR PM Geotech Services					0.00	0.00	0.00	0.00	20500.00	20500.00	
	5.00	YR		0.00	0	0	0	0	102,500	102,500	20500.00
TOTAL Additional Lab					0	1,519,750	0	0	452,500	1,972,250	
TOTAL Contaminated S	278416	CY			17,606	2,211,957	900,179	0	452,500	3,564,636	12.80
TOTAL Solids Collect					17,606	2,211,957	900,179	0	452,500	3,564,636	

331XX.19. Disposal (Comm	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST

331XX.19. Disposal (Commercial)
Parameters/Assumptions:

As sufficient quantities of contaminated material is stockpiled at the rail spur it will be loaded into the gondola cars and shipped to Envirocare of Utah. Rail availability is considered to be unconstrained, all gondola cars are available as required.

Reference 08 Solids Collect. and Containment notes for quantities.
Assumptions:
Gondola Capacity = 80 lcy
Gondola liner = $450/ea
Absorbent Material = $20 /car
Rail Transportation = $ 6,850 /car
Commercial Disposal Fees -
  Envirocare - Bulk Soil = $ 104/cy
  Envirocare - Mixed Waste = $458/cy
  Envirosafe - Bulk Soil = $ $85/cy
  Envirosafe - Mixed Waste = $110/cy
Assume level of protection to be Level D Modified.

Disposal Quantities by Location -
Slaps -
  Bulk Soil
    Envirosafe 115,445cy
    Envirocare 38,482cy
Slaps VP's -
  Bulk Soil
    Envirosafe 82,785cy
    Envirocare 27,595cy
Hiss/Futura -
  Bulk Soil
    Envirosafe 31,392cy
    Envirocare 31,392cy
  Mixed Waste
    Envirosafe 10,464cy
    Envirocare 10,464cy
Futura Buildings -
  Bulk Soil
    Envirosafe 0cy
    Envirocare 0cy
  Mixed Waste
    Envirosafe 0cy
    Envirocare 0cy

Summary -
  Envirosafe
    Bulksoil 229,623cy
    Mixed Waste 10,464cy
  Envirocare

331XX.19. Disposal (Comm	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST

Bulksoil 97,469cy
Mixed Waste 10,464cy

331XX.19.21. Transport to Storage/Disp Facil

Transport to storage/disposal facility during remedial action includes equipment, materials, and labor for hauling, loading and unloading of solid wastes.

331XX.19.21.01. Loading of Solids

Assume F.E.Loader to load material into gondola cars from stockpile pad. The gondola cars have a capacity of approximately 80cy's and will be lined with a disposable liner. Liner is estimated to cost approximately $450/car.

ExSitu Quantity to be used for loading into gondola cars.
Total ExSitu Quant. = 348,020cy

Production Rate:
Assume that 6 rail cars can be loaded per day. (site wide average)
6ea/day @ 80cy/ea = 480cy/day or 60cy/hr
348,020cy / 60cy/hr = 5,800hrs
348,020cy / 80cy/car = 4,351 rail cars

Use two F.E.Loaders, one to move the material around and one to load the cars, six laborers (working foreman), four to line the gondolas and two to close up after loading and a Health Physicist Technician for 1/2hr per rail car for inspection.

EP PM LDR,FE, WH, 5.					0.00	0.00	55.71	0.00	0.00	55.71	
00 CY, ARTIC, 970F(2ea)	11600	HR	L40CA017	1.00	0	0	646,268	0	0	646,268	55.71
MIL PM Outside Equip.					1.00	44.95	0.00	0.00	0.00	44.95	
Operators, Heavy(2ea)	11600	HR	X-EQOPRHVY	1.00	11,600	521,464	0	0	0	521,464	44.95
MIL PM Outside Labore					1.00	38.86	0.00	0.00	0.00	38.86	
rs Foreman	5800.00	HR	X-LABORER	1.00	5,800	225,386	0	0	0	225,386	38.86
MIL PM Outside Labore					1.00	37.86	0.00	0.00	0.00	37.86	
rs (5ea)	29000	HR	X-LABORER	1.00	29,000	1,097,928	0	0	0	1,097,928	37.86
USR PM Disposable lin					0.00	0.00	0.00	450.00	0.00	450.00	
er	4351.00	EA		0.00	0	0	0	1,957,950	0	1,957,950	450.00

331XX.19. Disposal (Comm	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
USR PM Absorbent Mate					0.00	0.00	0.00	20.00	0.00	20.00	
rial	4351.00	EA		0.00	0	0	0	87,020	0	87,020	20.00
TOTAL Loading of Sol	348020	CY			46,400	1,844,778	646,268	2,044,970	0	4,536,017	13.03

331XX.19. Disposal (Comm	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.19.21.90. Transportation Costs											
USR PM Rail Trans. Co					0.00	0.00	0.00	0.00	6850.00	6850.00	
st (per rail c ar)	4351.00	EA		0.00	0	0	0	0	29804350	29,804,350	6850.00
TOTAL Transportation	348020	CY			0	0	0	0	29804350	29,804,350	85.64
TOTAL Transport to S	348020	CY			46,400	1,844,778	646,268	2,044,970	29804350	34,340,367	98.67

331XX.19. Disposal (Comm	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.19.22. Disposal Fees and Taxes											
Provides for all fees and taxes charged during remedial action for the disposal of wastes. These include fees and taxes charged at third party/commercial facilities.											
331XX.19.22.01. Landfill/Burial Grounds											
USR PM Envirosafe - B					0.00	0.00	0.00	0.00	85.00	85.00	
ulk Soil	229623	CY		0.00	0	0	0	0	19517955	19,517,955	85.00
USR PM Envirosafe - M					0.00	0.00	0.00	0.00	123.00	123.00	
ixed Waste	10464	CY		0.00	0	0	0	0	1,287,072	1,287,072	123.00
USR PM Envirocare - B					0.00	0.00	0.00	0.00	97.00	97.00	
ulk Soil	97469	CY		0.00	0	0	0	0	9,454,493	9,454,493	97.00
USR PM Envirocare - M					0.00	0.00	0.00	0.00	484.00	484.00	
ixed Waste	10464	CY		0.00	0	0	0	0	5,064,576	5,064,576	484.00
TOTAL Landfill/Buria	348020	CY			0	0	0	0	35324096	35,324,096	101.50
TOTAL Disposal Fees	348020	CY			0	0	0	0	35324096	35,324,096	101.50

331XX.19. Disposal (Comm	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.19.90. Transportation and Disposal of Building Decon. Material											
Costs for building decon/roof remediation is based on the proposal for the GIFREHC building ($3,000,000) and only considers transportation and disposal of roofing material.											
331XX.19.90.01. VP-1L (Wagner Brake)											
USR PM Transportation					0.00	0.00	0.00	0.00	18.75	18.75	
& Disposal of	225300	SF		0.00	0	0	0	0	4,224,375	4,224,375	18.75
Remediated roofing Material											
TOTAL VP-1L (Wagner					0	0	0	0	4,224,375	4,224,375	

331XX.19. Disposal (Comm	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.19.90.02. VP-2L (GIFREHC)											
USR PM Transportation					0.00	0.00	0.00	0.00	18.75	18.75	
& Disposal of	160000	SF		0.00	0	0	0	0	3,000,000	3,000,000	18.75
Remediated roofing Material											
TOTAL VP-2L (GIFREH					0	0	0	0	3,000,000	3,000,000	

331XX.19. Disposal (Comm	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.19.90.03. VP-3L											
USR PM Transportation					0.00	0.00	0.00	0.00	18.75	18.75	
& Disposal of	131100	SF		0.00	0	0	0	0	2,458,125	2,458,125	18.75
Remediated roofing Material											
TOTAL VP-3L					0	0	0	0	2,458,125	2,458,125	

331XX.19. Disposal (Comm	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.19.90.04. VP-4L											
USR PM Transportation					0.00	0.00	0.00	0.00	18.75	18.75	
& Disposal of	73400	SF		0.00	0	0	0	0	1,376,250	1,376,250	18.75
Remediated roofing Material											
TOTAL VP-4L					0	0	0	0	1,376,250	1,376,250	

331XX.19. Disposal (Comm	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.19.90.05. VP-5L											
USR PM Transportation					0.00	0.00	0.00	0.00	18.75	18.75	
& Disposal of	81600	SF		0.00	0	0	0	0	1,530,000	1,530,000	18.75
Remediated roofing Material											
TOTAL VP-5L					0	0	0	0	1,530,000	1,530,000	
TOTAL Transportation					0	0	0	0	12588750	12,588,750	
TOTAL Disposal (Comm					46,400	1,844,778	646,268	2,044,970	77717196	82,253,213	

331XX.20. Site Restorati	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.20. Site Restoration North County Areas - Slaps = 22.7 acres HISS = 11 acres VP's = 53 acres Total North County (unrestricted) = 86.7 acres , assume 75% for restoration Total assumed acreage to be restored = 65 acres											
331XX.20.01. Earthwork											
331XX.20.01.07. Grading											
L USR PM Subgrade, Fine					8.00	324.37	131.55	0.00	0.00	455.92	
Grading +/- . 1'	65.00	ACR	COFGA	0.25	520	21,084	8,550	0	0	29,635	455.92
L USR PM Rough Grade wi					1.67	70.72	104.83	0.00	0.00	175.55	
th Dozer	65.00	ACR	CODTG	0.75	108	4,597	6,814	0	0	11,411	175.55
TOTAL Grading	65.00	ACR			628	25,681	15,364	0	0	41,045	631.47
TOTAL Earthwork					628	25,681	15,364	0	0	41,045	

331XX.20. Site Restorati	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.20.04. Revegetation And Planting											
Revegetation and planting provides for the complete restoration of areas affected by remedial action construction. This includes fine grading and leveling of topsoil(refer. earthwork), seeding, mulching, fertilizer, sodding, erosion control, shrubs, and trees.											
331XX.20.04.01. Seeding/Mulch/Fertilizer											
USR PM 18.36 Lb/1000					1.02	38.50	39.40	22.65	0.00	100.55	
SF Fertilizer,	65.00	ACR	COFWK	1.72	66	2,503	2,561	1,472	0	6,536	100.55
Sprayed from Truck											
B USR PM Mechanical See					2.50	95.15	0.00	750.20	0.00	845.35	
ding	65.00	ACR	ULABE	0.50	163	6,185	0	48,763	0	54,948	845.35
AF PM Watering, wate					0.70	26.20	31.81	0.87	0.00	58.88	
r by truck	65.00	ACR	COFWB59	1.43	45	1,703	2,068	57	0	3,827	58.88
TOTAL Seeding/Mulch/	65.00	ACR			274	10,390	4,629	50,292	0	65,311	1004.78

331XX.20. Site Restorati	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.20.04.02. Miscelaneous Landscaping											
USR PM Misc. Landscap					0.00	0.00	0.00	0.00	500.00	500.00	
ing	65.00	ACR		0.00	0	0	0	0	32,500	32,500	500.00
TOTAL Miscelaneous L	65.00	ACR			0	0	0	0	32,500	32,500	500.00
TOTAL Revegetation A					274	10,390	4,629	50,292	32,500	97,811	

331XX.20. Site Restorati	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.20.92. Site Cleanup											
USR PM Site Debris Cl					6.40	250.47	95.77	0.00	0.00	346.24	
ean-Up & Remov al	65.00	AC	COETF	0.63	416	16,280	6,225	0	0	22,505	346.24
TOTAL Site Cleanup					416	16,280	6,225	0	0	22,505	
TOTAL Site Restorati					1,318	52,352	26,218	50,292	32,500	161,362	

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST

331XX.21. Demobilization

The same assumptions and durations considered for Mobilization and Prepatory Work will be used for Demobilzation unless specified otherwise. Time for decon of equipment is considered part of demob. time.

Reference notes under 01 Mobilize and Preporatory work for general assumptions.

331XX.21.01. Removal Of Temporary Facilities

Removal during remedial action of temporary facilities includes demobilization and dismantling of office trailers, storage and decontamination facilities, and other temporary facilities.

331XX.21.01.01. Office Trailers (contr.'s only)

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
USR PM Disconnect and					0.00	0.00	0.00	0.00	750.00	750.00	
Remove	8.00	EA		0.00	0	0	0	0	6,000	6,000	750.00
TOTAL Office Trailer	8.00	EA			0	0	0	0	6,000	6,000	750.00

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.21.01.02. Storage Facilities Assume the staging areas to be removed after the completion of the last contract.											
USR PM Removal of Sta					0.00	0.00	0.00	0.00	5000.00	5000.00	
ging Area	1.00	LS		0.00	0	0	0	0	5,000	5,000	5000.00
TOTAL Storage Facili	2.00	EA			0	0	0	0	5,000	5,000	2500.00

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.21.01.05. Decon. Fac. for Const. Equip.											
Decon. facility is presently in place at the SLAPS site. Assume the decon. facility to be removed after the completion of the last contract. Assume 25% of the original estimated cost for removal.											
USR PM Remove Deconta					0.00	0.00	0.00	0.00	15000.00	15000.00	
mination Facil ity	1.00	EA		0.00	0	0	0	0	15,000	15,000	15000.00
TOTAL Decon. Fac. f					0	0	0	0	15,000	15,000	

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.21.01.10. Toilets											
Assume 2 portable toilets to be removed per each contract. (16ea)											
USR PM Portable Toile					0.00	0.00	0.00	0.00	100.00	100.00	
ts	16.00	EA		0.00	0	0	0	0	1,600	1,600	100.00
TOTAL Toilets	16.00	EA			0	0	0	0	1,600	1,600	100.00

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.21.01.11. Barricades											
Assume a lump sum cost per contract for removal.											
USR PM Remove Barrica					0.00	0.00	0.00	0.00	1500.00	1500.00	
des	8.00	EA		0.00	0	0	0	0	12,000	12,000	1500.00
TOTAL Barricades					0	0	0	0	12,000	12,000	

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.21.01.28. Signs											
Assume a cost per contract for removal.											
USR PM Remove Project					0.00	0.00	0.00	0.00	100.00	100.00	
Signs	16.00	EA		0.00	0	0	0	0	1,600	1,600	100.00
TOTAL Signs	16.00	EA			0	0	0	0	1,600	1,600	100.00
TOTAL Removal Of Tem					0	0	0	0	41,200	41,200	

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.21.02. Removal Of Temporary Utilities Provides for the dismantling and disconnection of project utilities during remedial action including site power and lighting, telephone/communication service, water, sewer and gas service.											
331XX.21.02.02. Power Connection/Distribution											
USR PM Temp. power di					0.00	0.00	0.00	0.00	500.00	500.00	
sconnect/contr	8.00	EA		0.00	0	0	0	0	4,000	4,000	500.00
act											
TOTAL Power Connecti					0	0	0	0	4,000	4,000	

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.21.02.03. Telephone/Communication Dist.											
L USR PM Disconnection					0.06	2.46	1.88	0.00	50.00	54.34	
Fee (per contract)	8.00	EA	COETW	60.00	0	20	15	0	400	435	54.34
TOTAL Telephone/Comm					0	20	15	0	400	435	

331XX.21. Demobilization	QUANTY UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.21.02.04. Water Connection/Distribution										
USR PM Disconnection				0.00	0.00	0.00	0.00	500.00	500.00	
Fee	8.00 EA		0.00	0	0	0	0	4,000	4,000	500.00
TOTAL Water Connecti				0	0	0	0	4,000	4,000	

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.21.02.05. Sewer Connection/Distribution											
USR PM Disconnection					0.00	0.00	0.00	0.00	300.00	300.00	
Fee	8.00	EA		0.00	0	0	0	0	2,400	2,400	300.00
TOTAL Sewer Connecti					0	0	0	0	2,400	2,400	
TOTAL Removal Of Tem					0	20	15	0	10,800	10,835	

331XX.21. Demobilization	QUANTY UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.21.04. Demob of Construction Equip/Facl										
Work associated with demobilization of remedial action construction equipment and temporary facilities. Includes transportation, manifests, tolls, permits, escort vehicles, drivers, and equipment operators.										
331XX.21.04.05. Permits										
USR PM Permits (all i				0.00	0.00	0.00	0.00	500.00	500.00	
nclusive)	8.00 EA		0.00	0	0	0	0	4,000	4,000	500.00
TOTAL Permits				0	0	0	0	4,000	4,000	

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
331XX.21.04.07. Demob. of Construction Equipment											
UPB PM TRK,WTR,OF-HY,					0.00	0.00	61.38	0.00	0.00	61.38	
6000GAL,W/CAT	64.00	HR	T60KI002	1.00	0	0	3,928	0	0	3,928	61.38
621E											
UPB PM TRK,WTR,OF-HY,					0.00	0.00	15.28	0.00	0.00	15.28	
6000GAL,W/CAT	256.00	HR	T60KI002	1.00	0	0	3,911	0	0	3,911	15.28
621E											
UPB PM HYD EXCAV, CRW					0.00	0.00	134.41	0.00	0.00	134.41	
LR, 3.125CY BK	32.00	HR	H25CA008	0.00	0	0	4,301	0	0	4,301	134.41
T											
UPB PM HYD EXCAV, CRW					0.00	0.00	36.79	0.00	0.00	36.79	
LR, 3.125CY BK	256.00	HR	H25CA008	0.00	0	0	9,419	0	0	9,419	36.79
T											
MIL PM ROLLER,VIB,SD,					0.00	0.00	29.67	0.00	0.00	29.67	
S/P,13.0T,66"W	64.00	HR	R50DY002	1.00	0	0	1,899	0	0	1,899	29.67
,PAD											
MIL PM ROLLER,VIB,SD,					0.00	0.00	6.41	0.00	0.00	6.41	
S/P,13.0T,66"W	256.00	HR	R50DY002	1.00	0	0	1,642	0	0	1,642	6.41
,PAD											
MAP PM DOZER,CWLR, D-					0.00	0.00	49.71	0.00	0.00	49.71	
6H PS,W/BLADE	64.00	HR	T15CA010	1.00	0	0	3,182	0	0	3,182	49.71
(ADD ATTACHMENTS)											
MAP PM DOZER,CWLR, D-					0.00	0.00	10.52	0.00	0.00	10.52	
6H PS,W/BLADE	256.00	HR	T15CA010	1.00	0	0	2,694	0	0	2,694	10.52
(ADD ATTACHMENTS)											
MAP PM DOZER,CWLR, D-					0.00	0.00	60.94	0.00	0.00	60.94	
8R PS,W/BLADE	64.00	HR	T15CA016	1.00	0	0	3,900	0	0	3,900	60.94
(ADD ATTACHMENTS)											
MAP PM DOZER,CWLR, D-					0.00	0.00	15.62	0.00	0.00	15.62	
8R PS,W/BLADE	256.00	HR	T15CA016	1.00	0	0	3,998	0	0	3,998	15.62
(ADD ATTACHMENTS)											
MIL PM SCRAPER,SELF,					0.00	0.00	98.56	0.00	0.00	98.56	
21-31CY, 37.5T	128.00	HR	S15CA002	1.00	0	0	12,615	0	0	12,615	98.56
, PS											
(2ea)											

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
MIL PM SCRAPER,SELF,					0.00	0.00	27.94	0.00	0.00	27.94	
21-31CY, 37.5T , PS (2ea)	512.00	HR	S15CA002	1.00	0	0	14,307	0	0	14,307	27.94
UPB PM LDR,FE, WH, 4.					0.00	0.00	60.99	0.00	0.00	60.99	
50 CY, ARTIC, 966E (2ea)	128.00	HR	L40CA006	1.00	0	0	7,807	0	0	7,807	60.99
UPB PM LDR,FE, WH, 4.					0.00	0.00	15.67	0.00	0.00	15.67	
50 CY, ARTIC, 966E (2ea)	512.00	HR	L40CA006	1.00	0	0	8,021	0	0	8,021	15.67
USR PM CR,ME,CWLR,LIF					0.00	0.00	91.24	0.00	0.00	91.24	
TING, 85T/160' BOOM	16.00	HR	C85AM010	1.00	0	0	1,460	0	0	1,460	91.24
USR PM CR,ME,CWLR,LIF					0.00	0.00	30.43	0.00	0.00	30.43	
TING, 85T/160' BOOM	64.00	HR	C85AM010	1.00	0	0	1,947	0	0	1,947	30.43
USR PM PILE HAMMER,VI					0.00	0.00	63.45	0.00	0.00	63.45	
B,116T FORCE D RIVE (ADD LEADS & CRANE)	16.00	HR	P30MK003	1.00	0	0	1,015	0	0	1,015	63.45
USR PM PILE HAMMER,VI					0.00	0.00	11.95	0.00	0.00	11.95	
B,116T FORCE D RIVE (ADD LEADS & CRANE)	64.00	HR	P30MK003	1.00	0	0	765	0	0	765	11.95
UPB PM TRLR,LOWBOY, 4					0.00	0.00	6.88	0.00	0.00	6.88	
0T, 3 AXLE (ADD TOWING TRUCK)	80.00	HR	T45XX015	1.00	0	0	551	0	0	551	6.88
UPB PM TRK,HWY, 46,00					0.00	0.00	35.40	0.00	0.00	35.40	
0 GVW, 6X4, 3 AXLE	80.00	HR	T50FO018	1.00	0	0	2,832	0	0	2,832	35.40
MIL PM TRK,HWY,10,000					0.00	0.00	7.97	0.00	0.00	7.97	
GVW,4X2, 1T-PI CKUP	80.00	HR	T50FO005	1.00	0	0	638	0	0	638	7.97

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
MIL PM Outside Equip.					1.00	44.95	0.00	0.00	0.00	44.95	
Operators, Heavy	80.00	HR	X-EQOPRHVY	1.00	80	3,596	0	0	0	3,596	44.95
MIL PM Outside Equip.					1.00	42.23	0.00	0.00	0.00	42.23	
Operators, Medium	80.00	HR	X-EQOPRMED	1.00	80	3,379	0	0	0	3,379	42.23
MIL PM Outside Truck					1.00	37.59	0.00	0.00	0.00	37.59	
Drivers, Heavy	80.00	HR	X-TRKDVRHV	1.00	80	3,007	0	0	0	3,007	37.59
MIL PM Outside Laborers, (Semi-Skilled) - 2ea					1.00	37.86	0.00	0.00	0.00	37.86	
	160.00	HR	X-LABORER	1.00	160	6,058	0	0	0	6,058	37.86
TOTAL Demob. of Cons					400	16,040	90,832	0	0	106,871	

331XX.21.04.90. Decon. of Construction Equipment

It is assumed that all equipment will be mobed., decontaminated, and demobed for each contract. Decontaminate 7pc.'s/contract x 8 contracts = 56pc's of equipment . Decontamination of construction equipment is assumed to be spread over the 5 year duration considered this study. Use 2days/pc. of equip.

Decon. Crew and Equipment -

Mechanics Truck	Operator/Mechanic
Compressor	Laborers -2ea
Power Washer	
Misc. Small Tools	

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
MIL PM TRK,HWY,10,000					0.00	0.00	7.97	0.00	0.00	7.97	
GVW,4X2, 1T-PI CKUP	896.00	HR	T50FO005	1.00	0	0	7,143	0	0	7,143	7.97
MIL PM Outside Equip.					1.00	42.23	0.00	0.00	0.00	42.23	
Operators, Mechanic	896.00	HR	X-EQOPRMED	1.00	896	37,841	0	0	0	37,841	42.23
MIL PM Outside Labore					1.00	37.86	0.00	0.00	0.00	37.86	
rs, (Semi-Skil led) - 2ea	1792.00	HR	X-LABORER	1.00	1,792	67,844	0	0	0	67,844	37.86
NON PM SMALL TOOLS					0.00	0.00	1.57	0.00	0.00	1.57	
	896.00	HR	XMIXX020	1.00	0	0	1,407	0	0	1,407	1.57
MAP PM WATER BLASTR,					0.00	0.00	8.48	0.00	0.00	8.48	
HOT WTR, 3000 PSI TRLR MTD	896.00	HR	W25SD004	1.00	0	0	7,598	0	0	7,598	8.48
EP PM AIR COMPR, 250					0.00	0.00	7.55	0.00	0.00	7.55	
CFM, 100 PSI (ADD HOSES & ATTACHMENTS)	896.00	HR	A15SR005	1.00	0	0	6,763	0	0	6,763	7.55
TOTAL Decon. of Cons					2,688	105,686	22,911	0	0	128,597	
TOTAL Demob of Const					3,088	121,725	113,743	0	4,000	239,468	

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST

331XX.21.06. Submittals

Submittals are incurred for obtaining all necessary site clean closure documentation. These include all final reports, punch lists, project acceptance, final QA/QC reports and As-Built Drawings during remedial action .

Assume a engineer and technicion for 80hrs/contract or 160hr/ea for contract closeout.

331XX.21.06.03. Project Acceptance

Assume 40hrs/ea contract for contract close-out

331XX.21. Demobilization	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
FOP PM Field Engineer					1.00	27.16	0.00	0.00	0.00	27.16	
	320.00	HR	FC-FLDER	1.00	320	8,690	0	0	0	8,690	27.16
FOP PM Field Constr.Q					1.00	19.35	0.00	0.00	0.00	19.35	
C.Technician	320.00	HR	FC-FLABT	1.00	320	6,191	0	0	0	6,191	19.35
TOTAL Project Accept	8.00	EA			640	14,881	0	0	0	14,881	1860.14
TOTAL Submittals					640	14,881	0	0	0	14,881	
TOTAL Demobilization					3,728	136,626	113,758	0	56,000	306,384	
TOTAL HTRW REMEDIAL					107,809	7,347,523	2,894,100	3,560,837	89857021	103,659,481	

332XX.01. Engineering Du	QUANTY UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
332XX. ENGINEERING DURING CONSTRUCTION										
332XX.01. Engineering During Construction										
USR Engineering Du				0.00	0.00	0.00	0.00	1388000	1388000.00	
ring Construct	1.00 LS		0.00	0	0	0	0	1,388,000	1,388,000	1388000.00
ion										
(1%)										
TOTAL Engineering Du				0	0	0	0	1,388,000	1,388,000	
TOTAL ENGINEERING DU				0	0	0	0	1,388,000	1,388,000	

333XX.01. CONSTRUCTION M	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
333XX. CONSTRUCTION MANAGEMENT (S&A)											
333XX.01. CONSTRUCTION MANAGEMENT (S&A)											
USR Construction M					0.00	0.00	0.00	0.00	8329000	8329000.00	
anagement (6%)	1.00	LS		0.00	0	0	0	0	8,329,000	8,329,000	8329000.00
TOTAL CONSTRUCTION M					0	0	0	0	8,329,000	8,329,000	
TOTAL CONSTRUCTION M					0	0	0	0	8,329,000	8,329,000	

34XXX.20. Operation, Mai	QUANTY UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST

34XXX. POST-REMEDIAL ACTION
(Post Remedial Action)
34XXX.20. Operation, Maint. & Monitoring
34XXX.20.01. Final Status Surveys

Costs were developed by field personnel and are based on projected manhours for individual tasks. The following items were considered ; walkover surveys, surveying in sample locations, sample collection, data analysis, preperation of reports, radiological analysis, QA/QC, metals analysis, on-site lab analysis and commercial lab analysis(off-site). Reference cost estimate backup data per file.

34XXX.20.01. 5. North County Properties

USR	Class 1 Survey				0.00	0.00	0.00	0.00	13200.00	13200.00	
	s	184.00 EA		0.00	0	0	0	0	2,428,800	2,428,800	13200.00
USR	Class 2 Survey				0.00	0.00	0.00	0.00	12600.00	12600.00	
	s	70.00 EA		0.00	0	0	0	0	882,000	882,000	12600.00
USR	Class 3 Survey				0.00	0.00	0.00	0.00	12600.00	12600.00	
	s	20.00 EA		0.00	0	0	0	0	252,000	252,000	12600.00
TOTAL	North County P				0	0	0	0	3,562,800	3,562,800	

34XXX. POST-REMEDIAL ACTION

34XXX.20. Operation, Mai	QUANTY UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
34XXX.20.01.10. Coldwater Creek										
USR Class 1 Survey				0.00	0.00	0.00	0.00	13200.00	13200.00	
s	20.00 EA		0.00	0	0	0	0	264,000	264,000	13200.00
USR Class 2 Survey				0.00	0.00	0.00	0.00	12600.00	12600.00	
s	124.00 EA		0.00	0	0	0	0	1,562,400	1,562,400	12600.00
USR Class 3 Survey				0.00	0.00	0.00	0.00	12600.00	12600.00	
s	140.00 EA		0.00	0	0	0	0	1,764,000	1,764,000	12600.00
TOTAL Coldwater Cree				0	0	0	0	3,590,400	3,590,400	

34XXX.20. Operation, Mai		QUANTY UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
	34XXX.20.01.15. North County Buildings										
USR	Class 2 Survey				0.00	0.00	0.00	0.00	10100.00	10100.00	
	s	89.00 EA		0.00	0	0	0	0	898,900	898,900	10100.00
USR	Class 3 Survey				0.00	0.00	0.00	0.00	1600.00	1600.00	
	s	40.00 EA		0.00	0	0	0	0	64,000	64,000	1600.00
TOTAL	North County B				0	0	0	0	962,900	962,900	

34XXX.20. Operation, Mai	QUANTY UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
34XXX.20.01.20. Roads										
USR Class 2 Sample				0.00	0.00	0.00	0.00	1100.00	1100.00	
s	600.00 EA		0.00	0	0	0	0	660,000	660,000	1100.00
TOTAL Roads				0	0	0	0	660,000	660,000	
TOTAL Final Status S				0	0	0	0	8,776,100	8,776,100	

34XXX.20. Operation, Mai	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
34XXX.20.02. Monitoring											
Monitoring cost includes costs associated with monitoring, sampling, testing and maintenance. Costs used are based on the current annual monitoring costs and depend on the number of areas that require monitoring. Costs are allocated as follows; SLAPS 40%, HISS/Futura 40%, LATTY 10%, SLAPS-VP 5%, AND Coldwater Creek 5%.											
USR Monitoring					0.00	0.00	0.00	0.00	686000.00	686000.00	
	1.00	LS		0.00	0	0	0	0	686,000	686,000	686000.00
TOTAL Monitoring					0	0	0	0	686,000	686,000	

34XXX.20. Operation, Mai	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
34XXX.20.03. Five Year Review The review consists of land use assessment, monitoring, testing and analysis, evaluation and risk assessment.											
USR Five Year Review	1.00	LS		0.00	0.00 0	0.00 0	0.00 0	0.00 0	40000.00 40,000	40000.00 40,000	40000.00
TOTAL Five Year Revi					0	0	0	0	40,000	40,000	

34XXX.20. Operation, Mai	QUANTY	UOM	CREW ID	OUTPUT	MANHOUR	LABOR	EQUIPMNT	MATERIAL	UNITCOST	TOTAL COST	UNIT COST
34XXX.20.04. Post Remedial Site Supervision											
Site supervision includes mowing, site maintenance and routine inspection.											
USR Site Supervisi					0.00	0.00	0.00	0.00	237000.00	237000.00	
on	1.00	LS		0.00	0	0	0	0	237,000	237,000	237000.00
TOTAL Post Remedial					0	0	0	0	237,000	237,000	
TOTAL Operation, Mai					0	0	0	0	9,739,100	9,739,100	
TOTAL POST-REMEDIAL					0	0	0	0	9,739,100	9,739,100	
TOTAL Revised FSPP -					107,809	7,347,523	2,894,100	3,560,837	127637121	141,439,581	

** CREW BACKUP **

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	**** LABOR **** HOURS	COST	**** EQUIP **** HOURS	COST	TOTAL COST
	CLABB13	5 laborers + 1 crane, hydr, trk mtd, 60 ton			PROD = 100%				CREW HOURS =	276
MIL	B-LABORER F	Laborers, (Semi-Skilled)	1.00	HR	38.86	1.00	38.86			38.86
MIL	B-LABORER L	Laborers, (Semi-Skilled)	4.00	HR	37.86	4.00	151.44			151.44
MIL	B-EQOPRCRNL	Equip. Operators, Crane/Shovel	1.00	HR	44.95	1.00	44.95			44.95
MIL	B-EQOPROILL	Equip. Operators, Oilers	1.00	HR	37.28	1.00	37.28			37.28
GEN	C80Z2280 E	CRANE, HYD, TRUCK MTD, 60 TON	1.00	HR	81.32			1.00	81.32	81.32
	TOTAL					7.00	272.53	1.00	81.32	353.85
	CLABB14	5 laborers + 1 loader, BH, wheel, 0.80 CY FE bkt			PROD = 100%				CREW HOURS =	193
MIL	B-LABORER F	Laborers, (Semi-Skilled)	1.00	HR	38.86	1.00	38.86			38.86
MIL	B-LABORER L	Laborers, (Semi-Skilled)	4.00	HR	37.86	4.00	151.44			151.44
MIL	B-EQOPRLT L	Equip. Operators, Light	1.00	HR	37.94	1.00	37.94			37.94
GEN	L50Z4640 E	LOADER/BH, WH, 0.80 CY (0.6 M3)	1.00	HR	12.96			1.00	12.96	12.96
	TOTAL					6.00	228.24	1.00	12.96	241.19
	CLABB78	5 laborers + 1 line striper, 3-4 guns, S/P			PROD = 100%				CREW HOURS =	5
MIL	B-LABORER F	Laborers, (Semi-Skilled)	1.00	HR	38.86	1.00	38.86			38.86
MIL	B-LABORER L	Laborers, (Semi-Skilled)	4.00	HR	37.86	4.00	151.44			151.44
MIL	B-TRKDVRLTL	Truck Drivers, Light	1.00	HR	34.98	1.00	34.98			34.98
GEN	L25Z4080 E	LINE STRIPER, 3-4 GUNS	1.00	HR	13.54			1.00	13.54	13.54
GEN	T50Z7400 E	TRUCK, 20,000 - 25,000 (9072 -	1.00	HR	14.21			1.00	14.21	14.21
GEN	T40Z7000 E	FLATBED,8' (2.4 M) X 20' (6.1 M	1.00	HR	1.03			1.00	1.03	1.03
GEN	T50Z7320 E	TRUCK, PICKUP, 8,800 (3992 KG)	1.00	HR	7.75			1.00	7.75	7.75
	TOTAL					6.00	225.28	4.00	36.53	261.81
	CLADB38	3 laborers + 1 hydraulic hammer, 1,000 ft-lbs			PROD = 100%				CREW HOURS =	288
MIL	B-LABORER F	Laborers, (Semi-Skilled)	1.00	HR	38.86	1.00	38.86			38.86
MIL	B-LABORER L	Laborers, (Semi-Skilled)	2.00	HR	37.86	2.00	75.72			75.72
MIL	B-EQOPRLT L	Equip. Operators, Light	1.00	HR	37.94	1.00	37.94			37.94
MIL	B-EQOPRMEDL	Equip. Operators, Medium	1.00	HR	42.23	1.00	42.23			42.23
GEN	L50Z4640 E	LOADER/BH, WH, 0.80 CY (0.6 M3)	1.00	HR	12.96			1.00	12.96	12.96
GEN	H10Z3120 E	HYD HAMMER,1000 FT-LBS (1356N-M	1.00	HR	7.97			1.00	7.97	7.97
GEN	L40Z4410 E	LOADER, F/E, WHEEL, 4.00 CY	1.00	HR	60.99			1.00	60.99	60.99
GEN	H25Z3680 E	PAVEMENT-REMOVAL BUCKET, 36"	1.00	HR	3.33			1.00	3.33	3.33
	TOTAL					5.00	194.75	4.00	85.25	280.00
	CODEB12D	1 eqoprcrn + 1 hydr excavator, crawler, 3.70 CY			PROD = 100%				CREW HOURS =	1553
MIL	B-EQOPRCRNL	Equip. Operators, Crane/Shovel	1.00	HR	44.95	1.00	44.95			44.95
MIL	B-EQOPROILL	Equip. Operators, Oilers	1.00	HR	37.28	1.00	37.28			37.28
GEN	H25Z3210 E	HYD EXCV, CRAWLER, 3.50 CY	1.00	HR	125.16			1.00	125.16	125.16
	TOTAL					2.00	82.23	1.00	125.16	207.39

** CREW BACKUP **

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	LABOR HOURS	LABOR COST	EQUIP HOURS	EQUIP COST	TOTAL COST
	CODSB33E	1 eqoprmed + 1 scraper, self propelled, 21-31 CY			PROD = 100%				CREW HOURS = 1759	
MIL	B-EQOPRMEDL	Equip. Operators, Medium	1.30	HR	42.23	1.30	54.90			54.90
MIL	B-LABORER L	Laborers, (Semi-Skilled)	0.50	HR	37.86	0.50	18.93			18.93
GEN	S15Z5980 E	SCRAPER, S/P, 21-31 CY	1.00	HR	98.56			1.00	98.56	98.56
GEN	T15Z6600 E	DOZER, CRWLR, 341-440 HP	0.30	HR	83.13			0.30	24.94	24.94
	TOTAL					1.80	73.83	1.30	123.50	197.33
	CODTB10B	1 eqoprmed + 1 dozer, crawler, 181-250 HP			PROD = 100%				CREW HOURS = 2784	
MIL	B-EQOPRMEDL	Equip. Operators, Medium	1.00	HR	42.23	1.00	42.23			42.23
MIL	B-LABORER L	Laborers, (Semi-Skilled)	0.50	HR	37.86	0.50	18.93			18.93
GEN	T15Z6520 E	DOZER, CRAWLER, 181-250 HP	1.00	HR	55.76			1.00	55.76	55.76
	TOTAL					1.50	61.16	1.00	55.76	116.92
	CODTB10M	1 eqoprmed + 1 dozer, crawler, 341-440 HP			PROD = 100%				CREW HOURS = 1759	
MIL	B-EQOPRMEDL	Equip. Operators, Medium	1.00	HR	42.23	1.00	42.23			42.23
MIL	B-LABORER L	Laborers, (Semi-Skilled)	0.50	HR	37.86	0.50	18.93			18.93
GEN	T15Z6600 E	DOZER, CRWLR, 341-440 HP	1.00	HR	83.13			1.00	83.13	83.13
	TOTAL					1.50	61.16	1.00	83.13	144.30
	CODTG	1 eqoprmed + 1 Dozer, Cat D-7H, 215 Hp			PROD = 100%				CREW HOURS = 87	
MIL	B-EQOPRMEDL	Equip. Operators, Medium	1.00	HR	42.23	1.00	42.23			42.23
MIL	B-EQOPRMEDF	Equip. Operators, Medium	0.25	HR	43.23	0.25	10.81			10.81
MIL	T10CA013 E	BLADE, UNIVERSAL, HYDR (FOR D7	1.00	HR	7.34			1.00	7.34	7.34
MIL	T15CA013 E	DOZER,CWLR, D-7H,PS (ADD BLADE	1.00	HR	71.28			1.00	71.28	71.28
	TOTAL					1.25	53.04	2.00	78.62	131.66
	COEIB34B	1 trkdvrhv + 1 truck, dump, 16-23.5 CY			PROD = 100%				CREW HOURS = 26320	
MIL	B-TRKDVRHVL	Truck Drivers, Heavy	1.00	HR	37.59	1.00	37.59			37.59
GEN	T50Z7420 E	TRUCK, 40,000 - 45,000 (18 144	1.00	HR	37.22			1.00	37.22	37.22
GEN	T40Z6860 E	REAR DUMP BODY,16-23.5 CY (12.2	1.00	HR	2.13			1.00	2.13	2.13
	TOTAL					1.00	37.59	2.00	39.35	76.94
	COETF	2 laborer + 1 8 Cy Dump Truck,Bckhoe/Loadr			PROD = 100%				CREW HOURS = 104	
MIL	B-LABORER L	Laborers, (Semi-Skilled)	2.00	HR	37.86	2.00	75.72			75.72
MIL	B-EQOPRMEDF	Equip. Operators, Medium	1.00	HR	43.23	1.00	43.23			43.23
MIL	B-TRKDVRHVL	Truck Drivers, Heavy	1.00	HR	37.59	1.00	37.59			37.59
MIL	L50CA003 E	LDR,BH,WH, 1.38CY FE BKT, 30"DI	1.00	HR	19.78			1.00	19.78	19.78
MIL	T40XX008 E	REAR DUMP BODY, 8 CY,(30,000 GV	1.00	HR	2.86			1.00	2.86	2.86
MIL	T50KE003 E	TRK,HWY, 46,000 GVW, 6X4, 3 AXL	1.00	HR	37.22			1.00	37.22	37.22
	TOTAL					4.00	156.54	3.00	59.86	216.40

** CREW BACKUP **

SRC	ITEM ID	DESCRIPTION	NO. UOM	RATE	LABOR HOURS	LABOR COST	EQUIP HOURS	EQUIP COST	TOTAL COST
	* COETW	2 eqoprlt + 1 1 Cy Hydr. Exc.,Cwlr + Backhoe		PROD = 100%			CREW HOURS =		0
MIL	B-ELECTRN L	Electricians	0.33 HR	52.08	0.33	17.19			17.19
MIL	B-EQOPRMEDF	Equip. Operators, Medium	0.25 HR	43.23	0.25	10.81			10.81
MIL	B-EQOPRMEDL	Equip. Operators, Medium	2.00 HR	42.23	2.00	84.47			84.47
MIL	B-TRKDVRLTL	Truck Drivers, Light	1.00 HR	34.98	1.00	34.98			34.98
MIL	H25CA023 E	HYD EXCAV, CRWLR, 1.125CY BKT,	1.00 HR	40.45			1.00	40.45	40.45
MIL	L40CA004 E	LDR,FE, WH, 2.50 CY, ARTIC, 936	1.00 HR	32.43			1.00	32.43	32.43
MIL	T40XX008 E	REAR DUMP BODY, 8 CY,(30,000 GV	1.00 HR	2.86			1.00	2.86	2.86
MIL	T50KE003 E	TRK,HWY, 46,000 GVW, 6X4, 3 AXL	1.00 HR	37.22			1.00	37.22	37.22
	TOTAL				3.58	147.44	4.00	112.96	260.40
	COFCB32F	1 eqoprmed + 1 truck, water, off-hwg, 6,000 gal		PROD = 100%			CREW HOURS =		580
MIL	B-LABORER L	Laborers, (Semi-Skilled)	1.00 HR	37.86	1.00	37.86			37.86
MIL	B-EQOPRMEDL	Equip. Operators, Medium	1.00 HR	42.23	1.00	42.23			42.23
MIL	B-TRKDVRHVL	Truck Drivers, Heavy	1.00 HR	37.59	1.00	37.59			37.59
GEN	R30Z5645 E	ROLLER, STATIC, S/P,13 T (12 MT	1.00 HR	16.84			1.00	16.84	16.84
GEN	T60Z7920 E	TRUCK, WATER, OFF-HWY, 6000 GAL	1.00 HR	61.38			1.00	61.38	61.38
	TOTAL				3.00	117.68	2.00	78.22	195.90
	COFGA	1 eqoprmed + 1 Grader 12-G		PROD = 100%			CREW HOURS =		260
MIL	B-LABORER L	Laborers, (Semi-Skilled)	1.00 HR	37.86	1.00	37.86			37.86
MIL	B-EQOPRMEDF	Equip. Operators, Medium	1.00 HR	43.23	1.00	43.23			43.23
MIL	G15CA003 E	GRADER,MOTOR, ARTIC, CAT 12-G	1.00 HR	32.89			1.00	32.89	32.89
	TOTAL				2.00	81.09	1.00	32.89	113.98
	COFGB36B	4 eqoprmed + 1 dozer, crawler, 251-340 HP		PROD = 100%			CREW HOURS =		25
MIL	B-LABORER F	Laborers, (Semi-Skilled)	1.00 HR	38.86	1.00	38.86			38.86
MIL	B-LABORER L	Laborers, (Semi-Skilled)	2.00 HR	37.86	2.00	75.72			75.72
MIL	B-EQOPRMEDL	Equip. Operators, Medium	4.00 HR	42.23	4.00	168.94			168.94
MIL	B-TRKDVRHVL	Truck Drivers, Heavy	1.00 HR	37.59	1.00	37.59			37.59
GEN	G15Z3080 E	GRADER, MOTOR, ARTICULATED	1.00 HR	30.33			1.00	30.33	30.33
GEN	L35Z4240 E	LOADER, F/E, CRWLR, 1.50 CY	1.00 HR	32.84			1.00	32.84	32.84
GEN	T15Z6570 E	DOZER, CRWLR, 300-340 HP	1.00 HR	69.94			1.00	69.94	69.94
GEN	R45Z5690 E	ROLLER, VIB, TANDEM, S/P 12 T	1.00 HR	40.76			1.00	40.76	40.76
GEN	T60Z7910 E	TRUCK, WATER, OFF-HWY, 5000 GAL	1.00 HR	33.67			1.00	33.67	33.67
	TOTAL				8.00	321.10	5.00	207.55	528.65
	COFWB59	1 trkdvrhv + 1 water tanker, 5,000 gal		PROD = 100%			CREW HOURS =		45
MIL	B-TRKDVRHVL	Truck Drivers, Heavy	1.00 HR	37.59	1.00	37.59			37.59
GEN	T50Z7520 E	TRUCK, 50,000-55,000 (22 680-24	1.00 HR	35.72			1.00	35.72	35.72
GEN	T45Z7280 E	TRAILER, WTR TANKER, 5000 GAL	1.00 HR	9.92			1.00	9.92	9.92
	TOTAL				1.00	37.59	2.00	45.64	83.23

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	LABOR HOURS	LABOR COST	EQUIP HOURS	EQUIP COST	TOTAL COST
	COFWK	1 trkdvrhv + 1 truck, water, off hwy, 6,000 gal PROD = 100%							CREW HOURS =	2035
MIL	B-EQOPRLT F	Equip. Operators, Light	0.25	HR	38.94	0.25	9.73			9.73
MIL	B-TRKDVRHVL	Truck Drivers, Heavy	1.00	HR	37.59	1.00	37.59			37.59
MIL	B-EQOPRLT L	Equip. Operators, Light	0.50	HR	37.94	0.50	18.97			18.97
GEN	P55Z5200 E	PUMP, SUBMERSIBLE, 6" (152 MM)	1.00	HR	6.46			1.00	6.46	6.46
GEN	T60Z7920 E	TRUCK, WATER, OFF-HWY, 6000 GAL	1.00	HR	61.38			1.00	61.38	61.38
	TOTAL					1.75	66.29	2.00	67.84	134.13
	COKBB45	1 eqoprmed + 1 asphalt distributor, 3,000 gal PROD = 100%							CREW HOURS =	3
MIL	B-EQOPRMEDL	Equip. Operators, Medium	1.00	HR	42.23	1.00	42.23			42.23
MIL	B-TRKDVRHVL	Truck Drivers, Heavy	1.00	HR	37.59	1.00	37.59			37.59
GEN	A25Z0580 E	ASPHALT DISTR,3000 GAL(11355L)	1.00	HR	15.58			1.00	15.58	15.58
GEN	T50Z7580 E	TRUCK, 40,000 - 45,000 (18 144	1.00	HR	34.75			1.00	34.75	34.75
	TOTAL					2.00	79.82	2.00	50.33	130.16
	COKCB25	8 laborers + 1 asph finisher, w/screed, 10' wide PROD = 100%							CREW HOURS =	20
MIL	B-LABORER F	Laborers, (Semi-Skilled)	1.00	HR	38.86	1.00	38.86			38.86
MIL	B-LABORER L	Laborers, (Semi-Skilled)	7.00	HR	37.86	7.00	265.02			265.02
MIL	B-EQOPRMEDL	Equip. Operators, Medium	3.00	HR	42.23	3.00	126.70			126.70
GEN	A30Z0640 E	ASPHALT FINISHER, 10' (3.1 M),W	1.00	HR	67.08			1.00	67.08	67.08
GEN	R45Z5690 E	ROLLER, VIB, TANDEM, S/P 12 T	1.00	HR	40.76			1.00	40.76	40.76
GEN	R30Z5645 E	ROLLER, STATIC, S/P,13 T (12 MT	1.00	HR	16.84			1.00	16.84	16.84
	TOTAL					11.00	430.58	3.00	124.69	555.27
	COKCB25B	8 laborers + 1 roller,vib,tandem,S/P,12Ton,84"w PROD = 100%							CREW HOURS =	16
MIL	B-LABORER F	Laborers, (Semi-Skilled)	1.00	HR	38.86	1.00	38.86			38.86
MIL	B-LABORER L	Laborers, (Semi-Skilled)	7.00	HR	37.86	7.00	265.02			265.02
MIL	B-EQOPRMEDL	Equip. Operators, Medium	4.00	HR	42.23	4.00	168.94			168.94
GEN	A30Z0640 E	ASPHALT FINISHER, 10' (3.1 M),W	1.00	HR	67.08			1.00	67.08	67.08
GEN	R45Z5690 E	ROLLER, VIB, TANDEM, S/P 12 T	2.00	HR	40.76			2.00	81.53	81.53
GEN	R30Z5645 E	ROLLER, STATIC, S/P,13 T (12 MT	1.00	HR	16.84			1.00	16.84	16.84
	TOTAL					12.00	472.81	4.00	165.45	638.27
	CPIDB40	5 piledrvrs + 1 crane, crawler,drag/clam, 50 ton PROD = 100%							CREW HOURS =	223
MIL	B-PILEDRVRF	Pile Drivers	1.00	HR	44.61	1.00	44.61			44.61
MIL	B-PILEDRVRL	Pile Drivers	4.00	HR	43.61	4.00	174.45			174.45
MIL	B-EQOPRCRNL	Equip. Operators, Crane/Shovel	2.00	HR	44.95	2.00	89.91			89.91
MIL	B-EQOPROILL	Equip. Operators, Oilers	1.00	HR	37.28	1.00	37.28			37.28
GEN	C85Z2395 E	CRANE, CRWLR, DRAG/CLAM, 2.0CY	1.00	HR	72.82			1.00	72.82	72.82
GEN	P30Z4920 E	PILE HAMMER,VIB,80T(73 MT) FORC	1.00	HR	62.18			1.00	62.18	62.18
	TOTAL					8.00	346.25	2.00	135.00	481.25

** CREW BACKUP **

SRC	ITEM ID	DESCRIPTION	NO.	UOM	RATE	**** LABOR **** HOURS	LABOR COST	**** EQUIP **** HOURS	EQUIP COST	TOTAL COST
	ULABA2	2 laborers + 1 truck, flatbed, 20,000-25,000 GVW			PROD = 100%				CREW HOURS =	62
MIL	B-LABORER	L Laborers, (Semi-Skilled)	2.00	HR	37.86	2.00	75.72			75.72
MIL	B-TRKDVRLT	L Truck Drivers, Light	1.00	HR	34.98	1.00	34.98			34.98
GEN	T40Z6960	E FLATBED,8' (2.4 M) X 12' (3.7 M	1.00	HR	0.72			1.00	0.72	0.72
GEN	T50Z7400	E TRUCK, 20,000 - 25,000 (9072 -	1.00	HR	14.21			1.00	14.21	14.21
	TOTAL					3.00	110.70	2.00	14.93	125.63
	ULABE	1 laborer			PROD = 100%				CREW HOURS =	130
MIL	B-LABORER	L Laborers, (Semi-Skilled)	1.00	HR	37.86	1.00	37.86			37.86
MIL	B-LABORER	F Laborers, (Semi-Skilled)	0.25	HR	38.86	0.25	9.71			9.71
	TOTAL					1.25	47.57	0.00	0.00	47.57
	XFLAC	2 flagger + 1 Pilot Car			PROD = 100%				CREW HOURS =	520
MIL	T50GM001	E TRK,HWY, 3,500GVW,4X2, COMPACT-	0.13	HR	4.86			0.13	0.63	0.63
MIL	X-LABORER	L Outside Laborers, (Semi-Skilled	0.25	HR	37.86	0.25	9.46			9.46
MIL	T50GM001	U TRK,HWY, 3,500GVW,4X2, COMPACT-	0.75	HR	0.86			0.75	0.64	0.64
	TOTAL					0.25	9.46	0.88	1.28	10.74

ITEM ID DESCRIPTION

0. 5. Prime Contractor
01XXX. G. Rights of Entry/Temporary Permit
32XXX.10. Project Management
32XXX.20. Investigations (PRP)
32XXX.30. Remedial Design
32XXX.40. Remedial Action Contracting
331XX.01. Mobilize and Preparatory Work
331XX.02. Monitor'g,Samplng,Test &Analysis
331XX.03. Site Work

CLABB13	5 laborers + 1 crane, hydr, trk mtd, 60 ton	PROD = 100%	CREW HOURS = 276
CLABB14	5 laborers + 1 loader, BH, wheel, 0.80 CY FE bkt	PROD = 100%	CREW HOURS = 193
CLABB78	5 laborers + 1 line striper, 3-4 guns, S/P	PROD = 100%	CREW HOURS = 5
CLADB38	3 laborers + 1 hydraulic hammer, 1,000 ft-lbs	PROD = 100%	CREW HOURS = 288
CODTB10B	1 eqoprmed + 1 dozer, crawler, 181-250 HP	PROD = 100%	CREW HOURS = 2784
COEIB34B	1 trkdvrhv + 1 truck, dump, 16-23.5 CY	PROD = 100%	CREW HOURS = 17619
COFCB32F	1 eqoprmed + 1 truck, water, off-hwg, 6,000 gal	PROD = 100%	CREW HOURS = 580
COFGB36B	4 eqoprmed + 1 dozer, crawler, 251-340 HP	PROD = 100%	CREW HOURS = 25
COFWK	1 trkdvrhv + 1 truck, water, off hwy, 6,000 gal	PROD = 100%	CREW HOURS = 1997
COKBB45	1 eqoprmed + 1 asphalt distributor, 3,000 gal	PROD = 100%	CREW HOURS = 3
COKCB25	8 laborers + 1 asph finisher, w/screed, 10' wide	PROD = 100%	CREW HOURS = 20
COKCB25B	8 laborers + 1 roller,vib,tandem,S/P,12Ton,84"w	PROD = 100%	CREW HOURS = 16
CPIDB40	5 piledrvrs + 1 crane, crawler,drag/clam, 50 ton	PROD = 100%	CREW HOURS = 223
ULABA2	2 laborers + 1 truck, flatbed, 20,000-25,000 GVW	PROD = 100%	CREW HOURS = 62
XFLAC	2 flagger + 1 Pilot Car	PROD = 100%	CREW HOURS = 520

331XX.05. Surface Water Collect & Control OR)
331XX.08. Solids Collect and Containment

CODEB12D	1 eqoprcrn + 1 hydr excavator, crawler, 3.70 CY	PROD = 100%	CREW HOURS = 1553
CODSB33E	1 eqoprmed + 1 scraper, self propelled, 21-31 CY	PROD = 100%	CREW HOURS = 1759
CODTB10M	1 eqoprmed + 1 dozer, crawler, 341-440 HP	PROD = 100%	CREW HOURS = 1759
COEIB34B	1 trkdvrhv + 1 truck, dump, 16-23.5 CY	PROD = 100%	CREW HOURS = 8701

331XX.19. Disposal (Commercial) RIES)
331XX.20. Site Restoration

CODTG	1 eqoprmed + 1 Dozer, Cat D-7H, 215 Hp	PROD = 100%	CREW HOURS = 87
COETF	2 laborer + 1 8 Cy Dump Truck,Bckhoe/Loadr	PROD = 100%	CREW HOURS = 104
COFGA	1 eqoprmed + 1 Grader 12-G	PROD = 100%	CREW HOURS = 260
COFWB59	1 trkdvrhv + 1 water tanker, 5,000 gal	PROD = 100%	CREW HOURS = 45
COFWK	1 trkdvrhv + 1 truck, water, off hwy, 6,000 gal	PROD = 100%	CREW HOURS = 38
ULABE	1 laborer	PROD = 100%	CREW HOURS = 130

331XX.21. Demobilization OR)

* COETW	2 eqoprlt + 1 1 Cy Hydr. Exc.,Cwlr + Backhoe	PROD = 100%	CREW HOURS = 0

332XX.01. Engineering During Construction
333XX.01. CONSTRUCTION MANAGEMENT (S&A)
34XXX.20. Operation, Maint. & Monitoring

** LABOR BACKUP **

SRC	LABOR ID	DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	RATE	UOM	UPDATE	**** TOTAL **** DEFAULT	HOURS
MIL	B-ELECTRN	Electricians	26.45	0.0%	43.2%	14.21	0.00	52.08	HR	11/30/00	27.92	0
MIL	B-EQOPRCRN	Equip. Operators, Crane/Shovel	23.92	0.0%	43.2%	10.71	0.00	44.95	HR	11/30/00	23.41	2274
MIL	B-EQOPRLT	Equip. Operators, Light	19.02	0.0%	43.2%	10.71	0.00	37.94	HR	11/30/00	15.97	2007
MIL	B-EQOPRMED	Equip. Operators, Medium	22.02	0.0%	43.2%	10.71	0.00	42.23	HR	11/30/00	15.97	8394
MIL	B-EQOPROIL	Equip. Operators, Oilers	18.56	0.0%	43.2%	10.71	0.00	37.28	HR	11/30/00	15.97	2051
MIL	B-LABORER	Laborers, (Semi-Skilled)	22.01	0.0%	43.2%	6.35	0.00	37.86	HR	11/30/00	12.50	8074
MIL	B-PILEDRVR	Pile Drivers	26.49	0.0%	43.2%	5.69	0.00	43.61	HR	11/30/00	25.72	1113
MIL	B-TRKDVRHV	Truck Drivers, Heavy	22.91	0.0%	43.2%	4.79	0.00	37.59	HR	11/30/00	11.56	29112
MIL	B-TRKDVRLT	Truck Drivers, Light	21.11	0.0%	43.2%	4.76	0.00	34.98	HR	11/30/00	9.51	67
FOP	FC-ENCGE	Geologist	19.89	0.0%	22.0%	2.89	0.00	27.16	HR	06/09/94	27.16	160
FOP	FC-ENGCI	Engineers, Civil	19.20	0.0%	22.0%	2.89	0.00	26.31	HR	06/09/94	26.31	960
FOP	FC-ENGQC	Engineers, Quality Control	19.89	0.0%	22.0%	2.89	0.00	27.16	HR	06/09/94	27.16	320
FOP	FC-FLABT	Field Constr.QC.\ Lab Technician	13.49	0.0%	22.0%	2.89	0.00	19.35	HR	06/09/94	19.35	320
FOP	FC-FLDER	Field Engineers	19.89	0.0%	22.0%	2.89	0.00	27.16	HR	06/09/94	27.16	320
RAD	FH-CIDEYG	Certified Industrial Hygienist	35.50	0.0%	35.0%	2.75	0.00	50.68	HR	06/09/94	50.68	352
RAD	FH-HEALTO	Site Safety & Health Officer	31.00	0.0%	35.0%	2.75	0.00	44.60	HR	06/09/94	44.60	448
MIL	X-EQOPRHVY	Outside Equip. Operators, Heavy	23.92	0.0%	43.2%	10.71	0.00	44.95	HR	11/30/00	23.41	12128
MIL	X-EQOPRMED	Outside Equip. Operators, Medium	22.02	0.0%	43.2%	10.71	0.00	42.23	HR	11/30/00	21.21	1424
MIL	X-LABORER	Outside Laborers, (Semi-Skilled)	22.01	0.0%	43.2%	6.35	0.00	37.86	HR	11/30/00	9.72	37778
MIL	X-TRKDVRHV	Outside Truck Drivers, Heavy	22.91	0.0%	43.2%	4.79	0.00	37.59	HR	11/30/00	19.23	528

SRC	LABOR ID	DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	RATE	UOM	UPDATE	**** TOTAL **** DEFAULT	HOURS
		0. 5. Prime Contractor										
		01XXX. G. Rights of Entry/Temporary Permit										
		32XXX.10. Project Management										
		32XXX.20. Investigations (PRP)										
		32XXX.30. Remedial Design										
		32XXX.40. Remedial Action Contracting										
		331XX.01. Mobilize and Preparatory Work										
FOP	FC-ENCGE	Geologist	19.89	0.0%	22.0%	2.89	0.00	27.16	HR	06/09/94	27.16	160
FOP	FC-ENGCI	Engineers, Civil	19.20	0.0%	22.0%	2.89	0.00	26.31	HR	06/09/94	26.31	960
FOP	FC-ENGQC	Engineers, Quality Control	19.89	0.0%	22.0%	2.89	0.00	27.16	HR	06/09/94	27.16	320
RAD	FH-CIDEYG	Certified Industrial Hygienist	35.50	0.0%	35.0%	2.75	0.00	50.68	HR	06/09/94	50.68	352
RAD	FH-HEALTO	Site Safety & Health Officer	31.00	0.0%	35.0%	2.75	0.00	44.60	HR	06/09/94	44.60	448
MIL	X-EQOPRHVY	Outside Equip. Operators, Heavy	23.92	0.0%	43.2%	10.71	0.00	44.95	HR	11/30/00	23.41	448
MIL	X-EQOPRMED	Outside Equip. Operators, Medium	22.02	0.0%	43.2%	10.71	0.00	42.23	HR	11/30/00	21.21	448
MIL	X-LABORER	Outside Laborers, (Semi-Skilled)	22.01	0.0%	43.2%	6.35	0.00	37.86	HR	11/30/00	9.72	896
MIL	X-TRKDVRHV	Outside Truck Drivers, Heavy	22.91	0.0%	43.2%	4.79	0.00	37.59	HR	11/30/00	19.23	448
		331XX.02. Monitor'g,Samplng,Test &Analysis										
		331XX.03. Site Work										
MIL	B-EQOPRCRN	Equip. Operators, Crane/Shovel	23.92	0.0%	43.2%	10.71	0.00	44.95	HR	11/30/00	23.41	721
MIL	B-EQOPRLT	Equip. Operators, Light	19.02	0.0%	43.2%	10.71	0.00	37.94	HR	11/30/00	15.97	1979
MIL	B-EQOPRMED	Equip. Operators, Medium	22.02	0.0%	43.2%	10.71	0.00	42.23	HR	11/30/00	15.97	3875
MIL	B-EQOPROIL	Equip. Operators, Oilers	18.56	0.0%	43.2%	10.71	0.00	37.28	HR	11/30/00	15.97	498
MIL	B-LABORER	Laborers, (Semi-Skilled)	22.01	0.0%	43.2%	6.35	0.00	37.86	HR	11/30/00	12.50	5684
MIL	B-PILEDRVR	Pile Drivers	26.49	0.0%	43.2%	5.69	0.00	43.61	HR	11/30/00	25.72	1113
MIL	B-TRKDVRHV	Truck Drivers, Heavy	22.91	0.0%	43.2%	4.79	0.00	37.59	HR	11/30/00	11.56	20224
MIL	B-TRKDVRLT	Truck Drivers, Light	21.11	0.0%	43.2%	4.76	0.00	34.98	HR	11/30/00	9.51	67
MIL	X-LABORER	Outside Laborers, (Semi-Skilled)	22.01	0.0%	43.2%	6.35	0.00	37.86	HR	11/30/00	9.72	130
		331XX.05. Surface Water Collect & Control										
		331XX.08. Solids Collect and Containment										
MIL	B-EQOPRCRN	Equip. Operators, Crane/Shovel	23.92	0.0%	43.2%	10.71	0.00	44.95	HR	11/30/00	23.41	1553
MIL	B-EQOPRMED	Equip. Operators, Medium	22.02	0.0%	43.2%	10.71	0.00	42.23	HR	11/30/00	15.97	4046
MIL	B-EQOPROIL	Equip. Operators, Oilers	18.56	0.0%	43.2%	10.71	0.00	37.28	HR	11/30/00	15.97	1553
MIL	B-LABORER	Laborers, (Semi-Skilled)	22.01	0.0%	43.2%	6.35	0.00	37.86	HR	11/30/00	12.50	1759
MIL	B-TRKDVRHV	Truck Drivers, Heavy	22.91	0.0%	43.2%	4.79	0.00	37.59	HR	11/30/00	11.56	8701
		331XX.19. Disposal (Commercial)										
MIL	X-EQOPRHVY	Outside Equip. Operators, Heavy	23.92	0.0%	43.2%	10.71	0.00	44.95	HR	11/30/00	23.41	11600
MIL	X-LABORER	Outside Laborers, (Semi-Skilled)	22.01	0.0%	43.2%	6.35	0.00	37.86	HR	11/30/00	9.72	34800
		331XX.20. Site Restoration										
MIL	B-EQOPRLT	Equip. Operators, Light	19.02	0.0%	43.2%	10.71	0.00	37.94	HR	11/30/00	15.97	28
MIL	B-EQOPRMED	Equip. Operators, Medium	22.02	0.0%	43.2%	10.71	0.00	42.23	HR	11/30/00	15.97	472
MIL	B-LABORER	Laborers, (Semi-Skilled)	22.01	0.0%	43.2%	6.35	0.00	37.86	HR	11/30/00	12.50	631
MIL	B-TRKDVRHV	Truck Drivers, Heavy	22.91	0.0%	43.2%	4.79	0.00	37.59	HR	11/30/00	11.56	187
		331XX.21. Demobilization										
MIL	B-ELECTRN	Electricians	26.45	0.0%	43.2%	14.21	0.00	52.08	HR	11/30/00	27.92	0
MIL	B-EQOPRMED	Equip. Operators, Medium	22.02	0.0%	43.2%	10.71	0.00	42.23	HR	11/30/00	15.97	0
MIL	B-TRKDVRLT	Truck Drivers, Light	21.11	0.0%	43.2%	4.76	0.00	34.98	HR	11/30/00	9.51	0

** LABOR BACKUP - SYSTEM **

SRC	LABOR ID	DESCRIPTION	BASE	OVERTM	TXS/INS	FRNG	TRVL	RATE	UOM	UPDATE	**** TOTAL **** DEFAULT	HOURS
FOP	FC-FLABT	Field Constr.QC.\ Lab Technician	13.49	0.0%	22.0%	2.89	0.00	19.35	HR	06/09/94	19.35	320
FOP	FC-FLDER	Field Engineers	19.89	0.0%	22.0%	2.89	0.00	27.16	HR	06/09/94	27.16	320
MIL	X-EQOPRHVY	Outside Equip. Operators, Heavy	23.92	0.0%	43.2%	10.71	0.00	44.95	HR	11/30/00	23.41	80
MIL	X-EQOPRMED	Outside Equip. Operators, Medium	22.02	0.0%	43.2%	10.71	0.00	42.23	HR	11/30/00	21.21	976
MIL	X-LABORER	Outside Laborers, (Semi-Skilled)	22.01	0.0%	43.2%	6.35	0.00	37.86	HR	11/30/00	9.72	1952
MIL	X-TRKDVRHV	Outside Truck Drivers, Heavy	22.91	0.0%	43.2%	4.79	0.00	37.59	HR	11/30/00	19.23	80

332XX.01. Engineering During Construction
333XX.01. CONSTRUCTION MANAGEMENT (S&A)
34XXX.20. Operation, Maint. & Monitoring

** EQUIPMENT BACKUP **

SRC	ID.NO.	EQUIPMENT DESCRIPTION	DEPR	FCCM	FUEL	FOG	TR WR	TR REP	EQ REP	TOTAL RATE	** TOTAL ** HOURS
EP	A15SR005	AIR COMPR, 250 CFM, 100 PSI	1.54	0.46	2.87	0.96			1.73	7.55 HR	896
GEN	A25Z0580	ASPHALT DISTR, 3,000GAL (11355L)	5.52	1.21		1.80			7.05	15.58 HR	3
GEN	A30Z0640	ASPHALT PAVER, 10.0' (3.1M)W,SP	20.53	5.73	4.71	3.07	1.69	0.28	31.09	67.08 HR	35
GEN	C80Z2280	CRANE, HYD, TRUCK MTD, 65T	28.15	10.71	10.63	3.30	0.92	0.15	27.47	81.32 HR	276
EP	C85AM010	CR,ME,CWLR,LIFTING, 85T/160'BOOM	33.06	13.90	4.12	1.05			39.11	91.24 HR	160
GEN	C85Z2395	DRAGLINE/CLAMSHELL,CRWLR, 2.0CY	27.16	9.03	3.22	1.29			32.13	72.82 HR	223
EP	G15CA003	GRADER,MOTOR, ARTIC, CAT 12-H	10.60	4.34	3.99	1.60	0.47	0.08	11.82	32.89 HR	260
GEN	G15Z3080	GRADER, MOTOR, 135 HP (101KW)	9.66	3.96	3.85	1.54	0.47	0.08	10.78	30.33 HR	25
GEN	H10Z3120	HYD HAMMER, 1000FT-LBS (1356N-M)	2.64	0.45		1.00			3.88	7.97 HR	288
EP	H25CA023	HYD EXCAV, CRWLR, 45,320 LBS,	13.93	4.42	3.89	1.73			16.48	40.45 HR	0
GEN	H25Z3210	HYD EXCV, CRAWLER, 140,000LBS,	37.19	15.63	12.27	3.13			56.94	125.16 HR	1553
GEN	H25Z3680	BUCKET, PAVEMENT-REMOVAL, 36"	1.42	0.24					1.67	3.33 HR	288
GEN	L25Z4080	ROAD LINE STRIPER, 3-4 GUNS	3.13	0.76	2.17	1.60			5.88	13.54 HR	5
GEN	L35Z4240	LOADER, F/E, CRWLR, 1.50CY	8.93	1.96	2.98	1.32			17.65	32.84 HR	25
MAP	L40CA006	LDR,FE, WH, 4.50 CY, ARTIC, 966F	19.33	6.00	6.68	3.34	3.76	0.63	21.26	60.99 HR	1280
EP	L40CA017	LDR,FE, WH, 5.00 CY, ARTIC, 970F	18.28	5.87	7.59	2.70	3.14	0.52	17.61	55.71 HR	11600
GEN	L40Z4410	LOADER, F/E, WHEEL, 4.00CY	19.33	6.00	6.68	3.34	3.76	0.63	21.26	60.99 HR	288
EP	L50CA003	LDR,BH,WH, 1.38CY FE BKT, 30"DIP	6.08	1.84	2.70	1.02	0.46	0.08	7.60	19.78 HR	104
GEN	L50Z4640	LOADER/BCK-HOE,WH, 0.80CY(0.6M3)	3.73	1.17	1.82	0.69	0.72	0.12	4.70	12.96 HR	481
MAP	P30MK003	PILE HAMMER,VIB,107T FORCE DRIVE	16.44	3.74	9.87	3.72			29.69	63.45 HR	160
GEN	P30Z4920	PILE HAMMER,VIB, 80T (73MT)FORCE	16.02	3.64	9.87	3.72			28.93	62.18 HR	223
GEN	P55Z5200	PUMP, SUBM, 6" DIA, 1950GPM	1.15	0.34	2.54	1.35			1.08	6.46 HR	2035
GEN	R30Z5645	ROLLER, STATIC, 9 TIRES, SP,14T	5.95	1.34	2.43	0.67	0.34	0.06	6.06	16.84 HR	615
GEN	R45Z5690	ROLLER, VIB, DD, SP 12.0T	12.42	2.73	4.23	1.60			19.78	40.76 HR	76
MAP	R50DY002	ROLLER,VIB,SD,S/P,13.0T,66"W,PAD	8.89	1.97	4.15	1.57	0.18	0.03	12.89	29.67 HR	640
MAP	S15CA002	SCRAPER,SELF, 21-31CY, 37.5T, PS	30.52	12.69	12.83	4.84	8.33	1.39	27.96	98.56 HR	640
GEN	S15Z5980	SCRAPER, SP, 21-31CY (16-24M3)	30.52	12.69	12.83	4.84	8.33	1.39	27.96	98.56 HR	1759
MAP	T10CA013	BLADE, UNIVERSAL, HYDR, D-7	2.97	0.80		0.08			3.48	7.34 HR	87
MAP	T15CA010	DOZER,CWLR, D-6H PS,W/BLADE	13.23	3.91	5.46	2.31			24.80	49.71 HR	640
MAP	T15CA016	DOZER,CWLR, D-8R PS,W/BLADE	16.21	7.51	10.10	3.36			23.75	60.94 HR	640
GEN	T15Z6520	DOZER, CRAWLER, 181-250HP	15.42	7.15	7.95	2.65			22.59	55.76 HR	2784
GEN	T15Z6570	DOZER, CRAWLER, 300-340HP	19.06	8.83	10.60	3.53			27.92	69.94 HR	25
GEN	T15Z6600	DOZER, CRAWLER, 341-440HP	22.29	10.33	13.41	4.47			32.64	83.13 HR	2287
GEN	T40Z6860	REAR DUMP BODY, 16-23.5CY (12.2-	0.95	0.21					0.97	2.13 HR	26320
GEN	T40Z6960	TRK FLATBED, 8'X 12'(2.4MX 3.7M)	0.34	0.08					0.30	0.72 HR	62
GEN	T40Z7000	TRK FLATBED, 8'X 20'(2.4MX 6.1M)	0.49	0.11					0.43	1.03 HR	5
EP	T45XX015	TRLR,LOWBOY, 40T, 3 AXLE	2.58	0.92		0.50	0.58	0.10	2.22	6.88 HR	528
GEN	T45Z7280	TRAILER, WATER TANKER, 5000GAL	2.93	1.02	1.91	0.53	0.45	0.07	3.00	9.92 HR	45
EP	T50FO005	TRK,HWY,10,000GVW,4X2, 1T-PICKUP	1.96	0.45	2.28	0.76	0.46	0.08	2.00	7.97 HR	1424
EP	T50FO018	TRK,HWY, 46,000 GVW, 6X4, 3 AXLE	10.95	2.51	7.91	2.63	1.49	0.25	9.65	35.40 HR	528
MAP	T50GM001	TRK,HWY, 3,500GVW,4X2, COMPACT-P	1.19	0.26	1.53	0.51	0.14	0.02	1.20	4.86 HR	458
MAP	T50KE003	TRK,HWY, 50,000 GVW, 6X4, 3 AXLE	10.79	2.44	10.04	3.34	0.97	0.16	9.48	37.22 HR	104
GEN	T50Z7320	TRUCK, HWY 8,800 (3,992KG)GVW	1.93	0.43	2.28	0.76	0.34	0.06	1.96	7.75 HR	5
GEN	T50Z7400	TRUCK, HWY 25,000 (11,340KG)GVW	3.45	0.89	4.42	1.37	0.70	0.12	3.27	14.21 HR	67
GEN	T50Z7420	TRUCK, HWY 45,000 (20,412KG)GVW	10.79	2.44	10.04	3.34	0.97	0.16	9.48	37.22 HR	26320
GEN	T50Z7520	TRUCK, HWY 55,000 (24,948KG)GVW	10.07	2.28	10.04	3.34	0.97	0.16	8.85	35.72 HR	45
GEN	T50Z7580	TRUCK, HWY 45,000 (20,412KG)GVW	10.68	2.45	7.91	2.63	1.43	0.24	9.41	34.75 HR	3
MAP	T60KI002	TRK,WTR,OF-HY, 6000GAL,W/CAT621E	18.24	6.16	10.02	3.78	3.45	0.57	19.16	61.38 HR	640
GEN	T60Z7910	TRUCK, OFF-HWY, WATER, 5000GAL	10.15	3.42	5.31	2.01	1.82	0.30	10.66	33.67 HR	25
GEN	T60Z7920	TRUCK, OFF-HWY, WATER, 6000GAL	18.24	6.16	10.02	3.78	3.45	0.57	19.16	61.38 HR	2615
MAP	W25SD004	WATER BLASTR, HOT WTR, 3000 PSI	1.95	0.24	2.43	0.67	0.03	0.01	3.16	8.48 HR	896

** EQUIPMENT BACKUP **

SRC	ID.NO.	EQUIPMENT DESCRIPTION	DEPR	FCCM	FUEL	FOG	TR WR	TR REP	EQ REP	TOTAL RATE	** TOTAL ** HOURS
NON	XMIXX020	SMALL TOOLS	0.50	0.22	0.16	0.07			0.63	1.57 HR	896

** EQUIPMENT BACKUP - SYSTEM **

0. 5. Prime Contractor
01XXX. G. Rights of Entry/Temporary Permit
32XXX.10. Project Management
32XXX.20. Investigations (PRP)
32XXX.30. Remedial Design
32XXX.40. Remedial Action Contracting
331XX.01. Mobilize and Preparatory Work

SRC	ID.NO.	EQUIPMENT DESCRIPTION	DEPR	FCCM	FUEL	FOG	TR WR	TR REP	EQ REP	TOTAL RATE	** TOTAL ** HOURS
EP	C85AM010	CR,ME,CWLR,LIFTING, 85T/160'BOOM	33.06	13.90	4.12	1.05			39.11	91.24 HR	80
MAP	L40CA006	LDR,FE, WH, 4.50 CY, ARTIC, 966F	19.33	6.00	6.68	3.34	3.76	0.63	21.26	60.99 HR	640
MAP	P30MK003	PILE HAMMER,VIB,107T FORCE DRIVE	16.44	3.74	9.87	3.72			29.69	63.45 HR	80
MAP	R50DY002	ROLLER,VIB,SD,S/P,13.0T,66"W,PAD	8.89	1.97	4.15	1.57	0.18	0.03	12.89	29.67 HR	320
MAP	T15CA010	DOZER,CWLR, D-6H PS,W/BLADE	13.23	3.91	5.46	2.31			24.80	49.71 HR	320
MAP	T15CA016	DOZER,CWLR, D-8R PS,W/BLADE	16.21	7.51	10.10	3.36			23.75	60.94 HR	320
EP	T45XX015	TRLR,LOWBOY, 40T, 3 AXLE	2.58	0.92		0.50	0.58	0.10	2.22	6.88 HR	448
EP	T50FO005	TRK,HWY,10,000GVW,4X2, 1T-PICKUP	1.96	0.45	2.28	0.76	0.46	0.08	2.00	7.97 HR	448
EP	T50FO018	TRK,HWY, 46,000 GVW, 6X4, 3 AXLE	10.95	2.51	7.91	2.63	1.49	0.25	9.65	35.40 HR	448
MAP	T60KI002	TRK,WTR,OF-HY, 6000GAL,W/CAT621E	18.24	6.16	10.02	3.78	3.45	0.57	19.16	61.38 HR	320

331XX.02. Monitor'g,Samplng,Test &Analysis
331XX.03. Site Work

SRC	ID.NO.	EQUIPMENT DESCRIPTION	DEPR	FCCM	FUEL	FOG	TR WR	TR REP	EQ REP	TOTAL RATE	** TOTAL ** HOURS
GEN	A25Z0580	ASPHALT DISTR, 3,000GAL (11355L)	5.52	1.21		1.80			7.05	15.58 HR	3
GEN	A30Z0640	ASPHALT PAVER, 10.0' (3.1M)W,SP	20.53	5.73	4.71	3.07	1.69	0.28	31.09	67.08 HR	35
GEN	C80Z2280	CRANE, HYD, TRUCK MTD, 65T	28.15	10.71	10.63	3.30	0.92	0.15	27.47	81.32 HR	276
GEN	C85Z2395	DRAGLINE/CLAMSHELL,CRWLR, 2.0CY	27.16	9.03	3.22	1.29			32.13	72.82 HR	223
GEN	G15Z3080	GRADER, MOTOR, 135 HP (101KW)	9.66	3.96	3.85	1.54	0.47	0.08	10.78	30.33 HR	25
GEN	H10Z3120	HYD HAMMER, 1000FT-LBS (1356N-M)	2.64	0.45		1.00			3.88	7.97 HR	288
GEN	H25Z3680	BUCKET, PAVEMENT-REMOVAL, 36"	1.42	0.24					1.67	3.33 HR	288
GEN	L25Z4080	ROAD LINE STRIPER, 3-4 GUNS	3.13	0.76	2.17	1.60			5.88	13.54 HR	5
GEN	L35Z4240	LOADER, F/E, CRWLR, 1.50CY	8.93	1.96	2.98	1.32			17.65	32.84 HR	25
GEN	L40Z4410	LOADER, F/E, WHEEL, 4.00CY	19.33	6.00	6.68	3.34	3.76	0.63	21.26	60.99 HR	288
GEN	L50Z4640	LOADER/BCK-HOE,WH, 0.80CY(0.6M3)	3.73	1.17	1.82	0.69	0.72	0.12	4.70	12.96 HR	481
GEN	P30Z4920	PILE HAMMER,VIB, 80T (73MT)FORCE	16.02	3.64	9.87	3.72			28.93	62.18 HR	223
GEN	P55Z5200	PUMP, SUBM, 6" DIA, 1950GPM	1.15	0.34	2.54	1.35			1.08	6.46 HR	1997
GEN	R30Z5645	ROLLER, STATIC, 9 TIRES, SP,14T	5.95	1.34	2.43	0.67	0.34	0.06	6.06	16.84 HR	615
GEN	R45Z5690	ROLLER, VIB, DD, SP 12.0T	12.42	2.73	4.23	1.60			19.78	40.76 HR	76
GEN	T15Z6520	DOZER, CRAWLER, 181-250HP	15.42	7.15	7.95	2.65			22.59	55.76 HR	2784
GEN	T15Z6570	DOZER, CRAWLER, 300-340HP	19.06	8.83	10.60	3.53			27.92	69.94 HR	25
GEN	T40Z6860	REAR DUMP BODY, 16-23.5CY (12.2-	0.95	0.21					0.97	2.13 HR	17619
GEN	T40Z6960	TRK FLATBED, 8'X 12'(2.4MX 3.7M)	0.34	0.08					0.30	0.72 HR	62
GEN	T40Z7000	TRK FLATBED, 8'X 20'(2.4MX 6.1M)	0.49	0.11					0.43	1.03 HR	5
MAP	T50GM001	TRK,HWY, 3,500GVW,4X2, COMPACT-P	1.19	0.26	1.53	0.51	0.14	0.02	1.20	4.86 HR	458
GEN	T50Z7320	TRUCK, HWY 8,800 (3,992KG)GVW	1.93	0.43	2.28	0.76	0.34	0.06	1.96	7.75 HR	5
GEN	T50Z7400	TRUCK, HWY 25,000 (11,340KG)GVW	3.45	0.89	4.42	1.37	0.70	0.12	3.27	14.21 HR	67
GEN	T50Z7420	TRUCK, HWY 45,000 (20,412KG)GVW	10.79	2.44	10.04	3.34	0.97	0.16	9.48	37.22 HR	17619
GEN	T50Z7580	TRUCK, HWY 45,000 (20,412KG)GVW	10.68	2.45	7.91	2.63	1.43	0.24	9.41	34.75 HR	3
GEN	T60Z7910	TRUCK, OFF-HWY, WATER, 5000GAL	10.15	3.42	5.31	2.01	1.82	0.30	10.66	33.67 HR	25
GEN	T60Z7920	TRUCK, OFF-HWY, WATER, 6000GAL	18.24	6.16	10.02	3.78	3.45	0.57	19.16	61.38 HR	2577

331XX.05. Surface Water Collect & Control
331XX.08. Solids Collect and Containment

SRC	ID.NO.	EQUIPMENT DESCRIPTION	DEPR	FCCM	FUEL	FOG	TR WR	TR REP	EQ REP	TOTAL RATE	** TOTAL ** HOURS
GEN	H25Z3210	HYD EXCV, CRAWLER, 140,000LBS,	37.19	15.63	12.27	3.13			56.94	125.16 HR	1553

SRC	ID.NO.	EQUIPMENT DESCRIPTION	DEPR	FCCM	FUEL	FOG	TR WR	TR REP	EQ REP	TOTAL RATE	** TOTAL ** HOURS
GEN	S15Z5980	SCRAPER, SP, 21-31CY (16-24M3)	30.52	12.69	12.83	4.84	8.33	1.39	27.96	98.56 HR	1759
GEN	T15Z6600	DOZER, CRAWLER, 341-440HP	22.29	10.33	13.41	4.47			32.64	83.13 HR	2287
GEN	T40Z6860	REAR DUMP BODY, 16-23.5CY (12.2-	0.95	0.21					0.97	2.13 HR	8701
GEN	T50Z7420	TRUCK, HWY 45,000 (20,412KG)GVW	10.79	2.44	10.04	3.34	0.97	0.16	9.48	37.22 HR	8701
331XX.19. Disposal (Commercial)											
EP	L40CA017	LDR,FE, WH, 5.00 CY, ARTIC, 970F	18.28	5.87	7.59	2.70	3.14	0.52	17.61	55.71 HR	11600
331XX.20. Site Restoration											
EP	G15CA003	GRADER,MOTOR, ARTIC, CAT 12-H	10.60	4.34	3.99	1.60	0.47	0.08	11.82	32.89 HR	260
EP	L50CA003	LDR,BH,WH, 1.38CY FE BKT, 30"DIP	6.08	1.84	2.70	1.02	0.46	0.08	7.60	19.78 HR	104
GEN	P55Z5200	PUMP, SUBM, 6" DIA, 1950GPM	1.15	0.34	2.54	1.35			1.08	6.46 HR	38
MAP	T10CA013	BLADE, UNIVERSAL, HYDR, D-7	2.97	0.80		0.08			3.48	7.34 HR	87
GEN	T45Z7280	TRAILER, WATER TANKER, 5000GAL	2.93	1.02	1.91	0.53	0.45	0.07	3.00	9.92 HR	45
MAP	T50KE003	TRK,HWY, 50,000 GVW, 6X4, 3 AXLE	10.79	2.44	10.04	3.34	0.97	0.16	9.48	37.22 HR	104
GEN	T50Z7520	TRUCK, HWY 55,000 (24,948KG)GVW	10.07	2.28	10.04	3.34	0.97	0.16	8.85	35.72 HR	45
GEN	T60Z7920	TRUCK, OFF-HWY, WATER, 6000GAL	18.24	6.16	10.02	3.78	3.45	0.57	19.16	61.38 HR	38
331XX.21. Demobilization											
EP	A15SR005	AIR COMPR, 250 CFM, 100 PSI	1.54	0.46	2.87	0.96			1.73	7.55 HR	896
EP	C85AM010	CR,ME,CWLR,LIFTING, 85T/160'BOOM	33.06	13.90	4.12	1.05			39.11	91.24 HR	80
EP	H25CA023	HYD EXCAV, CRWLR, 45,320 LBS,	13.93	4.42	3.89	1.73			16.48	40.45 HR	0
MAP	L40CA006	LDR,FE, WH, 4.50 CY, ARTIC, 966F	19.33	6.00	6.68	3.34	3.76	0.63	21.26	60.99 HR	640
MAP	P30MK003	PILE HAMMER,VIB,107T FORCE DRIVE	16.44	3.74	9.87	3.72			29.69	63.45 HR	80
MAP	R50DY002	ROLLER,VIB,SD,S/P,13.0T,66"W,PAD	8.89	1.97	4.15	1.57	0.18	0.03	12.89	29.67 HR	320
MAP	S15CA002	SCRAPER,SELF, 21-31CY, 37.5T, PS	30.52	12.69	12.83	4.84	8.33	1.39	27.96	98.56 HR	640
MAP	T15CA010	DOZER,CWLR, D-6H PS,W/BLADE	13.23	3.91	5.46	2.31			24.80	49.71 HR	320
MAP	T15CA016	DOZER,CWLR, D-8R PS,W/BLADE	16.21	7.51	10.10	3.36			23.75	60.94 HR	320
EP	T45XX015	TRLR,LOWBOY, 40T, 3 AXLE	2.58	0.92		0.50	0.58	0.10	2.22	6.88 HR	80
EP	T50FO005	TRK,HWY,10,000GVW,4X2, 1T-PICKUP	1.96	0.45	2.28	0.76	0.46	0.08	2.00	7.97 HR	976
EP	T50FO018	TRK,HWY, 46,000 GVW, 6X4, 3 AXLE	10.95	2.51	7.91	2.63	1.49	0.25	9.65	35.40 HR	80
MAP	T50KE003	TRK,HWY, 50,000 GVW, 6X4, 3 AXLE	10.79	2.44	10.04	3.34	0.97	0.16	9.48	37.22 HR	0
MAP	T60KI002	TRK,WTR,OF-HY, 6000GAL,W/CAT621E	18.24	6.16	10.02	3.78	3.45	0.57	19.16	61.38 HR	320
MAP	W25SD004	WATER BLASTR, HOT WTR, 3000 PSI	1.95	0.24	2.43	0.67	0.03	0.01	3.16	8.48 HR	896
NON	XMIXX020	SMALL TOOLS	0.50	0.22	0.16	0.07			0.63	1.57 HR	896

332XX.01. Engineering During Construction
333XX.01. CONSTRUCTION MANAGEMENT (S&A)
34XXX.20. Operation, Maint. & Monitoring

Cost Assumption Summary for Alternative 5

Cost Code	Cost Components	Assumptions			
3XXX	**TOTAL COST**	Includes Design Contingencies (5%) **plus** Escalation Cost (Mid point of Construction, 2003) (7.3%) **plus** Post Remedial Action Escalation Cost (25.6%) (March 2008) **plus** Construction Contingencies (15%)			
01XXX	**Real Estate Analysis/Documents**				
01XXX.G	Rights of Entry/Temp Permits	Rights of Entry (ROE) = 279; Unit Cost = 500			
01XXX.G.02	Damages	Rights of Entry (ROE) = 279; Unit Cost = 500			
32XXX	**Project Management & Pre-Remedial Action**				
32XXX.10	Project Management	3% of HTRW Remedial Action (Construct)			
32XXX.20	Investigation (PRP)	PRP = 1% of HTRW Remedial Action (Construct)			
32XXX.30	Remedial Design	8% of HTRW Remedial Action (Construct)			
32XXX.40	Remedial Action Contracting	1% of HTRW Remedial Action (Construct)			
331XX	**HTRW Remedial Action (Construct)**				
331XX.01	***Mobilize and Preparatory Work***	8 contracts for mobilization (6 for SLAPS & 2 for HISS/Futura) No additional mobilization for SLAPS contract which is already in place 40 hrs/mobilization event (8 hrs operation & 32 hrs standby) Mobilization Crews = Truck w/lowboy, Mechanics truck, Pickup truck, Truck Driver, Mechanic, Operator, Laborer			
331XX.01.01	*Mob Construction Equip & Facilities*				
331XX.01.01.05	Permits	Cost per contract is same ($500) for all 8 contracts			
331XX.01.01.07	Construction Equipment	***Name***	***Quantity***	***Operating Cost ($/hr)***	***Standby Cost ($/hr)***
		Water Truck	1	61.38	15.28
		Hyd Excav CRW	1	134.41	36.79
		Roller	1	29.67	6.41
		Dozer, 6H PS	1	49.71	10.52
		Dozer, 8R PS	1	60.94	15.62
		FE Loader	2	60.99	15.67
		Lifting CWLR	1	91.24 (2 hrs)	30.43
		VI Pile Hammer	1	63.45	11.95
		Lowboy TRLR	1	6.88 (80 hrs)	15.67
		HWY Truck	1	35.40 (80 hrs)	7.97(80 hrs)
		Equip. Operator	1	44.95 (80 hrs)	42.23(80 hrs)
		Truck Driver	1	37.59 (80 hrs)	
		Outside laborers	2	37.86(80 hrs)	
331XX.01.03	*Submittals/Implementation Plan*	One plan for each contract			
331XX.01.03.04	Environmental Protection Plan	1 Civil Engineer	320 hrs	$26.31/hr	
		1 Certified Industrial Hygienist	160 hrs	$50.67/hr	
331XX.01.03.05	Sedimentation Control Plan	1 Civil Engineer	320 hrs	$26.31/hr	
		1 Geologist	160 hrs	$27.16/hr	
331XX.01.03.08	Site Safety and Health Plan	1 Site Safety & Health Officer	448 hrs	$44.60/hr	
		1 Certified Industrial Hygienist	192 hrs	$50.67/hr	
331XX.01.03.13	General Site Work Plan	1 Civil Engineer	320 hrs	$26.31/hr	
331XX.01.03.14	Quality Control Plan	1 Quality Control Engineer	320 hrs	$27.16/hr	
331XX.01.03.38	Permits	Unit Cost = $750/contract; Total Permit = 8			
331XX.01.04	*Setup/ Construct Temp Facilities*				
331XX.01.04.01	Office Trailers (Contractor)	One setup/hookup for each contract ($1500) (Deliver & Setup)			
331XX.01.04.02	Storage Facilities	2 storage areas (1office and I tool trailer for each area) for all			

Cost Code	Cost Components	Assumptions		
		contracts; (Unit cost = $5000)		
331XX.01.04.10	Toilets	2 portable toilets for each contract ($100/toilet)		
331XX.01.04.11	Barricades	Lump sum cost of $1500 for each contract		
331XX.01.04.28	Signs	2 construction signs per contract ($345/Sign)		
331XX.01.05	*Construct Temporary Utilities*	Assume all utilities are presently in-place on site and only a temporary hookup fee will be charged for each utility.		
331XX.01.05.02	Power Connection/Distribution	$500 for each contract		
331XX.01.05.03	Telephone/Communication Dist.	$100 for each contract		
331XX.01.05.04	Water Connection/Distribution	$500 for each contract		
331XX.01.05.05	Sewer Connection/Distribution	$300 for each contract		
331XX.02	***Monitoring, Sampling, Test, Analysis***	Costs are based on historical data for previous fiscal years. Monitoring Period = 5 Years		
331XX.02.90	Environmental Monitoring	Environmental Monitoring cost for each year = $627,560.		
331XX.02.91	Additional Labor & Sampling	Lab Sampling Services = $48,000/yr Health Physics Technician Cost = $1,083,638/yr Radiological Instrument & Supply Cost = $207,905/yr		
331XX.03	***Site Work***	Includes stripping topsoil, excavation, backfill, compaction, fine grading, hauling spoil, importation of borrow material and topsoil. Excludes work involving contaminated or hazardous materials. No personal protection is required. Normal productivity.		
331XX.03.03	*Earthwork*	All required borrow will come from Ft. Bell Quarry. Over-Excavation factor = 20%; Material Swell factor = 25 % Soil Excavation Volume = 278,416 CY; and Borrow required = 348,020 CY		
331XX.03.03.03	Backfill	Spreading Borrow with Dozer Cost = $0.94/CY Total Backfill = 348,020 CY		
331XX.03.03.04	Borrow	$4.00/CY for borrow material; Amount of Borrow = 308,446 CYs		
331XX.03.03.05	Hauling	Unit Cost (HWY Haulers) = $3.85/CY (348,020 CY)		
331XX.03.03.08	Compaction	Unit Cost (Wheel Roller) = $0.33/CY; Unit Cost (Water) = $0.974/CY; Compaction Volume = 348,020 CY		
331XX.03.04	*Roads*	Replacing asphalt roads at SLAPS VPs. Replacement cross-section: 3" Wearing Coarse, 4" Binder Coarse, and 9" Base with Geotextile. Roads to be replaced based on the supplementary cleanup criteria (100 pCi/g Ra-226, 285 pCi/g Th-230, 1,775 pCi/g U-238) Pershall Rd. = 1,865 SY; Hazelwood Rd. = 1,417 SY Latty Rd = 1,186 SY; Frost Avenue = 1,475 SY McDonnell Blvd = 4,410 SY; Banshee Rd = 954 SY Total =		
331XX.03.04.01	Bituminous Surfacing	*Material*	*Amount*	*Unit Cost (Labor + Mat)*
		4" Binder course	2083 Tons	$31.9/Ton
		3" Wearing course	1562 Tons	$35.38/Ton
331XX.03.04.02	Prime Coat	Bituminous Surface Treatment	2604 gal	$1.18/gallon
331XX.03.04.05	Base Course	Crushed Stone	3720 Tons	$9.77/Ton
331XX.03.04.06	Geotextile Fabric	120 mil Thick, non-woven polypropylene	9300 SY	$2.13/Ton
331XX.03.04.11	Striping	Acrylic Waterborne	12210 LF	$0.19/LF
331XX.03.04.90	Pavement Removal	Removal of Asphalt Road	9300 SY	$8.66/ SY
331XX.03.04.91	Hauling of Pavement for Disposal	Swell factor = 30%. So, total hauling of Pavement = 3,100 CY		

Cost Code	Cost Components	Assumptions		
		* 1.3 = 4,030 CY. Cost = Haulers cost (3.85/CY) + Landfill tipping fee ($203.85/CY)		
331XX.03.04.92	Traffic Control	Duration of Traffic Control = 3 months or 520 hrs. Database crew only considers 25% actual work time Unit Cost = $10.74/hr		
331XX.03.90	*Railroads*	14 locations with 2900 linear feet of railroad track to be removed and reinstalled. Material price Includes 75% salvage on track and 50% reuse of the ballast.		
331XX.03.90.5	Railroad Track Removal	Unit cost = $ 31.45/LF		
331XX.03.90.10	Railroad Track Reinstallation	Unit Cost Prime Rail = $5.17/LF; Ballast & Crushed stone = $20.17/LF Miscellaneous Materials & Supplies = $5.00/LF		
331XX.03.91	Sheetpile Shoring	Two locations along McDonnell Blvd. Total Quantities = 18256 SF; Unit Cost = $8.18/SF		
331XX.03.92	*Additional Labor & Services*	5 years		
331XX.03.92.15	Backfill	*Job Description*	*Time*	*Unit cost*
		1 Engineering Manager	500 hrs	$52.09/hr
		1 Lead Engineer	1400 hrs	$46.23 /hr
		1 Engineer	1150 hrs	$34.05 /hr
		Surveying Services	5 years	$5000/yr
		Compaction Testing	5 years	$12,500/yr
331XX.03.93	Misc. Utility Resources	Assume 1 event/year for the 5-year project. Unit cost = $50,000/yr		
331XX.05.	**Surface Water Collect & Control**			
331XX.05.92.	*Additional Labor & Services*			
331XX.03.92.5	Water Management	*Job Description*	*Hours/year*	*Unit cost ($/hr)*
		1 Engineering Manager	100	52.09
		1 Engineer	330	34.05
		1 Lead Engineer	480	46.23
		1 Construction Engineer	1250	36.56
		1 Principal Engineer	200	69.65
		1 Support Engineer	1210	64
331XX.03.92.10	Water Treatment	*Job*	*Time*	*Unit cost*
		1 Engineering Manager	100 hrs/yr	$52.09/hr
		1 Lead Engineer	480 hrs/yr	$46.23/hr
		Consulting Services	5 years	$10,000/yr
		Testing & Analysis	5 years	$20,000/yr
		EDI-HP Tech	5 years	$14,758/yr
		Insitu Lining Sedimentation Basin Discharge Pipe	5 years	$20,000/yr
		Permit Coordinator	400 hrs/yr	$65/hr
		1 Chemical Engineer	1040 hrs/yr	$65/hr
		Resin Change Out	5 years	$128,500/yr
		Bag Filters	5 years	$1,000/yr
		Misc. PVC, Hose, Fittings	5 years	$12,000/yr
		Freeze Protection	5 years	$10,000/yr
331XX.08	***Solids Collect and Containment***	All excavated material is assumed to be disposed offsite. Excavated SLAPS material to be hauled to the rail spur by scrapers. Other excavated material will be loaded into trucks, hauled to		

<table>
<tr><th>Cost Code</th><th>Cost Components</th><th colspan="4">Assumptions</th></tr>
<tr><td></td><td></td><td colspan="4">the rail spur & stockpiled on loading pad for loading into rail cars.
Over-Excavation factor = 20%; Swell factor = 25%.
Excavated volume (Insitu) = 239,013 CY.
Excavated volume (Exsitu) = 348,020 CY (Used for hauling, loading into rail cars, spreading & compaction of backfill).
Production Rate:
Level of protection to be Level D Modified.
Efficiency Factor = 75%; HTRW Productivity factor = 82%</td></tr>
<tr><td>331XX.08.01</td><td>Contaminated Soil Collection</td><td colspan="4">Bulk excavation to be accomplished using scrapers and dozers (SLAPS) and all other material will be loaded directly into trucks and hauled to the rail spur for disposal.
PPE is not considered for hauling.</td></tr>
<tr><td rowspan="4">331XX.08.01.02</td><td rowspan="4">Excavation</td><td>Equipment</td><td>Amount of Soil (CY)</td><td colspan="2">Unit Cost ($/CY)</td></tr>
<tr><td>Hydraulic Excavator (100 cy/hr)</td><td>155,274</td><td colspan="2">2.07</td></tr>
<tr><td>Scraper (70 cy/hr)</td><td>123,142</td><td colspan="2">2.82</td></tr>
<tr><td>Doze (70 cy/hr)</td><td>123,142</td><td colspan="2">2.06</td></tr>
<tr><td>331XX.08.01.03</td><td>Hauling</td><td>Hwy Haulers</td><td>348,020</td><td colspan="2">1.92</td></tr>
<tr><td rowspan="8">331XX.08.01.90</td><td rowspan="8">Additional Labor & Services</td><td>Job Description</td><td>Time</td><td colspan="2">Unit Cost</td></tr>
<tr><td>1 Engineering Manager</td><td>100 hrs/yr</td><td colspan="2">$52.09/hr</td></tr>
<tr><td>1 Lead Engineer</td><td>280 hrs/yr</td><td colspan="2">$46.23/hr</td></tr>
<tr><td>1 Principle Engineer</td><td>330 hrs/yr</td><td colspan="2">$34.05/hr</td></tr>
<tr><td>1 Field Engineer</td><td>2080 hrs/yr</td><td colspan="2">$66/hr</td></tr>
<tr><td>1 Field Engineer</td><td>2080 hrs/yr</td><td colspan="2">$66/hr</td></tr>
<tr><td>Surveying Services</td><td>5 yr</td><td colspan="2">$70,000/yr</td></tr>
<tr><td>Geotech Services</td><td>5 yr</td><td colspan="2">$20,500/yr</td></tr>
<tr><td>331XX.19</td><td>Disposal (Commercial)</td><td colspan="4">The contaminated material will be loaded into the gondola cars and shipped to Envirocare of Utah.
Rail and gondola cars are available as required.
Gondola capacity = 80 CY
Total Ex Situ Quantity = 348,020 CY
6 rail cars will be loaded per day.
Total rail cars = 4,820.</td></tr>
<tr><td>331XX.19.21</td><td>Transportation to Storage/Disposal Facility</td><td colspan="4">Includes equipment, materials, and labor for hauling, loading and unloading of solid wastes</td></tr>
<tr><td rowspan="7">331XX.19.21.01</td><td rowspan="7">Loading of Solids</td><td>Equipment/Laborer</td><td>Quantity</td><td>Total Hrs</td><td>Unit Cost ($/hr)</td></tr>
<tr><td>F.E Loaders</td><td>2</td><td>6543</td><td>55.71</td></tr>
<tr><td>Heavy Eqp. Operators</td><td>2</td><td>6543</td><td>44.95</td></tr>
<tr><td>Foreman</td><td>1.</td><td>6543</td><td>38.86</td></tr>
<tr><td>Outside Laborer</td><td>5</td><td>6543</td><td>37.86</td></tr>
<tr><td>Disposable Liner</td><td>48202</td><td>-</td><td>$450/unit</td></tr>
<tr><td>Absorbent Material</td><td>4820</td><td>-</td><td>$20/unit</td></tr>
<tr><td>331XX.19.21.90</td><td>Transportation Costs</td><td colspan="4">Rail Transportation = $6,850/car</td></tr>
<tr><td>331XX.19.22</td><td>Disposal Fees and Taxes</td><td colspan="4"></td></tr>
<tr><td rowspan="5">331XX.19.22.01</td><td rowspan="5">Landfill/Burial Grounds</td><td></td><td>Quantity (CY)</td><td colspan="2">Unit Cost ($/CY)</td></tr>
<tr><td>Envirosafe – Bulk Soil</td><td>229,623</td><td colspan="2">85</td></tr>
<tr><td>Envirosafe – Mixed Waste</td><td>10,494</td><td colspan="2">123</td></tr>
<tr><td>Envirocare – Bulk Soil</td><td>97,469</td><td colspan="2">97</td></tr>
<tr><td>Envirocare – Mixed Waste</td><td>10,464</td><td colspan="2">484</td></tr>
</table>

Cost Code	Cost Components	Assumptions	
331XX.19.90	Transportation and Disposal of Building Decont. Material	Unit Cost = $18.75/SF	
331XX.19.90.01	VP-1L (Wagner)	Amount of Remediated Roofing Material = 225,300 SF	
331XX.19.90.02	VP-2L (GIFREHC)	Amount of Remediated Roofing Material = 160,000 SF	
331XX.19.90.03	VP-3L	Amount of Remediated Roofing Material = 131,100 SF	
331XX.19.90.04	VP-4L	Amount of Remediated Roofing Material = 73,400 SF	
331XX.19.90.05	VP-5L	Amount of Remediated Roofing Material = 81,600 SF	
331XX.20	*Site Restoration*	SLAPS = 22.7 acres; HISS = 11 acres; VPs = 53 acres; North County (unrestricted) = 86.7 acres; 75% for restoration. Total acreages to be restored = 65 acres	
331XX.20.01	Earthwork	The entire site will be graded, fertilized and seeded. Miscellaneous landscaping/planting is also assumed for the site.	
331XX.20.01.07	Grading	*Equipment*	*Unit Cost ($/acres)*
		Fine grading	455.92
		Rough grading with Dozer	175.55
331XX.20.04	Revegetation and Planting	65 acres	
331XX.20.04.01	Seeding/Mulch/Fertilizer	*Equipment*	*Unit Cost ($/acres)*
		Spraying Fertilizer	100.55
		Mechanical Seeding	845.35
		Watering by Truck	58.88
331XX.20.04.02	Miscellaneous Landscaping	Landscaping Cost = $500/acres	
331XX.20.92	Site Cleanup	Site Debris Cleanup & Removal Cost = $346.24/acres	
331XX.21	***Demobilization***	Same assumptions and duration for Mobilization and Preparatory work will be used. Time for decontamination of equipment is considered part of demobilization time.	
331XX.21.01	*Removal of Temporary Facilities*	Includes demobilization & dismantling of office trailers, storage, and decontamination of facilities and other temporary facilities.	
331XX.21.01.01	Office Trailers (Contractor) only	Disconnect & Remove Cost = $750/Contact	
331XX.21.01.02	Storage Facilities	Will be removed completion of last contract. Removal Cost = $2500/each storage area	
331XX.21.01.05	Decontamination Facility For Construction Equipment	The decontamination facility will be removed after the completion of last contract. 25% of the original estimated cost for removal; Cost = $15000	
331XX.21.01.10	Toilets	2 toilets for each contract to be removed; Removal Cost = $100/unit	
331XX.21.01.11	Barricades	Total Barricades= 8; Unit Removal Cost = $1500	
331XX.21.01.28	Signs	Total Signs = 16: Unit Sign Removal Cost = $100	
331XX.21.02	*Removal of Temporary Utilities*	Dismantling & disconnection of project utilities during remedial action.	
331XX.21.02.02	Power Connection/Distribution	Disconnect/Contract Cost = $500	
331XX.21.02.03	Telephone/Communication Dist.	Disconnection Fee = $54.34/contract	
331XX.21.02.04	Water Connection/Distribution	Disconnection Fee = $500/contract	
331XX.21.02.05	Sewer Connection/Distribution	Disconnection Fee = $300/contract	
331XX.21.04	*Demobilization of Construction Equipment/Facilities*	It includes transportation, manifests, tolls, permits, escort vehicles, drivers, and equipment operators.	
331XX.21.04.05	Permits	Cost = $500/contract	

<table>
<tr><th>Cost Code</th><th>Cost Components</th><th colspan="3">Assumptions</th></tr>
<tr><td rowspan="16">331XX.21.04.07</td><td rowspan="16">Demobilization Of Construction Equipment</td><td>Equipment/ Laborer</td><td>Operating Cost ($/hr) & Hours</i></td><td><i>Stand by Cost ($/hr) & Hours</td></tr>
<tr><td>Water Truck</td><td>61.38
(64 hrs)</td><td>15.28
(256 hrs)</td></tr>
<tr><td>Excav CRW</td><td>134.41
(32 hrs)</td><td>36.79
(256 hrs)</td></tr>
<tr><td>Roller</td><td>29.67
(64 hrs)</td><td>6.41
(256 hrs)</td></tr>
<tr><td>Dozer, 6H PS</td><td>49.71
(64 hrs)</td><td>10.52
(256 hrs)</td></tr>
<tr><td>Dozer, 8R PS</td><td>60.94
(64 hrs)</td><td>15.62
(256 hrs)</td></tr>
<tr><td>Self Scrapper
(2 of them)</td><td>98.56
(128 hrs)</td><td>27.94
(512 hrs)</td></tr>
<tr><td>FE Loader
(2 of them)</td><td>60.99
(128 hrs)</td><td>15.67
(512 hrs)</td></tr>
<tr><td>Lifting CWLR</td><td>91.24
(16 hrs)</td><td>30.43/hr
(64 hrs)</td></tr>
<tr><td>VI Pile Hammer</td><td>63.45
(16 hrs)</td><td>11.95
(64 hrs)</td></tr>
<tr><td>Lowboy TRLR</td><td>6.88
(80 hrs)</td><td></td></tr>
<tr><td>HWY Truck</td><td>35.40
(80 hrs)</td><td>7.97
(80 hrs)</td></tr>
<tr><td>Outside Equip. Operator</td><td>44.95
(80 hrs)</td><td></td></tr>
<tr><td>Outside Equip. Operator</td><td>42.23
(80 hrs)</td><td></td></tr>
<tr><td>Outside Truck Driver</td><td>37.59
(80 hrs)</td><td></td></tr>
<tr><td>Outside laborers
(2 of them)</td><td>37.86
(160 hrs)</td><td></td></tr>
<tr><td>331XX.21.04.90</td><td>Decontamination Of Construction Equipment</td><td colspan="3">All equipment (56) will be decontaminated and demobilized for each contract. 2 days per piece of equipment.
Decontamination will be performed over the 5 years duration.
Equipments/Laborer
Total Hrs
Unit Cost ($/hr)

Mechanics Truck
896
7.97

Equipment Operators
896
42.23

Outside Laborers (2)
2 * 896
37.86

Small Tools
896
1.57

Power Washer
896
8.48</td></tr>
</table>

<table>
<tr><th>Cost Code</th><th>Cost Components</th><th colspan="3">Assumptions</th></tr>
<tr><td></td><td></td><td colspan="3">Compressor
896
7.55</td></tr>
<tr><td>331XX.21.06</td><td>Submittals</td><td colspan="3">1 Engineer and 1 Technician will work 80 hrs/contract.</td></tr>
<tr><td>331XX.21.06.03</td><td>Project Acceptance</td><td colspan="3">40 hrs/contract for contract closeout with 8 contracts = total hrs = 320.
Unit Cost (Engineer) = $27.16/hr;
Unit Cost (Technician) = $19.35/hr</td></tr>
<tr><td>332XX</td><td>Engineering During Construction</td><td colspan="3"></td></tr>
<tr><td>332XX.01</td><td>Total Engineering During Construction</td><td colspan="3">1% of HTRW Remedial Action (Construct)</td></tr>
<tr><td>333XX</td><td>Construction Management (S&A)</td><td colspan="3"></td></tr>
<tr><td>333XX.01</td><td>Construction Management (S&A)</td><td colspan="3">6% of HTRW Remedial Action (Construct)</td></tr>
<tr><td>34XXX</td><td>Post Remedial Action</td><td colspan="3"></td></tr>
<tr><td>34XXX.20</td><td>Operation, Maintenance & Monitoring</td><td colspan="3"></td></tr>
<tr><td>34XXX.20.01</td><td>Final Status Surveys</td><td colspan="3">Cost includes walkover surveys, surveying in sample locations, sample collection, data analysis, preparation of reports, radiological analysis, QA/QC, metals analysis, on-site lab analysis and commercial lab analysis (Off-site)</td></tr>
<tr><td rowspan="4">34XXX.20.01.5</td><td rowspan="4">North Country Properties</td><td>Survey Type</td><td># of Survey Units</td><td>Unit Cost ($/Survey)</td></tr>
<tr><td>Class 1 Survey</td><td>184</td><td>13,200</td></tr>
<tr><td>Class 2 Survey</td><td>70</td><td>12,600</td></tr>
<tr><td>Class 3 Survey</td><td>20</td><td>12,600</td></tr>
<tr><td rowspan="3">34XXX.20.01.10</td><td rowspan="3">Coldwater Creek</td><td>Class 1 Survey</td><td>20</td><td>13,200</td></tr>
<tr><td>Class 2 Survey</td><td>124</td><td>12,600</td></tr>
<tr><td>Class 3 Survey</td><td>140</td><td>12,600</td></tr>
<tr><td rowspan="2">34XXX.20.01.15</td><td rowspan="2">North County Buildings</td><td>Class 2 Survey</td><td>89</td><td>10,100</td></tr>
<tr><td>Class 3 Survey</td><td>40</td><td>1,600</td></tr>
<tr><td>34XXX.20.01.20</td><td>Roads</td><td>Class 2 Survey</td><td>600</td><td>1,100</td></tr>
<tr><td>34XXX.20.02</td><td>Monitoring, Sampling, Test, Analysis</td><td colspan="3">Monitoring cost includes cost associated with monitoring, sampling, testing, and maintenance. Cost will be broken down for different sites as follows:
SLAPS = 40%; HISS/Futura = 40%; Latty Ave = 10%;
SLAPS VPs = 5%; and Coldwater Creek = 5%.

For Alternative 5, monitoring assumed only for SLAPS VPs (roads, railroads, and bridges). Total annual costs for monitoring ($548,896) are multiplied by 5% to yield $27,445/yr for 25 years or a total monitoring cost of $686,000</td></tr>
<tr><td>34XXX.20.03</td><td>Five-Year Review.</td><td colspan="3">Cost includes cost associated with land use assessment, monitoring, testing and analysis, evaluation and risk assessment.

Number of 5-year Reviews = 5
Review time = 3 months (520 hrs) of 4 persons
No per diem or travel
Number, Types and Cost of Labor =
1 Senior Scientist ($94/hr)
1 Junior Engineer ($65/hr)
Attorney ($110/hr)
Clerical ($36/hr)</td></tr>
</table>

Cost Code	Cost Components	Assumptions
34XXX.20.04	*Post Remedial Site Supervision*	Includes mowing, site maintenance, and routine inspection. Number, Types and Cost of Labor = 1 Site Supervisor Manager ($72/hr) Total Supervision time = 62,400 hrs (30 person years) Misc. equipments cost = $10,000/yr

ON-SITE DISPOSAL CELL ESTIMATE WORK SHEET

PROJECT: FUSRAP - North County Feasibility Study DATE: 29-Apr-2003

SUBJECT: Alternative 5 with On-site Disposal Cell Option FILE: NCFSPPAlt.xls

Account No.	ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
01XXX	REAL ESTATE ANALYSIS/DOCUMENTS				
G	Rights of Entry/Temporary Permit				
G.01	Rights of Entry Acquisition	279	EA	500.00	139,500
G.02	Damages	279	EA	500.00	139,500
32XXX	PROJ. MANG. & PRE-REMEDIAL ACTION				
10	Project Management	1	LS		1,706,747
20	Investigation (PRP)	1	LS		568,916
30	Remedial Design	1	LS		4,551,324
40	Remedial Action Contracting	1	LS		568,916
331XX	HTRW REMEDIAL ACTION (CONSTRUCT)				
01	Mobilize and Preparatory Work	1	LS		416,000
02	Monitor'g, Sampling, Test & Analysis				
02.90	Environmental Monitoring	1	LS		4,146,000
02.91	Additional Labor & Services	1	LS		8,849,000
03	Site Work				
03.03	Earthwork	308,446	CY	15.30	4,726,000
03.04	Roads	11,307	SY	41.30	466,979
03.90	Railroads	2,900	LF	81.60	236,640
03.91	Sheetpile Shoring	18,300	SF	10.80	197,640
03.92	Additional Labor & Services	1	LS		657,000
03.93	Misc. Utility Relocations	1	LS		330,000
05	Surface Water Collect & Control				
05.92	Additional Labor & Services	1	LS		3,389,000
08	Solids Collect and Containment				
08.01	Contaminated Soil Collection	308,446	CY	16.30	5,027,670
19	Disposal (On-site)				
19.XX	Disposal Cell Cost	1	LS*		27,832,625
20	Site Restoration	1	LS		213,000
21	Demobilization	1	LS		404,000
34XXX	POST-REMEDIAL ACTION				
20	Operation, Maint. & Monitoring				
20.01	Final Status Surveys	1	LS		8,776,000
20.02	Monitoring	1	LS		15,369,000
20.03	Five Year Review	1	LS		793,000
20.04	Post Remedial Site Supervision	1	LS		4,773,000
		SUBTOTAL:			$94,277,456
		CONTINGENCIES: (in %)		25	$23,600,000
		ESCALATION: (in %)		7.3	$6,880,000
		SUBTOTAL:-------------------			$124,700,000
		E.D.C. (in %)-----------------		1	$1,250,000
		C.M. (in %)-------------------		6	$7,480,000
			TOTAL COST		**$133,430,000**

*See follow-up sheet for further details for disposal cell costs.

Estimation of Onsite Disposal Cell Cost

Cost Code	Cost Components	Estimated Amount
3XXX	**TOTAL COST**	27,832,625
01XXX	**Real Estate Analysis/Documents**	3,110,000
G	Rights of Entry/Temporary Permit	10,000
G.01	Rights of Entry Acquisition	3,000,000
G.02	Damages	0
G.03	Property Study	100,000
331XX	**HTRW Remedial Action (Cell Construction/Waste Placement)**	24,722,625
331XX.01	***Mobilize and Preparatory Work***	52,000
331XX.01.01	*Mob Construction Equip & Fac*	29,875
331XX.01.03	*Submittals/Implementation Plan*	13,500
331XX.01.04	*Setup/Constuct Temp Facilities*	6,750
331XX.01.05	*Construct Temporary Utilities*	1,875
331XX.02	***Monitoring, Sampling, Test, Analysis***	4,399,700
331XX.03	*****Site Work***	4,631,200
331XX.03.03	*Earthwork*	3,060,000
331XX.03.04	*Access Roads*	250,000
331XX.03.05	*Anchor Trench & Leachate Piping*	81,000
331XX.03.06	*Construction Water Treatment Plant*	150,000
331XX.03.07	*Site Fencing*	100,000
331XX.03.08	*Gates*	3,200
331XX.03.92	*Additional Labor & Services*	657,000
331XX.03.93	*Misc. Utility Resources*	330,000
331XX.04	***Support Facilities***	415,000
331XX.04.01	*Scales/Acceptance Station*	90,000
331XX.04.02	*Parking Lot Construction*	50,000
331XX.04.03	*Decontamination Pad*	10,000
331XX.04.04	*Temporary Soil Stockpile Area*	200,000
331XX.04.06	*Personnel Decon Facility*	15,000
331XX.04.07	*Equipment Storage & Maintenance Building*	50,000
331XX.05	***Surface Water Collect and Containment***	423,625
331XX.05.92	*Additional Labor & Service*	423,625
331XX.06	***Leachate Treatment Plant***	585,000
331XX.06.01	*Construction*	570,000
331XX.06.02	*Effluent Permit*	15,000
331XX.07	***Cell Construction***	13,985,600
331XX.07.01	*'Excavation & Stockpiling of Impacted Soil within Cell Construction Footprint*	600,000
331XX.07.02	*Disposal Cell Construction*	3,589,600
331XX.07.03	*Additional Labor & Service*	6,088,000
331XX.08.02	*Placement of Impacted Soil in Cell*	3,708,000
331XX.20	***Site Restoration***	180,000
331XX.20.01	*Earthwork*	75,000
331XX.20.04	*Revegetation & Planting*	75,000
331XX.20.92	*Site Cleanup*	30,000
331XX.21	***Demobilization***	50,500
331XX.21.01	*Removal of Temporary Facilities*	6,750
331XX.21.02	*Removal of Temporary Utilities*	1,750
331XX.21.04	*Demob of Contrustion Equip/Fac*	39,500
331XX.21.06	*Submittals*	2,500

In Situ Volumes (yd3) for North County FS

Totals for Various Catagories and for Each Alternative at Bottom

		SOR>1 3D Modeled In Situ Volumes (yd3)								
		5/15(Ra226) 14/15(Th230) 50(U238)			25(Ra226) 70(Th230) 250(U238)			Contingency for Inaccessible Areas		
Property ID	Category	0-6 in	below 6 in	total	0-6 in	below 6 in	total	0-6 in	below 6 in	total
Coldwater Creek:East of VP-09©	Coldwater Creek	0	0	0	0	0	0	0	0	0
Coldwater Creek:Northwest of IA-09	Coldwater Creek	19	36	55	0	0	0	0	0	0
Coldwater Creek:West of IA-01	Coldwater Creek	44	419	462	7	34	42	0	0	0
VP-01(C): (09K120040	Coldwater Creek VPs	148	314	461	0	0	0	0	0	0
VP-02(C) (09K120040):East	Coldwater Creek VPs	3	1	5	0	0	0	0	0	0
VP-02(C) (09K120040):West	Coldwater Creek VPs	0	0	0	0	0	0	0	0	0
VP-03(C) :09K120040	Coldwater Creek VPs	155	368	524	0	0	0	0	0	0
VP-04(C):09K120127 East	Coldwater Creek VPs	0	0	0	0	0	0	0	0	0
VP-04(C):09K120127South	Coldwater Creek VPs	20	11	31	0	0	0	0	0	0
VP-04(C):09K120127 West	Coldwater Creek VPs	1	0	1	0	0	0	0	0	0
VP-05(C):09K120116	Coldwater Creek VPs	41	24	65	0	0	0	0	0	0
VP-06(C): 10K440104	Coldwater Creek VPs	0	0	0	0	0	0	0	0	0
VP-07(C): 10K440113	Coldwater Creek VPs	0	0	0	0	0	0	0	0	0
VP-08(C): 10K440074	Coldwater Creek VPs	91	1,200	1,291	0	0	0	0	0	0
VP-09(C): 10K420010	Coldwater Creek VPs	0	0	0	0	0	0	0	0	0
VP-10(C)	Coldwater Creek VPs	0	0	0	0	0	0	0	0	0
Futura:Accessible	HISS/Futura Subsurface	2,502	32,434	34,936	1,422	11,364	12,787	0	0	0
HISS Property	HISS/Futura Subsurface	3,946	16,925	20,872	1,493	5,465	6,958	0	0	0
VP-40A:RR	Latty RR	335	2,188	2,523	20	38	58	0	0	0
Parcel:10K530087	Latty VPs	406	2,038	2,444	113	391	504	0	0	0
VP-01(L): 10K530098	Latty VPs	132	60	192	10	2	12	0	0	0
VP-02(L):	Latty VPs	3,058	4,276	7,334	826	732	1,559	0	0	0
VP-03(L): 10K520022	Latty VPs	40	111	150	6	9	15	0	0	0
VP-04(L): 10K520044	Latty VPs	8	70	77	0	0	0	0	0	0
VP-05(L): 10K520033	Latty VPs	0	0	0	0	0	0	0	0	0
VP-06(L): 10K510067	Latty VPs	8	2	9	0	0	0	0	0	0
VP-40A Area (10L340041):North of VP-4	Latty VPs	0	0	0	0	0	0	0	0	0
VP-40A (10L340041):East	Latty VPs	4,534	26,816	31,350	1,180	4,538	5,718	0	0	0
VP-40A (10L340041):West(a)	Latty VPs	0	0	0	0	0	0	0	0	0
VP-40A (10L340041):West(b)	Latty VPs	167	26	193	0	0	0	0	0	0
IA-01	SLAPS	230	3,375	3,605	198	2,062	2,260	0	0	0
IA-02	SLAPS	640	11,710	12,350	536	4,715	5,252	0	0	0
IA-03	SLAPS	1,280	26,718	27,997	1,138	18,413	19,551	0	0	0
IA-04	SLAPS	0	0	0	0	0	0	0	0	0
IA-05	SLAPS	3,385	39,213	42,598	3,275	25,160	28,435	0	0	0
IA-06	SLAPS	600	7,118	7,718	176	949	1,124	0	0	0
IA-07	SLAPS	132	872	1,004	117	364	481	0	0	0
IA-08:North Ditch	SLAPS	724	4,149	4,873	180	1,397	1,577	0	0	0
IA-09:North Ditch	SLAPS	342	2,131	2,473	48	674	723	0	0	0
Ballfields:North of IA-09	SLAPS VPs	1	0	1	0	0	0	0	0	0
Coldwater Cr. Area:North of McDonnell	SLAPS VPs	66	83	150	1	0	1	0	0	0
IA-08:South Ditch	SLAPS VPs	251	3,627	3,877	92	556	649	0	0	0
IA-09:Ballfields	SLAPS VPs	2,366	15,222	17,588	396	5,292	5,687	0	0	0
IA-13:Airport Auth	SLAPS VPs	224	272	496	0	0	0	0	0	0
Norfolk Southern:East of Railroad(a)	SLAPS VPs	0	0	0	0	0	0	0	0	0
Norfolk Southern:East of Railroad(b)	SLAPS VPs	0	0	0	0	0	0	0	0	0
Norfolk Southern:South of Railroad	SLAPS VPs	0	0	0	0	0	0	0	0	0
Norfolk Southern:West of Railroad	SLAPS VPs	16	6	21	0	0	0	0	0	0
Parcel:10K130014	SLAPS VPs	16	10	26	0	0	0	0	0	0
Parcel:10K330421	SLAPS VPs	2	0	2	0	0	0	0	0	0
Pershall Rd:South Ditch	SLAPS VPs	404	953	1,357	57	26	84	0	0	0
VP-01: 10L220893	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-02: 10L240093	SLAPS VPs	1	0	1	0	0	0	0	0	0
VP-03:	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-04:	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-05	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-06: 10L330040	SLAPS VPs	1	0	1	0	0	0	0	0	0
VP-07: 10L330031	SLAPS VPs	3	1	4	0	0	0	0	0	0
VP-08: 10L330022	SLAPS VPs	35	14	49	0	0	0	0	0	0
VP-09: 10L330073	SLAPS VPs	43	32	75	3	0	3	0	0	0
VP-10	SLAPS VPs	69	38	107	60	36	96	0	0	0
VP-11: 10L340151	SLAPS VPs	1	0	1	0	0	0	0	0	0
VP-12: 10L340142	SLAPS VPs	296	359	655	111	70	181	0	0	0
VP-13: 10L310011	SLAPS VPs	262	417	679	37	32	69	0	0	0
VP-14: 11K510035	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-15: 11K520056	SLAPS VPs	49	55	104	0	0	0	0	0	0
VP-16	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-17: 10K210053	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-18: 10K230051	SLAPS VPs	19	70	90	0	0	0	0	0	0
VP-19: 10K230031	SLAPS VPs	0	0	0	0	0	0	0	0	0

Property ID	Category	SOR>1 5/15(Ra226) 14/15(Th230) 50(U238) 0-6 in	below 6 in	total	3D Modeled In Situ Volumes (yd3) 25(Ra226) 70(Th230) 250(U238) 0-6 in	below 6 in	total	Contingency for Inaccessible Areas 0-6 in	below 6 in	total
VP-20: 10K230040	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-21: 10K230073	SLAPS VPs	20	7	26	1	0	1	0	0	0
VP-22: 10K240106	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-23: 10K240094	SLAPS VPs	53	38	92	3	1	4	0	0	0
VP-24: 10K330232	SLAPS VPs	184	48	231	0	0	0	0	0	0
VP-25	SLAPS VPs	1	0	1	0	0	0	0	0	0
VP-25 Area: West of VP-25	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-26: 10K240207	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-27: 10K330030	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-28: 10K330351	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-29: 10K330223	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-30: 10K330232	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-31	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-31A: 10K330250	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-32: 10K330241	SLAPS VPs	62	189	251	0	0	0	0	0	0
VP-33: 10K330342	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-34: 10K330324	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-35: 10K610178	SLAPS VPs	16	4	19	0	0	0	0	0	0
VP-35A	SLAPS VPs	24	15	39	0	0	0	0	0	0
VP-36: 10K610189	SLAPS VPs	10	0	10	0	0	0	0	0	0
VP-37: 10K520066	SLAPS VPs	38	35	73	6	1	7	0	0	0
VP-38: 10K540097	SLAPS VPs	84	166	250	1	0	1	0	0	0
VP-39: 10K630363	SLAPS VPs	31	2	33	0	0	0	0	0	0
VP-40: 09K220140	SLAPS VPs	6	0	6	0	0	0	0	0	0
VP-41: 10K540031	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-42: 09K220041	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-43: 10K540075	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-44: 09K220030	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-45	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-46: 09K220074	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-47: 09K220085	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-48	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-48A	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-49	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-50	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-51	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-52	SLAPS VPs	1	0	1	0	0	0	0	0	0
VP-53	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-54	SLAPS VPs	1	0	1	0	0	0	0	0	0
VP-55	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-56	SLAPS VPs	19	361	380	1	0	1	0	0	0
VP-57: 09K140026	SLAPS VPs	26	144	170	0	0	0	0	0	0
VP-58: 09K140015	SLAPS VPs	214	765	980	21	60	81	0	0	0
VP-59	SLAPS VPs	5	19	24	0	0	0	0	0	0
VP-60: 09K130104	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-61	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-62: 09K130038	SLAPS VPs	0	0	0	0	0	0	0	0	0
VP-63: 10K430042	SLAPS VPs	0	0	0	0	0	0	0	0	0
Futura:Inaccess. 1	Under Futura buildings	145	100	245	0	0	0	0	0	0
Futura:Inaccess. 2	Under Futura buildings	534	12,517	13,051	521	6,866	7,387	89	2,256	2,346
Futura:Inaccess. 3	Under Futura buildings	564	2,522	3,085	246	151	397	6	12	18
Latty Ave	Under Latty Road	475	462	936	9	9	19	0	0	0
Latty Ave:East of Hazelwood	Under Latty Road	11	3	14	0	0	0	0	0	0
Byassee Road	Under SLAPS VP Roads	5	2	7	0	0	0	0	0	0
Eva Rd	Under SLAPS VP Roads	187	80	267	7	1	8	0	0	0
Frost Ave	Under SLAPS VP Roads	275	347	622	25	8	33	0	0	0
Hazelwood Ave	Under SLAPS VP Roads	740	1,162	1,902	149	180	328	65	16	80
IA-08:McDonnell Blvd	Under SLAPS VP Roads	1,633	13,165	14,798	664	2,627	3,291	145	284	429
IA-13:Banshee Road	Under SLAPS VP Roads	255	1,005	1,260	5	4	9	0	0	0
McDonnell Blvd:East Section(a)	Under SLAPS VP Roads	138	515	654	4	5	9	0	0	0
McDonnell Blvd:East Section(b)	Under SLAPS VP Roads	452	495	947	52	40	92	5	1	6
McDonnell Blvd:West Section	Under SLAPS VP Roads	995	6,982	7,977	273	1,033	1,306	42	67	109
Parcel:Road South of 09K210	Under SLAPS VP Roads	0	0	0	0	0	0	0	0	0
Pershall Rd:Inaccessible	Under SLAPS VP Roads	1,231	2,727	3,958	426	532	959	68	26	95
Road Row	Under SLAPS VP Roads	13	12	25	0	0	0	0	0	0
VP-55 Area:Area East of VP-55	Under SLAPS VP Roads	0	0	0	0	0	0	0	0	0
VP-56 Area:Road South of VP-56	Under SLAPS VP Roads	0	0	0	0	0	0	0	0	0
VP-59 Area:Road South of VP-59	Under SLAPS VP Roads	0	0	0	0	0	0	0	0	0
IA-12	Under SLAPS VP RR	2,912	11,928	14,839	834	2,686	3,520	80	272	351
Norfolk Southern:RR	Under SLAPS VP RR	666	1,348	2,014	78	195	273	1	0	1
VP-02(C):RR	Under SLAPS VP RR	3	1	4	0	0	0	0	0	0
VP-04(C):RR	Under SLAPS VP RR	9	6	15	0	0	0	0	0	0

		SOR>1 3D Modeled In Situ Volumes (yd3)								
		5/15(Ra226) 14/15(Th230) 50(U238)			25(Ra226) 70(Th230) 250(U238)			Contingency for Inaccessible Areas		
Property ID	Category	0-6 in	below 6 in	total	0-6 in	below 6 in	total	0-6 in	below 6 in	total
VP-07(C):RR	Under SLAPS VP RR	0	0	0	0	0	0	0	0	0
Parcel:09K110018	none	0	0	0	0	0	0	0	0	0
Parcel:09K110348	none	0	0	0	0	0	0	0	0	0
Parcel:09K110382	none	0	0	0	0	0	0	0	0	0
Parcel:09K110425	none	0	0	0	0	0	0	0	0	0
Parcel:09K120062	none	0	0	0	0	0	0	0	0	0
Parcel:09K120138	none	0	0	0	0	0	0	0	0	0
Parcel:09K130104a	none	0	0	0	0	0	0	0	0	0
Parcel:09K130104b	none	0	0	0	0	0	0	0	0	0
Parcel:09K210042	none	0	0	0	0	0	0	0	0	0
Parcel:09K210075	none	0	0	0	0	0	0	0	0	0
Parcel:09K210130	none	0	0	0	0	0	0	0	0	0
Parcel:09K210141	none	0	0	0	0	0	0	0	0	0
Parcel:09K210152	none	0	0	0	0	0	0	0	0	0
Parcel:09K210185	none	0	0	0	0	0	0	0	0	0
Parcel:09K210196	none	0	0	0	0	0	0	0	0	0
Parcel:10K140042	none	0	0	0	0	0	0	0	0	0
Parcel:10K240182	none	0	0	0	0	0	0	0	0	0
Parcel:10K240193	none	0	0	0	0	0	0	0	0	0
Parcel:10K410099	none	0	0	0	0	0	0	0	0	0
Parcel:10K440122	none	0	0	0	0	0	0	0	0	0
Parcel:10K510078	none	0	0	0	0	0	0	0	0	0
Parcel:10K520165	none	0	0	0	0	0	0	0	0	0
Parcel:10K530065	none	0	0	0	0	0	0	0	0	0
Parcel:10K530076	none	0	0	0	0	0	0	0	0	0
Parcel:10L340133	none	0	0	0	0	0	0	0	0	0
	total	39,151	260,935	300,087	14,831	96,719	111,551	501	2,934	3,435

Coldwater Creek	62	455	517	7	34	42			
Coldwater Creek VPs	458	1,919	2,377	0	0	0			
HISS/Futura Subsurface	6,449	49,359	55,808	2,915	16,829	19,745			
Latty RR	335	2,188	2,523	20	38	58	0	0	0
Latty VPs	8,352	33,399	41,751	2,135	5,672	7,807			
SLAPS	7,331	95,287	102,618	5,669	53,734	59,403			
SLAPS VPs	4,920	22,951	27,871	792	6,073	6,865			
Under Futura buildings	1,242	15,139	16,381	767	7,017	7,784	95	2,268	2,364
Under Latty Road	486	465	950	9	9	19	0	0	0
Under SLAPS VP Roads	5,925	26,492	32,416	1,604	4,430	6,035	325	394	718
Under SLAPS VP RR	3,591	13,282	16,873	911	2,882	3,793	81	272	353
total	39,150	260,935	300,086	14,831	96,719	111,551	501	2,934	3,435

Notes:

1) Volumes based upon models developed from 9/9/2002 database report, with the exception of PDI models.

2) Volumes include overburden requiring removal to access subsurface areas that exceed criteria.

3) Volumes do not include areas that have been remediated or that will be remediated by June 30, 2003

VOLUMES UNDER EACH ALTERNATIVE

Area	Alt 1	Alt 2[a]	Alt 3[b]	Alt 4	Alt 5[c]	Alt 6[d]
Coldwater Creek	0	0	466	0	517	517
Coldwater Creek VPs	0	2,377	2,377	0	2,377	2,377
HISS/Futura Subsurface	0	19,745	55,808	0	55,808	55,808
Latty RR	0	0	0	0	0	2,523
Latty VPs	0	41,751	41,751	0	41,751	41,751
SLAPS	0	59,403	59,403	0	102,618	102,618
SLAPS VPs	0	27,871	27,871	0	27,871	27,871
Under Futura buildings	0	2,364	2,364	0	0	16,381
Under Latty Road	0	0	0	0	0	950
Under SLAPS VP Roads	0	718	718	0	718	32,416
Under SLAPS VP RR	0	353	353	0	353	16,873
Total Insitu Volume	0	154,582	191,111	0	232,013	300,086
20% Over-excavation	0	185,498	229,333	0	278,416	360,103
25% Swell	0	231,873	286,666	0	348,020	450,128

Volumes for each alternative are based on the following assumptions:

[a] Volumes for Alternative 2 use 5/15, 14/15, 50/50 criteria for all VPs. The volumes for HISS/Futura subsurface and SLAPS use the 25/70/250 criteria
Under Alternative 2, CWC Sediments are not addressed

[b] Volumes for Alternative 3 use 5/15, 14/15, 50/50 criteria for all VPs, and use 25/70/250 criteria for SLAPS and HISS/Futura.
Under Alternative 3, the volume for CWC assumes that 10% will be addressed by phytoremediation (i.e, 90% of 5/15, 14/15, 50/50 CWC volumes were used)

c Volumes for Alternative 5 use the 5/15, 14/15, 50/50 criteria for all areas except roads, bridges, and railroads
and beneath the Futura Building, where it is assumed no remediation will occur until the soils become accessible.

d Volumes for Alternative 6 use the 5/15, 14/15, 50/50 criteria for all areas

As a contingency, an estimate of the volume of inaccessible soils (soils beneath roads, bridges, railroads, and under the Futura buildings) is included

APPENDIX D

DOSE AND RISK ANALYSIS

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D.0 INTRODUCTION

Potential health impacts from exposure to chemical contamination are assessed in support of the Feasibility Study (FS) for the Formerly Utilized Sites Remedial Action Program (FUSRAP) St. Louis North County Site (North County Site). The potential health impacts include radiological dose, carcinogenic risk, and non-carcinogenic toxicity. This assessment includes both radionuclide and non-radiological constituents in an evaluation of baseline conditions that supplements the site Baseline Risk Assessment (BRA) (DOE, 1993). The supplemental evaluation is necessary because significant additional chemical data have been collected and because conditions have changed since the original BRA was issued. Nevertheless, the basic conclusion of the BRA is unchanged, i.e. there is a need for cleanup action at the site. Contaminants of potential concern (COPCs) are identified and site-specific remediation goals (RGs) are calculated in this evaluation (RGs are not presented in the BRA). A subset of the COPCs is also identified as contaminants of concern (COCs) for use in the FS. The COC subset is selected based on known links to FUSRAP-related activities. Site-specific RGs are used in Section 5 of the FS to semi-quantitatively evaluate health impacts from exposure to COCs under Alternatives 1 through 6. The assessment approach, including the evaluation of baseline conditions, is consistent with the approach outlined in the *Potential Contaminants of Concern Assessment Memorandum* (PAM) (USACE, 1999b). The PAM uses the latest risk assessment guidance from the U.S. Environmental Protection Agency (EPA), including updated cancer slope factors (CSFs) and exposure parameters.

This assessment evaluates risk from exposure to both radionuclides and non-radionuclides. Note that a CSF for a radionuclide is defined differently than a CSF for a non-radionuclide. EPA outlines these differences in EPA 1996a, some of which include the following:

- Radiological risk estimates are based primarily on human data – chemical risk estimates are based primarily on animal studies; and

- Radiological risk estimates are based on the central estimate of the mean – chemical risk estimates are based on the 95% upper confidence limit (UCL_{95}) of the mean.

Given these differences, incremental lifetime cancer risks (ILCRs) from radionuclides and non-radionuclides are assessed and presented separately. The addition of their risks was evaluated even though this action is not recommended. In addition, natural background radiation is already present at levels exceeding typical risk targets, and natural variability in these background levels may preclude the ability to quantify small incremental risks due to contamination (EPA, 1996a). Therefore, radiological risk calculations will use exposure concentrations representing specific activity above background.

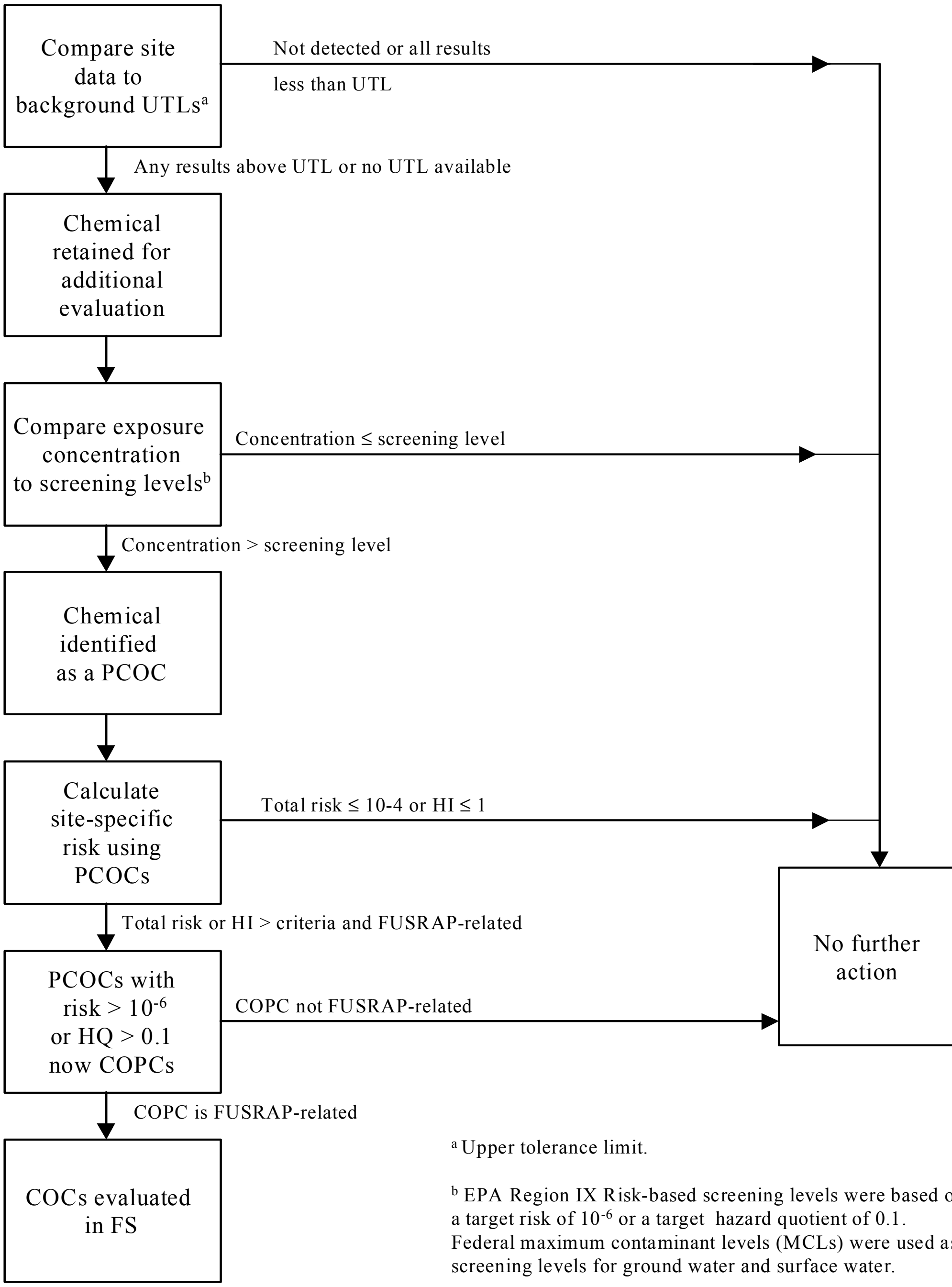
D.1 SUMMARY OF BASELINE RISK

Baseline risks from exposure to site chemicals are evaluated using *Risk Assessment Guidance for Superfund Volume I, Human Health Evaluation Manual (Part A)* (RAGS, Part A) (EPA, 1989). The purpose of this evaluation is to identify COCs and to provide site-specific RGs for consideration by site planners. An evaluation (subsequent to the one provided in the BRA) is considered necessary because significant additional chemical data have been collected, site conditions have changed since the original BRA was issued, and the BRA does not provide RGs. For radionuclides, RESRAD Version 5.82 is used instead of standard RAGS equations to estimate potential health impacts. The RESRAD code uses methods similar to RAGS Part A, using Health Effects Assessment Summary Table (HEAST) slope factors to estimate carcinogenic risk and Federal Guidance Reports 11 and 12 to estimate radiological dose. A comparison of RESRAD versus strict RAGS Part A approaches is discussed in more detail in Section D.1.3.1.

The standard procedure for identifying COCs as outlined in RAGS Part A is to first identify potential chemicals of concern (PCOCs) based on background, risk, and weight of evidence screens. For any PCOCs identified, the next step is to perform site-specific risk calculations. If the total risk for a specified receptor and medium exceeds 10^{-4}, those carcinogenic chemicals with a risk greater than 10^{-6} are identified as COPCs. If the total hazard index (HI) for a specified receptor (e.g., resident) and medium (e.g., soil) exceeds 1.0, those noncarcinogenic chemicals with a hazard quotient (HQ) greater than 0.1 are also identified as COPCs. COCs are then identified as those COPCs which may be reasonably associated with uranium processing activities. Assuming COCs are identified, site-specific RGs are presented for the point of departure (i.e., 10^{-6}) or for a HQ of 0.1, as appropriate, and based on applicable or relevant and appropriate requirements (ARARs). Risk-based RGs are site-specific preliminary remediation goals (PRGs), which are modified versions of the generic PRGs used by EPA. Slight modifications to the standard procedure are required when addressing radiological contaminants in the North County Site properties. Figure D-1 illustrates how COCs are identified at the North County Site.

For North County properties, the likely PCOCs include radionuclides from the naturally occurring uranium, thorium, and actinium decay series. Because the availability of risk-based screening values for radionuclides is limited, and because background concentrations of some of these radionuclides produce a risk on the order of 10^{-4}, a risk screen is not performed to identify PCOCs. Instead, a site-wide background screen is performed, comparing site radiological data to an upper tolerance limit on the background distribution. All COPCs are identified from the subset of PCOCs using site-specific risk modeling. If a COPC is site-related, it is considered a COC. RGs are presented for all COCs.

Five exposure scenarios are considered in the evaluation of baseline risk including a site resident, an industrial worker, a maintenance worker, a recreational receptor/trespasser, and a construction/utility worker. The North County Site properties vary in both size and projected future land use. For this screening assessment, however, standard default values were used for the size and configuration.



[a] Upper tolerance limit.

[b] EPA Region IX Risk-based screening levels were based on a target risk of 10^{-6} or a target hazard quotient of 0.1. Federal maximum contaminant levels (MCLs) were used as screening levels for ground water and surface water.

Figure D-1. Developing Contaminants of Concern

D.1.1 SELECTION OF CONTAMINANTS OF CONCERN

The site database contains radionuclide and non-radionuclide data that may or may not be site-related and may or may not be considered as COPCs (see Figure D-1). These data will be passed through data screens to “narrow down” the total list to be considered in the quantitative risk evaluation. These screens typically include a background screen, a risk screen, and a weight of evidence screen. Slight modifications to standard screening procedures are required when addressing radiological contaminants in the North County properties. Each screening approach, including any modifications to address radionuclides, is described below.

The background screen is performed by comparing the maximum detected chemical concentration against background criteria. Attachments 1 through 4 show the characterization of background for soil, ground water, surface water, and sediment, respectively. If the maximum detected concentration is below the corresponding background criteria, the chemical is not retained for additional evaluation. However, if the chemical is present at concentrations above background criteria, that chemical is retained and subjected to additional analyses. For this assessment, the background criterion is that concentration level below which at least 95% of the background sample concentrations in the distribution fall, with a confidence level of 95% [hereafter referred to as the upper tolerance level (UTL)]. To complete the background screen, all results in a given media and aggregate, where applicable, are compared to the chemical-specific UTL. Chemicals with no detection greater than the UTL are considered naturally occurring and not related to past waste disposal activities at the site. The background screen was performed using the entire North County database. For these initial screens chemicals are retained for the entire site and not by individual properties. This conservative approach was considered necessary given the limited data at some individual properties.

Having completed the background screen, chemicals are then compared to risk-based screening levels, or generic PRGs. The generic PRGs used in this FS are those developed by EPA Region IX. Note that the non-carcinogenic PRGs from Region IX are for a HI of 0.1 (versus 1.0). Thus, EPA Region IX has reduced these noncarcinogenic values by a factor of 10 from the HQ of 1.0 for screening purposes. Thus, the generic PRGs used are conservative screening values based on a HQ of 0.1 or a 10^{-6} risk. These levels are often referred to as the "point of departure".

Note that the Region IX PRGs are for non-radionuclides only. These PRGs (with the non-carcinogenic values modified as described above) are used for screening as follows. The tap water PRGs are used to screen detected ground water and surface water chemicals. The residential soil PRGs are used to screen chemicals detected in surface soil and sediment, while the industrial soil PRGs are used to screen detected subsurface soil chemicals. Chemicals with maximum detected concentrations less than the corresponding generic PRG are removed from further analyses. Because generic PRGs for radionuclides are not provided by Region IX, the risk screen is not performed on radionuclides. All radionuclides are further evaluated in the subsequent processes.

The final screen before identifying PCOCs is the weight of evidence screen. A weight of evidence screen is performed to determine which chemicals that pass through the background and risk screens should be included in site-specific risk calculations. Chemicals that are infrequently detected are evaluated to determine if they truly are site-related (EPA, 1989). Unless the presence of an infrequently detected chemical is expected (based on historical site information), or is likely to identify the existence of a "hot spot," those chemicals with low frequency of detection are eliminated from additional analyses. The weight of evidence screen also eliminates those chemicals that are essential nutrients with low concentrations (EPA, 1989).

Any chemicals that pass through the background, risk, and weight of evidence screens are retained as PCOCs. However, all PCOCs may not be identified as COPCs until after a site-specific risk assessment is performed. If the total risk for a specified receptor (e.g., resident) and medium (e.g., soil) exceeds 10^{-4}, those individual PCOCs with a risk greater than 10^{-6} may be identified as carcinogenic COPCs for the site. If the total hazard for a specified receptor (e.g., resident) and medium (e.g., soil) exceeds 1.0, those individual PCOCs with a hazard quotient greater than 0.1 may be identified as non-carcinogenic COPCs for the site. As mentioned, radiological and non-radiological risks are calculated separately. Therefore, the identification of radiological COPCs will not depend on non-radiological PCOCs, and vice versa. The final step in selecting COCs to be used in the evaluation of alternatives is to determine what risk-based COPCs are linked to FUSRAP ore processing and waste disposal activities. Those COPCs which are determined to be site-related are retained for evaluation in the FS as COCs.

D.1.1.1 Radionuclide Screening

The St. Louis Site, including both the St. Louis Downtown Site (SLDS) and the North County Site, was designated into FUSRAP because elevated concentrations of radionuclides (as a result of processing uranium ore) were found at the site. Uranium ore is known to contain elevated concentrations of radionuclides from the three naturally occurring decay series, specifically the uranium, thorium and actinium series. The primary list of radiological contaminants is limited to long-lived radionuclides in these series (short-lived decay products are included in slope factors so that they need not be included explicitly). The list of long-lived radionuclides includes U-238, U-234, Th-230, Ra-226 and Pb-210 from the uranium series, Th-232, Ra-228 and Th-228 from the thorium series; and U-235, Pa-231 and Ac-227 from the actinium series.

The background screen indicates all long-lived members of the uranium, thorium and actinium series are present above background and are retained for various location across the North County, although at some properties they may not be present above screening levels or may be absent from the site database. The site database contains mostly data on U-238, Th-230, Ra-226 and Th-232 and limited data on remaining radionuclides. However, the relationship between radionuclides in these decay series is used to estimate the total source term. The site database also contains non-FUSRAP-related radionuclides including Am-241 and Cs-137 that are a result of fallout from past atmospheric weapons testing, and naturally occurring K-40. These are removed from consideration as a result of the background screen, and the fact that they are not FUSRAP-related.

For any given property, data for the complete list of long-lived radionuclides may not be available. Examples include properties with only Th-230 data, only Ra-226, Th-230, and Th-232 data, or only Ra-226, Th-230, Th-232, and U-238 data. In such cases, concentrations of other

FUSRAP-related radionuclides may be estimated based an observed relationship or site knowledge. Specifically, when site data are not available:

- Radionuclides in the thorium series are assumed to be in secular equilibrium because sufficient time has passed since the ore was processed to allow equilibrium to be achieved;

- Because the uranium was neither enriched nor depleted, uranium isotopes are assumed to be present in natural abundance (i.e., the ratios for U-238:U-235:U-234 = 1.0:0.046:1.0 by activity or 99.28%:0.711%:0.0055% by mass);

- Because there is evidence that the extraction process affected Pa-231 or Ac-227, these radionuclides are assumed to be present as described in Table 2.15 of the BRA [additional samples have been collected from the St. Louis Airport Site (SLAPS) to supplement Table 2.15 results]; and

- Pb-210 is assumed to be present relative to Ra-226 as described in Table 2.15 of the BRA. (Note that the BRA Table 2-15 data are summarized in Section D.1.2.2 of this Appendix).

Because a risk screen is not performed on radionuclides, all radionuclides that pass through the background screen are retained. Radionuclides that pass through the weight of evidence screen (see Section D.1.1.3) will be identified as PCOCs. Attachment 5 presents estimated radionuclide concentrations in surface and subsurface soil on a property-by-property basis after background is subtracted from the gross concentration. Consistent with Federal guidance risks and doses from radionuclides will be quantified only for those isotopes that are above background. Isotopes with an adjusted exposure concentration of 0.0 pCi/g are considered to be below background.

D.1.1.2 Non-Radionuclide Screening

The non-radiological screening to determine PCOCs is presented in Attachments 6 through 10 for surface soil, subsurface soil, ground water, surface water, and sediment, respectively. These attachments include exposure concentrations for each property. Attachments 8, 9, and 10 also include radionuclide data in non-soil media. Radionuclides in soil were presented separately from non-radionuclides given the overwhelming amount of radiological soil data relative to non-radiological data and because the risk model for radionuclides in soil requires the separation of data sets.

D.1.1.3 Weight of Evidence Screen

A weight of evidence screen is performed to determine which of those chemicals that pass through the background and risk screens are PCOCs. Chemicals that are infrequently detected are evaluated to determine if they can be eliminated as PCOCs for a given medium. Unless an infrequently detected chemical is expected (based on historical site information), or is likely to identify the existence of a "hotspot," these chemicals with low frequency of detection are eliminated (EPA 1989).

Long-lived radionuclides from the uranium, thorium, and actinium series are the only radionuclides identified as PCOCs. All non-radionuclides that pass through the background screen, the risk screen, and the weight of evidence screen are identified as PCOCs. Attachments 6 through 10 present the screening and determination of PCOCs for surface soil, subsurface soil, ground water, surface water, and sediment, respectively (see far right column in each table). Table D-1 summarizes the PCOCs identified across all media.

Table D-1. Summary of Potential Chemicals of Concern (PCOCs) for Each Medium

PCOC	Surface Soil	Subsurface Soil	Ground Water	Surface Water	Sediment
Quantitative PCOCs					
Inorganics					
Antimony	X	X			
Arsenic	X	X	X	X	X
Barium	X		X		
Boron	X		X		
Cadmium	X		X		
Chromium	X	X	X		
Fluoride			X	X	
Manganese	X	X	X		X
Molybdenum	X		X	X	
Nickel	X	X	X		
Nitrate	X		X	X	
Nitrite			X	X	
Selenium	X		X	X	X
Strontium			X		
Thallium	X	X	X		X
Uranium	X	X	X	X	
Vanadium	X		X		
Zinc	X				
Organics					
1,2-Dichloroethene	X	X	X		
Acetone				X	
Benz(a)anthracene	X				X
Benzo(a)pyrene	X				X
Benzo(b)fluoranthene	X				X
Benzo(k)fluoranthene					X
Bis(2-ethylhexyl)phthalate			X	X	
Chloroform			X		
Chloromethane			X		
Dibenz(a,h)anthracene	X				X
Dieldrin		X			
Dimethylbenzene	X	X	X	X	
Indeno(1,2,3-cd)pyrene	X				X
MCPA	X				
MCPP	X	X	X		
Methylene chloride				X	
PCB-1254	X				
Tetrachloroethene				X	
Trichloroethene			X	X	

Table D-1. Summary of Potential Chemicals of Concern (PCOCs) for Each Medium (Cont'd)

PCOC	Surface Soil	Subsurface Soil	Ground Water	Surface Water	Sediment
Radionuclides					
Actinium-227	X	X			
Lead-210	X	X			
Protactinium-231	X	X			
Radium-226	X	X			
Radium-228	X	X			
Thorium-228	X	X			
Thorium-230	X	X			
Thorium-232	X	X			
Uranium-234	X	X			
Uranium-235	X	X			
Uranium-238	X	X			
Qualitative PCOCs[a]					
Inorganics					
Aluminum	X			X	X
Ammonia			X	X	
Cerium					X
Cobalt	X	X			
Copper	X				
Lanthanum					X
Lead	X	X	X	X	
Lithium			X		
Neodymium					X
Niobium					X
Orthophosphate				X	
Silicon			X		
Sulfate	X	X	X	X	
Sulfide	X	X			
Thorium					X
Titanium	X	X	X	X	X
Organics					
1,2,3,5-Tetramethylbenzene				X	
1,2,3-Trimethylbenzene				X	
1,2,4-Trimethylbenzene				X	
1,3,5-Trimethylbenzene				X	
1-Ethyl-2-methylbenzene				X	
2-Methylnaphthalene	X	X			X
Benzo(ghi)perylene	X				X
Endosulfan I			X		
Endosulfan sulfate					X
Endrin ketone					X
Phenanthrene	X				X

[a] Based on the lack of available toxicity information, some PCOCs were evaluated qualitatively.

D.1.2 EXPOSURE ASSESSMENT

D.1.2.1 Land Use

This assessment considers approximately 100 individual properties or exposure units. Each exposure unit has a unique identifier (usually a city parcel number) so that data and exposure results may easily be tracked. These properties represent a wide range of physical characteristics (size, shape, etc.), current land uses, and projected future land uses. For the baseline assessment, however, the conservative standard default size is used and the land use is assumed to include all five potential receptors. That is, contamination on some properties may cover a small surface area (which would lower risk estimates) and may only reasonably expose a subset of individuals (e.g., utility workers). Property-specific and receptor-specific calculations will be part of the final status survey process.

D.1.2.2 Identification of Receptors and Primary Exposure Parameters

Table D-2 summarizes the potential receptors and the primary exposure parameters to be used in risk and dose calculations. The potential receptors modeled in this assessment include a resident, an industrial worker, a maintenance worker, a recreational receptor/trespasser, and a construction/utility (subsurface industrial) worker. Exposure pathways for all receptors include dermal contact (non-radionuclides only), direct gamma (radionuclides only), soil/sediment ingestion and dust inhalation. While ground-water data are evaluated, the drinking water pathway is not considered to be a viable pathway for the contaminated areas at the North County Site. The evaluation of ground water is presented for informational purposes only.

Erosion Rate

The following is an excerpt from the *Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil* (ANL, 1993) used to select the erosion rate for North County soils.

> *An erosion rate of 6×10^{-5} m/yr, leading to erosion of 0.06 m of soil in 1,000 yr, can be used for a site with a 2% slope if it can be reasonably shown that the farm/garden scenario is unreasonable; for example, if the site is, and will likely continue to be, unsuitable for agricultural use.*

Resident

The site resident is assumed to live on-site for 350 days per year for 30 years beginning from birth. Each day the resident is assumed to spend 16.4 hours indoors and 2.0 hours outdoors on-site (EPA, 1997). Because child and adult ingestion rates, body weights, and exposure durations vary, exposure to the resident via ingestion of soil/sediment is based on a weighted average of the respective child and adult parameters. The assumptions used in this weighted average are:

Table D-2. Exposure Parameters for each Medium and Receptor Evaluated

Parameter by Media/Pathway	Units	Industrial	Construction/ Utility	Recreational/ Trespasser	Maintenance Worker	Residential
Parameters Independent of Media/Pathway						
Exposure Frequency	days/year	250[c]	250 (10[a])	26[b]	26[b]	350[c]
Exposure Duration	years	25[c]	1.0	9.0	6.6[c]	30[c]
Indoor Exposure Frequency	hours/day	7.0	0.0	0.0	4.0	16.4[c]
Indoor Fraction	unitless	0.200	0.0	0.0	0.0119	0.655
Outdoor Exposure Frequency	hours/day	1.0	8.0	2.0	4.0	2.0[c]
Outdoor Fraction	unitless	0.0285	0.228 (0.00913[a])	0.00594	0.0119	0.0799
Contaminated Zone Thickness	meters	0.3	0.3	0.3	0.3	0.3
Cover Thickness	meters	0.0	0.0	0.0	0.0	0.0
Erosion Rate	meters/year	0.00006	0.00006	0.00006	0.00006	0.00006
Media Evaluated per Receptor						
Surface Soil	-	Yes	Yes	Yes	Yes	Yes
Subsurface Soil	-	No	Yes	No	No	No
Sediment	-	Yes	No	Yes	Yes	Yes
Ground Water	-	Yes	No	No	No	Yes
Surface Water	-	No	No	Yes	No	Yes
Surface Soil and Sediment *						
Incidental Ingestion						
Soil Ingestion Rate						
Adult	mg/day	50[c]	480[c]	NA	480[c]	100[c]
Child	mg/day	NA	NA	50[c]	NA	200[c]
Exposure Frequency	days/year	250	250 (10[a])	26[b]	26[b]	350
Exposure Duration	years					
Adult	years	25	1	NA	6.6[c]	24
Child	years	NA	NA	9[d]	NA	6
Body Weight						
Adult	kg	70	70	NA	70	70
Child	kg	NA	NA	50[d]	NA	50
Carcinogenic Averaging Time	days	25550	25550	25550	25550	25550
Non-carcinogenic Averaging Time	days	9125	365	3285	2409	10950
Dermal Contact						
Skin Area	m^2/event	0.57[e]	0.57[e]	0.34[e]	0.57[e]	0.57[e]
Adherence Factor	mg/cm^2	0.1[e]	0.28[e]	0.3[e]	0.035[e]	0.08[e]
Exposure Frequency	days/year	250	250 (10[a])	26[b]	26[b]	350
Exposure Duration	years	25	1[i]	9[d]	6.6[c]	30
Body Weight	kg	70	70	50[d]	70	70
Carcinogenic Averaging Time	days	25550	25550	25550	25550	25550
Non-carcinogenic Averaging Time	days	9125	365	3285	2409	10950
Inhalation of VOCs and Dust						
Inhalation Rate	m^3/hour	0.552[c,f]	1.3[c,h]	0.514[c,g]	1.3[c,h]	0.552[c,f]
Exposure Time	hours/day	8	8	2[i]	8	18.4[c,j]
Exposure Frequency	days/year	250	250 (10[a])	26[b]	26[d]	350
Exposure Duration	years	25	1	9[d]	6.6[c]	30
Body Weight	kg	70	70	50[d]	70	70
Carcinogenic Averaging Time	days	25550	25550	25550	25550	25550
Non-carcinogenic Averaging Time	days	9125	365	3285	2409	10950
External Radiation						
Gamma Shielding Factor[o]	unitless	0.4	0.4	NE	0.4	0.4
Subsurface Soil						
Incidental Ingestion						
Soil Ingestion Rate	mg/day	NE	480[c]	NE	NE	NE
Exposure Frequency	days/year	NE	250	NE	NE	NE
Exposure Duration	years	NE	1.0[i]	NE	NE	NE
Body Weight	kg	NE	70	NE	NE	NE

Table D-2. Exposure Parameters for each Medium and Receptor Evaluated (Cont'd)

Parameter by Media/Pathway	Units	Industrial	Construction/ Utility	Recreational/ Trespasser	Maintenance Worker	Residential
Carcinogenic Averaging Time	days	NE	25550	NE	NE	NE
Non-carcinogenic Averaging Time	days	NE	365	NE	NE	NE
Dermal Contact						
Skin Area	m^2/event	NE	0.57[e]	NE	NE	NE
Adherence Factor	mg/cm^2	NE	0.28[e]	NE	NE	NE
Exposure Frequency	days/year	NE	250	NE	NE	NE
Exposure Duration	years	NE	1[i]	NE	NE	NE
Body Weight	kg	NE	70	NE	NE	NE
Carcinogenic Averaging Time	days	NE	25550	NE	NE	NE
Non-carcinogenic Averaging Time	days	NE	365	NE	NE	NE
Inhalation of VOCs and Dust						
Inhalation Rate	m^3/hour	NE	1.3[c,h]	NE	NE	NE
Exposure Time	hours/day	NE	8	NE	NE	NE
Exposure Frequency	days/year	NE	250	NE	NE	NE
Exposure Duration	years	NE	1[i]	NE	NE	NE
Body Weight	kg	NE	70	NE	NE	NE
Carcinogenic Averaging Time	days	NE	25550	NE	NE	NE
Non-carcinogenic Averaging Time	days	NE	365	NE	NE	NE
Ground Water						
Drinking Water Ingestion						
Drinking Water Ingestion	L/day	1	NE	NE	NE	2.3[c]
Exposure Frequency	days/year	250	NE	NE	NE	350
Exposure Duration	years	25	NE	NE	NE	30
Body Weight	kg	70	NE	NE	NE	70
Carcinogenic Averaging Time	days	25550	NE	NE	NE	25550
Non-carcinogenic Averaging Time	days	9125	NE	NE	NE	10950
Dermal Contact while Showering						
Skin Area	m^2	NE	NE	NE	NE	2.2[e]
Exposure Time	hours/event	NE	NE	NE	NE	0.25[e]
Exposure Frequency	events/year	NE	NE	NE	NE	350
Exposure Duration	years	NE	NE	NE	NE	30
Body Weight	kg	NE	NE	NE	NE	70
Carcinogenic Averaging Time	days	NE	NE	NE	NE	25550
Non-carcinogenic Averaging Time	days	NE	NE	NE	NE	10950
Inhalation of VOCs during Household Water Use						
Intake Rate	mg/day	NE	NE	NE	NE	Chemical-Specific [k]
Exposure Frequency	events/year	NE	NE	NE	NE	350
Exposure Duration	years	NE	NE	NE	NE	30
Body Weight	kg	NE	NE	NE	NE	70
Carcinogenic Averaging Time	days	NE	NE	NE	NE	25550
Non-carcinogenic Averaging Time	days	NE	NE	NE	NE	10950
Surface Water						
Dermal Contact while Wading						
Skin Area	m^2	NE	NE	0.619[l]	NE	0.619[l]
Exposure Time	hours/event	NE	NE	2	NE	2
Exposure Frequency	events/year	NE	NE	5[m]	NE	26[b]
Exposure Duration	years	NE	NE	9[d]	NE	9[d]
Body Weight	kg	NE	NE	50[d]	NE	50[d]
Carcinogenic Averaging Time	days	NE	NE	25550	NE	25550
Non-carcinogenic Averaging Time	days	NE	NE	3285	NE	3285

Table D-2. Exposure Parameters for each Medium and Receptor Evaluated (Cont'd)

Parameter by Media/Pathway	Units	Industrial	Construction/ Utility	Recreational/ Trespasser	Maintenance Worker	Residential
Inhalation of VOCs						
Inhalation Rate	m^3/hour	NE	NE	0.514[c,g]	NE	0.514[c,g]
Exposure Time	hours/day	NE	NE	2	NE	2
Volatilization Factor	L/m^3	NE	NE	0.5[n]	NE	0.5[n]
Exposure Frequency	events/year	NE	NE	5[m]	NE	26[b]
Exposure Duration	years	NE	NE	9[d]	NE	9[d]
Body Weight	kg	NE	NE	50[d]	NE	50[d]
Carcinogenic Averaging Time	days	NE	NE	25550	NE	25550
Non-carcinogenic Averaging Time	days	NE	NE	3285	NE	3285

a Utility worker only – all other parameters the same for both construction and utility workers
b Assumes an average of one event every other week.
c EPA 1997, "Exposure Factors Handbook," Volumes I, II, and III, EPA/600/P-95/002Fa-c, EPA, Office of Research and Development, Washington, DC.
d Based on an exposure to a child 6 to 14 years old.
e EPA 1998, "Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance," Office of Emergency and Remedial Response, Washington, D.C.
f Average of male and female adult values.
g Average of males and females between 6 and 14 years of age.
h Hourly average for outdoor worker.
i Value from the 1993 Baseline Risk Assessment.
j Average time spent at home.
k Murphy, B.L. 1987. Total exposure from contaminated tap water, presented at the 80th Annual Meeting of the Association Dedicated to Air Pollution Control and Hazardous Waste Management. June 21-26, 1987.
l Average value for males and females between 6 and 14 years of age. Represents area for hands, legs, and feet.
m Assumes one event every other week during the summer months.
n EPA 1991, Appendix D of "Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals)," Office of Emergency and Remedial Response, Washington, D.C.
o EPA 1996b, "Reassessment of Radium and Thorium Soil Concentrations and Annual Dose Rates"

* Construction Worker is evaluated for exposure to surface soil, but not to sediment. All other receptors are evaluated for exposure to both surface soil and sediment.

NE = Not evaluated.
NA = Not applicable.

The ingestion of soil/sediment for the residential scenario incorporates a weighted-average of child and adult parameter values, which are from EPA 1997. No other scenario incorporates this weighted average. This approach was requested by Dave Crawford (USACE, Kansas City District).

Additional parameters that impact risk calculations include the relationship between radionuclides in site soils. For some properties, a complete set of radionuclides in not available. When this is the case, the relationships shown in BRA Table 2.15 are used (see below). For more details, see the BRA.

Radionuclides	SLAPS	Residential Vicinity Properties	HISS/Futura
Actinium-227	0.92 times Radium-226 value	0.007 times Thorium-230 value	1.1 times Radium-226 value
Lead-210	1.7 times Radium-226 value	0.014 times Thorium-230 value	2.4 times Radium-226 value
Ptroactinium-231	1.0 times Radium-226 value	0.008 times Thorium-230 value	1.3 times Radium-226 value
Radium-226	1.0 times Radium-226 value	0.007 times Thorium-230 value	1.0 times Radium-226 value
Radium-228	0.28 times Thorium-232 value	0.00036 times Thorium-230 value	0.08 times Thorium-232 value
Thorium-228	0.85 times Thorium-232 value	0.001 times Thorium-230 value	1.0 times Thorium-232 value
Thorium-230	1.0 times Thorium-230 value	1.0 times Thorium-230 value	1.0 times Thorium-230 value
Thorium-232	1.0 times Thorium-232 value	0.001 times Thorium-230 value	1.0 times Thorium-232 value
Uranium-234	1.0 times Uranium-238 value	0.012 times Thorium-230 value	1.0 times Uranium-238 value
Uranium-235	0.046 times Uranium-238 value	0.00052 times Thorium-230 value	0.046 times Uranium-238 value
Uranium-238	1.0 times Uranium-238 value	0.012 times Thorium-230 value	1.0 times Uranium-238 value

- The child weighs 50 kg and ingests 200 mg of soil or sediment per day, over a 6 year time period.

- The adult weighs 70 kg and ingests 100 mg of soil or sediment per day, over a 24 year time period.

This resident also is assumed to breathe at a rate of 0.552 m^3 of air per hour. No clean cover is assumed to be present so the resident is exposed to contaminants in surface soils. A shielding factor of 0.4 (60 percent reduction) is assumed for indoor exposures. A dust loading value of 100 $\mu g/m^3$ is also assumed.

Industrial Worker

The industrial worker is assumed to be on site for 7 hours per day while indoors and 1 hour per day while outdoors. The worker is at the site for 250 days per year for 25 years. It is assumed that the industrial worker ingests 50 mg of soil per day and breathes at a rate of 0.552 m^3 per hour. No clean cover is assumed to be present so the industrial worker is exposed to contaminants in surface soils. A shielding factor of 0.4 (60 percent reduction) is assumed for indoor exposures and a dust loading value of 0.1 mg/m^3 is also assumed.

Maintenance Worker

The maintenance worker is assumed to be on the site for 8 hours per week (4 hours inside and 4 hours outside) to mow, care for any landscaping and generally maintain the site. It is assumed that this individual is on-site for 26 total days per year. It is assumed that the worker holds the position for 6.6 years, has an inhalation rate of 1.3 m^3 per hour and a soil ingestion rate of 480 mg per day. The soil ingestion rate of 480 mg per day may be conservative for this receptor, but is used because the worker could participate in construction-like activities (e.g., landscaping). A shielding factor of 0.4 (60 percent reduction) is assumed for indoor exposures and a dust loading value of 0.1 mg/m^3 is assumed.

Recreational Receptor/Trespasser

The recreational receptor is assumed to be an older child (6-14 years old) who occasionally trespasses on the site. This individual is assumed to be on the site for 2 hour per day, 26 days per year for 9 years. An inhalation rate of 0.514 m^3 per hour, a soil ingestion rate of 50 mg per day and a mass loading of 0.1 mg/m^3 are assumed. The recreational receptor/trespasser is an outdoor exposure scenario only, so no shielding factor is required.

Construction/Utility Worker

The construction worker is an individual who digs into subsurface soils to complete construction-type activities (e.g., constructing a building foundation). It is assumed that the construction worker is exposed for 8 hours per day, 250 days per year for one year. An inhalation rate of 1.3 m^3 per hour, a soil ingestion rate of 480 mg per day and a mass loading of 0.1 mg/m^3 are assumed. The construction worker is an outdoor exposure scenario only, so no shielding factor is required. A utility worker may also be described using similar exposure parameters, although the listed exposure frequency (see Table D-2) is considered too conservative. Input from local utilities suggests that a reasonable exposure frequency is 10 days or 80 hours per year verses 250 days or 2000 hours per year for the base construction worker (USACE, 1999a). For road, railroad, and bridge construction activities, the listed exposure frequency is again considered too conservative. A reasonable exposure frequency given the linear feet of potentially contaminated road and rail in North County is 90 days or 720 hours per year versus 250 days or 2000 hours per year for the base construction worker.

D.1.2.3 Exposure Concentration

Exposure concentrations of chemicals are developed using EPA guidance *Supplemental Guidance to RAGS: Calculating the Concentration Term* (EPA, 1992). The exposure concentration is a representative concentration to which a receptor will be exposed for a site and medium. The following describes the approach for calculating the exposure concentration term for use in risk assessment calculations.

As defined in RAGS Part A, the concentration term should be the smaller value between the maximum detected concentration and the upper 95% confidence limit on the mean (hereafter referred to as the UCL_{95}) (EPA, 1989). In order to calculate the UCL_{95}, the data's particular statistical distribution must be determined (e.g., normal vs. log-normal). After this determination is made, the UCL_{95} can be calculated appropriately and the exposure concentration term can then be determined. For non-radionuclides, the exposure concentration is defined as the smaller of the UCL_{95} and the maximum detected concentration. For radionuclides, the exposure concentration is defined as the smaller of the UCL_{95} and the maximum detected concentration, minus the average background concentration (i.e., net values).

Attachment 5 lists the radionuclide exposure concentrations in soil for each site property. These exposure concentrations represent the smaller of the UCL_{95} and maximum detected concentration, minus average site background values. Average background in the North County is estimated at 1.05 pCi/g for Ra-226, 1.66 pCi/g for Th-230, 1.11 pCi/g for Th-232 and 1.18 pCi/g for U-238. Some properties in Attachment 5 are listed without a source term. In these cases, the radionuclide concentrations are below background and risk calculations are not required. Data are broken into four depth intervals, including less than 0.5 ft (15 cm), greater than 0.5 ft (15 cm), less than 5 ft (1.5 m) for SLAPS only, and all depths. These depth intervals were selected as dictated by the exposure assessment method and the site database. Surface soils are defined as the top 5 ft for SLAPS, because the top several feet have been disturbed and some subsurface soil could be at the surface in the near future. This averaging technique increases the calculated dose and risk from the generally higher concentrations of material in the near surface soils.

Data from some properties is limited to one or a few radionuclides. When data are limited, missing radionuclides are added, to the extent possible, considering the following:

- A known relationship between parent and decay products;
- A relationship based on the site analysis of site data (e.g., Table 2.15 in the BRA and as shown at the bottom of Table D-2); or

- Best technical judgment.

There is no current method for adding non-radiological constituents that are absent from the database.

In some cases there is no sound basis for adding in radionuclides. For example, some sites have data for Th-230 only. At these sites, the Th-230 value is low (usually less than 10 pCi/g) and the BRA suggests that other radionuclides be considered at some small fraction of the Th-230 value. This step, however, would add the remaining radionuclides at levels below background and would, thus, complicate the source term calculation without adding to the actual source. In this case, the Th-230 data are considered without the addition of other radionuclides.

There are also properties with only Ra-226, Th-230 and Th-232 data (no U-238 value). It is currently difficult to predict the U-238 value through use of a radium or thorium surrogate. It is also known that the risk and dose from uranium in soil is at least an order of magnitude less than that from radium or thorium and the concentrations of uranium are relatively insignificant in the North County. This considered, the U-238 (or other uranium isotope) values are not estimated when no database value is given.

Similarly, there are sites where no Th-230 value is provided. In many cases, the radium, uranium, etc., concentrations appear to be near or below background. It is known, however, that Th-230 is the radionuclide found in the highest concentrations in the North County Site. A possible next step could be to estimate a Th-230 concentration at a significantly higher concentration than the other site radionuclide concentrations. Doing so may incorrectly introduce a source of contamination (with a high level of uncertainty) and, thus, identify a property as requiring remediation when it does not. While it may be considered conservative to estimate a Th-230 value, this assessment assumes that the uncertainty in such a step is too high, and those properties should instead be considered for additional characterization.

Attachments 6 through 10 list the non-radionuclide exposure concentrations for each site property, for surface soil, subsurface soil, ground water, surface water, and sediment, respectively. Attachments 6 through 10 also list radiological exposure concentrations for radionuclides for all media.

D.1.3 RISK CHARACTERIZATION

D.1.3.1 Methodology

RESRAD Version 5.82 is used to estimate potential health impacts due to exposure to radiological PCOCs in soil and sediment. The RESRAD code uses methods similar to RAGS guidance. RESRAD uses Federal Guidance Reports 11 and 12 to estimate dose and HEAST slope factors to estimate risk. The major differences in RESRAD and the RAGS Part A methods include the following:

- RESRAD models into the future taking into account source removal by radiological decay, leaching, erosion, etc., and radiological ingrowth – RAGS does not;
- RESRAD considers site-specific conditions such as rainfall, soil density, etc. that may impact results – RAGS does not; and
- RESRAD considers the source geometry taking into account the thickness and surface area of soil contamination – RAGS does not.

To estimate risk from exposure to radiological PCOCs, the parameter values listed in Table D-2 and the soil concentrations listed in Attachment 5 were entered into the RESRAD code. A total risk is estimated for years zero (0.0) to 1,000. This approach is necessary to consider the ingrowth of Ra-226 over time. That is, Th-230 does not typically drive risk or dose. Th-230 does, however, decay into Ra-226 that typically does drive risk and dose. To be conservative, dose and risk calculations are performed assuming that up to 1,000 years of Ra-226 ingrowth has occurred.

The methodology for estimating risk from exposure to non-radionuclides is consistent with the methods outlined in the PAM (USACE, 1999b). Standard RAGS equations were used with the parameter values listed in Table D-2. Toxicity values and other chemical-specific parameters used to quantify risks and hazards are presented for the PCOCs in Attachment 11.

D.1.3.2 Uncertainties

Exposure parameters were selected to provide a conservative, yet reasonable, estimate of potential risks to each receptor. Site-specific measurements and data were used, as appropriate, to describe site conditions as accurately as possible. Where site-specific data were not available, parameter values were chosen to provide reasonably conservative estimates of risk, or standard default values recommended by the Exposure Factors Handbook (EPA, 1997) were used. The model assumes that contamination is always spread over a large area and is never covered. Final status surveys and post-remediation risk/dose assessments for each property will consider property-specific characteristics such as surface area and depth below ground surface.

The accuracy of exposure calculations is ultimately limited to the accuracy of the site data and risk models. The data used in the assessment include results from several characterization efforts and include different target analytes, analysis methods, and reporting requirements. The data in this assessment is used assuming the best knowledge of the distribution of contaminants in site soils with the goal of providing conservative, yet reasonable, estimates of risk. The models used to calculate risks and doses are approved by EPA and are assumed to provide a reasonable prediction of site exposures.

Lifetime cancer risk estimates are provided for exposure to chemical contaminants and are compared to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) target risk range of 10^{-6} to 10^{-4}. Radiological risk slope factors have been developed primarily using data from groups such as the Japanese atomic bomb survivors. These individuals received large doses of radiation over a short period of time. By contrast, potential receptors in this assessment receive relatively small radiological doses over a long period of time. Although cancerous effects have only been detected at doses several orders of magnitude larger than those estimated at the North County Site, it is assumed that the slope factors apply to both large and small radiological doses. Non-radiological CSFs are developed mostly from animal studies, and slope factors for radionuclides and non-radiological incorporate several differences that may result in incompatibility. EPA, therefore, acknowledges a large (undefined) uncertainty in risk estimates and recommends that radiological and chemical risks be presented separately (EPA, 1996a).

A series of reports published by the National Research Council's Committee on the Biological Effects of Ionizing Radiation (BEIR) lists additional uncertainties resulting from the use of CSFs for radionuclides. BEIR reports point out that cancer risks from exposure to radionuclides at environmental levels (typical background radiation produces approximately 300 mrem/yr) are very difficult to distinguish from background cancer rates. In addition, the calculation of CSFs is based on radium dial painter studies, atomic bomb survivor studies, etc., each considering doses many orders of magnitude higher than those received at environmental levels. The applicability of the linear no-threshold model has been debated by many professional societies. However, the linear no-threshold model (i.e., assuming risk is linear with exposure and is possible for even the smallest doses) has been adopted by all relevant United States regulating agencies. Using this model, risks at environmental levels are calculated even at dose levels a small fraction of background.

The use of standard default assumptions for property size and that all modeled receptors are equally likely produces conservative dose and risk results. That is, contamination on some properties may cover a small surface area (which would lower dose estimates) and may only reasonably expose a subset of individuals (e.g., utility workers). Property-specific and receptor-specific calculations will be part of the final status survey process.

In October 1999, Washington State University, under contract to the USACE, published a report titled *Determination of the In Vitro Dissolution Rates of Selected Radionuclides in Soils and Subsequent ICRP 30 Solubility Classification for Dosimetry* (sic) that may be used to support radiological dose and risk estimates. In vitro dissolution rates are broken into three class: D, W and Y with Class D being the most soluble and Class Y being the least soluble. RESRAD assumes by default that all radionuclides are present as Class Y because Class Y would cause the calculated dose and risk estimates to be higher. RESRAD models can be adjusted to reflect the site-specific conditions, if appropriate. Of the three radionuclides studied, Pa-231 and Th-230 are found to be Class Y and only U-238 demonstrates Class W or D characteristics. However, U-238 also shows some Class Y characteristics. To be conservative (i.e., to assure that the calculated dose and risk are not underestimated), all radionuclides including U-238 are modeled with a Class Y solubility (the RESRAD default).

D.1.3.3 Results

Table D-3 presents the total risk for the reasonable maximum exposure (RME) receptor expected to occur under current and future land use. The limiting RME case occurs for the SLAPS property. Radiological dose and risk estimates are provided with exposure concentrations for soil, for each property and depth grouping, in Attachment 12. This attachment/table includes dose and risk estimates for year 0.0 and year 1,000 as discussed in Section D.1.3.1. The dose assigned to a property is defined as the maximum dose from years 0.0 or 1,000. The risk assigned to a property is defined as the maximum risk from years 0.0 or 1,000. Table D-4a and Table D-4b summarize the results listed in Attachment 12 into major groupings [e.g., vicinity properties (VPs), SLAPS, etc.]. This risk is based on the characterization data. However, some properties have undergone, or are currently undergoing removal actions. Risk results from these properties have been or will be updated as part of the final status survey process.

Attachment 12 lists the dose and risk contributions from all radionuclides for which a non-zero exposure concentration is estimated. As outlined in Section D.1.2.3, some properties may not have concentrations above background, or may not have sufficient data to estimate the concentration of all radionuclides. Radionuclides with no exposure concentration are not listed in this attachment. Attachment 12 also lists dose and risk estimates for a range of depth intervals. These intervals were selected based on data limitations and are evaluated on a property-by-property basis.

Results show that, in general, doses and risks from year zero are significantly larger than those from year 1,000. This occurs because of a combination of factors related to the removal of radionuclides from the contaminated lens. A lens thickness of 0.3 meters is assumed as a typical site-wide value. RESRAD default distribution coefficients were also used and when combined with the stated lens thickness, non-radium radionuclides are effectively removed from the contaminated lens. Analysis has shown that if distribution coefficients are increased by an order of magnitude, non-radium radionuclides remain in the contaminated lens enough to contribute significantly to dose/risk at year 1,000. However, the default distribution coefficients were used in the final model given the high uncertainty and considering that the model is conservative by design. Risk and dose results are presented as conservative averages for each property or exposure unit. While some results may be acceptable to human health, remediation may still be required if concentrations exceed RGs, or if during the final status survey smaller areas containing concentrations above health-based limits are identified.

Potential receptors evaluated include a resident, the industrial worker, maintenance worker, a recreational/trespasser, a utility worker, and construction worker. The current use conditions in the North County Site are summarized by aggregating similar groups of properties or considering major individual properties as follows:

- Industrial, utility, and maintenance worker use for vicinity properties, including investigation areas (IAs)-9, 10, 11, and 13;

Table D-3. RME Receptors Risk Summary

Carcinogens								
Scenario Timeframe:	Current							
Receptor Population:	Maintenance Worker							
Receptor Age:	Adult							
Receptor Location:	SLAPS							
				Carcinogenic Risk				
Medium	**Exposure Medium**	**Exposure Route-Pathway**	**Contaminant of Concern**	**Ingestion**	**Inhalation**	**Dermal**	**External (Radiation)**	**Exposure Route Total**
Soil	Soil	Soil On-Site - Direct Contact	None [a]	Note b	Note b	Note b	Note b	Note b
	Dust	Soil On-Site – Inhalation of Soil as Dust	None [a]	Note b	Note b	Note b	Note b	Note b
							Chemical Soil Risk Total	Note b
				Carcinogenic Risk				
Medium	**Exposure Medium**	**Exposure Route-Pathway**	**Contaminant of Concern**	**Ingestion**	**Inhalation**	**Dermal**	**External (Radiation)**	**Exposure Route Total**
Soil	Soil/Dust	Soil On-Site - Direct Contact and Inhalation of Soil as Dust	Radionuclides	Note c	Note c	-	Note c	4.8E-05
							Radiological Soil Risk Total	4.8E-05
Carcinogens								
Scenario Timeframe:	Future							
Receptor Population:	Resident							
Receptor Age:	Adult/Child							
Receptor Location:	SLAPS							
				Carcinogenic Risk				
Medium	**Exposure Medium**	**Exposure Route-Pathway**	**Contaminant of Concern**	**Ingestion**	**Inhalation**	**Dermal**	**External (Radiation)**	**Exposure Route Total**
Soil	Soil	Soil On-Site - Direct Contact	Arsenic [d]	8.0E-05	doesn't apply to direct contact	6.6E-07	doesn't apply to direct contact	8.1E-05
	Dust	Soil On-Site - Inhalation of Soil as Dust	Arsenic [d]	doesn't apply to inhalation	4.6E-08	doesn't apply to inhalation	doesn't apply to inhalation	4.6E-08
							Chemical Soil Risk Total	8.1E-05
				Carcinogenic Risk				
Medium	**Exposure Medium**	**Exposure Route-Pathway**	**Contaminant of Concern**	**Ingestion**	**Inhalation**	**Dermal**	**External (Radiation)**	**Exposure Route Total**
Soil	Soil/Dust	Soil On-Site - Direct Contact and Inhalation of Soil as Dust	Radionuclides	Note c	Note c	-	Note c	3.7E-03
							Radiological Soil Risk Total	3.7E-03
							Total Risk	Note e

Table D-3. Risk Characterization Summary (Cont'd)

Medium	Exposure Medium	Exposure Route-Pathway	Contaminant of Concern	Primary Target Organ(s)	Non-Carcinogenic Hazard Quotient			
Non-Carcinogens								
Scenario Timeframe:		Current						
Receptor Population:		Maintenance Worker						
Receptor Age:		Adult						
Receptor Location:		SLAPS						
Medium	**Exposure Medium**	**Exposure Route-Pathway**	**Chemical of Concern [f]**	**Primary Target Organ(s)**	**Ingestion**	**Inhalation**	**Dermal**	**Exposure Route Total**
Soil	Soil	Soil On-Site - Direct Contact	Arsenic	Cardiovascular, Skin/Hair	1.1E-01	doesn't apply to direct contact	1.1E-04	1.1E-01
		Soil On-Site - Direct Contact	Nickel	Lungs, Immune System	4.2E-02	doesn't apply to direct contact	6.5E-05	4.3E-02
		Soil On-Site - Direct Contact	Thallium	CNS, Skin/Hair	2.0E-03	doesn't apply to direct contact	4.2E-06	2.0E-03
		Soil On-Site - Direct Contact	Vanadium	Lungs	2.0E-02	doesn't apply to direct contact	8.4E-04	2.1E-02
	Dust	Soil On-Site – Inhalation of Soil as Dust	Arsenic	Cardiovascular, Skin/Hair	doesn't apply to inhalation	-	doesn't apply to inhalation	-
		Soil On-Site - Inhalation of Soil as Dust	Nickel	Lungs, Immune System	doesn't apply to inhalation	-	doesn't apply to inhalation	-
		Soil On-Site - Inhalation of Soil as Dust	Thallium	CNS, Skin/Hair	doesn't apply to inhalation	-	doesn't apply to inhalation	-
		Soil On-Site - Inhalation of Soil as Dust	Vanadium	Lungs	doesn't apply to inhalation	-	doesn't apply to inhalation	-
							Chemical Soil Hazard Index Total	1.7E-01
							Cardiovascular System Total Hazard Index	1.1E-01
							Central Nervous System (CNS) Total Hazard Index	2.0E-03
							Immune System Total Hazard Index	4.3E-02
							Respiratory System (Lungs) Total Hazard Index	6.3E-02
							Skin/Hair Total Hazard Index	1.1E-01
					Ingestion	**Inhalation**	**Dermal**	**Exposure Route Total**
Soil	Soil/Dust	Soil On-Site - Direct Contact and Inhalation of Soil as Dust	Radionuclides	Note g	Note g	Note g	Note g	Note g
							Radiological Soil Total Dose (mrem/yr)	2.2E+01

Table D-3. Risk Characterization Summary (Cont'd)

Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult/Child
Receptor Location: SLAPS

Medium	Exposure Medium	Exposure Route-Pathway	Contaminant of Concern [h]	Primary Target Organ(s)	Non-Carcinogenic Hazard Quotient: Ingestion	Inhalation	Dermal	Exposure Route Total
Soil	Soil	Soil On-Site - Direct Contact	Arsenic	Cardiovascular, Skin/Hair	4.2E-01	doesn't apply to direct contact	3.4E-03	4.2E-01
		Soil On-Site - Direct Contact	Barium	Cardiovascular	9.8E-02	doesn't apply to direct contact	4.7E-03	1.0E-01
		Soil On-Site - Direct Contact	Chromium	Lungs	3.8E-01	doesn't apply to direct contact	6.4E-02	4.5E-01
		Soil On-Site - Direct Contact	Nickel	Lungs, Immune System	1.6E-01	doesn't apply to direct contact	2.0E-03	1.6E-01
		Soil On-Site - Direct Contact	Thallium	CNS, Skin/Hair	7.7E-02	doesn't apply to direct contact	1.3E-03	7.8E-02
		Soil On-Site - Direct Contact	Vanadium	Lungs	7.7E-02	doesn't apply to direct contact	2.6E-02	1.0E-01
		Soil On-Site - Direct Contact	Zinc	Blood	5.2E-03	doesn't apply to direct contact	8.8E-05	5.3E-03
	Dust	Soil On-Site - Inhalation of Soil as Dust	Arsenic	Cardiovascular, Skin/Hair	doesn't apply to inhalation	-	doesn't apply to inhalation	-
		Soil On-Site - Inhalation of Soil as Dust	Barium	Cardiovascular	doesn't apply to inhalation	2.7E-03	doesn't apply to inhalation	2.7E-03
		Soil On-Site - Inhalation of Soil as Dust	Chromium	Lungs	doesn't apply to inhalation	2.3E-03	doesn't apply to inhalation	2.3E-03
		Soil On-Site - Inhalation of Soil as Dust	Nickel	Lungs, Immune System	doesn't apply to inhalation	-	doesn't apply to inhalation	-
		Soil On-Site - Inhalation of Soil as Dust	Thallium	CNS, Skin/Hair	doesn't apply to inhalation	-	doesn't apply to inhalation	-
		Soil On-Site - Inhalation of Soil as Dust	Vanadium	Lungs	doesn't apply to inhalation	-	doesn't apply to inhalation	-
		Soil On-Site - Inhalation of Soil as Dust	Zinc	Blood	doesn't apply to inhalation	-	doesn't apply to inhalation	-
Chemical Soil Hazard Index Total								1.3E+00
Blood Total Hazard Index								5.3E-03
Cardiovascular System Total Hazard Index								5.2E-01
Central Nervous System (CNS) Total Hazard Index								7.8E-02
Immune System Total Hazard Index								1.6E-01
Respiratory System (Lungs) Total Hazard Index								7.1E-01
Skin/Hair Total Hazard Index								5.0E-01

Table D-3. Risk Characterization Summary (Cont'd)

Medium	Exposure Medium	Exposure Point	Contaminant of Concern	Primary Target Organ(s)	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Route Total
Soil	Soil/Dust	Soil On-Site - Direct Contact and Inhalation of Soil as Dust	Radionuclides	Note g	Note g	Note g	Note g	Note g
							Radiological Soil Total Dose (mrem/yr)	3.2E+02

Notes:

[a] No Contaminants of Concern (COC) were identified for this property or any other property for the Maintenance Worker receptor.
[b] Not applicable since there are no COCs.
[c] The risk for radionuclides was calculated based only as a total across applicable exposure pathways and are not presented for each individual pathway.
[d] Although not a COC for this property, this contaminant was identified as a COC for another property for the Resident receptor. Risks are shown here for all carcinogenic residential COCs.
[e] The total risk (e.g., sum of chemical and radionuclide risks) may not be directly additive but the risk from exposure to radionuclides far exceeds the risk from exposure to non-radionuclides. Therefore the total risk is approximately the same as the radiological risk.
[f] Although none of the chemicals listed are COCs at this site, these chemicals have been identified as COCs for another property for the Maintenance Worker receptor. Hazards are shown here for all non-carcinogenic maintenance worker COCs.
[g] Radionuclide exposure is not presented in terms of hazard quotient (see dose in mrem/yr).
[h] Although none of the chemicals listed are COCs at this site (since all target organs produce a total HI < 1), these chemicals have been identified as COCs for another property for the Resident receptor. Hazards are shown here for all non-carcinogenic residential COCs except for antimony, which was not evaluated for risk at this site since it was eliminated in the soil screening process.
\- Toxicity criteria are not available to quantitatively address this route of exposure

Table D-4a. Supplemental Human Health Risk Summary Table

Radiological Reasonable Maximum Exposures - Current Receptors

Properties [a]	RME [b] Receptor	Minimum Dose (mrem/yr)	Maximum Dose (mrem/yr)	Average Dose [c] (mrem/yr)	Minimum Risk [d]	Maximum Risk [d]	Average Risk [c]
IAs 1-13	Maintenance	0.0	233	21	6E-10	5E-04	5E-05
HISS & Futura	Industrial	2.7	79	25	4E-05	8E-04	3E-04
Coldwater Creek	Construction	2.9	8.6	5.8	2E-06	3E-06	3E-06
Roads/Bridges/Railroads	Construction	5.4	31	17	2E-06	1E-05	6E-06
VPs (worst-case) [d]	Industrial	15	18	17	2E-04	2E-04	2E-04
VPs (average) [e]	Industrial	0.8	1.3	1.1	2E-05	2E-05	2E-05

Radiological Reasonable Maximum Exposures - Future Receptors

Properties [a]	RME [b] Receptor	Minimum Dose (mrem/yr)	Maximum Dose (mrem/yr)	Average Dose [c] (mrem/yr)	Minimum Risk	Maximum Risk	Average Risk [c]
IAs 1-13	Resident	0.0	3407	311	1E-07	4E-02	4E-03
HISS & Futura	Resident	9.3	294	91	1E-04	3E-03	1E-03
Coldwater Creek	Construction	2.9	8.6	5.8	2E-06	3E-06	3E-06
Roads/Bridges/Railroads	Construction	5.4	31	17	2E-06	1E-05	6E-06
VPs (worst-case) [d]	Resident	51	60	56	7E-04	9E-04	8E-04
VPs (average) [e]	Resident	2.7	4.3	3.5	6E-05	7E-05	7E-05

Non-radiological Reasonable Maximum Exposures - Current Receptors [f]

Properties [a]	RME [b] Receptor	Minimum HI [g]	Maximum HI	Average HI	Minimum Risk	Maximum Risk	Average Risk
IAs 1-13	Maintenance	< 0.1	0.5	< 0.2	2E-8	2E-5	3E-6
HISS & Futura	Industrial	1.4	3.5	2.5	9E-5	3E-4	2E-4
Coldwater Creek	Construction	-	-	-	-	-	-
Roads/Bridges/Railroads [h]	Construction	1.3	1.3	1.3	2E-6	2E-6	2E-5
VPs [h]	Industrial	< 0.1	< 0.1	< 0.1	-	-	-

Non-radiological Reasonable Maximum Exposures - Future Receptors [f]

Properties [a]	RME [b] Receptor	Minimum HI	Maximum HI	Average HI	Minimum Risk	Maximum Risk	Average Risk
IAs 1-13	Resident	< 0.1	2.5	< 0.8	5E-7	3E-4	5E-5
HISS & Futura	Resident	4.7	13	9	4E-4	1E-3	7E-4
Coldwater Creek	Construction	-	-	-	-	-	-
Roads/Bridges/Railroads [h]	Construction	1.3	1.3	1.3	2E-6	2E-6	2E-6
VPs [h]	Resident	0.2	0.2	0.2	-	-	-

[a] VP = vicinity property; IA = investigation area (includes SLAPS)
[b] RME = reasonable maximum exposure
[c] Averaged over year 0.0 and year 1,000 estimates for listed properties
[d] Minimum and maximum values listed for VP with worst-case source term
[e] Results when averaging across all VPs
[f] Results for all non-radionuclides including those that are non-FUSRAP-related
[g] HI = hazard index; only maximum values provided because total risks are dominated by radionuclides
[h] No non-radiological available data except where property also falls under an IA

Table D-4b. Summary of Radiological Doses and Risks by Property

Property Name	RESIDENTIAL SCENARIO				INDUSTRIAL SCENARIO				CONSTRUCTION SCENARIO			
	Dose Year = 0.0	Dose Year = 1000	Risk Year = 0.0	Risk Year = 1000	Dose Year = 0.0	Dose Year = 1000	Risk Year = 0.0	Risk Year = 1000	Dose Year = 0.0	Dose Year = 1000	Risk Year = 0.0	Risk Year = 1000
VPs (highest value)	60	51	9E-04	7E-04	18	15	2E-04	2E-04	47	42	2E-05	2E-05
VPs (average value)	2.7	4.3	6E-05	7E-05	0.8	1.3	2E-05	2E-05	2.3	3.2	9E-07	2E-06
Coldwater Creek	not applicable				not applicable				8.6	2.9	3E-06	2E-06
Railroad	not applicable				not applicable				6.7	5.4	3E-06	2E-06
Road Right-of-way	29	37	4E-04	5E-04	8.0	11	1E-04	1E-04	25	31	9E-06	1E-05
HISS	42	9.3	5E-04	1E-04	12	2.7	1E-04	4E-05	34	7.4	1E-05	3E-06
Futura	294	18	3E-03	3E-04	79	5.3	8E-04	7E-05	251	14	8E-05	6E-06
IA-1	3407	78	4E-02	1E-03	946	24	9E-03	3E-04	2801	56	1E-03	3E-05
IA-2	382	180	5E-03	3E-03	105	51	1E-03	7E-04	322	149	1E-04	6E-05
IA-3	492	65	6E-03	9E-04	144	18	2E-03	2E-04	369	54	2E-04	2E-05
IA-4	1159	315	2E-02	4E-03	337	90	4E-03	1E-03	890	262	4E-04	1E-04
IA-5	179	89	2E-03	1E-03	48	25	5E-04	3E-04	156	73	5E-05	3E-05
IA-6	84	68	9E-04	1E-03	21	20	2E-04	3E-04	80	55	2E-05	2E-05
IA-7	621	256	6E-03	4E-03	164	72	2E-03	9E-04	557	213	2E-04	8E-05
IA-8	341	221	3E-03	3E-03	87	63	8E-04	8E-04	325	184	8E-05	7E-05
IA-9	24	16	2E-04	2E-04	6.0	4.5	6E-05	6E-05	22	13	6E-06	5E-06
IA-10	24	5.0	3E-04	8E-05	6.5	1.5	7E-05	2E-05	20	3.6	7E-06	2E-06
IA-11	0.0	0.0	1E-07	4E-07	0.0	0.0	2E-08	1E-07	0.0	0.0	5E-10	1E-08
IA-12	30	42	4E-04	6E-04	7.6	12	9E-05	2E-04	30	35	7E-06	1E-05
IA-13	10	4.8	1E-04	8E-05	2.8	1.5	3E-05	2E-05	8.8	3.3	3E-06	2E-06
SLAPS	321	110	4E-03	2E-03	89	31	1E-03	4E-04	267	91	1E-04	4E-05
Property Name	**MAINTENANCE SCENARIO**				**RECREATIONAL/TRESPASSER SCENARIO**				**UTILITY WORKER SCENARIO**			
	Dose Year = 0.0	**Dose Year = 1000**	**Risk Year = 0.0**	**Risk Year = 1000**	**Dose Year = 0.0**	**Dose Year = 1000**	**Risk Year = 0.0**	**Risk Year = 1000**	**Dose Year = 0.0**	**Dose Year = 1000**	**Risk Year = 0.0**	**Risk Year = 1000**
VPs (highest value)	3.8	3.4	1E-05	8E-06	0.9	0.8	5E-06	4E-06	1.9	1.7	8E-07	7E-07
VPs (average value)	0.2	0.3	5E-07	7E-07	0.0	0.1	3E-07	3E-07	0.1	0.1	3E-08	6E-08
Coldwater Creek	0.7	0.2	1E-06	8E-07	0.1	0.1	5E-07	4E-07	0.3	0.1	1E-07	6E-08
Railroad	0.5	0.4	2E-06	1E-06	0.1	0.1	8E-07	6E-07	0.3	0.2	1E-07	1E-07
Road Right-of-way	2.1	2.5	5E-06	6E-06	0.4	0.6	2E-06	3E-06	1.0	1.2	4E-07	5E-07
HISS	2.8	0.6	7E-06	2E-06	0.6	0.1	3E-06	7E-07	1.3	0.3	6E-07	1E-07
Futura	21	1.1	4E-05	3E-06	4.0	0.3	2E-05	1E-06	10	0.6	3E-06	2E-07
IA-1	233	4.2	5E-04	1E-05	49	1.3	2E-04	7E-06	112	2.2	4E-05	1E-06
IA-2	27	12	6E-05	3E-05	5.4	2.7	2E-05	1E-05	13	6.0	5E-06	2E-06
IA-3	29	4.3	8E-05	1E-05	7.6	1.0	4E-05	5E-06	15	2.1	7E-06	8E-07
IA-4	71	21	2E-04	5E-05	18	4.7	9E-05	2E-05	36	10	2E-05	4E-06
IA-5	13	6.0	3E-05	1E-05	2.5	1.3	1E-05	6E-06	6.2	2.9	2E-06	1E-06
IA-6	6.9	4.5	1E-05	1E-05	1.1	1.0	4E-06	5E-06	3.2	2.2	8E-07	9E-07
IA-7	48	17	8E-05	4E-05	8.3	3.8	3E-05	2E-05	22	8.5	7E-06	3E-06
IA-8	28	15	4E-05	4E-05	4.3	3.3	2E-05	2E-05	13	7.4	3E-06	3E-06
IA-9	1.9	1.0	3E-06	3E-06	0.3	0.2	1E-06	1E-06	0.9	0.5	2E-07	2E-07
IA-10	1.7	0.3	3E-06	9E-07	0.3	0.1	1E-06	4E-07	0.8	0.1	3E-07	7E-08
IA-11	0.0	0.0	6E-10	5E-09	0.0	0.0	2E-10	2E-09	0.0	0.0	2E-11	4E-10
IA-12	2.6	2.8	4E-06	7E-06	0.4	0.6	2E-06	3E-06	1.2	1.4	3E-07	5E-07
IA-13	0.7	0.3	1E-06	9E-07	0.1	0.1	6E-07	4E-07	0.4	0.1	1E-07	7E-08
SLAPS	22	7.4	5E-05	2E-05	4.6	1.6	2E-05	8E-06	11	3.6	4E-06	1E-06

VP = vicinity property
IA = investigation area
All doses in units of mrem/y

Recreational/trespasser use applicable for Coldwater Creek;

- Construction and trespasser scenario applies to SLAPS (including IA-1 through IA-7), HISS, and Futura; and

- Construction/utility and maintenance worker use assumed for the railroads, including IA-12 (Railroad area south of SLAPS to Banshee Road), and road right-of-ways, including IA-8 (under and along McDonnell Boulevard at SLAPS).

Under current use conditions (including existing restrictions), the radiological results shown in Table D-4b indicate that the risks are often above the 10^{-6} point of departure, but are within the CERCLA target risk range for radionuclides[1]. Specifically, recreational/trespasser risks do not exceed the range for Coldwater Creek, SLAPS, HISS, and Futura; maintenance worker risks do not exceed the range for VPs, the railroads, and road right-of-ways; industrial worker risks do not exceed the range for the VPs; and construction worker risks do not exceed the range for the railroads and road right-of-ways. Risks above the CERCLA target risk range could occur for the likely future industrial land use at some properties (see the industrial risk values for the IA units, Futura, and SLAPS). If residential development is assumed, risks at HISS, several of the IAs, and the most contaminated of the VPs could exceed the risk range.

The highest calculated dose results under current conditions are: 49 mrem/yr for the recreational/trespasser (IA-1); 28 mrem/yr for the maintenance worker (IA-8); 17.5 mrem/yr for the industrial worker (highest VP); and 325 mrem/yr for the construction worker (IA-8). When assessing potential future conditions, radiological doses for industrial and construction workers range from tens to several hundred mrem/yr. If the properties revert to residential use, doses could exceed 1,000 mrem/yr in IA-1 and IA-4. Results in Table D-4b indicate that under future use conditions, risks could exceed limits and dose guidelines for residential, industrial, and construction users on several properties.

Surface soil non-radiological risks and hazards are shown for each property and depth grouping in Attachment 13. Table D-5 summarizes the results listed in Attachment 13 into major groupings (e.g., VPs, SLAPS, etc.). Eleven metals (with locations in parentheses) are identified as surface soil COPCs: antimony (IA-3 and HISS), arsenic (Futura, HISS, IA-2, IA-4, and SLAPS), barium (Futura, HISS, IA-4, IA-7, and SLAPS), cadmium (HISS and IA-3), chromium (IA-3 and SLAPS), molybdenum (Futura, HISS, and IA-7), nickel (Futura, HISS, IA-4, IA-7, and SLAPS), selenium (Futura, HISS, and IA-7), thallium (HISS), uranium (IA-3 and IA-4), and vanadium (Futura, HISS, IA-2, IA-7, and SLAPS). Total risks (i.e., risks across all non-radiological PCOCs) exceed 1×10^{-4} for the industrial worker at HISS and for the resident at HISS, Futura, and IA-2. No other risks exceed 1×10^{-4}. The hazard index (i.e., sum of the hazard quotients across all appropriate pathways and across all PCOCs) exceeded unity for only the following receptor/properties:

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1. Note that while EPA generally defines the CERCLA target risk range as 1×10^{-6} to 1×10^{-4} for non-radiological contaminants, 3×10^{-4} may be considered an acceptable upper bound for radionuclides.

Table D-5. Summary of Surface Soil Risks and Hazards for Non-radionuclides by Property

Property Name	RESIDENTIAL SCENARIO		INDUSTRIAL SCENARIO		CONSTRUCTION SCENARIO		MAINTENANCE SCENARIO		RECREATIONAL TRESPASSER SCENARIO	
	Chemical Hazard	Chemical Risk	Chemical Hazard	Chemical Risk	Chemical Hazard	Chemical Risk	Chemical Hazard	Chemical Risk	Chemical Hazard	Chemical Risk
VPs (highest value)	0.2		<0.1		0.5		<0.1		<0.1	
VPs (average value)*	0.2		<0.1		0.5		<0.1		<0.1	
Road Right-of-way	0.9	3E-05	0.3	6E-06	1.3	2E-06	0.1	2E-06	<0.1	3E-07
HISS	12.6	1E-03	3.5	3E-04	20.0	1E-04	2.0	7E-05	0.5	1E-05
Futura	4.7	4E-04	1.4	9E-05	11.8	3E-05	1.2	2E-05	0.2	5E-06
IA-1	<0.1	5E-07	<0.1	2E-07	<0.1	4E-08	<0.1	2E-08	<0.1	1E-08
IA-2	1.8	3E-04	0.5	6E-05	4.6	2E-05	0.5	2E-05	<0.1	3E-06
IA-3	2.5	5E-06	0.9	1E-06	1.9	1E-07	0.1	8E-08	0.2	2E-08
IA-4	0.8	6E-05	0.2	1E-05	1.7	5E-06	0.2	4E-06	<0.1	7E-07
IA-5	0.3	2E-05	<0.1	4E-06	0.5	2E-06	<0.1	1E-06	<0.1	2E-07
IA-7	1.5		0.4		3.7		0.4		<0.1	
IA-8	0.1	2E-05	<0.1	4E-06	0.3	1E-06	<0.1	8E-07	<0.1	3E-07
IA-9	0.3	3E-05	0.1	7E-06	0.9	2E-06	<0.1	2E-06	<0.1	4E-07
IA-10		6E-06		2E-06		5E-07		3E-07		1E-07
IA-13	0.2	2E-05	<0.1	5E-06	0.3	2E-06	<0.1	1E-06	<0.1	3E-07
SLAPS	1.4	8E-05	0.5	2E-05	2.4	7E-06	0.2	5E-06	<0.1	1E-06

VP = vicinity property
IA = investigation area
* Average value for all VP data combined. Note that the availability of data varies on a property by property basis.
Note: Chemical hazards and risks shown in this table include hazards and risks from uranium as a chemical.

The maintenance worker and industrial worker at HISS and Futura;

- The construction worker at the road right-of-way, HISS, Futura, IA-2 to IA-4, IA-7, and SLAPS; and

- The resident at HISS, Futura, IA-2, IA-3, IA-7, and SLAPS.

All surface soil COPCs may be linked to FUSRAP-related activities and are retained as COCs. Subsurface soil non-radiological risks and hazards for the construction worker are shown for each property in Attachment 14. Table D-6 summarizes the results listed in Attachment 14 into major groupings (e.g., VPs, SLAPS, etc.). Five non-radionuclide subsurface soil exceed risk criteria based on the evaluation of the construction worker's exposure to subsurface soil and are selected as COPCs. The COPCs are antimony (IA-10), arsenic (IA-2, IA-10, and road right-of-way), manganese (road right-of-way), thallium (IA-10), and uranium (IA-2). Of these, manganese was not identified above criteria on either SLAPS or HISS and, thus, is not considered FUSRAP-related. By eliminating manganese, arsenic is also eliminated (total hazard of 0.37) for road right-of-way leaving no non-radiological COPCs for the road right-of-way grouping. Total risks across all PCOCs were less than 1×10^{-4} for all properties, while total FUSRAP-related hazards exceed 1.0 for two areas (IA-2 and IA-10 have estimated hazards of 2.4 and 8.1, respectively). Subsurface COCs retained for SLAPS and contiguous properties (IAs 1-13), HISS/Futura, and Latty Avenue VPs 2L and 10k530087 include antimony, arsenic, thallium, and uranium.

Table D-6. Subsurface Soil Risks and Hazards for Non-radionuclides by Property

Property Name	Construction Worker Scenario	
	Chemical Hazard	Chemical Risk
VPs (highest value)	0.5	
VPs (average value)	0.5	
Road Right-of-way	1.2	2E-06
IA-2	2.4	1E-05
IA-3	0.4	5E-08
IA-4	0.3	2E-06
IA-5	0.2	1E-06
IA-7	0.5	
IA-9	0.3	2E-06
IA-10	8.1	4E-05
SLAPS	0.5	2E-06

Ground-water non-radiological risks and hazards are shown in Attachment 15. Six metals (arsenic, barium, fluoride, manganese, thallium, and uranium) and two organics [bis(2-ethylhexyl)phthalate and MCPP] are identified as COPCs for the drinking water pathway and the deep aquifer [hydrostratigraphic zone B (HZ-B)]. Risks and hazards in deep ground water are driven by MCPP, arsenic, manganese, and thallium. Although arsenic and manganese are present in ores in trace amounts, the lack of connection between the HZ-A unit and the deep aquifer precludes the presence of FUSRAP-related arsenic and manganese as COCs in the deep aquifer. There is no evidence that the presence of MCPP and thallium in the deep aquifer is a result of FUSRAP-related activities given both the lack of hydraulic connection and the fact that thallium is only present in trace amounts in the ores (MCPP is a herbicide with no ore-processing connection). If the three metals are removed from consideration, the risk and hazard would be within the CERCLA risk range and have an HI < 1. Because the potential yield is very low for shallow ground water, it is not a source of potable drinking water, and no additional COCs are identified for ground water.

Attachment 16 displays the non-radiological risks and hazards for surface water. Several COPCs were identified in surface-water samples from Coldwater Creek. However, an evaluation of the data against background, risk, and hazard criteria indicates that the levels present are within the acceptable risk range. For that reason, no COCs were identified for surface water and surface water was not carried forward as a media of concern.

Sediment risks and hazards for radiological PCOCs are shown in Attachment 17. Radiological estimates show that the highest radiological risk under the recreational/trespasser scenario is 3×10^{-4}. These estimates are for the hot spot with the highest concentration of Th-230. However, a future scenario where no restriction is placed on public use of creek sediments in residential areas may pose a potential unacceptable risk to human health. Thus, radiological PCOCs for soil are retained as COPCs and COCs for sediments. Sediment risks and hazards for non-radiological PCOCs are shown in Attachment 18. Results for non-radionuclides indicate that one metal (arsenic) and five organics [benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene] are COPCs. Arsenic is below background adjacent to SLAPS and HISS (i.e., at Reach A). Arsenic concentrations increase with distance downstream, thus elevated arsenic in Reaches B and C is most likely due to the heavy industrial activity in the area and is not associated with site activities. Thus, arsenic is not considered to be a COC in sediment. Similarly, none of the five organics were identified above risk criteria in Reach A and, given the heavy industrial activity in the area, these organics are not considered to be the result of site activities and are not identified as sediment COCs. Only radionuclides are considered COCs for sediments.

A summary of COCs across all media and land uses is shown in Table D-7. COCs are limited to metals and radionuclides.

Results of the supplemental risk assessment show that there is a need for action at the North County Site, thus are in agreement with the original 1993 BRA. These results indicate that remedial action would be required based on radiological COCs alone, but non-radiological constituents could also produce unacceptable risk at some properties. In general, however, the risk from radionuclides is at least an order of magnitude above non-radiological risks. HISS is the exception where the residential risk is 1×10^{-3} for non-radionuclides and 5×10^{-4} for radionuclides.

The addition of radiological risk and chemical risk was evaluated as requested by EPA. However, as described in *Radiation Exposure and Risk Assessment Manual* (EPA, 1996a), there are several differences in radiological and non-radiological CSFs including the following:

- the radiological endpoint is fatal cancer – the constituent endpoint is tumorigenic cancer;
- radiological risk estimates are based primarily on human data – constituent risk estimates are based primarily on animal studies; and

- radiological risk estimates are based on the central estimate of the mean – many constituent risk estimates are based on 95% UCL of the mean.

Additional considerations include the fact that exposure point concentrations for radionuclides and non-radionuclides are specific to distinct models incorporating different assumptions.

Results indicate that in no case could an acceptable risk be changed to unacceptable by combining radiological and non-radiological results. Likewise, hazard results exceed limits on some sites where the radiological risk also exceeds limits. This suggests that the remediation of risk drivers (radionuclides) would be acceptable for the site.

Table D-7. Summary of Contaminants of Concern (COCs) by Land Use and Medium

COC	Land Use [a]				
	Residential Scenario	Industrial Scenario	Construction Scenario	Maintenance Scenario	Recreational Scenario
Inorganics					
Antimony	ss	ss	ss, sb		ss
Arsenic	ss	ss	ss, sb	ss	ss
Barium	ss		ss		ss
Cadmium	ss		ss		ss
Chromium	ss		ss		ss
Molybdenum			ss		
Nickel	ss	ss	ss	ss	ss
Selenium			ss		
Thallium	ss	ss	ss, sb	ss	ss
Uranium			ss, sb		
Vanadium	ss	ss	ss	ss	ss
Radionuclides					
Actinium-227	so, sd	so, sd	so, sd	so, sd	so, sd
Lead-210	so, sd	so, sd	so, sd	so, sd	so, sd
Protactinium-231	so, sd	so, sd	so, sd	so, sd	so, sd
Radium-226	so, sd	so, sd	so, sd	so, sd	so, sd
Radium-228	so, sd	so, sd	so, sd	so, sd	so, sd
Thorium-228	so, sd	so, sd	so, sd	so, sd	so, sd
Thorium-230	so, sd	so, sd	so, sd	so, sd	so, sd
Thorium-232	so, sd	so, sd	so, sd	so, sd	so, sd
Uranium-234	so, sd	so, sd	so, sd	so, sd	so, sd
Uranium-235	so, sd	so, sd	so, sd	so, sd	so, sd
Uranium-238	so, sd	so, sd	so, sd	so, sd	so, sd

[a] COCs are identified in the table by media codes within each land use:
ss = surface soil
sb = subsurface soil
sd = sediment (Note that sediments are generally protective, but are remediated to assure removals from small areas with elevated concentrations, and to assure long-term effectiveness under CERCLA, particularly with respect to their potential for relocation to adjacent residential property.)
so = soil (radionuclides only, all depths)

D.2 DERIVATION OF SITE-SPECIFIC REMEDIATION GOALS (RGs)

The remediation goals proposed for the North County Site comply with ARARs, are protective of human health and environment and are consistent with the NCP. They are protective under conditions of RME for residential site conditions (see Preamble to the final rule for 40 CFR 192 as specified in 48 FR 600 and the Final Environmental Impact Assessment). No directly applicable chemical-specific requirements are identified. Relevant and appropriate requirements are identified for radioactive contaminants in soil. Remediation goals for other contaminants in soil are derived using site-specific evaluations. Risk and dose assessments were also performed to assure protectiveness in light of multiple contaminants and multiple pathways (e.g., inhalation, ingestion, and direct exposure) at the North County Site. The remediation goal for Ra-226 is set forth in 40 CFR 192, Subpart B. Site-specific remediation goals for U-238 and Th-230 are derived in accordance with 10 CFR 40, Appendix A, Criterion 6(6) and 40 CFR 192, Subpart A.

No chemical-specific requirements were identified for non-radiological contaminants. Remediation goals were derived based on site-specific exposure assumptions, and with the objective of meeting the acceptable risk range as provided in the NCP. According to the NCP, acceptable exposure levels to known or suspected carcinogens are levels that represent an excess upper bound lifetime cancer risk to an individual of between one in 10,000 (10^{-4}) and one in 1,000,000 (10^{-6}). The EPA establishes preliminary remediation goals (PRGs) for all carcinogenic chemicals at the 10^{-6} level, also known as the point of departure. Final remediation goals may be different based on factors such as uncertainty, technical limitations on detection, or other considerations consistent with the remedy selection criteria defined in the NCP. In this case, practical limits on the ability to distinguish between naturally occurring background levels and very small increments above background require the use of final remediation goals that exceed the 10^{-6} level for some of the non-radiological contaminants; however, final cleanup levels remain within the acceptable risk range. Aggregate risks from final cleanup levels are also within the risk range. Remediation goals for non-carcinogens were developed to ensure that the cumulative toxic effects would result in a HI < 1.0.

The soil cleanup standards found in 40 CFR 192, Subpart B, were developed specifically for the cleanup of uranium mill tailings sites designated under Section 102 (a)(1) of the Uranium Mill Tailings Radiation Control Act (UMTRCA). These standards are intended to provide for unrestricted use of remediated properties. These standards address contaminants and circumstances similar to those found at the North County Site and are, therefore, considered relevant and appropriate to soil cleanup at the North County Site. The surface and subsurface soil criteria in 40 CFR 192, Subpart B for radium–226 are 5 and 15 pCi/g, respectively. The surface remediation goal applies to the 100 m^2 areal average concentration above background in the top 15 cm (6 in.) layer. The subsurface remediation goal applies to the 100m^2 areal average concentration above background in any subsequent 15 cm (6 in) layer. The Ra-226 remediation goal of 5 and 15 pCi/g in surface and subsurface soils has been used with St Louis sites pursuant to the Record of Decision for the St Louis Downtown Site and to Engineering Evaluation/Cost Analyses for the St Louis North County Site. Implementation of the subsurface remediation criterion for Ra-226 results in actual average residual concentrations of Ra-226 significantly less than 5 pCi/g. This is based on cleanup results of a number of different areas and properties within the St Louis North County Site and St Louis Downtown Site, using cleanup goals of 15 pCi/g subsurface criterion for Ra-226 in combination with subsurface remediation goals of

15 and 50 pCi/g for Th-230 and U-238, respectively. Table D-9 (Section D.2.1) lists the residual radionuclide concentrations at properties where response actions have been completed.

The site-specific Th-230 and U-238 remediation goals are derived based on the 10 CFR 40, Appendix A, Criterion 6(6), also referred to as the benchmark dose approach. These requirements supplement the standards found in 40 CFR 192.

The U-238 goal was established using U-238 as a surrogate for all of the uranium isotopes (including U-234 and U-235) and certain uranium decay products. Using the U-238 as a surrogate, the residual concentration was determined to be about 81 pCi/g. However, since some of the decay products are present above the natural abundance, the site-specific remediation goal of 50 pCi/g for U-238 is considered appropriate. Site experience shows that a 50 pCi/g limit is reasonably achievable at little extra cost. This limit has been used on the St Louis North County Site for removal actions conducted by USACE and the DOE since 1991 and is the site-specific remediation goal for U-238 established in the Record of Decision for the St Louis Downtown Site.

Table D-11 in Section D2.2.2 presents the calculation resulting from 10 CFR Part 40, Appendix A, Criterion 6(6) and lists the most restrictive Th-230 concentration as 330 pCi/g. This concentration, although protective with respect to Th-230, would result in the in-growth of Ra-226 such that future concentrations of Ra-226 would exceed the limits specified in ARARs. 40 CFR 192.02(a) requires the selected remedial action be designed to be effective for up to 1000 years to the extent reasonably achievable, and in any case, for at least 200 years. To ensure ARAR is met, the in-growth of Ra-226 from the Th-230 decay process must be calculated and examined. A soil concentration of 14 pCi/g of Th-230 would result in the in-growth of 5 pCi/g Ra-226 concentration at the end of the 1000-year time period stated in 40 CFR 192.02(a). Although a subsurface soil concentration of 43 pCi/g would result in the in-growth of 15 pCi/g Ra-226, EPA's guidance documents for the cleanup of CERCLA sites using 40 CFR 192 as ARAR set forth EPA's expectation that remediation of subsurface soil contamination will, in practice, achieve the surface cleanup criterion of 5 pCi/g for Ra-226. (See OSWER 9200.4-25, "Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA Sites). EPA approval of the ROD is contingent upon satisfying EPA's expectations for cleanup of CERCLA sites; therefore, USACE has adopted, on a site-specific basis, Th-230 surface and subsurface soil cleanup levels that are consistent with a residual Ra-226 concentration of 5 pCi/g. Constraining the concentration of Th-230 in surface soils to 14 pCi/g and subsurface soils to 15 pCi/g along with the use of the unity rule assures that the concentration of Ra-226 does not exceed 5 pCi/g during the 1000-year time period.

No remediation goal is developed for Th-232. Removal of Th-230 to the remediation goals will effectively remove Th-232 present in site soils. Analytical data indicate that Th-232 is co-located with Th-230 and is present at relatively low concentrations. Removal of soils to the radionuclide criteria results in Th-232 concentrations of less than 1.5 pCi/g including background for SLAPS, SLDS, and North County VPs. Residual concentrations do not produce risks significantly above background.

Remediation goals for radiological contaminants of concern for the St Louis North County Site soils are 5/14/50 pCi/g for Ra-226, Th-230 and U-238 in surface soils and 15/15/50 pCi/g for subsurface soils. These remediation goals are consistent with the remediation standards used in Engineering Evaluation/Cost Analyses (EE/CAs) by DOE prior to transfer of

FUSRAP execution to USACE, in USACE EE/CAs, and in local Records of Decision both at the St Louis Downtown Site and by DOE at Weldon Spring Site Remedial Action Project. These remediation goals meet the threshold criteria of overall protection of human health and the environment and compliance with ARARs and will achieve a final status that requires no restrictions on land use. Remediation goals for use in limited circumstances (e.g. Coldwater Creek sediments and supplemental standards for use with containment and treatment alternatives) are developed in Sections D.2.2.2 and D.2.2.3.

D.2.1 OVERALL PROTECTIVENESS

EPA defines protectiveness primarily in term of carcinogenic risk and non-carcinogenic hazard. Any remedial alternative that limits contaminants to concentrations producing a carcinogenic risk less than 1 in 1,000,000 (1×10^{-6}) and an HI $\leq$ 1.0 is considered a protective alternative. The 1×10^{-6} risk level is called the point of departure and is the initial cleanup goal for all EPA sites. However, 1×10^{-6} may not be achievable for a particular contaminant or site, or if there are multiple contaminants at the site. Movement away from the point of departure is allowed based on consideration of the CERCLA criteria, e.g. protectiveness and implementability. The range of acceptable risk is referred to as the CERCLA target risk range. A remedial alternative is protective assuming the point of departure is unachievable if the total risk from exposure to all contaminants is within the CERCLA target risk range and the total hazard is less than 1.0.

At the North County Site, no ARARs have been identified for the non-radiological contaminants. Thus, given that total risks exceed the CERCLA target risk range, each contaminant requires evaluation against the 1×10^{-6} risk level and an HI $\leq$ 1.0 pursuant to CERCLA. For North County Site properties, if the total risk for a specified receptor and medium exceeds 10^{-4}, any FUSRAP-related contaminant with a risk greater than 10^{-6} is considered a COC. Similarly, if the total hazard for a specified receptor and medium exceeds 1.0, any FUSRAP-related contaminant with an HI > 0.1 is considered a COC.

With respect to risk, the primary contaminants at the North County Site are the naturally occurring isotopes of the thorium, uranium and actinium decay series. Background concentrations of many of these radionuclides produce risks well above 1×10^{-6}. In addition, there are limits to the ability to detect these contaminants in the environment. Therefore movement away from 1×10^{-6} is justified by the NCP in Title 40 Code of Federal Regulations (CFR) 300.430(e)(2). Remediation goals must therefore be derived that produce acceptable total risks that are achievable. The establishment of achievable goals for these radionuclides hinges primarily on the ability to detect these contaminants using field and laboratory analyses.

A range of radionuclide concentrations and risk levels is presented in Table D-8 for industrial and residential receptors. These scenarios are provided because they represent the maximum-exposed individuals for most properties in the North County Site. The background screening criteria (UTL) for the North County Site and typical field detection limits are also listed in Table D-8. As shown in Table D-8, measuring concentrations of radionuclides corresponding to the 10^{-6} risk level is not achievable for radionuclides at the North County Site. These concentrations are often within the range of background and below detection limits, and movement away from the 10^{-6} point of departure is justified.

Table D-8 shows that the field detection limits for Ra-226 and Th-230 (2.8 and 2120 pCi/g, respectively) correspond to an incremental residential risk on the order of 10^{-4}. The field detection limit for U-238 (39 pCi/g) corresponds to a residential incremental risk on the order of 10^{-5}. At the North County Site, Ra-226, Th-230, and U-238 are the radionuclides found at the highest concentrations. Remediation of the North County Site is somewhat limited by the ability to detect Th-230 and Ra-226 in the field either directly or through a surrogate. It is also noted that laboratory detection limits for these radionuclides are at best around 1.0 pCi/g each, or at levels that would produce a total risk on the order of 10^{-4}. Subsequently, remediation is limited by the ability to identify contamination both in the field and in the laboratory.

Table D-8. Comparison of Relevant Soil Concentrations for Radionuclides

			Background	Detection	Soil Concentration by Risk Level			
Receptor	**Analyte**	**Units**	**UTL_{95}**	**Limit [a]**	**$1x10^{-6}$**	**$1x10^{-5}$**	**$1x10^{-4}$**	**$3x10^{-4}$**
Industrial	Ac-227	pCi/g	0.82 [b]	-	0.98	9.8	98	294
Industrial	Pa-231	pCi/g	2.17 [b]	-	1.9	19	190	570
Industrial	Pb-210	pCi/g	1.55 [c]	-	15	150	1500	4500
Industrial	Ra-226	pCi/g	1.55	2.8	0.071	0.71	7.1	21
Industrial	Ra-228	pCi/g	1.24	-	0.15	1.5	15	45
Industrial	Th-228	pCi/g	2.04	-	0.53	5.3	53	159
Industrial	Th-230	pCi/g	2.89	2120	11	110	1100	3300
Industrial	Th-232	pCi/g	1.83	1.8 [d]	0.072	0.72	7.2	22
Industrial	U-234	pCi/g	2.22	-	170	1700	17000	51000
Industrial	U-235	pCi/g	0.25	-	1.8	18	180	540
Industrial	U-238	pCi/g	2.02	39	7.3	73	730	2190
Residential	Ac-227	pCi/g	0.82 [b]	-	0.3	3.0	30	90
Residential	Pa-231	pCi/g	2.17 [b]	-	0.5	5.0	50	150
Residential	Pb-210	pCi/g	1.55 [c]	-	1.8	18	180	540
Residential	Ra-226	pCi/g	1.55	2.8	0.019	0.19	1.9	5.7
Residential	Ra-228	pCi/g	1.24	-	0.048	0.48	4.8	14.4
Residential	Th-228	pCi/g	2.04	-	0.16	1.6	16	48
Residential	Th-230	pCi/g	2.89	2120	2.4	24	240	720
Residential	Th-232	pCi/g	1.83	1.8 [d]	0.018	0.18	1.8	5.4
Residential	U-234	pCi/g	2.22	-	25	250	2500	7500
Residential	U-235	pCi/g	0.25	-	0.5	5	50	150
Residential	U-238	pCi/g	2.02	39	1.9	19	190	570

[a] Limits for surface scanning using a 2-inch by 2-inch NaI detector (NUREG 1507)
[b] No reported result above detection limits. Background likely similar to that of U-235
[c] No value reported. Assumed to be in equilibrium with Ra-226, the nearest long-lived parent radionuclide
[d] Assumed to be in equilibrium with Ra-228 and Th-228

Ra-226 can be used as a surrogate for other FUSRAP-related radionuclides including Th-230 and U-238. Cleanup under non-time-critical removal actions is currently underway at the North County Site based on cleanup criteria for Ra-226 and Th-230 of 5 pCi/g above background in surface and 15 pCi/g in the subsurface (5/15 pCi/g), and U-238 of 50 pCi/g above background in all soil horizons. Remediation under the SLDS Record of Decision (ROD) is also underway using the same criteria. The results in Table D-9 demonstrate that removal to this criteria reduces Ra-226, Th-230, Th-232, and U-238 concentrations to levels comparable to background. These removal actions have been implemented by removing soils with gamma radiation levels (produced primarily by Ra-226) that are just barely distinguishable from background (limited by the sensitivity of the instrumentation and the skill of the surveyor) and correlated to isotopic activity. In most cases, remediation to lower levels could significantly increase cost by excavating soils very difficult to distinguish from background without significantly decreasing risk. At the levels shown in Table D-9, total risk estimates are around 10^{-4} for a residential scenario or on the order of 10^{-5} for an industrial scenario. In other words, residual concentrations do not produce risks significantly above background. The results shown in Table D-9 also demonstrate that cleanup using the 15 pCi/g Ra-226 criterion in subsurface soil and using Ra-226 as a surrogate for other radionuclides has achieved gross residual Ra-226 concentrations of less than 5 pCi/g for several St. Louis FUSRAP removal actions.

The information in Tables D-8 and D-9 demonstrates that remediation of Ra-226 to 5/15 pCi/g above background, and the use of Ra-226 as a surrogate for other radionuclides would achieve residual concentrations of all radionuclides that can be implemented and would produce acceptable total risk. A cleanup goal of 5/15 pCi/g for Ra-226 would be achievable based on USACE/FUSRAP experience in St. Louis, and would be protective considering the typical residual concentrations listed in Table D-9.

Very limited concentrations of Th-232 were present within the St. Louis North County Site. Removal of Th-230 to the remediation goals will effectively remove Th-232 present in site soils. Analytical data indicate that Th-232 is co-located with Th-230 and is present at relatively low concentrations. As shown in Table D-9, removal of soils to the radionuclide criteria results in gross residual Th-232 concentrations of less than 1.5 pCi/g. SLAPS, SLDS, and the North County VPs. These residual concentrations do not produce risks significantly above background.

In summary, remediation of Ra-226 to 5 pCi/g above background (surface) and 15 pCi/g (subsurface); and of Th-230 to 14 pCi/g above background (surface) and 15 pCi/g (subsurface) is achievable and protective based on site experience. Characterization data and analytical results from previous removal actions indicate that the radionuclides generally dominate the FUSRAP-related risks. In addition, removal of soils to the radionuclide criteria results in residual risks and hazards from non-radionuclides that are only a small fraction of the radionuclide related risks and within the acceptable risk and hazard range. Table D-10 provides post-cleanup data for the 11 non-radionuclide COCs for the North County Site. The RGs are also presented in the Table for comparison.

DOE collected radon data from within the Futura buildings (BNI, 1987). Radon results range from 0.3 to 0.7 pCi/L with an average of 0.6 pCi/L indicating that indoor radon levels are well below the 4.0 pCi/L guideline. Radon could increase over time as Ra-226 approaches Th-230 concentrations. However, Ra-226 ingrowth would likely not be a concern until well after the site buildings have completed their life cycles. Radon monitoring should continue as long as the buildings are erect and contaminants above the unconditional release criteria are present beneath the structures.

Table D-9. Post-Cleanup Summary Data (Including Background) from Remedial and Removal Actions under St. Louis FUSRAP

Survey Unit	Residual Ra-226 (pCi/g)[a]		Residual Th-230 (pCi/g)[a]		Residual Th-232 (pCi/g)[a]		Residual U-238 (pCi/g)[a]	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
City Property Unit 1	2.49	1.27	4.99	3.21	1.03	0.28	3.05	1.20
City Property Unit 2	2.26	1.38	4.26	3.37	1.09	0.28	2.68	1.81
City Property Unit 3	1.97	0.48	5.20	3.02	1.19	0.46	2.79	1.16
City Property Unit 4	1.90	1.89	3.90	3.77	0.97	0.37	3.18	4.67
City Property Unit 5	2.76	1.12	4.52	1.82	1.14	0.40	7.12	6.07
City Property Unit 6	2.18	0.63	4.60	2.46	1.10	0.24	2.74	1.09
City Property Unit 7	2.07	1.18	3.97	2.48	0.93	0.32	5.52	3.99
City Property Unit 8	2.22	1.28	4.93	3.08	0.92	0.34	8.82	10.14
City Property Unit 9	2.75	3.17	3.42	1.44	0.78	0.50	7.64	12.29
Plant 2 Unit 1A	1.0	0.36	2.7	2.8	1.1	0.4	15.6	19.9
Plant 2 Unit 1B	1.0	0.42	2.4	1.3	1.0	0.3	16.6	22.2
Plant 2 Unit 1C	1.5	0.92	2.5	1.9	1.0	0.4	8.4	8.9
Plant 2 Unit 3	1.0	0.43	2.5	2.2	0.8	0.4	1.8	2.0
Plant 2 Unit 4	0.9	0.18	2.0	0.91	0.9	0.2	1.5	0.65
Plant 2 Unit 5	0.9	0.45	1.7	0.85	1.0	0.6	1.6	0.92
Plant 2 Unit 6	1.1	0.31	1.9	0.85	0.9	0.3	3.3	6.0
Plant 2 Unit 7	1.3	0.75	2.2	1.5	1.0	0.5	4.2	8.8
Plant 2 Unit 8	1.1	0.64	1.9	1.1	0.9	0.4	3.7	6.1
Plant 2 Unit 9	1.3	0.56	2.5	0.91	1.1	0.3	2.9	1.8
Plant 2 Unit 10	1.1	0.52	2.5	1.5	1.3	1.2	2.1	1.5
Plant 2 Unit 11	1.0	0.3	2.0	0.62	1.0	0.3	1.6	0.8
SLDS Background[b]	*2.78*	*0.89*	*1.94*	*0.76*	*1.09*	*0.29*	*1.44*	*0.75*
IA-7 Unit 1	0.75	0.10	5.65	4.68	1.30	0.33	1.40	0.67
IA-7 Unit 2	0.75	0.08	3.74	3.47	1.39	0.35	1.07	0.41
IA-7 Unit 3	1.12	1.65	5.07	3.94	1.39	0.35	2.37	2.9
IA-7 Unit 4	0.83	0.09	3.32	3.50	1.08	0.23	1.21	0.50
East End Unit 5	0.85	0.11	3.43	3.64	1.02	0.22	1.82	0.96
East End Unit 6	0.74	0.06	1.67	0.30	1.02	0.21	3.10	2.15
East End Unit 22	0.90	0.10	4.5	3.67	1.01	0.20	1.50	0.78
North Ditch Unit 1	0.83	0.13	4.19	2.92	1.28	0.29	1.56	0.96
North Ditch Unit 2	0.84	0.13	4.11	4.28	1.00	0.27	1.14	0.75
Radium Pit Unit 17	0.85	0.33	6.71	16.73	0.92	0.16	5.01	4.01
Radium Pit Unit 18	0.75	0.18	1.97	2.93	0.94	0.26	8.45	13.40
Radium Pit Unit 19	0.94	0.28	7.91	11.56	1.15	0.24	4.07	2.12
Radium Pit Unit 20	0.81	0.19	2.47	1.55	1.10	0.23	5.96	4.88
VP2L Unit 1	0.93	0.10	3.32	3.14	1.15	0.29	1.14	0.45
VP38 Unit 1	0.83	0.87	5.00	8.20	1.04	0.24	1.11	0.47
VP56 Unit 1	0.97	0.35	13.93	30.24	1.05	0.22	1.24	0.64
VP56 Unit 2	1.07	0.17	13.03	14.14	1.11	0.85	1.23	0.67
VP56 Unit 3	0.82	0.07	6.03	8.73	1.14	0.24	1.06	0.39
North County Background[b]	*1.05*	*0.27*	*1.66*	*0.49*	*1.11*	*0.35*	*1.18*	*0.33*

[a] All values are gross results (include background). A comparison against the respective background concentrations shows that subtraction of background would result in negative values in some cases.
[b] SLDS background different from North County Background (provided for comparison to final status survey data which includes background).

Table D-10. Post-Cleanup Non-Radionuclide Summary Data (Including Background) from Remedial and Removal Actions under St. Louis FUSRAP (mg/kg)

Survey Unit	Antimony		Arsenic		Barium		Cadmium		Chromium		Molybdenum		Nickel		Selenium		Thallium		Uranium		Vanadium	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
SLDS Plant 2	-	-	12.9	8.9	-	-	0.6	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
East End Unit 1	4.4[1]	0.0	5.9	1.6	113	14.8	0.5[1]	0.0	14.5	0.5	0.9[1]	0.0	21.6	2.4	0.4	0.1	1.1	0.0	16.4[1]	0.1	23.3	1.1
East End Unit 2	13.6[1]	13.2	12.4	5.7	213	26.9	1.4[1]	1.4	16.5	4.3	2.9	2.3	32.9	11.6	0.3[1]	0.0	2.1[1]	0.4	50.2[1]	48.9	32.3	7.5
East End Unit 3	13.8[1]	12.2	13.0	6.6	224	121	1.5[1]	1.3	19.0	4.1	2.9	2.1	44.0	30.1	0.4	0.1	2.6	1.3	50.8[1]	45.4	36.3	13.0
East End Unit 4	0.6	0.0	17.4	3.2	254	25	0.0[1]	0.0	19.8	3.0	0.5[1]	0.3	35.3	10.4	1.0	0.2	0.7	0.4	2.6[1]	0.1	42.3	1.8
East End Unit 5	0.4	0.1	8.9	5.6	128	69	0.0[1]	0.0	15.8	2.1	0.9	0.6	26.2	10.5	0.6[1]	0.3	0.3[1]	0.0	12.6	14.3	26.6	6.5
East End Unit 6	0.4[1]	0.1	7.2	1.3	105	57.4	0.3[1]	0.3	14.3	3.2	0.7[1]	0.3	15.9	5.9	0.7[1]	0.4	0.2[1]	0	1.8[1]	0	24.0	3.0
North Ditch Unit 1	2.9	1.9	7.8	1.4	188	53.1	0.5	0.3	20.4	9.9	3.7	4.1	16.9	5.4	1.5	1.4	2.7	1.9	8.2	1.0	23.4	5.3
North Ditch Unit 2	4.5	0	6.3	0.8	116	27.1	0.5	0	14.8	0.8	0.9	0	19.9	3.0	0.4	0.1	1.3	0	-	-	28.7	0.5
Radium Pits Unit 17	0.3[1]	0	17.1	13.9	120	7.1	0.7[1]	0.1	15.6	0.5	2.0	0.9	18.4	1.1	0.9[1]	0.6	1.2	0.3	11.9	10.3	29.4	4.2
Radium Pits Unit 18	0.4[1]	0	13.7	12.7	233	33.9	0.6	0.2	13.7	0.9	3.4	3.5	18.5	1.0	2.2	1.3	0.4[1]	0	6.1	3.8	26.4	5.8
Radium Pits Unit 19	1.3[1]	0	8.6	0	132	0	0.5[1]	0	14.2	0	0.8[1]	0	19.2	0	1.6	0	0.4[1]	0	3.6[1]	0	29.4	0
Radium Pits Unit 20	0.4	0	13.9	9.8	154	27.6	0.7	0.2	16.3	1.7	0.8	0.2	17.3	2.3	0.3	0.1	0.4[1]	0	12.9	13.2	33.7	7.2
VP2L Unit 1	0.6	0.2	13.3	0.5	212	55.2	1.0[1]	0	20.6	0.8	0.4[1]	0.2	26.5	3.3	0.3[1]	0	1.1[1]	0.2	4.3[1]	0.1	41.6	1.4
RGs	15		36		2800		12		350		1000		1500		300		25		150		112	

- No data available.
[1]Results reported as less than minimum detection by laboratory.

Table D-11. Concentrations of North County Radionuclides that would Result in the 5 pCi/g Radium Benchmark Dose as Required by 10 CFR Part 40 Appendix A Criterion 6(6)

Analyte	Typical Conditions [a]	Concentrations to Produce Benchmark Based on 5 pCi/g of Ra-226 (pCi/g) [b]					
		Residential Scenario	Industrial Scenario	Maintenance Scenario	Recreational Scenario	Construction Scenario	Utility Scenario
Ac-227	4.2	14	18	9.5	20	11	10
Pa-231	4.6	43	78	21	110	27	26
Ra-226[c]	40	5.0	5.0	5.0	5.0	5.0	5.0
Th-230	222	670	1100	330	1500	380	380
$Th\text{-}230_k$ [d]	-	14	14	14	14	14	14
U-234	40	1500	2500	680	3500	810	800
U-235	1.4	73	73	81	72	77	75
U-238	40	340	560	300	370	310	300
U-238[e]	84	120	140	81	160	89	88
Ra-226 Benchmark Dose [f,g]		19	5.9	1.1	0.32	14	0.55

[a] Based on pre-remediation data averaged over the SLAPS subsurface. Used to demonstrate typical radionuclide distributions in the North County. Units are pCi/g.
[b] Values greater than 1.0 pCi/g rounded to two digits.
[c] Assumes equilibrium conditions with Pb-210.
[d] $Th\text{-}230_k$ value provided to limit ingrowth of Ra-226 over 1,000 years.
[e] Uranium at natural abundance concentration with Ac-227 and Pa-227 in equilibrium with U-235.
[f] Benchmark in units of dose (mrem/yr). Doses rounded to two significant digits.
[g] Benchmark doses for 15 pCi/g of Ra-226 would equate to values three times those specified above for 5 pCi/g of Ra-226.

D.2.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

ARARs were reviewed for COCs identified at the North County Site. No ARARs were identified for the non-radionuclide contaminants, but ARARs were identified for the North County Site to address radionuclide COCs. The proposed ARARs for the radionuclides addressed in this response action include Title 40 Code of Federal Regulations Part 192 (40 CFR 192), Subparts A, B and C; and 10 CFR 40, Appendix A, Criterion 6(6).

40 CFR 192 Subpart A defines the "standards for control of residual radioactive materials from inactive uranium processing sites." This section sets several standards that provide protection for stabilized residual materials disposal areas at uranium processing sites. 40 CFR 192.02(a) states that control of residual radioactive materials must be designed to be effective for up to 1000 years to the extent achievable, and in any case, for at least 200 years.

Subpart B identifies EPA's standards for remedial actions of lands and buildings contaminated with residual radioactive materials at inactive uranium processing sites and provides cleanup standards for Ra-226 in soil, among other things.

Subpart C provides regulations for the implementation of standards established in Subparts A and B. Among other things, it sets forth conditions appropriate for the development of supplemental standards. Supplemental standards are derived pursuant to 40 CFR 192 Subpart C for subsurface materials at the primary storage areas (i.e., SLAPS and HISS/Futura) for use with the containment and treatment alternatives. The supplemental standards are appropriate in accordance with 40 CFR 192.21 (c) which specifies that supplemental standards may be applied under circumstances that would result in excessive remedial action costs relative to the long-term benefits and where the residual radioactive materials do not pose a clear present or future hazard. The supplemental standards for the primary storage areas in the containment and treatment alternatives (Alternatives 2 and 3) are to be used in conjunction with institutional controls.

10 CFR 40, Appendix A is the Nuclear Regulatory Commission's (NRCs) regulations for active uranium processing sites, and these regulations conform to the standards set by EPA in 40 CFR 192. Criterion 6(6) is the NRC's process for developing RGs for other radionuclides to be consistent with the Ra-226 limits. 10 CFR 40, Appendix A, Criterion 6(6) is used in the North County Site as an ARAR to derive cleanup goals for non-radium radionuclides, particularly uranium and thorium, which are not explicitly included in EPA's 40 CFR 192 standards. In addition, this criterion requires the use of the unity rule when multiple contaminants are present. The unity rule sums the ratio of the residual concentration to remediation goals for each radiological contaminant of concern. Criterion 6(6) also provides relevant and appropriate radiological criteria for decommissioning lands and structures associated with uranium recovery facilities.

Criteria which are the basis of ARARs (40 CFR Part 192 and 10 CFR Part 40) are protective for all future anticipated land uses. This protectiveness has been upheld by judicial action.

A general description of these ARARs as they apply to the North County Site is provided below, followed by a discussion on implementation and overall protectiveness.

D.2.2.1 40 Code of Federal Regulations (CFR) Part 192

Soil criteria under 40 CFR Part 192, implemented by EPA pursuant to the Uranium Mill Tailings Radiation Control Act (UMTRCA), were developed for the control of residual radioactive material at designated processing or depository sites and properties in the vicinity of such sites. Although not applicable to the North County Site, 40 CFR Part 192 Subparts A, B, and C have been determined to be relevant and appropriate for the North County Site as conditions are sufficiently similar to designated UMTRCA sites.

Standards specified in Subpart B (40 CFR 192.12) apply to lands that are part of an UMTRCA site, including VPs, and explicitly limit the allowable concentration of Ra-226 in soil. Subpart B specifies that Ra-226 concentrations shall not exceed the background level by more than 5 pCi/g in the first 15 cm (6 in) below the surface or 15 pCi/g averaged over any subsequent 15 cm (6 in) layer. These concentration limits are averaged over an area of 100 m^2. As noted above, EPA promulgated the radium standard for uranium recovery sites similar to the St. Louis Site (including SLDS and the North County Site). The remediation criteria in Subpart B were developed for Ra-226 at UMTRCA sites "since Ra-226 is in equilibrium with other nuclides which would be present," and the "establishment of criteria which limits the amount of Ra-226 contamination also assures that other potential contaminants would be limited to an acceptable level" (May 1978 Staff Technical Position from the Fuel Processing and Fabrication Board titled "Interim Land Cleanup Criteria for Decontamination"). Subpart B is relevant and appropriate for properties at the North County Site.

Requirements specified in Subpart A apply to the control of residual radioactive material at UMTRCA sites. The design period requirement of Subpart A is considered relevant and appropriate for the development of site-specific soil RGs for the North County Site. Subpart A requires in §192.02(a) that controls for residual radioactive materials and listed constituents shall be effective for up to 1000 years to the extent reasonably achievable, and, in any case, for at least 200 years. Application of this design requirement in the development of RGs for radionuclides other than Ra-226 assures that the ingrowth of Ra-226 from the Th-230 decay process will not exceed the Ra-226 standard set forth in Subpart B during the 1000-year design period.

Subpart C includes guidance for implementation (40 CFR 192.20) and criteria for applying supplemental standards (40 CFR 192.21). Subpart C's guidance for implementation is discussed below in Section D.2.3. Supplemental standards are discussed in the following text.

Supplemental standards in 192.21 are allowed if the following circumstances exist:

- Remedial actions would pose a clear and present risk of injury to workers or members of the general public;

- The estimated remediation cost is unreasonably high and residual materials do not pose a clear present or future hazard; and

- Radionuclides other than Ra-226 pose a significant hazard (one North County Site example is uranium in slag). Non-radium radionuclide contaminants are addressed under the discussion on 10 CFR 40 in Section D.2.2.2).

Subpart C lists other reasons for developing supplemental standards, but the listed reasons provided above are most relevant to the North County Site. Supplemental standards are appropriate for some areas in the North County Site and for some conditions (i.e., when controls to restrict the use of subsurface soils are in place).

The derivation of supplemental standards to address radionuclides other than Ra-226 would be required for the North County Site if not for the recently appended and promulgated Appendix A Criterion 6(6) from 10 CFR Part 40. Appendix A Criterion 6(6) from 10 CFR Part 40 is an ARAR, and will be used to develop site-specific criteria for radionuclides corresponding to that specified in UMTRCA. The following subsection includes the derivation of non-radium concentration limits for unrestricted release.

40 CFR Part 192 Subpart B also contains limits for radon decay products (the radon isotope Rn-222 is the decay product of Ra-226). The limits are provided in units call Working Levels (WLs), and for this assessment it is assumed that 0.02 WL is equivalent to 4 pCi/L of air. Specifically, 192.12(b)(1) states the following:

> *The objective of the remedial action shall be, and reasonable effort shall be made to achieve, an average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL. In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL.*

Indoor radon and decay product concentrations are simple to measure but very difficult to model. Concentrations are dependent on many variables such as the geology in the immediate vicinity, the basic construction style (basement, vs. crawl space vs. slab on grade), indoor environmental control methods, etc. It is also known that indoor radon and radon decay product concentrations may exceed Subpart B limits even when Ra-226 is at background. Based on this information, it is assumed that remediation to unconditional release criteria will also limit indoor radon decay products to no more than the values specified in Subpart B. It is also assumed that indoor radon levels in habitable structures will be monitored whenever supplemental standards with institutional controls are required.

D.2.2.2 10 CFR Part 40 Appendix A Criterion 6(6)

10 CFR Part 40 Appendix A was developed to provide a clear and consistent regulatory basis for determining the extent to which soils and buildings are to be remediated. Criterion 6(6) regulates uranium recovery sites and is not applicable to the North County Site, but it is relevant and appropriate. Criterion 6(6) specifically states:

> *Byproduct material containing concentrations of radionuclides other than radium in soil … must not result in a total effective dose equivalent (TEDE) exceeding the dose from the cleanup of radium contaminated soil to the above standard (benchmark dose), and must be at levels which are as low as reasonably achievable. If more than one residual radionuclide is present in the same 100-square-meter area, the sum of the ratios for each radionuclide of concentration present to the concentration limit will not exceed "1" (unity). A calculation of the potential peak annual TEDE within 1000 years to the average member of the critical group that would result from the standard (not including radon) on the site must be submitted for approval.*

The remediation goals for U-238 and Th-230 in surface soils were developed using the benchmark dose approach defined in 10 CFR 40, Appendix A, Criterion 6(6). As discussed in section D.2, the site-specific remediation goals for U-238 and Th-230 are also derived in accordance with 40 CFR 192, Subpart A. Site-specific soil RGs of 15 pCi/g of Th-230, and 50 pCi/g of U-238 were established.

The benchmark dose approach defined in Criterion 6(6) was applied in development of the Coldwater Creek subsurface sediment remediation goals. The remediation goal derived for subsurface sediments (i.e., 15 pCi/g of Ra-226, 43 pCi/g of Th-230 and 150 pCi/g of U-238 above background) is implemented for soils and sediments under the mean water gradient for Coldwater Creek. This remediation goal assures protectiveness of Coldwater Creek under all future anticipated land use conditions (e.g., recreational/trespasser, maintenance, construction, and utility uses) and minimizes adverse environmental impact associated with greater excavation in Coldwater Creek.

The following subsections develop supplemental standards for subsurface soils and deep soils. The supplemental standards for use with institutional controls assumed for the North County Site limit doses to less than 100 mrem/yr for anticipated receptors should institutional controls be lost. Therefore, the concentrations in soil or sediment must be limited so that the residual dose does not exceed 100 mrem in any single year over a 1,000-year evaluation period. The 100-mrem/yr limit is adopted to be consistent with national and international guidance. The 100-mrem/yr limit also applies even when institutional controls are lost. In summary, supplemental standards will include the following components:

1. Land use will be restricted by institutional controls;

2. The risk to potential receptors will be limited to the CERCLA target risk range with institutional controls in place;

If institutional controls are lost, the dose to potential receptors (e.g., residential) will be limited to 100 mrem/yr.

D.2.2.3 Supplemental Standards

Supplemental standards are described below that could be implemented pursuant to 40 CFR Part 192 Subpart C and include controls to restrict land use. The dose-based supplemental standards developed herein also limit risks to within the CERCLA risk range when institutional controls are in place.

Supplemental cleanup standards have been developed for subsurface materials at the primary storage areas (SLAPS and HISS/Futura) under the containment and treatment alternatives (Alternatives 2 and 3) to ensure protectiveness under commercial/industrial use. These supplemental standards are appropriate in accordance with criteria specified in 40 CFR 192.21 (c), which states that supplemental standards may be applied under circumstances where removal would result in excessive remedial action costs relative to the long-term benefits and the residual radioactive materials do not pose a clear present or future hazard. The supplemental standards for subsurface materials at the primary storage areas are to be used in conjunction with institutional controls. For those remedial alternatives involving land use restrictions at SLAPS and HISS/Futura (Alternatives 2 and 3), supplemental standards of 25/70/250 pCi/g above background for Ra-226/Th-230/U-238 would be used for subsurface soils. These supplemental standards would protect the most likely current and future receptors (e.g., construction and utility workers) and ensure that doses to the general public would be limited to less than 100 mrem/yr if institutional controls were lost.

Concentrations of individual radionuclides in subsurface soils that would produce 100 mrem/yr are listed in Table D-12. Although institutional controls would likely limit the future land use to industrial, the standard would also apply if controls are lost leading to residential exposures. Table D-12 shows that if controls were lost the residential-use or construction scenarios would limit residual concentrations (limiting values are bolded). If a mixture of concentrations were identified, a sum of ratios (SOR) approach would be required to limit the total dose to 100 mrem/yr. Using the radionuclides found in the highest concentrations, the dose-based SOR equation that would limit doses to 100 mrem/yr for North County receptors would include Ra-226 at 26 pCi/g and Th-230 at 73 pCi/g. These values are approximately 5 times the free release criteria of 5 pCi/g and 14 pCi/g, respectively. The supplemental standard for subsurface soil is, therefore set to 5 times the free release standard as shown in Equation 1:

$$SOR_{subsurface} = \frac{^{226}Ra_N}{25\,pCi/g} + \frac{^{230}Th_N}{70\,pCi/g} + \frac{^{238}U_N}{250\,pCi/g} \leq 1 \qquad \text{Eq. 1}$$

where the subscript "N" stands for the net (above background) value. Note that the U-238 concentration could be much higher than 250 pCi/g and still satisfy dose criteria. However, the value is set to 5 times the 50 pCi/g free release criterion to be consistent with other radionuclides and considering "primary balancing factors" and "modifying considerations" as defined under CERCLA (i.e., public acceptance, long term effectiveness, etc.).

Table D-12. Concentrations to Produce Supplemental Standard Dose (pCi/g) for Subsurface Soils

Analyte	Residential	Industrial	Maintenance	Recreational	Construction	Utility
Ac-227	**75**	303	865.7	6211	**75**	1885
Pa-231	227	1325	1945	35486	**192**	4794
Ra-226 [a]	**26**	84.7	472	1573	36	910
Ra-228	**51**	162	997	2966	74	1857
Th-228	**30**	96.3	613.6	1764	45	1129
Th-230 (0)	3673	18840	29803	467290	2741	68512
Th-230 (1k) [b]	**73**	242	1349	4494	104	2600
Th-232	745	3845	5996	95969	**552**	13789
U-234	7713	41754	62011	1077935	**5814**	145349
U-235	**382**	1230	7313	22640	549	13714
U-238	**1770**	6146	27250	117014	2194	54861
Dose [c]	100	100	100	100	100	100

[a] Assumed to be in equilibrium with Pb-210

[b] Provided to limit ingrowth of Ra-226 over 1,000 years

[c] Dose limit used to develop industrial-use supplemental standards for soil concentrations (mrem/yr)

The values shown in Equation 1 satisfy the 100-mrem/yr dose limit. Remediation of the top 0.15 m (6 inches) of soil to the release criteria from the ARAR for unrestricted release is shown in Equation 2:

$$SOR_{surf} = \frac{^{226}Ra_N}{5pCi/g} + \frac{^{230}Th_N}{14pCi/g} + \frac{^{238}U_N}{50pCi/g} \leq 1 \qquad \text{Eq. 2}$$

where the subscript "surf" refers to the top 0.15 m (6 inches) of soil and "N" stands for the net (above background) value. Maintaining the surface soil to the free release criterion and subsurface soils to the limits shown in Equation 1 would assure that the three components required for supplemental standards are incorporated. As an additional assurance, implementation of this supplemental standard would also include calculations to assure that residual risks and doses from all radionuclides listed in Table D-12 are within acceptable limits.

Supplemental Standard for Deep Soils

A supplemental standard for deep soils was assessed during development of the FS alternatives as a potential option for addressing deep (greater than 8 ft below ground surface) soil contamination at SLAPS and HISS/Futura. The deep soil criteria were not carried forth in any of the alternatives discussed in the FS, although they have been retained as potential remediation standards. Deep soil criteria are primarily dependent on three variables: 1) the depth of residual contamination, 2) the dose limit, and 3) the exposure scenario(s). The dose limit is 100 mrem/yr as described above and the possible exposure scenarios are listed in Table D-13. The actual depth to contamination and contamination thickness may vary. These variables are defined to conservatively describe known site conditions.

Variable 1 (Total Depth, TD) is defined as the total depth of an excavation that would result in the surface deposition of contaminants. It is assumed that the top eight feet of material would be remediated to unrestricted release criterion or to the subsurface soil supplemental standard as previously described. Eight feet is chosen as a reasonable excavation depth for future construction activities. It is then assumed that under rare occasions an excavation could extend another 4 ft making TD = 12 feet. Variable 2 (Contaminated Lens, CL) is defined as the thickness of the contaminated lens within the evaluated interval. If excavation to the surface soil supplemental standard or the unrestricted release criterion would apply to the top 8 ft and TD is 12 ft, CL ≤ 4 ft. The material potentially deposited on the surface is subject to a mixing ratio of CL to TD or CL/TD. Thus, the allowable concentrations listed in Table D-12 or Equation 1 could be increased by one over the ratio $(CL/TD)^{-1}$ or TD/CL.

The results in Table D-13 show that Ra-226 could be up to 77 pCi/g and Th-230 up to 219, or approximately 15 times the surface soil free release criteria. After rounding and applying the factor of 15, the criterion for deep soil is shown in Equation 3 using the SOR approach:

$$SOR_{deep} = \frac{^{226}Ra_N}{75pCi/g} + \frac{^{230}Th_N}{210pCi/g} + \frac{^{238}U_N}{750pCi/g} \leq 1 \qquad \text{Eq. 3}$$

where the subscript "deep" stands for deep soil. As with the surface soil standard, implementation to these RGs would require additional calculations to assure that residual doses from all radionuclides listed in Table D-13 are below acceptable limits. Note that the risk from exposure to deep soils is negligible as long as institutional controls are maintained.

Table D-13. Concentrations to Produce Supplemental Standard Dose (pCi/g) for Deep Soils

Analyte	Residential	Industrial	Maintenance	Recreational	Construction	Utility
Ac-227	226	908	2597	18634	226	5656
Pa-231	681	3975	5834	106459	575	14382
Ra-226	77	254	1416	4719	109	2730
Ra-228	152	485	2991	8897	223	5572
Th-228	91	289	1841	5291	135	3386
Th-230 (0)	11020	56519	89409	1401869	8222	205536
Th-230 (1k) [b]	219	726	4047	13482	312	7800
Th-232	2234	11534	17989	287908	1655	41368
U-234	23138	125010	185847	3227336	17407	435174
U-235	1145	3681	21918	67784	1642	41059
U-238	5309	18402	81669	350339	6570	164253
Total Depth (TD)		**12 ft**				
Contaminated Lens (CL)		**4 ft**				

[a] Assumed to be in equilibrium with Pb-210
[b] Th-230(1k) value provided to limit ingrowth of Ra-226 over 1,000 years

D.2.2.4 ARAR Summary

ARARs establish 5 pCi/g above background as the criteria for Ra-226 in the top 6 inches (15 cm) of soil, and 15 pCi/g in any subsequent 6-inch layer. The remediation goal for Ra-226 is set forth in 40 CFR 192, Subpart B. Site-specific remediation goals for U-238 and Th-230 are derived in accordance with 10 CFR 40, Appendix A, Criterion 6(6) and 40 CFR 192, Subpart A. Exposures from all radionuclides will be constrained to the benchmark dose or from the in-growth of Ra-226 from Th-230. For cases where material is left above criteria for unrestricted release of a property, institutional controls would be used to restrict land use and ensure protectiveness.

D.2.3 SITE-SPECIFIC REMEDIATION GOALS

Earlier risk screens included the use of generic PRGs based on typical default values. As a next step, site-specific RGs were then developed based on site-specific risk assessments, hazard evaluations, and ARARs. These site-specific RGs are presented in Table D-14. The need for movement away from the point of departure is described below based on consideration of the CERCLA criteria, e.g. protectiveness and implementability.

Table D-14 lists site-specific RGs for soil and sediments at the North County Site. While one objective of the source removals and other remedial actions is to protect surface water and other media, no site-specific RGs were calculated for these media because there were no COCs for ground water or surface water. Carcinogenic, non-carcinogenic, and ARAR-based requirements were all considered in the development of these RGs.

As discussed in Section D.2.1, cleanup of the radiological COCs in the North County Site at the 10^{-6} level would not be achievable and/or would significantly increase cost without significant risk reductions. Reasons for movement away from 10^{-6} include the inability to distinguish soil concentrations at the 10^{-6} level from background, and the limitations of field and laboratory equipment. The development of site-specific RGs is described below. This evaluation shows that the RGs required by ARAR criteria for radionuclides would achieve protectiveness to levels within the CERCLA target risk range and below a HI of 1.0, and has been demonstrated to be implementable. The implementation of ARAR-based RGs for radionuclides (discussed in the next section) would also require the evaluation of non-radiological COCs.

Tables D-14, D-15, and D-16 summarize the proposed cleanup criteria as defined and used throughout the North County FS. These values have been selected considering ARARs, the values listed in Tables D-8 through D-13, and other CERCLA criteria including a balance of cost and risk to likely receptors, and implementability. Note that relocation of sediments from Coldwater Creek at their current levels could result in risks exceeding the unrestricted use criteria for an adjacent residential property. As such, soils above the mean water gradient within Coldwater Creek would be remediated to unrestricted use criteria (i.e., CERCLA risk and the residential benchmark dose). Sediments below the mean water gradient would be remediated to 15 pCi/g of Ra-226, 43 pCi/g of Th-230, or 150 pCi/g of U-238 (all above background concentrations). For sediments no adjustment to the ARAR-based criteria are considered necessary, due to less uncertainty regarding future land use. This approach assures protectiveness of Coldwater Creek under all future anticipated land use conditions.

No ARARs have been identified for the non-radiological contaminants in soils at the North County Site. The remediation goals for non-radiological COCs were developed based on site-specific risk assessments and hazard evaluations. At the North County Site, eleven non-radionuclides are identified as COCs for soils: antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium. These noncarcinogens have different effects on different organs or systems in the body. The remediation goals for noncarcinogens were developed to ensure that the cumulative effect of the chemical levels of the COCs produces a HI < 1.0 for each target organ/system affected. In addition, remediation goals were selected at levels above detection limits and background levels.

Toxicologists evaluated the primary effects of the 11 metals in the soils at North County. A matrix is developed in Table D-17 to show the effects of these 11 metals of the primary target organs/systems. Only those listed by the toxicologists as "primary" are included on the matrix table. The HIs were calculated for all six different types of receptors – residential, industrial, construction worker, maintenance worker, recreational/trespasser, and utility worker. Generally, the construction worker was identified as the most sensitive receptor, except for a few cases where the residential receptor was the most sensitive or restrictive scenario. The proposed RGs for all non-radionuclides were calculated based on the HIs for the different primary target organs. Because the HIs were very similar for the construction and residential receptors, the same RGs are proposed for unrestricted use and for use with institutional controls. The protectiveness to each primary organ was tested by adding up the HIs of the corresponding COCs targeted to that primary organ. In each case, the value of HI was less than one.

Table D-14. Site-specific Remediation Goals (RGs) for Soil and Sediment in the North County Site

RGs for Unrestricted Release – Surface Soil/Sediment

Description	Analyte	Units	Hazard-Based	Risk-Based [a]	ARAR-Based	Basis
Unrestricted release concentrations for surface soils. Unrestricted release concentrations for surface sediments above the mean water gradient of Coldwater Creek. Non-radiological RGs apply to SLAPS and Contiguous Areas (IAs 1-13), HISS/Futura, and Latty Avenue VPs 2L and 10k530087. Chromium and uranium (considered as a non-radionuclide) are not COCs at all Latty Avenue properties.	Antimony	mg/kg	15	-	-	Corresponding to Cardiovascular and Respiratory HI = 0.08
	Arsenic	mg/kg	36	-	-	Corresponding to Cardiovascular HI = 0.23
	Barium	mg/kg	2,800	-	-	Corresponding to Cardiovascular HI = 0.08
	Cadmium	mg/kg	12	-	-	Corresponding to Kidney and Respiratory HI = 0.10
	Chromium	mg/kg	350	-	-	Corresponding to Respiratory HI = 0.10
	Molybdenum	mg/kg	1,000	-	-	Corresponding to Skeletal HI = 0.38
	Nickel	mg/kg	1,500	-	-	Corresponding to Immune and Respiratory HI = 0.14
	Selenium	mg/kg	300	-	-	Corresponding to Skin HI = 0.11
	Thallium	mg/kg	25	-	-	Corresponding to Skin and Central Nervous System HI = 0.15
	Uranium	mg/kg	150	-	-	Corresponding to Kidney HI = 0.09
	Vanadium	mg/kg	112	-	-	Corresponding to Respiratory HI = 0.10
	Ra-226	pCi/g	-	-	5.0	As defined by ARARs
	Ra-228	pCi/g	-	-	5.0	As defined by ARARs
	Th-230	pCi/g	-	-	14	Set to limit ingrowth of Ra-226 of 1,000 years
	U-238	pCi/g	-	-	50	Corresponds to benchmark dose for most restrictive receptor plus adjustments to conservatively account for residual decay products out of equilibrium.

RGs for Unrestricted Release – Subsurface Soil/Sediment

Description	Analyte	Units	Hazard-Based	Risk-Based [a]	ARAR-Based	Basis
Unrestricted release concentrations for subsurface soils. Unrestricted release concentrations for subsurface sediments above the mean water gradient of Coldwater Creek. Non-radiological RGs apply to SLAPS and Contiguous Areas (IAs 1-13), HISS/Futura, and Latty Avenue VPs 2L and 10k530087. Uranium (considered as a non-radionuclide) is not a COC at all Latty Avenue properties.	Antimony	mg/kg	25	-	-	Corresponding to Respiratory HI = 0.14
	Arsenic	mg/kg	40	-	-	Corresponding to Skin HI = 0.23
	Thallium	mg/kg	30	-	-	Corresponding to Central Nervous System HI = 0.08
	Uranium	mg/kg	150	-	-	Corresponding to Kidney HI = 0.09
	Ra-226	pCi/g	-	-	15	As defined by ARARs
	Ra-228	pCi/g	-	-	15	As defined by ARARs
	Th-230	pCi/g	-	-	15	Set to Ra-226 RG to account for uncertainty in future land use, exposure pathways, etc.. and to facilitate EPA's approval of the remedial action selected.
	U-238	pCi/g	-	-	50	Set to surface soil RG to account for uncertainty in future land use, exposure pathways, etc.

Table D-14. Site-specific Remediation Goals (RGs) for Soil and Sediment in the North County Site (Cont'd)

Description	Analyte	Units	Hazard-Based	Risk-Based [a]	ARAR-Based	Basis
RGs for Unrestricted Release – Sediment						
RGs for sediment below the mean water gradient of Coldwater Creek.	Ra-226	pCi/g	-	-	15	Subsurface RG for unconditional release (3 times the surface RG) used for sediment below the mean water line.
	Ra-228	pCi/g	-	-	15	Subsurface RG for unconditional release (3 times the surface RG) used for sediment below the mean water line.
	Th-230	pCi/g	-	-	43	Set to limit ingrowth of Ra-226 of 1,000 years
	U-238	pCi/g	-	-	150	Set to 3 times the RG for unconditional release consistent with the approach for Ra-226.
Supplemental Standards for Subsurface Soils using Institutional Controls						
Description	**Analyte**	**Units**	**Hazard-Based**	**Risk-Based [a]**	**ARAR-Based**	**Basis**
Supplemental standards for soils below the top 15 cm (6 inches).	Ra-226	pCi/g	-	-	25	Limits dose to less than 100 mrem/yr if controls are lost (equivalent to 5 times the unconditional release RG)
	Th-230	pCi/g	-	-	70	Set to limit ingrowth of Ra-226 of 1,000 years
	U-238	pCi/g	-	-	250	Scaled to 5 times the unconditional release RG for subsurface soil to be consistent with Ra-266 and Th-230 RGs.
Supplemental Standard for Deep Soils using Institutional Controls						
Description	**Analyte**	**Units**	**Hazard-Based**	**Risk-Based [a]**	**ARAR-Based**	**Basis**
Supplemental standards for deep soils. Unity rule applies.	Ra-226	pCi/g	-	-	75	Limits dose to less than 100 mrem/yr if controls are lost
	Th-230	pCi/g	-	-	210	Set to limit ingrowth of Ra-226 of 1,000 years
	U-238	pCi/g	-	-	750	Scaled to a 15 times the unconditional release RG for subsurface soil to be consistent with Ra-266 and Th-230 RGs.

Table D-14. Site-specific Remediation Goals (RGs) for Soil and Sediment in the North County Site (Cont'd)

RGs for Use with Institutional Controls – Surface Soil Non-radionuclides						
Description	**Analyte**	**Units**	**Hazard-Based**	**Risk-Based [a]**	**ARAR-Based**	**Basis**
Provided to limit risk from non-radionuclides assuming institutional controls are applied. RGs apply to SLAPS and Contiguous Areas (IAs 1-13), HISS/Futura, and Latty Avenue VPs 2L and 10k530087. Chromium and uranium (considered as a non-radionuclide) are not COCs at all Latty Avenue properties.	Antimony	mg/kg	15	-	-	Corresponding to Cardiovascular and Respiratory HI = 0.08
	Arsenic	mg/kg	36	-	-	Corresponding to Cardiovascular HI = 0.23
	Barium	mg/kg	2,800	-	-	Corresponding to Cardiovascular HI = 0.08
	Cadmium	mg/kg	12	-	-	Corresponding to Kidney and Respiratory HI = 0.10
	Chromium	mg/kg	350	-	-	Corresponding to Respiratory HI = 0.10
	Molybdenum	mg/kg	1,000	-	-	Corresponding to Skeletal HI = 0.38
	Nickel	mg/kg	1,500	-	-	Corresponding to Immune and Respiratory HI = 0.14
	Selenium	mg/kg	300	-	-	Corresponding to Skin HI = 0.11
	Thallium	mg/kg	25	-	-	Corresponding to Skin and Central Nervous System HI = 0.15
	Uranium	mg/kg	150	-	-	Corresponding to Kidney HI = 0.09
	Vanadium	mg/kg	112	-	-	Corresponding to Respiratory HI = 0.10
RGs for Use with Institutional Controls – Subsurface Soil Non-radionuclides						
Description	**Analyte**	**Units**	**Hazard-Based**	**Risk-Based [a]**	**ARAR-Based**	**Basis**
Provided to limit risk from non-radionuclides assuming institutional controls are applied. RGs apply to SLAPS and Contiguous Areas (IAs 1-13), HISS/Futura, and Latty Avenue VPs 2L and 10k530087. Uranium (considered as a non-radionuclide) is not a COC at all Latty Avenue properties.	Antimony	mg/kg	25	-	-	Corresponding to Respiratory HI = 0.14
	Arsenic	mg/kg	40	-	-	Corresponding to Skin HI = 0.23
	Thallium	mg/kg	30	-	-	Corresponding to Central Nervous System HI = 0.08
	Uranium	mg/kg	150	-	-	Corresponding to Kidney HI = 0.09

Table D-15. Summary of Proposed Remediation Goals (RGs)

Remediation Goals for Unrestricted Land Use	Remediation Goals for Use with Institutional Controls at SLAPS and HISS/Futura
Surface soils would be remediated if the radionuclide concentrations above background averaged over 100 m^2 exceed 5 pCi/g of Ra-226, 14 pCi/g of Th-230, or 50 pCi/g of U-238 in the top 15 cm (6 in). Subsurface soils would be remediated if the radionuclide concentrations above background averaged over 100 m^2 exceed 15 pCi/g of Ra-226, 15 pCi/g of Th-230, or 50 pCi/g of U-238 in any subsequent 15-cm (6-in) layer. Soils and sediments below the mean water gradient of Coldwater Creek would be remediated if the radionuclide concentrations above background averaged over 100m^2 exceed 15 pCi/g of Ra-226, 43 pCi/g of Th-230, or 150 pCi/g of U-238. Soil remediation goals apply to soils above the mean water gradient of Coldwater Creek. Confirmation would include surveys and residual risk calculations to assure that total residual site risk is within the CERCLA risk range. Final status surveys compatible with MARSSIM would be used to document achievement of the remediation goals for radiological COCs.	Supplemental standards are developed for Alternatives 2 and 3 in accordance with 40 CFR 192, Subpart C. These supplemental standards are used in conjunction with institutional controls at SLAPS and HISS/Futura (the primary areas used for storage of FUSRAP materials). Supplemental standards are appropriate for the primary storage areas under the containment and treatment alternatives because excavation to the RGs for unrestricted use would result in excessive remediation costs relative to the long term benefits and because the residual materials will not pose present or future hazard. The supplemental criteria constrain doses such that public exposure limits are not exceeded should the institutional controls be lost. The supplemental criteria for subsurface soil limit contamination to average above background concentrations of 25 pCi/g of Ra-226, 70 pCi/g of Th-230, and 250 pCi/g of U-238 or combinations of radionuclides. Institutional controls are implemented to assure that future land use is fully protective.

Table D-16. Proposed Remediation Goals (RGs) for Non-radionuclide Contaminants of Concern (COCs)[a]

Analyte	Units	Proposed RG[b]
Surface		
Antimony	mg/kg	15
Arsenic	mg/kg	36
Barium	mg/kg	2800
Cadmium	mg/kg	12
Chromium	mg/kg	350
Molybdenum	mg/kg	1000
Nickel	mg/kg	1500
Selenium	mg/kg	300
Thallium	mg/kg	25
Uranium	mg/kg	150
Vanadium	mg/kg	112
Subsurface		
Analyte	Units	Proposed RG
Antimony	mg/kg	25
Arsenic	mg/kg	40
Thallium	mg/kg	30
Uranium	mg/kg	150

[a] Non-radionuclide COCs were only identified for SLAPS and Contiguous Areas (IAs 1-13), HISS/Futura, and Latty Avenue VPs 2L and 10k530087. Remediation of non-FUSRAP related wastes based on the RGs for non-radionuclide COCs will be conducted in areas where they are co-located with FUSRAP COCs.

[b] The calculated HIs for different primary target organs were based on the construction worker. Thus the same RGs are proposed for unrestricted use and for use with institutional controls.

Table D-17. Primary organs/critical effects for noncarcinogenic chemical COCs

Organ/System	Antimony	Arsenic	Barium	Cadmium	Chromium	Molybdenum	Nickel	Selenium	Thallium	Uranium	Vanadium	Total # COCs
Cardiovascular System	X	X	X									3
Respiratory System/Lungs	X			X	X		X				X	5
Central Nervous System (CNS)								X	X			2
Immune System							X					1
Skeletal System/bones						X						1
Kidney				X						X		2
Skin/hair		X						X	X			3

Table D-16 shows the RGs for the 11 surface soil and 4 subsurface soil COCs. Table D-18 demonstrates the attainment of protectiveness for all target organs/systems for both the residential and construction worker receptors.

The full list of COCs calculated in this assessment does not apply to the entire North County Site. Table D-19 lists the COCs by medium, noting that no chemicals are identified as COCs for ground water or surface water, and only radionuclides are identified as COCs for sediments. Both radionuclides and non-radionuclides are identified as COCs for North County Site soils. Radionuclide COCs include members of the uranium, thorium, and actinium series and are applicable to all site soil and sediment. Non-radionuclide COCs include antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium for SLAPS and contiguous area; and antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, and vanadium for HISS/Futura and Latty Avenue VPs 2L and 10k530087. Only radionuclides are identified as COCs for haul roads and remaining VPs. Although non-radiological PCOCs were identified for shallow ground water, the shallow aquifer (HZ-A) is not a potable drinking water source. Because there is no exposure pathway, no ground-water COCs are identified.

Attachment 19 provides a summary of property units at the North County Site, current and future receptors by property, cleanup status, removal actions, the proposed criteria to be applied to each property on an alternative by alternative basis, and whether remediation of the property is required to meet the proposed criteria. Note that many Latty Avenue VPs are noted with a "(L)" in the VP number and many properties adjacent to Coldwater Creek are noted with a "(C)" in the VP number. The information in Table D-14 and Attachment 19 may be used to identify which properties require remediation, which remediation criteria are used, and which COCs are relevant.

D.2.4 IMPLEMENTATION

The previous subsection defines soil RGs and the basis for derivation of such goals to the CERCLA process. In this subsection, the methods to document compliance with concentration-, risk-, and dose-based limits are provided.

40 CFR 192.20 (in Subpart C) provides guidance for implementation of remediation standards. This guidance authorizes the implementing agency the flexibility to "establish methods and procedures to provide 'reasonable assurance' that the provisions of Subparts A and B are satisfied. These methods and procedures may be varied to suit conditions at specific sites." Cleanup in the North County Site under non-time-critical removal actions is currently underway using the guidance derived subsequent to UMTRCA from Multi-Agency Radiation Site Survey and Investigation Manual (MARSSIM). MARSSIM was jointly issued in December of 1997 by the Department of Defense, EPA, et al. to provide a consistent method for conducting final status surveys of sites with radioactive contamination. USACE experience has demonstrated that the achievement of RGs required by 40 CFR Part 192 and 10 CFR Part 40 Appendix A Criterion 6(6) can be fully documented using MARSSIM's methodology. MARSSIM (or similar guidance) will be used to develop final status survey plans for the North County Site that will, in turn, be used to demonstrate compliance with radiological criteria. This approach is consistent with the current practices in the North County Site. Similarly, non-radiological COCs will be evaluated in the final

status survey to verify that risk and hazard criteria are fully protective under CERCLA and have been satisfied.

Final status surveys would likely include the use of gamma walkover scans to identify areas of elevated gamma activity, biased sampling if elevated areas are identified, and systematic sampling similar to the approach currently use in the North County and at SLDS. MARSSIM (or similar) guidance would also provide methodology for calculating the appropriate number of samples for a given area to demonstrate statistical confidence. Having collected systematic and biased soil data, dose, risk and statistical calculations are performed as part of the final status survey to document that criteria have been satisfied. The final status survey would fully consider and account for property-specific considerations, such as geometry, intended future land use, COCs, data confidence, etc. MARSSIM is designed specifically for radionuclides; chemical COCs will be assessed using similar EPA/CERCLA methods to verify that any non-radionuclide RGs are achieved. The use of MARSSIM (or similar) guidance to implement the RGs similar to those presented in Section D.2. would likely produce residual soil concentrations similar to those shown in Table D-8. Thus, the referenced RGs are protective as defined by CERLCA and the ARARs, and are implementable based on site experience.

Receptor-specific dose and risk calculations would also be performed to be consistent with remedial objectives. Confirmation sampling of COCs will be conducted to assure that risks are within or below the CERCA target risk range and that hazards are below 1.0. If confirmation sampling indicates that remediation of radiological COCs consistently removes non-radiological COCs to below risk and hazard criteria, the number of analytes and sampling frequency may be reduced as fewer samples would be needed to demonstrate protectiveness to the same statistical confidence level.

Table D-18. Verification of Protectiveness to Various Primary Organs

Verification of Protectiveness for the Cardiovascular, Respiratory, and Central Nervous Systems [a]

COC	Construction Worker Surface Soil			Construction Worker Subsurface Soil		
	HI for Card.	HI for Resp.	HI for CNS	HI for Card.	HI for Resp.	HI for CNS
Antimony	0.21	0.21		0.34	0.34	
Arsenic	0.57			0.63		
Barium	0.20					
Cadmium		0.24				
Chromium		0.10				
Molybdenum						
Nickel		0.36				
Selenium			0.28			
Thallium			0.15			0.18
Uranium						
Vanadium		0.10				
Total HI	**0.97**	**1.00**	**0.43**	**0.97**	**0.34**	**0.18**
	Resident Surface Soil			**Resident Subsurface Soil**		
COC	**HI for Card.**	**HI for Resp.**	**HI for CNS**	**HI for Card.**	**HI for Resp.**	**HI for CNS**
Antimony	0.08	0.08		0.14	0.14	
Arsenic	0.23			0.25		
Barium	0.08					
Cadmium		0.10				
Chromium		0.26				
Molybdenum						
Nickel		0.14				
Selenium			0.11			
Thallium			0.59			0.71
Uranium						
Vanadium		0.00				
Total HI	**0.39**	**0.58**	**0.71**	**0.39**	**0.14**	**0.71**

Verification of Protectiveness for the Immune System, Skeletal System, and Kidneys [b]

COC	Construction Worker Surface Soil			Construction Worker Subsurface Soil		
	HI for Imm.	HI for Skel.	HI for Kidney	HI for Imm.	HI for Skel.	HI for Kidney
Antimony						
Arsenic						
Barium						
Cadmium			0.24			
Chromium						
Molybdenum		0.94				
Nickel	0.36					
Selenium						
Thallium						
Uranium			0.24			0.24
Vanadium						
Total HI	**0.36**	**0.94**	**0.48**	**0.00**	**0.00**	**0.24**

Table D-18. Verification of Protectiveness to Various Primary Organs (Cont'd)

Verification of Protectiveness for the Immune System, Skeletal System, and Kidneys [b] (Cont'd)

	Resident Surface Soil			Resident Subsurface Soil		
COC	**HI for Imm.**	**HI for Skel.**	**HI for Kidney**	**HI for Imm.**	**HI for Skel.**	**HI for Kidney**
Antimony						
Arsenic						
Barium						
Cadmium			0.10			
Chromium						
Molybdenum		0.38				
Nickel	0.14					
Selenium						
Thallium						
	Resident Surface Soil			**Resident Subsurface Soil**		
COC	**HI for Imm.**	**HI for Skel.**	**HI for Kidney**	**HI for Imm.**	**HI for Skel.**	**HI for Kidney**
Uranium			0.09			0.09
Vanadium						
Total HI	**0.14**	**0.38**	**0.19**	**0.00**	**0.00**	**0.09**

Verification of Protectiveness for Skin/Hair [b]

	Construction Worker		Resident	
	Surface Soil	**Subsurface Soil**	**Surface Soil**	**Subsurface Soil**
COC	**HI for Skin**	**HI for Skin**	**HI for Skin**	**HI for Skin**
Antimony				
Arsenic	0.57	0.63	0.23	0.25
Barium				
Cadmium				
Chromium				
Molybdenum				
Nickel				
Selenium	0.28		0.11	
Thallium	0.15	0.18	0.59	0.71
Uranium				
Vanadium				
Total HI	**1.00**	**0.81**	**0.93**	**0.96**

HI = hazard index (the sum of all hazard quotients across all chemicals that affect the system being evaluated).

[a] Protectiveness is met when the HI $\leq$ 1.0.

[b] Protectiveness is met when the HI $<$ 1.0.

Table D-19. North County Site Contaminants of Concern

Soil		Sediment		Ground Water [a]	Surface Water
SLAPS and Contiguous Areas [b]	Radionuclides [c], antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium	Coldwater Creek	Radionuclides [c]	None	None
HISS/Futura and Latty Avenue VPs 2L and 10k530087	Radionuclides [c], antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, and vanadium				
Haul Road Properties and Remaining VPs	Radionuclides[c]				
Coldwater Creek (within banks)	Radionuclides[c]				

[a] PCOCs identified in HZ-A. However, no COCs identified because HZ-A is not a source of potable drinking water.
[b] IA-1 through IA-13.
[c] Radionuclides in the uranium, thorium, and actinium series.

D.3 REFERENCES

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APPENDIX D

ATTACHMENTS

Attachment 1. Soil Background Summary (Page 1 of 2)

Analysis Type	Analyte (units)	Freq. of Detect	Minimum Nondetect	Maximum Nondetect	Minimum Detect	Maximum Detect	Average Result	Standard Deviation	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Metals	Aluminum (mg/kg)	40/40			4260.00	14700.00	7290.00	2568.65	X	14700.00		14700.00	14700.00
Metals	Antimony (mg/kg)	2/40	1.60	7.85	4.50	5.20	3.43	2.52	D	7.85		7.85	5.20
Metals	Arsenic (mg/kg)	40/40			0.84	18.00	7.07	3.26	X	18.00		18.00	18.00
Metals	Barium (mg/kg)	40/40			40.70	279.00	141.00	42.51	X	279.00		279.00	279.00
Metals	Beryllium (mg/kg)	16/40	0.22	0.41	0.33	0.83	0.39	0.16	D	0.83		0.83	0.83
Metals	Boron (mg/kg)	27/40	1.10	1.30	2.80	9.90	4.25	2.66	X	9.90		9.90	9.90
Metals	Cadmium (mg/kg)	6/40	0.15	0.90	0.36	0.62	0.40	0.31	D	0.90		0.90	0.62
Metals	Calcium (mg/kg)	40/40			1250.00	28900.00	6560.00	7023.90	X	28900.00		28900.00	28900.00
Metals	Chromium (mg/kg)	40/40			7.00	17.60	11.50	2.38	L	17.60	17.30	17.60	17.30
Metals	Cobalt (mg/kg)	40/40			2.30	31.70	7.02	4.56	X	31.70		31.70	31.70
Metals	Copper (mg/kg)	40/40			8.40	22.30	12.90	2.67	L	22.30	19.40	22.30	19.40
Metals	Iron (mg/kg)	40/40			6250.00	28200.00	13600.00	4953.34	L	28200.00	26600.00	28200.00	26600.00
Metals	Lead (mg/kg)	40/40			6.60	79.70	22.10	16.96	X	79.70		79.70	79.70
Metals	Lithium (mg/kg)	22/30	1.60	3.40	2.00	8.10	4.58	1.99	N	8.10	9.00	8.10	8.10
Metals	Magnesium (mg/kg)	40/40			819.00	18400.00	3910.00	4153.01	X	18400.00		18400.00	18400.00
Metals	Manganese (mg/kg)	40/40			68.30	4690.00	756.00	838.06	L	4690.00	2830.00	4690.00	2830.00
Metals	Mercury (mg/kg)	8/30	0.03	0.04	0.06	0.69	0.06	0.12	D	0.69		0.69	0.69
Metals	Molybdenum (mg/kg)	13/40	0.40	0.55	1.00	22.70	3.04	4.91	D	22.70		22.70	22.70
Metals	Nickel (mg/kg)	40/40			4.10	47.00	14.60	7.26	L	47.00	33.90	47.00	33.90
Metals	Potassium (mg/kg)	40/40			433.00	1220.00	753.00	183.74	N	1220.00	1140.00	1220.00	1140.00
Metals	Selenium (mg/kg)	9/40	0.13	0.65	0.29	0.55	0.25	0.13	D	0.65		0.65	0.55
Metals	Silver (mg/kg)	1/40	0.08	1.30	2.60	2.60	0.58	0.52	D	2.60		2.60	2.60
Metals	Sodium (mg/kg)	37/40	23.10	45.25	51.40	279.00	94.60	51.70	L	279.00	235.00	279.00	235.00
Metals	Strontium (mg/kg)	30/30			8.60	26.00	17.00	5.19	L	26.00	32.50	26.00	26.00
Metals	Titanium (mg/kg)	30/30			101.00	269.00	180.00	45.82	N	269.00	281.00	269.00	269.00
Metals	Vanadium (mg/kg)	40/40			9.50	31.00	17.90	5.08	L	31.00	31.30	31.00	31.00
Metals	Zinc (mg/kg)	40/40			30.60	278.00	55.30	39.98	X	278.00		278.00	278.00
Organics-Pesticide/PCB	4,4'-DDT (mg/kg)	1/30	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Organics-Pesticide/PCB	Aldrin (mg/kg)	1/30	0.00	0.00	0.02	0.02	0.00	0.00	D	0.02		0.02	0.02
Organics-Pesticide/PCB	Alpha Chlordane (mg/kg)	1/30	0.00	0.00	0.01	0.01	0.00	0.00	D	0.01		0.01	0.01
Organics-Pesticide/PCB	Dieldrin (mg/kg)	2/30	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Organics-Pesticide/PCB	Gamma Chlordane (mg/kg)	1/30	0.00	0.00	0.01	0.01	0.00	0.00	D	0.01		0.01	0.01
Organics-Pesticide/PCB	Heptachlor Epoxide (mg/kg)	1/30	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Organics-Semivolatile	Anthracene (mg/kg)	1/46	0.18	0.23	0.03	0.03	0.20	0.03	D	0.23		0.23	0.03
Organics-Semivolatile	Benzo(a)anthracene (mg/kg)	7/46	0.18	0.23	0.06	0.30	0.20	0.04	D	0.30		0.30	0.30
Organics-Semivolatile	Benzo(a)pyrene (mg/kg)	8/46	0.18	0.23	0.05	0.34	0.19	0.06	D	0.34		0.34	0.34
Organics-Semivolatile	Benzo(b)fluoranthene (mg/kg	10/46	0.18	0.23	0.04	0.31	0.20	0.04	D	0.31		0.31	0.31
Organics-Semivolatile	Benzo(g,h,i)perylene (mg/kg)	4/46	0.18	0.23	0.06	0.39	0.20	0.04	D	0.39		0.39	0.39
Organics-Semivolatile	Benzo(k)fluoranthene (mg/kg	4/46	0.18	0.23	0.05	0.29	0.20	0.04	D	0.29		0.29	0.29
Organics-Semivolatile	Bis(2-ethylhexyl)phthalate (m	14/46	0.18	0.23	0.05	0.18	0.18	0.06	D	0.23		0.23	0.18
Organics-Semivolatile	Butyl Benzyl Phthalate (mg/k	6/46	0.18	0.23	0.04	0.25	0.19	0.05	D	0.25		0.25	0.25
Organics-Semivolatile	Chrysene (mg/kg)	9/46	0.18	0.22	0.06	0.57	0.20	0.07	D	0.57		0.57	0.57
Organics-Semivolatile	Dibenzo(a,h)anthracene (mg/k	1/46	0.18	0.23	0.04	0.04	0.20	0.03	D	0.23		0.23	0.04
Organics-Semivolatile	Fluoranthene (mg/kg)	9/46	0.18	0.23	0.05	0.70	0.20	0.09	D	0.70		0.70	0.70
Organics-Semivolatile	Indeno(1,2,3-cd)pyrene (mg/k	5/46	0.18	0.23	0.06	0.35	0.21	0.04	D	0.35		0.35	0.35
Organics-Semivolatile	Phenanthrene (mg/kg)	4/46	0.18	0.23	0.05	0.28	0.20	0.03	D	0.28		0.28	0.28
Organics-Semivolatile	Pyrene (mg/kg)	14/46	0.18	0.23	0.08	0.66	0.21	0.08	D	0.66		0.66	0.66

Attachment 1. Soil Background Summary (Page 2 of 2)

Analysis Type	Analyte (units)	Freq. of Detect	Minimum Nondetect	Maximum Nondetect	Minimum Detect	Maximum Detect	Average Result	Standard Deviation	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Organics-Volatile	1,2-Dichloroethane (mg/kg)	3/40	0.00	0.01	0.00	0.01	0.00	0.00	D	0.01		0.01	0.01
Organics-Volatile	2-Butanone (mg/kg)	2/40	0.01	0.01	0.02	0.02	0.01	0.00	D	0.02		0.02	0.02
Organics-Volatile	Acetone (mg/kg)	1/40	0.01	0.04	0.02	0.02	0.01	0.01	D	0.04		0.04	0.02
Organics-Volatile	Chloroethane (mg/kg)	1/40	0.01	0.01	0.02	0.02	0.01	0.00	D	0.02		0.02	0.02
Organics-Volatile	Methylene Chloride (mg/kg)	9/40	0.00	0.01	0.00	0.01	0.00	0.00	D	0.01		0.01	0.01
Organics-Volatile	Toluene (mg/kg)	12/39	0.00	0.01	0.00	0.11	0.01	0.02	D	0.11		0.11	0.11
Radionuclides	Actinium-227 (pCi/g)	17/74	-0.16	0.62	0.15	0.82	0.21	0.23	D	0.82		0.82	0.82
Radionuclides	Cesium-137 (pCi/g)	37/74	-0.02	0.02	0.05	0.57	0.16	0.18	X	0.57		0.57	0.57
Radionuclides	Protactinium-231 (pCi/g)	2/74	-0.49	2.17	1.06	1.13	0.20	0.42	D	2.17		2.17	1.13
Radionuclides	Potassium-40 (pCi/g)	63/74	12.31	14.70	12.73	17.28	14.60	1.09	N	17.28	16.80	17.28	16.80
Radionuclides	Radium-226 (pCi/g)	74/74			0.56	1.55	1.05	0.27	X	1.55		1.55	1.55
Radionuclides	Radium-228 (pCi/g)	74/74			0.72	1.24	0.98	0.13	L	1.24	1.27	1.24	1.24
Radionuclides	Thorium-228 (pCi/g)	74/74			0.63	2.15	1.18	0.35	L	2.15	2.04	2.15	2.04
Radionuclides	Thorium-230 (pCi/g)	74/74			0.94	2.89	1.66	0.49	X	2.89		2.89	2.89
Radionuclides	Thorium-232 (pCi/g)	74/74			0.53	1.96	1.11	0.35	N	1.96	1.83	1.96	1.83
Radionuclides	Uranium-234 (pCi/g)	49/50	0.40	0.40	0.45	3.53	1.13	0.47	L	3.53	2.22	3.53	2.22
Radionuclides	Uranium-235 (pCi/g)	2/74	-0.06	0.22	0.22	0.25	0.06	0.07	D	0.25		0.25	0.25
Radionuclides	Uranium-238 (pCi/g)	50/74	0.66	1.72	0.65	2.04	1.18	0.33	L	2.04	2.02	2.04	2.02

UTL = Upper Tolerance Limit.

[a] Distribution codes:

D = Not determined because fewer than 5 detects or < 50% detects; parametric method to determine 95% UTL was not used.
L = Lognormal; parametric method was used to determine 95% UTL.
N = Normal; parametric method was used to determine 95% UTL.
X = Neither normal nor lognormal; parametric method to determine 95% UTL was not used.

[b] Background criteria was assigned as 0.0 for analytes never detected in background.

Attachment 2. Ground-Water Background Summary (Page 1 of 9)

Analysis Type	Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
DEEP WELLS												
Anions	Chloride (mg/L)	2/3	0.50	0.50	0.83	1.21	0.85	N	1.21	3.57	1.21	1.21
Anions	Fluoride (mg/L)	2/4	0.05	0.25	0.20	0.24	0.18	N	0.25	0.66	0.25	0.24
Anions	Nitrate (mg/L)	1/4	0.01	0.05	0.10	0.10	0.05	D	0.10		0.10	0.10
Anions	Nitrite (mg/L)	0/3	0.01	0.05			0.03	O	0.10		0.05	0.00
Anions	Sulfate (mg/L)	1/4	0.25	1.25	6.93	6.93	2.17	D	6.93		6.93	6.93
GENERA	Ammonia (mg/L)	4/4			5.08	6.70	5.87	L	6.70	11.20	6.70	6.70
GENERA	Phosphorous (mg/L)	3/3			1.14	1.24	1.20	N	1.24	1.59	1.24	1.24
GENERA	Silicon (mg/L)	1/1			8.36	8.36	8.36	X	8.36		8.36	8.36
MISC	Total Dissolved Solids (mg/L)	3/3			512.00	552.00	535.00	N	552.00	692.00	552.00	552.00
MISC	Total Suspended Solids (mg/L)	3/3			43.00	49.00	46.70	N	49.00	71.30	49.00	49.00
Metals	Aluminum (mg/L)	1/4	0.02	0.09	0.05	0.05	0.06	D	0.09		0.09	0.05
Metals	Antimony (mg/L)	0/4	0.00	0.02			0.01	O	0.04		0.02	0.00
Metals	Arsenic (mg/L)	4/4			0.07	0.08	0.08	L	0.08	0.11	0.08	0.08
Metals	Barium (mg/L)	4/4			0.40	0.42	0.41	N	0.42	0.48	0.42	0.42
Metals	Beryllium (mg/L)	0/4	0.00	0.00			0.00	O	0.00		0.00	0.00
Metals	Boron (mg/L)	4/4			0.19	0.21	0.20	L	0.21	0.26	0.21	0.21
Metals	Cadmium (mg/L)	0/4	0.00	0.00			0.00	O	0.00		0.00	0.00
Metals	Calcium (mg/L)	4/4			104.00	113.00	109.00	N	113.00	129.00	113.00	113.00
Metals	Chromium (mg/L)	1/4	0.00	0.00	0.01	0.01	0.00	D	0.01		0.01	0.01
Metals	Cobalt (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Metals	Copper (mg/L)	1/4	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Metals	Iron (mg/L)	4/4			13.20	15.20	14.50	N	15.20	19.20	15.20	15.20
Metals	Lead (mg/L)	0/4	0.00	0.00			0.00	O	0.00		0.00	0.00
Metals	Lithium (mg/L)	0/4	0.00	0.01			0.01	O	0.03		0.01	0.00
Metals	Magnesium (mg/L)	4/4			39.70	42.60	41.50	N	42.60	48.20	42.60	42.60
Metals	Manganese (mg/L)	4/4			0.20	0.23	0.22	N	0.23	0.29	0.23	0.23
Metals	Mercury (mg/L)	0/4	0.00	0.00			0.00	O	0.00		0.00	0.00
Metals	Molybdenum (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Metals	Nickel (mg/L)	1/4	0.00	0.01	0.00	0.00	0.00	D	0.01		0.01	0.00
Metals	Orthophosphate (mg/L)	0/1	0.05	0.05			0.05	O	0.10		0.05	0.00
Metals	Potassium (mg/L)	4/4			2.00	3.51	2.49	L	3.51	9.17	3.51	3.51
Metals	Selenium (mg/L)	0/4	0.00	0.00			0.00	O	0.00		0.00	0.00
Metals	Silver (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Metals	Sodium (mg/L)	4/4			44.40	51.00	47.40	L	51.00	63.40	51.00	51.00
Metals	Strontium (mg/L)	4/4			0.68	0.74	0.72	N	0.74	0.84	0.74	0.74
Metals	Thallium (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Metals	Titanium (mg/L)	2/3	0.00	0.00	0.00	0.01	0.00	N	0.01	0.04	0.01	0.01
Metals	Uranium (mg/L)	1/4	0.03	0.07	0.00	0.00	0.04	D	0.07		0.07	0.00
Metals	Vanadium (mg/L)	0/4	0.00	0.01			0.00	O	0.01		0.01	0.00
Metals	Zinc (mg/L)	4/4			0.01	0.05	0.02	L	0.05	1.55	0.05	0.05
Organics-Herbicides	2,4,5-T (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Herbicides	2,4-D (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Herbicides	2,4-DB (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Herbicides	Dalapon (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00

Attachment 2. Ground-Water Background Summary (Page 2 of 9)

Analysis Type	Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Organics-Herbicides	Dicamba (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Herbicides	Dichloroprop (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Herbicides	Dinoseb (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Herbicides	MCPA (mg/L)	0/3	0.20	0.20			0.20	O	0.40		0.20	0.00
Organics-Herbicides	MCPP (mg/L)	0/3	0.20	0.20			0.20	O	0.40		0.20	0.00
Organics-Herbicides	Silvex (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	4,4'-DDD (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	4,4'-DDE (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	4,4'-DDT (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Aldrin (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Dieldrin (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Endosulfan I (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Endosulfan II (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Endosulfan sulfate (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Endrin (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Endrin aldehyde (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Endrin ketone (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Heptachlor (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Heptachlor epoxide (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Lindane (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Methoxychlor (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	PCB-1016 (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	PCB-1221 (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	PCB-1232 (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	PCB-1242 (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	PCB-1248 (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	PCB-1254 (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	PCB-1260 (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Toxaphene (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Pesticide/PCB	alpha-BHC (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	alpha-Chlordane (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	beta-BHC (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	delta-BHC (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	gamma-Chlordane (mg/L)	0/3	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Semivolatile	1,2,4-Trichlorobenzene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	1,2-Dichlorobenzene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	1,3-Dichlorobenzene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	1,4-Dichlorobenzene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2,4,5-Trichlorophenol (mg/L)	0/4	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	2,4,6-Trichlorophenol (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2,4-Dichlorophenol (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2,4-Dimethylphenol (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2,4-Dinitrophenol (mg/L)	0/4	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	2,4-Dinitrotoluene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2,6-Dinitrotoluene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00

Attachment 2. Ground-Water Background Summary (Page 3 of 9)

Analysis Type	Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Organics-Semivolatile	2-Chloronaphthalene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2-Chlorophenol (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2-Methyl-4,6-dinitrophenol (mg/L)	0/4	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	2-Methylnaphthalene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2-Methylphenol (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2-Nitrobenzenamine (mg/L)	0/4	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	2-Nitrophenol (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	3,3'-Dichlorobenzidine (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	3-Nitrobenzenamine (mg/L)	0/4	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	4-Bromophenyl phenyl ether (mg/I	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	4-Chloro-3-methylphenol (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	4-Chlorobenzenamine (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	4-Chlorophenyl phenyl ether (mg/I	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	4-Methylphenol (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	4-Nitrobenzenamine (mg/L)	0/4	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	4-Nitrophenol (mg/L)	0/4	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	Acenaphthene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Acenaphthylene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Anthracene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Benz(a)anthracene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Benzo(a)pyrene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Benzo(b)fluoranthene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Benzo(ghi)perylene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Benzo(k)fluoranthene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Bis(2-chloroethoxy)methane (mg/I	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Bis(2-chloroethyl) ether (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Bis(2-chloroisopropyl) ether (mg/L	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Bis(2-ethylhexyl)phthalate (mg/L)	1/4	0.01	0.01	0.00	0.00	0.00	D	0.01		0.01	0.00
Organics-Semivolatile	Butyl benzyl phthalate (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Carbazole (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Chrysene (mg/L)	0/3	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Di-n-butyl phthalate (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Di-n-octylphthalate (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Dibenz(a,h)anthracene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Dibenzofuran (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Diethyl phthalate (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Dimethyl phthalate (mg/L)	0/3	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Fluoranthene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Fluorene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Hexachlorobenzene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Hexachlorobutadiene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Hexachlorocyclopentadiene (mg/L	0/3	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Hexachloroethane (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Indeno(1,2,3-cd)pyrene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Isophorone (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00

Attachment 2. Ground-Water Background Summary (Page 4 of 9)

Analysis Type	Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Organics-Semivolatile	N-Nitroso-di-n-propylamine (mg/L	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	N-Nitrosodiphenylamine (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Naphthalene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Nitrobenzene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Pentachlorophenol (mg/L)	0/4	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	Phenanthrene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Phenol (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Pyrene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Volatile	1,1,1-Trichloroethane (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	1,1,2,2-Tetrachloroethane (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	1,1,2-Trichloro-1,2,2-trifluoroethar	0/3	0.00	0.01			0.00	O	0.01		0.01	0.00
Organics-Volatile	1,1,2-Trichloroethane (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	1,1-Dichloroethane (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	1,1-Dichloroethene (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	1,2-Dichloroethane (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	1,2-Dichloroethene (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	1,2-Dichloropropane (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	2-Butanone (mg/L)	0/4	0.00	0.01			0.01	O	0.02		0.01	0.00
Organics-Volatile	2-Hexanone (mg/L)	0/4	0.00	0.01			0.01	O	0.02		0.01	0.00
Organics-Volatile	4-Methyl-2-pentanone (mg/L)	0/4	0.00	0.01			0.01	O	0.02		0.01	0.00
Organics-Volatile	Acetone (mg/L)	0/3	0.01	0.01			0.01	O	0.02		0.01	0.00
Organics-Volatile	Benzene (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Bromodichloromethane (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Bromoform (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Bromomethane (mg/L)	0/4	0.00	0.01			0.00	O	0.01		0.01	0.00
Organics-Volatile	Carbon disulfide (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Carbon tetrachloride (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Chlorobenzene (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Chloroethane (mg/L)	0/4	0.00	0.01			0.00	O	0.01		0.01	0.00
Organics-Volatile	Chloroform (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Chloromethane (mg/L)	0/4	0.00	0.01			0.00	O	0.01		0.01	0.00
Organics-Volatile	Dibromochloromethane (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Dimethylbenzene (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Ethylbenzene (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Methylene chloride (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Styrene (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Tetrachloroethene (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Toluene (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Trichloroethene (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Vinyl chloride (mg/L)	0/4	0.00	0.01			0.00	O	0.01		0.01	0.00
Organics-Volatile	cis-1,3-Dichloropropene (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	trans-1,3-Dichloropropene (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Radionuclides	Actinium-227 (pCi/L)	0/1	-0.01	-0.01			-0.01	O	-0.01		-0.01	0.00
Radionuclides	Lead-210 (pCi/L)	0/1	0.50	0.50			0.50	O	0.50		0.50	0.50
Radionuclides	Protactinium-231 (pCi/L)	0/1	151.00	151.00			151.00	O	151.00		151.00	151.00

Attachment 2. Ground-Water Background Summary (Page 5 of 9)

Analysis Type	Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Radionuclides	Radium-226 (pCi/L)	2/3	1.36	1.36	0.83	1.03	1.07	L	1.36	7.05	1.36	1.03
Radionuclides	Radium-228 (pCi/L)	0/1	0.00	0.00			0.00	O	0.00		0.00	0.00
Radionuclides	Thorium-228 (pCi/L)	0/3	0.00	0.62			0.40	O	0.62		0.62	0.62
Radionuclides	Thorium-230 (pCi/L)	1/3	-0.07	0.02	0.63	0.63	0.20	D	0.63		0.63	0.63
Radionuclides	Thorium-232 (pCi/L)	0/3	-0.07	0.00			-0.02	O	0.00		0.00	0.00
Radionuclides	Uranium-234 (pCi/L)	0/2	-0.10	-0.06			-0.08	O	-0.06		-0.06	0.00
Radionuclides	Uranium-235 (pCi/L)	0/2	-0.07	0.49			0.21	O	0.49		0.49	0.49
Radionuclides	Uranium-238 (pCi/L)	0/2	0.00	0.11			0.06	O	0.11		0.11	0.11
SHALLOW WELLS												
Anions	Chloride (mg/L)	4/4			7.85	13.40	10.50	L	13.40	34.00	13.40	13.40
Anions	Fluoride (mg/L)	1/4	0.10	0.25	0.25	0.25	0.21	D	0.25		0.25	0.25
Anions	Nitrate (mg/L)	4/4			0.19	0.72	0.45	N	0.72	1.59	0.72	0.72
Anions	Nitrite (mg/L)	0/3	0.01	0.05			0.03	O	0.10		0.05	0.00
Anions	Sulfate (mg/L)	4/4			80.30	376.00	176.00	L	376.00	4580.00	376.00	376.00
GENERA	Ammonia (mg/L)	1/4	0.03	0.50	0.29	0.29	0.23	D	0.50		0.50	0.29
GENERA	Phosphorous (mg/L)	3/3			0.06	0.08	0.07	X	0.08		0.08	0.08
GENERA	Silicon (mg/L)	1/1			7.95	7.95	7.95	X	7.95		7.95	7.95
MISC	Total Dissolved Solids (mg/L)	3/3			552.00	692.00	607.00	L	692.00	1510.00	692.00	692.00
MISC	Total Suspended Solids (mg/L)	2/3	0.50	0.50	2.00	17.00	6.50	L	17.00	2070000.00	17.00	17.00
Metals	Aluminum (mg/L)	0/4	0.00	0.02			0.01	O	0.04		0.02	0.00
Metals	Antimony (mg/L)	0/4	0.00	0.02			0.01	O	0.04		0.02	0.00
Metals	Arsenic (mg/L)	0/4	0.00	0.00			0.00	O	0.00		0.00	0.00
Metals	Barium (mg/L)	4/4			0.17	0.20	0.19	N	0.20	0.26	0.20	0.20
Metals	Beryllium (mg/L)	0/4	0.00	0.00			0.00	O	0.00		0.00	0.00
Metals	Boron (mg/L)	3/4	0.01	0.01	0.03	0.06	0.04	N	0.06	0.17	0.06	0.06
Metals	Cadmium (mg/L)	1/4	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Metals	Calcium (mg/L)	4/4			106.00	122.00	116.00	N	122.00	150.00	122.00	122.00
Metals	Chromium (mg/L)	2/4	0.00	0.00	0.00	0.01	0.00	L	0.01	0.76	0.01	0.01
Metals	Cobalt (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Metals	Copper (mg/L)	1/4	0.00	0.00	0.01	0.01	0.00	D	0.01		0.01	0.01
Metals	Iron (mg/L)	0/4	0.01	0.04			0.03	O	0.09		0.04	0.00
Metals	Lead (mg/L)	0/4	0.00	0.00			0.00	O	0.00		0.00	0.00
Metals	Lithium (mg/L)	1/4	0.00	0.02	0.01	0.01	0.01	D	0.02		0.02	0.01
Metals	Magnesium (mg/L)	4/4			44.40	57.00	51.20	N	57.00	77.90	57.00	57.00
Metals	Manganese (mg/L)	4/4			0.04	1.58	0.43	X	1.58		1.58	1.58
Metals	Mercury (mg/L)	0/4	0.00	0.00			0.00	O	0.00		0.00	0.00
Metals	Molybdenum (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Metals	Nickel (mg/L)	0/4	0.00	0.01			0.00	O	0.01		0.01	0.00
Metals	Orthophosphate (mg/L)	0/1	0.05	0.05			0.05	O	0.10		0.05	0.00
Metals	Potassium (mg/L)	3/4	0.90	0.90	1.03	2.17	1.54	L	2.17	15.10	2.17	2.17
Metals	Selenium (mg/L)	0/4	0.00	0.00			0.00	O	0.00		0.00	0.00
Metals	Silver (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Metals	Sodium (mg/L)	4/4			19.40	22.00	20.60	L	22.00	26.80	22.00	22.00
Metals	Strontium (mg/L)	4/4			0.28	0.32	0.30	L	0.32	0.41	0.32	0.32

Attachment 2. Ground-Water Background Summary (Page 6 of 9)

Analysis Type	Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Metals	Thallium (mg/L)	0/4	0.00	0.00			0.00	O	0.01		0.00	0.00
Metals	Titanium (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Metals	Uranium (mg/L)	1/4	0.03	0.07	0.00	0.00	0.04	D	0.07		0.07	0.00
Metals	Vanadium (mg/L)	0/4	0.00	0.01			0.00	O	0.01		0.01	0.00
Metals	Zinc (mg/L)	3/4	0.01	0.01	0.01	0.01	0.01	N	0.01	0.03	0.01	0.01
Organics-Herbicides	2,4,5-T (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Herbicides	2,4-D (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Herbicides	2,4-DB (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Herbicides	Dalapon (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Herbicides	Dicamba (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Herbicides	Dichloroprop (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Herbicides	Dinoseb (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Herbicides	MCPA (mg/L)	0/2	0.20	0.20			0.20	O	0.40		0.20	0.00
Organics-Herbicides	MCPP (mg/L)	0/2	0.20	0.20			0.20	O	0.40		0.20	0.00
Organics-Herbicides	Silvex (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	4,4'-DDD (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	4,4'-DDE (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	4,4'-DDT (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Aldrin (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Dieldrin (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Endosulfan I (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Endosulfan II (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Endosulfan sulfate (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Endrin (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Endrin aldehyde (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Endrin ketone (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Heptachlor (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Heptachlor epoxide (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Lindane (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Methoxychlor (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	PCB-1016 (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	PCB-1221 (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	PCB-1232 (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	PCB-1242 (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	PCB-1248 (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	PCB-1254 (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	PCB-1260 (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	Toxaphene (mg/L)	0/2	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Pesticide/PCB	alpha-BHC (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	alpha-Chlordane (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	beta-BHC (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	delta-BHC (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Pesticide/PCB	gamma-Chlordane (mg/L)	0/2	0.00	0.00			0.00	O	0.00		0.00	0.00
Organics-Semivolatile	1,2,4-Trichlorobenzene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	1,2-Dichlorobenzene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00

Attachment 2. Ground-Water Background Summary (Page 7 of 9)

Analysis Type	Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Organics-Semivolatile	1,3-Dichlorobenzene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	1,4-Dichlorobenzene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2,4,5-Trichlorophenol (mg/L)	0/3	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	2,4,6-Trichlorophenol (mg/L)	0/3	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2,4-Dichlorophenol (mg/L)	0/3	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2,4-Dimethylphenol (mg/L)	0/3	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2,4-Dinitrophenol (mg/L)	0/3	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	2,4-Dinitrotoluene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2,6-Dinitrotoluene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2-Chloronaphthalene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2-Chlorophenol (mg/L)	0/3	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2-Methyl-4,6-dinitrophenol (mg/L)	0/3	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	2-Methylnaphthalene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2-Methylphenol (mg/L)	0/3	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	2-Nitrobenzenamine (mg/L)	0/4	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	2-Nitrophenol (mg/L)	0/3	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	3,3'-Dichlorobenzidine (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	3-Nitrobenzenamine (mg/L)	0/4	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	4-Bromophenyl phenyl ether (mg/I	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	4-Chloro-3-methylphenol (mg/L)	0/3	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	4-Chlorobenzenamine (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	4-Chlorophenyl phenyl ether (mg/I	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	4-Methylphenol (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	4-Nitrobenzenamine (mg/L)	0/4	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	4-Nitrophenol (mg/L)	0/3	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	Acenaphthene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Acenaphthylene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Anthracene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Benz(a)anthracene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Benzo(a)pyrene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Benzo(b)fluoranthene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Benzo(ghi)perylene (mg/L)	0/4	0.00	0.01			0.00	O	0.01		0.01	0.00
Organics-Semivolatile	Benzo(k)fluoranthene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Bis(2-chloroethoxy)methane (mg/I	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Bis(2-chloroethyl) ether (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Bis(2-chloroisopropyl) ether (mg/I	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Bis(2-ethylhexyl)phthalate (mg/L)	1/4	0.01	0.01	0.01	0.01	0.01	D	0.01		0.01	0.01
Organics-Semivolatile	Butyl benzyl phthalate (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Carbazole (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Chrysene (mg/L)	0/3	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Di-n-butyl phthalate (mg/L)	1/4	0.01	0.01	0.00	0.00	0.00	D	0.01		0.01	0.00
Organics-Semivolatile	Di-n-octylphthalate (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Dibenz(a,h)anthracene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Dibenzofuran (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Diethyl phthalate (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00

Attachment 2. Ground-Water Background Summary (Page 8 of 9)

Analysis Type	Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Organics-Semivolatile	Dimethyl phthalate (mg/L)	0/3	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Fluoranthene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Fluorene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Hexachlorobenzene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Hexachlorobutadiene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Hexachlorocyclopentadiene (mg/L	0/3	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Hexachloroethane (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Indeno(1,2,3-cd)pyrene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Isophorone (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	N-Nitroso-di-n-propylamine (mg/L	0/3	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	N-Nitrosodiphenylamine (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Naphthalene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Nitrobenzene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Pentachlorophenol (mg/L)	0/3	0.01	0.01			0.01	O	0.03		0.01	0.00
Organics-Semivolatile	Phenanthrene (mg/L)	0/4	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Phenol (mg/L)	0/3	0.01	0.01			0.01	O	0.01		0.01	0.00
Organics-Semivolatile	Pyrene (mg/L)	1/4	0.01	0.01	0.00	0.00	0.00	D	0.01		0.01	0.00
Organics-Volatile	1,1,1-Trichloroethane (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	1,1,2,2-Tetrachloroethane (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	1,1,2-Trichloro-1,2,2-trifluoroethan	0/2	0.00	0.01			0.00	O	0.01		0.01	0.00
Organics-Volatile	1,1,2-Trichloroethane (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	1,1-Dichloroethane (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	1,1-Dichloroethene (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	1,2-Dichloroethane (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	1,2-Dichloroethene (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	1,2-Dichloropropane (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	2-Butanone (mg/L)	0/3	0.00	0.01			0.01	O	0.02		0.01	0.00
Organics-Volatile	2-Hexanone (mg/L)	0/3	0.00	0.01			0.01	O	0.02		0.01	0.00
Organics-Volatile	4-Methyl-2-pentanone (mg/L)	0/3	0.00	0.01			0.01	O	0.02		0.01	0.00
Organics-Volatile	Acetone (mg/L)	0/2	0.01	0.01			0.01	O	0.02		0.01	0.00
Organics-Volatile	Benzene (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Bromodichloromethane (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Bromoform (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Bromomethane (mg/L)	0/3	0.00	0.01			0.00	O	0.01		0.01	0.00
Organics-Volatile	Carbon disulfide (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Carbon tetrachloride (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Chlorobenzene (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Chloroethane (mg/L)	0/3	0.00	0.01			0.00	O	0.01		0.01	0.00
Organics-Volatile	Chloroform (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Chloromethane (mg/L)	0/3	0.00	0.01			0.00	O	0.01		0.01	0.00
Organics-Volatile	Dibromochloromethane (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Dimethylbenzene (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Ethylbenzene (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Methylene chloride (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Styrene (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00

Attachment 2. Ground-Water Background Summary (Page 9 of 9)

Analysis Type	Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Organics-Volatile	Tetrachloroethene (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Toluene (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Trichloroethene (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	Vinyl chloride (mg/L)	0/3	0.00	0.01			0.00	O	0.01		0.01	0.00
Organics-Volatile	cis-1,3-Dichloropropene (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Organics-Volatile	trans-1,3-Dichloropropene (mg/L)	0/3	0.00	0.00			0.00	O	0.01		0.00	0.00
Radionuclides	Actinium-227 (pCi/L)	0/1	-0.01	-0.01			-0.01	O	-0.01		-0.01	0.00
Radionuclides	Lead-210 (pCi/L)	1/1			0.62	0.62	0.62	X	0.62		0.62	0.62
Radionuclides	Protactinium-231 (pCi/L)	0/1	176.00	176.00			176.00	O	176.00		176.00	176.00
Radionuclides	Radium-226 (pCi/L)	0/4	-0.25	0.91			0.13	O	0.91		0.91	0.91
Radionuclides	Radium-228 (pCi/L)	0/1	0.00	0.00			0.00	O	0.00		0.00	0.00
Radionuclides	Thorium-228 (pCi/L)	1/4	0.00	0.96	0.66	0.66	0.44	D	0.96		0.96	0.66
Radionuclides	Thorium-230 (pCi/L)	0/4	0.00	1.18			0.53	O	1.18		1.18	1.18
Radionuclides	Thorium-232 (pCi/L)	0/4	0.00	0.25			0.06	O	0.25		0.25	0.25
Radionuclides	Uranium-234 (pCi/L)	2/3	0.67	0.67	0.97	6.07	2.57	L	6.07	13200.00	6.07	6.07
Radionuclides	Uranium-235 (pCi/L)	0/3	-0.14	0.47			0.09	O	0.47		0.47	0.47
Radionuclides	Uranium-238 (pCi/L)	2/2			1.36	2.28	1.82	N	2.28	2.28	2.28	2.28

UTL = Upper Tolerance Limit.

[a] Distribution codes:

D = Not determined because fewer than 5 detects or < 50% detects; parametric method to determine 95% UTL was not used.

L = Lognormal; parametric method was used to determine 95% UTL.

N = Normal; parametric method was used to determine 95% UTL.

O = Not determined because there were no detected concentrations; parametric method to determine 95% UTL was not used.

X = Neither normal nor lognormal; parametric method to determine 95% UTL was not used.

[b] Background criteria was assigned as 0.0 for analytes never detected in background.

Attachment 3. Surface Water Background Summary (Page 1 of 6)

Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Standard Deviation	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Chloride (mg/L)	10/10			89.00	240.00	143.00	41.93	L	240.00	306.00	240.00	240.00
Fluoride (mg/L)	10/10			0.48	1.10	0.62	0.19	X	1.10		1.10	1.10
Nitrate (mg/L)	10/11	0.01	0.01	0.13	2.51	1.55	0.84	N	2.51	3.91	2.51	2.51
Nitrite (mg/L)	7/10	0.01	0.05	0.02	0.19	0.10	0.07	N	0.19	0.30	0.19	0.19
Sulfate (mg/L)	10/10			74.00	210.00	106.00	42.41	L	210.00	270.00	210.00	210.00
Ammonia (mg/L)	10/10			0.02	0.90	0.28	0.26	L	0.90	3.46	0.90	0.90
Chromium, hexavalent (mg/L)	0/1	0.01	0.01			0.01		O	0.01		0.01	0.00
Phosphorous (mg/L)	9/11	0.03	0.03	0.10	0.54	0.19	0.15	L	0.54	2.09	0.54	0.54
Aluminum (mg/L)	2/7	0.01	0.13	1.00	1.13	0.34	0.50	D	1.13		1.13	1.13
Antimony (mg/L)	3/9	0.01	0.02	0.00	0.04	0.01	0.01	D	0.04		0.04	0.04
Arsenic (mg/L)	7/9	0.00	0.00	0.00	0.01	0.00	0.00	L	0.01	0.01	0.01	0.01
Barium (mg/L)	9/9			0.08	0.17	0.13	0.03	N	0.17	0.21	0.17	0.17
Beryllium (mg/L)	2/9	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Boron (mg/L)	10/11	0.05	0.05	0.07	0.16	0.10	0.03	L	0.16	0.22	0.16	0.16
Cadmium (mg/L)	3/9	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Calcium (mg/L)	11/11			55.00	101.00	82.70	15.66	N	101.00	127.00	101.00	101.00
Chromium (mg/L)	4/9	0.00	0.00	0.00	0.05	0.01	0.02	D	0.05		0.05	0.05
Cobalt (mg/L)	2/9	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Copper (mg/L)	6/9	0.00	0.01	0.00	0.02	0.01	0.01	L	0.02	0.10	0.02	0.02
Cyanide (mg/L)	2/2			0.01	0.01	0.01	0.00	X	0.01		0.01	0.01
Iron (mg/L)	6/9	0.02	0.03	0.03	2.15	0.65	0.88	X	2.15		2.15	2.15
Lead (mg/L)	5/9	0.00	0.00	0.00	0.01	0.00	0.00	X	0.01		0.01	0.01
Lithium (mg/L)	5/9	0.00	0.01	0.00	0.04	0.01	0.01	L	0.04	0.14	0.04	0.04
Magnesium (mg/L)	11/11			23.00	38.10	31.40	5.08	N	38.10	45.70	38.10	38.10
Manganese (mg/L)	9/9			0.16	0.63	0.34	0.13	L	0.63	0.98	0.63	0.63
Mercury (mg/L)	2/9	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Molybdenum (mg/L)	3/9	0.00	0.01	0.01	0.01	0.01	0.00	D	0.01		0.01	0.01
Nickel (mg/L)	4/9	0.01	0.01	0.00	0.01	0.00	0.00	D	0.01		0.01	0.01
Orthophosphate (mg/L)	4/4			0.16	0.46	0.27	0.13	L	0.46	2.53	0.46	0.46
Potassium (mg/L)	11/11			5.40	15.00	9.50	2.57	L	15.00	19.70	15.00	15.00
Selenium (mg/L)	3/9	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Silver (mg/L)	2/9	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Sodium (mg/L)	11/11			56.50	140.00	78.80	26.30	L	140.00	173.00	140.00	140.00
Strontium (mg/L)	11/11			0.14	0.62	0.48	0.15	X	0.62		0.62	0.62
Thallium (mg/L)	2/9	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Titanium (mg/L)	1/7	0.00	0.03	0.03	0.03	0.01	0.01	D	0.03		0.03	0.03

Attachment 3. Surface Water Background Summary (Page 2 of 6)

Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Standard Deviation	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Uranium (mg/L)	21/28	0.06	0.07	0.00	0.00	0.02	0.03	X	0.07		0.07	0.00
Vanadium (mg/L)	7/9	0.01	0.01	0.00	0.02	0.01	0.00	N	0.02	0.02	0.02	0.02
Zinc (mg/L)	8/9	0.01	0.01	0.00	0.06	0.03	0.02	L	0.06	0.46	0.06	0.06
2,4,5-T (mg/L)	0/2	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
2,4-D (mg/L)	1/2	0.00	0.00	0.01	0.01	0.00	0.00	N	0.01	0.01	0.01	0.01
2,4-DB (mg/L)	0/2	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Dalapon (mg/L)	0/2	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Dicamba (mg/L)	0/2	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Dichloroprop (mg/L)	0/2	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Dinoseb (mg/L)	0/2	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
MCPA (mg/L)	0/2	0.20	0.21			0.20	0.00	O	0.41		0.21	0.00
MCPP (mg/L)	0/2	0.20	0.21			0.20	0.00	O	0.41		0.21	0.00
Silvex (mg/L)	0/2	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
4,4'-DDD (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
4,4'-DDE (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
4,4'-DDT (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Aldrin (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Dieldrin (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Endosulfan I (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Endosulfan II (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Endosulfan sulfate (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Endrin (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Endrin aldehyde (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Endrin ketone (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Heptachlor (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Heptachlor epoxide (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Lindane (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Methoxychlor (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
PCB-1016 (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
PCB-1221 (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
PCB-1232 (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
PCB-1242 (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
PCB-1248 (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
PCB-1254 (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
PCB-1260 (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
Toxaphene (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00

Attachment 3. Surface Water Background Summary (Page 3 of 6)

Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Standard Deviation	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
alpha-BHC (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
alpha-Chlordane (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
beta-BHC (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
delta-BHC (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
gamma-Chlordane (mg/L)	0/3	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
1,2,4-Trichlorobenzene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
1,2-Dichlorobenzene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
1,3-Dichlorobenzene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
1,4-Dichlorobenzene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
2,4,5-Trichlorophenol (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.03		0.01	0.00
2,4,6-Trichlorophenol (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
2,4-Dichlorophenol (mg/L)	1/6	0.00	0.01	0.00	0.00	0.00	0.00	D	0.01		0.01	0.00
2,4-Dimethylphenol (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
2,4-Dinitrophenol (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.03		0.01	0.00
2,4-Dinitrotoluene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
2,6-Dinitrotoluene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
2-Chloronaphthalene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
2-Chlorophenol (mg/L)	1/6	0.00	0.01	0.00	0.00	0.00	0.00	D	0.01		0.01	0.00
2-Methyl-4,6-dinitrophenol (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.03		0.01	0.00
2-Methylnaphthalene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
2-Methylphenol (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
2-Nitrobenzenamine (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.03		0.01	0.00
2-Nitrophenol (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
3,3'-Dichlorobenzidine (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
3-Nitrobenzenamine (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.03		0.01	0.00
4-Bromophenyl phenyl ether (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
4-Chloro-3-methylphenol (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
4-Chlorobenzenamine (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
4-Chlorophenyl phenyl ether (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
4-Methylphenol (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
4-Nitrobenzenamine (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.03		0.01	0.00
4-Nitrophenol (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.03		0.01	0.00
Acenaphthene (mg/L)	1/6	0.00	0.01	0.00	0.00	0.00	0.00	D	0.01		0.01	0.00
Acenaphthylene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Anthracene (mg/L)	2/6	0.01	0.01	0.00	0.00	0.00	0.00	D	0.01		0.01	0.00
Benz(a)anthracene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00

Attachment 3. Surface Water Background Summary (Page 4 of 6)

Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Standard Deviation	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Benzo(a)pyrene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Benzo(b)fluoranthene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Benzo(ghi)perylene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Benzo(k)fluoranthene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Bis(2-chloroethoxy)methane (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Bis(2-chloroethyl) ether (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Bis(2-chloroisopropyl) ether (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Bis(2-ethylhexyl)phthalate (mg/L)	1/6	0.00	0.01	0.01	0.01	0.00	0.00	D	0.01		0.01	0.01
Butyl benzyl phthalate (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Carbazole (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Chrysene (mg/L)	2/6	0.01	0.01	0.00	0.01	0.01	0.00	D	0.01		0.01	0.01
Di-n-butyl phthalate (mg/L)	0/6	0.00	0.01			0.00	0.00	O	0.01		0.01	0.00
Di-n-octylphthalate (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Dibenz(a,h)anthracene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Dibenzofuran (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Diethyl phthalate (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Dimethyl phthalate (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Fluoranthene (mg/L)	2/6	0.01	0.01	0.00	0.00	0.00	0.00	D	0.01		0.01	0.00
Fluorene (mg/L)	1/6	0.00	0.01	0.00	0.00	0.00	0.00	D	0.01		0.01	0.00
Hexachlorobenzene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Hexachlorobutadiene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Hexachlorocyclopentadiene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Hexachloroethane (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Indeno(1,2,3-cd)pyrene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Isophorone (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
N-Nitroso-di-n-propylamine (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
N-Nitrosodiphenylamine (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Naphthalene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Nitrobenzene (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Pentachlorophenol (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.03		0.01	0.00
Phenanthrene (mg/L)	2/6	0.01	0.01	0.00	0.00	0.00	0.00	D	0.01		0.01	0.00
Phenol (mg/L)	1/6	0.00	0.01	0.02	0.02	0.01	0.01	D	0.02		0.02	0.02
Pyrene (mg/L)	2/6	0.01	0.01	0.00	0.00	0.00	0.00	D	0.01		0.01	0.00
1,1,1-Trichloroethane (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
1,1,2,2-Tetrachloroethane (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
1,1,2-Trichloro-1,2,2-trifluoroethane (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00

Attachment 3. Surface Water Background Summary (Page 5 of 6)

Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Standard Deviation	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
1,1,2-Trichloroethane (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
1,1-Dichloroethane (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
1,1-Dichloroethene (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
1,2,3,4-Tetramethylbenzene (mg/L)	0/2	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
1,2,3,5-Tetramethylbenzene (mg/L)	1/2	0.00	0.00	0.00	0.00	0.00	0.00	N	0.00	0.00	0.00	0.00
1,2,3-Trimethylbenzene (mg/L)	1/2	0.00	0.00	0.00	0.00	0.00	0.00	N	0.00	0.00	0.00	0.00
1,2,4-Trimethylbenzene (mg/L)	1/2	0.00	0.00	0.00	0.00	0.00	0.00	N	0.00	0.00	0.00	0.00
1,2-Dichloroethane (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
1,2-Dichloroethene (mg/L)	1/4	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
1,2-Dichloropropane (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
1,3,5-Trimethylbenzene (mg/L)	1/2	0.00	0.00	0.00	0.00	0.00	0.00	N	0.00	0.00	0.00	0.00
1-Ethyl-2-methylbenzene (mg/L)	0/2	0.00	0.00			0.00	0.00	O	0.00		0.00	0.00
1-Methyl-4-(1-methylethyl)benzene (mg/L)	1/2	0.00	0.00	0.00	0.00	0.00	0.00	N	0.00	0.00	0.00	0.00
2-Butanone (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
2-Hexanone (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
4-Methyl-2-pentanone (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Acetone (mg/L)	3/6	0.01	0.04	0.00	0.02	0.02	0.01	L	0.04	0.29	0.04	0.02
Benzene (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
Bromodichloromethane (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
Bromoform (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
Bromomethane (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Carbon disulfide (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
Carbon tetrachloride (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
Chlorobenzene (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
Chloroethane (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Chloroform (mg/L)	1/6	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Chloromethane (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00
Dibromochloromethane (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
Dimethylbenzene (mg/L)	1/6	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Ethylbenzene (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
Methylene chloride (mg/L)	2/6	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Styrene (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
Tetrachloroethene (mg/L)	1/6	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Toluene (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
Trichloroethene (mg/L)	1/6	0.00	0.00	0.00	0.00	0.00	0.00	D	0.00		0.00	0.00
Vinyl chloride (mg/L)	0/4	0.01	0.01			0.01	0.00	O	0.01		0.01	0.00

Attachment 3. Surface Water Background Summary (Page 6 of 6)

Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Standard Deviation	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
cis-1,2-Dichloroethene (mg/L)	1/2	0.00	0.00	0.00	0.00	0.00	0.00	N	0.00	0.00	0.00	0.00
cis-1,3-Dichloropropene (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
trans-1,3-Dichloropropene (mg/L)	0/4	0.00	0.00			0.00	0.00	O	0.01		0.00	0.00
Alpha activity (pCi/L)	2/2			2.10	7.86	4.98	4.07	N	7.86	7.86	7.86	7.86
Beta activity (pCi/L)	2/2			13.90	41.80	27.90	19.73	N	41.80	41.80	41.80	41.80
Radium-226 (pCi/L)	13/28	0.00	1.00	0.10	0.88	0.32	0.26	D	1.00		1.00	0.88
Radium-228 (pCi/L)	1/12	0.05	1.00	0.34	0.34	0.27	0.35	D	1.00		1.00	0.34
Thorium-228 (pCi/L)	5/11	-0.06	0.39	0.34	3.12	0.63	0.90	D	3.12		3.12	3.12
Thorium-230 (pCi/L)	12/28	-0.01	0.26	0.15	4.65	0.72	1.27	D	4.65		4.65	4.65
Thorium-232 (pCi/L)	0/24	0.00	0.62			0.11	0.12	O	0.62		0.62	0.00
Uranium-234 (pCi/L)	3/6	0.87	1.18	1.14	3.90	1.79	1.25	L	3.90	15.30	3.90	3.90
Uranium-235 (pCi/L)	0/7	-0.15	0.29			0.03	0.17	O	0.29		0.29	0.00
Uranium-238 (pCi/L)	7/7			0.83	5.05	1.99	1.45	L	5.05	12.50	5.05	5.05

Results less than the detection limit were set to 1/2 the reported detection limit except for radioisotopes.

UTL = Upper Tolerance Limit.

[a] Distribution codes:

D = Not determined because fewer than 5 detects or < 50% detects; parametric method to determine 95% UTL was not used.

L = Lognormal; parametric method was used to determine 95% UTL.

N = Normal; parametric method was used to determine 95% UTL.

O = Not determined because all concentrations were non-detects; parametric method to determine 95% UTL was not used.

X = Neither normal nor lognormal; parametric method to determine 95% UTL was not used.

[b] Background criteria was assigned as 0.0 for analytes never detected in background.

Attachment 4. Sediment Background Summary (Page 1 of 6)

Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Standard Deviation	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Phosphorous (mg/kg)	2/2			1500	1700	1600	141.42	N	1700	1700	1700	1700
Aluminum (mg/kg)	4/4			3020	51000	23200	22905.70	L	51000	13800000	51000	51000
Antimony (mg/kg)	0/2	2.1	4.5			3.3	1.70	O	9		4.5	0
Arsenic (mg/kg)	2/4	5	11.2	2	13	7.8	5.17	N	13	34.4	13	13
Barium (mg/kg)	4/4			39.2	890	447	445.63	L	890	689000	890	890
Beryllium (mg/kg)	2/4	0.5	0.55	1.2	2	1.06	0.70	L	2	26.9	2	2
Bismuth (mg/kg)	0/2	5	5			5	0.00	O	10		5	0
Boron (mg/kg)	1/2	11.2	11.2	75.9	75.9	43.6	45.75	N	75.9	75.9	75.9	75.9
Cadmium (mg/kg)	2/4	0.225	0.55	2	4	1.69	1.72	L	4	757	4	4
Calcium (mg/kg)	4/4			13000	116000	67300	49182.48	N	116000	320000	116000	116000
Cerium (mg/kg)	2/2			65	85	75	14.14	N	85	85	85	85
Chromium (mg/kg)	4/4			9.8	140	62.8	58.73	L	140	17400	140	140
Cobalt (mg/kg)	2/4	1.55	5.6	30	31	17	15.64	L	31	16300	31	31
Copper (mg/kg)	4/4			8.6	330	107	150.01	L	330	111000	330	330
Europium (mg/kg)	0/2	1	1			1	0.00	O	2		1	0
Gallium (mg/kg)	2/2			16	18	17	1.41	N	18	18	18	18
Gold (mg/kg)	0/2	4	4			4	0.00	O	8		4	0
Holmium (mg/kg)	0/2	2	2			2	0.00	O	4		2	0
Iron (mg/kg)	4/4			8690	42000	24200	17762.68	N	42000	116000	42000	42000
Lanthanum (mg/kg)	2/2			28	38	33	7.07	N	38	38	38	38
Lead (mg/kg)	4/4			5.8	380	169	159.71	N	380	990	380	380
Lithium (mg/kg)	2/3	1.75	1.75	18	22	13.9	10.72	N	22	96	22	22
Magnesium (mg/kg)	4/4			7290	21000	11800	6226.78	L	21000	116000	21000	21000
Manganese (mg/kg)	4/4			410	3200	1610	1330.18	L	3200	186000	3200	3200
Mercury (mg/kg)	0/1	0.03	0.03			0.03		O	0.06		0.03	0
Molybdenum (mg/kg)	2/4	1.55	11.2	3	6	5.44	4.27	L	11.2	343	11.2	6
Neodymium (mg/kg)	2/2			28	35	31.5	4.95	N	35	35	35	35
Nickel (mg/kg)	4/4			9.1	72	37.3	31.98	N	72	202	72	72
Niobium (mg/kg)	1/2	2	2	7	7	4.5	3.54	N	7	7	7	7
Potassium (mg/kg)	3/4	560	560	655	15000	6800	7338.90	N	15000	44600	15000	15000
Scandium (mg/kg)	2/2			5	8	6.5	2.12	N	8	8	8	8
Selenium (mg/kg)	1/2	0.14	0.14	54.4	54.4	27.3	38.37	N	54.4	54.4	54.4	54.4
Silver (mg/kg)	1/4	0.345	1.1	4	4	1.61	1.63	D	4		4	4
Sodium (mg/kg)	3/4	560	560	1000	10000	4290	4436.86	L	10000	2740000	10000	10000
Strontium (mg/kg)	3/3			136	380	229	132.16	L	380	12900	380	380
Tantalum (mg/kg)	0/2	20	20			20	0.00	O	40		20	0

Attachment 4. Sediment Background Summary (Page 2 of 6)

Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Standard Deviation	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Thallium (mg/kg)	0/2	0.265	11.2			5.73	7.73	O	22.4		11.2	0
Thorium (mg/kg)	2/2			8	9	8.5	0.71	N	9	9	9	9
Tin (mg/kg)	1/2	2.5	2.5	17	17	9.75	10.25	N	17	17	17	17
Titanium (mg/kg)	3/3			203	2800	1600	1309.89	N	2800	11600	2800	2800
Uranium (mg/kg)	14/15	7.85	7.85	1.51	8.69	3.53	2.23	L	8.69	12	8.69	8.69
Vanadium (mg/kg)	4/4			15.2	99	54.6	43.62	N	99	279	99	99
Ytterbium (mg/kg)	2/2			2	3	2.5	0.71	N	3	3	3	3
Yttrium (mg/kg)	2/2			18	24	21	4.24	N	24	24	24	24
Zinc (mg/kg)	4/4			66.3	1370	552	572.38	L	1370	222000	1370	1370
4,4'-DDD (mg/kg)	0/1	0.0038	0.0038			0.0038		O	0.0076		0.0038	0
4,4'-DDE (mg/kg)	0/1	0.0038	0.0038			0.0038		O	0.0076		0.0038	0
4,4'-DDT (mg/kg)	0/1	0.0038	0.0038			0.0038		O	0.0076		0.0038	0
Aldrin (mg/kg)	1/1			0.023	0.023	0.023		X	0.023		0.023	0.023
Dieldrin (mg/kg)	1/1			0.021	0.021	0.021		X	0.021		0.021	0.021
Endosulfan I (mg/kg)	0/1	0.002	0.00195			0.00195		O	0.0039		0.00195	0
Endosulfan II (mg/kg)	0/1	0.0038	0.0038			0.0038		O	0.0076		0.0038	0
Endosulfan sulfate (mg/kg)	0/1	0.0038	0.0038			0.0038		O	0.0076		0.0038	0
Endrin (mg/kg)	0/1	0.0038	0.0038			0.0038		O	0.0076		0.0038	0
Endrin aldehyde (mg/kg)	0/1	0.0038	0.0038			0.0038		O	0.0076		0.0038	0
Endrin ketone (mg/kg)	0/1	0.0038	0.0038			0.0038		O	0.0076		0.0038	0
Heptachlor (mg/kg)	0/1	0.002	0.00195			0.00195		O	0.0039		0.00195	0
Heptachlor epoxide (mg/kg)	0/1	0.002	0.00195			0.00195		O	0.0039		0.00195	0
Lindane (mg/kg)	0/1	0.002	0.00195			0.00195		O	0.0039		0.00195	0
Methoxychlor (mg/kg)	0/1	0.0195	0.0195			0.0195		O	0.039		0.0195	0
PCB-1016 (mg/kg)	0/1	0.038	0.038			0.038		O	0.076		0.038	0
PCB-1221 (mg/kg)	0/1	0.075	0.075			0.075		O	0.15		0.075	0
PCB-1232 (mg/kg)	0/1	0.038	0.038			0.038		O	0.076		0.038	0
PCB-1242 (mg/kg)	0/1	0.038	0.038			0.038		O	0.076		0.038	0
PCB-1248 (mg/kg)	0/1	0.038	0.038			0.038		O	0.076		0.038	0
PCB-1254 (mg/kg)	0/1	0.038	0.038			0.038		O	0.076		0.038	0
PCB-1260 (mg/kg)	0/1	0.038	0.038			0.038		O	0.076		0.038	0
Toxaphene (mg/kg)	0/1	0.195	0.195			0.195		O	0.39		0.195	0
alpha-BHC (mg/kg)	0/1	0.002	0.00195			0.00195		O	0.0039		0.00195	0
alpha-Chlordane (mg/kg)	0/1	0.002	0.00195			0.00195		O	0.0039		0.00195	0
beta-BHC (mg/kg)	0/1	0.002	0.00195			0.00195		O	0.0039		0.00195	0
delta-BHC (mg/kg)	0/1	0.002	0.00195			0.00195		O	0.0039		0.00195	0

Attachment 4. Sediment Background Summary (Page 3 of 6)

Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Standard Deviation	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
gamma-Chlordane (mg/kg)	0/1	0.002	0.00195			0.00195		O	0.0039		0.00195	0
1,2,4-Trichlorobenzene (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
1,2-Dichlorobenzene (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
1,3-Dichlorobenzene (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
1,4-Dichlorobenzene (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
2,4,5-Trichlorophenol (mg/kg)	0/2	0.48	4.85			2.67	3.09	O	9.7		4.85	0
2,4,6-Trichlorophenol (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
2,4-Dichlorophenol (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
2,4-Dimethylphenol (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
2,4-Dinitrophenol (mg/kg)	0/2	0.48	4.85			2.67	3.09	O	9.7		4.85	0
2,4-Dinitrotoluene (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
2,6-Dinitrotoluene (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
2-Chloronaphthalene (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
2-Chlorophenol (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
2-Methyl-4,6-dinitrophenol (mg/kg)	0/2	0.48	4.85			2.67	3.09	O	9.7		4.85	0
2-Methylnaphthalene (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
2-Methylphenol (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
2-Nitrobenzenamine (mg/kg)	0/2	0.48	4.85			2.67	3.09	O	9.7		4.85	0
2-Nitrophenol (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
3,3'-Dichlorobenzidine (mg/kg)	0/2	0.19	1.95			1.07	1.24	O	3.9		1.95	0
3-Nitrobenzenamine (mg/kg)	0/2	0.48	4.85			2.67	3.09	O	9.7		4.85	0
4-Bromophenyl phenyl ether (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
4-Chloro-3-methylphenol (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
4-Chlorobenzenamine (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
4-Chlorophenyl phenyl ether (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
4-Methylphenol (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
4-Nitrobenzenamine (mg/kg)	0/2	0.48	4.85			2.67	3.09	O	9.7		4.85	0
4-Nitrophenol (mg/kg)	0/2	0.48	4.85			2.67	3.09	O	9.7		4.85	0
Acenaphthene (mg/kg)	1/2	0.95	0.95	0.25	0.25	0.6	0.49	N	0.95	0.25	0.95	0.25
Acenaphthylene (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
Anthracene (mg/kg)	1/2	0.95	0.95	0.2	0.2	0.575	0.53	N	0.95	0.2	0.95	0.2
Benz(a)anthracene (mg/kg)	4/4			0.7	2.3	1.35	0.70	L	2.3	16.6	2.3	2.3
Benzo(a)pyrene (mg/kg)	3/4	0.95	0.95	0.69	1.7	1.16	0.44	L	1.7	8.16	1.7	1.7
Benzo(b)fluoranthene (mg/kg)	2/4	0.335	0.95	1.1	1.5	0.971	0.48	N	1.5	3.46	1.5	1.5
Benzo(ghi)perylene (mg/kg)	3/4	0.95	0.95	0.34	1.8	0.973	0.61	L	1.8	28.3	1.8	1.8
Benzo(k)fluoranthene (mg/kg)	3/4	0.95	0.95	0.52	1.4	1.02	0.38	N	1.4	2.97	1.4	1.4

Attachment 4. Sediment Background Summary (Page 4 of 6)

Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Standard Deviation	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Benzoic acid (mg/kg)	0/1	4.85	4.85			4.85		O	9.7		4.85	0
Bis(2-chloroethoxy)methane (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
Bis(2-chloroethyl) ether (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
Bis(2-chloroisopropyl) ether (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
Bis(2-ethylhexyl)phthalate (mg/kg)	1/2	0.245	0.245	0.56	0.56	0.403	0.22	N	0.56	0.56	0.56	0.56
Butyl benzyl phthalate (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
Carbazole (mg/kg)	0/1	0.19	0.19			0.19		O	0.38		0.19	0
Chrysene (mg/kg)	4/4			0.87	2.4	1.69	0.63	N	2.4	4.93	2.4	2.4
Di-n-butyl phthalate (mg/kg)	1/2	0.95	0.95	0.047	0.047	0.499	0.64	N	0.95	0.047	0.95	0.047
Di-n-octylphthalate (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
Dibenz(a,h)anthracene (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
Dibenzofuran (mg/kg)	1/2	0.95	0.95	0.086	0.086	0.518	0.61	N	0.95	0.086	0.95	0.086
Diethyl phthalate (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
Dimethyl phthalate (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
Fluoranthene (mg/kg)	4/4			1.4	7.1	3.95	2.67	L	7.1	161	7.1	7.1
Fluorene (mg/kg)	1/2	0.95	0.95	0.2	0.2	0.575	0.53	N	0.95	0.2	0.95	0.2
Hexachlorobenzene (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
Hexachlorobutadiene (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
Hexachlorocyclopentadiene (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
Hexachloroethane (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
Indeno(1,2,3-cd)pyrene (mg/kg)	3/4	0.95	0.95	0.31	1.5	0.89	0.49	N	1.5	3.41	1.5	1.5
Isophorone (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
N-Nitroso-di-n-propylamine (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
N-Nitrosodiphenylamine (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
Naphthalene (mg/kg)	1/2	0.95	0.95	0.04	0.04	0.495	0.64	N	0.95	0.04	0.95	0.04
Nitrobenzene (mg/kg)	0/2	0.19	0.95			0.57	0.54	O	1.9		0.95	0
Pentachlorophenol (mg/kg)	0/2	0.48	4.85			2.67	3.09	O	9.7		4.85	0
Phenanthrene (mg/kg)	4/4			0.84	5.7	2.64	2.15	L	5.7	134	5.7	5.7
Phenol (mg/kg)	1/2	0.19	0.19	0.97	0.97	0.58	0.55	N	0.97	0.97	0.97	0.97
Pyrene (mg/kg)	4/4			1.4	4	2.5	1.11	L	4	22.6	4	4
1,1,1-Trichloroethane (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
1,1,2,2-Tetrachloroethane (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
1,1,2-Trichloro-1,2,2-trifluoroethane (mg/l	0/1	0.006	0.006			0.006		O	0.012		0.006	0
1,1,2-Trichloroethane (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
1,1-Dichloroethane (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
1,1-Dichloroethene (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0

Attachment 4. Sediment Background Summary (Page 5 of 6)

Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Standard Deviation	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
1,2-Dichloroethane (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
1,2-Dichloroethene (mg/kg)	0/1	0.003	0.003			0.003		O	0.006		0.003	0
1,2-Dichloropropane (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
2-Butanone (mg/kg)	0/2	0.006	0.006			0.006	0.00	O	0.012		0.006	0
2-Chloroethyl vinyl ether (mg/kg)	0/1	0.006	0.006			0.006		O	0.012		0.006	0
2-Hexanone (mg/kg)	0/2	0.006	0.006			0.006	0.00	O	0.012		0.006	0
4-Methyl-2-pentanone (mg/kg)	0/2	0.006	0.006			0.006	0.00	O	0.012		0.006	0
Acetone (mg/kg)	0/2	0.006	0.006			0.006	0.00	O	0.012		0.006	0
Acrolein (mg/kg)	0/1	0.006	0.006			0.006		O	0.012		0.006	0
Acrylonitrile (mg/kg)	0/1	0.006	0.006			0.006		O	0.012		0.006	0
Benzene (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
Benzenemethanol (mg/kg)	0/1	0.95	0.95			0.95		O	1.9		0.95	0
Bromodichloromethane (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
Bromoform (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
Bromomethane (mg/kg)	0/2	0.006	0.006			0.006	0.00	O	0.012		0.006	0
Carbon disulfide (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
Carbon tetrachloride (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
Chlorobenzene (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
Chloroethane (mg/kg)	0/2	0.006	0.006			0.006	0.00	O	0.012		0.006	0
Chloroform (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
Chloromethane (mg/kg)	0/2	0.006	0.006			0.006	0.00	O	0.012		0.006	0
Dibromochloromethane (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
Dimethylbenzene (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
Ethylbenzene (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
Methylene chloride (mg/kg)	1/2	0.003	0.003	0.03	0.03	0.0165	0.02	N	0.03	0.03	0.03	0.03
Styrene (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
Tetrachloroethene (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
Toluene (mg/kg)	1/2	0.003	0.003	0.002	0.002	0.0025	0.00	N	0.003	0.002	0.003	0.002
Trichloroethene (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
Vinyl acetate (mg/kg)	0/1	0.006	0.006			0.006		O	0.012		0.006	0
Vinyl chloride (mg/kg)	0/2	0.006	0.006			0.006	0.00	O	0.012		0.006	0
cis-1,3-Dichloropropene (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
trans-1,2-Dichloroethene (mg/kg)	0/1	0.003	0.003			0.003		O	0.006		0.003	0
trans-1,3-Dichloropropene (mg/kg)	0/2	0.003	0.003			0.003	0.00	O	0.006		0.003	0
Actinium-227 (pCi/g)	0/1	0.12	0.12			0.12		O	0.12		0.12	0
Americium-241 (pCi/g)	0/1	0.01	0.01			0.01		O	0.01		0.01	0

Attachment 4. Sediment Background Summary (Page 6 of 6)

Analyte (units)	Freq. of Det.	Min. Nondet.	Max. Nondet.	Min. Det.	Max. Det.	Average Result	Standard Deviation	Dist.[a]	99th Percentile	Parametric 95% UTL	Nonparametric 95% UTL	Background Criteria[b]
Beryllium-7 (pCi/g)	1/1			1.6	1.6	1.6		X	1.6		1.6	1.6
Bismuth-211 (pCi/g)	1/1			2.9	2.9	2.9		X	2.9		2.9	2.9
Bismuth-212 (pCi/g)	1/1			1.6	1.6	1.6		X	1.6		1.6	1.6
Bismuth-214 (pCi/g)	1/1			0.97	0.97	0.97		X	0.97		0.97	0.97
Cesium-137 (pCi/g)	0/2	0	0.12			0.06	0.08	O	0.12		0.12	0
Chromium-51 (pCi/g)	1/1			1.8	1.8	1.8		X	1.8		1.8	1.8
Lead-212 (pCi/g)	1/1			0.96	0.96	0.96		X	0.96		0.96	0.96
Lead-214 (pCi/g)	0/1	1.5	1.5			1.5		O	1.5		1.5	0
Potassium-40 (pCi/g)	2/2			7.32	15.6	11.5	5.85	N	15.6	15.6	15.6	15.6
Protactinium-231 (pCi/g)	0/1	0.29	0.29			0.29		O	0.29		0.29	0
Radium-226 (pCi/g)	13/15	-0.01	1.2	0.51	4.87	1.31	1.09	L	4.87	4.73	4.87	4.73
Radium-228 (pCi/g)	5/6	0.76	0.76	0.21	1.32	0.787	0.43	N	1.32	2.39	1.32	1.32
Sodium-22 (pCi/g)	0/1	0.09	0.09			0.09		O	0.09		0.09	0
Thorium-228 (pCi/g)	5/6	0.25	0.25	0.43	1.32	0.782	0.42	N	1.32	2.35	1.32	1.32
Thorium-230 (pCi/g)	13/14	0.38	0.38	0.57	2.2	1.22	0.61	L	2.2	4.42	2.2	2.2
Thorium-232 (pCi/g)	10/11	0.5	0.5	0.37	1.19	0.734	0.30	N	1.19	1.56	1.19	1.19
Uranium-235 (pCi/g)	0/1	0.07	0.07			0.07		O	0.07		0.07	0
Uranium-238 (pCi/g)	1/2	0.62	0.62	4.3	4.3	2.46	2.60	N	4.3	4.3	4.3	4.3

Results less than the detection limit were set to 1/2 the reported detection limit except for radioisotopes.

UTL = Upper Tolerance Limit.

[a] Distribution codes:

D = Not determined because fewer than 5 detects or < 50% detects; parametric method to determine 95% UTL was not used.

L = Lognormal; parametric method was used to determine 95% UTL.

N = Normal; parametric method was used to determine 95% UTL.

O = Not determined because all concentrations were non-detects; parametric method to determine 95% UTL was not used.

X = Neither normal nor lognormal; parametric method to determine 95% UTL was not used.

[b] Background criteria was assigned as 0.0 for analytes never detected in background.

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	09K120040/VP-3(C)	Lead-210						0.1988	0	0.1988
Soil - All Depths	09K120040/VP-3(C)	Protactinium-231						0.1136	0.2	0
Soil - All Depths	09K120040/VP-3(C)	Radium-226	24/29	0.3	4	1.41	L	1.74	1.05	0.69
Soil - All Depths	09K120040/VP-3(C)	Radium-228						0.005112	0.98	0
Soil - All Depths	09K120040/VP-3(C)	Thorium-228						0.0142	1.18	0
Soil - All Depths	09K120040/VP-3(C)	Thorium-230	28/29	1.4	79	8.91	L	14.2	1.66	12.54
Soil - All Depths	09K120040/VP-3(C)	Thorium-232	18/29	0.8	4	1.67	X	1.96	1.11	0.85
Soil - All Depths	09K120040/VP-3(C)	Uranium-234						0.1704	1.13	0
Soil - All Depths	09K120040/VP-3(C)	Uranium-235						0.007384	0.06	0
Soil - All Depths	09K120040/VP-3(C)	Uranium-238	1/29	2.7	2.7	7.73	D	2.7	1.18	1.52
Subsurface Soil (>0.5 ft)	09K120040/VP-3(C)	Actinium-227						0.266	0.21	0.056
Subsurface Soil (>0.5 ft)	09K120040/VP-3(C)	Lead-210						0.532	0	0.532
Subsurface Soil (>0.5 ft)	09K120040/VP-3(C)	Protactinium-231						0.304	0.2	0.104
Subsurface Soil (>0.5 ft)	09K120040/VP-3(C)	Radium-226	5/5	0.3	2.3	1.36	N	2.18	1.05	1.13
Subsurface Soil (>0.5 ft)	09K120040/VP-3(C)	Radium-228						0.01368	0.98	0
Subsurface Soil (>0.5 ft)	09K120040/VP-3(C)	Thorium-228						0.038	1.18	0
Subsurface Soil (>0.5 ft)	09K120040/VP-3(C)	Thorium-230	5/5	1.9	38	14.2	L	38	1.66	36.34
Subsurface Soil (>0.5 ft)	09K120040/VP-3(C)	Thorium-232	3/5	0.9	1.5	1.16	D	1.42	1.11	0.31
Subsurface Soil (>0.5 ft)	09K120040/VP-3(C)	Uranium-234						0.456	1.13	0
Subsurface Soil (>0.5 ft)	09K120040/VP-3(C)	Uranium-235						0.01976	0.06	0
Subsurface Soil (>0.5 ft)	09K120040/VP-3(C)	Uranium-238	1/5	2.7	2.7	3.98	D	2.7	1.18	1.52
Surface Soil (<0.5 ft)	09K120040/VP-3(C)	Actinium-227						0.0931	0.21	0
Surface Soil (<0.5 ft)	09K120040/VP-3(C)	Lead-210						0.1862	0	0.1862
Surface Soil (<0.5 ft)	09K120040/VP-3(C)	Protactinium-231						0.1064	0.2	0
Surface Soil (<0.5 ft)	09K120040/VP-3(C)	Radium-226	19/24	0.7	4	1.43	L	1.7	1.05	0.65
Surface Soil (<0.5 ft)	09K120040/VP-3(C)	Radium-228						0.004788	0.98	0
Surface Soil (<0.5 ft)	09K120040/VP-3(C)	Thorium-228						0.0133	1.18	0
Surface Soil (<0.5 ft)	09K120040/VP-3(C)	Thorium-230	23/24	1.4	79	7.82	X	13.3	1.66	11.64
Surface Soil (<0.5 ft)	09K120040/VP-3(C)	Thorium-232	15/24	0.8	4	1.77	X	2.12	1.11	1.01
Surface Soil (<0.5 ft)	09K120040/VP-3(C)	Uranium-234						0.1596	1.13	0
Surface Soil (<0.5 ft)	09K120040/VP-3(C)	Uranium-235						0.006916	0.06	0
Surface Soil (<0.5 ft)	09K120040/VP-3(C)	Uranium-238	0/24			8.51	D	9.87	1.18	8.69

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	09K120116/VP-5(C)	Actinium-227						0.1897	0.21	0
Soil - All Depths	09K120116/VP-5(C)	Lead-210						0.3794	0	0.3794
Soil - All Depths	09K120116/VP-5(C)	Protactinium-231						0.2168	0.2	0.0168
Soil - All Depths	09K120116/VP-5(C)	Radium-226	17/20	0.7	3	1.29	N	1.53	1.05	0.48
Soil - All Depths	09K120116/VP-5(C)	Radium-228						0.009756	0.98	0
Soil - All Depths	09K120116/VP-5(C)	Thorium-228						0.0271	1.18	0
Soil - All Depths	09K120116/VP-5(C)	Thorium-230	17/20	0.6	61	7.78	L	27.1	1.66	25.44
Soil - All Depths	09K120116/VP-5(C)	Thorium-232	16/20	0.1	3	1.39	X	1.72	1.11	0.61
Soil - All Depths	09K120116/VP-5(C)	Uranium-234						0.3252	1.13	0
Soil - All Depths	09K120116/VP-5(C)	Uranium-235						0.014092	0.06	0
Soil - All Depths	09K120116/VP-5(C)	Uranium-238	2/20	3.2	3.7	6.41	D	3.7	1.18	2.52
Subsurface Soil (>0.5 ft)	09K120116/VP-5(C)	Actinium-227						0.427	0.21	0.217
Subsurface Soil (>0.5 ft)	09K120116/VP-5(C)	Lead-210						0.854	0	0.854
Subsurface Soil (>0.5 ft)	09K120116/VP-5(C)	Protactinium-231						0.488	0.2	0.288
Subsurface Soil (>0.5 ft)	09K120116/VP-5(C)	Radium-226	5/5	1	2.2	1.4	X	1.94	1.05	0.89
Subsurface Soil (>0.5 ft)	09K120116/VP-5(C)	Radium-228						0.02196	0.98	0
Subsurface Soil (>0.5 ft)	09K120116/VP-5(C)	Thorium-228						0.061	1.18	0
Subsurface Soil (>0.5 ft)	09K120116/VP-5(C)	Thorium-230	5/5	2.9	61	19.5	L	61	1.66	59.34
Subsurface Soil (>0.5 ft)	09K120116/VP-5(C)	Thorium-232	5/5	0.8	2	1.32	L	2	1.11	0.89
Subsurface Soil (>0.5 ft)	09K120116/VP-5(C)	Uranium-234						0.732	1.13	0
Subsurface Soil (>0.5 ft)	09K120116/VP-5(C)	Uranium-235						0.03172	0.06	0
Subsurface Soil (>0.5 ft)	09K120116/VP-5(C)	Uranium-238	0/5			4.68	D	5.63	1.18	4.45
Surface Soil (<0.5 ft)	09K120116/VP-5(C)	Actinium-227						0.098	0.21	0
Surface Soil (<0.5 ft)	09K120116/VP-5(C)	Lead-210						0.196	0	0.196
Surface Soil (<0.5 ft)	09K120116/VP-5(C)	Protactinium-231						0.112	0.2	0
Surface Soil (<0.5 ft)	09K120116/VP-5(C)	Radium-226	12/15	0.7	3	1.25	N	1.56	1.05	0.51
Surface Soil (<0.5 ft)	09K120116/VP-5(C)	Radium-228						0.00504	0.98	0
Surface Soil (<0.5 ft)	09K120116/VP-5(C)	Thorium-228						0.014	1.18	0
Surface Soil (<0.5 ft)	09K120116/VP-5(C)	Thorium-230	12/15	0.6	16	3.88	L	14	1.66	12.34
Surface Soil (<0.5 ft)	09K120116/VP-5(C)	Thorium-232	11/15	0.1	3	1.41	L	3	1.11	1.89
Surface Soil (<0.5 ft)	09K120116/VP-5(C)	Uranium-234						0.168	1.13	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	09K120116/VP-5(C)	Uranium-235						0.00728	0.06	0
Surface Soil (<0.5 ft)	09K120116/VP-5(C)	Uranium-238	2/15	3.2	3.7	6.99	D	3.7	1.18	2.52
Soil - All Depths	09K120127/VP-4(C)	Actinium-227						0.03115	0.21	0
Soil - All Depths	09K120127/VP-4(C)	Lead-210						0.0623	0	0.0623
Soil - All Depths	09K120127/VP-4(C)	Protactinium-231						0.0356	0.2	0
Soil - All Depths	09K120127/VP-4(C)	Radium-226	16/16	0.6	2	1.33	N	1.49	1.05	0.44
Soil - All Depths	09K120127/VP-4(C)	Radium-228						0.001602	0.98	0
Soil - All Depths	09K120127/VP-4(C)	Thorium-228						0.00445	1.18	0
Soil - All Depths	09K120127/VP-4(C)	Thorium-230	15/16	0.7	17	2.83	L	4.45	1.66	2.79
Soil - All Depths	09K120127/VP-4(C)	Thorium-232	14/16	0.9	4	1.85	L	2.27	1.11	1.16
Soil - All Depths	09K120127/VP-4(C)	Uranium-234						0.0534	1.13	0
Soil - All Depths	09K120127/VP-4(C)	Uranium-235						0.002314	0.06	0
Soil - All Depths	09K120127/VP-4(C)	Uranium-238	0/16			5.64	D	6.85	1.18	5.67
Subsurface Soil (>0.5 ft)	09K120127/VP-4(C)	Actinium-227						0.02681	0.21	0
Subsurface Soil (>0.5 ft)	09K120127/VP-4(C)	Lead-210						0.05362	0	0.05362
Subsurface Soil (>0.5 ft)	09K120127/VP-4(C)	Protactinium-231						0.03064	0.2	0
Subsurface Soil (>0.5 ft)	09K120127/VP-4(C)	Radium-226	4/4	0.6	1.2	0.95	D	1.2	1.05	0.15
Subsurface Soil (>0.5 ft)	09K120127/VP-4(C)	Radium-228						0.0013788	0.98	0
Subsurface Soil (>0.5 ft)	09K120127/VP-4(C)	Thorium-228						0.00383	1.18	0
Subsurface Soil (>0.5 ft)	09K120127/VP-4(C)	Thorium-230	4/4	1	4	2.35	D	3.83	1.66	2.17
Subsurface Soil (>0.5 ft)	09K120127/VP-4(C)	Thorium-232	3/4	0.9	1.1	1.28	D	1.1	1.11	0
Subsurface Soil (>0.5 ft)	09K120127/VP-4(C)	Uranium-234						0.04596	1.13	0
Subsurface Soil (>0.5 ft)	09K120127/VP-4(C)	Uranium-235						0.0019916	0.06	0
Subsurface Soil (>0.5 ft)	09K120127/VP-4(C)	Uranium-238	0/4			3.75	D	5.52	1.18	4.34
Surface Soil (<0.5 ft)	09K120127/VP-4(C)	Actinium-227						0.03745	0.21	0
Surface Soil (<0.5 ft)	09K120127/VP-4(C)	Lead-210						0.0749	0	0.0749
Surface Soil (<0.5 ft)	09K120127/VP-4(C)	Protactinium-231						0.0428	0.2	0
Surface Soil (<0.5 ft)	09K120127/VP-4(C)	Radium-226	12/12	0.9	2	1.45	N	1.62	1.05	0.57
Surface Soil (<0.5 ft)	09K120127/VP-4(C)	Radium-228						0.001926	0.98	0
Surface Soil (<0.5 ft)	09K120127/VP-4(C)	Thorium-228						0.00535	1.18	0
Surface Soil (<0.5 ft)	09K120127/VP-4(C)	Thorium-230	11/12	0.7	17	2.98	X	5.35	1.66	3.69

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	09K120127/VP-4(C)	Thorium-232	11/12	1.5	4	2.04	L	2.54	1.11	1.43
Surface Soil (<0.5 ft)	09K120127/VP-4(C)	Uranium-234						0.0642	1.13	0
Surface Soil (<0.5 ft)	09K120127/VP-4(C)	Uranium-235						0.002782	0.06	0
Surface Soil (<0.5 ft)	09K120127/VP-4(C)	Uranium-238	0/12			6.27	D	7.74	1.18	6.56
Soil - All Depths	09K130038/VP-62	Actinium-227						0.0238	0.21	0
Soil - All Depths	09K130038/VP-62	Lead-210						0.0476	0	0.0476
Soil - All Depths	09K130038/VP-62	Protactinium-231						0.0272	0.2	0
Soil - All Depths	09K130038/VP-62	Radium-226						0.0238	1.05	0
Soil - All Depths	09K130038/VP-62	Radium-228						0.001224	0.98	0
Soil - All Depths	09K130038/VP-62	Thorium-228						0.0034	1.18	0
Soil - All Depths	09K130038/VP-62	Thorium-230	5/5	1	3.4	2.06	L	3.4	1.66	1.74
Soil - All Depths	09K130038/VP-62	Thorium-232						0.0034	1.11	0
Soil - All Depths	09K130038/VP-62	Uranium-234						0.0408	1.13	0
Soil - All Depths	09K130038/VP-62	Uranium-235						0.001768	0.06	0
Soil - All Depths	09K130038/VP-62	Uranium-238						0.0408	1.18	0
Subsurface Soil (>0.5 ft)	09K130038/VP-62	Actinium-227						0.0238	0.21	0
Subsurface Soil (>0.5 ft)	09K130038/VP-62	Lead-210						0.0476	0	0.0476
Subsurface Soil (>0.5 ft)	09K130038/VP-62	Protactinium-231						0.0272	0.2	0
Subsurface Soil (>0.5 ft)	09K130038/VP-62	Radium-226						0.0238	1.05	0
Subsurface Soil (>0.5 ft)	09K130038/VP-62	Radium-228						0.001224	0.98	0
Subsurface Soil (>0.5 ft)	09K130038/VP-62	Thorium-228						0.0034	1.18	0
Subsurface Soil (>0.5 ft)	09K130038/VP-62	Thorium-230	5/5	1	3.4	2.06	L	3.4	1.66	1.74
Subsurface Soil (>0.5 ft)	09K130038/VP-62	Thorium-232						0.0034	1.11	0
Subsurface Soil (>0.5 ft)	09K130038/VP-62	Uranium-234						0.0408	1.13	0
Subsurface Soil (>0.5 ft)	09K130038/VP-62	Uranium-235						0.001768	0.06	0
Subsurface Soil (>0.5 ft)	09K130038/VP-62	Uranium-238						0.0408	1.18	0
Soil - All Depths	09K130104/VP-60	Actinium-227						0.01043	0.21	0
Soil - All Depths	09K130104/VP-60	Lead-210						0.02086	0	0.02086
Soil - All Depths	09K130104/VP-60	Protactinium-231						0.01192	0.2	0
Soil - All Depths	09K130104/VP-60	Radium-226						0.01043	1.05	0
Soil - All Depths	09K130104/VP-60	Radium-228						0.0005364	0.98	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	09K130104/VP-60	Thorium-228						0.00149	1.18	0
Soil - All Depths	09K130104/VP-60	Thorium-230	9/10	0.8	1.7	1.32	N	1.49	1.66	0
Soil - All Depths	09K130104/VP-60	Thorium-232						0.00149	1.11	0
Soil - All Depths	09K130104/VP-60	Uranium-234						0.01788	1.13	0
Soil - All Depths	09K130104/VP-60	Uranium-235						0.0007748	0.06	0
Soil - All Depths	09K130104/VP-60	Uranium-238						0.01788	1.18	0
Subsurface Soil (>0.5 ft)	09K130104/VP-60	Actinium-227						0.01043	0.21	0
Subsurface Soil (>0.5 ft)	09K130104/VP-60	Lead-210						0.02086	0	0.02086
Subsurface Soil (>0.5 ft)	09K130104/VP-60	Protactinium-231						0.01192	0.2	0
Subsurface Soil (>0.5 ft)	09K130104/VP-60	Radium-226						0.01043	1.05	0
Subsurface Soil (>0.5 ft)	09K130104/VP-60	Radium-228						0.0005364	0.98	0
Subsurface Soil (>0.5 ft)	09K130104/VP-60	Thorium-228						0.00149	1.18	0
Subsurface Soil (>0.5 ft)	09K130104/VP-60	Thorium-230	9/10	0.8	1.7	1.32	N	1.49	1.66	0
Subsurface Soil (>0.5 ft)	09K130104/VP-60	Thorium-232						0.00149	1.11	0
Subsurface Soil (>0.5 ft)	09K130104/VP-60	Uranium-234						0.01788	1.13	0
Subsurface Soil (>0.5 ft)	09K130104/VP-60	Uranium-235						0.0007748	0.06	0
Subsurface Soil (>0.5 ft)	09K130104/VP-60	Uranium-238						0.01788	1.18	0
Soil - All Depths	09K140015/VP-58	Actinium-227						0.273	0.21	0.063
Soil - All Depths	09K140015/VP-58	Lead-210						0.546	0	0.546
Soil - All Depths	09K140015/VP-58	Protactinium-231						0.312	0.2	0.112
Soil - All Depths	09K140015/VP-58	Radium-226	25/25	0.9	10	2.28	X	2.88	1.05	1.83
Soil - All Depths	09K140015/VP-58	Radium-228						0.01404	0.98	0
Soil - All Depths	09K140015/VP-58	Thorium-228						0.039	1.18	0
Soil - All Depths	09K140015/VP-58	Thorium-230	26/26	0.9	240	19.9	X	39	1.66	37.34
Soil - All Depths	09K140015/VP-58	Thorium-232	21/25	1	5	2.1	L	2.5	1.11	1.39
Soil - All Depths	09K140015/VP-58	Uranium-234						0.468	1.13	0
Soil - All Depths	09K140015/VP-58	Uranium-235						0.02028	0.06	0
Soil - All Depths	09K140015/VP-58	Uranium-238	0/25			10.6	D	12.7	1.18	11.52
Subsurface Soil (>0.5 ft)	09K140015/VP-58	Actinium-227						0.5306	0.21	0.3206
Subsurface Soil (>0.5 ft)	09K140015/VP-58	Lead-210						1.0612	0	1.0612
Subsurface Soil (>0.5 ft)	09K140015/VP-58	Protactinium-231						0.6064	0.2	0.4064

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	09K140015/VP-58	Radium-226	13/13	1.4	10	2.65	X	3.8	1.05	2.75
Subsurface Soil (>0.5 ft)	09K140015/VP-58	Radium-228						0.027288	0.98	0
Subsurface Soil (>0.5 ft)	09K140015/VP-58	Thorium-228						0.0758	1.18	0
Subsurface Soil (>0.5 ft)	09K140015/VP-58	Thorium-230	13/13	0.9	240	37.1	X	75.8	1.66	74.14
Subsurface Soil (>0.5 ft)	09K140015/VP-58	Thorium-232	11/13	1	5	2.3	L	3.23	1.11	2.12
Subsurface Soil (>0.5 ft)	09K140015/VP-58	Uranium-234						0.9096	1.13	0
Subsurface Soil (>0.5 ft)	09K140015/VP-58	Uranium-235						0.039416	0.06	0
Subsurface Soil (>0.5 ft)	09K140015/VP-58	Uranium-238	0/13			12	D	15.6	1.18	14.42
Surface Soil (<0.5 ft)	09K140015/VP-58	Actinium-227						0.02709	0.21	0
Surface Soil (<0.5 ft)	09K140015/VP-58	Lead-210						0.05418	0	0.05418
Surface Soil (<0.5 ft)	09K140015/VP-58	Protactinium-231						0.03096	0.2	0
Surface Soil (<0.5 ft)	09K140015/VP-58	Radium-226	12/12	0.9	2.8	1.88	N	2.18	1.05	1.13
Surface Soil (<0.5 ft)	09K140015/VP-58	Radium-228						0.0013932	0.98	0
Surface Soil (<0.5 ft)	09K140015/VP-58	Thorium-228						0.00387	1.18	0
Surface Soil (<0.5 ft)	09K140015/VP-58	Thorium-230	13/13	1.2	6.9	2.68	L	3.87	1.66	2.21
Surface Soil (<0.5 ft)	09K140015/VP-58	Thorium-232	10/12	1	3	1.88	L	2.33	1.11	1.22
Surface Soil (<0.5 ft)	09K140015/VP-58	Uranium-234						0.04644	1.13	0
Surface Soil (<0.5 ft)	09K140015/VP-58	Uranium-235						0.0020124	0.06	0
Surface Soil (<0.5 ft)	09K140015/VP-58	Uranium-238	0/12			9.17	D	11.1	1.18	9.92
Soil - All Depths	09K140026/VP-57	Actinium-227						0.133	0.21	0
Soil - All Depths	09K140026/VP-57	Lead-210						0.266	0	0.266
Soil - All Depths	09K140026/VP-57	Protactinium-231						0.152	0.2	0
Soil - All Depths	09K140026/VP-57	Radium-226	9/9	0.8	2.1	1.59	N	1.9	1.05	0.85
Soil - All Depths	09K140026/VP-57	Radium-228						0.00684	0.98	0
Soil - All Depths	09K140026/VP-57	Thorium-228						0.019	1.18	0
Soil - All Depths	09K140026/VP-57	Thorium-230	8/9	1.3	19	6.96	L	19	1.66	17.34
Soil - All Depths	09K140026/VP-57	Thorium-232	6/9	0.7	3	1.51	L	2.3	1.11	1.19
Soil - All Depths	09K140026/VP-57	Uranium-234						0.228	1.13	0
Soil - All Depths	09K140026/VP-57	Uranium-235						0.00988	0.06	0
Soil - All Depths	09K140026/VP-57	Uranium-238	0/9			8.18	D	10.5	1.18	9.32
Subsurface Soil (>0.5 ft)	09K140026/VP-57	Actinium-227						0.133	0.21	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	09K140026/VP-57	Lead-210						0.266	0	0.266
Subsurface Soil (>0.5 ft)	09K140026/VP-57	Protactinium-231						0.152	0.2	0
Subsurface Soil (>0.5 ft)	09K140026/VP-57	Radium-226	3/3	0.8	2.1	1.4	D	2.1	1.05	1.05
Subsurface Soil (>0.5 ft)	09K140026/VP-57	Radium-228						0.00684	0.98	0
Subsurface Soil (>0.5 ft)	09K140026/VP-57	Thorium-228						0.019	1.18	0
Subsurface Soil (>0.5 ft)	09K140026/VP-57	Thorium-230	2/3	2	19	7.17	D	19	1.66	17.34
Subsurface Soil (>0.5 ft)	09K140026/VP-57	Thorium-232	3/3	0.7	1.3	0.933	D	1.3	1.11	0.19
Subsurface Soil (>0.5 ft)	09K140026/VP-57	Uranium-234						0.228	1.13	0
Subsurface Soil (>0.5 ft)	09K140026/VP-57	Uranium-235						0.00988	0.06	0
Subsurface Soil (>0.5 ft)	09K140026/VP-57	Uranium-238	0/3			5.73	D	8.35	1.18	7.17
Surface Soil (<0.5 ft)	09K140026/VP-57	Actinium-227						0.119	0.21	0
Surface Soil (<0.5 ft)	09K140026/VP-57	Lead-210						0.238	0	0.238
Surface Soil (<0.5 ft)	09K140026/VP-57	Protactinium-231						0.136	0.2	0
Surface Soil (<0.5 ft)	09K140026/VP-57	Radium-226	6/6	0.9	2.1	1.68	N	2.05	1.05	1
Surface Soil (<0.5 ft)	09K140026/VP-57	Radium-228						0.00612	0.98	0
Surface Soil (<0.5 ft)	09K140026/VP-57	Thorium-228						0.017	1.18	0
Surface Soil (<0.5 ft)	09K140026/VP-57	Thorium-230	6/6	1.3	17	6.85	L	17	1.66	15.34
Surface Soil (<0.5 ft)	09K140026/VP-57	Thorium-232	3/6	2	3	1.8	D	2.38	1.11	1.27
Surface Soil (<0.5 ft)	09K140026/VP-57	Uranium-234						0.204	1.13	0
Surface Soil (<0.5 ft)	09K140026/VP-57	Uranium-235						0.00884	0.06	0
Surface Soil (<0.5 ft)	09K140026/VP-57	Uranium-238	0/6			9.4	D	12.8	1.18	11.62
Soil - All Depths	09K210206/VP-56,1(C)	Actinium-227						0.0826	0.21	0
Soil - All Depths	09K210206/VP-56,1(C)	Lead-210						0.1652	0	0.1652
Soil - All Depths	09K210206/VP-56,1(C)	Protactinium-231						0.0944	0.2	0
Soil - All Depths	09K210206/VP-56,1(C)	Radium-226	30/31	0.8	3.3	1.81	L	2.06	1.05	1.01
Soil - All Depths	09K210206/VP-56,1(C)	Radium-228						0.004248	0.98	0
Soil - All Depths	09K210206/VP-56,1(C)	Thorium-228						0.0118	1.18	0
Soil - All Depths	09K210206/VP-56,1(C)	Thorium-230	31/31	1.2	43	8.31	X	11.8	1.66	10.14
Soil - All Depths	09K210206/VP-56,1(C)	Thorium-232	23/31	1	5	2.22	L	2.7	1.11	1.59
Soil - All Depths	09K210206/VP-56,1(C)	Uranium-234						0.1416	1.13	0
Soil - All Depths	09K210206/VP-56,1(C)	Uranium-235						0.006136	0.06	0
Soil - All Depths	09K210206/VP-56,1(C)	Uranium-238	0/31			9.26	D	10.6	1.18	9.42

Attachment 5. Soil Summary Statistics for Radionuclides (Page 8 of 84)

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	09K210206/VP-56,1(C	Actinium-227						0.2415	0.21	0.0315
Subsurface Soil (>0.5 ft)	09K210206/VP-56,1(C	Lead-210						0.483	0	0.483
Subsurface Soil (>0.5 ft)	09K210206/VP-56,1(C	Protactinium-231						0.276	0.2	0.076
Subsurface Soil (>0.5 ft)	09K210206/VP-56,1(C	Radium-226	7/7	1.3	3.1	1.8	L	2.39	1.05	1.34
Subsurface Soil (>0.5 ft)	09K210206/VP-56,1(C	Radium-228						0.01242	0.98	0
Subsurface Soil (>0.5 ft)	09K210206/VP-56,1(C	Thorium-228						0.0345	1.18	0
Subsurface Soil (>0.5 ft)	09K210206/VP-56,1(C	Thorium-230	7/7	1.4	43	22.6	N	34.5	1.66	32.84
Subsurface Soil (>0.5 ft)	09K210206/VP-56,1(C	Thorium-232	3/7	1.2	1.7	1.17	D	1.38	1.11	0.27
Subsurface Soil (>0.5 ft)	09K210206/VP-56,1(C	Uranium-234						0.414	1.13	0
Subsurface Soil (>0.5 ft)	09K210206/VP-56,1(C	Uranium-235						0.01794	0.06	0
Subsurface Soil (>0.5 ft)	09K210206/VP-56,1(C	Uranium-238	0/7			5.9	D	7.54	1.18	6.36
Surface Soil (<0.5 ft)	09K210206/VP-56,1(C	Actinium-227						0.04074	0.21	0
Surface Soil (<0.5 ft)	09K210206/VP-56,1(C	Lead-210						0.08148	0	0.08148
Surface Soil (<0.5 ft)	09K210206/VP-56,1(C	Protactinium-231						0.04656	0.2	0
Surface Soil (<0.5 ft)	09K210206/VP-56,1(C	Radium-226	23/24	0.8	3.3	1.81	L	2.13	1.05	1.08
Surface Soil (<0.5 ft)	09K210206/VP-56,1(C	Radium-228						0.0020952	0.98	0
Surface Soil (<0.5 ft)	09K210206/VP-56,1(C	Thorium-228						0.00582	1.18	0
Surface Soil (<0.5 ft)	09K210206/VP-56,1(C	Thorium-230	24/24	1.2	20	4.13	X	5.82	1.66	4.16
Surface Soil (<0.5 ft)	09K210206/VP-56,1(C	Thorium-232	20/24	1	5	2.53	X	2.9	1.11	1.79
Surface Soil (<0.5 ft)	09K210206/VP-56,1(C	Uranium-234						0.06984	1.13	0
Surface Soil (<0.5 ft)	09K210206/VP-56,1(C	Uranium-235						0.0030264	0.06	0
Surface Soil (<0.5 ft)	09K210206/VP-56,1(C	Uranium-238	0/24			10.2	D	11.8	1.18	10.62
Soil - All Depths	09K220029	Actinium-227						0.0077	0.21	0
Soil - All Depths	09K220029	Lead-210						0.0154	0	0.0154
Soil - All Depths	09K220029	Protactinium-231						0.0088	0.2	0
Soil - All Depths	09K220029	Radium-226						0.0077	1.05	0
Soil - All Depths	09K220029	Radium-228						0.000396	0.98	0
Soil - All Depths	09K220029	Thorium-228						0.0011	1.18	0
Soil - All Depths	09K220029	Thorium-230	1/1	1.1	1.1	1.1	D	1.1	1.66	0
Soil - All Depths	09K220029	Thorium-232						0.0011	1.11	0
Soil - All Depths	09K220029	Uranium-234						0.0132	1.13	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	09K220029	Uranium-235						0.000572	0.06	0
Soil - All Depths	09K220029	Uranium-238						0.0132	1.18	0
Subsurface Soil (>0.5 ft)	09K220029	Actinium-227						0.0077	0.21	0
Subsurface Soil (>0.5 ft)	09K220029	Lead-210						0.0154	0	0.0154
Subsurface Soil (>0.5 ft)	09K220029	Protactinium-231						0.0088	0.2	0
Subsurface Soil (>0.5 ft)	09K220029	Radium-226						0.0077	1.05	0
Subsurface Soil (>0.5 ft)	09K220029	Radium-228						0.000396	0.98	0
Subsurface Soil (>0.5 ft)	09K220029	Thorium-228						0.0011	1.18	0
Subsurface Soil (>0.5 ft)	09K220029	Thorium-230	1/1	1.1	1.1	1.1	D	1.1	1.66	0
Subsurface Soil (>0.5 ft)	09K220029	Thorium-232						0.0011	1.11	0
Subsurface Soil (>0.5 ft)	09K220029	Uranium-234						0.0132	1.13	0
Subsurface Soil (>0.5 ft)	09K220029	Uranium-235						0.000572	0.06	0
Subsurface Soil (>0.5 ft)	09K220029	Uranium-238						0.0132	1.18	0
Soil - All Depths	09K220030/VP-44	Actinium-227						0.01113	0.21	0
Soil - All Depths	09K220030/VP-44	Lead-210						0.02226	0	0.02226
Soil - All Depths	09K220030/VP-44	Protactinium-231						0.01272	0.2	0
Soil - All Depths	09K220030/VP-44	Radium-226						0.01113	1.05	0
Soil - All Depths	09K220030/VP-44	Radium-228						0.0005724	0.98	0
Soil - All Depths	09K220030/VP-44	Thorium-228						0.00159	1.18	0
Soil - All Depths	09K220030/VP-44	Thorium-230	4/4	1.1	1.6	1.35	D	1.59	1.66	0
Soil - All Depths	09K220030/VP-44	Thorium-232						0.00159	1.11	0
Soil - All Depths	09K220030/VP-44	Uranium-234						0.01908	1.13	0
Soil - All Depths	09K220030/VP-44	Uranium-235						0.0008268	0.06	0
Soil - All Depths	09K220030/VP-44	Uranium-238						0.01908	1.18	0
Subsurface Soil (>0.5 ft)	09K220030/VP-44	Actinium-227						0.01113	0.21	0
Subsurface Soil (>0.5 ft)	09K220030/VP-44	Lead-210						0.02226	0	0.02226
Subsurface Soil (>0.5 ft)	09K220030/VP-44	Protactinium-231						0.01272	0.2	0
Subsurface Soil (>0.5 ft)	09K220030/VP-44	Radium-226						0.01113	1.05	0
Subsurface Soil (>0.5 ft)	09K220030/VP-44	Radium-228						0.0005724	0.98	0
Subsurface Soil (>0.5 ft)	09K220030/VP-44	Thorium-228						0.00159	1.18	0
Subsurface Soil (>0.5 ft)	09K220030/VP-44	Thorium-230	4/4	1.1	1.6	1.35	D	1.59	1.66	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	09K220030/VP-44	Thorium-232						0.00159	1.11	0
Subsurface Soil (>0.5 ft)	09K220030/VP-44	Uranium-234						0.01908	1.13	0
Subsurface Soil (>0.5 ft)	09K220030/VP-44	Uranium-235						0.0008268	0.06	0
Subsurface Soil (>0.5 ft)	09K220030/VP-44	Uranium-238						0.01908	1.18	0
Soil - All Depths	09K220041/VP-42	Actinium-227						0.01771	0.21	0
Soil - All Depths	09K220041/VP-42	Lead-210						0.03542	0	0.03542
Soil - All Depths	09K220041/VP-42	Protactinium-231						0.02024	0.2	0
Soil - All Depths	09K220041/VP-42	Radium-226						0.01771	1.05	0
Soil - All Depths	09K220041/VP-42	Radium-228						0.0009108	0.98	0
Soil - All Depths	09K220041/VP-42	Thorium-228						0.00253	1.18	0
Soil - All Depths	09K220041/VP-42	Thorium-230	6/6	1.4	2.7	2.08	N	2.53	1.66	0.87
Soil - All Depths	09K220041/VP-42	Thorium-232						0.00253	1.11	0
Soil - All Depths	09K220041/VP-42	Uranium-234						0.03036	1.13	0
Soil - All Depths	09K220041/VP-42	Uranium-235						0.0013156	0.06	0
Soil - All Depths	09K220041/VP-42	Uranium-238						0.03036	1.18	0
Subsurface Soil (>0.5 ft)	09K220041/VP-42	Actinium-227						0.01771	0.21	0
Subsurface Soil (>0.5 ft)	09K220041/VP-42	Lead-210						0.03542	0	0.03542
Subsurface Soil (>0.5 ft)	09K220041/VP-42	Protactinium-231						0.02024	0.2	0
Subsurface Soil (>0.5 ft)	09K220041/VP-42	Radium-226						0.01771	1.05	0
Subsurface Soil (>0.5 ft)	09K220041/VP-42	Radium-228						0.0009108	0.98	0
Subsurface Soil (>0.5 ft)	09K220041/VP-42	Thorium-228						0.00253	1.18	0
Subsurface Soil (>0.5 ft)	09K220041/VP-42	Thorium-230	6/6	1.4	2.7	2.08	N	2.53	1.66	0.87
Subsurface Soil (>0.5 ft)	09K220041/VP-42	Thorium-232						0.00253	1.11	0
Subsurface Soil (>0.5 ft)	09K220041/VP-42	Uranium-234						0.03036	1.13	0
Subsurface Soil (>0.5 ft)	09K220041/VP-42	Uranium-235						0.0013156	0.06	0
Subsurface Soil (>0.5 ft)	09K220041/VP-42	Uranium-238						0.03036	1.18	0
Soil - All Depths	09K220074/VP-46	Actinium-227						0.0203	0.21	0
Soil - All Depths	09K220074/VP-46	Lead-210						0.0406	0	0.0406
Soil - All Depths	09K220074/VP-46	Protactinium-231						0.0232	0.2	0
Soil - All Depths	09K220074/VP-46	Radium-226						0.0203	1.05	0
Soil - All Depths	09K220074/VP-46	Radium-228						0.001044	0.98	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	09K220074/VP-46	Thorium-228						0.0029	1.18	0
Soil - All Depths	09K220074/VP-46	Thorium-230	5/6	0.8	2.9	1.43	L	2.9	1.66	1.24
Soil - All Depths	09K220074/VP-46	Thorium-232						0.0029	1.11	0
Soil - All Depths	09K220074/VP-46	Uranium-234						0.0348	1.13	0
Soil - All Depths	09K220074/VP-46	Uranium-235						0.001508	0.06	0
Soil - All Depths	09K220074/VP-46	Uranium-238						0.0348	1.18	0
Subsurface Soil (>0.5 ft)	09K220074/VP-46	Actinium-227						0.0203	0.21	0
Subsurface Soil (>0.5 ft)	09K220074/VP-46	Lead-210						0.0406	0	0.0406
Subsurface Soil (>0.5 ft)	09K220074/VP-46	Protactinium-231						0.0232	0.2	0
Subsurface Soil (>0.5 ft)	09K220074/VP-46	Radium-226						0.0203	1.05	0
Subsurface Soil (>0.5 ft)	09K220074/VP-46	Radium-228						0.001044	0.98	0
Subsurface Soil (>0.5 ft)	09K220074/VP-46	Thorium-228						0.0029	1.18	0
Subsurface Soil (>0.5 ft)	09K220074/VP-46	Thorium-230	5/6	0.8	2.9	1.43	L	2.9	1.66	1.24
Subsurface Soil (>0.5 ft)	09K220074/VP-46	Thorium-232						0.0029	1.11	0
Subsurface Soil (>0.5 ft)	09K220074/VP-46	Uranium-234						0.0348	1.13	0
Subsurface Soil (>0.5 ft)	09K220074/VP-46	Uranium-235						0.001508	0.06	0
Subsurface Soil (>0.5 ft)	09K220074/VP-46	Uranium-238						0.0348	1.18	0
Soil - All Depths	09K220085/VP-47	Actinium-227						0.0133	0.21	0
Soil - All Depths	09K220085/VP-47	Lead-210						0.0266	0	0.0266
Soil - All Depths	09K220085/VP-47	Protactinium-231						0.0152	0.2	0
Soil - All Depths	09K220085/VP-47	Radium-226						0.0133	1.05	0
Soil - All Depths	09K220085/VP-47	Radium-228						0.000684	0.98	0
Soil - All Depths	09K220085/VP-47	Thorium-228						0.0019	1.18	0
Soil - All Depths	09K220085/VP-47	Thorium-230	4/4	0.9	1.9	1.6	D	1.9	1.66	0.24
Soil - All Depths	09K220085/VP-47	Thorium-232						0.0019	1.11	0
Soil - All Depths	09K220085/VP-47	Uranium-234						0.0228	1.13	0
Soil - All Depths	09K220085/VP-47	Uranium-235						0.000988	0.06	0
Soil - All Depths	09K220085/VP-47	Uranium-238						0.0228	1.18	0
Subsurface Soil (>0.5 ft)	09K220085/VP-47	Actinium-227						0.0133	0.21	0
Subsurface Soil (>0.5 ft)	09K220085/VP-47	Lead-210						0.0266	0	0.0266
Subsurface Soil (>0.5 ft)	09K220085/VP-47	Protactinium-231						0.0152	0.2	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	09K220085/VP-47	Radium-226						0.0133	1.05	0
Subsurface Soil (>0.5 ft)	09K220085/VP-47	Radium-228						0.000684	0.98	0
Subsurface Soil (>0.5 ft)	09K220085/VP-47	Thorium-228						0.0019	1.18	0
Subsurface Soil (>0.5 ft)	09K220085/VP-47	Thorium-230	4/4	0.9	1.9	1.6	D	1.9	1.66	0.24
Subsurface Soil (>0.5 ft)	09K220085/VP-47	Thorium-232						0.0019	1.11	0
Subsurface Soil (>0.5 ft)	09K220085/VP-47	Uranium-234						0.0228	1.13	0
Subsurface Soil (>0.5 ft)	09K220085/VP-47	Uranium-235						0.000988	0.06	0
Subsurface Soil (>0.5 ft)	09K220085/VP-47	Uranium-238						0.0228	1.18	0
Soil - All Depths	09K220140/VP-40	Actinium-227						0.02275	0.21	0
Soil - All Depths	09K220140/VP-40	Lead-210						0.0455	0	0.0455
Soil - All Depths	09K220140/VP-40	Protactinium-231						0.026	0.2	0
Soil - All Depths	09K220140/VP-40	Radium-226						0.02275	1.05	0
Soil - All Depths	09K220140/VP-40	Radium-228						0.00117	0.98	0
Soil - All Depths	09K220140/VP-40	Thorium-228						0.00325	1.18	0
Soil - All Depths	09K220140/VP-40	Thorium-230	6/8	1.5	4.3	1.84	L	3.25	1.66	1.59
Soil - All Depths	09K220140/VP-40	Thorium-232						0.00325	1.11	0
Soil - All Depths	09K220140/VP-40	Uranium-234						0.039	1.13	0
Soil - All Depths	09K220140/VP-40	Uranium-235						0.00169	0.06	0
Soil - All Depths	09K220140/VP-40	Uranium-238						0.039	1.18	0
Subsurface Soil (>0.5 ft)	09K220140/VP-40	Actinium-227						0.02275	0.21	0
Subsurface Soil (>0.5 ft)	09K220140/VP-40	Lead-210						0.0455	0	0.0455
Subsurface Soil (>0.5 ft)	09K220140/VP-40	Protactinium-231						0.026	0.2	0
Subsurface Soil (>0.5 ft)	09K220140/VP-40	Radium-226						0.02275	1.05	0
Subsurface Soil (>0.5 ft)	09K220140/VP-40	Radium-228						0.00117	0.98	0
Subsurface Soil (>0.5 ft)	09K220140/VP-40	Thorium-228						0.00325	1.18	0
Subsurface Soil (>0.5 ft)	09K220140/VP-40	Thorium-230	6/8	1.5	4.3	1.84	L	3.25	1.66	1.59
Subsurface Soil (>0.5 ft)	09K220140/VP-40	Thorium-232						0.00325	1.11	0
Subsurface Soil (>0.5 ft)	09K220140/VP-40	Uranium-234						0.039	1.13	0
Subsurface Soil (>0.5 ft)	09K220140/VP-40	Uranium-235						0.00169	0.06	0
Subsurface Soil (>0.5 ft)	09K220140/VP-40	Uranium-238						0.039	1.18	0
Soil - All Depths	09K220162/VP-53	Actinium-227						0.014	0.21	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	09K220162/VP-53	Lead-210						0.028	0	0.028
Soil - All Depths	09K220162/VP-53	Protactinium-231						0.016	0.2	0
Soil - All Depths	09K220162/VP-53	Radium-226						0.014	1.05	0
Soil - All Depths	09K220162/VP-53	Radium-228						0.00072	0.98	0
Soil - All Depths	09K220162/VP-53	Thorium-228						0.002	1.18	0
Soil - All Depths	09K220162/VP-53	Thorium-230	3/3	1.5	2	1.73	D	2	1.66	0.34
Soil - All Depths	09K220162/VP-53	Thorium-232						0.002	1.11	0
Soil - All Depths	09K220162/VP-53	Uranium-234						0.024	1.13	0
Soil - All Depths	09K220162/VP-53	Uranium-235						0.00104	0.06	0
Soil - All Depths	09K220162/VP-53	Uranium-238						0.024	1.18	0
Subsurface Soil (>0.5 ft)	09K220162/VP-53	Actinium-227						0.014	0.21	0
Subsurface Soil (>0.5 ft)	09K220162/VP-53	Lead-210						0.028	0	0.028
Subsurface Soil (>0.5 ft)	09K220162/VP-53	Protactinium-231						0.016	0.2	0
Subsurface Soil (>0.5 ft)	09K220162/VP-53	Radium-226						0.014	1.05	0
Subsurface Soil (>0.5 ft)	09K220162/VP-53	Radium-228						0.00072	0.98	0
Subsurface Soil (>0.5 ft)	09K220162/VP-53	Thorium-228						0.002	1.18	0
Subsurface Soil (>0.5 ft)	09K220162/VP-53	Thorium-230	3/3	1.5	2	1.73	D	2	1.66	0.34
Subsurface Soil (>0.5 ft)	09K220162/VP-53	Thorium-232						0.002	1.11	0
Subsurface Soil (>0.5 ft)	09K220162/VP-53	Uranium-234						0.024	1.13	0
Subsurface Soil (>0.5 ft)	09K220162/VP-53	Uranium-235						0.00104	0.06	0
Subsurface Soil (>0.5 ft)	09K220162/VP-53	Uranium-238						0.024	1.18	0
Soil - All Depths	09K220173/VP-48(A)	Actinium-227						0.0147	0.21	0
Soil - All Depths	09K220173/VP-48(A)	Lead-210						0.0294	0	0.0294
Soil - All Depths	09K220173/VP-48(A)	Protactinium-231						0.0168	0.2	0
Soil - All Depths	09K220173/VP-48(A)	Radium-226	0/1			1	D		1.05	0
Soil - All Depths	09K220173/VP-48(A)	Radium-226						0.0147	1.05	0
Soil - All Depths	09K220173/VP-48(A)	Radium-228						0.000756	0.98	0
Soil - All Depths	09K220173/VP-48(A)	Thorium-228						0.0021	1.18	0
Soil - All Depths	09K220173/VP-48(A)	Thorium-230	4/4	1.6	2.1	1.93	D	2.1	1.66	0.44
Soil - All Depths	09K220173/VP-48(A)	Thorium-232	1/1	1.9	1.9	1.9	D	1.9	1.11	0.79
Soil - All Depths	09K220173/VP-48(A)	Uranium-234						0.0252	1.13	0
Soil - All Depths	09K220173/VP-48(A)	Uranium-235						0.001092	0.06	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	09K220173/VP-48(A)	Uranium-238						0.0252	1.18	0
Soil - All Depths	09K220173/VP-48(A)	Uranium-238	0/1			10	D		1.18	0
Subsurface Soil (>0.5 ft)	09K220173/VP-48(A)	Actinium-227						0.0147	0.21	0
Subsurface Soil (>0.5 ft)	09K220173/VP-48(A)	Lead-210						0.0294	0	0.0294
Subsurface Soil (>0.5 ft)	09K220173/VP-48(A)	Protactinium-231						0.0168	0.2	0
Subsurface Soil (>0.5 ft)	09K220173/VP-48(A)	Radium-226						0.0147	1.05	0
Subsurface Soil (>0.5 ft)	09K220173/VP-48(A)	Radium-228						0.000756	0.98	0
Subsurface Soil (>0.5 ft)	09K220173/VP-48(A)	Thorium-228						0.0021	1.18	0
Subsurface Soil (>0.5 ft)	09K220173/VP-48(A)	Thorium-230	3/3	1.6	2.1	1.87	D	2.1	1.66	0.44
Subsurface Soil (>0.5 ft)	09K220173/VP-48(A)	Thorium-232						0.0021	1.11	0
Subsurface Soil (>0.5 ft)	09K220173/VP-48(A)	Uranium-234						0.0252	1.13	0
Subsurface Soil (>0.5 ft)	09K220173/VP-48(A)	Uranium-235						0.001092	0.06	0
Subsurface Soil (>0.5 ft)	09K220173/VP-48(A)	Uranium-238						0.0252	1.18	0
Surface Soil (<0.5 ft)	09K220173/VP-48(A)	Actinium-227						0.0147	0.21	0
Surface Soil (<0.5 ft)	09K220173/VP-48(A)	Lead-210						0.0294	0	0.0294
Surface Soil (<0.5 ft)	09K220173/VP-48(A)	Protactinium-231						0.0168	0.2	0
Surface Soil (<0.5 ft)	09K220173/VP-48(A)	Radium-226	0/1			1	D		1.05	0
Surface Soil (<0.5 ft)	09K220173/VP-48(A)	Radium-226						0.0147	1.05	0
Surface Soil (<0.5 ft)	09K220173/VP-48(A)	Radium-228						0.000756	0.98	0
Surface Soil (<0.5 ft)	09K220173/VP-48(A)	Thorium-228						0.0021	1.18	0
Surface Soil (<0.5 ft)	09K220173/VP-48(A)	Thorium-230	1/1	2.1	2.1	2.1	D	2.1	1.66	0.44
Surface Soil (<0.5 ft)	09K220173/VP-48(A)	Thorium-232	1/1	1.9	1.9	1.9	D	1.9	1.11	0.79
Surface Soil (<0.5 ft)	09K220173/VP-48(A)	Uranium-234						0.0252	1.13	0
Surface Soil (<0.5 ft)	09K220173/VP-48(A)	Uranium-235						0.001092	0.06	0
Surface Soil (<0.5 ft)	09K220173/VP-48(A)	Uranium-238						0.0252	1.18	0
Surface Soil (<0.5 ft)	09K220173/VP-48(A)	Uranium-238	0/1			10	D		1.18	0
Soil - All Depths	09K220184/VP-48	Actinium-227						0.05397	0.21	0
Soil - All Depths	09K220184/VP-48	Lead-210						0.10794	0	0.10794
Soil - All Depths	09K220184/VP-48	Protactinium-231						0.06168	0.2	0
Soil - All Depths	09K220184/VP-48	Radium-226	1/1	1.8	1.8	1.8	D	1.8	1.05	0.75
Soil - All Depths	09K220184/VP-48	Radium-228						0.0027756	0.98	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	09K220184/VP-48	Thorium-228						0.00771	1.18	0
Soil - All Depths	09K220184/VP-48	Thorium-230	16/18	0.7	32	4.55	X	7.71	1.66	6.05
Soil - All Depths	09K220184/VP-48	Thorium-232	1/1	1.6	1.6	1.6	D	1.6	1.11	0.49
Soil - All Depths	09K220184/VP-48	Uranium-234						0.09252	1.13	0
Soil - All Depths	09K220184/VP-48	Uranium-235						0.0040092	0.06	0
Soil - All Depths	09K220184/VP-48	Uranium-238	1/1	6.9	6.9	6.9	D	6.9	1.18	5.72
Subsurface Soil (>0.5 ft)	09K220184/VP-48	Actinium-227						0.0567	0.21	0
Subsurface Soil (>0.5 ft)	09K220184/VP-48	Lead-210						0.1134	0	0.1134
Subsurface Soil (>0.5 ft)	09K220184/VP-48	Protactinium-231						0.0648	0.2	0
Subsurface Soil (>0.5 ft)	09K220184/VP-48	Radium-226						0.0567	1.05	0
Subsurface Soil (>0.5 ft)	09K220184/VP-48	Radium-228						0.002916	0.98	0
Subsurface Soil (>0.5 ft)	09K220184/VP-48	Thorium-228						0.0081	1.18	0
Subsurface Soil (>0.5 ft)	09K220184/VP-48	Thorium-230	15/17	0.7	32	4.76	X	8.1	1.66	6.44
Subsurface Soil (>0.5 ft)	09K220184/VP-48	Thorium-232						0.0081	1.11	0
Subsurface Soil (>0.5 ft)	09K220184/VP-48	Uranium-234						0.0972	1.13	0
Subsurface Soil (>0.5 ft)	09K220184/VP-48	Uranium-235						0.004212	0.06	0
Subsurface Soil (>0.5 ft)	09K220184/VP-48	Uranium-238						0.0972	1.18	0
Surface Soil (<0.5 ft)	09K220184/VP-48	Actinium-227						0.00658	0.21	0
Surface Soil (<0.5 ft)	09K220184/VP-48	Lead-210						0.01316	0	0.01316
Surface Soil (<0.5 ft)	09K220184/VP-48	Protactinium-231						0.00752	0.2	0
Surface Soil (<0.5 ft)	09K220184/VP-48	Radium-226	1/1	1.8	1.8	1.8	D	1.8	1.05	0.75
Surface Soil (<0.5 ft)	09K220184/VP-48	Radium-228						0.0003384	0.98	0
Surface Soil (<0.5 ft)	09K220184/VP-48	Thorium-228						0.00094	1.18	0
Surface Soil (<0.5 ft)	09K220184/VP-48	Thorium-230	1/1	0.94	0.94	0.94	D	0.94	1.66	0
Surface Soil (<0.5 ft)	09K220184/VP-48	Thorium-232	1/1	1.6	1.6	1.6	D	1.6	1.11	0.49
Surface Soil (<0.5 ft)	09K220184/VP-48	Uranium-234						0.01128	1.13	0
Surface Soil (<0.5 ft)	09K220184/VP-48	Uranium-235						0.0004888	0.06	0
Surface Soil (<0.5 ft)	09K220184/VP-48	Uranium-238	1/1	6.9	6.9	6.9	D	6.9	1.18	5.72
Soil - All Depths	09K220195/VP-49	Actinium-227						0.01834	0.21	0
Soil - All Depths	09K220195/VP-49	Lead-210						0.03668	0	0.03668
Soil - All Depths	09K220195/VP-49	Protactinium-231						0.02096	0.2	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	09K220195/VP-49	Radium-226						0.01834	1.05	0
Soil - All Depths	09K220195/VP-49	Radium-228						0.0009432	0.98	0
Soil - All Depths	09K220195/VP-49	Thorium-228						0.00262	1.18	0
Soil - All Depths	09K220195/VP-49	Thorium-230	4/4	0.8	2.8	1.63	D	2.62	1.66	0.96
Soil - All Depths	09K220195/VP-49	Thorium-232						0.00262	1.11	0
Soil - All Depths	09K220195/VP-49	Uranium-234						0.03144	1.13	0
Soil - All Depths	09K220195/VP-49	Uranium-235						0.0013624	0.06	0
Soil - All Depths	09K220195/VP-49	Uranium-238						0.03144	1.18	0
Subsurface Soil (>0.5 ft)	09K220195/VP-49	Actinium-227						0.01834	0.21	0
Subsurface Soil (>0.5 ft)	09K220195/VP-49	Lead-210						0.03668	0	0.03668
Subsurface Soil (>0.5 ft)	09K220195/VP-49	Protactinium-231						0.02096	0.2	0
Subsurface Soil (>0.5 ft)	09K220195/VP-49	Radium-226						0.01834	1.05	0
Subsurface Soil (>0.5 ft)	09K220195/VP-49	Radium-228						0.0009432	0.98	0
Subsurface Soil (>0.5 ft)	09K220195/VP-49	Thorium-228						0.00262	1.18	0
Subsurface Soil (>0.5 ft)	09K220195/VP-49	Thorium-230	4/4	0.8	2.8	1.63	D	2.62	1.66	0.96
Subsurface Soil (>0.5 ft)	09K220195/VP-49	Thorium-232						0.00262	1.11	0
Subsurface Soil (>0.5 ft)	09K220195/VP-49	Uranium-234						0.03144	1.13	0
Subsurface Soil (>0.5 ft)	09K220195/VP-49	Uranium-235						0.0013624	0.06	0
Subsurface Soil (>0.5 ft)	09K220195/VP-49	Uranium-238						0.03144	1.18	0
Soil - All Depths	09K310197/VP-50,51	Actinium-227						0.0119	0.21	0
Soil - All Depths	09K310197/VP-50,51	Lead-210						0.0238	0	0.0238
Soil - All Depths	09K310197/VP-50,51	Protactinium-231						0.0136	0.2	0
Soil - All Depths	09K310197/VP-50,51	Radium-226						0.0119	1.05	0
Soil - All Depths	09K310197/VP-50,51	Radium-228						0.000612	0.98	0
Soil - All Depths	09K310197/VP-50,51	Thorium-228						0.0017	1.18	0
Soil - All Depths	09K310197/VP-50,51	Thorium-230	3/3	1.2	1.7	1.4	D	1.7	1.66	0.04
Soil - All Depths	09K310197/VP-50,51	Thorium-232						0.0017	1.11	0
Soil - All Depths	09K310197/VP-50,51	Uranium-234						0.0204	1.13	0
Soil - All Depths	09K310197/VP-50,51	Uranium-235						0.000884	0.06	0
Soil - All Depths	09K310197/VP-50,51	Uranium-238						0.0204	1.18	0
Subsurface Soil (>0.5 ft)	09K310197/VP-50,51	Actinium-227						0.0119	0.21	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	09K310197/VP-50,51	Lead-210						0.0238	0	0.0238
Subsurface Soil (>0.5 ft)	09K310197/VP-50,51	Protactinium-231						0.0136	0.2	0
Subsurface Soil (>0.5 ft)	09K310197/VP-50,51	Radium-226						0.0119	1.05	0
Subsurface Soil (>0.5 ft)	09K310197/VP-50,51	Radium-228						0.000612	0.98	0
Subsurface Soil (>0.5 ft)	09K310197/VP-50,51	Thorium-228						0.0017	1.18	0
Subsurface Soil (>0.5 ft)	09K310197/VP-50,51	Thorium-230	3/3	1.2	1.7	1.4	D	1.7	1.66	0.04
Subsurface Soil (>0.5 ft)	09K310197/VP-50,51	Thorium-232						0.0017	1.11	0
Subsurface Soil (>0.5 ft)	09K310197/VP-50,51	Uranium-234						0.0204	1.13	0
Subsurface Soil (>0.5 ft)	09K310197/VP-50,51	Uranium-235						0.000884	0.06	0
Subsurface Soil (>0.5 ft)	09K310197/VP-50,51	Uranium-238						0.0204	1.18	0
Soil - All Depths	10K110021	Actinium-227						0.01022	0.21	0
Soil - All Depths	10K110021	Lead-210						0.02044	0	0.02044
Soil - All Depths	10K110021	Protactinium-231						0.01168	0.2	0
Soil - All Depths	10K110021	Radium-226	17/18	0.6	2.1	1.39	N	1.6	1.05	0.55
Soil - All Depths	10K110021	Radium-228						0.0005256	0.98	0
Soil - All Depths	10K110021	Thorium-228						0.00146	1.18	0
Soil - All Depths	10K110021	Thorium-230	18/22	0.4	2.8	1.19	Z	1.46	1.66	0
Soil - All Depths	10K110021	Thorium-232	13/18	1	4	1.64	Z	2.06	1.11	0.95
Soil - All Depths	10K110021	Uranium-234						0.01752	1.13	0
Soil - All Depths	10K110021	Uranium-235						0.0007592	0.06	0
Soil - All Depths	10K110021	Uranium-238	0/18			5.39	D	7.4	1.18	6.22
Subsurface Soil (>0.5 ft)	10K110021	Actinium-227						0.0105	0.21	0
Subsurface Soil (>0.5 ft)	10K110021	Lead-210						0.021	0	0.021
Subsurface Soil (>0.5 ft)	10K110021	Protactinium-231						0.012	0.2	0
Subsurface Soil (>0.5 ft)	10K110021	Radium-226						0.0105	1.05	0
Subsurface Soil (>0.5 ft)	10K110021	Radium-228						0.00054	0.98	0
Subsurface Soil (>0.5 ft)	10K110021	Thorium-228						0.0015	1.18	0
Subsurface Soil (>0.5 ft)	10K110021	Thorium-230	2/2	1.2	1.5	1.35	D	1.5	1.66	0
Subsurface Soil (>0.5 ft)	10K110021	Thorium-232						0.0015	1.11	0
Subsurface Soil (>0.5 ft)	10K110021	Uranium-234						0.018	1.13	0
Subsurface Soil (>0.5 ft)	10K110021	Uranium-235						0.00078	0.06	0
Subsurface Soil (>0.5 ft)	10K110021	Uranium-238						0.018	1.18	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	10K110021	Actinium-227						0.01029	0.21	0
Surface Soil (<0.5 ft)	10K110021	Lead-210						0.02058	0	0.02058
Surface Soil (<0.5 ft)	10K110021	Protactinium-231						0.01176	0.2	0
Surface Soil (<0.5 ft)	10K110021	Radium-226	17/18	0.6	2.1	1.39	N	1.6	1.05	0.55
Surface Soil (<0.5 ft)	10K110021	Radium-228						0.0005292	0.98	0
Surface Soil (<0.5 ft)	10K110021	Thorium-228						0.00147	1.18	0
Surface Soil (<0.5 ft)	10K110021	Thorium-230	16/20	0.4	2.8	1.17	Z	1.47	1.66	0
Surface Soil (<0.5 ft)	10K110021	Thorium-232	13/18	1	4	1.64	Z	2.06	1.11	0.95
Surface Soil (<0.5 ft)	10K110021	Uranium-234						0.01764	1.13	0
Surface Soil (<0.5 ft)	10K110021	Uranium-235						0.0007644	0.06	0
Surface Soil (<0.5 ft)	10K110021	Uranium-238	0/18			5.39	D	7.4	1.18	6.22
Soil - All Depths	10K130014	Actinium-227						0.0161	0.21	0
Soil - All Depths	10K130014	Lead-210						0.0322	0	0.0322
Soil - All Depths	10K130014	Protactinium-231						0.0184	0.2	0
Soil - All Depths	10K130014	Radium-226	1/2	1.1	1.1	0.65	D	1.1	1.05	0.05
Soil - All Depths	10K130014	Radium-228						0.000828	0.98	0
Soil - All Depths	10K130014	Thorium-228						0.0023	1.18	0
Soil - All Depths	10K130014	Thorium-230	2/2	1	2.3	1.65	D	2.3	1.66	0.64
Soil - All Depths	10K130014	Thorium-232	0/2			0.5	D	3.66	1.11	2.55
Soil - All Depths	10K130014	Uranium-234						0.0276	1.13	0
Soil - All Depths	10K130014	Uranium-235						0.001196	0.06	0
Soil - All Depths	10K130014	Uranium-238	0/2			3	D	21.9	1.18	20.72
Surface Soil (<0.5 ft)	10K130014	Actinium-227						0.0161	0.21	0
Surface Soil (<0.5 ft)	10K130014	Lead-210						0.0322	0	0.0322
Surface Soil (<0.5 ft)	10K130014	Protactinium-231						0.0184	0.2	0
Surface Soil (<0.5 ft)	10K130014	Radium-226	1/2	1.1	1.1	0.65	D	1.1	1.05	0.05
Surface Soil (<0.5 ft)	10K130014	Radium-228						0.000828	0.98	0
Surface Soil (<0.5 ft)	10K130014	Thorium-228						0.0023	1.18	0
Surface Soil (<0.5 ft)	10K130014	Thorium-230	2/2	1	2.3	1.65	D	2.3	1.66	0.64
Surface Soil (<0.5 ft)	10K130014	Thorium-232	0/2			0.5	D	3.66	1.11	2.55
Surface Soil (<0.5 ft)	10K130014	Uranium-234						0.0276	1.13	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	10K130014	Uranium-235						0.001196	0.06	0
Surface Soil (<0.5 ft)	10K130014	Uranium-238	0/2			3	D	21.9	1.18	20.72
Soil - All Depths	10K140024/VP-10(C)	Actinium-227						0.0399	0.21	0
Soil - All Depths	10K140024/VP-10(C)	Lead-210						0.0798	0	0.0798
Soil - All Depths	10K140024/VP-10(C)	Protactinium-231						0.0456	0.2	0
Soil - All Depths	10K140024/VP-10(C)	Radium-226	3/3	1.6	1.8	1.67	D	1.8	1.05	0.75
Soil - All Depths	10K140024/VP-10(C)	Radium-228						0.002052	0.98	0
Soil - All Depths	10K140024/VP-10(C)	Thorium-228						0.0057	1.18	0
Soil - All Depths	10K140024/VP-10(C)	Thorium-230	3/3	1.5	5.7	3.03	D	5.7	1.66	4.04
Soil - All Depths	10K140024/VP-10(C)	Thorium-232	3/3	1.7	3	2.57	D	3	1.11	1.89
Soil - All Depths	10K140024/VP-10(C)	Uranium-234						0.0684	1.13	0
Soil - All Depths	10K140024/VP-10(C)	Uranium-235						0.002964	0.06	0
Soil - All Depths	10K140024/VP-10(C)	Uranium-238	0/3			8.33	D	12.2	1.18	11.02
Surface Soil (<0.5 ft)	10K140024/VP-10(C)	Actinium-227						0.0399	0.21	0
Surface Soil (<0.5 ft)	10K140024/VP-10(C)	Lead-210						0.0798	0	0.0798
Surface Soil (<0.5 ft)	10K140024/VP-10(C)	Protactinium-231						0.0456	0.2	0
Surface Soil (<0.5 ft)	10K140024/VP-10(C)	Radium-226	3/3	1.6	1.8	1.67	D	1.8	1.05	0.75
Surface Soil (<0.5 ft)	10K140024/VP-10(C)	Radium-228						0.002052	0.98	0
Surface Soil (<0.5 ft)	10K140024/VP-10(C)	Thorium-228						0.0057	1.18	0
Surface Soil (<0.5 ft)	10K140024/VP-10(C)	Thorium-230	3/3	1.5	5.7	3.03	D	5.7	1.66	4.04
Surface Soil (<0.5 ft)	10K140024/VP-10(C)	Thorium-232	3/3	1.7	3	2.57	D	3	1.11	1.89
Surface Soil (<0.5 ft)	10K140024/VP-10(C)	Uranium-234						0.0684	1.13	0
Surface Soil (<0.5 ft)	10K140024/VP-10(C)	Uranium-235						0.002964	0.06	0
Surface Soil (<0.5 ft)	10K140024/VP-10(C)	Uranium-238	0/3			8.33	D	12.2	1.18	11.02
Soil - All Depths	10K210053/VP-17	Actinium-227						0.01757	0.21	0
Soil - All Depths	10K210053/VP-17	Lead-210						0.03514	0	0.03514
Soil - All Depths	10K210053/VP-17	Protactinium-231						0.02008	0.2	0
Soil - All Depths	10K210053/VP-17	Radium-226						0.01757	1.05	0
Soil - All Depths	10K210053/VP-17	Radium-228						0.0009036	0.98	0
Soil - All Depths	10K210053/VP-17	Thorium-228						0.00251	1.18	0
Soil - All Depths	10K210053/VP-17	Thorium-230	4/5	1.4	3.2	1.66	D	2.51	1.66	0.85

Attachment 5. Soil Summary Statistics for Radionuclides (Page 20 of 84)

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K210053/VP-17	Thorium-232						0.00251	1.11	0
Soil - All Depths	10K210053/VP-17	Uranium-234						0.03012	1.13	0
Soil - All Depths	10K210053/VP-17	Uranium-235						0.0013052	0.06	0
Soil - All Depths	10K210053/VP-17	Uranium-238						0.03012	1.18	0
Subsurface Soil (>0.5 ft)	10K210053/VP-17	Actinium-227						0.01757	0.21	0
Subsurface Soil (>0.5 ft)	10K210053/VP-17	Lead-210						0.03514	0	0.03514
Subsurface Soil (>0.5 ft)	10K210053/VP-17	Protactinium-231						0.02008	0.2	0
Subsurface Soil (>0.5 ft)	10K210053/VP-17	Radium-226						0.01757	1.05	0
Subsurface Soil (>0.5 ft)	10K210053/VP-17	Radium-228						0.0009036	0.98	0
Subsurface Soil (>0.5 ft)	10K210053/VP-17	Thorium-228						0.00251	1.18	0
Subsurface Soil (>0.5 ft)	10K210053/VP-17	Thorium-230	4/5	1.4	3.2	1.66	D	2.51	1.66	0.85
Subsurface Soil (>0.5 ft)	10K210053/VP-17	Thorium-232						0.00251	1.11	0
Subsurface Soil (>0.5 ft)	10K210053/VP-17	Uranium-234						0.03012	1.13	0
Subsurface Soil (>0.5 ft)	10K210053/VP-17	Uranium-235						0.0013052	0.06	0
Subsurface Soil (>0.5 ft)	10K210053/VP-17	Uranium-238						0.03012	1.18	0
Soil - All Depths	10K210064	Actinium-227						0.03465	0.21	0
Soil - All Depths	10K210064	Lead-210						0.0693	0	0.0693
Soil - All Depths	10K210064	Protactinium-231						0.0396	0.2	0
Soil - All Depths	10K210064	Radium-226						0.03465	1.05	0
Soil - All Depths	10K210064	Radium-228						0.001782	0.98	0
Soil - All Depths	10K210064	Thorium-228						0.00495	1.18	0
Soil - All Depths	10K210064	Thorium-230	7/7	1.5	6.6	3.77	N	4.95	1.66	3.29
Soil - All Depths	10K210064	Thorium-232						0.00495	1.11	0
Soil - All Depths	10K210064	Uranium-234						0.0594	1.13	0
Soil - All Depths	10K210064	Uranium-235						0.002574	0.06	0
Soil - All Depths	10K210064	Uranium-238						0.0594	1.18	0
Subsurface Soil (>0.5 ft)	10K210064	Actinium-227						0.03465	0.21	0
Subsurface Soil (>0.5 ft)	10K210064	Lead-210						0.0693	0	0.0693
Subsurface Soil (>0.5 ft)	10K210064	Protactinium-231						0.0396	0.2	0
Subsurface Soil (>0.5 ft)	10K210064	Radium-226						0.03465	1.05	0
Subsurface Soil (>0.5 ft)	10K210064	Radium-228						0.001782	0.98	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	10K210064	Thorium-228						0.00495	1.18	0
Subsurface Soil (>0.5 ft)	10K210064	Thorium-230	7/7	1.5	6.6	3.77	N	4.95	1.66	3.29
Subsurface Soil (>0.5 ft)	10K210064	Thorium-232						0.00495	1.11	0
Subsurface Soil (>0.5 ft)	10K210064	Uranium-234						0.0594	1.13	0
Subsurface Soil (>0.5 ft)	10K210064	Uranium-235						0.002574	0.06	0
Subsurface Soil (>0.5 ft)	10K210064	Uranium-238						0.0594	1.18	0
Soil - All Depths	10K230031/VP-19	Actinium-227						0.05355	0.21	0
Soil - All Depths	10K230031/VP-19	Lead-210						0.1071	0	0.1071
Soil - All Depths	10K230031/VP-19	Protactinium-231						0.0612	0.2	0
Soil - All Depths	10K230031/VP-19	Radium-226						0.05355	1.05	0
Soil - All Depths	10K230031/VP-19	Radium-228						0.002754	0.98	0
Soil - All Depths	10K230031/VP-19	Thorium-228						0.00765	1.18	0
Soil - All Depths	10K230031/VP-19	Thorium-230	7/8	1.4	11	3.11	L	7.65	1.66	5.99
Soil - All Depths	10K230031/VP-19	Thorium-232						0.00765	1.11	0
Soil - All Depths	10K230031/VP-19	Uranium-234						0.0918	1.13	0
Soil - All Depths	10K230031/VP-19	Uranium-235						0.003978	0.06	0
Soil - All Depths	10K230031/VP-19	Uranium-238						0.0918	1.18	0
Subsurface Soil (>0.5 ft)	10K230031/VP-19	Actinium-227						0.05355	0.21	0
Subsurface Soil (>0.5 ft)	10K230031/VP-19	Lead-210						0.1071	0	0.1071
Subsurface Soil (>0.5 ft)	10K230031/VP-19	Protactinium-231						0.0612	0.2	0
Subsurface Soil (>0.5 ft)	10K230031/VP-19	Radium-226						0.05355	1.05	0
Subsurface Soil (>0.5 ft)	10K230031/VP-19	Radium-228						0.002754	0.98	0
Subsurface Soil (>0.5 ft)	10K230031/VP-19	Thorium-228						0.00765	1.18	0
Subsurface Soil (>0.5 ft)	10K230031/VP-19	Thorium-230	7/8	1.4	11	3.11	L	7.65	1.66	5.99
Subsurface Soil (>0.5 ft)	10K230031/VP-19	Thorium-232						0.00765	1.11	0
Subsurface Soil (>0.5 ft)	10K230031/VP-19	Uranium-234						0.0918	1.13	0
Subsurface Soil (>0.5 ft)	10K230031/VP-19	Uranium-235						0.003978	0.06	0
Subsurface Soil (>0.5 ft)	10K230031/VP-19	Uranium-238						0.0918	1.18	0
Soil - All Depths	10K230040/VP-20	Actinium-227						0.03283	0.21	0
Soil - All Depths	10K230040/VP-20	Lead-210						0.06566	0	0.06566
Soil - All Depths	10K230040/VP-20	Protactinium-231						0.03752	0.2	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K230040/VP-20	Radium-226						0.03283	1.05	0
Soil - All Depths	10K230040/VP-20	Radium-228						0.0016884	0.98	0
Soil - All Depths	10K230040/VP-20	Thorium-228						0.00469	1.18	0
Soil - All Depths	10K230040/VP-20	Thorium-230	14/14	0.7	8.4	2.82	L	4.69	1.66	3.03
Soil - All Depths	10K230040/VP-20	Thorium-232						0.00469	1.11	0
Soil - All Depths	10K230040/VP-20	Uranium-234						0.05628	1.13	0
Soil - All Depths	10K230040/VP-20	Uranium-235						0.0024388	0.06	0
Soil - All Depths	10K230040/VP-20	Uranium-238						0.05628	1.18	0
Subsurface Soil (>0.5 ft)	10K230040/VP-20	Actinium-227						0.03283	0.21	0
Subsurface Soil (>0.5 ft)	10K230040/VP-20	Lead-210						0.06566	0	0.06566
Subsurface Soil (>0.5 ft)	10K230040/VP-20	Protactinium-231						0.03752	0.2	0
Subsurface Soil (>0.5 ft)	10K230040/VP-20	Radium-226						0.03283	1.05	0
Subsurface Soil (>0.5 ft)	10K230040/VP-20	Radium-228						0.0016884	0.98	0
Subsurface Soil (>0.5 ft)	10K230040/VP-20	Thorium-228						0.00469	1.18	0
Subsurface Soil (>0.5 ft)	10K230040/VP-20	Thorium-230	14/14	0.7	8.4	2.82	L	4.69	1.66	3.03
Subsurface Soil (>0.5 ft)	10K230040/VP-20	Thorium-232						0.00469	1.11	0
Subsurface Soil (>0.5 ft)	10K230040/VP-20	Uranium-234						0.05628	1.13	0
Subsurface Soil (>0.5 ft)	10K230040/VP-20	Uranium-235						0.0024388	0.06	0
Subsurface Soil (>0.5 ft)	10K230040/VP-20	Uranium-238						0.05628	1.18	0
Soil - All Depths	10K230051/VP-18	Actinium-227						0.01911	0.21	0
Soil - All Depths	10K230051/VP-18	Lead-210						0.03822	0	0.03822
Soil - All Depths	10K230051/VP-18	Protactinium-231						0.02184	0.2	0
Soil - All Depths	10K230051/VP-18	Radium-226						0.01911	1.05	0
Soil - All Depths	10K230051/VP-18	Radium-228						0.0009828	0.98	0
Soil - All Depths	10K230051/VP-18	Thorium-228						0.00273	1.18	0
Soil - All Depths	10K230051/VP-18	Thorium-230	6/7	1.2	3.2	2.04	N	2.73	1.66	1.07
Soil - All Depths	10K230051/VP-18	Thorium-232						0.00273	1.11	0
Soil - All Depths	10K230051/VP-18	Uranium-234						0.03276	1.13	0
Soil - All Depths	10K230051/VP-18	Uranium-235						0.0014196	0.06	0
Soil - All Depths	10K230051/VP-18	Uranium-238						0.03276	1.18	0
Subsurface Soil (>0.5 ft)	10K230051/VP-18	Actinium-227						0.01911	0.21	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	10K230051/VP-18	Lead-210						0.03822	0	0.03822
Subsurface Soil (>0.5 ft)	10K230051/VP-18	Protactinium-231						0.02184	0.2	0
Subsurface Soil (>0.5 ft)	10K230051/VP-18	Radium-226						0.01911	1.05	0
Subsurface Soil (>0.5 ft)	10K230051/VP-18	Radium-228						0.0009828	0.98	0
Subsurface Soil (>0.5 ft)	10K230051/VP-18	Thorium-228						0.00273	1.18	0
Subsurface Soil (>0.5 ft)	10K230051/VP-18	Thorium-230	6/7	1.2	3.2	2.04	N	2.73	1.66	1.07
Subsurface Soil (>0.5 ft)	10K230051/VP-18	Thorium-232						0.00273	1.11	0
Subsurface Soil (>0.5 ft)	10K230051/VP-18	Uranium-234						0.03276	1.13	0
Subsurface Soil (>0.5 ft)	10K230051/VP-18	Uranium-235						0.0014196	0.06	0
Subsurface Soil (>0.5 ft)	10K230051/VP-18	Uranium-238						0.03276	1.18	0
Soil - All Depths	10K230073/VP-21	Actinium-227						0.01057	0.21	0
Soil - All Depths	10K230073/VP-21	Lead-210						0.02114	0	0.02114
Soil - All Depths	10K230073/VP-21	Protactinium-231						0.01208	0.2	0
Soil - All Depths	10K230073/VP-21	Radium-226	5/5	0.8	2	1.36	L	2	1.05	0.95
Soil - All Depths	10K230073/VP-21	Radium-228						0.0005436	0.98	0
Soil - All Depths	10K230073/VP-21	Thorium-228						0.00151	1.18	0
Soil - All Depths	10K230073/VP-21	Thorium-230	6/11	0.53	2.4	1.01	L	1.51	1.66	0
Soil - All Depths	10K230073/VP-21	Thorium-232	5/5	1.3	2	1.72	N	2	1.11	0.89
Soil - All Depths	10K230073/VP-21	Uranium-234						0.01812	1.13	0
Soil - All Depths	10K230073/VP-21	Uranium-235						0.0007852	0.06	0
Soil - All Depths	10K230073/VP-21	Uranium-238	2/5	4.8	11.6	5.66	D	9.16	1.18	7.98
Subsurface Soil (>0.5 ft)	10K230073/VP-21	Actinium-227						0.00756	0.21	0
Subsurface Soil (>0.5 ft)	10K230073/VP-21	Lead-210						0.01512	0	0.01512
Subsurface Soil (>0.5 ft)	10K230073/VP-21	Protactinium-231						0.00864	0.2	0
Subsurface Soil (>0.5 ft)	10K230073/VP-21	Radium-226						0.00756	1.05	0
Subsurface Soil (>0.5 ft)	10K230073/VP-21	Radium-228						0.0003888	0.98	0
Subsurface Soil (>0.5 ft)	10K230073/VP-21	Thorium-228						0.00108	1.18	0
Subsurface Soil (>0.5 ft)	10K230073/VP-21	Thorium-230	2/6	1.2	1.2	0.85	D	1.08	1.66	0
Subsurface Soil (>0.5 ft)	10K230073/VP-21	Thorium-232						0.00108	1.11	0
Subsurface Soil (>0.5 ft)	10K230073/VP-21	Uranium-234						0.01296	1.13	0
Subsurface Soil (>0.5 ft)	10K230073/VP-21	Uranium-235						0.0005616	0.06	0
Subsurface Soil (>0.5 ft)	10K230073/VP-21	Uranium-238						0.01296	1.18	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	10K230073/VP-21	Actinium-227						0.014	0.21	0
Surface Soil (<0.5 ft)	10K230073/VP-21	Lead-210						0.028	0	0.028
Surface Soil (<0.5 ft)	10K230073/VP-21	Protactinium-231						0.016	0.2	0
Surface Soil (<0.5 ft)	10K230073/VP-21	Radium-226	5/5	0.8	2	1.36	L	2	1.05	0.95
Surface Soil (<0.5 ft)	10K230073/VP-21	Radium-228						0.00072	0.98	0
Surface Soil (<0.5 ft)	10K230073/VP-21	Thorium-228						0.002	1.18	0
Surface Soil (<0.5 ft)	10K230073/VP-21	Thorium-230	4/5	0.53	2.4	1.21	D	2	1.66	0.34
Surface Soil (<0.5 ft)	10K230073/VP-21	Thorium-232	5/5	1.3	2	1.72	N	2	1.11	0.89
Surface Soil (<0.5 ft)	10K230073/VP-21	Uranium-234						0.024	1.13	0
Surface Soil (<0.5 ft)	10K230073/VP-21	Uranium-235						0.00104	0.06	0
Surface Soil (<0.5 ft)	10K230073/VP-21	Uranium-238	2/5	4.8	11.6	5.66	D	9.16	1.18	7.98
Soil - All Depths	10K240094/VP-23	Actinium-227						0.01134	0.21	0
Soil - All Depths	10K240094/VP-23	Lead-210						0.02268	0	0.02268
Soil - All Depths	10K240094/VP-23	Protactinium-231						0.01296	0.2	0
Soil - All Depths	10K240094/VP-23	Radium-226	5/5	1.1	1.8	1.54	N	1.8	1.05	0.75
Soil - All Depths	10K240094/VP-23	Radium-228						0.0005832	0.98	0
Soil - All Depths	10K240094/VP-23	Thorium-228						0.00162	1.18	0
Soil - All Depths	10K240094/VP-23	Thorium-230	10/13	0.67	2.5	1.12	L	1.62	1.66	0
Soil - All Depths	10K240094/VP-23	Thorium-232	5/5	1.3	1.9	1.6	L	1.9	1.11	0.79
Soil - All Depths	10K240094/VP-23	Uranium-234						0.01944	1.13	0
Soil - All Depths	10K240094/VP-23	Uranium-235						0.0008424	0.06	0
Soil - All Depths	10K240094/VP-23	Uranium-238	1/5	4.1	4.1	3.04	D	4.01	1.18	2.83
Subsurface Soil (>0.5 ft)	10K240094/VP-23	Actinium-227						0.01099	0.21	0
Subsurface Soil (>0.5 ft)	10K240094/VP-23	Lead-210						0.02198	0	0.02198
Subsurface Soil (>0.5 ft)	10K240094/VP-23	Protactinium-231						0.01256	0.2	0
Subsurface Soil (>0.5 ft)	10K240094/VP-23	Radium-226						0.01099	1.05	0
Subsurface Soil (>0.5 ft)	10K240094/VP-23	Radium-228						0.0005652	0.98	0
Subsurface Soil (>0.5 ft)	10K240094/VP-23	Thorium-228						0.00157	1.18	0
Subsurface Soil (>0.5 ft)	10K240094/VP-23	Thorium-230	6/8	1	2.5	1.21	X	1.57	1.66	0
Subsurface Soil (>0.5 ft)	10K240094/VP-23	Thorium-232						0.00157	1.11	0
Subsurface Soil (>0.5 ft)	10K240094/VP-23	Uranium-234						0.01884	1.13	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	10K240094/VP-23	Uranium-235						0.0008164	0.06	0
Subsurface Soil (>0.5 ft)	10K240094/VP-23	Uranium-238						0.01884	1.18	0
Surface Soil (<0.5 ft)	10K240094/VP-23	Actinium-227						0.01106	0.21	0
Surface Soil (<0.5 ft)	10K240094/VP-23	Lead-210						0.02212	0	0.02212
Surface Soil (<0.5 ft)	10K240094/VP-23	Protactinium-231						0.01264	0.2	0
Surface Soil (<0.5 ft)	10K240094/VP-23	Radium-226	5/5	1.1	1.8	1.54	N	1.8	1.05	0.75
Surface Soil (<0.5 ft)	10K240094/VP-23	Radium-228						0.0005688	0.98	0
Surface Soil (<0.5 ft)	10K240094/VP-23	Thorium-228						0.00158	1.18	0
Surface Soil (<0.5 ft)	10K240094/VP-23	Thorium-230	4/5	0.67	1.9	0.984	D	1.58	1.66	0
Surface Soil (<0.5 ft)	10K240094/VP-23	Thorium-232	5/5	1.3	1.9	1.6	L	1.9	1.11	0.79
Surface Soil (<0.5 ft)	10K240094/VP-23	Uranium-234						0.01896	1.13	0
Surface Soil (<0.5 ft)	10K240094/VP-23	Uranium-235						0.0008216	0.06	0
Surface Soil (<0.5 ft)	10K240094/VP-23	Uranium-238	1/5	4.1	4.1	3.04	D	4.01	1.18	2.83
Soil - All Depths	10K240106/VP-22	Actinium-227						0.01099	0.21	0
Soil - All Depths	10K240106/VP-22	Lead-210						0.02198	0	0.02198
Soil - All Depths	10K240106/VP-22	Protactinium-231						0.01256	0.2	0
Soil - All Depths	10K240106/VP-22	Radium-226	3/3	1.2	1.4	1.3	D	1.4	1.05	0.35
Soil - All Depths	10K240106/VP-22	Radium-228						0.0005652	0.98	0
Soil - All Depths	10K240106/VP-22	Thorium-228						0.00157	1.18	0
Soil - All Depths	10K240106/VP-22	Thorium-230	6/8	0.63	2.3	1.05	L	1.57	1.66	0
Soil - All Depths	10K240106/VP-22	Thorium-232	3/3	1.4	1.7	1.57	D	1.7	1.11	0.59
Soil - All Depths	10K240106/VP-22	Uranium-234						0.01884	1.13	0
Soil - All Depths	10K240106/VP-22	Uranium-235						0.0008164	0.06	0
Soil - All Depths	10K240106/VP-22	Uranium-238	3/3	4.8	5	4.87	D	5	1.18	3.82
Subsurface Soil (>0.5 ft)	10K240106/VP-22	Actinium-227						0.00763	0.21	0
Subsurface Soil (>0.5 ft)	10K240106/VP-22	Lead-210						0.01526	0	0.01526
Subsurface Soil (>0.5 ft)	10K240106/VP-22	Protactinium-231						0.00872	0.2	0
Subsurface Soil (>0.5 ft)	10K240106/VP-22	Radium-226						0.00763	1.05	0
Subsurface Soil (>0.5 ft)	10K240106/VP-22	Radium-228						0.0003924	0.98	0
Subsurface Soil (>0.5 ft)	10K240106/VP-22	Thorium-228						0.00109	1.18	0
Subsurface Soil (>0.5 ft)	10K240106/VP-22	Thorium-230	3/5	0.9	1.2	0.88	D	1.09	1.66	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	10K240106/VP-22	Thorium-232						0.00109	1.11	0
Subsurface Soil (>0.5 ft)	10K240106/VP-22	Uranium-234						0.01308	1.13	0
Subsurface Soil (>0.5 ft)	10K240106/VP-22	Uranium-235						0.0005668	0.06	0
Subsurface Soil (>0.5 ft)	10K240106/VP-22	Uranium-238						0.01308	1.18	0
Surface Soil (<0.5 ft)	10K240106/VP-22	Actinium-227						0.0161	0.21	0
Surface Soil (<0.5 ft)	10K240106/VP-22	Lead-210						0.0322	0	0.0322
Surface Soil (<0.5 ft)	10K240106/VP-22	Protactinium-231						0.0184	0.2	0
Surface Soil (<0.5 ft)	10K240106/VP-22	Radium-226	3/3	1.2	1.4	1.3	D	1.4	1.05	0.35
Surface Soil (<0.5 ft)	10K240106/VP-22	Radium-228						0.000828	0.98	0
Surface Soil (<0.5 ft)	10K240106/VP-22	Thorium-228						0.0023	1.18	0
Surface Soil (<0.5 ft)	10K240106/VP-22	Thorium-230	3/3	0.63	2.3	1.34	D	2.3	1.66	0.64
Surface Soil (<0.5 ft)	10K240106/VP-22	Thorium-232	3/3	1.4	1.7	1.57	D	1.7	1.11	0.59
Surface Soil (<0.5 ft)	10K240106/VP-22	Uranium-234						0.0276	1.13	0
Surface Soil (<0.5 ft)	10K240106/VP-22	Uranium-235						0.001196	0.06	0
Surface Soil (<0.5 ft)	10K240106/VP-22	Uranium-238	3/3	4.8	5	4.87	D	5	1.18	3.82
Soil - All Depths	10K240182	Actinium-227						0.01134	0.21	0
Soil - All Depths	10K240182	Lead-210						0.02268	0	0.02268
Soil - All Depths	10K240182	Protactinium-231						0.01296	0.2	0
Soil - All Depths	10K240182	Radium-226						0.01134	1.05	0
Soil - All Depths	10K240182	Radium-228						0.0005832	0.98	0
Soil - All Depths	10K240182	Thorium-228						0.00162	1.18	0
Soil - All Depths	10K240182	Thorium-230	5/5	1	1.7	1.36	N	1.62	1.66	0
Soil - All Depths	10K240182	Thorium-232						0.00162	1.11	0
Soil - All Depths	10K240182	Uranium-234						0.01944	1.13	0
Soil - All Depths	10K240182	Uranium-235						0.0008424	0.06	0
Soil - All Depths	10K240182	Uranium-238						0.01944	1.18	0
Surface Soil (<0.5 ft)	10K240182	Actinium-227						0.01134	0.21	0
Surface Soil (<0.5 ft)	10K240182	Lead-210						0.02268	0	0.02268
Surface Soil (<0.5 ft)	10K240182	Protactinium-231						0.01296	0.2	0
Surface Soil (<0.5 ft)	10K240182	Radium-226						0.01134	1.05	0
Surface Soil (<0.5 ft)	10K240182	Radium-228						0.0005832	0.98	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	10K240182	Thorium-228						0.00162	1.18	0
Surface Soil (<0.5 ft)	10K240182	Thorium-230	5/5	1	1.7	1.36	N	1.62	1.66	0
Surface Soil (<0.5 ft)	10K240182	Thorium-232						0.00162	1.11	0
Surface Soil (<0.5 ft)	10K240182	Uranium-234						0.01944	1.13	0
Surface Soil (<0.5 ft)	10K240182	Uranium-235						0.0008424	0.06	0
Surface Soil (<0.5 ft)	10K240182	Uranium-238						0.01944	1.18	0
Soil - All Depths	10K240207	Actinium-227						0.02828	0.21	0
Soil - All Depths	10K240207	Lead-210						0.05656	0	0.05656
Soil - All Depths	10K240207	Protactinium-231						0.03232	0.2	0
Soil - All Depths	10K240207	Radium-226						0.02828	1.05	0
Soil - All Depths	10K240207	Radium-228						0.0014544	0.98	0
Soil - All Depths	10K240207	Thorium-228						0.00404	1.18	0
Soil - All Depths	10K240207	Thorium-230	10/10	1.2	8.1	2.71	L	4.04	1.66	2.38
Soil - All Depths	10K240207	Thorium-232						0.00404	1.11	0
Soil - All Depths	10K240207	Uranium-234						0.04848	1.13	0
Soil - All Depths	10K240207	Uranium-235						0.0021008	0.06	0
Soil - All Depths	10K240207	Uranium-238						0.04848	1.18	0
Subsurface Soil (>0.5 ft)	10K240207	Actinium-227						0.02975	0.21	0
Subsurface Soil (>0.5 ft)	10K240207	Lead-210						0.0595	0	0.0595
Subsurface Soil (>0.5 ft)	10K240207	Protactinium-231						0.034	0.2	0
Subsurface Soil (>0.5 ft)	10K240207	Radium-226						0.02975	1.05	0
Subsurface Soil (>0.5 ft)	10K240207	Radium-228						0.00153	0.98	0
Subsurface Soil (>0.5 ft)	10K240207	Thorium-228						0.00425	1.18	0
Subsurface Soil (>0.5 ft)	10K240207	Thorium-230	8/8	1.6	8.1	2.8	X	4.25	1.66	2.59
Subsurface Soil (>0.5 ft)	10K240207	Thorium-232						0.00425	1.11	0
Subsurface Soil (>0.5 ft)	10K240207	Uranium-234						0.051	1.13	0
Subsurface Soil (>0.5 ft)	10K240207	Uranium-235						0.00221	0.06	0
Subsurface Soil (>0.5 ft)	10K240207	Uranium-238						0.051	1.18	0
Surface Soil (<0.5 ft)	10K240207	Actinium-227						0.0245	0.21	0
Surface Soil (<0.5 ft)	10K240207	Lead-210						0.049	0	0.049
Surface Soil (<0.5 ft)	10K240207	Protactinium-231						0.028	0.2	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	10K240207	Radium-226						0.0245	1.05	0
Surface Soil (<0.5 ft)	10K240207	Radium-228						0.00126	0.98	0
Surface Soil (<0.5 ft)	10K240207	Thorium-228						0.0035	1.18	0
Surface Soil (<0.5 ft)	10K240207	Thorium-230	2/2	1.2	3.5	2.35	D	3.5	1.66	1.84
Surface Soil (<0.5 ft)	10K240207	Thorium-232						0.0035	1.11	0
Surface Soil (<0.5 ft)	10K240207	Uranium-234						0.042	1.13	0
Surface Soil (<0.5 ft)	10K240207	Uranium-235						0.00182	0.06	0
Surface Soil (<0.5 ft)	10K240207	Uranium-238						0.042	1.18	0
Soil - All Depths	10K330030/VP-27	Actinium-227						0.04333	0.21	0
Soil - All Depths	10K330030/VP-27	Lead-210						0.08666	0	0.08666
Soil - All Depths	10K330030/VP-27	Protactinium-231						0.04952	0.2	0
Soil - All Depths	10K330030/VP-27	Radium-226						0.04333	1.05	0
Soil - All Depths	10K330030/VP-27	Radium-228						0.0022284	0.98	0
Soil - All Depths	10K330030/VP-27	Thorium-228						0.00619	1.18	0
Soil - All Depths	10K330030/VP-27	Thorium-230	7/7	1.5	6.6	3.49	L	6.19	1.66	4.53
Soil - All Depths	10K330030/VP-27	Thorium-232						0.00619	1.11	0
Soil - All Depths	10K330030/VP-27	Uranium-234						0.07428	1.13	0
Soil - All Depths	10K330030/VP-27	Uranium-235						0.0032188	0.06	0
Soil - All Depths	10K330030/VP-27	Uranium-238						0.07428	1.18	0
Subsurface Soil (>0.5 ft)	10K330030/VP-27	Actinium-227						0.04137	0.21	0
Subsurface Soil (>0.5 ft)	10K330030/VP-27	Lead-210						0.08274	0	0.08274
Subsurface Soil (>0.5 ft)	10K330030/VP-27	Protactinium-231						0.04728	0.2	0
Subsurface Soil (>0.5 ft)	10K330030/VP-27	Radium-226						0.04137	1.05	0
Subsurface Soil (>0.5 ft)	10K330030/VP-27	Radium-228						0.0021276	0.98	0
Subsurface Soil (>0.5 ft)	10K330030/VP-27	Thorium-228						0.00591	1.18	0
Subsurface Soil (>0.5 ft)	10K330030/VP-27	Thorium-230	4/4	1.5	6.6	3.15	D	5.91	1.66	4.25
Subsurface Soil (>0.5 ft)	10K330030/VP-27	Thorium-232						0.00591	1.11	0
Subsurface Soil (>0.5 ft)	10K330030/VP-27	Uranium-234						0.07092	1.13	0
Subsurface Soil (>0.5 ft)	10K330030/VP-27	Uranium-235						0.0030732	0.06	0
Subsurface Soil (>0.5 ft)	10K330030/VP-27	Uranium-238						0.07092	1.18	0
Surface Soil (<0.5 ft)	10K330030/VP-27	Actinium-227						0.028	0.21	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	10K330030/VP-27	Lead-210						0.056	0	0.056
Surface Soil (<0.5 ft)	10K330030/VP-27	Protactinium-231						0.032	0.2	0
Surface Soil (<0.5 ft)	10K330030/VP-27	Radium-226						0.028	1.05	0
Surface Soil (<0.5 ft)	10K330030/VP-27	Radium-228						0.00144	0.98	0
Surface Soil (<0.5 ft)	10K330030/VP-27	Thorium-228						0.004	1.18	0
Surface Soil (<0.5 ft)	10K330030/VP-27	Thorium-230	3/3	3.9	4	3.93	D	4	1.66	2.34
Surface Soil (<0.5 ft)	10K330030/VP-27	Thorium-232						0.004	1.11	0
Surface Soil (<0.5 ft)	10K330030/VP-27	Uranium-234						0.048	1.13	0
Surface Soil (<0.5 ft)	10K330030/VP-27	Uranium-235						0.00208	0.06	0
Surface Soil (<0.5 ft)	10K330030/VP-27	Uranium-238						0.048	1.18	0
Soil - All Depths	10K330140/VP-24	Actinium-227						0.00945	0.21	0
Soil - All Depths	10K330140/VP-24	Lead-210						0.0189	0	0.0189
Soil - All Depths	10K330140/VP-24	Protactinium-231						0.0108	0.2	0
Soil - All Depths	10K330140/VP-24	Radium-226	4/4	0.91	1.6	1.25	D	1.59	1.05	0.54
Soil - All Depths	10K330140/VP-24	Radium-228						0.000486	0.98	0
Soil - All Depths	10K330140/VP-24	Thorium-228						0.00135	1.18	0
Soil - All Depths	10K330140/VP-24	Thorium-230	16/20	0.77	1.7	1.19	L	1.35	1.66	0
Soil - All Depths	10K330140/VP-24	Thorium-232	4/4	1.3	1.7	1.5	D	1.7	1.11	0.59
Soil - All Depths	10K330140/VP-24	Uranium-234						0.0162	1.13	0
Soil - All Depths	10K330140/VP-24	Uranium-235						0.000702	0.06	0
Soil - All Depths	10K330140/VP-24	Uranium-238	2/4	4.5	4.8	3.63	D	4.8	1.18	3.62
Subsurface Soil (>0.5 ft)	10K330140/VP-24	Actinium-227						0.00966	0.21	0
Subsurface Soil (>0.5 ft)	10K330140/VP-24	Lead-210						0.01932	0	0.01932
Subsurface Soil (>0.5 ft)	10K330140/VP-24	Protactinium-231						0.01104	0.2	0
Subsurface Soil (>0.5 ft)	10K330140/VP-24	Radium-226						0.00966	1.05	0
Subsurface Soil (>0.5 ft)	10K330140/VP-24	Radium-228						0.0004968	0.98	0
Subsurface Soil (>0.5 ft)	10K330140/VP-24	Thorium-228						0.00138	1.18	0
Subsurface Soil (>0.5 ft)	10K330140/VP-24	Thorium-230	12/16	0.9	1.7	1.23	N	1.38	1.66	0
Subsurface Soil (>0.5 ft)	10K330140/VP-24	Thorium-232						0.00138	1.11	0
Subsurface Soil (>0.5 ft)	10K330140/VP-24	Uranium-234						0.01656	1.13	0
Subsurface Soil (>0.5 ft)	10K330140/VP-24	Uranium-235						0.0007176	0.06	0
Subsurface Soil (>0.5 ft)	10K330140/VP-24	Uranium-238						0.01656	1.18	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	10K330140/VP-24	Actinium-227						0.00931	0.21	0
Surface Soil (<0.5 ft)	10K330140/VP-24	Lead-210						0.01862	0	0.01862
Surface Soil (<0.5 ft)	10K330140/VP-24	Protactinium-231						0.01064	0.2	0
Surface Soil (<0.5 ft)	10K330140/VP-24	Radium-226	4/4	0.91	1.6	1.25	D	1.59	1.05	0.54
Surface Soil (<0.5 ft)	10K330140/VP-24	Radium-228						0.0004788	0.98	0
Surface Soil (<0.5 ft)	10K330140/VP-24	Thorium-228						0.00133	1.18	0
Surface Soil (<0.5 ft)	10K330140/VP-24	Thorium-230	4/4	0.77	1.4	1.01	D	1.33	1.66	0
Surface Soil (<0.5 ft)	10K330140/VP-24	Thorium-232	4/4	1.3	1.7	1.5	D	1.7	1.11	0.59
Surface Soil (<0.5 ft)	10K330140/VP-24	Uranium-234						0.01596	1.13	0
Surface Soil (<0.5 ft)	10K330140/VP-24	Uranium-235						0.0006916	0.06	0
Surface Soil (<0.5 ft)	10K330140/VP-24	Uranium-238	2/4	4.5	4.8	3.63	D	4.8	1.18	3.62
Soil - All Depths	10K330223/VP-29	Actinium-227						0.0224	0.21	0
Soil - All Depths	10K330223/VP-29	Lead-210						0.0448	0	0.0448
Soil - All Depths	10K330223/VP-29	Protactinium-231						0.0256	0.2	0
Soil - All Depths	10K330223/VP-29	Radium-226						0.0224	1.05	0
Soil - All Depths	10K330223/VP-29	Radium-228						0.001152	0.98	0
Soil - All Depths	10K330223/VP-29	Thorium-228						0.0032	1.18	0
Soil - All Depths	10K330223/VP-29	Thorium-230	6/6	0.7	3.2	1.55	L	3.2	1.66	1.54
Soil - All Depths	10K330223/VP-29	Thorium-232						0.0032	1.11	0
Soil - All Depths	10K330223/VP-29	Uranium-234						0.0384	1.13	0
Soil - All Depths	10K330223/VP-29	Uranium-235						0.001664	0.06	0
Soil - All Depths	10K330223/VP-29	Uranium-238						0.0384	1.18	0
Subsurface Soil (>0.5 ft)	10K330223/VP-29	Actinium-227						0.0224	0.21	0
Subsurface Soil (>0.5 ft)	10K330223/VP-29	Lead-210						0.0448	0	0.0448
Subsurface Soil (>0.5 ft)	10K330223/VP-29	Protactinium-231						0.0256	0.2	0
Subsurface Soil (>0.5 ft)	10K330223/VP-29	Radium-226						0.0224	1.05	0
Subsurface Soil (>0.5 ft)	10K330223/VP-29	Radium-228						0.001152	0.98	0
Subsurface Soil (>0.5 ft)	10K330223/VP-29	Thorium-228						0.0032	1.18	0
Subsurface Soil (>0.5 ft)	10K330223/VP-29	Thorium-230	6/6	0.7	3.2	1.55	L	3.2	1.66	1.54
Subsurface Soil (>0.5 ft)	10K330223/VP-29	Thorium-232						0.0032	1.11	0
Subsurface Soil (>0.5 ft)	10K330223/VP-29	Uranium-234						0.0384	1.13	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	10K330223/VP-29	Uranium-235						0.001664	0.06	0
Subsurface Soil (>0.5 ft)	10K330223/VP-29	Uranium-238						0.0384	1.18	0
Soil - All Depths	10K330232/VP-30	Actinium-227						0.0133	0.21	0
Soil - All Depths	10K330232/VP-30	Lead-210						0.0266	0	0.0266
Soil - All Depths	10K330232/VP-30	Protactinium-231						0.0152	0.2	0
Soil - All Depths	10K330232/VP-30	Radium-226						0.0133	1.05	0
Soil - All Depths	10K330232/VP-30	Radium-228						0.000684	0.98	0
Soil - All Depths	10K330232/VP-30	Thorium-228						0.0019	1.18	0
Soil - All Depths	10K330232/VP-30	Thorium-230	1/1	1.9	1.9	1.9	D	1.9	1.66	0.24
Soil - All Depths	10K330232/VP-30	Thorium-232						0.0019	1.11	0
Soil - All Depths	10K330232/VP-30	Uranium-234						0.0228	1.13	0
Soil - All Depths	10K330232/VP-30	Uranium-235						0.000988	0.06	0
Soil - All Depths	10K330232/VP-30	Uranium-238						0.0228	1.18	0
Subsurface Soil (>0.5 ft)	10K330232/VP-30	Actinium-227						0.0133	0.21	0
Subsurface Soil (>0.5 ft)	10K330232/VP-30	Lead-210						0.0266	0	0.0266
Subsurface Soil (>0.5 ft)	10K330232/VP-30	Protactinium-231						0.0152	0.2	0
Subsurface Soil (>0.5 ft)	10K330232/VP-30	Radium-226						0.0133	1.05	0
Subsurface Soil (>0.5 ft)	10K330232/VP-30	Radium-228						0.000684	0.98	0
Subsurface Soil (>0.5 ft)	10K330232/VP-30	Thorium-228						0.0019	1.18	0
Subsurface Soil (>0.5 ft)	10K330232/VP-30	Thorium-230	1/1	1.9	1.9	1.9	D	1.9	1.66	0.24
Subsurface Soil (>0.5 ft)	10K330232/VP-30	Thorium-232						0.0019	1.11	0
Subsurface Soil (>0.5 ft)	10K330232/VP-30	Uranium-234						0.0228	1.13	0
Subsurface Soil (>0.5 ft)	10K330232/VP-30	Uranium-235						0.000988	0.06	0
Subsurface Soil (>0.5 ft)	10K330232/VP-30	Uranium-238						0.0228	1.18	0
Soil - All Depths	10K330241/VP-32	Actinium-227						0.04564	0.21	0
Soil - All Depths	10K330241/VP-32	Lead-210						0.09128	0	0.09128
Soil - All Depths	10K330241/VP-32	Protactinium-231						0.05216	0.2	0
Soil - All Depths	10K330241/VP-32	Radium-226						0.04564	1.05	0
Soil - All Depths	10K330241/VP-32	Radium-228						0.0023472	0.98	0
Soil - All Depths	10K330241/VP-32	Thorium-228						0.00652	1.18	0
Soil - All Depths	10K330241/VP-32	Thorium-230	16/17	1.2	12	3.52	L	6.52	1.66	4.86

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K330241/VP-32	Thorium-232						0.00652	1.11	0
Soil - All Depths	10K330241/VP-32	Uranium-234						0.07824	1.13	0
Soil - All Depths	10K330241/VP-32	Uranium-235						0.0033904	0.06	0
Soil - All Depths	10K330241/VP-32	Uranium-238						0.07824	1.18	0
Subsurface Soil (>0.5 ft)	10K330241/VP-32	Actinium-227						0.084	0.21	0
Subsurface Soil (>0.5 ft)	10K330241/VP-32	Lead-210						0.168	0	0.168
Subsurface Soil (>0.5 ft)	10K330241/VP-32	Protactinium-231						0.096	0.2	0
Subsurface Soil (>0.5 ft)	10K330241/VP-32	Radium-226						0.084	1.05	0
Subsurface Soil (>0.5 ft)	10K330241/VP-32	Radium-228						0.00432	0.98	0
Subsurface Soil (>0.5 ft)	10K330241/VP-32	Thorium-228						0.012	1.18	0
Subsurface Soil (>0.5 ft)	10K330241/VP-32	Thorium-230	9/10	1.2	12	4.32	L	12	1.66	10.34
Subsurface Soil (>0.5 ft)	10K330241/VP-32	Thorium-232						0.012	1.11	0
Subsurface Soil (>0.5 ft)	10K330241/VP-32	Uranium-234						0.144	1.13	0
Subsurface Soil (>0.5 ft)	10K330241/VP-32	Uranium-235						0.00624	0.06	0
Subsurface Soil (>0.5 ft)	10K330241/VP-32	Uranium-238						0.144	1.18	0
Surface Soil (<0.5 ft)	10K330241/VP-32	Actinium-227						0.02541	0.21	0
Surface Soil (<0.5 ft)	10K330241/VP-32	Lead-210						0.05082	0	0.05082
Surface Soil (<0.5 ft)	10K330241/VP-32	Protactinium-231						0.02904	0.2	0
Surface Soil (<0.5 ft)	10K330241/VP-32	Radium-226						0.02541	1.05	0
Surface Soil (<0.5 ft)	10K330241/VP-32	Radium-228						0.0013068	0.98	0
Surface Soil (<0.5 ft)	10K330241/VP-32	Thorium-228						0.00363	1.18	0
Surface Soil (<0.5 ft)	10K330241/VP-32	Thorium-230	7/7	1.4	4	2.39	L	3.63	1.66	1.97
Surface Soil (<0.5 ft)	10K330241/VP-32	Thorium-232						0.00363	1.11	0
Surface Soil (<0.5 ft)	10K330241/VP-32	Uranium-234						0.04356	1.13	0
Surface Soil (<0.5 ft)	10K330241/VP-32	Uranium-235						0.0018876	0.06	0
Surface Soil (<0.5 ft)	10K330241/VP-32	Uranium-238						0.04356	1.18	0
Soil - All Depths	10K330250/VP-31A	Actinium-227						0.0777	0.21	0
Soil - All Depths	10K330250/VP-31A	Lead-210						0.1554	0	0.1554
Soil - All Depths	10K330250/VP-31A	Protactinium-231						0.0888	0.2	0
Soil - All Depths	10K330250/VP-31A	Radium-226	1/1	1.4	1.4	1.4	D	1.4	1.05	0.35
Soil - All Depths	10K330250/VP-31A	Radium-228						0.003996	0.98	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K330250/VP-31A	Thorium-228						0.0111	1.18	0
Soil - All Depths	10K330250/VP-31A	Thorium-230	10/10	1.7	27	6.37	X	11.1	1.66	9.44
Soil - All Depths	10K330250/VP-31A	Thorium-232	1/1	2	2	2	D	2	1.11	0.89
Soil - All Depths	10K330250/VP-31A	Uranium-234						0.1332	1.13	0
Soil - All Depths	10K330250/VP-31A	Uranium-235						0.005772	0.06	0
Soil - All Depths	10K330250/VP-31A	Uranium-238						0.1332	1.18	0
Soil - All Depths	10K330250/VP-31A	Uranium-238	0/1			5	D		1.18	0
Subsurface Soil (>0.5 ft)	10K330250/VP-31A	Actinium-227						0.0882	0.21	0
Subsurface Soil (>0.5 ft)	10K330250/VP-31A	Lead-210						0.1764	0	0.1764
Subsurface Soil (>0.5 ft)	10K330250/VP-31A	Protactinium-231						0.1008	0.2	0
Subsurface Soil (>0.5 ft)	10K330250/VP-31A	Radium-226						0.0882	1.05	0
Subsurface Soil (>0.5 ft)	10K330250/VP-31A	Radium-228						0.004536	0.98	0
Subsurface Soil (>0.5 ft)	10K330250/VP-31A	Thorium-228						0.0126	1.18	0
Subsurface Soil (>0.5 ft)	10K330250/VP-31A	Thorium-230	7/7	1.7	27	5.71	X	12.6	1.66	10.94
Subsurface Soil (>0.5 ft)	10K330250/VP-31A	Thorium-232						0.0126	1.11	0
Subsurface Soil (>0.5 ft)	10K330250/VP-31A	Uranium-234						0.1512	1.13	0
Subsurface Soil (>0.5 ft)	10K330250/VP-31A	Uranium-235						0.006552	0.06	0
Subsurface Soil (>0.5 ft)	10K330250/VP-31A	Uranium-238						0.1512	1.18	0
Surface Soil (<0.5 ft)	10K330250/VP-31A	Actinium-227						0.098	0.21	0
Surface Soil (<0.5 ft)	10K330250/VP-31A	Lead-210						0.196	0	0.196
Surface Soil (<0.5 ft)	10K330250/VP-31A	Protactinium-231						0.112	0.2	0
Surface Soil (<0.5 ft)	10K330250/VP-31A	Radium-226	1/1	1.4	1.4	1.4	D	1.4	1.05	0.35
Surface Soil (<0.5 ft)	10K330250/VP-31A	Radium-228						0.00504	0.98	0
Surface Soil (<0.5 ft)	10K330250/VP-31A	Thorium-228						0.014	1.18	0
Surface Soil (<0.5 ft)	10K330250/VP-31A	Thorium-230	3/3	3.3	14	7.9	D	14	1.66	12.34
Surface Soil (<0.5 ft)	10K330250/VP-31A	Thorium-232	1/1	2	2	2	D	2	1.11	0.89
Surface Soil (<0.5 ft)	10K330250/VP-31A	Uranium-234						0.168	1.13	0
Surface Soil (<0.5 ft)	10K330250/VP-31A	Uranium-235						0.00728	0.06	0
Surface Soil (<0.5 ft)	10K330250/VP-31A	Uranium-238						0.168	1.18	0
Surface Soil (<0.5 ft)	10K330250/VP-31A	Uranium-238	0/1			5	D		1.18	0
Soil - All Depths	10K330324/VP-34	Actinium-227						0.021	0.21	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K330324/VP-34	Lead-210						0.042	0	0.042
Soil - All Depths	10K330324/VP-34	Protactinium-231						0.024	0.2	0
Soil - All Depths	10K330324/VP-34	Radium-226						0.021	1.05	0
Soil - All Depths	10K330324/VP-34	Radium-228						0.00108	0.98	0
Soil - All Depths	10K330324/VP-34	Thorium-228						0.003	1.18	0
Soil - All Depths	10K330324/VP-34	Thorium-230	4/4	1.8	3	2.4	D	3	1.66	1.34
Soil - All Depths	10K330324/VP-34	Thorium-232						0.003	1.11	0
Soil - All Depths	10K330324/VP-34	Uranium-234						0.036	1.13	0
Soil - All Depths	10K330324/VP-34	Uranium-235						0.00156	0.06	0
Soil - All Depths	10K330324/VP-34	Uranium-238						0.036	1.18	0
Subsurface Soil (>0.5 ft)	10K330324/VP-34	Actinium-227						0.021	0.21	0
Subsurface Soil (>0.5 ft)	10K330324/VP-34	Lead-210						0.042	0	0.042
Subsurface Soil (>0.5 ft)	10K330324/VP-34	Protactinium-231						0.024	0.2	0
Subsurface Soil (>0.5 ft)	10K330324/VP-34	Radium-226						0.021	1.05	0
Subsurface Soil (>0.5 ft)	10K330324/VP-34	Radium-228						0.00108	0.98	0
Subsurface Soil (>0.5 ft)	10K330324/VP-34	Thorium-228						0.003	1.18	0
Subsurface Soil (>0.5 ft)	10K330324/VP-34	Thorium-230	4/4	1.8	3	2.4	D	3	1.66	1.34
Subsurface Soil (>0.5 ft)	10K330324/VP-34	Thorium-232						0.003	1.11	0
Subsurface Soil (>0.5 ft)	10K330324/VP-34	Uranium-234						0.036	1.13	0
Subsurface Soil (>0.5 ft)	10K330324/VP-34	Uranium-235						0.00156	0.06	0
Subsurface Soil (>0.5 ft)	10K330324/VP-34	Uranium-238						0.036	1.18	0
Soil - All Depths	10K330333/VP-33	Actinium-227						0.02093	0.21	0
Soil - All Depths	10K330333/VP-33	Lead-210						0.04186	0	0.04186
Soil - All Depths	10K330333/VP-33	Protactinium-231						0.02392	0.2	0
Soil - All Depths	10K330333/VP-33	Radium-226						0.02093	1.05	0
Soil - All Depths	10K330333/VP-33	Radium-228						0.0010764	0.98	0
Soil - All Depths	10K330333/VP-33	Thorium-228						0.00299	1.18	0
Soil - All Depths	10K330333/VP-33	Thorium-230	4/4	1.3	3.1	2.08	D	2.99	1.66	1.33
Soil - All Depths	10K330333/VP-33	Thorium-232						0.00299	1.11	0
Soil - All Depths	10K330333/VP-33	Uranium-234						0.03588	1.13	0
Soil - All Depths	10K330333/VP-33	Uranium-235						0.0015548	0.06	0
Soil - All Depths	10K330333/VP-33	Uranium-238						0.03588	1.18	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	10K330333/VP-33	Actinium-227						0.02093	0.21	0
Subsurface Soil (>0.5 ft)	10K330333/VP-33	Lead-210						0.04186	0	0.04186
Subsurface Soil (>0.5 ft)	10K330333/VP-33	Protactinium-231						0.02392	0.2	0
Subsurface Soil (>0.5 ft)	10K330333/VP-33	Radium-226						0.02093	1.05	0
Subsurface Soil (>0.5 ft)	10K330333/VP-33	Radium-228						0.0010764	0.98	0
Subsurface Soil (>0.5 ft)	10K330333/VP-33	Thorium-228						0.00299	1.18	0
Subsurface Soil (>0.5 ft)	10K330333/VP-33	Thorium-230	4/4	1.3	3.1	2.08	D	2.99	1.66	1.33
Subsurface Soil (>0.5 ft)	10K330333/VP-33	Thorium-232						0.00299	1.11	0
Subsurface Soil (>0.5 ft)	10K330333/VP-33	Uranium-234						0.03588	1.13	0
Subsurface Soil (>0.5 ft)	10K330333/VP-33	Uranium-235						0.0015548	0.06	0
Subsurface Soil (>0.5 ft)	10K330333/VP-33	Uranium-238						0.03588	1.18	0
Soil - All Depths	10K330342/VP-33	Actinium-227						0.0147	0.21	0
Soil - All Depths	10K330342/VP-33	Lead-210						0.0294	0	0.0294
Soil - All Depths	10K330342/VP-33	Protactinium-231						0.0168	0.2	0
Soil - All Depths	10K330342/VP-33	Radium-226						0.0147	1.05	0
Soil - All Depths	10K330342/VP-33	Radium-228						0.000756	0.98	0
Soil - All Depths	10K330342/VP-33	Thorium-228						0.0021	1.18	0
Soil - All Depths	10K330342/VP-33	Thorium-230	2/2	1.8	2.1	1.95	D	2.1	1.66	0.44
Soil - All Depths	10K330342/VP-33	Thorium-232						0.0021	1.11	0
Soil - All Depths	10K330342/VP-33	Uranium-234						0.0252	1.13	0
Soil - All Depths	10K330342/VP-33	Uranium-235						0.001092	0.06	0
Soil - All Depths	10K330342/VP-33	Uranium-238						0.0252	1.18	0
Subsurface Soil (>0.5 ft)	10K330342/VP-33	Actinium-227						0.0147	0.21	0
Subsurface Soil (>0.5 ft)	10K330342/VP-33	Lead-210						0.0294	0	0.0294
Subsurface Soil (>0.5 ft)	10K330342/VP-33	Protactinium-231						0.0168	0.2	0
Subsurface Soil (>0.5 ft)	10K330342/VP-33	Radium-226						0.0147	1.05	0
Subsurface Soil (>0.5 ft)	10K330342/VP-33	Radium-228						0.000756	0.98	0
Subsurface Soil (>0.5 ft)	10K330342/VP-33	Thorium-228						0.0021	1.18	0
Subsurface Soil (>0.5 ft)	10K330342/VP-33	Thorium-230	2/2	1.8	2.1	1.95	D	2.1	1.66	0.44
Subsurface Soil (>0.5 ft)	10K330342/VP-33	Thorium-232						0.0021	1.11	0
Subsurface Soil (>0.5 ft)	10K330342/VP-33	Uranium-234						0.0252	1.13	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	10K330342/VP-33	Uranium-235						0.001092	0.06	0
Subsurface Soil (>0.5 ft)	10K330342/VP-33	Uranium-238						0.0252	1.18	0
Soil - All Depths	10K330351/VP-28	Actinium-227						0.0273	0.21	0
Soil - All Depths	10K330351/VP-28	Lead-210						0.0546	0	0.0546
Soil - All Depths	10K330351/VP-28	Protactinium-231						0.0312	0.2	0
Soil - All Depths	10K330351/VP-28	Radium-226						0.0273	1.05	0
Soil - All Depths	10K330351/VP-28	Radium-228						0.001404	0.98	0
Soil - All Depths	10K330351/VP-28	Thorium-228						0.0039	1.18	0
Soil - All Depths	10K330351/VP-28	Thorium-230	5/5	1.5	3.9	2.36	L	3.9	1.66	2.24
Soil - All Depths	10K330351/VP-28	Thorium-232						0.0039	1.11	0
Soil - All Depths	10K330351/VP-28	Uranium-234						0.0468	1.13	0
Soil - All Depths	10K330351/VP-28	Uranium-235						0.002028	0.06	0
Soil - All Depths	10K330351/VP-28	Uranium-238						0.0468	1.18	0
Subsurface Soil (>0.5 ft)	10K330351/VP-28	Actinium-227						0.0273	0.21	0
Subsurface Soil (>0.5 ft)	10K330351/VP-28	Lead-210						0.0546	0	0.0546
Subsurface Soil (>0.5 ft)	10K330351/VP-28	Protactinium-231						0.0312	0.2	0
Subsurface Soil (>0.5 ft)	10K330351/VP-28	Radium-226						0.0273	1.05	0
Subsurface Soil (>0.5 ft)	10K330351/VP-28	Radium-228						0.001404	0.98	0
Subsurface Soil (>0.5 ft)	10K330351/VP-28	Thorium-228						0.0039	1.18	0
Subsurface Soil (>0.5 ft)	10K330351/VP-28	Thorium-230	5/5	1.5	3.9	2.36	L	3.9	1.66	2.24
Subsurface Soil (>0.5 ft)	10K330351/VP-28	Thorium-232						0.0039	1.11	0
Subsurface Soil (>0.5 ft)	10K330351/VP-28	Uranium-234						0.0468	1.13	0
Subsurface Soil (>0.5 ft)	10K330351/VP-28	Uranium-235						0.002028	0.06	0
Subsurface Soil (>0.5 ft)	10K330351/VP-28	Uranium-238						0.0468	1.18	0
Soil - All Depths	10K420010/VP-9(C)	Actinium-227						0.04095	0.21	0
Soil - All Depths	10K420010/VP-9(C)	Lead-210						0.0819	0	0.0819
Soil - All Depths	10K420010/VP-9(C)	Protactinium-231						0.0468	0.2	0
Soil - All Depths	10K420010/VP-9(C)	Radium-226	3/4	1.4	1.8	1.45	D	1.8	1.05	0.75
Soil - All Depths	10K420010/VP-9(C)	Radium-228						0.002106	0.98	0
Soil - All Depths	10K420010/VP-9(C)	Thorium-228						0.00585	1.18	0
Soil - All Depths	10K420010/VP-9(C)	Thorium-230	4/4	1	6.5	3.03	D	5.85	1.66	4.19

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K420010/VP-9(C)	Thorium-232	3/4	1	1.3	1.08	D	1.25	1.11	0.14
Soil - All Depths	10K420010/VP-9(C)	Uranium-234						0.0702	1.13	0
Soil - All Depths	10K420010/VP-9(C)	Uranium-235						0.003042	0.06	0
Soil - All Depths	10K420010/VP-9(C)	Uranium-238	0/4			7.5	D	10.3	1.18	9.12
Surface Soil (<0.5 ft)	10K420010/VP-9(C)	Actinium-227						0.04095	0.21	0
Surface Soil (<0.5 ft)	10K420010/VP-9(C)	Lead-210						0.0819	0	0.0819
Surface Soil (<0.5 ft)	10K420010/VP-9(C)	Protactinium-231						0.0468	0.2	0
Surface Soil (<0.5 ft)	10K420010/VP-9(C)	Radium-226	3/4	1.4	1.8	1.45	D	1.8	1.05	0.75
Surface Soil (<0.5 ft)	10K420010/VP-9(C)	Radium-228						0.002106	0.98	0
Surface Soil (<0.5 ft)	10K420010/VP-9(C)	Thorium-228						0.00585	1.18	0
Surface Soil (<0.5 ft)	10K420010/VP-9(C)	Thorium-230	4/4	1	6.5	3.03	D	5.85	1.66	4.19
Surface Soil (<0.5 ft)	10K420010/VP-9(C)	Thorium-232	3/4	1	1.3	1.08	D	1.25	1.11	0.14
Surface Soil (<0.5 ft)	10K420010/VP-9(C)	Uranium-234						0.0702	1.13	0
Surface Soil (<0.5 ft)	10K420010/VP-9(C)	Uranium-235						0.003042	0.06	0
Surface Soil (<0.5 ft)	10K420010/VP-9(C)	Uranium-238	0/4			7.5	D	10.3	1.18	9.12
Soil - All Depths	10K430042/VP-63	Actinium-227						0.0182	0.21	0
Soil - All Depths	10K430042/VP-63	Lead-210						0.0364	0	0.0364
Soil - All Depths	10K430042/VP-63	Protactinium-231						0.0208	0.2	0
Soil - All Depths	10K430042/VP-63	Radium-226						0.0182	1.05	0
Soil - All Depths	10K430042/VP-63	Radium-228						0.000936	0.98	0
Soil - All Depths	10K430042/VP-63	Thorium-228						0.0026	1.18	0
Soil - All Depths	10K430042/VP-63	Thorium-230	1/1	2.6	2.6	2.6	D	2.6	1.66	0.94
Soil - All Depths	10K430042/VP-63	Thorium-232						0.0026	1.11	0
Soil - All Depths	10K430042/VP-63	Uranium-234						0.0312	1.13	0
Soil - All Depths	10K430042/VP-63	Uranium-235						0.001352	0.06	0
Soil - All Depths	10K430042/VP-63	Uranium-238						0.0312	1.18	0
Surface Soil (<0.5 ft)	10K430042/VP-63	Actinium-227						0.0182	0.21	0
Surface Soil (<0.5 ft)	10K430042/VP-63	Lead-210						0.0364	0	0.0364
Surface Soil (<0.5 ft)	10K430042/VP-63	Protactinium-231						0.0208	0.2	0
Surface Soil (<0.5 ft)	10K430042/VP-63	Radium-226						0.0182	1.05	0
Surface Soil (<0.5 ft)	10K430042/VP-63	Radium-228						0.000936	0.98	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	10K430042/VP-63	Thorium-228						0.0026	1.18	0
Surface Soil (<0.5 ft)	10K430042/VP-63	Thorium-230	1/1	2.6	2.6	2.6	D	2.6	1.66	0.94
Surface Soil (<0.5 ft)	10K430042/VP-63	Thorium-232						0.0026	1.11	0
Surface Soil (<0.5 ft)	10K430042/VP-63	Uranium-234						0.0312	1.13	0
Surface Soil (<0.5 ft)	10K430042/VP-63	Uranium-235						0.001352	0.06	0
Surface Soil (<0.5 ft)	10K430042/VP-63	Uranium-238						0.0312	1.18	0
Soil - All Depths	10K440074/VP-8(C)	Actinium-227						0.0805	0.21	0
Soil - All Depths	10K440074/VP-8(C)	Lead-210						0.161	0	0.161
Soil - All Depths	10K440074/VP-8(C)	Protactinium-231						0.092	0.2	0
Soil - All Depths	10K440074/VP-8(C)	Radium-226	31/34	0.4	2.8	1.55	N	1.73	1.05	0.68
Soil - All Depths	10K440074/VP-8(C)	Radium-228						0.00414	0.98	0
Soil - All Depths	10K440074/VP-8(C)	Thorium-228						0.0115	1.18	0
Soil - All Depths	10K440074/VP-8(C)	Thorium-230	33/33	1	40	7.62	L	11.5	1.66	9.84
Soil - All Depths	10K440074/VP-8(C)	Thorium-232	27/34	0.9	4	1.9	L	2.2	1.11	1.09
Soil - All Depths	10K440074/VP-8(C)	Uranium-234						0.138	1.13	0
Soil - All Depths	10K440074/VP-8(C)	Uranium-235						0.00598	0.06	0
Soil - All Depths	10K440074/VP-8(C)	Uranium-238	3/34	3	4.2	6.38	D	4.2	1.18	3.02
Subsurface Soil (>0.5 ft)	10K440074/VP-8(C)	Actinium-227						0.1624	0.21	0
Subsurface Soil (>0.5 ft)	10K440074/VP-8(C)	Lead-210						0.3248	0	0.3248
Subsurface Soil (>0.5 ft)	10K440074/VP-8(C)	Protactinium-231						0.1856	0.2	0
Subsurface Soil (>0.5 ft)	10K440074/VP-8(C)	Radium-226	11/13	0.5	2.7	1.32	L	1.93	1.05	0.88
Subsurface Soil (>0.5 ft)	10K440074/VP-8(C)	Radium-228						0.008352	0.98	0
Subsurface Soil (>0.5 ft)	10K440074/VP-8(C)	Thorium-228						0.0232	1.18	0
Subsurface Soil (>0.5 ft)	10K440074/VP-8(C)	Thorium-230	12/12	1.1	40	8.26	L	23.2	1.66	21.54
Subsurface Soil (>0.5 ft)	10K440074/VP-8(C)	Thorium-232	8/13	0.9	3	1.42	L	1.72	1.11	0.61
Subsurface Soil (>0.5 ft)	10K440074/VP-8(C)	Uranium-234						0.2784	1.13	0
Subsurface Soil (>0.5 ft)	10K440074/VP-8(C)	Uranium-235						0.012064	0.06	0
Subsurface Soil (>0.5 ft)	10K440074/VP-8(C)	Uranium-238	0/13			6.41	D	7.47	1.18	6.29
Surface Soil (<0.5 ft)	10K440074/VP-8(C)	Actinium-227						0.0868	0.21	0
Surface Soil (<0.5 ft)	10K440074/VP-8(C)	Lead-210						0.1736	0	0.1736
Surface Soil (<0.5 ft)	10K440074/VP-8(C)	Protactinium-231						0.0992	0.2	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	10K440074/VP-8(C)	Radium-226	20/21	0.4	2.8	1.69	N	1.9	1.05	0.85
Surface Soil (<0.5 ft)	10K440074/VP-8(C)	Radium-228						0.004464	0.98	0
Surface Soil (<0.5 ft)	10K440074/VP-8(C)	Thorium-228						0.0124	1.18	0
Surface Soil (<0.5 ft)	10K440074/VP-8(C)	Thorium-230	21/21	1	23	7.25	L	12.4	1.66	10.74
Surface Soil (<0.5 ft)	10K440074/VP-8(C)	Thorium-232	19/21	1	4	2.2	L	2.66	1.11	1.55
Surface Soil (<0.5 ft)	10K440074/VP-8(C)	Uranium-234						0.1488	1.13	0
Surface Soil (<0.5 ft)	10K440074/VP-8(C)	Uranium-235						0.006448	0.06	0
Surface Soil (<0.5 ft)	10K440074/VP-8(C)	Uranium-238	3/21	3	4.2	6.36	D	4.2	1.18	3.02
Soil - All Depths	10K440096	Actinium-227						0.06349	0.21	0
Soil - All Depths	10K440096	Lead-210						0.12698	0	0.12698
Soil - All Depths	10K440096	Protactinium-231						0.07256	0.2	0
Soil - All Depths	10K440096	Radium-226	43/46	0.4	2.5	1.41	N	1.53	1.05	0.48
Soil - All Depths	10K440096	Radium-228						0.0032652	0.98	0
Soil - All Depths	10K440096	Thorium-228						0.00907	1.18	0
Soil - All Depths	10K440096	Thorium-230	46/46	0.8	61	6.13	X	9.07	1.66	7.41
Soil - All Depths	10K440096	Thorium-232	34/46	0.7	5	1.59	X	1.8	1.11	0.69
Soil - All Depths	10K440096	Uranium-234						0.10884	1.13	0
Soil - All Depths	10K440096	Uranium-235						0.0047164	0.06	0
Soil - All Depths	10K440096	Uranium-238	1/46	4.8	4.8	6.21	D	4.8	1.18	3.62
Subsurface Soil (>0.5 ft)	10K440096	Actinium-227						0.364	0.21	0.154
Subsurface Soil (>0.5 ft)	10K440096	Lead-210						0.728	0	0.728
Subsurface Soil (>0.5 ft)	10K440096	Protactinium-231						0.416	0.2	0.216
Subsurface Soil (>0.5 ft)	10K440096	Radium-226	7/7	0.7	2.2	1.24	L	1.89	1.05	0.84
Subsurface Soil (>0.5 ft)	10K440096	Radium-228						0.01872	0.98	0
Subsurface Soil (>0.5 ft)	10K440096	Thorium-228						0.052	1.18	0
Subsurface Soil (>0.5 ft)	10K440096	Thorium-230	7/7	1.6	52	14.6	L	52	1.66	50.34
Subsurface Soil (>0.5 ft)	10K440096	Thorium-232	4/7	0.9	1.9	1.19	D	1.44	1.11	0.33
Subsurface Soil (>0.5 ft)	10K440096	Uranium-234						0.624	1.13	0
Subsurface Soil (>0.5 ft)	10K440096	Uranium-235						0.02704	0.06	0
Subsurface Soil (>0.5 ft)	10K440096	Uranium-238	0/7			5	D	6.59	1.18	5.41
Surface Soil (<0.5 ft)	10K440096	Actinium-227						0.05117	0.21	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	10K440096	Lead-210						0.10234	0	0.10234
Surface Soil (<0.5 ft)	10K440096	Protactinium-231						0.05848	0.2	0
Surface Soil (<0.5 ft)	10K440096	Radium-226	36/39	0.4	2.5	1.44	N	1.57	1.05	0.52
Surface Soil (<0.5 ft)	10K440096	Radium-228						0.0026316	0.98	0
Surface Soil (<0.5 ft)	10K440096	Thorium-228						0.00731	1.18	0
Surface Soil (<0.5 ft)	10K440096	Thorium-230	39/39	0.8	61	4.62	X	7.31	1.66	5.65
Surface Soil (<0.5 ft)	10K440096	Thorium-232	30/39	0.7	5	1.67	L	1.98	1.11	0.87
Surface Soil (<0.5 ft)	10K440096	Uranium-234						0.08772	1.13	0
Surface Soil (<0.5 ft)	10K440096	Uranium-235						0.0038012	0.06	0
Surface Soil (<0.5 ft)	10K440096	Uranium-238	1/39	4.8	4.8	6.43	D	4.8	1.18	3.62
Soil - All Depths	10K440104/VP-6(C)	Actinium-227						0.0133	0.21	0
Soil - All Depths	10K440104/VP-6(C)	Lead-210						0.0266	0	0.0266
Soil - All Depths	10K440104/VP-6(C)	Protactinium-231						0.0152	0.2	0
Soil - All Depths	10K440104/VP-6(C)	Radium-226	2/2	1.1	1.5	1.3	D	1.5	1.05	0.45
Soil - All Depths	10K440104/VP-6(C)	Radium-228						0.000684	0.98	0
Soil - All Depths	10K440104/VP-6(C)	Thorium-228						0.0019	1.18	0
Soil - All Depths	10K440104/VP-6(C)	Thorium-230	2/2	1.1	1.9	1.5	D	1.9	1.66	0.24
Soil - All Depths	10K440104/VP-6(C)	Thorium-232	2/2	1.6	1.8	1.7	D	1.8	1.11	0.69
Soil - All Depths	10K440104/VP-6(C)	Uranium-234						0.0228	1.13	0
Soil - All Depths	10K440104/VP-6(C)	Uranium-235						0.000988	0.06	0
Soil - All Depths	10K440104/VP-6(C)	Uranium-238	0/2			5.85	D	6.8	1.18	5.62
Surface Soil (<0.5 ft)	10K440104/VP-6(C)	Actinium-227						0.0133	0.21	0
Surface Soil (<0.5 ft)	10K440104/VP-6(C)	Lead-210						0.0266	0	0.0266
Surface Soil (<0.5 ft)	10K440104/VP-6(C)	Protactinium-231						0.0152	0.2	0
Surface Soil (<0.5 ft)	10K440104/VP-6(C)	Radium-226	2/2	1.1	1.5	1.3	D	1.5	1.05	0.45
Surface Soil (<0.5 ft)	10K440104/VP-6(C)	Radium-228						0.000684	0.98	0
Surface Soil (<0.5 ft)	10K440104/VP-6(C)	Thorium-228						0.0019	1.18	0
Surface Soil (<0.5 ft)	10K440104/VP-6(C)	Thorium-230	2/2	1.1	1.9	1.5	D	1.9	1.66	0.24
Surface Soil (<0.5 ft)	10K440104/VP-6(C)	Thorium-232	2/2	1.6	1.8	1.7	D	1.8	1.11	0.69
Surface Soil (<0.5 ft)	10K440104/VP-6(C)	Uranium-234						0.0228	1.13	0
Surface Soil (<0.5 ft)	10K440104/VP-6(C)	Uranium-235						0.000988	0.06	0
Surface Soil (<0.5 ft)	10K440104/VP-6(C)	Uranium-238	0/2			5.85	D	6.8	1.18	5.62

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K440113/VP-7(C)	Actinium-227						0.0364	0.21	0
Soil - All Depths	10K440113/VP-7(C)	Lead-210						0.0728	0	0.0728
Soil - All Depths	10K440113/VP-7(C)	Protactinium-231						0.0416	0.2	0
Soil - All Depths	10K440113/VP-7(C)	Radium-226	2/2	1.2	1.7	1.45	D	1.7	1.05	0.65
Soil - All Depths	10K440113/VP-7(C)	Radium-228						0.001872	0.98	0
Soil - All Depths	10K440113/VP-7(C)	Thorium-228						0.0052	1.18	0
Soil - All Depths	10K440113/VP-7(C)	Thorium-230	2/2	1.2	5.2	3.2	D	5.2	1.66	3.54
Soil - All Depths	10K440113/VP-7(C)	Thorium-232	1/2	3	3	1.7	D	3	1.11	1.89
Soil - All Depths	10K440113/VP-7(C)	Uranium-234						0.0624	1.13	0
Soil - All Depths	10K440113/VP-7(C)	Uranium-235						0.002704	0.06	0
Soil - All Depths	10K440113/VP-7(C)	Uranium-238	0/2			9.5	D	31.6	1.18	30.42
Surface Soil (<0.5 ft)	10K440113/VP-7(C)	Actinium-227						0.0364	0.21	0
Surface Soil (<0.5 ft)	10K440113/VP-7(C)	Lead-210						0.0728	0	0.0728
Surface Soil (<0.5 ft)	10K440113/VP-7(C)	Protactinium-231						0.0416	0.2	0
Surface Soil (<0.5 ft)	10K440113/VP-7(C)	Radium-226	2/2	1.2	1.7	1.45	D	1.7	1.05	0.65
Surface Soil (<0.5 ft)	10K440113/VP-7(C)	Radium-228						0.001872	0.98	0
Surface Soil (<0.5 ft)	10K440113/VP-7(C)	Thorium-228						0.0052	1.18	0
Surface Soil (<0.5 ft)	10K440113/VP-7(C)	Thorium-230	2/2	1.2	5.2	3.2	D	5.2	1.66	3.54
Surface Soil (<0.5 ft)	10K440113/VP-7(C)	Thorium-232	1/2	3	3	1.7	D	3	1.11	1.89
Surface Soil (<0.5 ft)	10K440113/VP-7(C)	Uranium-234						0.0624	1.13	0
Surface Soil (<0.5 ft)	10K440113/VP-7(C)	Uranium-235						0.002704	0.06	0
Surface Soil (<0.5 ft)	10K440113/VP-7(C)	Uranium-238	0/2			9.5	D	31.6	1.18	30.42
Soil - All Depths	10K510067/VP-6(L)	Actinium-227						0.04116	0.21	0
Soil - All Depths	10K510067/VP-6(L)	Lead-210						0.08232	0	0.08232
Soil - All Depths	10K510067/VP-6(L)	Protactinium-231						0.04704	0.2	0
Soil - All Depths	10K510067/VP-6(L)	Radium-226	84/88	0.4	3	1.49	N	1.58	1.05	0.53
Soil - All Depths	10K510067/VP-6(L)	Radium-228						0.0021168	0.98	0
Soil - All Depths	10K510067/VP-6(L)	Thorium-228						0.00588	1.18	0
Soil - All Depths	10K510067/VP-6(L)	Thorium-230	83/84	1	40	4.86	X	5.88	1.66	4.22
Soil - All Depths	10K510067/VP-6(L)	Thorium-232	80/88	0.8	4	1.97	X	2.11	1.11	1
Soil - All Depths	10K510067/VP-6(L)	Uranium-234						0.07056	1.13	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K510067/VP-6(L)	Uranium-235						0.0030576	0.06	0
Soil - All Depths	10K510067/VP-6(L)	Uranium-238	0/88			8.36	D	8.81	1.18	7.63
Subsurface Soil (>0.5 ft)	10K510067/VP-6(L)	Actinium-227						0.04585	0.21	0
Subsurface Soil (>0.5 ft)	10K510067/VP-6(L)	Lead-210						0.0917	0	0.0917
Subsurface Soil (>0.5 ft)	10K510067/VP-6(L)	Protactinium-231						0.0524	0.2	0
Subsurface Soil (>0.5 ft)	10K510067/VP-6(L)	Radium-226	15/16	1	2.2	1.63	N	1.81	1.05	0.76
Subsurface Soil (>0.5 ft)	10K510067/VP-6(L)	Radium-228						0.002358	0.98	0
Subsurface Soil (>0.5 ft)	10K510067/VP-6(L)	Thorium-228						0.00655	1.18	0
Subsurface Soil (>0.5 ft)	10K510067/VP-6(L)	Thorium-230	12/13	1.2	9.6	3.66	L	6.55	1.66	4.89
Subsurface Soil (>0.5 ft)	10K510067/VP-6(L)	Thorium-232	15/16	0.9	4	2.44	L	3.17	1.11	2.06
Subsurface Soil (>0.5 ft)	10K510067/VP-6(L)	Uranium-234						0.0786	1.13	0
Subsurface Soil (>0.5 ft)	10K510067/VP-6(L)	Uranium-235						0.003406	0.06	0
Subsurface Soil (>0.5 ft)	10K510067/VP-6(L)	Uranium-238	0/16			8.06	D	9.3	1.18	8.12
Surface Soil (<0.5 ft)	10K510067/VP-6(L)	Actinium-227						0.04389	0.21	0
Surface Soil (<0.5 ft)	10K510067/VP-6(L)	Lead-210						0.08778	0	0.08778
Surface Soil (<0.5 ft)	10K510067/VP-6(L)	Protactinium-231						0.05016	0.2	0
Surface Soil (<0.5 ft)	10K510067/VP-6(L)	Radium-226	69/72	0.4	3	1.46	L	1.58	1.05	0.53
Surface Soil (<0.5 ft)	10K510067/VP-6(L)	Radium-228						0.0022572	0.98	0
Surface Soil (<0.5 ft)	10K510067/VP-6(L)	Thorium-228						0.00627	1.18	0
Surface Soil (<0.5 ft)	10K510067/VP-6(L)	Thorium-230	71/71	1	40	5.08	X	6.27	1.66	4.61
Surface Soil (<0.5 ft)	10K510067/VP-6(L)	Thorium-232	65/72	0.8	4	1.87	X	2	1.11	0.89
Surface Soil (<0.5 ft)	10K510067/VP-6(L)	Uranium-234						0.07524	1.13	0
Surface Soil (<0.5 ft)	10K510067/VP-6(L)	Uranium-235						0.0032604	0.06	0
Surface Soil (<0.5 ft)	10K510067/VP-6(L)	Uranium-238	0/72			8.43	D	8.91	1.18	7.73
Soil - All Depths	10K520022/VP-3(L)	Actinium-227						0.2674	0.21	0.0574
Soil - All Depths	10K520022/VP-3(L)	Lead-210						0.5348	0	0.5348
Soil - All Depths	10K520022/VP-3(L)	Protactinium-231						0.3056	0.2	0.1056
Soil - All Depths	10K520022/VP-3(L)	Radium-226	94/94	0.6	10	1.83	X	2.03	1.05	0.98
Soil - All Depths	10K520022/VP-3(L)	Radium-228						0.013752	0.98	0
Soil - All Depths	10K520022/VP-3(L)	Thorium-228						0.0382	1.18	0
Soil - All Depths	10K520022/VP-3(L)	Thorium-230	113/113	0.2	1200	19.6	X	38.2	1.66	36.54

Attachment 5. Soil Summary Statistics for Radionuclides (Page 43 of 84)

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K520022/VP-3(L)	Thorium-232	82/94	0.9	5	1.99	X	2.14	1.11	1.03
Soil - All Depths	10K520022/VP-3(L)	Uranium-234						0.4584	1.13	0
Soil - All Depths	10K520022/VP-3(L)	Uranium-235						0.019864	0.06	0
Soil - All Depths	10K520022/VP-3(L)	Uranium-238	1/94	17	17	9.93	D	10.9	1.18	9.72
Subsurface Soil (>0.5 ft)	10K520022/VP-3(L)	Actinium-227						0.2863	0.21	0.0763
Subsurface Soil (>0.5 ft)	10K520022/VP-3(L)	Lead-210						0.5726	0	0.5726
Subsurface Soil (>0.5 ft)	10K520022/VP-3(L)	Protactinium-231						0.3272	0.2	0.1272
Subsurface Soil (>0.5 ft)	10K520022/VP-3(L)	Radium-226	77/77	0.6	10	1.83	X	2.06	1.05	1.01
Subsurface Soil (>0.5 ft)	10K520022/VP-3(L)	Radium-228						0.014724	0.98	0
Subsurface Soil (>0.5 ft)	10K520022/VP-3(L)	Thorium-228						0.0409	1.18	0
Subsurface Soil (>0.5 ft)	10K520022/VP-3(L)	Thorium-230	83/83	0.5	1200	16.9	X	40.9	1.66	39.24
Subsurface Soil (>0.5 ft)	10K520022/VP-3(L)	Thorium-232	68/77	0.9	5	2.03	X	2.19	1.11	1.08
Subsurface Soil (>0.5 ft)	10K520022/VP-3(L)	Uranium-234						0.4908	1.13	0
Subsurface Soil (>0.5 ft)	10K520022/VP-3(L)	Uranium-235						0.021268	0.06	0
Subsurface Soil (>0.5 ft)	10K520022/VP-3(L)	Uranium-238	1/77	17	17	10.2	D	11.4	1.18	10.22
Surface Soil (<0.5 ft)	10K520022/VP-3(L)	Actinium-227						0.4445	0.21	0.2345
Surface Soil (<0.5 ft)	10K520022/VP-3(L)	Lead-210						0.889	0	0.889
Surface Soil (<0.5 ft)	10K520022/VP-3(L)	Protactinium-231						0.508	0.2	0.308
Surface Soil (<0.5 ft)	10K520022/VP-3(L)	Radium-226	17/17	1.1	4.2	1.85	X	2.19	1.05	1.14
Surface Soil (<0.5 ft)	10K520022/VP-3(L)	Radium-228						0.02286	0.98	0
Surface Soil (<0.5 ft)	10K520022/VP-3(L)	Thorium-228						0.0635	1.18	0
Surface Soil (<0.5 ft)	10K520022/VP-3(L)	Thorium-230	30/30	0.2	390	27	L	63.5	1.66	61.84
Surface Soil (<0.5 ft)	10K520022/VP-3(L)	Thorium-232	14/17	1.1	4	1.81	X	2.2	1.11	1.09
Surface Soil (<0.5 ft)	10K520022/VP-3(L)	Uranium-234						0.762	1.13	0
Surface Soil (<0.5 ft)	10K520022/VP-3(L)	Uranium-235						0.03302	0.06	0
Surface Soil (<0.5 ft)	10K520022/VP-3(L)	Uranium-238	0/17			8.88	D	9.96	1.18	8.78
Soil - All Depths	10K520033/VP-5(L)	Actinium-227						0.01645	0.21	0
Soil - All Depths	10K520033/VP-5(L)	Lead-210						0.0329	0	0.0329
Soil - All Depths	10K520033/VP-5(L)	Protactinium-231						0.0188	0.2	0
Soil - All Depths	10K520033/VP-5(L)	Radium-226	77/77	0.7	4	1.7	L	1.82	1.05	0.77
Soil - All Depths	10K520033/VP-5(L)	Radium-228						0.000846	0.98	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K520033/VP-5(L)	Thorium-228						0.00235	1.18	0
Soil - All Depths	10K520033/VP-5(L)	Thorium-230	79/81	0.6	12	2	X	2.35	1.66	0.69
Soil - All Depths	10K520033/VP-5(L)	Thorium-232	72/77	0.8	7	2.24	X	2.44	1.11	1.33
Soil - All Depths	10K520033/VP-5(L)	Uranium-234						0.0282	1.13	0
Soil - All Depths	10K520033/VP-5(L)	Uranium-235						0.001222	0.06	0
Soil - All Depths	10K520033/VP-5(L)	Uranium-238	0/77			10.2	D	11.1	1.18	9.92
Subsurface Soil (>0.5 ft)	10K520033/VP-5(L)	Actinium-227						0.01288	0.21	0
Subsurface Soil (>0.5 ft)	10K520033/VP-5(L)	Lead-210						0.02576	0	0.02576
Subsurface Soil (>0.5 ft)	10K520033/VP-5(L)	Protactinium-231						0.01472	0.2	0
Subsurface Soil (>0.5 ft)	10K520033/VP-5(L)	Radium-226	65/65	0.9	4	1.76	X	1.9	1.05	0.85
Subsurface Soil (>0.5 ft)	10K520033/VP-5(L)	Radium-228						0.0006624	0.98	0
Subsurface Soil (>0.5 ft)	10K520033/VP-5(L)	Thorium-228						0.00184	1.18	0
Subsurface Soil (>0.5 ft)	10K520033/VP-5(L)	Thorium-230	65/66	0.6	7.2	1.61	X	1.84	1.66	0.18
Subsurface Soil (>0.5 ft)	10K520033/VP-5(L)	Thorium-232	60/65	1	7	2.36	X	2.59	1.11	1.48
Subsurface Soil (>0.5 ft)	10K520033/VP-5(L)	Uranium-234						0.02208	1.13	0
Subsurface Soil (>0.5 ft)	10K520033/VP-5(L)	Uranium-235						0.0009568	0.06	0
Subsurface Soil (>0.5 ft)	10K520033/VP-5(L)	Uranium-238	0/65			10.6	D	11.6	1.18	10.42
Surface Soil (<0.5 ft)	10K520033/VP-5(L)	Actinium-227						0.05481	0.21	0
Surface Soil (<0.5 ft)	10K520033/VP-5(L)	Lead-210						0.10962	0	0.10962
Surface Soil (<0.5 ft)	10K520033/VP-5(L)	Protactinium-231						0.06264	0.2	0
Surface Soil (<0.5 ft)	10K520033/VP-5(L)	Radium-226	12/12	0.7	1.9	1.37	L	1.72	1.05	0.67
Surface Soil (<0.5 ft)	10K520033/VP-5(L)	Radium-228						0.0028188	0.98	0
Surface Soil (<0.5 ft)	10K520033/VP-5(L)	Thorium-228						0.00783	1.18	0
Surface Soil (<0.5 ft)	10K520033/VP-5(L)	Thorium-230	14/15	1.2	12	3.73	L	7.83	1.66	6.17
Surface Soil (<0.5 ft)	10K520033/VP-5(L)	Thorium-232	12/12	0.8	3	1.58	L	1.96	1.11	0.85
Surface Soil (<0.5 ft)	10K520033/VP-5(L)	Uranium-234						0.09396	1.13	0
Surface Soil (<0.5 ft)	10K520033/VP-5(L)	Uranium-235						0.0040716	0.06	0
Surface Soil (<0.5 ft)	10K520033/VP-5(L)	Uranium-238	0/12			8	D	9.36	1.18	8.18
Soil - All Depths	10K520044/VP-4(L)	Actinium-227						0.1491	0.21	0
Soil - All Depths	10K520044/VP-4(L)	Lead-210						0.2982	0	0.2982
Soil - All Depths	10K520044/VP-4(L)	Protactinium-231						0.1704	0.2	0

Attachment 5. Soil Summary Statistics for Radionuclides (Page 45 of 84)

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K520044/VP-4(L)	Radium-226	91/91	0.5	10	1.77	X	1.97	1.05	0.92
Soil - All Depths	10K520044/VP-4(L)	Radium-228						0.007668	0.98	0
Soil - All Depths	10K520044/VP-4(L)	Thorium-228						0.0213	1.18	0
Soil - All Depths	10K520044/VP-4(L)	Thorium-230	90/91	0.7	460	11.5	X	21.3	1.66	19.64
Soil - All Depths	10K520044/VP-4(L)	Thorium-232	81/91	0.5	4	1.83	X	1.97	1.11	0.86
Soil - All Depths	10K520044/VP-4(L)	Uranium-234						0.2556	1.13	0
Soil - All Depths	10K520044/VP-4(L)	Uranium-235						0.011076	0.06	0
Soil - All Depths	10K520044/VP-4(L)	Uranium-238	0/91			8.7	D	9.38	1.18	8.2
Subsurface Soil (>0.5 ft)	10K520044/VP-4(L)	Actinium-227						0.091	0.21	0
Subsurface Soil (>0.5 ft)	10K520044/VP-4(L)	Lead-210						0.182	0	0.182
Subsurface Soil (>0.5 ft)	10K520044/VP-4(L)	Protactinium-231						0.104	0.2	0
Subsurface Soil (>0.5 ft)	10K520044/VP-4(L)	Radium-226	75/75	0.5	7	1.66	L	1.8	1.05	0.75
Subsurface Soil (>0.5 ft)	10K520044/VP-4(L)	Radium-228						0.00468	0.98	0
Subsurface Soil (>0.5 ft)	10K520044/VP-4(L)	Thorium-228						0.013	1.18	0
Subsurface Soil (>0.5 ft)	10K520044/VP-4(L)	Thorium-230	74/75	0.7	280	6.78	X	13	1.66	11.34
Subsurface Soil (>0.5 ft)	10K520044/VP-4(L)	Thorium-232	70/75	0.5	4	1.9	L	2.1	1.11	0.99
Subsurface Soil (>0.5 ft)	10K520044/VP-4(L)	Uranium-234						0.156	1.13	0
Subsurface Soil (>0.5 ft)	10K520044/VP-4(L)	Uranium-235						0.00676	0.06	0
Subsurface Soil (>0.5 ft)	10K520044/VP-4(L)	Uranium-238	0/75			8.76	D	9.54	1.18	8.36
Surface Soil (<0.5 ft)	10K520044/VP-4(L)	Actinium-227						0.5859	0.21	0.3759
Surface Soil (<0.5 ft)	10K520044/VP-4(L)	Lead-210						1.1718	0	1.1718
Surface Soil (<0.5 ft)	10K520044/VP-4(L)	Protactinium-231						0.6696	0.2	0.4696
Surface Soil (<0.5 ft)	10K520044/VP-4(L)	Radium-226	16/16	1.2	10	2.26	X	3.18	1.05	2.13
Surface Soil (<0.5 ft)	10K520044/VP-4(L)	Radium-228						0.030132	0.98	0
Surface Soil (<0.5 ft)	10K520044/VP-4(L)	Thorium-228						0.0837	1.18	0
Surface Soil (<0.5 ft)	10K520044/VP-4(L)	Thorium-230	16/16	1.2	460	33.9	X	83.7	1.66	82.04
Surface Soil (<0.5 ft)	10K520044/VP-4(L)	Thorium-232	11/16	1	3	1.52	X	1.81	1.11	0.7
Surface Soil (<0.5 ft)	10K520044/VP-4(L)	Uranium-234						1.0044	1.13	0
Surface Soil (<0.5 ft)	10K520044/VP-4(L)	Uranium-235						0.043524	0.06	0
Surface Soil (<0.5 ft)	10K520044/VP-4(L)	Uranium-238	0/16			8.44	D	9.69	1.18	8.51
Soil - All Depths	10K520066/VP-37	Actinium-227						0.1715	0.21	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K520066/VP-37	Lead-210						0.343	0	0.343
Soil - All Depths	10K520066/VP-37	Protactinium-231						0.196	0.2	0
Soil - All Depths	10K520066/VP-37	Radium-226	69/69	0.6	2.7	1.55	N	1.64	1.05	0.59
Soil - All Depths	10K520066/VP-37	Radium-228						0.00882	0.98	0
Soil - All Depths	10K520066/VP-37	Thorium-228						0.0245	1.18	0
Soil - All Depths	10K520066/VP-37	Thorium-230	91/92	0.6	600	13.1	X	24.5	1.66	22.84
Soil - All Depths	10K520066/VP-37	Thorium-232	63/69	0.6	4	1.95	L	2.15	1.11	1.04
Soil - All Depths	10K520066/VP-37	Uranium-234						0.294	1.13	0
Soil - All Depths	10K520066/VP-37	Uranium-235						0.01274	0.06	0
Soil - All Depths	10K520066/VP-37	Uranium-238	0/68			8.41	D	9.06	1.18	7.88
Subsurface Soil (>0.5 ft)	10K520066/VP-37	Actinium-227						0.04417	0.21	0
Subsurface Soil (>0.5 ft)	10K520066/VP-37	Lead-210						0.08834	0	0.08834
Subsurface Soil (>0.5 ft)	10K520066/VP-37	Protactinium-231						0.05048	0.2	0
Subsurface Soil (>0.5 ft)	10K520066/VP-37	Radium-226	63/63	0.6	2.7	1.56	N	1.66	1.05	0.61
Subsurface Soil (>0.5 ft)	10K520066/VP-37	Radium-228						0.0022716	0.98	0
Subsurface Soil (>0.5 ft)	10K520066/VP-37	Thorium-228						0.00631	1.18	0
Subsurface Soil (>0.5 ft)	10K520066/VP-37	Thorium-230	76/77	0.6	74	4.11	X	6.31	1.66	4.65
Subsurface Soil (>0.5 ft)	10K520066/VP-37	Thorium-232	59/63	0.6	4	1.96	L	2.17	1.11	1.06
Subsurface Soil (>0.5 ft)	10K520066/VP-37	Uranium-234						0.07572	1.13	0
Subsurface Soil (>0.5 ft)	10K520066/VP-37	Uranium-235						0.0032812	0.06	0
Subsurface Soil (>0.5 ft)	10K520066/VP-37	Uranium-238	0/62			8.34	D	9.03	1.18	7.85
Surface Soil (<0.5 ft)	10K520066/VP-37	Actinium-227						0.917	0.21	0.707
Surface Soil (<0.5 ft)	10K520066/VP-37	Lead-210						1.834	0	1.834
Surface Soil (<0.5 ft)	10K520066/VP-37	Protactinium-231						1.048	0.2	0.848
Surface Soil (<0.5 ft)	10K520066/VP-37	Radium-226	6/6	1.1	2.1	1.47	L	1.94	1.05	0.89
Surface Soil (<0.5 ft)	10K520066/VP-37	Radium-228						0.04716	0.98	0
Surface Soil (<0.5 ft)	10K520066/VP-37	Thorium-228						0.131	1.18	0
Surface Soil (<0.5 ft)	10K520066/VP-37	Thorium-230	15/15	1.2	600	59.1	X	131	1.66	129.34
Surface Soil (<0.5 ft)	10K520066/VP-37	Thorium-232	4/6	1.5	3	1.87	D	2.62	1.11	1.51
Surface Soil (<0.5 ft)	10K520066/VP-37	Uranium-234						1.572	1.13	0.442
Surface Soil (<0.5 ft)	10K520066/VP-37	Uranium-235						0.06812	0.06	0.00812
Surface Soil (<0.5 ft)	10K520066/VP-37	Uranium-238	0/6			9.17	D	11.4	1.18	10.22

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K520165	Actinium-227						0.077	0.21	0
Soil - All Depths	10K520165	Lead-210						0.154	0	0.154
Soil - All Depths	10K520165	Protactinium-231						0.088	0.2	0
Soil - All Depths	10K520165	Radium-226	3/3	2.1	2.5	2.33	D	2.5	1.05	1.45
Soil - All Depths	10K520165	Radium-228						0.00396	0.98	0
Soil - All Depths	10K520165	Thorium-228						0.011	1.18	0
Soil - All Depths	10K520165	Thorium-230	5/5	1.2	11	3.92	L	11	1.66	9.34
Soil - All Depths	10K520165	Thorium-232	3/3	2.5	3.7	2.97	D	3.7	1.11	2.59
Soil - All Depths	10K520165	Uranium-234						0.132	1.13	0
Soil - All Depths	10K520165	Uranium-235						0.00572	0.06	0
Soil - All Depths	10K520165	Uranium-238	3/3	9.9	11.8	10.8	D	11.8	1.18	10.62
Surface Soil (<0.5 ft)	10K520165	Actinium-227						0.077	0.21	0
Surface Soil (<0.5 ft)	10K520165	Lead-210						0.154	0	0.154
Surface Soil (<0.5 ft)	10K520165	Protactinium-231						0.088	0.2	0
Surface Soil (<0.5 ft)	10K520165	Radium-226	3/3	2.1	2.5	2.33	D	2.5	1.05	1.45
Surface Soil (<0.5 ft)	10K520165	Radium-228						0.00396	0.98	0
Surface Soil (<0.5 ft)	10K520165	Thorium-228						0.011	1.18	0
Surface Soil (<0.5 ft)	10K520165	Thorium-230	5/5	1.2	11	3.92	L	11	1.66	9.34
Surface Soil (<0.5 ft)	10K520165	Thorium-232	3/3	2.5	3.7	2.97	D	3.7	1.11	2.59
Surface Soil (<0.5 ft)	10K520165	Uranium-234						0.132	1.13	0
Surface Soil (<0.5 ft)	10K520165	Uranium-235						0.00572	0.06	0
Surface Soil (<0.5 ft)	10K520165	Uranium-238	3/3	9.9	11.8	10.8	D	11.8	1.18	10.62
Soil - All Depths	10K530076	Actinium-227						0.0441	0.21	0
Soil - All Depths	10K530076	Lead-210						0.0882	0	0.0882
Soil - All Depths	10K530076	Protactinium-231						0.0504	0.2	0
Soil - All Depths	10K530076	Radium-226						0.0441	1.05	0
Soil - All Depths	10K530076	Radium-228						0.002268	0.98	0
Soil - All Depths	10K530076	Thorium-228						0.0063	1.18	0
Soil - All Depths	10K530076	Thorium-230	4/4	2.2	6.3	4.13	D	6.3	1.66	4.64
Soil - All Depths	10K530076	Thorium-232						0.0063	1.11	0
Soil - All Depths	10K530076	Uranium-234						0.0756	1.13	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K530076	Uranium-235						0.003276	0.06	0
Soil - All Depths	10K530076	Uranium-238						0.0756	1.18	0
Surface Soil (<0.5 ft)	10K530076	Actinium-227						0.0441	0.21	0
Surface Soil (<0.5 ft)	10K530076	Lead-210						0.0882	0	0.0882
Surface Soil (<0.5 ft)	10K530076	Protactinium-231						0.0504	0.2	0
Surface Soil (<0.5 ft)	10K530076	Radium-226						0.0441	1.05	0
Surface Soil (<0.5 ft)	10K530076	Radium-228						0.002268	0.98	0
Surface Soil (<0.5 ft)	10K530076	Thorium-228						0.0063	1.18	0
Surface Soil (<0.5 ft)	10K530076	Thorium-230	4/4	2.2	6.3	4.13	D	6.3	1.66	4.64
Surface Soil (<0.5 ft)	10K530076	Thorium-232						0.0063	1.11	0
Surface Soil (<0.5 ft)	10K530076	Uranium-234						0.0756	1.13	0
Surface Soil (<0.5 ft)	10K530076	Uranium-235						0.003276	0.06	0
Surface Soil (<0.5 ft)	10K530076	Uranium-238						0.0756	1.18	0
Soil - All Depths	10K530087	Actinium-227						0.3899	0.21	0.1799
Soil - All Depths	10K530087	Lead-210						0.7798	0	0.7798
Soil - All Depths	10K530087	Protactinium-231						0.4456	0.2	0.2456
Soil - All Depths	10K530087	Radium-226	50/50	0.7	11	1.85	X	2.2	1.05	1.15
Soil - All Depths	10K530087	Radium-228						0.020052	0.98	0
Soil - All Depths	10K530087	Thorium-228						0.0557	1.18	0
Soil - All Depths	10K530087	Thorium-230	62/62	0.8	750	33.9	X	55.7	1.66	54.04
Soil - All Depths	10K530087	Thorium-232	47/50	0.7	4	1.83	L	2.04	1.11	0.93
Soil - All Depths	10K530087	Uranium-234						0.6684	1.13	0
Soil - All Depths	10K530087	Uranium-235						0.028964	0.06	0
Soil - All Depths	10K530087	Uranium-238	1/50	18	18	9.06	D	9.83	1.18	8.65
Subsurface Soil (>0.5 ft)	10K530087	Actinium-227						0.04144	0.21	0
Subsurface Soil (>0.5 ft)	10K530087	Lead-210						0.08288	0	0.08288
Subsurface Soil (>0.5 ft)	10K530087	Protactinium-231						0.04736	0.2	0
Subsurface Soil (>0.5 ft)	10K530087	Radium-226	32/32	0.7	2.5	1.42	N	1.55	1.05	0.5
Subsurface Soil (>0.5 ft)	10K530087	Radium-228						0.0021312	0.98	0
Subsurface Soil (>0.5 ft)	10K530087	Thorium-228						0.00592	1.18	0
Subsurface Soil (>0.5 ft)	10K530087	Thorium-230	33/33	0.9	44	3.72	X	5.92	1.66	4.26

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	10K530087	Thorium-232	29/32	1	2.6	1.61	X	1.76	1.11	0.65
Subsurface Soil (>0.5 ft)	10K530087	Uranium-234						0.07104	1.13	0
Subsurface Soil (>0.5 ft)	10K530087	Uranium-235						0.0030784	0.06	0
Subsurface Soil (>0.5 ft)	10K530087	Uranium-238	0/32			8.06	D	8.89	1.18	7.71
Surface Soil (<0.5 ft)	10K530087	Actinium-227						2.506	0.21	2.296
Surface Soil (<0.5 ft)	10K530087	Lead-210						5.012	0	5.012
Surface Soil (<0.5 ft)	10K530087	Protactinium-231						2.864	0.2	2.664
Surface Soil (<0.5 ft)	10K530087	Radium-226	18/18	1	11	2.61	X	3.52	1.05	2.47
Surface Soil (<0.5 ft)	10K530087	Radium-228						0.12888	0.98	0
Surface Soil (<0.5 ft)	10K530087	Thorium-228						0.358	1.18	0
Surface Soil (<0.5 ft)	10K530087	Thorium-230	29/29	0.8	750	68.2	L	358	1.66	356.34
Surface Soil (<0.5 ft)	10K530087	Thorium-232	18/18	0.7	4	2.22	N	2.61	1.11	1.5
Surface Soil (<0.5 ft)	10K530087	Uranium-234						4.296	1.13	3.166
Surface Soil (<0.5 ft)	10K530087	Uranium-235						0.18616	0.06	0.12616
Surface Soil (<0.5 ft)	10K530087	Uranium-238	1/18	18	18	10.8	D	12.2	1.18	11.02
Soil - All Depths	10K530098/VP-1(L)	Actinium-227						0.4844	0.21	0.2744
Soil - All Depths	10K530098/VP-1(L)	Lead-210						0.9688	0	0.9688
Soil - All Depths	10K530098/VP-1(L)	Protactinium-231						0.5536	0.2	0.3536
Soil - All Depths	10K530098/VP-1(L)	Radium-226	24/24	0.68	2.8	1.77	N	1.97	1.05	0.92
Soil - All Depths	10K530098/VP-1(L)	Radium-228						0.024912	0.98	0
Soil - All Depths	10K530098/VP-1(L)	Thorium-228						0.0692	1.18	0
Soil - All Depths	10K530098/VP-1(L)	Thorium-230	102/102	0.7	810	48.6	X	69.2	1.66	67.54
Soil - All Depths	10K530098/VP-1(L)	Thorium-232	20/24	0.47	5	1.64	L	2.08	1.11	0.97
Soil - All Depths	10K530098/VP-1(L)	Uranium-234						0.8304	1.13	0
Soil - All Depths	10K530098/VP-1(L)	Uranium-235						0.035984	0.06	0
Soil - All Depths	10K530098/VP-1(L)	Uranium-238	2/24	4.5	5.8	8.44	D	5.8	1.18	4.62
Subsurface Soil (>0.5 ft)	10K530098/VP-1(L)	Actinium-227						0.04956	0.21	0
Subsurface Soil (>0.5 ft)	10K530098/VP-1(L)	Lead-210						0.09912	0	0.09912
Subsurface Soil (>0.5 ft)	10K530098/VP-1(L)	Protactinium-231						0.05664	0.2	0
Subsurface Soil (>0.5 ft)	10K530098/VP-1(L)	Radium-226	15/15	0.68	2.3	1.51	N	1.71	1.05	0.66
Subsurface Soil (>0.5 ft)	10K530098/VP-1(L)	Radium-228						0.0025488	0.98	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	10K530098/VP-1(L)	Thorium-228						0.00708	1.18	0
Subsurface Soil (>0.5 ft)	10K530098/VP-1(L)	Thorium-230	65/65	0.7	67	4.9	X	7.08	1.66	5.42
Subsurface Soil (>0.5 ft)	10K530098/VP-1(L)	Thorium-232	14/15	0.7	3	1.54	L	1.95	1.11	0.84
Subsurface Soil (>0.5 ft)	10K530098/VP-1(L)	Uranium-234						0.08496	1.13	0
Subsurface Soil (>0.5 ft)	10K530098/VP-1(L)	Uranium-235						0.0036816	0.06	0
Subsurface Soil (>0.5 ft)	10K530098/VP-1(L)	Uranium-238	2/15	4.5	5.8	7.62	D	5.8	1.18	4.62
Surface Soil (<0.5 ft)	10K530098/VP-1(L)	Actinium-227						1.239	0.21	1.029
Surface Soil (<0.5 ft)	10K530098/VP-1(L)	Lead-210						2.478	0	2.478
Surface Soil (<0.5 ft)	10K530098/VP-1(L)	Protactinium-231						1.416	0.2	1.216
Surface Soil (<0.5 ft)	10K530098/VP-1(L)	Radium-226	9/9	1.1	2.8	2.21	N	2.54	1.05	1.49
Surface Soil (<0.5 ft)	10K530098/VP-1(L)	Radium-228						0.06372	0.98	0
Surface Soil (<0.5 ft)	10K530098/VP-1(L)	Thorium-228						0.177	1.18	0
Surface Soil (<0.5 ft)	10K530098/VP-1(L)	Thorium-230	37/37	0.9	810	125	X	177	1.66	175.34
Surface Soil (<0.5 ft)	10K530098/VP-1(L)	Thorium-232	6/9	0.47	5	1.81	L	4.19	1.11	3.08
Surface Soil (<0.5 ft)	10K530098/VP-1(L)	Uranium-234						2.124	1.13	0.994
Surface Soil (<0.5 ft)	10K530098/VP-1(L)	Uranium-235						0.09204	0.06	0.03204
Surface Soil (<0.5 ft)	10K530098/VP-1(L)	Uranium-238	0/9			9.8	D	12.3	1.18	11.12
Soil - All Depths	10K540031/VP-41	Actinium-227						0.01652	0.21	0
Soil - All Depths	10K540031/VP-41	Lead-210						0.03304	0	0.03304
Soil - All Depths	10K540031/VP-41	Protactinium-231						0.01888	0.2	0
Soil - All Depths	10K540031/VP-41	Radium-226						0.01652	1.05	0
Soil - All Depths	10K540031/VP-41	Radium-228						0.0008496	0.98	0
Soil - All Depths	10K540031/VP-41	Thorium-228						0.00236	1.18	0
Soil - All Depths	10K540031/VP-41	Thorium-230	24/24	0.8	5.6	2	L	2.36	1.66	0.7
Soil - All Depths	10K540031/VP-41	Thorium-232						0.00236	1.11	0
Soil - All Depths	10K540031/VP-41	Uranium-234						0.02832	1.13	0
Soil - All Depths	10K540031/VP-41	Uranium-235						0.0012272	0.06	0
Soil - All Depths	10K540031/VP-41	Uranium-238						0.02832	1.18	0
Subsurface Soil (>0.5 ft)	10K540031/VP-41	Actinium-227						0.01652	0.21	0
Subsurface Soil (>0.5 ft)	10K540031/VP-41	Lead-210						0.03304	0	0.03304
Subsurface Soil (>0.5 ft)	10K540031/VP-41	Protactinium-231						0.01888	0.2	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	10K540031/VP-41	Radium-226						0.01652	1.05	0
Subsurface Soil (>0.5 ft)	10K540031/VP-41	Radium-228						0.0008496	0.98	0
Subsurface Soil (>0.5 ft)	10K540031/VP-41	Thorium-228						0.00236	1.18	0
Subsurface Soil (>0.5 ft)	10K540031/VP-41	Thorium-230	24/24	0.8	5.6	2	L	2.36	1.66	0.7
Subsurface Soil (>0.5 ft)	10K540031/VP-41	Thorium-232						0.00236	1.11	0
Subsurface Soil (>0.5 ft)	10K540031/VP-41	Uranium-234						0.02832	1.13	0
Subsurface Soil (>0.5 ft)	10K540031/VP-41	Uranium-235						0.0012272	0.06	0
Subsurface Soil (>0.5 ft)	10K540031/VP-41	Uranium-238						0.02832	1.18	0
Soil - All Depths	10K540075/VP-43	Actinium-227						0.01071	0.21	0
Soil - All Depths	10K540075/VP-43	Lead-210						0.02142	0	0.02142
Soil - All Depths	10K540075/VP-43	Protactinium-231						0.01224	0.2	0
Soil - All Depths	10K540075/VP-43	Radium-226						0.01071	1.05	0
Soil - All Depths	10K540075/VP-43	Radium-228						0.0005508	0.98	0
Soil - All Depths	10K540075/VP-43	Thorium-228						0.00153	1.18	0
Soil - All Depths	10K540075/VP-43	Thorium-230	0/2			0.9	D	1.53	1.66	0
Soil - All Depths	10K540075/VP-43	Thorium-232						0.00153	1.11	0
Soil - All Depths	10K540075/VP-43	Uranium-234						0.01836	1.13	0
Soil - All Depths	10K540075/VP-43	Uranium-235						0.0007956	0.06	0
Soil - All Depths	10K540075/VP-43	Uranium-238						0.01836	1.18	0
Subsurface Soil (>0.5 ft)	10K540075/VP-43	Actinium-227						0.01071	0.21	0
Subsurface Soil (>0.5 ft)	10K540075/VP-43	Lead-210						0.02142	0	0.02142
Subsurface Soil (>0.5 ft)	10K540075/VP-43	Protactinium-231						0.01224	0.2	0
Subsurface Soil (>0.5 ft)	10K540075/VP-43	Radium-226						0.01071	1.05	0
Subsurface Soil (>0.5 ft)	10K540075/VP-43	Radium-228						0.0005508	0.98	0
Subsurface Soil (>0.5 ft)	10K540075/VP-43	Thorium-228						0.00153	1.18	0
Subsurface Soil (>0.5 ft)	10K540075/VP-43	Thorium-230	0/2			0.9	D	1.53	1.66	0
Subsurface Soil (>0.5 ft)	10K540075/VP-43	Thorium-232						0.00153	1.11	0
Subsurface Soil (>0.5 ft)	10K540075/VP-43	Uranium-234						0.01836	1.13	0
Subsurface Soil (>0.5 ft)	10K540075/VP-43	Uranium-235						0.0007956	0.06	0
Subsurface Soil (>0.5 ft)	10K540075/VP-43	Uranium-238						0.01836	1.18	0
Soil - All Depths	10K540097/VP-38	Actinium-227						0.03213	0.21	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K540097/VP-38	Lead-210						0.06426	0	0.06426
Soil - All Depths	10K540097/VP-38	Protactinium-231						0.03672	0.2	0
Soil - All Depths	10K540097/VP-38	Radium-226	165/166	0.6	5	1.59	L	1.67	1.05	0.62
Soil - All Depths	10K540097/VP-38	Radium-228						0.0016524	0.98	0
Soil - All Depths	10K540097/VP-38	Thorium-228						0.00459	1.18	0
Soil - All Depths	10K540097/VP-38	Thorium-230	233/237	0.5	150	3.33	X	4.59	1.66	2.93
Soil - All Depths	10K540097/VP-38	Thorium-232	143/166	0.9	5	2.06	X	2.17	1.11	1.06
Soil - All Depths	10K540097/VP-38	Uranium-234						0.05508	1.13	0
Soil - All Depths	10K540097/VP-38	Uranium-235						0.0023868	0.06	0
Soil - All Depths	10K540097/VP-38	Uranium-238	0/166			9.59	D	10.1	1.18	8.92
Subsurface Soil (>0.5 ft)	10K540097/VP-38	Actinium-227						0.02478	0.21	0
Subsurface Soil (>0.5 ft)	10K540097/VP-38	Lead-210						0.04956	0	0.04956
Subsurface Soil (>0.5 ft)	10K540097/VP-38	Protactinium-231						0.02832	0.2	0
Subsurface Soil (>0.5 ft)	10K540097/VP-38	Radium-226	135/136	0.6	3	1.52	X	1.6	1.05	0.55
Subsurface Soil (>0.5 ft)	10K540097/VP-38	Radium-228						0.0012744	0.98	0
Subsurface Soil (>0.5 ft)	10K540097/VP-38	Thorium-228						0.00354	1.18	0
Subsurface Soil (>0.5 ft)	10K540097/VP-38	Thorium-230	196/200	0.5	69	2.69	X	3.54	1.66	1.88
Subsurface Soil (>0.5 ft)	10K540097/VP-38	Thorium-232	115/136	1	5	2.08	X	2.21	1.11	1.1
Subsurface Soil (>0.5 ft)	10K540097/VP-38	Uranium-234						0.04248	1.13	0
Subsurface Soil (>0.5 ft)	10K540097/VP-38	Uranium-235						0.0018408	0.06	0
Subsurface Soil (>0.5 ft)	10K540097/VP-38	Uranium-238	0/136			9.58	D	10.2	1.18	9.02
Surface Soil (<0.5 ft)	10K540097/VP-38	Actinium-227						0.0945	0.21	0
Surface Soil (<0.5 ft)	10K540097/VP-38	Lead-210						0.189	0	0.189
Surface Soil (<0.5 ft)	10K540097/VP-38	Protactinium-231						0.108	0.2	0
Surface Soil (<0.5 ft)	10K540097/VP-38	Radium-226	30/30	0.9	5	1.89	L	2.15	1.05	1.1
Surface Soil (<0.5 ft)	10K540097/VP-38	Radium-228						0.00486	0.98	0
Surface Soil (<0.5 ft)	10K540097/VP-38	Thorium-228						0.0135	1.18	0
Surface Soil (<0.5 ft)	10K540097/VP-38	Thorium-230	37/37	1	150	6.79	X	13.5	1.66	11.84
Surface Soil (<0.5 ft)	10K540097/VP-38	Thorium-232	28/30	0.9	3	1.97	X	2.16	1.11	1.05
Surface Soil (<0.5 ft)	10K540097/VP-38	Uranium-234						0.162	1.13	0
Surface Soil (<0.5 ft)	10K540097/VP-38	Uranium-235						0.00702	0.06	0
Surface Soil (<0.5 ft)	10K540097/VP-38	Uranium-238	0/30			9.63	D	10.6	1.18	9.42

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K610178/VP-35	Actinium-227						0.01589	0.21	0
Soil - All Depths	10K610178/VP-35	Lead-210						0.03178	0	0.03178
Soil - All Depths	10K610178/VP-35	Protactinium-231						0.01816	0.2	0
Soil - All Depths	10K610178/VP-35	Radium-226	217/218	0.7	3.2	1.65	L	1.71	1.05	0.66
Soil - All Depths	10K610178/VP-35	Radium-228						0.0008172	0.98	0
Soil - All Depths	10K610178/VP-35	Thorium-228						0.00227	1.18	0
Soil - All Depths	10K610178/VP-35	Thorium-230	229/230	0.8	18	2.1	X	2.27	1.66	0.61
Soil - All Depths	10K610178/VP-35	Thorium-232	209/218	0.8	5	2.04	X	2.12	1.11	1.01
Soil - All Depths	10K610178/VP-35	Uranium-234						0.02724	1.13	0
Soil - All Depths	10K610178/VP-35	Uranium-235						0.0011804	0.06	0
Soil - All Depths	10K610178/VP-35	Uranium-238	1/218	10.6	10.6	9.57	D	9.9	1.18	8.72
Subsurface Soil (>0.5 ft)	10K610178/VP-35	Actinium-227						0.01547	0.21	0
Subsurface Soil (>0.5 ft)	10K610178/VP-35	Lead-210						0.03094	0	0.03094
Subsurface Soil (>0.5 ft)	10K610178/VP-35	Protactinium-231						0.01768	0.2	0
Subsurface Soil (>0.5 ft)	10K610178/VP-35	Radium-226	21/21	0.7	2.7	1.54	L	1.78	1.05	0.73
Subsurface Soil (>0.5 ft)	10K610178/VP-35	Radium-228						0.0007956	0.98	0
Subsurface Soil (>0.5 ft)	10K610178/VP-35	Thorium-228						0.00221	1.18	0
Subsurface Soil (>0.5 ft)	10K610178/VP-35	Thorium-230	31/31	0.8	5.5	1.91	L	2.21	1.66	0.55
Subsurface Soil (>0.5 ft)	10K610178/VP-35	Thorium-232	21/21	0.8	5	2.21	L	2.72	1.11	1.61
Subsurface Soil (>0.5 ft)	10K610178/VP-35	Uranium-234						0.02652	1.13	0
Subsurface Soil (>0.5 ft)	10K610178/VP-35	Uranium-235						0.0011492	0.06	0
Subsurface Soil (>0.5 ft)	10K610178/VP-35	Uranium-238	0/21			10.1	D	11.2	1.18	10.02
Surface Soil (<0.5 ft)	10K610178/VP-35	Actinium-227						0.01624	0.21	0
Surface Soil (<0.5 ft)	10K610178/VP-35	Lead-210						0.03248	0	0.03248
Surface Soil (<0.5 ft)	10K610178/VP-35	Protactinium-231						0.01856	0.2	0
Surface Soil (<0.5 ft)	10K610178/VP-35	Radium-226	196/197	0.7	3.2	1.66	L	1.72	1.05	0.67
Surface Soil (<0.5 ft)	10K610178/VP-35	Radium-228						0.0008352	0.98	0
Surface Soil (<0.5 ft)	10K610178/VP-35	Thorium-228						0.00232	1.18	0
Surface Soil (<0.5 ft)	10K610178/VP-35	Thorium-230	198/199	0.8	18	2.13	X	2.32	1.66	0.66
Surface Soil (<0.5 ft)	10K610178/VP-35	Thorium-232	188/197	0.8	5	2.02	X	2.1	1.11	0.99
Surface Soil (<0.5 ft)	10K610178/VP-35	Uranium-234						0.02784	1.13	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	10K610178/VP-35	Uranium-235						0.0012064	0.06	0
Surface Soil (<0.5 ft)	10K610178/VP-35	Uranium-238	1/197	10.6	10.6	9.51	D	9.85	1.18	8.67
Soil - All Depths	10K610189/VP-36	Actinium-227						0.01617	0.21	0
Soil - All Depths	10K610189/VP-36	Lead-210						0.03234	0	0.03234
Soil - All Depths	10K610189/VP-36	Protactinium-231						0.01848	0.2	0
Soil - All Depths	10K610189/VP-36	Radium-226						0.01617	1.05	0
Soil - All Depths	10K610189/VP-36	Radium-228						0.0008316	0.98	0
Soil - All Depths	10K610189/VP-36	Thorium-228						0.00231	1.18	0
Soil - All Depths	10K610189/VP-36	Thorium-230	11/11	1.5	2.7	2.03	L	2.31	1.66	0.65
Soil - All Depths	10K610189/VP-36	Thorium-232						0.00231	1.11	0
Soil - All Depths	10K610189/VP-36	Uranium-234						0.02772	1.13	0
Soil - All Depths	10K610189/VP-36	Uranium-235						0.0012012	0.06	0
Soil - All Depths	10K610189/VP-36	Uranium-238						0.02772	1.18	0
Subsurface Soil (>0.5 ft)	10K610189/VP-36	Actinium-227						0.01617	0.21	0
Subsurface Soil (>0.5 ft)	10K610189/VP-36	Lead-210						0.03234	0	0.03234
Subsurface Soil (>0.5 ft)	10K610189/VP-36	Protactinium-231						0.01848	0.2	0
Subsurface Soil (>0.5 ft)	10K610189/VP-36	Radium-226						0.01617	1.05	0
Subsurface Soil (>0.5 ft)	10K610189/VP-36	Radium-228						0.0008316	0.98	0
Subsurface Soil (>0.5 ft)	10K610189/VP-36	Thorium-228						0.00231	1.18	0
Subsurface Soil (>0.5 ft)	10K610189/VP-36	Thorium-230	11/11	1.5	2.7	2.03	L	2.31	1.66	0.65
Subsurface Soil (>0.5 ft)	10K610189/VP-36	Thorium-232						0.00231	1.11	0
Subsurface Soil (>0.5 ft)	10K610189/VP-36	Uranium-234						0.02772	1.13	0
Subsurface Soil (>0.5 ft)	10K610189/VP-36	Uranium-235						0.0012012	0.06	0
Subsurface Soil (>0.5 ft)	10K610189/VP-36	Uranium-238						0.02772	1.18	0
Soil - All Depths	10K620412	Actinium-227						0.0462	0.21	0
Soil - All Depths	10K620412	Lead-210						0.0924	0	0.0924
Soil - All Depths	10K620412	Protactinium-231						0.0528	0.2	0
Soil - All Depths	10K620412	Radium-226	3/3	1.1	1.7	1.43	D	1.7	1.05	0.65
Soil - All Depths	10K620412	Radium-228						0.002376	0.98	0
Soil - All Depths	10K620412	Thorium-228						0.0066	1.18	0
Soil - All Depths	10K620412	Thorium-230	2/3	2.3	6.6	3.1	D	6.6	1.66	4.94

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10K620412	Thorium-232	3/3	1.1	1.3	1.17	D	1.3	1.11	0.19
Soil - All Depths	10K620412	Uranium-234						0.0792	1.13	0
Soil - All Depths	10K620412	Uranium-235						0.003432	0.06	0
Soil - All Depths	10K620412	Uranium-238	1/3	2.5	2.5	2.8	D	2.5	1.18	1.32
Surface Soil (<0.5 ft)	10K620412	Actinium-227						0.0462	0.21	0
Surface Soil (<0.5 ft)	10K620412	Lead-210						0.0924	0	0.0924
Surface Soil (<0.5 ft)	10K620412	Protactinium-231						0.0528	0.2	0
Surface Soil (<0.5 ft)	10K620412	Radium-226	3/3	1.1	1.7	1.43	D	1.7	1.05	0.65
Surface Soil (<0.5 ft)	10K620412	Radium-228						0.002376	0.98	0
Surface Soil (<0.5 ft)	10K620412	Thorium-228						0.0066	1.18	0
Surface Soil (<0.5 ft)	10K620412	Thorium-230	2/3	2.3	6.6	3.1	D	6.6	1.66	4.94
Surface Soil (<0.5 ft)	10K620412	Thorium-232	3/3	1.1	1.3	1.17	D	1.3	1.11	0.19
Surface Soil (<0.5 ft)	10K620412	Uranium-234						0.0792	1.13	0
Surface Soil (<0.5 ft)	10K620412	Uranium-235						0.003432	0.06	0
Surface Soil (<0.5 ft)	10K620412	Uranium-238	1/3	2.5	2.5	2.8	D	2.5	1.18	1.32
Soil - All Depths	10K620452	Actinium-227						0.0056	0.21	0
Soil - All Depths	10K620452	Lead-210						0.0112	0	0.0112
Soil - All Depths	10K620452	Protactinium-231						0.0064	0.2	0
Soil - All Depths	10K620452	Radium-226	1/1	1	1	1	D	1	1.05	0
Soil - All Depths	10K620452	Radium-228						0.000288	0.98	0
Soil - All Depths	10K620452	Thorium-228						0.0008	1.18	0
Soil - All Depths	10K620452	Thorium-230	1/1	0.8	0.8	0.8	D	0.8	1.66	0
Soil - All Depths	10K620452	Thorium-232	1/1	0.9	0.9	0.9	D	0.9	1.11	0
Soil - All Depths	10K620452	Uranium-234						0.0096	1.13	0
Soil - All Depths	10K620452	Uranium-235						0.000416	0.06	0
Soil - All Depths	10K620452	Uranium-238						0.0096	1.18	0
Soil - All Depths	10K620452	Uranium-238	0/1			3.3	D		1.18	0
Surface Soil (<0.5 ft)	10K620452	Actinium-227						0.0056	0.21	0
Surface Soil (<0.5 ft)	10K620452	Lead-210						0.0112	0	0.0112
Surface Soil (<0.5 ft)	10K620452	Protactinium-231						0.0064	0.2	0
Surface Soil (<0.5 ft)	10K620452	Radium-226	1/1	1	1	1	D	1	1.05	0

Attachment 5. Soil Summary Statistics for Radionuclides (Page 56 of 84)

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	10K620452	Radium-228						0.000288	0.98	0
Surface Soil (<0.5 ft)	10K620452	Thorium-228						0.0008	1.18	0
Surface Soil (<0.5 ft)	10K620452	Thorium-230	1/1	0.8	0.8	0.8	D	0.8	1.66	0
Surface Soil (<0.5 ft)	10K620452	Thorium-232	1/1	0.9	0.9	0.9	D	0.9	1.11	0
Surface Soil (<0.5 ft)	10K620452	Uranium-234						0.0096	1.13	0
Surface Soil (<0.5 ft)	10K620452	Uranium-235						0.000416	0.06	0
Surface Soil (<0.5 ft)	10K620452	Uranium-238						0.0096	1.18	0
Surface Soil (<0.5 ft)	10K620452	Uranium-238	0/1			3.3	D		1.18	0
Soil - All Depths	10K630363/VP-39	Actinium-227						0.03108	0.21	0
Soil - All Depths	10K630363/VP-39	Lead-210						0.06216	0	0.06216
Soil - All Depths	10K630363/VP-39	Protactinium-231						0.03552	0.2	0
Soil - All Depths	10K630363/VP-39	Radium-226	99/100	0.6	5	1.43	L	1.53	1.05	0.48
Soil - All Depths	10K630363/VP-39	Radium-228						0.0015984	0.98	0
Soil - All Depths	10K630363/VP-39	Thorium-228						0.00444	1.18	0
Soil - All Depths	10K630363/VP-39	Thorium-230	127/130	0.8	52	3.32	X	4.44	1.66	2.78
Soil - All Depths	10K630363/VP-39	Thorium-232	93/100	0.8	5	1.87	X	2.01	1.11	0.9
Soil - All Depths	10K630363/VP-39	Uranium-234						0.05328	1.13	0
Soil - All Depths	10K630363/VP-39	Uranium-235						0.0023088	0.06	0
Soil - All Depths	10K630363/VP-39	Uranium-238	0/101			8.79	D	9.55	1.18	8.37
Subsurface Soil (>0.5 ft)	10K630363/VP-39	Actinium-227						0.0175	0.21	0
Subsurface Soil (>0.5 ft)	10K630363/VP-39	Lead-210						0.035	0	0.035
Subsurface Soil (>0.5 ft)	10K630363/VP-39	Protactinium-231						0.02	0.2	0
Subsurface Soil (>0.5 ft)	10K630363/VP-39	Radium-226	77/78	0.6	5	1.5	L	1.63	1.05	0.58
Subsurface Soil (>0.5 ft)	10K630363/VP-39	Radium-228						0.0009	0.98	0
Subsurface Soil (>0.5 ft)	10K630363/VP-39	Thorium-228						0.0025	1.18	0
Subsurface Soil (>0.5 ft)	10K630363/VP-39	Thorium-230	98/101	0.8	14	2.12	X	2.5	1.66	0.84
Subsurface Soil (>0.5 ft)	10K630363/VP-39	Thorium-232	72/78	0.9	5	1.97	X	2.14	1.11	1.03
Subsurface Soil (>0.5 ft)	10K630363/VP-39	Uranium-234						0.03	1.13	0
Subsurface Soil (>0.5 ft)	10K630363/VP-39	Uranium-235						0.0013	0.06	0
Subsurface Soil (>0.5 ft)	10K630363/VP-39	Uranium-238	0/78			9.37	D	10.3	1.18	9.12
Surface Soil (<0.5 ft)	10K630363/VP-39	Actinium-227						0.0861	0.21	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	10K630363/VP-39	Lead-210						0.1722	0	0.1722
Surface Soil (<0.5 ft)	10K630363/VP-39	Protactinium-231						0.0984	0.2	0
Surface Soil (<0.5 ft)	10K630363/VP-39	Radium-226	22/22	0.6	1.8	1.16	L	1.33	1.05	0.28
Surface Soil (<0.5 ft)	10K630363/VP-39	Radium-228						0.004428	0.98	0
Surface Soil (<0.5 ft)	10K630363/VP-39	Thorium-228						0.0123	1.18	0
Surface Soil (<0.5 ft)	10K630363/VP-39	Thorium-230	29/29	0.9	52	7.48	X	12.3	1.66	10.64
Surface Soil (<0.5 ft)	10K630363/VP-39	Thorium-232	21/22	0.8	2.8	1.49	L	1.77	1.11	0.66
Surface Soil (<0.5 ft)	10K630363/VP-39	Uranium-234						0.1476	1.13	0
Surface Soil (<0.5 ft)	10K630363/VP-39	Uranium-235						0.006396	0.06	0
Surface Soil (<0.5 ft)	10K630363/VP-39	Uranium-238	0/23			6.83	D	7.89	1.18	6.71
Soil - All Depths	10L220893/VP-1	Actinium-227						0.0126	0.21	0
Soil - All Depths	10L220893/VP-1	Lead-210						0.0252	0	0.0252
Soil - All Depths	10L220893/VP-1	Protactinium-231						0.0144	0.2	0
Soil - All Depths	10L220893/VP-1	Radium-226						0.0126	1.05	0
Soil - All Depths	10L220893/VP-1	Radium-228						0.000648	0.98	0
Soil - All Depths	10L220893/VP-1	Thorium-228						0.0018	1.18	0
Soil - All Depths	10L220893/VP-1	Thorium-230	3/3	0.8	1.8	1.23	D	1.8	1.66	0.14
Soil - All Depths	10L220893/VP-1	Thorium-232						0.0018	1.11	0
Soil - All Depths	10L220893/VP-1	Uranium-234						0.0216	1.13	0
Soil - All Depths	10L220893/VP-1	Uranium-235						0.000936	0.06	0
Soil - All Depths	10L220893/VP-1	Uranium-238						0.0216	1.18	0
Subsurface Soil (>0.5 ft)	10L220893/VP-1	Actinium-227						0.0126	0.21	0
Subsurface Soil (>0.5 ft)	10L220893/VP-1	Lead-210						0.0252	0	0.0252
Subsurface Soil (>0.5 ft)	10L220893/VP-1	Protactinium-231						0.0144	0.2	0
Subsurface Soil (>0.5 ft)	10L220893/VP-1	Radium-226						0.0126	1.05	0
Subsurface Soil (>0.5 ft)	10L220893/VP-1	Radium-228						0.000648	0.98	0
Subsurface Soil (>0.5 ft)	10L220893/VP-1	Thorium-228						0.0018	1.18	0
Subsurface Soil (>0.5 ft)	10L220893/VP-1	Thorium-230	3/3	0.8	1.8	1.23	D	1.8	1.66	0.14
Subsurface Soil (>0.5 ft)	10L220893/VP-1	Thorium-232						0.0018	1.11	0
Subsurface Soil (>0.5 ft)	10L220893/VP-1	Uranium-234						0.0216	1.13	0
Subsurface Soil (>0.5 ft)	10L220893/VP-1	Uranium-235						0.000936	0.06	0
Subsurface Soil (>0.5 ft)	10L220893/VP-1	Uranium-238						0.0216	1.18	0

Attachment 5. Soil Summary Statistics for Radionuclides (Page 58 of 84)

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10L240093/VP-2	Actinium-227						0.01428	0.21	0
Soil - All Depths	10L240093/VP-2	Lead-210						0.02856	0	0.02856
Soil - All Depths	10L240093/VP-2	Protactinium-231						0.01632	0.2	0
Soil - All Depths	10L240093/VP-2	Radium-226						0.01428	1.05	0
Soil - All Depths	10L240093/VP-2	Radium-228						0.0007344	0.98	0
Soil - All Depths	10L240093/VP-2	Thorium-228						0.00204	1.18	0
Soil - All Depths	10L240093/VP-2	Thorium-230	15/17	0.9	3.5	1.58	L	2.04	1.66	0.38
Soil - All Depths	10L240093/VP-2	Thorium-232						0.00204	1.11	0
Soil - All Depths	10L240093/VP-2	Uranium-234						0.02448	1.13	0
Soil - All Depths	10L240093/VP-2	Uranium-235						0.0010608	0.06	0
Soil - All Depths	10L240093/VP-2	Uranium-238						0.02448	1.18	0
Subsurface Soil (>0.5 ft)	10L240093/VP-2	Actinium-227						0.01428	0.21	0
Subsurface Soil (>0.5 ft)	10L240093/VP-2	Lead-210						0.02856	0	0.02856
Subsurface Soil (>0.5 ft)	10L240093/VP-2	Protactinium-231						0.01632	0.2	0
Subsurface Soil (>0.5 ft)	10L240093/VP-2	Radium-226						0.01428	1.05	0
Subsurface Soil (>0.5 ft)	10L240093/VP-2	Radium-228						0.0007344	0.98	0
Subsurface Soil (>0.5 ft)	10L240093/VP-2	Thorium-228						0.00204	1.18	0
Subsurface Soil (>0.5 ft)	10L240093/VP-2	Thorium-230	15/17	0.9	3.5	1.58	L	2.04	1.66	0.38
Subsurface Soil (>0.5 ft)	10L240093/VP-2	Thorium-232						0.00204	1.11	0
Subsurface Soil (>0.5 ft)	10L240093/VP-2	Uranium-234						0.02448	1.13	0
Subsurface Soil (>0.5 ft)	10L240093/VP-2	Uranium-235						0.0010608	0.06	0
Subsurface Soil (>0.5 ft)	10L240093/VP-2	Uranium-238						0.02448	1.18	0
Soil - All Depths	10L310011/VP-13	Actinium-227						0.364	0.21	0.154
Soil - All Depths	10L310011/VP-13	Lead-210						0.728	0	0.728
Soil - All Depths	10L310011/VP-13	Protactinium-231						0.416	0.2	0.216
Soil - All Depths	10L310011/VP-13	Radium-226	4/4	1.1	2.5	1.63	D	2.41	1.05	1.36
Soil - All Depths	10L310011/VP-13	Radium-228						0.01872	0.98	0
Soil - All Depths	10L310011/VP-13	Thorium-228						0.052	1.18	0
Soil - All Depths	10L310011/VP-13	Thorium-230	35/36	1	370	28	X	52	1.66	50.34
Soil - All Depths	10L310011/VP-13	Thorium-232	3/4	1.3	2.4	1.6	D	2.31	1.11	1.2
Soil - All Depths	10L310011/VP-13	Uranium-234						0.624	1.13	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10L310011/VP-13	Uranium-235						0.02704	0.06	0
Soil - All Depths	10L310011/VP-13	Uranium-238	0/4			10	D	11	1.18	9.82
Subsurface Soil (>0.5 ft)	10L310011/VP-13	Actinium-227						0.3703	0.21	0.1603
Subsurface Soil (>0.5 ft)	10L310011/VP-13	Lead-210						0.7406	0	0.7406
Subsurface Soil (>0.5 ft)	10L310011/VP-13	Protactinium-231						0.4232	0.2	0.2232
Subsurface Soil (>0.5 ft)	10L310011/VP-13	Radium-226	3/3	1.1	2.5	1.57	D	2.5	1.05	1.45
Subsurface Soil (>0.5 ft)	10L310011/VP-13	Radium-228						0.019044	0.98	0
Subsurface Soil (>0.5 ft)	10L310011/VP-13	Thorium-228						0.0529	1.18	0
Subsurface Soil (>0.5 ft)	10L310011/VP-13	Thorium-230	34/35	1	370	28.2	X	52.9	1.66	51.24
Subsurface Soil (>0.5 ft)	10L310011/VP-13	Thorium-232	2/3	1.7	2.4	1.7	D	2.4	1.11	1.29
Subsurface Soil (>0.5 ft)	10L310011/VP-13	Uranium-234						0.6348	1.13	0
Subsurface Soil (>0.5 ft)	10L310011/VP-13	Uranium-235						0.027508	0.06	0
Subsurface Soil (>0.5 ft)	10L310011/VP-13	Uranium-238	0/3			9.67	D	10.6	1.18	9.42
Surface Soil (<0.5 ft)	10L310011/VP-13	Actinium-227						0.147	0.21	0
Surface Soil (<0.5 ft)	10L310011/VP-13	Lead-210						0.294	0	0.294
Surface Soil (<0.5 ft)	10L310011/VP-13	Protactinium-231						0.168	0.2	0
Surface Soil (<0.5 ft)	10L310011/VP-13	Radium-226	1/1	1.8	1.8	1.8	D	1.8	1.05	0.75
Surface Soil (<0.5 ft)	10L310011/VP-13	Radium-228						0.00756	0.98	0
Surface Soil (<0.5 ft)	10L310011/VP-13	Thorium-228						0.021	1.18	0
Surface Soil (<0.5 ft)	10L310011/VP-13	Thorium-230	1/1	21	21	21	D	21	1.66	19.34
Surface Soil (<0.5 ft)	10L310011/VP-13	Thorium-232	1/1	1.3	1.3	1.3	D	1.3	1.11	0.19
Surface Soil (<0.5 ft)	10L310011/VP-13	Uranium-234						0.252	1.13	0
Surface Soil (<0.5 ft)	10L310011/VP-13	Uranium-235						0.01092	0.06	0
Surface Soil (<0.5 ft)	10L310011/VP-13	Uranium-238						0.252	1.18	0
Surface Soil (<0.5 ft)	10L310011/VP-13	Uranium-238	0/1			11	D		1.18	0
Soil - All Depths	10L330022/VP-8	Actinium-227						0.0805	0.21	0
Soil - All Depths	10L330022/VP-8	Lead-210						0.161	0	0.161
Soil - All Depths	10L330022/VP-8	Protactinium-231						0.092	0.2	0
Soil - All Depths	10L330022/VP-8	Radium-226						0.0805	1.05	0
Soil - All Depths	10L330022/VP-8	Radium-228						0.00414	0.98	0
Soil - All Depths	10L330022/VP-8	Thorium-228						0.0115	1.18	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10L330022/VP-8	Thorium-230	4/4	1.2	13	4.98	D	11.5	1.66	9.84
Soil - All Depths	10L330022/VP-8	Thorium-232						0.0115	1.11	0
Soil - All Depths	10L330022/VP-8	Uranium-234						0.138	1.13	0
Soil - All Depths	10L330022/VP-8	Uranium-235						0.00598	0.06	0
Soil - All Depths	10L330022/VP-8	Uranium-238						0.138	1.18	0
Subsurface Soil (>0.5 ft)	10L330022/VP-8	Actinium-227						0.0805	0.21	0
Subsurface Soil (>0.5 ft)	10L330022/VP-8	Lead-210						0.161	0	0.161
Subsurface Soil (>0.5 ft)	10L330022/VP-8	Protactinium-231						0.092	0.2	0
Subsurface Soil (>0.5 ft)	10L330022/VP-8	Radium-226						0.0805	1.05	0
Subsurface Soil (>0.5 ft)	10L330022/VP-8	Radium-228						0.00414	0.98	0
Subsurface Soil (>0.5 ft)	10L330022/VP-8	Thorium-228						0.0115	1.18	0
Subsurface Soil (>0.5 ft)	10L330022/VP-8	Thorium-230	4/4	1.2	13	4.98	D	11.5	1.66	9.84
Subsurface Soil (>0.5 ft)	10L330022/VP-8	Thorium-232						0.0115	1.11	0
Subsurface Soil (>0.5 ft)	10L330022/VP-8	Uranium-234						0.138	1.13	0
Subsurface Soil (>0.5 ft)	10L330022/VP-8	Uranium-235						0.00598	0.06	0
Subsurface Soil (>0.5 ft)	10L330022/VP-8	Uranium-238						0.138	1.18	0
Soil - All Depths	10L330031/VP-7	Actinium-227						0.0798	0.21	0
Soil - All Depths	10L330031/VP-7	Lead-210						0.1596	0	0.1596
Soil - All Depths	10L330031/VP-7	Protactinium-231						0.0912	0.2	0
Soil - All Depths	10L330031/VP-7	Radium-226						0.0798	1.05	0
Soil - All Depths	10L330031/VP-7	Radium-228						0.004104	0.98	0
Soil - All Depths	10L330031/VP-7	Thorium-228						0.0114	1.18	0
Soil - All Depths	10L330031/VP-7	Thorium-230	14/18	1.2	32	5.18	L	11.4	1.66	9.74
Soil - All Depths	10L330031/VP-7	Thorium-232						0.0114	1.11	0
Soil - All Depths	10L330031/VP-7	Uranium-234						0.1368	1.13	0
Soil - All Depths	10L330031/VP-7	Uranium-235						0.005928	0.06	0
Soil - All Depths	10L330031/VP-7	Uranium-238						0.1368	1.18	0
Subsurface Soil (>0.5 ft)	10L330031/VP-7	Actinium-227						0.0798	0.21	0
Subsurface Soil (>0.5 ft)	10L330031/VP-7	Lead-210						0.1596	0	0.1596
Subsurface Soil (>0.5 ft)	10L330031/VP-7	Protactinium-231						0.0912	0.2	0
Subsurface Soil (>0.5 ft)	10L330031/VP-7	Radium-226						0.0798	1.05	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	10L330031/VP-7	Radium-228						0.004104	0.98	0
Subsurface Soil (>0.5 ft)	10L330031/VP-7	Thorium-228						0.0114	1.18	0
Subsurface Soil (>0.5 ft)	10L330031/VP-7	Thorium-230	14/18	1.2	32	5.18	L	11.4	1.66	9.74
Subsurface Soil (>0.5 ft)	10L330031/VP-7	Thorium-232						0.0114	1.11	0
Subsurface Soil (>0.5 ft)	10L330031/VP-7	Uranium-234						0.1368	1.13	0
Subsurface Soil (>0.5 ft)	10L330031/VP-7	Uranium-235						0.005928	0.06	0
Subsurface Soil (>0.5 ft)	10L330031/VP-7	Uranium-238						0.1368	1.18	0
Soil - All Depths	10L330040/VP-6	Actinium-227						0.01785	0.21	0
Soil - All Depths	10L330040/VP-6	Lead-210						0.0357	0	0.0357
Soil - All Depths	10L330040/VP-6	Protactinium-231						0.0204	0.2	0
Soil - All Depths	10L330040/VP-6	Radium-226						0.01785	1.05	0
Soil - All Depths	10L330040/VP-6	Radium-228						0.000918	0.98	0
Soil - All Depths	10L330040/VP-6	Thorium-228						0.00255	1.18	0
Soil - All Depths	10L330040/VP-6	Thorium-230	4/4	1.1	2.8	1.6	D	2.55	1.66	0.89
Soil - All Depths	10L330040/VP-6	Thorium-232						0.00255	1.11	0
Soil - All Depths	10L330040/VP-6	Uranium-234						0.0306	1.13	0
Soil - All Depths	10L330040/VP-6	Uranium-235						0.001326	0.06	0
Soil - All Depths	10L330040/VP-6	Uranium-238						0.0306	1.18	0
Subsurface Soil (>0.5 ft)	10L330040/VP-6	Actinium-227						0.01785	0.21	0
Subsurface Soil (>0.5 ft)	10L330040/VP-6	Lead-210						0.0357	0	0.0357
Subsurface Soil (>0.5 ft)	10L330040/VP-6	Protactinium-231						0.0204	0.2	0
Subsurface Soil (>0.5 ft)	10L330040/VP-6	Radium-226						0.01785	1.05	0
Subsurface Soil (>0.5 ft)	10L330040/VP-6	Radium-228						0.000918	0.98	0
Subsurface Soil (>0.5 ft)	10L330040/VP-6	Thorium-228						0.00255	1.18	0
Subsurface Soil (>0.5 ft)	10L330040/VP-6	Thorium-230	4/4	1.1	2.8	1.6	D	2.55	1.66	0.89
Subsurface Soil (>0.5 ft)	10L330040/VP-6	Thorium-232						0.00255	1.11	0
Subsurface Soil (>0.5 ft)	10L330040/VP-6	Uranium-234						0.0306	1.13	0
Subsurface Soil (>0.5 ft)	10L330040/VP-6	Uranium-235						0.001326	0.06	0
Subsurface Soil (>0.5 ft)	10L330040/VP-6	Uranium-238						0.0306	1.18	0
Soil - All Depths	10L330073/VP-9	Actinium-227						0.084	0.21	0
Soil - All Depths	10L330073/VP-9	Lead-210						0.168	0	0.168

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	10L330073/VP-9	Protactinium-231						0.096	0.2	0
Soil - All Depths	10L330073/VP-9	Radium-226						0.084	1.05	0
Soil - All Depths	10L330073/VP-9	Radium-228						0.00432	0.98	0
Soil - All Depths	10L330073/VP-9	Thorium-228						0.012	1.18	0
Soil - All Depths	10L330073/VP-9	Thorium-230	7/8	1	12	4.49	L	12	1.66	10.34
Soil - All Depths	10L330073/VP-9	Thorium-232						0.012	1.11	0
Soil - All Depths	10L330073/VP-9	Uranium-234						0.144	1.13	0
Soil - All Depths	10L330073/VP-9	Uranium-235						0.00624	0.06	0
Soil - All Depths	10L330073/VP-9	Uranium-238						0.144	1.18	0
Subsurface Soil (>0.5 ft)	10L330073/VP-9	Actinium-227						0.084	0.21	0
Subsurface Soil (>0.5 ft)	10L330073/VP-9	Lead-210						0.168	0	0.168
Subsurface Soil (>0.5 ft)	10L330073/VP-9	Protactinium-231						0.096	0.2	0
Subsurface Soil (>0.5 ft)	10L330073/VP-9	Radium-226						0.084	1.05	0
Subsurface Soil (>0.5 ft)	10L330073/VP-9	Radium-228						0.00432	0.98	0
Subsurface Soil (>0.5 ft)	10L330073/VP-9	Thorium-228						0.012	1.18	0
Subsurface Soil (>0.5 ft)	10L330073/VP-9	Thorium-230	7/8	1	12	4.49	L	12	1.66	10.34
Subsurface Soil (>0.5 ft)	10L330073/VP-9	Thorium-232						0.012	1.11	0
Subsurface Soil (>0.5 ft)	10L330073/VP-9	Uranium-234						0.144	1.13	0
Subsurface Soil (>0.5 ft)	10L330073/VP-9	Uranium-235						0.00624	0.06	0
Subsurface Soil (>0.5 ft)	10L330073/VP-9	Uranium-238						0.144	1.18	0
Soil - All Depths	10L330114/VP-4,5	Actinium-227						0.01743	0.21	0
Soil - All Depths	10L330114/VP-4,5	Lead-210						0.03486	0	0.03486
Soil - All Depths	10L330114/VP-4,5	Protactinium-231						0.01992	0.2	0
Soil - All Depths	10L330114/VP-4,5	Radium-226						0.01743	1.05	0
Soil - All Depths	10L330114/VP-4,5	Radium-228						0.0008964	0.98	0
Soil - All Depths	10L330114/VP-4,5	Thorium-228						0.00249	1.18	0
Soil - All Depths	10L330114/VP-4,5	Thorium-230	8/8	1.1	3	1.79	L	2.49	1.66	0.83
Soil - All Depths	10L330114/VP-4,5	Thorium-232						0.00249	1.11	0
Soil - All Depths	10L330114/VP-4,5	Uranium-234						0.02988	1.13	0
Soil - All Depths	10L330114/VP-4,5	Uranium-235						0.0012948	0.06	0
Soil - All Depths	10L330114/VP-4,5	Uranium-238						0.02988	1.18	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	10L330114/VP-4,5	Actinium-227						0.01743	0.21	0
Subsurface Soil (>0.5 ft)	10L330114/VP-4,5	Lead-210						0.03486	0	0.03486
Subsurface Soil (>0.5 ft)	10L330114/VP-4,5	Protactinium-231						0.01992	0.2	0
Subsurface Soil (>0.5 ft)	10L330114/VP-4,5	Radium-226						0.01743	1.05	0
Subsurface Soil (>0.5 ft)	10L330114/VP-4,5	Radium-228						0.0008964	0.98	0
Subsurface Soil (>0.5 ft)	10L330114/VP-4,5	Thorium-228						0.00249	1.18	0
Subsurface Soil (>0.5 ft)	10L330114/VP-4,5	Thorium-230	8/8	1.1	3	1.79	L	2.49	1.66	0.83
Subsurface Soil (>0.5 ft)	10L330114/VP-4,5	Thorium-232						0.00249	1.11	0
Subsurface Soil (>0.5 ft)	10L330114/VP-4,5	Uranium-234						0.02988	1.13	0
Subsurface Soil (>0.5 ft)	10L330114/VP-4,5	Uranium-235						0.0012948	0.06	0
Subsurface Soil (>0.5 ft)	10L330114/VP-4,5	Uranium-238						0.02988	1.18	0
Soil - All Depths	10L330123/VP-3	Actinium-227						0.0273	0.21	0
Soil - All Depths	10L330123/VP-3	Lead-210						0.0546	0	0.0546
Soil - All Depths	10L330123/VP-3	Protactinium-231						0.0312	0.2	0
Soil - All Depths	10L330123/VP-3	Radium-226						0.0273	1.05	0
Soil - All Depths	10L330123/VP-3	Radium-228						0.001404	0.98	0
Soil - All Depths	10L330123/VP-3	Thorium-228						0.0039	1.18	0
Soil - All Depths	10L330123/VP-3	Thorium-230	5/7	1.2	3.9	1.7	L	3.9	1.66	2.24
Soil - All Depths	10L330123/VP-3	Thorium-232						0.0039	1.11	0
Soil - All Depths	10L330123/VP-3	Uranium-234						0.0468	1.13	0
Soil - All Depths	10L330123/VP-3	Uranium-235						0.002028	0.06	0
Soil - All Depths	10L330123/VP-3	Uranium-238						0.0468	1.18	0
Subsurface Soil (>0.5 ft)	10L330123/VP-3	Actinium-227						0.0273	0.21	0
Subsurface Soil (>0.5 ft)	10L330123/VP-3	Lead-210						0.0546	0	0.0546
Subsurface Soil (>0.5 ft)	10L330123/VP-3	Protactinium-231						0.0312	0.2	0
Subsurface Soil (>0.5 ft)	10L330123/VP-3	Radium-226						0.0273	1.05	0
Subsurface Soil (>0.5 ft)	10L330123/VP-3	Radium-228						0.001404	0.98	0
Subsurface Soil (>0.5 ft)	10L330123/VP-3	Thorium-228						0.0039	1.18	0
Subsurface Soil (>0.5 ft)	10L330123/VP-3	Thorium-230	5/7	1.2	3.9	1.7	L	3.9	1.66	2.24
Subsurface Soil (>0.5 ft)	10L330123/VP-3	Thorium-232						0.0039	1.11	0
Subsurface Soil (>0.5 ft)	10L330123/VP-3	Uranium-234						0.0468	1.13	0
Subsurface Soil (>0.5 ft)	10L330123/VP-3	Uranium-235						0.002028	0.06	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	10L330123/VP-3	Uranium-238						0.0468	1.18	0
Soil - All Depths	10L340041/VP-40A	Actinium-227	0/2			0.14	D	0.329	0.209	0.12
Soil - All Depths	10L340041/VP-40A	Lead-210						2.534	0	2.534
Soil - All Depths	10L340041/VP-40A	Protactinium-231	0/2			-1.49	D	0	0.195	0
Soil - All Depths	10L340041/VP-40A	Radium-226	590/603	0.49	1100	4.61	X	7.66	1.05	6.61
Soil - All Depths	10L340041/VP-40A	Radium-228	2/2	0.83	0.89	0.86	D	0.89	0.977	0
Soil - All Depths	10L340041/VP-40A	Thorium-228	2/2	0.83	0.89	0.86	D	0.89	1.18	0
Soil - All Depths	10L340041/VP-40A	Thorium-230	523/526	0.03	26000	98.1	X	181	1.66	179.34
Soil - All Depths	10L340041/VP-40A	Thorium-232	533/602	0.6	7	1.88	X	1.94	1.11	0.83
Soil - All Depths	10L340041/VP-40A	Uranium-234						2.172	1.13	1.042
Soil - All Depths	10L340041/VP-40A	Uranium-235	0/2			0.095	D	0.19	0.0618	0.1282
Soil - All Depths	10L340041/VP-40A	Uranium-238	20/603	2	390	9.47	D	10.6	1.18	9.42
Subsurface Soil (>0.5 ft)	10L340041/VP-40A	Actinium-227						0.1617	0.21	0
Subsurface Soil (>0.5 ft)	10L340041/VP-40A	Lead-210						0.3234	0	0.3234
Subsurface Soil (>0.5 ft)	10L340041/VP-40A	Protactinium-231						0.1848	0.2	0
Subsurface Soil (>0.5 ft)	10L340041/VP-40A	Radium-226	334/340	0.6	170	2.35	X	3.18	1.05	2.13
Subsurface Soil (>0.5 ft)	10L340041/VP-40A	Radium-228						0.008316	0.98	0
Subsurface Soil (>0.5 ft)	10L340041/VP-40A	Thorium-228						0.0231	1.18	0
Subsurface Soil (>0.5 ft)	10L340041/VP-40A	Thorium-230	252/253	0.03	1400	13.8	X	23.1	1.66	21.44
Subsurface Soil (>0.5 ft)	10L340041/VP-40A	Thorium-232	312/340	0.6	7	1.82	X	1.9	1.11	0.79
Subsurface Soil (>0.5 ft)	10L340041/VP-40A	Uranium-234						0.2772	1.13	0
Subsurface Soil (>0.5 ft)	10L340041/VP-40A	Uranium-235						0.012012	0.06	0
Subsurface Soil (>0.5 ft)	10L340041/VP-40A	Uranium-238	6/340	2	150	8.51	D	9.28	1.18	8.1
Surface Soil (<0.5 ft)	10L340041/VP-40A	Actinium-227	0/2			0.14	D	0.329	0.209	0.12
Surface Soil (<0.5 ft)	10L340041/VP-40A	Lead-210						4.69	0	4.69
Surface Soil (<0.5 ft)	10L340041/VP-40A	Protactinium-231	0/2			-1.49	D	0	0.195	0
Surface Soil (<0.5 ft)	10L340041/VP-40A	Radium-226	256/263	0.49	1100	7.52	X	14.4	1.05	13.35
Surface Soil (<0.5 ft)	10L340041/VP-40A	Radium-228	2/2	0.83	0.89	0.86	D	0.89	0.977	0
Surface Soil (<0.5 ft)	10L340041/VP-40A	Thorium-228	2/2	0.83	0.89	0.86	D	0.89	1.18	0
Surface Soil (<0.5 ft)	10L340041/VP-40A	Thorium-230	271/273	0.8	26000	176	X	335	1.66	333.34
Surface Soil (<0.5 ft)	10L340041/VP-40A	Thorium-232	221/262	0.7	7	1.96	X	2.06	1.11	0.95

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	10L340041/VP-40A	Uranium-234						4.02	1.13	2.89
Surface Soil (<0.5 ft)	10L340041/VP-40A	Uranium-235	0/2			0.095	D	0.19	0.0618	0.1282
Surface Soil (<0.5 ft)	10L340041/VP-40A	Uranium-238	14/263	3.7	390	10.7	D	13.1	1.18	11.92
Soil - All Depths	10L340142/VP-12	Actinium-227						0.2191	0.21	0.0091
Soil - All Depths	10L340142/VP-12	Lead-210						0.4382	0	0.4382
Soil - All Depths	10L340142/VP-12	Protactinium-231						0.2504	0.2	0.0504
Soil - All Depths	10L340142/VP-12	Radium-226	37/37	0.6	5	1.69	L	1.97	1.05	0.92
Soil - All Depths	10L340142/VP-12	Radium-228						0.011268	0.98	0
Soil - All Depths	10L340142/VP-12	Thorium-228						0.0313	1.18	0
Soil - All Depths	10L340142/VP-12	Thorium-230	39/40	0.8	280	17.8	X	31.3	1.66	29.64
Soil - All Depths	10L340142/VP-12	Thorium-232	29/37	0.8	3	1.64	X	1.82	1.11	0.71
Soil - All Depths	10L340142/VP-12	Uranium-234						0.3756	1.13	0
Soil - All Depths	10L340142/VP-12	Uranium-235						0.016276	0.06	0
Soil - All Depths	10L340142/VP-12	Uranium-238	0/37			9.16	D	10.5	1.18	9.32
Subsurface Soil (>0.5 ft)	10L340142/VP-12	Actinium-227						0.05789	0.21	0
Subsurface Soil (>0.5 ft)	10L340142/VP-12	Lead-210						0.11578	0	0.11578
Subsurface Soil (>0.5 ft)	10L340142/VP-12	Protactinium-231						0.06616	0.2	0
Subsurface Soil (>0.5 ft)	10L340142/VP-12	Radium-226	28/28	0.6	2.9	1.59	L	1.89	1.05	0.84
Subsurface Soil (>0.5 ft)	10L340142/VP-12	Radium-228						0.0029772	0.98	0
Subsurface Soil (>0.5 ft)	10L340142/VP-12	Thorium-228						0.00827	1.18	0
Subsurface Soil (>0.5 ft)	10L340142/VP-12	Thorium-230	30/31	0.8	28	5.08	L	8.27	1.66	6.61
Subsurface Soil (>0.5 ft)	10L340142/VP-12	Thorium-232	23/28	0.8	3	1.7	X	1.91	1.11	0.8
Subsurface Soil (>0.5 ft)	10L340142/VP-12	Uranium-234						0.09924	1.13	0
Subsurface Soil (>0.5 ft)	10L340142/VP-12	Uranium-235						0.0043004	0.06	0
Subsurface Soil (>0.5 ft)	10L340142/VP-12	Uranium-238	0/28			10.1	D	11.4	1.18	10.22
Surface Soil (<0.5 ft)	10L340142/VP-12	Actinium-227						1.96	0.21	1.75
Surface Soil (<0.5 ft)	10L340142/VP-12	Lead-210						3.92	0	3.92
Surface Soil (<0.5 ft)	10L340142/VP-12	Protactinium-231						2.24	0.2	2.04
Surface Soil (<0.5 ft)	10L340142/VP-12	Radium-226	9/9	0.8	5	2	L	3.5	1.05	2.45
Surface Soil (<0.5 ft)	10L340142/VP-12	Radium-228						0.1008	0.98	0
Surface Soil (<0.5 ft)	10L340142/VP-12	Thorium-228						0.28	1.18	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	10L340142/VP-12	Thorium-230	9/9	1	280	61.4	L	280	1.66	278.34
Surface Soil (<0.5 ft)	10L340142/VP-12	Thorium-232	6/9	1	3	1.43	N	1.92	1.11	0.81
Surface Soil (<0.5 ft)	10L340142/VP-12	Uranium-234						3.36	1.13	2.23
Surface Soil (<0.5 ft)	10L340142/VP-12	Uranium-235						0.1456	0.06	0.0856
Surface Soil (<0.5 ft)	10L340142/VP-12	Uranium-238	0/9			6.37	D	9.79	1.18	8.61
Soil - All Depths	10L340151/VP-10,11	Actinium-227						0.0385	0.21	0
Soil - All Depths	10L340151/VP-10,11	Lead-210						0.077	0	0.077
Soil - All Depths	10L340151/VP-10,11	Protactinium-231						0.044	0.2	0
Soil - All Depths	10L340151/VP-10,11	Radium-226						0.0385	1.05	0
Soil - All Depths	10L340151/VP-10,11	Radium-228						0.00198	0.98	0
Soil - All Depths	10L340151/VP-10,11	Thorium-228						0.0055	1.18	0
Soil - All Depths	10L340151/VP-10,11	Thorium-230	14/15	1.3	13	3.74	L	5.5	1.66	3.84
Soil - All Depths	10L340151/VP-10,11	Thorium-232						0.0055	1.11	0
Soil - All Depths	10L340151/VP-10,11	Uranium-234						0.066	1.13	0
Soil - All Depths	10L340151/VP-10,11	Uranium-235						0.00286	0.06	0
Soil - All Depths	10L340151/VP-10,11	Uranium-238						0.066	1.18	0
Subsurface Soil (>0.5 ft)	10L340151/VP-10,11	Actinium-227						0.0385	0.21	0
Subsurface Soil (>0.5 ft)	10L340151/VP-10,11	Lead-210						0.077	0	0.077
Subsurface Soil (>0.5 ft)	10L340151/VP-10,11	Protactinium-231						0.044	0.2	0
Subsurface Soil (>0.5 ft)	10L340151/VP-10,11	Radium-226						0.0385	1.05	0
Subsurface Soil (>0.5 ft)	10L340151/VP-10,11	Radium-228						0.00198	0.98	0
Subsurface Soil (>0.5 ft)	10L340151/VP-10,11	Thorium-228						0.0055	1.18	0
Subsurface Soil (>0.5 ft)	10L340151/VP-10,11	Thorium-230	14/15	1.3	13	3.74	L	5.5	1.66	3.84
Subsurface Soil (>0.5 ft)	10L340151/VP-10,11	Thorium-232						0.0055	1.11	0
Subsurface Soil (>0.5 ft)	10L340151/VP-10,11	Uranium-234						0.066	1.13	0
Subsurface Soil (>0.5 ft)	10L340151/VP-10,11	Uranium-235						0.00286	0.06	0
Subsurface Soil (>0.5 ft)	10L340151/VP-10,11	Uranium-238						0.066	1.18	0
Soil - All Depths	11K510035/VP-14	Actinium-227						0.0147	0.21	0
Soil - All Depths	11K510035/VP-14	Lead-210						0.0294	0	0.0294
Soil - All Depths	11K510035/VP-14	Protactinium-231						0.0168	0.2	0
Soil - All Depths	11K510035/VP-14	Radium-226						0.0147	1.05	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	11K510035/VP-14	Radium-228						0.000756	0.98	0
Soil - All Depths	11K510035/VP-14	Thorium-228						0.0021	1.18	0
Soil - All Depths	11K510035/VP-14	Thorium-230	6/9	1.2	2.8	1.47	L	2.1	1.66	0.44
Soil - All Depths	11K510035/VP-14	Thorium-232						0.0021	1.11	0
Soil - All Depths	11K510035/VP-14	Uranium-234						0.0252	1.13	0
Soil - All Depths	11K510035/VP-14	Uranium-235						0.001092	0.06	0
Soil - All Depths	11K510035/VP-14	Uranium-238						0.0252	1.18	0
Subsurface Soil (>0.5 ft)	11K510035/VP-14	Actinium-227						0.0147	0.21	0
Subsurface Soil (>0.5 ft)	11K510035/VP-14	Lead-210						0.0294	0	0.0294
Subsurface Soil (>0.5 ft)	11K510035/VP-14	Protactinium-231						0.0168	0.2	0
Subsurface Soil (>0.5 ft)	11K510035/VP-14	Radium-226						0.0147	1.05	0
Subsurface Soil (>0.5 ft)	11K510035/VP-14	Radium-228						0.000756	0.98	0
Subsurface Soil (>0.5 ft)	11K510035/VP-14	Thorium-228						0.0021	1.18	0
Subsurface Soil (>0.5 ft)	11K510035/VP-14	Thorium-230	6/9	1.2	2.8	1.47	L	2.1	1.66	0.44
Subsurface Soil (>0.5 ft)	11K510035/VP-14	Thorium-232						0.0021	1.11	0
Subsurface Soil (>0.5 ft)	11K510035/VP-14	Uranium-234						0.0252	1.13	0
Subsurface Soil (>0.5 ft)	11K510035/VP-14	Uranium-235						0.001092	0.06	0
Subsurface Soil (>0.5 ft)	11K510035/VP-14	Uranium-238						0.0252	1.18	0
Soil - All Depths	11K520056/VP-15	Actinium-227						0.01862	0.21	0
Soil - All Depths	11K520056/VP-15	Lead-210						0.03724	0	0.03724
Soil - All Depths	11K520056/VP-15	Protactinium-231						0.02128	0.2	0
Soil - All Depths	11K520056/VP-15	Radium-226						0.01862	1.05	0
Soil - All Depths	11K520056/VP-15	Radium-228						0.0009576	0.98	0
Soil - All Depths	11K520056/VP-15	Thorium-228						0.00266	1.18	0
Soil - All Depths	11K520056/VP-15	Thorium-230	17/20	1	4.8	2.02	L	2.66	1.66	1
Soil - All Depths	11K520056/VP-15	Thorium-232						0.00266	1.11	0
Soil - All Depths	11K520056/VP-15	Uranium-234						0.03192	1.13	0
Soil - All Depths	11K520056/VP-15	Uranium-235						0.0013832	0.06	0
Soil - All Depths	11K520056/VP-15	Uranium-238						0.03192	1.18	0
Subsurface Soil (>0.5 ft)	11K520056/VP-15	Actinium-227						0.01862	0.21	0
Subsurface Soil (>0.5 ft)	11K520056/VP-15	Lead-210						0.03724	0	0.03724

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	11K520056/VP-15	Protactinium-231						0.02128	0.2	0
Subsurface Soil (>0.5 ft)	11K520056/VP-15	Radium-226						0.01862	1.05	0
Subsurface Soil (>0.5 ft)	11K520056/VP-15	Radium-228						0.0009576	0.98	0
Subsurface Soil (>0.5 ft)	11K520056/VP-15	Thorium-228						0.00266	1.18	0
Subsurface Soil (>0.5 ft)	11K520056/VP-15	Thorium-230	17/20	1	4.8	2.02	L	2.66	1.66	1
Subsurface Soil (>0.5 ft)	11K520056/VP-15	Thorium-232						0.00266	1.11	0
Subsurface Soil (>0.5 ft)	11K520056/VP-15	Uranium-234						0.03192	1.13	0
Subsurface Soil (>0.5 ft)	11K520056/VP-15	Uranium-235						0.0013832	0.06	0
Subsurface Soil (>0.5 ft)	11K520056/VP-15	Uranium-238						0.03192	1.18	0
Soil - All Depths	11K630221	Actinium-227	1/1	0.29	0.29	0.29	D	0.29	0.209	0.081
Soil - All Depths	11K630221	Lead-210						0.1694	0	0.1694
Soil - All Depths	11K630221	Protactinium-231	0/1			0.04	D		0.195	0
Soil - All Depths	11K630221	Protactinium-231						0.0968	0.2	0
Soil - All Depths	11K630221	Radium-226	1/1	0.84	0.84	0.84	D	0.84	1.05	0
Soil - All Depths	11K630221	Radium-228	1/1	0.9	0.9	0.9	D	0.9	0.977	0
Soil - All Depths	11K630221	Thorium-228	1/1	0.91	0.91	0.91	D	0.91	1.18	0
Soil - All Depths	11K630221	Thorium-230	1/1	12.13	12.13	12.1	D	12.1	1.66	10.44
Soil - All Depths	11K630221	Thorium-232	1/1	0.75	0.75	0.75	D	0.75	1.11	0
Soil - All Depths	11K630221	Uranium-234						0.1452	1.13	0
Soil - All Depths	11K630221	Uranium-235						0.006292	0.06	0
Soil - All Depths	11K630221	Uranium-235	0/1			0.38	D		0.0618	0
Soil - All Depths	11K630221	Uranium-238						0.1452	1.18	0
Soil - All Depths	11K630221	Uranium-238	0/1			1.55	D		1.18	0
Surface Soil (<0.5 ft)	11K630221	Actinium-227	1/1	0.29	0.29	0.29	D	0.29	0.209	0.081
Surface Soil (<0.5 ft)	11K630221	Lead-210						0.1694	0	0.1694
Surface Soil (<0.5 ft)	11K630221	Protactinium-231	0/1			0.04	D		0.195	0
Surface Soil (<0.5 ft)	11K630221	Protactinium-231						0.0968	0.2	0
Surface Soil (<0.5 ft)	11K630221	Radium-226	1/1	0.84	0.84	0.84	D	0.84	1.05	0
Surface Soil (<0.5 ft)	11K630221	Radium-228	1/1	0.9	0.9	0.9	D	0.9	0.977	0
Surface Soil (<0.5 ft)	11K630221	Thorium-228	1/1	0.91	0.91	0.91	D	0.91	1.18	0
Surface Soil (<0.5 ft)	11K630221	Thorium-230	1/1	12.13	12.13	12.1	D	12.1	1.66	10.44
Surface Soil (<0.5 ft)	11K630221	Thorium-232	1/1	0.75	0.75	0.75	D	0.75	1.11	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	11K630221	Uranium-234						0.1452	1.13	0
Surface Soil (<0.5 ft)	11K630221	Uranium-235						0.006292	0.06	0
Surface Soil (<0.5 ft)	11K630221	Uranium-235	0/1			0.38	D		0.0618	0
Surface Soil (<0.5 ft)	11K630221	Uranium-238						0.1452	1.18	0
Surface Soil (<0.5 ft)	11K630221	Uranium-238	0/1			1.55	D		1.18	0
Soil - All Depths	11L520011	Actinium-227						0.01813	0.21	0
Soil - All Depths	11L520011	Lead-210						0.03626	0	0.03626
Soil - All Depths	11L520011	Protactinium-231						0.02072	0.2	0
Soil - All Depths	11L520011	Radium-226	2/2	1.3	1.9	1.6	D	1.9	1.05	0.85
Soil - All Depths	11L520011	Radium-228						0.0009324	0.98	0
Soil - All Depths	11L520011	Thorium-228						0.00259	1.18	0
Soil - All Depths	11L520011	Thorium-230	7/8	1.1	3.2	2.06	N	2.59	1.66	0.93
Soil - All Depths	11L520011	Thorium-232	1/2	1.8	1.8	1.4	D	1.8	1.11	0.69
Soil - All Depths	11L520011	Uranium-234						0.03108	1.13	0
Soil - All Depths	11L520011	Uranium-235						0.0013468	0.06	0
Soil - All Depths	11L520011	Uranium-238	0/2			7	D	19.6	1.18	18.42
Subsurface Soil (>0.5 ft)	11L520011	Actinium-227						0.0168	0.21	0
Subsurface Soil (>0.5 ft)	11L520011	Lead-210						0.0336	0	0.0336
Subsurface Soil (>0.5 ft)	11L520011	Protactinium-231						0.0192	0.2	0
Subsurface Soil (>0.5 ft)	11L520011	Radium-226	2/2	1.3	1.9	1.6	D	1.9	1.05	0.85
Subsurface Soil (>0.5 ft)	11L520011	Radium-228						0.000864	0.98	0
Subsurface Soil (>0.5 ft)	11L520011	Thorium-228						0.0024	1.18	0
Subsurface Soil (>0.5 ft)	11L520011	Thorium-230	6/7	1.1	3	1.9	N	2.4	1.66	0.74
Subsurface Soil (>0.5 ft)	11L520011	Thorium-232	1/2	1.8	1.8	1.4	D	1.8	1.11	0.69
Subsurface Soil (>0.5 ft)	11L520011	Uranium-234						0.0288	1.13	0
Subsurface Soil (>0.5 ft)	11L520011	Uranium-235						0.001248	0.06	0
Subsurface Soil (>0.5 ft)	11L520011	Uranium-238	0/2			7	D	19.6	1.18	18.42
Surface Soil (<0.5 ft)	11L520011	Actinium-227						0.0224	0.21	0
Surface Soil (<0.5 ft)	11L520011	Lead-210						0.0448	0	0.0448
Surface Soil (<0.5 ft)	11L520011	Protactinium-231						0.0256	0.2	0
Surface Soil (<0.5 ft)	11L520011	Radium-226						0.0224	1.05	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	11L520011	Radium-228						0.001152	0.98	0
Surface Soil (<0.5 ft)	11L520011	Thorium-228						0.0032	1.18	0
Surface Soil (<0.5 ft)	11L520011	Thorium-230	1/1	3.2	3.2	3.2	D	3.2	1.66	1.54
Surface Soil (<0.5 ft)	11L520011	Thorium-232						0.0032	1.11	0
Surface Soil (<0.5 ft)	11L520011	Uranium-234						0.0384	1.13	0
Surface Soil (<0.5 ft)	11L520011	Uranium-235						0.001664	0.06	0
Surface Soil (<0.5 ft)	11L520011	Uranium-238						0.0384	1.18	0
Soil - All Depths	CWC	Actinium-227						1.936	0.21	1.726
Soil - All Depths	CWC	Lead-210						4.224	0	4.224
Soil - All Depths	CWC	Protactinium-231						2.288	0.2	2.088
Soil - All Depths	CWC	Radium-226	9/10	0.9	2.3	1.38	L	1.76	1.05	0.71
Soil - All Depths	CWC	Radium-228						0.1576	0.98	0
Soil - All Depths	CWC	Thorium-228						1.97	1.18	0.79
Soil - All Depths	CWC	Thorium-230	10/10	1	4.1	2.35	N	2.97	1.66	1.31
Soil - All Depths	CWC	Thorium-232	7/10	1.2	3	1.59	L	1.97	1.11	0.86
Soil - All Depths	CWC	Uranium-234						5.69	1.13	4.56
Soil - All Depths	CWC	Uranium-235						0.26174	0.06	0.20174
Soil - All Depths	CWC	Uranium-238	0/10			4.43	D	5.69	1.18	4.51
Surface Soil (<0.5 ft)	CWC	Actinium-227						1.936	0.21	1.726
Surface Soil (<0.5 ft)	CWC	Lead-210						4.224	0	4.224
Surface Soil (<0.5 ft)	CWC	Protactinium-231						2.288	0.2	2.088
Surface Soil (<0.5 ft)	CWC	Radium-226	9/10	0.9	2.3	1.38	L	1.76	1.05	0.71
Surface Soil (<0.5 ft)	CWC	Radium-228						0.1576	0.98	0
Surface Soil (<0.5 ft)	CWC	Thorium-228						1.97	1.18	0.79
Surface Soil (<0.5 ft)	CWC	Thorium-230	10/10	1	4.1	2.35	N	2.97	1.66	1.31
Surface Soil (<0.5 ft)	CWC	Thorium-232	7/10	1.2	3	1.59	L	1.97	1.11	0.86
Surface Soil (<0.5 ft)	CWC	Uranium-234						5.69	1.13	4.56
Surface Soil (<0.5 ft)	CWC	Uranium-235						0.26174	0.06	0.20174
Surface Soil (<0.5 ft)	CWC	Uranium-238	0/10			4.43	D	5.69	1.18	4.51
Soil - All Depths	Futura	Actinium-227						50.6	0.21	50.39
Soil - All Depths	Futura	Lead-210						110.4	0	110.4

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Soil - All Depths	Futura	Protactinium-231						59.8	0.2	59.6
Soil - All Depths	Futura	Radium-226	359/361	0.4	2300	29.7	X	46	1.05	44.95
Soil - All Depths	Futura	Radium-228						0.1864	0.98	0
Soil - All Depths	Futura	Thorium-228						2.33	1.18	1.15
Soil - All Depths	Futura	Thorium-230	172/173	0.5	2000	68.9	X	102	1.66	100.34
Soil - All Depths	Futura	Thorium-232	333/361	0.7	26	2.17	X	2.33	1.11	1.22
Soil - All Depths	Futura	Uranium-234						54.2	1.13	53.07
Soil - All Depths	Futura	Uranium-235						2.4932	0.06	2.4332
Soil - All Depths	Futura	Uranium-238	48/361	2.3	2500	37	D	54.2	1.18	53.02
Soil - All Depths	HISS	Actinium-227	8/21	0.29	5.36	1.06	D	1.68	0.209	1.471
Soil - All Depths	HISS	Lead-210						23.04	0	23.04
Soil - All Depths	HISS	Protactinium-231	0/21			0.962	D	1.67	0.195	1.475
Soil - All Depths	HISS	Radium-226	537/544	0.5	700	6.91	X	9.6	1.05	8.55
Soil - All Depths	HISS	Radium-228	20/21	0.29	1.16	0.915	X	0.986	0.977	0.009
Soil - All Depths	HISS	Thorium-228	20/21	0.29	1.16	0.915	X	0.986	1.18	0
Soil - All Depths	HISS	Thorium-230	215/228	0.8	830	37.9	Z	51.9	1.66	50.24
Soil - All Depths	HISS	Thorium-232	481/544	0.29	5	1.73	X	1.79	1.11	0.68
Soil - All Depths	HISS	Uranium-234						17.1	1.13	15.97
Soil - All Depths	HISS	Uranium-235	0/21			1.01	D	1.59	0.0618	1.5282
Soil - All Depths	HISS	Uranium-238	62/543	4	800	13.9	D	17.1	1.18	15.92
Subsurface Soil (>0.5 ft)	IA-1	Actinium-227	5/14	0.2	0.8	0.473	D	0.785	0.209	0.576
Subsurface Soil (>0.5 ft)	IA-1	Lead-210						360.4	0	360.4
Subsurface Soil (>0.5 ft)	IA-1	Protactinium-231	0/14			0.664	D	1.32	0.195	1.125
Subsurface Soil (>0.5 ft)	IA-1	Radium-226	26/35	0.8	2700	82	X	212	1.05	210.95
Subsurface Soil (>0.5 ft)	IA-1	Radium-228	11/11	0.64	1.01	0.857	N	0.921	0.977	0
Subsurface Soil (>0.5 ft)	IA-1	Thorium-228	11/11	0.7	1.63	1.21	L	1.42	1.18	0.24
Subsurface Soil (>0.5 ft)	IA-1	Thorium-230	20/20	0	120	14.2	Z	27.7	1.66	26.04
Subsurface Soil (>0.5 ft)	IA-1	Thorium-232	22/35	0.45	63	3.51	X	6.48	1.11	5.37
Subsurface Soil (>0.5 ft)	IA-1	Uranium-234						110	1.13	108.87
Subsurface Soil (>0.5 ft)	IA-1	Uranium-235	2/11	0.22	0.25	0.112	D	0.155	0.0618	0.0932
Subsurface Soil (>0.5 ft)	IA-1	Uranium-238	8/35	4.68	1200	52.9	D	110	1.18	108.82

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<5 ft)	IA-1	Actinium-227	0/1			2.6	D		0.209	0
Surface Soil (<5 ft)	IA-1	Actinium-227						538.2	0.21	537.99
Surface Soil (<5 ft)	IA-1	Lead-210						994.5	0	994.5
Surface Soil (<5 ft)	IA-1	Protactinium-231	0/1			5.2	D		0.195	0
Surface Soil (<5 ft)	IA-1	Protactinium-231						585	0.2	584.8
Surface Soil (<5 ft)	IA-1	Radium-226	7/13	1	2700	216	X	585	1.05	583.95
Surface Soil (<5 ft)	IA-1	Radium-228						4.34	0.98	3.36
Surface Soil (<5 ft)	IA-1	Thorium-228						13.175	1.18	11.995
Surface Soil (<5 ft)	IA-1	Thorium-230	4/4	1.8	110	33.7	D	94.3	1.66	92.64
Surface Soil (<5 ft)	IA-1	Thorium-232	6/13	1.1	63	7.14	D	15.5	1.11	14.39
Surface Soil (<5 ft)	IA-1	Uranium-234						287	1.13	285.87
Surface Soil (<5 ft)	IA-1	Uranium-235						13.202	0.06	13.142
Surface Soil (<5 ft)	IA-1	Uranium-238	3/13	40	1200	128	D	287	1.18	285.82
Subsurface Soil (>0.5 ft)	IA-10	Actinium-227						4.0112	0.21	3.8012
Subsurface Soil (>0.5 ft)	IA-10	Lead-210						7.412	0	7.412
Subsurface Soil (>0.5 ft)	IA-10	Protactinium-231						4.36	0.2	4.16
Subsurface Soil (>0.5 ft)	IA-10	Radium-226	44/58	0.6	44	2.64	Z	4.36	1.05	3.31
Subsurface Soil (>0.5 ft)	IA-10	Radium-228						0.5712	0.98	0
Subsurface Soil (>0.5 ft)	IA-10	Thorium-228						1.734	1.18	0.554
Subsurface Soil (>0.5 ft)	IA-10	Thorium-230	60/63	0.4	46	6.04	Z	7.83	1.66	6.17
Subsurface Soil (>0.5 ft)	IA-10	Thorium-232	43/58	0.7	4	1.78	Z	2.04	1.11	0.93
Subsurface Soil (>0.5 ft)	IA-10	Uranium-234						10.9	1.13	9.77
Subsurface Soil (>0.5 ft)	IA-10	Uranium-235						0.5014	0.06	0.4414
Subsurface Soil (>0.5 ft)	IA-10	Uranium-238	2/58	43.9	45	8.23	D	10.9	1.18	9.72
Surface Soil (<0.5 ft)	IA-10	Actinium-227	0/4			0.1	D	0.217	0.209	0.008
Surface Soil (<0.5 ft)	IA-10	Lead-210						2.193	0	2.193
Surface Soil (<0.5 ft)	IA-10	Protactinium-231	0/4			-0.0175	D	0.305	0.195	0.11
Surface Soil (<0.5 ft)	IA-10	Radium-226	95/119	0.3	2.8	1.19	Z	1.29	1.05	0.24
Surface Soil (<0.5 ft)	IA-10	Radium-228	4/4	0.88	0.94	0.908	D	0.94	0.977	0
Surface Soil (<0.5 ft)	IA-10	Thorium-228	4/4	1.23	2.29	1.71	D	2.23	1.18	1.05
Surface Soil (<0.5 ft)	IA-10	Thorium-230	112/121	0.4	29	3.8	Z	4.44	1.66	2.78
Surface Soil (<0.5 ft)	IA-10	Thorium-232	88/119	0.5	4	1.39	Z	1.52	1.11	0.41

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	IA-10	Uranium-234						5.45	1.13	4.32
Surface Soil (<0.5 ft)	IA-10	Uranium-235	0/4			0.108	D	0.18	0.0618	0.1182
Surface Soil (<0.5 ft)	IA-10	Uranium-238	0/119			4.54	D	5.45	1.18	4.27
Surface Soil (<5 ft)	IA-11	Thorium-230	2/2	1.5	1.9	1.7	D	1.9	1.66	0.24
Subsurface Soil (>0.5 ft)	IA-12	Actinium-227	2/3	1.45	2.23	1.29	D	2.23	0.209	2.021
Subsurface Soil (>0.5 ft)	IA-12	Lead-210						4.352	0	4.352
Subsurface Soil (>0.5 ft)	IA-12	Protactinium-231	2/3	1.43	2.31	1.49	D	2.31	0.195	2.115
Subsurface Soil (>0.5 ft)	IA-12	Radium-226	148/148	0.6	26	2.25	X	2.56	1.05	1.51
Subsurface Soil (>0.5 ft)	IA-12	Radium-228	3/3	0.9	1.21	1.06	D	1.21	0.977	0.233
Subsurface Soil (>0.5 ft)	IA-12	Thorium-228	3/3	1.17	1.72	1.43	D	1.72	1.18	0.54
Subsurface Soil (>0.5 ft)	IA-12	Thorium-230	116/117	1.5	1900	47.2	X	74.9	1.66	73.24
Subsurface Soil (>0.5 ft)	IA-12	Thorium-232	133/148	0.9	5	1.9	X	2.01	1.11	0.9
Subsurface Soil (>0.5 ft)	IA-12	Uranium-234						9.47	1.13	8.34
Subsurface Soil (>0.5 ft)	IA-12	Uranium-235	2/3	1.17	1.75	0.987	D	1.75	0.0618	1.6882
Subsurface Soil (>0.5 ft)	IA-12	Uranium-238	14/148	5	31	8.91	D	9.47	1.18	8.29
Surface Soil (<0.5 ft)	IA-12	Actinium-227						3.8824	0.21	3.6724
Surface Soil (<0.5 ft)	IA-12	Lead-210						7.174	0	7.174
Surface Soil (<0.5 ft)	IA-12	Protactinium-231						4.22	0.2	4.02
Surface Soil (<0.5 ft)	IA-12	Radium-226	86/86	0.8	37	3.36	X	4.22	1.05	3.17
Surface Soil (<0.5 ft)	IA-12	Radium-228						0.4788	0.98	0
Surface Soil (<0.5 ft)	IA-12	Thorium-228						1.4535	1.18	0.2735
Surface Soil (<0.5 ft)	IA-12	Thorium-230	37/37	5.5	2200	173	L	319	1.66	317.34
Surface Soil (<0.5 ft)	IA-12	Thorium-232	70/86	0.6	5	1.57	X	1.71	1.11	0.6
Surface Soil (<0.5 ft)	IA-12	Uranium-234						12.3	1.13	11.17
Surface Soil (<0.5 ft)	IA-12	Uranium-235						0.5658	0.06	0.5058
Surface Soil (<0.5 ft)	IA-12	Uranium-238	11/86	5	94	10.4	D	12.3	1.18	11.12
Subsurface Soil (>0.5 ft)	IA-13	Actinium-227						1.8584	0.21	1.6484
Subsurface Soil (>0.5 ft)	IA-13	Lead-210						3.434	0	3.434
Subsurface Soil (>0.5 ft)	IA-13	Protactinium-231						2.02	0.2	1.82
Subsurface Soil (>0.5 ft)	IA-13	Radium-226	380/389	0.65	7	1.95	X	2.02	1.05	0.97

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	IA-13	Radium-228						0.588	0.98	0
Subsurface Soil (>0.5 ft)	IA-13	Thorium-228						1.785	1.18	0.605
Subsurface Soil (>0.5 ft)	IA-13	Thorium-230	375/378	0.45	100	2.6	X	3.24	1.66	1.58
Subsurface Soil (>0.5 ft)	IA-13	Thorium-232	278/389	0.6	6	2.02	X	2.1	1.11	0.99
Subsurface Soil (>0.5 ft)	IA-13	Uranium-234						10.8	1.13	9.67
Subsurface Soil (>0.5 ft)	IA-13	Uranium-235						0.4968	0.06	0.4368
Subsurface Soil (>0.5 ft)	IA-13	Uranium-238	6/389	1.2	16	10.2	D	10.8	1.18	9.62
Surface Soil (<0.5 ft)	IA-13	Actinium-227	26/38	0.2	0.71	0.328	X	0.382	0.209	0.173
Surface Soil (<0.5 ft)	IA-13	Lead-210						2.703	0	2.703
Surface Soil (<0.5 ft)	IA-13	Protactinium-231	2/38	1.55	1.92	0.391	D	0.514	0.195	0.319
Surface Soil (<0.5 ft)	IA-13	Radium-226	110/111	0.54	3.3	1.48	X	1.59	1.05	0.54
Surface Soil (<0.5 ft)	IA-13	Radium-228	37/37	0.14	1.13	0.844	X	0.911	0.977	0
Surface Soil (<0.5 ft)	IA-13	Thorium-228	38/38	0.39	2.14	1.11	N	1.2	1.18	0.02
Surface Soil (<0.5 ft)	IA-13	Thorium-230	108/109	0.42	110	11.4	L	15.4	1.66	13.74
Surface Soil (<0.5 ft)	IA-13	Thorium-232	103/112	0.44	4	1.44	L	1.54	1.11	0.43
Surface Soil (<0.5 ft)	IA-13	Uranium-234						4.03	1.13	2.9
Surface Soil (<0.5 ft)	IA-13	Uranium-235	11/38	0.2	0.51	0.168	D	0.195	0.0618	0.1332
Surface Soil (<0.5 ft)	IA-13	Uranium-238	3/112	2.8	7	3.58	D	4.03	1.18	2.85
Subsurface Soil (>0.5 ft)	IA-2	Actinium-227	44/57	0.18	130.4	3.27	X	7.14	0.209	6.931
Subsurface Soil (>0.5 ft)	IA-2	Lead-210						48.28	0	48.28
Subsurface Soil (>0.5 ft)	IA-2	Protactinium-231	5/57	2.33	179.3	3.99	D	9.28	0.195	9.085
Subsurface Soil (>0.5 ft)	IA-2	Radium-226	93/130	0.5	590	17.2	X	28.4	1.05	27.35
Subsurface Soil (>0.5 ft)	IA-2	Radium-228	57/57	0.67	4.82	1.02	X	1.14	0.977	0.163
Subsurface Soil (>0.5 ft)	IA-2	Thorium-228	57/57	0.74	4.82	1.43	X	1.58	1.18	0.4
Subsurface Soil (>0.5 ft)	IA-2	Thorium-230	90/91	0	14070	198	Z	456	1.66	454.34
Subsurface Soil (>0.5 ft)	IA-2	Thorium-232	78/130	0.6	4.82	2.16	X	2.35	1.11	1.24
Subsurface Soil (>0.5 ft)	IA-2	Uranium-234						49.9	1.13	48.77
Subsurface Soil (>0.5 ft)	IA-2	Uranium-235	24/57	0.19	37.21	1.16	D	2.28	0.0618	2.2182
Subsurface Soil (>0.5 ft)	IA-2	Uranium-238	26/128	3.99	706	36.6	D	49.9	1.18	48.72
Surface Soil (<5 ft)	IA-2	Actinium-227	11/13	0.18	130.4	13.1	X	30.9	0.209	30.691
Surface Soil (<5 ft)	IA-2	Lead-210						115.94	0	115.94

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<5 ft)	IA-2	Protactinium-231	5/13	2.66	179.3	17.1	D	41.4	0.195	41.205
Surface Soil (<5 ft)	IA-2	Radium-226	32/53	0.85	590	38.6	X	68.2	1.05	67.15
Surface Soil (<5 ft)	IA-2	Radium-228	13/13	0.38	4.82	1.19	X	1.74	0.977	0.763
Surface Soil (<5 ft)	IA-2	Thorium-228	13/13	0.5	4.82	1.39	X	1.92	1.18	0.74
Surface Soil (<5 ft)	IA-2	Thorium-230	30/30	0	14070	584	Z	1380	1.66	1378.34
Surface Soil (<5 ft)	IA-2	Thorium-232	23/53	0.44	4.82	2.71	D	3.15	1.11	2.04
Surface Soil (<5 ft)	IA-2	Uranium-234						98.1	1.13	96.97
Surface Soil (<5 ft)	IA-2	Uranium-235	10/13	0.25	37.21	4.65	Z	9.68	0.0618	9.6182
Surface Soil (<5 ft)	IA-2	Uranium-238	14/54	6.02	706	67.8	D	98.1	1.18	96.92
Subsurface Soil (>0.5 ft)	IA-3	Actinium-227	37/54	0.19	99.15	3.58	Z	6.98	0.209	6.771
Subsurface Soil (>0.5 ft)	IA-3	Lead-210						197.2	0	197.2
Subsurface Soil (>0.5 ft)	IA-3	Protactinium-231	7/54	1.5	56.27	2.24	D	4.25	0.195	4.055
Subsurface Soil (>0.5 ft)	IA-3	Radium-226	132/167	0.7	5620	57.7	X	116	1.05	114.95
Subsurface Soil (>0.5 ft)	IA-3	Radium-228	53/53	0.42	1.61	0.973	X	1.01	0.977	0.033
Subsurface Soil (>0.5 ft)	IA-3	Thorium-228	53/53	0.59	1.79	1.18	N	1.24	1.18	0.06
Subsurface Soil (>0.5 ft)	IA-3	Thorium-230	96/97	0.6	7241	189	Z	347	1.66	345.34
Subsurface Soil (>0.5 ft)	IA-3	Thorium-232	114/166	0.4	5	2.23	X	2.74	1.11	1.63
Subsurface Soil (>0.5 ft)	IA-3	Uranium-234						72.1	1.13	70.97
Subsurface Soil (>0.5 ft)	IA-3	Uranium-235	33/53	0.19	17.99	1.04	Z	1.7	0.0618	1.6382
Subsurface Soil (>0.5 ft)	IA-3	Uranium-238	47/167	3.04	1600	49.9	D	72.1	1.18	70.92
Surface Soil (<5 ft)	IA-3	Actinium-227	11/15	0.19	47.16	4.99	X	10.7	0.209	10.491
Surface Soil (<5 ft)	IA-3	Lead-210						27.03	0	27.03
Surface Soil (<5 ft)	IA-3	Protactinium-231	6/15	1.56	31.66	3.87	D	7.86	0.195	7.665
Surface Soil (<5 ft)	IA-3	Radium-226	59/74	0.7	208	10.1	X	15.9	1.05	14.85
Surface Soil (<5 ft)	IA-3	Radium-228	15/15	0.33	1.81	0.846	L	1.1	0.977	0.123
Surface Soil (<5 ft)	IA-3	Thorium-228	15/15	0.34	1.81	1.04	N	1.23	1.18	0.05
Surface Soil (<5 ft)	IA-3	Thorium-230	36/36	1.09	5335	226	X	482	1.66	480.34
Surface Soil (<5 ft)	IA-3	Thorium-232	51/74	0.4	5	1.96	L	2.27	1.11	1.16
Surface Soil (<5 ft)	IA-3	Uranium-234						31.4	1.13	30.27
Surface Soil (<5 ft)	IA-3	Uranium-235	11/15	0.22	8.21	1.46	Z	2.61	0.0618	2.5482
Surface Soil (<5 ft)	IA-3	Uranium-238	18/74	3.04	270	23.6	D	31.4	1.18	30.22

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	IA-4	Actinium-227	26/41	0.16	16.18	0.797	X	1.47	0.209	1.261
Subsurface Soil (>0.5 ft)	IA-4	Lead-210						200.6	0	200.6
Subsurface Soil (>0.5 ft)	IA-4	Protactinium-231	2/41	2.49	3.98	0.41	D	0.628	0.195	0.433
Subsurface Soil (>0.5 ft)	IA-4	Radium-226	64/105	0.62	1740	74	X	118	1.05	116.95
Subsurface Soil (>0.5 ft)	IA-4	Radium-228	40/40	0.78	1.25	0.93	X	0.955	0.977	0
Subsurface Soil (>0.5 ft)	IA-4	Thorium-228	40/40	0.57	2.2	1.25	L	1.36	1.18	0.18
Subsurface Soil (>0.5 ft)	IA-4	Thorium-230	74/74	1.08	2440	107	X	182	1.66	180.34
Subsurface Soil (>0.5 ft)	IA-4	Thorium-232	50/103	0.56	7	3.18	D	3.69	1.11	2.58
Subsurface Soil (>0.5 ft)	IA-4	Uranium-234						86.1	1.13	84.97
Subsurface Soil (>0.5 ft)	IA-4	Uranium-235	21/40	0.18	82.19	2.46	Z	5.91	0.0618	5.8482
Subsurface Soil (>0.5 ft)	IA-4	Uranium-238	12/104	3.34	1769	56.4	D	86.1	1.18	84.92
Surface Soil (<5 ft)	IA-4	Actinium-227	6/6	0.23	4.76	1.61	L	4.76	0.209	4.551
Surface Soil (<5 ft)	IA-4	Lead-210						453.9	0	453.9
Surface Soil (<5 ft)	IA-4	Protactinium-231	3/6	2.49	3.98	1.75	D	3.29	0.195	3.095
Surface Soil (<5 ft)	IA-4	Radium-226	20/40	0.82	1518	170	X	267	1.05	265.95
Surface Soil (<5 ft)	IA-4	Radium-228	6/6	0.95	1.2	1.04	L	1.13	0.977	0.153
Surface Soil (<5 ft)	IA-4	Thorium-228	6/6	1.02	2.2	1.4	L	1.86	1.18	0.68
Surface Soil (<5 ft)	IA-4	Thorium-230	15/15	1.1	2440	398	L	2440	1.66	2438.34
Surface Soil (<5 ft)	IA-4	Thorium-232	8/38	1.15	4	4.76	D	4	1.11	2.89
Surface Soil (<5 ft)	IA-4	Uranium-234						72.4	1.13	71.27
Surface Soil (<5 ft)	IA-4	Uranium-235	5/6	1.21	3.89	1.96	N	3.06	0.0618	2.9982
Surface Soil (<5 ft)	IA-4	Uranium-238	4/38	14.83	72.35	79.2	D	72.4	1.18	71.22
Subsurface Soil (>0.5 ft)	IA-5	Actinium-227	89/131	0.16	292.7	3.54	Z	7.31	0.209	7.101
Subsurface Soil (>0.5 ft)	IA-5	Lead-210						32.81	0	32.81
Subsurface Soil (>0.5 ft)	IA-5	Protactinium-231	11/131	1.21	346.4	4.03	D	8.48	0.195	8.285
Subsurface Soil (>0.5 ft)	IA-5	Radium-226	232/315	0.59	900	13.4	X	19.3	1.05	18.25
Subsurface Soil (>0.5 ft)	IA-5	Radium-228	130/131	0.71	3.56	0.944	X	0.983	0.977	0.006
Subsurface Soil (>0.5 ft)	IA-5	Thorium-228	130/131	0.61	3.56	1.24	X	1.28	1.18	0.1
Subsurface Soil (>0.5 ft)	IA-5	Thorium-230	246/246	0.78	14680	190	X	296	1.66	294.34
Subsurface Soil (>0.5 ft)	IA-5	Thorium-232	197/316	0.42	7.5	2.19	X	2.33	1.11	1.22
Subsurface Soil (>0.5 ft)	IA-5	Uranium-234						33.6	1.13	32.47
Subsurface Soil (>0.5 ft)	IA-5	Uranium-235	51/131	0.17	32.11	0.715	D	1.18	0.0618	1.1182

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	IA-5	Uranium-238	41/316	5.08	1000	27.3	D	33.6	1.18	32.42
Surface Soil (<5 ft)	IA-5	Actinium-227	34/43	0.19	292.7	10.4	Z	22	0.209	21.791
Surface Soil (<5 ft)	IA-5	Lead-210						49.98	0	49.98
Surface Soil (<5 ft)	IA-5	Protactinium-231	12/43	0.9	346.4	12.2	D	25.9	0.195	25.705
Surface Soil (<5 ft)	IA-5	Radium-226	107/160	0.6	900	18.8	X	29.4	1.05	28.35
Surface Soil (<5 ft)	IA-5	Radium-228	42/43	0.61	3.56	1.09	X	1.2	0.977	0.223
Surface Soil (<5 ft)	IA-5	Thorium-228	42/43	0.71	3.56	1.32	X	1.44	1.18	0.26
Surface Soil (<5 ft)	IA-5	Thorium-230	106/106	1	14680	419	X	662	1.66	660.34
Surface Soil (<5 ft)	IA-5	Thorium-232	88/160	0.64	7.5	2.45	X	2.63	1.11	1.52
Surface Soil (<5 ft)	IA-5	Uranium-234						51.6	1.13	50.47
Surface Soil (<5 ft)	IA-5	Uranium-235	30/43	0.2	32.11	2.05	Z	3.45	0.0618	3.3882
Surface Soil (<5 ft)	IA-5	Uranium-238	34/160	6	1000	40	D	51.6	1.18	50.42
Subsurface Soil (>0.5 ft)	IA-6	Actinium-227	2/5	0.22	17.89	3.7	D	11.3	0.209	11.091
Subsurface Soil (>0.5 ft)	IA-6	Lead-210						9.809	0	9.809
Subsurface Soil (>0.5 ft)	IA-6	Protactinium-231	1/5	18.78	18.78	3.74	D	11.8	0.195	11.605
Subsurface Soil (>0.5 ft)	IA-6	Radium-226	16/32	0.85	36	3.77	X	5.77	1.05	4.72
Subsurface Soil (>0.5 ft)	IA-6	Radium-228	5/5	0.84	1.37	1	L	1.24	0.977	0.263
Subsurface Soil (>0.5 ft)	IA-6	Thorium-228	5/5	1.33	1.67	1.46	L	1.61	1.18	0.43
Subsurface Soil (>0.5 ft)	IA-6	Thorium-230	25/25	0.6	2100	138	X	287	1.66	285.34
Subsurface Soil (>0.5 ft)	IA-6	Thorium-232	13/32	0.74	7	2.8	D	3.16	1.11	2.05
Subsurface Soil (>0.5 ft)	IA-6	Uranium-234						32	1.13	30.87
Subsurface Soil (>0.5 ft)	IA-6	Uranium-235	3/5	0.2	4.33	1.03	D	2.79	0.0618	2.7282
Subsurface Soil (>0.5 ft)	IA-6	Uranium-238	8/32	8.28	32	29	D	32	1.18	30.82
Surface Soil (<5 ft)	IA-6	Actinium-227	1/1	17.89	17.89	17.9	D	17.9	0.209	17.691
Surface Soil (<5 ft)	IA-6	Lead-210						16.354	0	16.354
Surface Soil (<5 ft)	IA-6	Protactinium-231	1/1	18.78	18.78	18.8	D	18.8	0.195	18.605
Surface Soil (<5 ft)	IA-6	Radium-226	11/24	1	39.4	5.98	D	9.62	1.05	8.57
Surface Soil (<5 ft)	IA-6	Radium-228	1/1	1.37	1.37	1.37	D	1.37	0.977	0.393
Surface Soil (<5 ft)	IA-6	Thorium-228	1/1	1.37	1.37	1.37	D	1.37	1.18	0.19
Surface Soil (<5 ft)	IA-6	Thorium-230	15/15	1.4	2100	211	X	464	1.66	462.34
Surface Soil (<5 ft)	IA-6	Thorium-232	8/24	1.2	7	3.04	D	3.45	1.11	2.34

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<5 ft)	IA-6	Uranium-234						32	1.13	30.87
Surface Soil (<5 ft)	IA-6	Uranium-235	1/1	4.33	4.33	4.33	D	4.33	0.0618	4.2682
Surface Soil (<5 ft)	IA-6	Uranium-238	7/24	12	32	33.6	D	32	1.18	30.82
Subsurface Soil (>0.5 ft)	IA-7	Actinium-227	19/35	0.19	0.68	0.269	Z	0.325	0.209	0.116
Subsurface Soil (>0.5 ft)	IA-7	Lead-210						4.454	0	4.454
Subsurface Soil (>0.5 ft)	IA-7	Protactinium-231	8/35	1.2	2.38	0.628	D	0.828	0.195	0.633
Subsurface Soil (>0.5 ft)	IA-7	Radium-226	86/90	0.65	27	2.05	X	2.62	1.05	1.57
Subsurface Soil (>0.5 ft)	IA-7	Radium-228	35/35	0.66	1.15	0.937	N	0.967	0.977	0
Subsurface Soil (>0.5 ft)	IA-7	Thorium-228	35/35	0.69	1.91	1.23	L	1.31	1.18	0.13
Subsurface Soil (>0.5 ft)	IA-7	Thorium-230	72/73	0.86	1400	70.9	X	113	1.66	111.34
Subsurface Soil (>0.5 ft)	IA-7	Thorium-232	80/90	0.59	4	1.61	X	1.75	1.11	0.64
Subsurface Soil (>0.5 ft)	IA-7	Uranium-234						9.59	1.13	8.46
Subsurface Soil (>0.5 ft)	IA-7	Uranium-235	4/35	0.24	0.48	0.108	D	0.137	0.0618	0.0752
Subsurface Soil (>0.5 ft)	IA-7	Uranium-238	20/90	5	39	8.12	D	9.59	1.18	8.41
Surface Soil (<5 ft)	IA-7	Actinium-227	9/19	0.32	695.7	56.5	D	127	0.209	126.791
Surface Soil (<5 ft)	IA-7	Lead-210						140.25	0	140.25
Surface Soil (<5 ft)	IA-7	Protactinium-231	10/19	1.2	685.8	56.4	X	126	0.195	125.805
Surface Soil (<5 ft)	IA-7	Radium-226	87/92	0.7	1818	42.2	X	82.5	1.05	81.45
Surface Soil (<5 ft)	IA-7	Radium-228	19/19	0.81	7.54	1.67	X	2.46	0.977	1.483
Surface Soil (<5 ft)	IA-7	Thorium-228	19/19	1.02	7.54	1.95	X	2.71	1.18	1.53
Surface Soil (<5 ft)	IA-7	Thorium-230	70/71	1	37780	965	X	2010	1.66	2008.34
Surface Soil (<5 ft)	IA-7	Thorium-232	80/92	0.7	7.54	2.15	X	2.61	1.11	1.5
Surface Soil (<5 ft)	IA-7	Uranium-234						28.7	1.13	27.57
Surface Soil (<5 ft)	IA-7	Uranium-235	5/19	0.24	54.18	4.7	D	10.3	0.0618	10.2382
Surface Soil (<5 ft)	IA-7	Uranium-238	24/92	5	201.9	19.3	D	28.7	1.18	27.52
Subsurface Soil (>0.5 ft)	IA-8	Actinium-227	15/28	0.23	0.95	0.291	L	0.597	0.209	0.388
Subsurface Soil (>0.5 ft)	IA-8	Lead-210						7.021	0	7.021
Subsurface Soil (>0.5 ft)	IA-8	Protactinium-231	6/28	1.28	2.63	0.567	D	0.798	0.195	0.603
Subsurface Soil (>0.5 ft)	IA-8	Radium-226	282/294	0.67	130	3.3	X	4.13	1.05	3.08
Subsurface Soil (>0.5 ft)	IA-8	Radium-228	28/28	0.81	1.15	0.948	X	0.973	0.977	0
Subsurface Soil (>0.5 ft)	IA-8	Thorium-228	28/28	0.68	1.98	1.27	N	1.38	1.18	0.2

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	IA-8	Thorium-230	303/303	0.9	15000	91.1	X	175	1.66	173.34
Subsurface Soil (>0.5 ft)	IA-8	Thorium-232	229/294	0.68	14	2.24	X	2.37	1.11	1.26
Subsurface Soil (>0.5 ft)	IA-8	Uranium-234						13.6	1.13	12.47
Subsurface Soil (>0.5 ft)	IA-8	Uranium-235	9/28	0.19	0.44	0.165	D	0.208	0.0618	0.1462
Subsurface Soil (>0.5 ft)	IA-8	Uranium-238	24/294	3.87	66	12.7	D	13.6	1.18	12.42
Surface Soil (<0.5 ft)	IA-8	Actinium-227	23/23	0.18	442.6	43	X	82.3	0.209	82.091
Surface Soil (<0.5 ft)	IA-8	Lead-210						58.99	0	58.99
Surface Soil (<0.5 ft)	IA-8	Protactinium-231	18/23	0.84	450.3	45.4	Z	86.5	0.195	86.305
Surface Soil (<0.5 ft)	IA-8	Radium-226	85/86	0.7	436.4	23.5	X	34.7	1.05	33.65
Surface Soil (<0.5 ft)	IA-8	Radium-228	23/23	0.28	4.76	1.29	X	1.64	0.977	0.663
Surface Soil (<0.5 ft)	IA-8	Thorium-228	23/23	0.49	4.76	1.49	L	1.82	1.18	0.64
Surface Soil (<0.5 ft)	IA-8	Thorium-230	83/84	2.9	20280	917	L	1750	1.66	1748.34
Surface Soil (<0.5 ft)	IA-8	Thorium-232	71/86	0.4	5	1.81	Z	2.03	1.11	0.92
Surface Soil (<0.5 ft)	IA-8	Uranium-234						25.9	1.13	24.77
Surface Soil (<0.5 ft)	IA-8	Uranium-235	21/23	0.32	38.87	5.35	L	20.2	0.0618	20.1382
Surface Soil (<0.5 ft)	IA-8	Uranium-238	29/86	6	190.4	19.9	D	25.9	1.18	24.72
Subsurface Soil (>0.5 ft)	IA-9	Actinium-227	106/140	0.09	189.9	2.85	Z	5.3	0.209	5.091
Subsurface Soil (>0.5 ft)	IA-9	Lead-210						5.576	0	5.576
Subsurface Soil (>0.5 ft)	IA-9	Protactinium-231	21/140	1.02	217.1	3.23	D	6.05	0.195	5.855
Subsurface Soil (>0.5 ft)	IA-9	Radium-226	420/427	0.15	230.7	2.29	Z	3.28	1.05	2.23
Subsurface Soil (>0.5 ft)	IA-9	Radium-228	140/140	0.15	2.79	0.969	X	1	0.977	0.023
Subsurface Soil (>0.5 ft)	IA-9	Thorium-228	139/140	0.6	15.78	1.38	X	1.56	1.18	0.38
Subsurface Soil (>0.5 ft)	IA-9	Thorium-230	402/407	0.6	10140	57.2	X	105	1.66	103.34
Subsurface Soil (>0.5 ft)	IA-9	Thorium-232	404/427	0.5	10.93	1.65	L	1.7	1.11	0.59
Subsurface Soil (>0.5 ft)	IA-9	Uranium-234						6.64	1.13	5.51
Subsurface Soil (>0.5 ft)	IA-9	Uranium-235	30/140	0.18	20.23	0.555	D	0.881	0.0618	0.8192
Subsurface Soil (>0.5 ft)	IA-9	Uranium-238	13/427	2	119.7	6.03	D	6.64	1.18	5.46
Surface Soil (<0.5 ft)	IA-9	Actinium-227	26/61	0.16	46.85	1.39	D	2.84	0.209	2.631
Surface Soil (<0.5 ft)	IA-9	Lead-210						2.873	0	2.873
Surface Soil (<0.5 ft)	IA-9	Protactinium-231	25/61	0.73	51.73	2.12	D	3.69	0.195	3.495
Surface Soil (<0.5 ft)	IA-9	Radium-226	451/478	0.5	29.27	1.53	Z	1.69	1.05	0.64

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	IA-9	Radium-228	61/61	0.26	1.29	0.924	X	0.964	0.977	0
Surface Soil (<0.5 ft)	IA-9	Thorium-228	61/61	0.6	2.1	1.25	L	1.33	1.18	0.15
Surface Soil (<0.5 ft)	IA-9	Thorium-230	510/523	0.51	2787	23.2	X	34.3	1.66	32.64
Surface Soil (<0.5 ft)	IA-9	Thorium-232	443/474	0.47	5	1.59	Z	1.65	1.11	0.54
Surface Soil (<0.5 ft)	IA-9	Uranium-234						6.01	1.13	4.88
Surface Soil (<0.5 ft)	IA-9	Uranium-235	13/61	0.15	6.92	0.324	D	0.549	0.0618	0.4872
Surface Soil (<0.5 ft)	IA-9	Uranium-238	19/479	3.6	42	5.65	D	6.01	1.18	4.83
Soil - All Depths	Norfork Southern	Actinium-227						0.1218	0.21	0
Soil - All Depths	Norfork Southern	Lead-210						0.2436	0	0.2436
Soil - All Depths	Norfork Southern	Protactinium-231						0.1392	0.2	0
Soil - All Depths	Norfork Southern	Radium-226	41/42	0.9	6	2.5	L	2.88	1.05	1.83
Soil - All Depths	Norfork Southern	Radium-228						0.006264	0.98	0
Soil - All Depths	Norfork Southern	Thorium-228						0.0174	1.18	0
Soil - All Depths	Norfork Southern	Thorium-230	128/136	0.8	230	13.3	X	17.4	1.66	15.74
Soil - All Depths	Norfork Southern	Thorium-232	28/42	0.9	4	1.7	X	1.87	1.11	0.76
Soil - All Depths	Norfork Southern	Uranium-234						0.2088	1.13	0
Soil - All Depths	Norfork Southern	Uranium-235						0.009048	0.06	0
Soil - All Depths	Norfork Southern	Uranium-238	0/41			10.1	D	10.9	1.18	9.72
Subsurface Soil (>0.5 ft)	Norfork Southern	Actinium-227						0.1176	0.21	0
Subsurface Soil (>0.5 ft)	Norfork Southern	Lead-210						0.2352	0	0.2352
Subsurface Soil (>0.5 ft)	Norfork Southern	Protactinium-231						0.1344	0.2	0
Subsurface Soil (>0.5 ft)	Norfork Southern	Radium-226	31/32	0.9	6	2.62	L	3.06	1.05	2.01
Subsurface Soil (>0.5 ft)	Norfork Southern	Radium-228						0.006048	0.98	0
Subsurface Soil (>0.5 ft)	Norfork Southern	Thorium-228						0.0168	1.18	0
Subsurface Soil (>0.5 ft)	Norfork Southern	Thorium-230	106/114	0.8	230	12.3	X	16.8	1.66	15.14
Subsurface Soil (>0.5 ft)	Norfork Southern	Thorium-232	24/32	1	4	1.74	X	1.96	1.11	0.85
Subsurface Soil (>0.5 ft)	Norfork Southern	Uranium-234						0.2016	1.13	0
Subsurface Soil (>0.5 ft)	Norfork Southern	Uranium-235						0.008736	0.06	0
Subsurface Soil (>0.5 ft)	Norfork Southern	Uranium-238	0/31			10.3	D	11.3	1.18	10.12
Surface Soil (<0.5 ft)	Norfork Southern	Actinium-227						0.2142	0.21	0.0042
Surface Soil (<0.5 ft)	Norfork Southern	Lead-210						0.4284	0	0.4284

Attachment 5. Soil Summary Statistics for Radionuclides (Page 81 of 84)

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	Norfork Southern	Protactinium-231						0.2448	0.2	0.0448
Surface Soil (<0.5 ft)	Norfork Southern	Radium-226	10/10	1	4	2.12	L	3.03	1.05	1.98
Surface Soil (<0.5 ft)	Norfork Southern	Radium-228						0.011016	0.98	0
Surface Soil (<0.5 ft)	Norfork Southern	Thorium-228						0.0306	1.18	0
Surface Soil (<0.5 ft)	Norfork Southern	Thorium-230	22/22	1.3	130	18.1	X	30.6	1.66	28.94
Surface Soil (<0.5 ft)	Norfork Southern	Thorium-232	4/10	0.9	2	1.56	D	1.86	1.11	0.75
Surface Soil (<0.5 ft)	Norfork Southern	Uranium-234						0.3672	1.13	0
Surface Soil (<0.5 ft)	Norfork Southern	Uranium-235						0.015912	0.06	0
Surface Soil (<0.5 ft)	Norfork Southern	Uranium-238	0/10			9.5	D	11.3	1.18	10.12
Soil - All Depths	ROAD ROW	Actinium-227	2/4	0.27	0.29	0.215	D	0.29	0.209	0.081
Soil - All Depths	ROAD ROW	Lead-210						0.6986	0	0.6986
Soil - All Depths	ROAD ROW	Protactinium-231	0/4			0.213	D	0.737	0.195	0.542
Soil - All Depths	ROAD ROW	Radium-226	1730/1757	0.4	92	2.7	X	2.89	1.05	1.84
Soil - All Depths	ROAD ROW	Radium-228	4/4	0.8	1.02	0.925	D	1.02	0.977	0.043
Soil - All Depths	ROAD ROW	Thorium-228	4/4	1.14	1.51	1.39	D	1.51	1.18	0.33
Soil - All Depths	ROAD ROW	Thorium-230	2740/2784	0.3	5100	42.2	X	49.9	1.66	48.24
Soil - All Depths	ROAD ROW	Thorium-232	1520/1752	0.35	64	2.13	Z	2.22	1.11	1.11
Soil - All Depths	ROAD ROW	Uranium-234						0.5988	1.13	0
Soil - All Depths	ROAD ROW	Uranium-235	1/4	0.24	0.24	0.133	D	0.24	0.0618	0.1782
Soil - All Depths	ROAD ROW	Uranium-238	47/1754	2.1	78	11.2	D	11.5	1.18	10.32
Subsurface Soil (>0.5 ft)	ROAD ROW	Actinium-227						0.0938	0.21	0
Subsurface Soil (>0.5 ft)	ROAD ROW	Lead-210						0.1876	0	0.1876
Subsurface Soil (>0.5 ft)	ROAD ROW	Protactinium-231						0.1072	0.2	0
Subsurface Soil (>0.5 ft)	ROAD ROW	Radium-226	1359/1381	0.4	39.9	1.99	X	2.07	1.05	1.02
Subsurface Soil (>0.5 ft)	ROAD ROW	Radium-228						0.004824	0.98	0
Subsurface Soil (>0.5 ft)	ROAD ROW	Thorium-228						0.0134	1.18	0
Subsurface Soil (>0.5 ft)	ROAD ROW	Thorium-230	2328/2371	0.3	1100	11.7	X	13.4	1.66	11.74
Subsurface Soil (>0.5 ft)	ROAD ROW	Thorium-232	1199/1376	0.4	64	2.19	X	2.28	1.11	1.17
Subsurface Soil (>0.5 ft)	ROAD ROW	Uranium-234						0.1608	1.13	0
Subsurface Soil (>0.5 ft)	ROAD ROW	Uranium-235						0.006968	0.06	0
Subsurface Soil (>0.5 ft)	ROAD ROW	Uranium-238	11/1379	2.1	48.2	11.3	D	11.6	1.18	10.42

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<0.5 ft)	ROAD ROW	Actinium-227	2/4	0.27	0.29	0.215	D	0.29	0.209	0.081
Surface Soil (<0.5 ft)	ROAD ROW	Lead-210						3.724	0	3.724
Surface Soil (<0.5 ft)	ROAD ROW	Protactinium-231	0/4			0.213	D	0.737	0.195	0.542
Surface Soil (<0.5 ft)	ROAD ROW	Radium-226	371/376	0.6	92	5.29	X	6.09	1.05	5.04
Surface Soil (<0.5 ft)	ROAD ROW	Radium-228	4/4	0.8	1.02	0.925	D	1.02	0.977	0.043
Surface Soil (<0.5 ft)	ROAD ROW	Thorium-228	4/4	1.14	1.51	1.39	D	1.51	1.18	0.33
Surface Soil (<0.5 ft)	ROAD ROW	Thorium-230	412/413	0.6	5100	218	X	266	1.66	264.34
Surface Soil (<0.5 ft)	ROAD ROW	Thorium-232	321/376	0.35	46	1.93	Z	2.14	1.11	1.03
Surface Soil (<0.5 ft)	ROAD ROW	Uranium-234						3.192	1.13	2.062
Surface Soil (<0.5 ft)	ROAD ROW	Uranium-235	1/4	0.24	0.24	0.133	D	0.24	0.0618	0.1782
Surface Soil (<0.5 ft)	ROAD ROW	Uranium-238	36/375	2.3	78	11	D	11.8	1.18	10.62
Subsurface Soil (>0.5 ft)	SLAPS	Actinium-227	222/337	0.16	292.7	2.7	Z	4.39	0.209	4.181
Subsurface Soil (>0.5 ft)	SLAPS	Lead-210						75.65	0	75.65
Subsurface Soil (>0.5 ft)	SLAPS	Protactinium-231	34/337	1.2	346.4	2.8	D	4.76	0.195	4.565
Subsurface Soil (>0.5 ft)	SLAPS	Radium-226	649/874	0.5	5620	31	X	44.5	1.05	43.45
Subsurface Soil (>0.5 ft)	SLAPS	Radium-228	331/332	0.42	4.82	0.958	X	0.985	0.977	0.008
Subsurface Soil (>0.5 ft)	SLAPS	Thorium-228	331/332	0.57	4.82	1.26	X	1.3	1.18	0.12
Subsurface Soil (>0.5 ft)	SLAPS	Thorium-230	623/626	0	14680	159	Z	221	1.66	219.34
Subsurface Soil (>0.5 ft)	SLAPS	Thorium-232	554/872	0.4	63	2.32	X	2.5	1.11	1.39
Subsurface Soil (>0.5 ft)	SLAPS	Uranium-234						42.3	1.13	41.17
Subsurface Soil (>0.5 ft)	SLAPS	Uranium-235	138/332	0.17	82.19	0.975	D	1.47	0.0618	1.4082
Subsurface Soil (>0.5 ft)	SLAPS	Uranium-238	162/872	3.04	1769	35.6	D	42.3	1.18	41.12
Surface Soil (<5 ft)	SLAPS	Actinium-227	72/98	0.18	695.7	18.3	Z	32.6	0.209	32.391
Surface Soil (<5 ft)	SLAPS	Lead-210						99.96	0	99.96
Surface Soil (<5 ft)	SLAPS	Protactinium-231	37/98	0.9	685.8	19.5	D	34.1	0.195	33.905
Surface Soil (<5 ft)	SLAPS	Radium-226	323/456	0.6	2700	42.6	X	58.8	1.05	57.75
Surface Soil (<5 ft)	SLAPS	Radium-228	96/97	0.33	7.54	1.18	X	1.35	0.977	0.373
Surface Soil (<5 ft)	SLAPS	Thorium-228	96/97	0.34	7.54	1.42	X	1.59	1.18	0.41
Surface Soil (<5 ft)	SLAPS	Thorium-230	278/279	0	37780	530	Z	823	1.66	821.34
Surface Soil (<5 ft)	SLAPS	Thorium-232	264/454	0.4	63	2.7	X	2.98	1.11	1.87
Surface Soil (<5 ft)	SLAPS	Uranium-234						49.6	1.13	48.47
Surface Soil (<5 ft)	SLAPS	Uranium-235	62/97	0.2	54.18	2.84	Z	4.22	0.0618	4.1582

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Surface Soil (<5 ft)	SLAPS	Uranium-238	104/455	3.04	1200	41.9	D	49.6	1.18	48.42
Soil - All Depths	Stone Container	Actinium-227	0/1			0.15	D		0.209	0
Soil - All Depths	Stone Container	Actinium-227						2.992	0.21	2.782
Soil - All Depths	Stone Container	Lead-210						6.528	0	6.528
Soil - All Depths	Stone Container	Protactinium-231	0/1			0.03	D		0.195	0
Soil - All Depths	Stone Container	Protactinium-231						3.536	0.2	3.336
Soil - All Depths	Stone Container	Radium-226	365/366	0.33	89	2.29	X	2.72	1.05	1.67
Soil - All Depths	Stone Container	Radium-228	1/1	1.06	1.06	1.06	D	1.06	0.977	0.083
Soil - All Depths	Stone Container	Thorium-228	1/1	1.06	1.06	1.06	D	1.06	1.18	0
Soil - All Depths	Stone Container	Thorium-230	316/318	0.4	5700	80.5	Z	119	1.66	117.34
Soil - All Depths	Stone Container	Thorium-232	332/366	0.7	5	1.88	X	1.95	1.11	0.84
Soil - All Depths	Stone Container	Uranium-234						10.3	1.13	9.17
Soil - All Depths	Stone Container	Uranium-235	0/1			0.21	D		0.0618	0
Soil - All Depths	Stone Container	Uranium-235						0.4738	0.06	0.4138
Soil - All Depths	Stone Container	Uranium-238	25/366	3.3	100	9.7	D	10.3	1.18	9.12
Soil - All Depths	Wabash/VP-2(C)	Actinium-227						0.04326	0.21	0
Soil - All Depths	Wabash/VP-2(C)	Lead-210						0.08652	0	0.08652
Soil - All Depths	Wabash/VP-2(C)	Protactinium-231						0.04944	0.2	0
Soil - All Depths	Wabash/VP-2(C)	Radium-226	16/16	0.7	3	1.64	N	1.93	1.05	0.88
Soil - All Depths	Wabash/VP-2(C)	Radium-228						0.0022248	0.98	0
Soil - All Depths	Wabash/VP-2(C)	Thorium-228						0.00618	1.18	0
Soil - All Depths	Wabash/VP-2(C)	Thorium-230	15/16	1	17	4.33	X	6.18	1.66	4.52
Soil - All Depths	Wabash/VP-2(C)	Thorium-232	13/16	0.9	4	1.76	L	2.19	1.11	1.08
Soil - All Depths	Wabash/VP-2(C)	Uranium-234						0.07416	1.13	0
Soil - All Depths	Wabash/VP-2(C)	Uranium-235						0.0032136	0.06	0
Soil - All Depths	Wabash/VP-2(C)	Uranium-238	0/16			8.59	D	10.9	1.18	9.72
Subsurface Soil (>0.5 ft)	Wabash/VP-2(C)	Actinium-227						0.0462	0.21	0
Subsurface Soil (>0.5 ft)	Wabash/VP-2(C)	Lead-210						0.0924	0	0.0924
Subsurface Soil (>0.5 ft)	Wabash/VP-2(C)	Protactinium-231						0.0528	0.2	0
Subsurface Soil (>0.5 ft)	Wabash/VP-2(C)	Radium-226	4/4	0.7	1.3	0.925	D	1.23	1.05	0.18
Subsurface Soil (>0.5 ft)	Wabash/VP-2(C)	Radium-228						0.002376	0.98	0

Data Grouping	Aggregate	Analyte[a]	Freq. Det.[b]	Min. Det. Conc.[b]	Max. Det. Conc.[b]	Mean Conc.[b]	Dist.[b,c]	Exposure Conc.	Mean Background Conc.	Adjusted Expos. Conc.[d]
Soil - All Depths	09K120040/VP-3(C)	Actinium-227						0.0994	0.21	0
Subsurface Soil (>0.5 ft)	Wabash/VP-2(C)	Thorium-228						0.0066	1.18	0
Subsurface Soil (>0.5 ft)	Wabash/VP-2(C)	Thorium-230	4/4	1	6.6	4.68	D	6.6	1.66	4.94
Subsurface Soil (>0.5 ft)	Wabash/VP-2(C)	Thorium-232	4/4	1.1	2	1.45	D	1.96	1.11	0.85
Subsurface Soil (>0.5 ft)	Wabash/VP-2(C)	Uranium-234						0.0792	1.13	0
Subsurface Soil (>0.5 ft)	Wabash/VP-2(C)	Uranium-235						0.003432	0.06	0
Subsurface Soil (>0.5 ft)	Wabash/VP-2(C)	Uranium-238	0/4			5.85	D	7.9	1.18	6.72
Surface Soil (<0.5 ft)	Wabash/VP-2(C)	Actinium-227						0.04676	0.21	0
Surface Soil (<0.5 ft)	Wabash/VP-2(C)	Lead-210						0.09352	0	0.09352
Surface Soil (<0.5 ft)	Wabash/VP-2(C)	Protactinium-231						0.05344	0.2	0
Surface Soil (<0.5 ft)	Wabash/VP-2(C)	Radium-226	12/12	0.9	3	1.88	N	2.18	1.05	1.13
Surface Soil (<0.5 ft)	Wabash/VP-2(C)	Radium-228						0.0024048	0.98	0
Surface Soil (<0.5 ft)	Wabash/VP-2(C)	Thorium-228						0.00668	1.18	0
Surface Soil (<0.5 ft)	Wabash/VP-2(C)	Thorium-230	11/12	1.2	17	4.22	X	6.68	1.66	5.02
Surface Soil (<0.5 ft)	Wabash/VP-2(C)	Thorium-232	9/12	0.9	4	1.87	L	2.48	1.11	1.37
Surface Soil (<0.5 ft)	Wabash/VP-2(C)	Uranium-234						0.08016	1.13	0
Surface Soil (<0.5 ft)	Wabash/VP-2(C)	Uranium-235						0.0034736	0.06	0
Surface Soil (<0.5 ft)	Wabash/VP-2(C)	Uranium-238	0/12			9.5	D	12.4	1.18	11.22

[a] All units are pCi/g.
[b] Values supplied only for isotopes that were measured.
[c] Distribution codes:

D = Not determined because fewer than 5 detects or < 50% detects; t-statistic used in calculations of exposure concentration.
L = Lognormal; H-statistic used in calculations of exposure concentration.
N = Normal; t-statistic used in calculations of exposure concentration.
X = neither normal nor lognormal; t-statistic used in calculations of exposure concentration.
Z = includes negative concentrations; t-statistic used in calculations of exposure concentration.

[d] Adjusted exposure concentration = (Exposure concentration) - (mean background concentration); if this quantity is negative, then the adjusted exposure concentration is set to 0.0 pCi/g.

Attachment 6. Determination of Surface[f] Soil Potential Chemicals of Concern by Aggregate (Page 1 of 14)
(only detected analytes are shown)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Soil - All Depths	09K220205/VP-54	Aluminum	10/10	mg/kg			4260	7880	5530	L	6180	6180	u	14700	0/10	7.5E+03	N		Below Background
Soil - All Depths	09K220205/VP-54	Arsenic	10/10	mg/kg			0.84	11.9	5.85	N	7.75	7.75	u	18	0/10	3.8E-01	N		Below Background
Soil - All Depths	09K220205/VP-54	Barium	10/10	mg/kg			40.7	279	143	N	183	183	u	279	0/10	5.2E+02	N		Below Background
Soil - All Depths	09K220205/VP-54	Beryllium	10/10	mg/kg			0.41	0.56	0.489	L	0.524	0.524	u	0.83	0/10	1.5E+01	N		Below Background
Soil - All Depths	09K220205/VP-54	Calcium	10/10	mg/kg			2320	15500	5190	X	7590	7590	u	28900	0/10		N		Below Background
Soil - All Depths	09K220205/VP-54	Chromium	10/10	mg/kg			10	12	10.7	N	11.1	11.1	u	17.3	0/10	3.0E+01	N		Below Background
Soil - All Depths	09K220205/VP-54	Cobalt	10/10	mg/kg			5.5	9.6	7.41	L	8.39	8.39	u	31.7	0/10	3.3E+02	N		Below Background
Soil - All Depths	09K220205/VP-54	Copper	10/10	mg/kg			9.6	16.4	13.4	N	14.5	14.5	u	19.4	0/10	2.8E+02	N		Below Background
Soil - All Depths	09K220205/VP-54	Iron	10/10	mg/kg			7270	28200	12800	L	16900	16900	u	26600	1/10	2.2E+03	N		Essential Nutrient (low conc.)
Soil - All Depths	09K220205/VP-54	Lead	10/10	mg/kg			7.3	30.9	12.8	L	17.2	17.2	u	79.7	0/10	4.0E+01	N		Below Background
Soil - All Depths	09K220205/VP-54	Magnesium	10/10	mg/kg			1610	9940	3550	X	5020	5020	u	18400	0/10		N		Below Background
Soil - All Depths	09K220205/VP-54	Manganese	10/10	mg/kg			68.3	4690	1250	L	5960	4690	m	2830	2/10	3.1E+02	Y	Quant.	
Soil - All Depths	09K220205/VP-54	Molybdenum	10/10	mg/kg			6.3	22.7	10.5	L	13.5	13.5	u	22.7	0/10	3.7E+01	N		Below Background
Soil - All Depths	09K220205/VP-54	Nickel	10/10	mg/kg			10.1	23.4	14.6	L	17.7	17.7	u	33.9	0/10	1.5E+02	N		Below Background
Soil - All Depths	09K220205/VP-54	Potassium	10/10	mg/kg			436	827	634	N	711	711	u	1140	0/10		N		Below Background
Soil - All Depths	09K220205/VP-54	Silver	1/10	mg/kg	1.25	1.3	2.6	2.6	1.39	D	1.64	1.64	u	2.6	0/10	3.7E+01	N		Below Background
Soil - All Depths	09K220205/VP-54	Sodium	10/10	mg/kg			51.8	78	66.5	N	71.8	71.8	u	235	0/10		N		Below Background
Soil - All Depths	09K220205/VP-54	Vanadium	10/10	mg/kg			9.5	16.3	12.7	L	13.8	13.8	u	31	0/10	5.2E+01	N		Below Background
Soil - All Depths	09K220205/VP-54	Zinc	10/10	mg/kg			30.6	52.8	40.6	L	44.8	44.8	u	278	0/10	2.2E+03	N		Below Background
Soil - All Depths	09K220205/VP-54	Anthracene	1/10	mg/kg	0.205	0.22	0.031	0.031	0.194	D	0.227	0.031	m	0.031	0/10	1.4E+03	N		Below Background
Soil - All Depths	09K220205/VP-54	Benz(a)anthracene	1/10	mg/kg	0.205	0.22	0.17	0.17	0.208	D	0.216	0.17	m	0.3	0/10	5.6E-01	N		Below Background
Soil - All Depths	09K220205/VP-54	Benzo(a)pyrene	1/10	mg/kg	0.205	0.22	0.15	0.15	0.206	D	0.217	0.15	m	0.34	0/10	5.6E-02	N		Below Background
Soil - All Depths	09K220205/VP-54	Benzo(b)fluoranthene	1/10	mg/kg	0.205	0.22	0.21	0.21	0.212	D	0.214	0.21	m	0.31	0/10	5.6E-01	N		Below Background
Soil - All Depths	09K220205/VP-54	Benzo(ghi)perylene	1/10	mg/kg	0.205	0.22	0.084	0.084	0.199	D	0.222	0.084	m	0.39	0/10		N		Below Background
Soil - All Depths	09K220205/VP-54	Benzo(k)fluoranthene	1/10	mg/kg	0.205	0.22	0.18	0.18	0.209	D	0.215	0.18	m	0.29	0/10	5.6E+00	N		Below Background
Soil - All Depths	09K220205/VP-54	Chrysene	1/10	mg/kg	0.205	0.22	0.19	0.19	0.21	D	0.214	0.19	m	0.57	0/10	5.6E+01	N		Below Background
Soil - All Depths	09K220205/VP-54	Dibenz(a,h)anthracene	1/10	mg/kg	0.205	0.22	0.035	0.035	0.194	D	0.227	0.035	m	0.035	0/10	5.6E-02	N		Below Background
Soil - All Depths	09K220205/VP-54	Fluoranthene	1/10	mg/kg	0.205	0.22	0.41	0.41	0.232	D	0.268	0.268	u	0.7	0/10	2.0E+02	N		Below Background
Soil - All Depths	09K220205/VP-54	Indeno(1,2,3-cd)pyrene	1/10	mg/kg	0.205	0.22	0.13	0.13	0.204	D	0.219	0.13	m	0.35	0/10	5.6E-01	N		Below Background
Soil - All Depths	09K220205/VP-54	Phenanthrene	1/10	mg/kg	0.205	0.22	0.18	0.18	0.209	D	0.215	0.18	m	0.28	0/10		N		Below Background
Soil - All Depths	09K220205/VP-54	Pyrene	1/10	mg/kg	0.205	0.22	0.34	0.34	0.225	D	0.248	0.248	u	0.66	0/10	1.5E+02	N		Below Background
Soil - All Depths	09K220205/VP-54	Acetone	1/10	mg/kg	0.0065	0.0065	0.017	0.017	0.00755	D	0.00947	0.00947	u	0.017	0/10	1.4E+02	N		Below Background
Soil - All Depths	09K220205/VP-54	Toluene	7/9	mg/kg	0.003	0.0065	0.002	0.11	0.0248	L	0.192	0.11	m	0.11	0/9	5.2E+02	N		Below Background
Soil - All Depths	11K630221	Aluminum	1/1	mg/kg			10400	10400	10400	D		10400	m	14700	0/1	7.5E+03	N		Below Background
Soil - All Depths	11K630221	Arsenic	1/1	mg/kg			16.3	16.3	16.3	D		16.3	m	18	0/1	3.8E-01	N		Below Background
Soil - All Depths	11K630221	Barium	1/1	mg/kg			172	172	172	D		172	m	279	0/1	5.2E+02	N		Below Background
Soil - All Depths	11K630221	Beryllium	1/1	mg/kg			0.65	0.65	0.65	D		0.65	m	0.83	0/1	1.5E+01	N		Below Background
Soil - All Depths	11K630221	Boron	1/1	mg/kg			6.2	6.2	6.2	D		6.2	m	9.9	0/1	4.9E+02	N		Below Background
Soil - All Depths	11K630221	Calcium	1/1	mg/kg			4320	4320	4320	D		4320	m	28900	0/1		N		Below Background
Soil - All Depths	11K630221	Chromium	1/1	mg/kg			16.3	16.3	16.3	D		16.3	m	17.3	0/1	3.0E+01	N		Below Background
Soil - All Depths	11K630221	Cobalt	1/1	mg/kg			11.6	11.6	11.6	D		11.6	m	31.7	0/1	3.3E+02	N		Below Background
Soil - All Depths	11K630221	Copper	1/1	mg/kg			20	20	20	D		20	m	19.4	1/1	2.8E+02	N		Max. detect < PRG
Soil - All Depths	11K630221	Iron	1/1	mg/kg			16600	16600	16600	D		16600	m	26600	0/1	2.2E+03	N		Below Background
Soil - All Depths	11K630221	Lead	1/1	mg/kg			52.1	52.1	52.1	D		52.1	m	79.7	0/1	4.0E+01	N		Below Background
Soil - All Depths	11K630221	Lithium	1/1	mg/kg			5.9	5.9	5.9	D		5.9	m	8.1	0/1	1.5E+02	N		Below Background
Soil - All Depths	11K630221	Magnesium	1/1	mg/kg			2700	2700	2700	D		2700	m	18400	0/1		N		Below Background
Soil - All Depths	11K630221	Manganese	1/1	mg/kg			807	807	807	D		807	m	2830	0/1	3.1E+02	N		Below Background
Soil - All Depths	11K630221	Molybdenum	1/1	mg/kg			1.6	1.6	1.6	D		1.6	m	22.7	0/1	3.7E+01	N		Below Background
Soil - All Depths	11K630221	Nickel	1/1	mg/kg			20.7	20.7	20.7	D		20.7	m	33.9	0/1	1.5E+02	N		Below Background
Soil - All Depths	11K630221	Potassium	1/1	mg/kg			1470	1470	1470	D		1470	m	1140	1/1		N		Essential Nutrient (low conc.)
Soil - All Depths	11K630221	Selenium	1/1	mg/kg			0.41	0.41	0.41	D		0.41	m	0.55	0/1	3.7E+01	N		Below Background
Soil - All Depths	11K630221	Sodium	1/1	mg/kg			143	143	143	D		143	m	235	0/1		N		Below Background
Soil - All Depths	11K630221	Strontium	1/1	mg/kg			15.8	15.8	15.8	D		15.8	m	26	0/1	4.5E+03	N		Below Background

Attachment 6. Determination of Surface[f] Soil Potential Chemicals of Concern by Aggregate (Page 2 of 14)
(only detected analytes are shown)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Soil - All Depths	11K630221	Titanium	1/1	mg/kg			189	189	189	D		189	m	269	0/1		N		Below Background
Soil - All Depths	11K630221	Vanadium	1/1	mg/kg			25.2	25.2	25.2	D		25.2	m	31	0/1	5.2E+01	N		Below Background
Soil - All Depths	11K630221	Zinc	1/1	mg/kg			72.7	72.7	72.7	D		72.7	m	278	0/1	2.2E+03	N		Below Background
Soil - All Depths	11K630221	Benz(a)anthracene	1/1	mg/kg			0.059	0.059	0.059	D		0.059	m	0.3	0/1	5.6E-01	N		Below Background
Soil - All Depths	11K630221	Benzo(a)pyrene	1/1	mg/kg			0.064	0.064	0.064	D		0.064	m	0.34	0/1	5.6E-02	N		Below Background
Soil - All Depths	11K630221	Benzo(b)fluoranthene	1/1	mg/kg			0.057	0.057	0.057	D		0.057	m	0.31	0/1	5.6E-01	N		Below Background
Soil - All Depths	11K630221	Benzo(ghi)perylene	1/1	mg/kg			0.061	0.061	0.061	D		0.061	m	0.39	0/1		N		Below Background
Soil - All Depths	11K630221	Benzo(k)fluoranthene	1/1	mg/kg			0.058	0.058	0.058	D		0.058	m	0.29	0/1	5.6E+00	N		Below Background
Soil - All Depths	11K630221	Bis(2-ethylhexyl)phthalate	1/1	mg/kg			0.091	0.091	0.091	D		0.091	m	0.18	0/1	3.2E+01	N		Below Background
Soil - All Depths	11K630221	Chrysene	1/1	mg/kg			0.11	0.11	0.11	D		0.11	m	0.57	0/1	5.6E+01	N		Below Background
Soil - All Depths	11K630221	Fluoranthene	1/1	mg/kg			0.14	0.14	0.14	D		0.14	m	0.7	0/1	2.0E+02	N		Below Background
Soil - All Depths	11K630221	Indeno(1,2,3-cd)pyrene	1/1	mg/kg			0.052	0.052	0.052	D		0.052	m	0.35	0/1	5.6E-01	N		Below Background
Soil - All Depths	11K630221	Phenanthrene	1/1	mg/kg			0.048	0.048	0.048	D		0.048	m	0.28	0/1		N		Below Background
Soil - All Depths	11K630221	Pyrene	1/1	mg/kg			0.11	0.11	0.11	D		0.11	m	0.66	0/1	1.5E+02	N		Below Background
Soil - All Depths	11K630221	Actinium-227	1/1	pCi/g			0.29	0.29	0.29	D		0.29	m	0.82	0/1		N		Below Background
Soil - All Depths	11K630221	Cesium-137	1/1	pCi/g			0.21	0.21	0.21	D		0.21	m	0.57	0/1		N		Below Background
Soil - All Depths	11K630221	Potassium-40	1/1	pCi/g			16.05	16.05	16.1	D		16.1	m	16.8	0/1		N		Below Background
Soil - All Depths	11K630221	Radium-226	1/1	pCi/g			0.84	0.84	0.84	D		0.84	m	1.55	0/1		N		Below Background
Soil - All Depths	11K630221	Radium-228	1/1	pCi/g			0.9	0.9	0.9	D		0.9	m	1.24	0/1		N		Below Background
Soil - All Depths	11K630221	Thorium-228	1/1	pCi/g			0.91	0.91	0.91	D		0.91	m	2.04	0/1		N		Below Background
Soil - All Depths	11K630221	Thorium-230	1/1	pCi/g			12.13	12.13	12.1	D		12.1	m	2.89	1/1		Y	Quant.	
Soil - All Depths	11K630221	Thorium-232	1/1	pCi/g			0.75	0.75	0.75	D		0.75	m	1.83	0/1		N		Below Background
Surface Soil (<0.5 ft)	11K630221	Aluminum	1/1	mg/kg			10400	10400	10400	D		10400	m	14700	0/1	7.5E+03	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Arsenic	1/1	mg/kg			16.3	16.3	16.3	D		16.3	m	18	0/1	3.8E-01	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Barium	1/1	mg/kg			172	172	172	D		172	m	279	0/1	5.2E+02	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Beryllium	1/1	mg/kg			0.65	0.65	0.65	D		0.65	m	0.83	0/1	1.5E+01	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Boron	1/1	mg/kg			6.2	6.2	6.2	D		6.2	m	9.9	0/1	4.9E+02	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Calcium	1/1	mg/kg			4320	4320	4320	D		4320	m	28900	0/1		N		Below Background
Surface Soil (<0.5 ft)	11K630221	Chromium	1/1	mg/kg			16.3	16.3	16.3	D		16.3	m	17.3	0/1	3.0E+01	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Cobalt	1/1	mg/kg			11.6	11.6	11.6	D		11.6	m	31.7	0/1	3.3E+02	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Copper	1/1	mg/kg			20	20	20	D		20	m	19.4	1/1	2.8E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	11K630221	Iron	1/1	mg/kg			16600	16600	16600	D		16600	m	26600	0/1	2.2E+03	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Lead	1/1	mg/kg			52.1	52.1	52.1	D		52.1	m	79.7	0/1	4.0E+01	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Lithium	1/1	mg/kg			5.9	5.9	5.9	D		5.9	m	8.1	0/1	1.5E+02	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Magnesium	1/1	mg/kg			2700	2700	2700	D		2700	m	18400	0/1		N		Below Background
Surface Soil (<0.5 ft)	11K630221	Manganese	1/1	mg/kg			807	807	807	D		807	m	2830	0/1	3.1E+02	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Molybdenum	1/1	mg/kg			1.6	1.6	1.6	D		1.6	m	22.7	0/1	3.7E+01	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Nickel	1/1	mg/kg			20.7	20.7	20.7	D		20.7	m	33.9	0/1	1.5E+02	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Potassium	1/1	mg/kg			1470	1470	1470	D		1470	m	1140	1/1		N		Essential Nutrient (low conc.)
Surface Soil (<0.5 ft)	11K630221	Selenium	1/1	mg/kg			0.41	0.41	0.41	D		0.41	m	0.55	0/1	3.7E+01	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Sodium	1/1	mg/kg			143	143	143	D		143	m	235	0/1		N		Below Background
Surface Soil (<0.5 ft)	11K630221	Strontium	1/1	mg/kg			15.8	15.8	15.8	D		15.8	m	26	0/1	4.5E+03	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Titanium	1/1	mg/kg			189	189	189	D		189	m	269	0/1		N		Below Background
Surface Soil (<0.5 ft)	11K630221	Vanadium	1/1	mg/kg			25.2	25.2	25.2	D		25.2	m	31	0/1	5.2E+01	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Zinc	1/1	mg/kg			72.7	72.7	72.7	D		72.7	m	278	0/1	2.2E+03	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Benz(a)anthracene	1/1	mg/kg			0.059	0.059	0.059	D		0.059	m	0.3	0/1	5.6E-01	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Benzo(a)pyrene	1/1	mg/kg			0.064	0.064	0.064	D		0.064	m	0.34	0/1	5.6E-02	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Benzo(b)fluoranthene	1/1	mg/kg			0.057	0.057	0.057	D		0.057	m	0.31	0/1	5.6E-01	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Benzo(ghi)perylene	1/1	mg/kg			0.061	0.061	0.061	D		0.061	m	0.39	0/1		N		Below Background
Surface Soil (<0.5 ft)	11K630221	Benzo(k)fluoranthene	1/1	mg/kg			0.058	0.058	0.058	D		0.058	m	0.29	0/1	5.6E+00	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Bis(2-ethylhexyl)phthalate	1/1	mg/kg			0.091	0.091	0.091	D		0.091	m	0.18	0/1	3.2E+01	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Chrysene	1/1	mg/kg			0.11	0.11	0.11	D		0.11	m	0.57	0/1	5.6E+01	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Fluoranthene	1/1	mg/kg			0.14	0.14	0.14	D		0.14	m	0.7	0/1	2.0E+02	N		Below Background

Attachment 6. Determination of Surface[f] Soil Potential Chemicals of Concern by Aggregate (Page 3 of 14)
(only detected analytes are shown)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Surface Soil (<0.5 ft)	11K630221	Indeno(1,2,3-cd)pyrene	1/1	mg/kg			0.052	0.052	0.052	D		0.052	m	0.35	0/1	5.6E-01	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Phenanthrene	1/1	mg/kg			0.048	0.048	0.048	D		0.048	m	0.28	0/1		N		Below Background
Surface Soil (<0.5 ft)	11K630221	Pyrene	1/1	mg/kg			0.11	0.11	0.11	D		0.11	m	0.66	0/1	1.5E+02	N		Below Background
Surface Soil (<0.5 ft)	11K630221	Actinium-227	1/1	pCi/g			0.29	0.29	0.29	D		0.29	m	0.82	0/1		N		Below Background
Surface Soil (<0.5 ft)	11K630221	Cesium-137	1/1	pCi/g			0.21	0.21	0.21	D		0.21	m	0.57	0/1		N		Below Background
Surface Soil (<0.5 ft)	11K630221	Potassium-40	1/1	pCi/g			16.05	16.05	16.1	D		16.1	m	16.8	0/1		N		Below Background
Surface Soil (<0.5 ft)	11K630221	Radium-226	1/1	pCi/g			0.84	0.84	0.84	D		0.84	m	1.55	0/1		N		Below Background
Surface Soil (<0.5 ft)	11K630221	Radium-228	1/1	pCi/g			0.9	0.9	0.9	D		0.9	m	1.24	0/1		N		Below Background
Surface Soil (<0.5 ft)	11K630221	Thorium-228	1/1	pCi/g			0.91	0.91	0.91	D		0.91	m	2.04	0/1		N		Below Background
Surface Soil (<0.5 ft)	11K630221	Thorium-230	1/1	pCi/g			12.13	12.13	12.1	D		12.1	m	2.89	1/1		Y	Quant.	
Surface Soil (<0.5 ft)	11K630221	Thorium-232	1/1	pCi/g			0.75	0.75	0.75	D		0.75	m	1.83	0/1		N		Below Background
Soil - All Depths	Futura	Arsenic	1/1	mg/kg			320	320	320	D		320	m	18	1/1	3.8E-01	Y	Quant.	
Soil - All Depths	Futura	Barium	1/1	mg/kg			3480	3480	3480	D		3480	m	279	1/1	5.2E+02	Y	Quant.	
Soil - All Depths	Futura	Boron	1/1	mg/kg			182	182	182	D		182	m	9.9	1/1	4.9E+02	N		Max. detect < PRG
Soil - All Depths	Futura	Cadmium	4/14	mg/kg	0.5	0.6	1.3	15.5	1.85	D	3.73	3.73	u	0.62	4/14	3.7E+00	Y	Quant.	
Soil - All Depths	Futura	Cobalt	6/6	mg/kg			42.4	14000	2460	X	7110	7110	u	31.7	6/6	3.3E+02	Y	Qual.	
Soil - All Depths	Futura	Copper	2/2	mg/kg			401	9090	4750	D	32200	9090	m	19.4	2/2	2.8E+02	Y	Qual.	
Soil - All Depths	Futura	Lead	1/1	mg/kg			529	529	529	D		529	m	79.7	1/1	4.0E+01	Y	Qual.	
Soil - All Depths	Futura	Magnesium	6/6	mg/kg			7360	43400	23400	N	35500	35500	u	18400	4/6		N		Essential Nutrient (low conc.)
Soil - All Depths	Futura	Molybdenum	5/14	mg/kg	9.9	12.95	20.9	947	83	D	201	201	u	22.7	4/14	3.7E+01	Y	Quant.	
Soil - All Depths	Futura	Nickel	1/1	mg/kg			17300	17300	17300	D		17300	m	33.9	1/1	1.5E+02	Y	Quant.	
Soil - All Depths	Futura	Selenium	1/14	mg/kg	9.8	12.95	1040	1040	84.6	D	215	215	u	0.55	1/14	3.7E+01	Y	Quant.	
Soil - All Depths	Futura	Vanadium	1/1	mg/kg			2180	2180	2180	D		2180	m	31	1/1	5.2E+01	Y	Quant.	
Soil - All Depths	Futura	Toluene	3/3	mg/kg			0.0015	0.015	0.00607	D	0.0191	0.015	m	0.11	0/3	5.2E+02	N		Below Background
Soil - All Depths	Futura	Trichlorofluoromethane	1/1	mg/kg			0.0013	0.0013	0.0013	D		0.0013	m		NA	3.8E+01	N		Max. detect < PRG
Soil - All Depths	Futura	Radium-226	359/361	pCi/g	1	1	0.4	2300	29.7	X	46	46	u	1.55	189/361		Y	Quant.	
Soil - All Depths	Futura	Thorium-230	172/173	pCi/g	1.2	1.2	0.5	2000	68.9	X	102	102	u	2.89	99/173		Y	Quant.	
Soil - All Depths	Futura	Thorium-232	333/361	pCi/g	1	6	0.7	26	2.17	X	2.33	2.33	u	1.83	172/361		Y	Quant.	
Soil - All Depths	Futura	Uranium-238	48/361	pCi/g	3	37	2.3	2500	37	D	54.2	54.2	u	2.02	48/361		Y	Quant.	
Soil - All Depths	HISS	Nitrate	1/1	mg/kg			1030	1030	1030	D		1030	m		NA		Y	Quant.	
Soil - All Depths	HISS	Sulfate	1/1	mg/kg			824	824	824	D		824	m		NA		Y	Qual.	
Soil - All Depths	HISS	Antimony	1/13	mg/kg	5.4	7.8	242	242	24.8	D	57	57	u	5.2	1/13	3.0E+00	Y	Quant.	
Soil - All Depths	HISS	Arsenic	2/2	mg/kg			51.3	1010	531	D	3560	1010	m	18	2/2	3.8E-01	Y	Quant.	
Soil - All Depths	HISS	Barium	2/2	mg/kg			3010	4360	3690	D	7950	4360	m	279	2/2	5.2E+02	Y	Quant.	
Soil - All Depths	HISS	Boron	1/1	mg/kg			1010	1010	1010	D		1010	m	9.9	1/1	4.9E+02	Y	Quant.	
Soil - All Depths	HISS	Cadmium	5/13	mg/kg	0.45	0.65	1.2	26.6	2.91	D	6.44	6.44	u	0.62	5/13	3.7E+00	Y	Quant.	
Soil - All Depths	HISS	Cobalt	6/6	mg/kg			125	1470	374	X	817	817	u	31.7	6/6	3.3E+02	Y	Qual.	
Soil - All Depths	HISS	Copper	4/4	mg/kg			109	946	334	D	815	815	u	19.4	4/4	2.8E+02	Y	Qual.	
Soil - All Depths	HISS	Lead	1/1	mg/kg			464	464	464	D		464	m	79.7	1/1	4.0E+01	Y	Qual.	
Soil - All Depths	HISS	Magnesium	4/4	mg/kg			7690	11400	9520	D	11700	11400	m	18400	0/4		N		Below Background
Soil - All Depths	HISS	Molybdenum	4/13	mg/kg	9.05	13.05	19.1	1100	99.8	D	248	248	u	22.7	2/13	3.7E+01	Y	Quant.	
Soil - All Depths	HISS	Nickel	1/1	mg/kg			1780	1780	1780	D		1780	m	33.9	1/1	1.5E+02	Y	Quant.	
Soil - All Depths	HISS	Selenium	2/13	mg/kg	9	13.05	41.1	1020	91.1	D	229	229	u	0.55	2/13	3.7E+01	Y	Quant.	
Soil - All Depths	HISS	Silver	1/1	mg/kg			18.3	18.3	18.3	D		18.3	m	2.6	1/1	3.7E+01	N		Max. detect < PRG
Soil - All Depths	HISS	Thallium	2/13	mg/kg	9	13.05	51.8	959	87.3	D	217	217	u	0	2/13	6.0E-01	Y	Quant.	
Soil - All Depths	HISS	Vanadium	1/1	mg/kg			712	712	712	D		712	m	31	1/1	5.2E+01	Y	Quant.	
Soil - All Depths	HISS	Zinc	1/1	mg/kg			308	308	308	D		308	m	278	1/1	2.2E+03	N		Max. detect < PRG
Soil - All Depths	HISS	Toluene	2/2	mg/kg			0.0028	0.0029	0.00285	D	0.00317	0.0029	m	0.11	0/2	5.2E+02	N		Below Background
Soil - All Depths	HISS	Actinium-227	8/21	pCi/g	-0.01	0.58	0.29	5.36	1.06	D	1.68	1.68	u	0.82	5/21		Y	Quant.	
Soil - All Depths	HISS	Cesium-137	1/21	pCi/g	-0.05	0.05	0.1	0.1	0.00667	D	0.0179	0.0179	u	0.57	0/21		N		Below Background
Soil - All Depths	HISS	Potassium-40	9/9	pCi/g			13.67	16.89	15.8	N	16.4	16.4	u	16.8	1/9		Y	Quant.	
Soil - All Depths	HISS	Radium-226	537/544	pCi/g	1	2	0.5	700	6.91	X	9.6	9.6	u	1.55	235/544		Y	Quant.	

Attachment 6. Determination of Surface[f] Soil Potential Chemicals of Concern by Aggregate (Page 4 of 14)
(only detected analytes are shown)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Soil - All Depths	HISS	Radium-228	20/21	pCi/g	0.78	0.78	0.29	1.16	0.915	X	0.986	0.986	u	1.24	0/21		N		Below Background
Soil - All Depths	HISS	Thorium-228	20/21	pCi/g	0.78	0.78	0.29	1.16	0.915	X	0.986	0.986	u	2.04	0/21		N		Below Background
Soil - All Depths	HISS	Thorium-230	215/228	pCi/g	-3.76	20.03	0.8	830	37.9	Z	51.9	51.9	u	2.89	92/228		Y	Quant.	
Soil - All Depths	HISS	Thorium-232	481/544	pCi/g	0.78	4	0.29	5	1.73	X	1.79	1.79	u	1.83	193/544		Y	Quant.	
Soil - All Depths	HISS	Uranium-238	62/543	pCi/g	-0.49	55	4	800	13.9	D	17.1	17.1	u	2.02	62/543		Y	Quant.	
Surface Soil (<5 ft)	IA-1	Magnesium	2/2	mg/kg			6110	10200	8160	D	21100	10200	m	18400	0/2		N		Below Background
Surface Soil (<5 ft)	IA-1	Molybdenum	1/2	mg/kg	8.6	8.6	17.7	17.7	13.2	D	41.9	17.7	m	22.7	0/2	3.7E+01	N		Below Background
Surface Soil (<5 ft)	IA-1	TOX	1/2	UG/G	30.35	30.35	56.9	56.9	43.6	D	127	56.9	m		NA		Y	Qual.	
Surface Soil (<5 ft)	IA-1	PCB-1254	1/2	mg/kg	0.0205	0.0205	0.26	0.26	0.14	D	0.896	0.26	m	0	1/2	9.7E-02	Y	Quant.	
Surface Soil (<5 ft)	IA-1	Toluene	2/2	mg/kg			0.003	0.0031	0.00305	D	0.00337	0.0031	m	0.11	0/2	5.2E+02	N		Below Background
Surface Soil (<5 ft)	IA-1	Radium-226	7/13	pCi/g	1.6	3.9	1	2700	216	X	585	585	u	1.55	5/13		Y	Quant.	
Surface Soil (<5 ft)	IA-1	Thorium-230	4/4	pCi/g			1.8	110	33.7	D	94.3	94.3	u	2.89	3/4		Y	Quant.	
Surface Soil (<5 ft)	IA-1	Thorium-232	6/13	pCi/g	1	4.3	1.1	63	7.14	D	15.5	15.5	u	1.83	2/13		Y	Quant.	
Surface Soil (<5 ft)	IA-1	Uranium-238	3/13	pCi/g	5	78.4	40	1200	128	D	287	287	u	2.02	3/13		Y	Quant.	
Surface Soil (<0.5 ft)	IA-10	Aluminum	4/4	mg/kg			8200	9100	8510	D	8990	8990	u	14700	0/4	7.5E+03	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Arsenic	4/4	mg/kg			4.7	5.9	5.45	D	6.13	5.9	m	18	0/4	3.8E-01	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Barium	4/4	mg/kg			127	149	140	D	151	149	m	279	0/4	5.2E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Beryllium	4/4	mg/kg			0.56	0.63	0.585	D	0.622	0.622	u	0.83	0/4	1.5E+01	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Boron	4/4	mg/kg			5.8	7.7	6.48	D	7.48	7.48	u	9.9	0/4	4.9E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Calcium	4/4	mg/kg			6680	10200	8100	D	10100	10100	u	28900	0/4		N		Below Background
Surface Soil (<0.5 ft)	IA-10	Chromium	4/4	mg/kg			15.5	16.3	15.9	D	16.3	16.3	u	17.3	0/4	3.0E+01	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Cobalt	4/4	mg/kg			6.5	7.2	6.73	D	7.11	7.11	u	31.7	0/4	3.3E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Copper	4/4	mg/kg			31.2	70.9	43.6	D	65.2	65.2	u	19.4	4/4	2.8E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-10	Iron	4/4	mg/kg			14100	15900	14700	D	15700	15700	u	26600	0/4	2.2E+03	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Lead	4/4	mg/kg			52.8	73.5	60.2	D	71	71	u	79.7	0/4	4.0E+01	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Lithium	4/4	mg/kg			5.1	5.9	5.38	D	5.8	5.8	u	8.1	0/4	1.5E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Magnesium	4/4	mg/kg			3320	5140	4030	D	5060	5060	u	18400	0/4		N		Below Background
Surface Soil (<0.5 ft)	IA-10	Manganese	4/4	mg/kg			407	577	512	D	600	577	m	2830	0/4	3.1E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Molybdenum	3/4	mg/kg	0.55	0.55	1.2	1.6	1.24	D	1.82	1.6	m	22.7	0/4	3.7E+01	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Nickel	4/4	mg/kg			14	17.1	15.5	D	17.1	17.1	u	33.9	0/4	1.5E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Potassium	4/4	mg/kg			968	1360	1170	D	1360	1360	u	1140	3/4		N		Essential Nutrient (low conc.)
Surface Soil (<0.5 ft)	IA-10	Selenium	4/4	mg/kg			0.44	0.7	0.543	D	0.687	0.687	u	0.55	2/4	3.7E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-10	Sodium	4/4	mg/kg			91.3	101	95.7	D	101	101	u	235	0/4		N		Below Background
Surface Soil (<0.5 ft)	IA-10	Strontium	4/4	mg/kg			18.3	22.7	20.1	D	22.3	22.3	u	26	0/4	4.5E+03	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Titanium	4/4	mg/kg			124	168	148	D	169	168	m	269	0/4		N		Below Background
Surface Soil (<0.5 ft)	IA-10	Vanadium	4/4	mg/kg			19.1	21.3	20.1	D	21.4	21.3	m	31	0/4	5.2E+01	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Zinc	4/4	mg/kg			75	88.7	83	D	90.9	88.7	m	278	0/4	2.2E+03	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Anthracene	2/4	mg/kg	0.21	0.215	0.046	0.14	0.153	D	0.246	0.14	m	0.031	2/4	1.4E+03	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-10	Benz(a)anthracene	4/4	mg/kg			0.06	0.76	0.325	D	0.696	0.696	u	0.3	2/4	5.6E-01	Y	Quant.	
Surface Soil (<0.5 ft)	IA-10	Benzo(a)pyrene	4/4	mg/kg			0.066	0.79	0.349	D	0.734	0.734	u	0.34	2/4	5.6E-02	Y	Quant.	
Surface Soil (<0.5 ft)	IA-10	Benzo(b)fluoranthene	4/4	mg/kg			0.065	0.69	0.316	D	0.647	0.647	u	0.31	2/4	5.6E-01	Y	Quant.	
Surface Soil (<0.5 ft)	IA-10	Benzo(ghi)perylene	4/4	mg/kg			0.071	0.95	0.435	D	0.903	0.903	u	0.39	2/4		Y	Qual.	
Surface Soil (<0.5 ft)	IA-10	Benzo(k)fluoranthene	4/4	mg/kg			0.059	0.65	0.292	D	0.607	0.607	u	0.29	2/4	5.6E+00	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-10	Bis(2-ethylhexyl)phthalate	4/4	mg/kg			0.058	0.84	0.375	D	0.764	0.764	u	0.18	3/4	3.2E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-10	Butyl benzyl phthalate	2/4	mg/kg	0.215	0.215	0.045	0.12	0.149	D	0.246	0.12	m	0.25	0/4	9.3E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-10	Carbazole	1/4	mg/kg	0.21	0.215	0.048	0.048	0.172	D	0.269	0.048	m	0	1/4	2.2E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-10	Chrysene	4/4	mg/kg			0.12	1.3	0.58	D	1.21	1.21	u	0.57	2/4	5.6E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-10	Fluoranthene	4/4	mg/kg			0.12	1.3	0.583	D	1.2	1.2	u	0.7	1/4	2.0E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-10	Indeno(1,2,3-cd)pyrene	4/4	mg/kg			0.059	0.82	0.372	D	0.777	0.777	u	0.35	2/4	5.6E-01	Y	Quant.	
Surface Soil (<0.5 ft)	IA-10	Phenanthrene	4/4	mg/kg			0.071	0.76	0.313	D	0.682	0.682	u	0.28	2/4		Y	Qual.	
Surface Soil (<0.5 ft)	IA-10	Pyrene	4/4	mg/kg			0.14	1.6	0.693	D	1.47	1.47	u	0.66	2/4	1.5E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-10	Cesium-137	4/4	pCi/g			0.13	0.21	0.163	D	0.203	0.203	u	0.57	0/4		N		Below Background

Attachment 6. Determination of Surface[f] Soil Potential Chemicals of Concern by Aggregate (Page 5 of 14)
(only detected analytes are shown)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Surface Soil (<0.5 ft)	IA-10	Potassium-40	4/4	pCi/g			14.99	16.54	15.7	D	16.5	16.5	u	16.8	0/4		N		Below Background
Surface Soil (<0.5 ft)	IA-10	Radium-226	95/119	pCi/g	0	2	0.3	2.8	1.19	Z	1.29	1.29	u	1.55	38/119		Y	Quant.	
Surface Soil (<0.5 ft)	IA-10	Radium-228	4/4	pCi/g			0.88	0.94	0.908	D	0.94	0.94	u	1.24	0/4		N		Below Background
Surface Soil (<0.5 ft)	IA-10	Thorium-228	4/4	pCi/g			1.23	2.29	1.71	D	2.23	2.23	u	2.04	1/4		Y	Quant.	
Surface Soil (<0.5 ft)	IA-10	Thorium-230	112/121	pCi/g	0	0.8	0.4	29	3.8	Z	4.44	4.44	u	2.89	59/121		Y	Quant.	
Surface Soil (<0.5 ft)	IA-10	Thorium-232	88/119	pCi/g	0	2.8	0.5	4	1.39	Z	1.52	1.52	u	1.83	35/119		Y	Quant.	
Surface Soil (<0.5 ft)	IA-13	Aluminum	6/6	mg/kg			8920	12900	10600	L	12000	12000	u	14700	0/6	7.5E+03	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Arsenic	6/6	mg/kg			5.1	19.9	11.6	L	24.9	19.9	m	18	1/6	3.8E-01	Y	Quant.	
Surface Soil (<0.5 ft)	IA-13	Barium	6/6	mg/kg			105	181	150	N	172	172	u	279	0/6	5.2E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Beryllium	3/6	mg/kg	0.335	0.37	0.63	0.78	0.521	D	0.682	0.682	u	0.83	0/6	1.5E+01	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Boron	6/6	mg/kg			5.5	9.2	7.6	N	8.65	8.65	u	9.9	0/6	4.9E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Calcium	6/6	mg/kg			3110	68900	15000	X	36800	36800	u	28900	1/6		N		Essential Nutrient (low conc.)
Surface Soil (<0.5 ft)	IA-13	Chromium	6/6	mg/kg			11.9	18.3	15.5	N	17.3	17.3	u	17.3	1/6	3.0E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-13	Cobalt	6/6	mg/kg			6.7	13.3	9.87	L	13.1	13.1	u	31.7	0/6	3.3E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Copper	6/6	mg/kg			19.3	29.7	23	L	27.1	27.1	u	19.4	5/6	2.8E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-13	Iron	6/6	mg/kg			12400	21000	17200	N	19700	19700	u	26600	0/6	2.2E+03	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Lead	6/6	mg/kg			17.2	137	57.3	L	214	137	m	79.7	1/6	4.0E+01	Y	Qual.	
Surface Soil (<0.5 ft)	IA-13	Lithium	6/6	mg/kg			5.2	7.4	6.35	L	7.36	7.36	u	8.1	0/6	1.5E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Magnesium	6/6	mg/kg			1960	9210	3920	X	6090	6090	u	18400	0/6		N		Below Background
Surface Soil (<0.5 ft)	IA-13	Manganese	6/6	mg/kg			463	743	615	N	712	712	u	2830	0/6	3.1E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Mercury	1/6	mg/kg	0.03	0.035	0.08	0.08	0.04	D	0.0562	0.0562	u	0.69	0/6	2.2E+00	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Molybdenum	4/6	mg/kg	0.47	0.55	1.2	2.1	1.25	D	1.8	1.8	u	22.7	0/6	3.7E+01	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Nickel	6/6	mg/kg			15.1	26.2	19.6	L	23.6	23.6	u	33.9	0/6	1.5E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Potassium	6/6	mg/kg			1230	1730	1470	N	1620	1620	u	1140	6/6		N		Essential Nutrient (low conc.)
Surface Soil (<0.5 ft)	IA-13	Selenium	3/6	mg/kg	0.165	0.195	0.66	0.78	0.447	D	0.692	0.692	u	0.55	3/6	3.7E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-13	Sodium	6/6	mg/kg			66.7	145	114	N	139	139	u	235	0/6		N		Below Background
Surface Soil (<0.5 ft)	IA-13	Strontium	6/6	mg/kg			14.9	79.4	30.6	X	50.5	50.5	u	26	1/6	4.5E+03	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-13	Thallium	1/6	mg/kg	0.345	0.95	1.4	1.4	0.734	D	1.05	1.05	u	0	1/6	6.0E-01	Y	Quant.	
Surface Soil (<0.5 ft)	IA-13	Titanium	6/6	mg/kg			155	303	221	L	305	303	m	269	2/6		Y	Qual.	
Surface Soil (<0.5 ft)	IA-13	Uranium	1/6	mg/kg	4.3	9.05	10.2	10.2	7.32	D	9.31	9.31	u	0	1/6		Y	Quant.	
Surface Soil (<0.5 ft)	IA-13	Vanadium	6/6	mg/kg			23.7	30.1	27.3	L	29.8	29.8	u	31	0/6	5.2E+01	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Zinc	6/6	mg/kg			56.6	81.6	69.9	N	78.8	78.8	u	278	0/6	2.2E+03	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Benz(a)anthracene	4/6	mg/kg	0.21	0.245	0.044	0.21	0.151	D	0.218	0.21	m	0.3	0/6	5.6E-01	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Benzo(a)pyrene	4/6	mg/kg	0.21	0.245	0.049	0.12	0.137	D	0.199	0.12	m	0.34	0/6	5.6E-02	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Benzo(b)fluoranthene	4/6	mg/kg	0.21	0.245	0.046	0.26	0.164	D	0.235	0.235	u	0.31	0/6	5.6E-01	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Benzo(ghi)perylene	3/6	mg/kg	0.21	0.245	0.055	0.13	0.163	D	0.222	0.13	m	0.39	0/6		N		Below Background
Surface Soil (<0.5 ft)	IA-13	Benzo(k)fluoranthene	3/6	mg/kg	0.21	0.245	0.044	0.092	0.15	D	0.218	0.092	m	0.29	0/6	5.6E+00	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Bis(2-ethylhexyl)phthalate	3/6	mg/kg	0.21	0.245	0.11	0.13	0.17	D	0.219	0.13	m	0.18	0/6	3.2E+01	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Butyl benzyl phthalate	1/6	mg/kg	0.205	0.245	0.061	0.061	0.192	D	0.246	0.061	m	0.25	0/6	9.3E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Chrysene	4/6	mg/kg	0.21	0.245	0.084	0.19	0.18	D	0.224	0.19	m	0.57	0/6	5.6E+01	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Fluoranthene	6/6	mg/kg			0.094	0.3	0.179	N	0.25	0.25	u	0.7	0/6	2.0E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Indeno(1,2,3-cd)pyrene	4/6	mg/kg	0.21	0.245	0.046	0.35	0.177	D	0.269	0.269	u	0.35	0/6	5.6E-01	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Phenanthrene	3/6	mg/kg	0.205	0.245	0.058	0.094	0.149	D	0.215	0.094	m	0.28	0/6		N		Below Background
Surface Soil (<0.5 ft)	IA-13	Pyrene	4/6	mg/kg	0.21	0.245	0.098	0.32	0.216	D	0.275	0.275	u	0.66	0/6	1.5E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-13	1,1,2,2-Tetrachloroethane	1/6	mg/kg	0.003	0.0035	0.006	0.006	0.00358	D	0.00457	0.00457	u	0	1/6	3.6E-01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-13	1,1,2-Trichloroethane	1/6	mg/kg	0.003	0.0035	0.003	0.003	0.00308	D	0.00325	0.003	m	0	1/6	8.2E-01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-13	2-Butanone	1/6	mg/kg	0.006	0.0075	0.014	0.014	0.00783	D	0.0104	0.0104	u	0.023	0/6	6.9E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-13	4-Methyl-2-pentanone	1/6	mg/kg	0.006	0.0075	0.011	0.011	0.00733	D	0.00887	0.00887	u	0	1/6	7.5E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-13	Bromoform	1/6	mg/kg	0.003	0.0035	0.004	0.004	0.00325	D	0.00359	0.00359	u	0	1/6	5.6E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-13	Toluene	1/6	mg/kg	0.003	0.0035	0.002	0.002	0.00292	D	0.00332	0.002	m	0.11	0/6	5.2E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-13	Actinium-227	26/38	pCi/g	0.02	0.19	0.2	0.71	0.328	X	0.382	0.382	u	0.82	0/38		N		Below Background
Surface Soil (<0.5 ft)	IA-13	Americium-241	1/38	pCi/g	-0.02	0.07	0.06	0.06	0.0303	D	0.0358	0.0358	u	0	1/38		N		<5% detected
Surface Soil (<0.5 ft)	IA-13	Cesium-137	35/37	pCi/g	0	0	0.05	0.55	0.242	Z	0.281	0.281	u	0.57	0/37		N		Below Background

Attachment 6. Determination of Surface[f] Soil Potential Chemicals of Concern by Aggregate (Page 6 of 14)
(only detected analytes are shown)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Surface Soil (<0.5 ft)	IA-13	Potassium-40	37/37	pCi/g			3.69	17.61	14.2	X	15.2	15.2	u	16.8	4/37		Y	Quant.	
Surface Soil (<0.5 ft)	IA-13	Protactinium-231	2/38	pCi/g	-0.34	1.03	1.55	1.92	0.391	D	0.514	0.514	u	1.13	2/38		Y	Quant.	
Surface Soil (<0.5 ft)	IA-13	Radium-226	110/111	pCi/g	1	1	0.54	3.3	1.48	X	1.59	1.59	u	1.55	49/111		Y	Quant.	
Surface Soil (<0.5 ft)	IA-13	Radium-228	37/37	pCi/g			0.14	1.13	0.844	X	0.911	0.911	u	1.24	0/37		N		Below Background
Surface Soil (<0.5 ft)	IA-13	Thorium-228	38/38	pCi/g			0.39	2.14	1.11	N	1.2	1.2	u	2.04	1/38		Y	Quant.	
Surface Soil (<0.5 ft)	IA-13	Thorium-230	108/109	pCi/g	1.2	1.2	0.42	110	11.4	L	15.4	15.4	u	2.89	83/109		Y	Quant.	
Surface Soil (<0.5 ft)	IA-13	Thorium-232	103/112	pCi/g	1	1	0.44	4	1.44	L	1.54	1.54	u	1.83	27/112		Y	Quant.	
Surface Soil (<0.5 ft)	IA-13	Uranium-235	11/38	pCi/g	-0.01	0.26	0.2	0.51	0.168	D	0.195	0.195	u	0.25	7/38		Y	Quant.	
Surface Soil (<0.5 ft)	IA-13	Uranium-238	3/112	pCi/g	0.26	13	2.8	7	3.58	D	4.03	4.03	u	2.02	3/112		N		<5% detected
Surface Soil (<5 ft)	IA-2	Arsenic	2/2	mg/kg			205	237	221	D	322	237	m	18	2/2	3.8E-01	Y	Quant.	
Surface Soil (<5 ft)	IA-2	Cadmium	4/12	mg/kg	0.45	0.55	1	5.9	1.38	D	2.31	2.31	u	0.62	4/12	3.7E+00	Y	Quant.	
Surface Soil (<5 ft)	IA-2	Cobalt	4/4	mg/kg			46.7	228	144	D	245	228	m	31.7	4/4	3.3E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-2	Copper	3/3	mg/kg			187	440	307	D	521	440	m	19.4	3/3	2.8E+02	Y	Qual.	
Surface Soil (<5 ft)	IA-2	Magnesium	5/5	mg/kg			8180	24900	12700	L	25500	24900	m	18400	1/5		N		Essential Nutrient (low conc.)
Surface Soil (<5 ft)	IA-2	Molybdenum	3/12	mg/kg	8.75	11.25	30.3	151	32.5	D	57.6	57.6	u	22.7	3/12	3.7E+01	Y	Quant.	
Surface Soil (<5 ft)	IA-2	Vanadium	2/2	mg/kg			782	862	822	D	1070	862	m	31	2/2	5.2E+01	Y	Quant.	
Surface Soil (<5 ft)	IA-2	Toluene	5/5	mg/kg			0.0025	0.0104	0.00716	N	0.0104	0.0104	u	0.11	0/5	5.2E+02	N		Below Background
Surface Soil (<5 ft)	IA-2	Actinium-227	11/13	pCi/g	0.1	0.19	0.18	130.4	13.1	X	30.9	30.9	u	0.82	5/13		Y	Quant.	
Surface Soil (<5 ft)	IA-2	Americium-241	4/13	pCi/g	0	0.11	0.06	2.58	0.333	D	0.687	0.687	u	0	4/13		Y	Quant.	
Surface Soil (<5 ft)	IA-2	Cesium-137	6/13	pCi/g	-0.04	0.04	0.03	3.09	0.278	D	0.697	0.697	u	0.57	1/13		Y	Quant.	
Surface Soil (<5 ft)	IA-2	Potassium-40	12/13	pCi/g	8.43	8.43	5.69	17.74	13	N	14.8	14.8	u	16.8	2/13		Y	Quant.	
Surface Soil (<5 ft)	IA-2	Protactinium-231	5/13	pCi/g	-0.03	0.7	2.66	179.3	17.1	D	41.4	41.4	u	1.13	5/13		Y	Quant.	
Surface Soil (<5 ft)	IA-2	Radium-226	32/53	pCi/g	1.5	5	0.85	590	38.6	X	68.2	68.2	u	1.55	19/53		Y	Quant.	
Surface Soil (<5 ft)	IA-2	Radium-228	13/13	pCi/g			0.38	4.82	1.19	X	1.74	1.74	u	1.24	2/13		Y	Quant.	
Surface Soil (<5 ft)	IA-2	Thorium-228	13/13	pCi/g			0.5	4.82	1.39	X	1.92	1.92	u	2.04	1/13		Y	Quant.	
Surface Soil (<5 ft)	IA-2	Thorium-230	30/30	pCi/g			0	14070	584	Z	1380	1380	u	2.89	25/30		Y	Quant.	
Surface Soil (<5 ft)	IA-2	Thorium-232	23/53	pCi/g	2	13.4	0.44	4.82	2.71	D	3.15	3.15	u	1.83	6/53		Y	Quant.	
Surface Soil (<5 ft)	IA-2	Uranium-235	10/13	pCi/g	-0.03	0.12	0.25	37.21	4.65	Z	9.68	9.68	u	0.25	9/13		Y	Quant.	
Surface Soil (<5 ft)	IA-2	Uranium-238	14/54	pCi/g	0.33	304	6.02	706	67.8	D	98.1	98.1	u	2.02	14/54		Y	Quant.	
Surface Soil (<5 ft)	IA-3	Aluminum	3/3	mg/kg			13100	23200	17000	D	26200	23200	m	14700	1/3	7.5E+03	Y	Qual.	
Surface Soil (<5 ft)	IA-3	Antimony	2/7	mg/kg	1.65	6	5.3	53.2	11.3	D	24.9	24.9	u	5.2	2/7	3.0E+00	Y	Quant.	
Surface Soil (<5 ft)	IA-3	Arsenic	3/3	mg/kg			7.2	9	8.2	D	9.75	9	m	18	0/3	3.8E-01	N		Below Background
Surface Soil (<5 ft)	IA-3	Barium	3/3	mg/kg			152	209	178	D	227	209	m	279	0/3	5.2E+02	N		Below Background
Surface Soil (<5 ft)	IA-3	Beryllium	3/3	mg/kg			0.84	2.4	1.36	D	2.88	2.4	m	0.83	3/3	1.5E+01	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-3	Boron	3/3	mg/kg			8.4	9.6	9.07	D	10.1	9.6	m	9.9	0/3	4.9E+02	N		Below Background
Surface Soil (<5 ft)	IA-3	Cadmium	2/7	mg/kg	0.14	0.5	0.52	50.4	7.52	D	21.4	21.4	u	0.62	1/7	3.7E+00	Y	Quant.	
Surface Soil (<5 ft)	IA-3	Calcium	3/3	mg/kg			4860	29500	13400	D	36900	29500	m	28900	1/3		N		Essential Nutrient (low conc.)
Surface Soil (<5 ft)	IA-3	Chromium	4/4	mg/kg			18.6	3240	830	D	2720	2720	u	17.3	4/4	3.0E+01	Y	Quant.	
Surface Soil (<5 ft)	IA-3	Cobalt	3/3	mg/kg			8.3	11.8	10.1	D	13.1	11.8	m	31.7	0/3	3.3E+02	N		Below Background
Surface Soil (<5 ft)	IA-3	Copper	3/3	mg/kg			14.1	31.8	21.8	D	37.1	31.8	m	19.4	2/3	2.8E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-3	Iron	3/3	mg/kg			19400	26800	21900	D	29100	26800	m	26600	1/3	2.2E+03	N		Essential Nutrient (low conc.)
Surface Soil (<5 ft)	IA-3	Lead	4/4	mg/kg			19.6	1200	336	D	1010	1010	u	79.7	2/4	4.0E+01	Y	Qual.	
Surface Soil (<5 ft)	IA-3	Lithium	3/3	mg/kg			8.9	14.6	11.6	D	16.4	14.6	m	8.1	3/3	1.5E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-3	Magnesium	5/5	mg/kg			3730	14700	7600	L	20000	14700	m	18400	0/5		N		Below Background
Surface Soil (<5 ft)	IA-3	Manganese	3/3	mg/kg			552	1330	852	D	1560	1330	m	2830	0/3	3.1E+02	N		Below Background
Surface Soil (<5 ft)	IA-3	Molybdenum	3/7	mg/kg	0.415	10.05	2.5	58.9	13.3	D	28.3	28.3	u	22.7	1/7	3.7E+01	Y	Quant.	
Surface Soil (<5 ft)	IA-3	Nickel	3/3	mg/kg			20.2	66.9	36.4	D	81	66.9	m	33.9	1/3	1.5E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-3	Potassium	3/3	mg/kg			1320	2070	1650	D	2300	2070	m	1140	3/3		N		Essential Nutrient (low conc.)
Surface Soil (<5 ft)	IA-3	Sodium	3/3	mg/kg			124	382	239	D	460	382	m	235	1/3		N		Essential Nutrient (low conc.)
Surface Soil (<5 ft)	IA-3	Strontium	3/3	mg/kg			24.1	53.2	42.7	D	70	53.2	m	26	2/3	4.5E+03	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-3	Thallium	2/7	mg/kg	0.8	10.05	1.2	1.4	5.94	D	9.27	1.4	m	0	2/7	6.0E-01	Y	Quant.	
Surface Soil (<5 ft)	IA-3	Titanium	3/3	mg/kg			260	416	321	D	462	416	m	269	2/3		Y	Qual.	

Attachment 6. Determination of Surface[f] Soil Potential Chemicals of Concern by Aggregate (Page 7 of 14)
(only detected analytes are shown)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Surface Soil (<5 ft)	IA-3	Uranium	2/3	mg/kg	6.9	6.9	15.6	129	50.5	D	165	129	m	0	2/3		Y	Quant.	
Surface Soil (<5 ft)	IA-3	Vanadium	3/3	mg/kg			35.6	57.2	43.6	D	63.6	57.2	m	31	3/3	5.2E+01	Y	Quant.	
Surface Soil (<5 ft)	IA-3	Zinc	4/4	mg/kg			49.8	4330	1130	D	3640	3640	u	278	1/4	2.2E+03	Y	Quant.	
Surface Soil (<5 ft)	IA-3	MCPP	1/3	mg/kg	4.5	4.7	11	11	6.73	D	13	11	m	0	1/3	5.5E+00	Y	Quant.	
Surface Soil (<5 ft)	IA-3	Benz(a)anthracene	2/3	mg/kg	0.19	0.19	0.09	0.18	0.153	D	0.246	0.18	m	0.3	0/3	5.6E-01	N		Below Background
Surface Soil (<5 ft)	IA-3	Benzo(a)pyrene	2/3	mg/kg	0.19	0.19	0.077	0.18	0.149	D	0.254	0.18	m	0.34	0/3	5.6E-02	N		Below Background
Surface Soil (<5 ft)	IA-3	Benzo(b)fluoranthene	1/3	mg/kg	0.185	0.19	0.083	0.083	0.153	D	0.254	0.083	m	0.31	0/3	5.6E-01	N		Below Background
Surface Soil (<5 ft)	IA-3	Benzo(ghi)perylene	1/3	mg/kg	0.19	0.195	0.19	0.19	0.192	D	0.197	0.19	m	0.39	0/3		N		Below Background
Surface Soil (<5 ft)	IA-3	Benzo(k)fluoranthene	1/3	mg/kg	0.19	0.195	0.066	0.066	0.15	D	0.274	0.066	m	0.29	0/3	5.6E+00	N		Below Background
Surface Soil (<5 ft)	IA-3	Butyl benzyl phthalate	1/3	mg/kg	0.185	0.19	0.1	0.1	0.158	D	0.244	0.1	m	0.25	0/3	9.3E+02	N		Below Background
Surface Soil (<5 ft)	IA-3	Chrysene	1/3	mg/kg	0.19	0.195	0.21	0.21	0.198	D	0.216	0.21	m	0.57	0/3	5.6E+01	N		Below Background
Surface Soil (<5 ft)	IA-3	Fluoranthene	2/3	mg/kg	0.19	0.19	0.1	0.31	0.2	D	0.378	0.31	m	0.7	0/3	2.0E+02	N		Below Background
Surface Soil (<5 ft)	IA-3	Indeno(1,2,3-cd)pyrene	2/3	mg/kg	0.19	0.19	0.089	0.18	0.153	D	0.247	0.18	m	0.35	0/3	5.6E-01	N		Below Background
Surface Soil (<5 ft)	IA-3	Phenanthrene	2/3	mg/kg	0.19	0.19	0.042	0.19	0.141	D	0.285	0.19	m	0.28	0/3		N		Below Background
Surface Soil (<5 ft)	IA-3	Pyrene	2/3	mg/kg	0.19	0.19	0.046	0.27	0.169	D	0.36	0.27	m	0.66	0/3	1.5E+02	N		Below Background
Surface Soil (<5 ft)	IA-3	1,2-Dichloroethene	1/3	mg/kg	0.003	0.003	0.003	0.003	0.003	D	0.003	0.003	u	0	1/3		Y	Quant.	
Surface Soil (<5 ft)	IA-3	Dimethylbenzene	1/3	mg/kg	0.003	0.003	0.01	0.01	0.00533	D	0.0121	0.01	m	0	1/3		Y	Quant.	
Surface Soil (<5 ft)	IA-3	Methylene chloride	1/3	mg/kg	0.003	0.004	0.13	0.13	0.0457	D	0.169	0.13	m	0.007	1/3	8.5E+00	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-3	Toluene	3/6	mg/kg	0.003	0.003	0.0015	0.055	0.0176	D	0.037	0.037	u	0.11	0/6	5.2E+02	N		Below Background
Surface Soil (<5 ft)	IA-3	Trichloroethene	1/3	mg/kg	0.003	0.003	0.005	0.005	0.00367	D	0.00561	0.005	m	0	1/3	2.7E+00	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-3	Actinium-227	11/15	pCi/g	0.12	0.24	0.19	47.16	4.99	X	10.7	10.7	u	0.82	7/15		Y	Quant.	
Surface Soil (<5 ft)	IA-3	Americium-241	1/15	pCi/g	-0.02	0.37	2.09	2.09	0.185	D	0.428	0.428	u	0	1/15		Y	Quant.	
Surface Soil (<5 ft)	IA-3	Cesium-137	10/15	pCi/g	-0.01	0.06	0.03	0.12	0.0507	Z	0.0662	0.0662	u	0.57	0/15		N		Below Background
Surface Soil (<5 ft)	IA-3	Potassium-40	15/15	pCi/g			7.02	17.01	12.2	L	14.2	14.2	u	16.8	2/15		Y	Quant.	
Surface Soil (<5 ft)	IA-3	Protactinium-231	6/15	pCi/g	-0.06	0.46	1.56	31.66	3.87	D	7.86	7.86	u	1.13	6/15		Y	Quant.	
Surface Soil (<5 ft)	IA-3	Radium-226	59/74	pCi/g	1.5	4.7	0.7	208	10.1	X	15.9	15.9	u	1.55	34/74		Y	Quant.	
Surface Soil (<5 ft)	IA-3	Radium-228	15/15	pCi/g			0.33	1.81	0.846	L	1.1	1.1	u	1.24	2/15		Y	Quant.	
Surface Soil (<5 ft)	IA-3	Thorium-228	15/15	pCi/g			0.34	1.81	1.04	N	1.23	1.23	u	2.04	0/15		N		Below Background
Surface Soil (<5 ft)	IA-3	Thorium-230	36/36	pCi/g			1.09	5335	226	X	482	482	u	2.89	33/36		Y	Quant.	
Surface Soil (<5 ft)	IA-3	Thorium-232	51/74	pCi/g	0.5	7.5	0.4	5	1.96	L	2.27	2.27	u	1.83	9/74		Y	Quant.	
Surface Soil (<5 ft)	IA-3	Uranium-235	11/15	pCi/g	-0.02	0.16	0.22	8.21	1.46	Z	2.61	2.61	u	0.25	10/15		Y	Quant.	
Surface Soil (<5 ft)	IA-3	Uranium-238	18/74	pCi/g	0.9	173.4	3.04	270	23.6	D	31.4	31.4	u	2.02	18/74		Y	Quant.	
Surface Soil (<5 ft)	IA-4	Fluoride	2/2	mg/kg			9.58	43.3	26.4	D	133	43.3	m		NA	3.3E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-4	Sulfide	1/2	mg/kg	13.6	13.6	21	21	17.3	D	40.7	21	m		NA		Y	Qual.	
Surface Soil (<5 ft)	IA-4	Aluminum	2/2	mg/kg			18500	19000	18800	D	20300	19000	m	14700	2/2	7.5E+03	Y	Qual.	
Surface Soil (<5 ft)	IA-4	Arsenic	3/3	mg/kg			8.5	50.8	22.9	D	63.6	50.8	m	18	1/3	3.8E-01	Y	Quant.	
Surface Soil (<5 ft)	IA-4	Barium	4/4	mg/kg			266	3750	1340	D	3270	3270	u	279	3/4	5.2E+02	Y	Quant.	
Surface Soil (<5 ft)	IA-4	Beryllium	2/2	mg/kg			0.98	1	0.99	D	1.05	1	m	0.83	2/2	1.5E+01	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-4	Boron	1/2	mg/kg	4.45	4.45	11.9	11.9	8.18	D	31.7	11.9	m	9.9	1/2	4.9E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-4	Cadmium	1/7	mg/kg	0.155	0.55	4.5	4.5	0.995	D	2.14	2.14	u	0.62	1/7	3.7E+00	Y	Quant.	
Surface Soil (<5 ft)	IA-4	Calcium	2/2	mg/kg			3610	3920	3770	D	4740	3920	m	28900	0/2		N		Below Background
Surface Soil (<5 ft)	IA-4	Chromium	2/2	mg/kg			20.6	20.8	20.7	D	21.3	20.8	m	17.3	2/2	3.0E+01	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-4	Cobalt	7/7	mg/kg			4.7	1510	313	L	120000	1510	m	31.7	5/7	3.3E+02	Y	Qual.	
Surface Soil (<5 ft)	IA-4	Copper	4/4	mg/kg			13.1	876	283	D	762	762	u	19.4	3/4	2.8E+02	Y	Qual.	
Surface Soil (<5 ft)	IA-4	Iron	2/2	mg/kg			22500	24200	23400	D	28700	24200	m	26600	0/2	2.2E+03	N		Below Background
Surface Soil (<5 ft)	IA-4	Lead	4/4	mg/kg			8.6	408	176	D	406	406	u	79.7	2/4	4.0E+01	Y	Qual.	
Surface Soil (<5 ft)	IA-4	Lithium	2/2	mg/kg			8.9	9.6	9.25	D	11.5	9.6	m	8.1	2/2	1.5E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-4	Magnesium	3/3	mg/kg			3510	13200	6820	D	16100	13200	m	18400	0/3		N		Below Background
Surface Soil (<5 ft)	IA-4	Manganese	2/2	mg/kg			172	692	432	D	2070	692	m	2830	0/2	3.1E+02	N		Below Background
Surface Soil (<5 ft)	IA-4	Mercury	1/2	mg/kg	0.03	0.03	0.07	0.07	0.05	D	0.176	0.07	m	0.69	0/2	2.2E+00	N		Below Background
Surface Soil (<5 ft)	IA-4	Molybdenum	3/7	mg/kg	0.465	11.1	8.2	71.9	20.5	D	38.6	38.6	u	22.7	2/7	3.7E+01	Y	Quant.	
Surface Soil (<5 ft)	IA-4	Nickel	3/3	mg/kg			19	2010	684	D	2620	2010	m	33.9	1/3	1.5E+02	Y	Quant.	
Surface Soil (<5 ft)	IA-4	Potassium	2/2	mg/kg			1060	1350	1210	D	2120	1350	m	1140	1/2		N		Essential Nutrient (low conc.)

Attachment 6. Determination of Surface[f] Soil Potential Chemicals of Concern by Aggregate (Page 8 of 14)
(only detected analytes are shown)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Surface Soil (<5 ft)	IA-4	Selenium	1/7	mg/kg	0.5	11.1	29.3	29.3	10.4	D	17.4	17.4	u	0.55	1/7	3.7E+01	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-4	Sodium	2/2	mg/kg			197	242	220	D	362	242	m	235	1/2		N		Essential Nutrient (low conc.)
Surface Soil (<5 ft)	IA-4	Strontium	2/2	mg/kg			23.7	26.3	25	D	33.2	26.3	m	26	1/2	4.5E+03	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-4	Thallium	2/7	mg/kg	9.55	11.1	1	3.3	8.09	D	11.1	3.3	m	0	2/7	6.0E-01	Y	Quant.	
Surface Soil (<5 ft)	IA-4	Titanium	2/2	mg/kg			170	243	207	D	437	243	m	269	0/2		N		Below Background
Surface Soil (<5 ft)	IA-4	Uranium	1/2	mg/kg	7.8	7.8	73.6	73.6	40.7	D	248	73.6	m	0	1/2		Y	Quant.	
Surface Soil (<5 ft)	IA-4	Vanadium	2/2	mg/kg			29.5	39.1	34.3	D	64.6	39.1	m	31	1/2	5.2E+01	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-4	Zinc	2/2	mg/kg			52.3	59.3	55.8	D	77.9	59.3	m	278	0/2	2.2E+03	N		Below Background
Surface Soil (<5 ft)	IA-4	Toluene	4/5	mg/kg	0.003	0.003	0.0018	0.12	0.0273	D	0.0768	0.0768	u	0.11	1/5	5.2E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-4	Actinium-227	6/6	pCi/g			0.23	4.76	1.61	L	108	4.76	m	0.82	3/6		Y	Quant.	
Surface Soil (<5 ft)	IA-4	Americium-241	2/6	pCi/g	0.06	0.09	0.18	0.24	0.118	D	0.179	0.179	u	0	2/6		Y	Quant.	
Surface Soil (<5 ft)	IA-4	Potassium-40	6/6	pCi/g			13.85	16.65	14.9	L	15.8	15.8	u	16.8	0/6		N		Below Background
Surface Soil (<5 ft)	IA-4	Protactinium-231	3/6	pCi/g	-0.12	0.45	2.49	3.98	1.75	D	3.29	3.29	u	1.13	3/6		Y	Quant.	
Surface Soil (<5 ft)	IA-4	Radium-226	20/40	pCi/g	1.2	4.4	0.82	1518	170	X	267	267	u	1.55	17/40		Y	Quant.	
Surface Soil (<5 ft)	IA-4	Radium-228	6/6	pCi/g			0.95	1.2	1.04	L	1.13	1.13	u	1.24	0/6		N		Below Background
Surface Soil (<5 ft)	IA-4	Thorium-228	6/6	pCi/g			1.02	2.2	1.4	L	1.86	1.86	u	2.04	1/6		Y	Quant.	
Surface Soil (<5 ft)	IA-4	Thorium-230	15/15	pCi/g			1.1	2440	398	L	30800	2440	m	2.89	13/15		Y	Quant.	
Surface Soil (<5 ft)	IA-4	Thorium-232	8/38	pCi/g	2	20.4	1.15	4	4.76	D	5.97	4	m	1.83	2/38		Y	Quant.	
Surface Soil (<5 ft)	IA-4	Uranium-235	5/6	pCi/g	0.14	0.14	1.21	3.89	1.96	N	3.06	3.06	u	0.25	5/6		Y	Quant.	
Surface Soil (<5 ft)	IA-4	Uranium-238	4/38	pCi/g	1.4	406	14.83	72.35	79.2	D	106	72.4	m	2.02	4/38		Y	Quant.	
Surface Soil (<5 ft)	IA-5	Fluoride	2/2	mg/kg			4.42	21.1	12.8	D	65.4	21.1	m		NA	3.3E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-5	Aluminum	7/7	mg/kg			10700	17100	13600	L	15500	15500	u	14700	2/7	7.5E+03	Y	Qual.	
Surface Soil (<5 ft)	IA-5	Arsenic	7/7	mg/kg			7.3	26.2	11	X	16	16	u	18	1/7	3.8E-01	Y	Quant.	
Surface Soil (<5 ft)	IA-5	Barium	8/8	mg/kg			166	4550	744	X	1770	1770	u	279	1/8	5.2E+02	Y	Quant.	
Surface Soil (<5 ft)	IA-5	Beryllium	6/7	mg/kg	0.375	0.375	0.7	1.4	0.865	N	1.09	1.09	u	0.83	4/7	1.5E+01	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-5	Boron	7/7	mg/kg			2.3	15.1	8.53	N	11.3	11.3	u	9.9	1/7	4.9E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-5	Cadmium	3/18	mg/kg	0.155	0.55	0.63	4.2	0.66	D	1.03	1.03	u	0.62	3/18	3.7E+00	Y	Quant.	
Surface Soil (<5 ft)	IA-5	Calcium	7/7	mg/kg			2230	9310	5650	N	7290	7290	u	28900	0/7		N		Below Background
Surface Soil (<5 ft)	IA-5	Chromium	7/7	mg/kg			15.1	34.6	20.2	L	25.9	25.9	u	17.3	4/7	3.0E+01	Y	Quant.	
Surface Soil (<5 ft)	IA-5	Cobalt	13/13	mg/kg			7.6	308	107	L	653	308	m	31.7	8/13	3.3E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-5	Copper	9/9	mg/kg			13.2	191	63.6	L	369	191	m	19.4	4/9	2.8E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-5	Cyanide	1/3	mg/kg	0.3105	0.3225	0.772	0.772	0.468	D	0.912	0.772	m		NA	1.1E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-5	Iron	7/7	mg/kg			16100	21400	19300	N	20800	20800	u	26600	0/7	2.2E+03	N		Below Background
Surface Soil (<5 ft)	IA-5	Lead	7/7	mg/kg			10.3	49	21	L	39.6	39.6	u	79.7	0/7	4.0E+01	N		Below Background
Surface Soil (<5 ft)	IA-5	Lithium	7/7	mg/kg			6	10.1	8.59	N	9.71	9.71	u	8.1	4/7	1.5E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-5	Magnesium	9/9	mg/kg			2010	26900	7150	X	12200	12200	u	18400	1/9		N		Essential Nutrient (low conc.)
Surface Soil (<5 ft)	IA-5	Manganese	7/7	mg/kg			373	823	658	N	773	773	u	2830	0/7	3.1E+02	N		Below Background
Surface Soil (<5 ft)	IA-5	Molybdenum	7/18	mg/kg	0.465	11.25	1.2	27.9	10.3	D	13.6	13.6	u	22.7	2/18	3.7E+01	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-5	Nickel	7/7	mg/kg			21.2	108	45.1	X	70.3	70.3	u	33.9	3/7	1.5E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-5	Potassium	7/7	mg/kg			827	2820	1390	L	2080	2080	u	1140	4/7		N		Essential Nutrient (low conc.)
Surface Soil (<5 ft)	IA-5	Selenium	7/18	mg/kg	1	11.35	0.38	19.6	8.61	D	10.7	10.7	u	0.55	5/18	3.7E+01	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-5	Silver	1/7	mg/kg	0.315	0.385	0.81	0.81	0.421	D	0.549	0.549	u	2.6	0/7	3.7E+01	N		Below Background
Surface Soil (<5 ft)	IA-5	Sodium	7/7	mg/kg			69.5	201	134	L	194	194	u	235	0/7		N		Below Background
Surface Soil (<5 ft)	IA-5	Strontium	7/7	mg/kg			14.8	243	79.5	X	154	154	u	26	3/7	4.5E+03	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-5	Thallium	4/18	mg/kg	0.6	11.35	1.9	2	6.97	D	8.85	2	m	0	4/18	6.0E-01	Y	Quant.	
Surface Soil (<5 ft)	IA-5	Titanium	7/7	mg/kg			99.1	338	225	N	284	284	u	269	2/7		Y	Qual.	
Surface Soil (<5 ft)	IA-5	Uranium	3/7	mg/kg	4.95	7.85	11.1	45.1	14.5	D	25.1	25.1	u	0	3/7		Y	Quant.	
Surface Soil (<5 ft)	IA-5	Vanadium	7/7	mg/kg			27.4	111	43.7	X	65.8	65.8	u	31	4/7	5.2E+01	Y	Quant.	
Surface Soil (<5 ft)	IA-5	Zinc	7/7	mg/kg			41.4	79.7	56.2	L	68.5	68.5	u	278	0/7	2.2E+03	N		Below Background
Surface Soil (<5 ft)	IA-5	MCPP	1/5	mg/kg	4.9	10.5	30	30	12.1	D	22	22	u	0	1/5	5.5E+00	Y	Quant.	
Surface Soil (<5 ft)	IA-5	Benz(a)anthracene	1/5	mg/kg	0.2	0.21	0.19	0.19	0.202	D	0.209	0.19	m	0.3	0/5	5.6E-01	N		Below Background
Surface Soil (<5 ft)	IA-5	Benzo(b)fluoranthene	1/5	mg/kg	0.2	0.21	0.36	0.36	0.237	D	0.303	0.303	u	0.31	1/5	5.6E-01	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-5	Bis(2-ethylhexyl)phthalate	1/5	mg/kg	0.2	0.295	0.21	0.21	0.224	D	0.262	0.21	m	0.18	1/5	3.2E+01	N		Max. detect < PRG

Attachment 6. Determination of Surface[f] Soil Potential Chemicals of Concern by Aggregate (Page 9 of 14)
(only detected analytes are shown)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Surface Soil (<5 ft)	IA-5	Butyl benzyl phthalate	1/5	mg/kg	0.2	0.21	0.31	0.31	0.226	D	0.271	0.271	u	0.25	1/5	9.3E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-5	Chrysene	1/5	mg/kg	0.2	0.21	0.14	0.14	0.192	D	0.22	0.14	m	0.57	0/5	5.6E+01	N		Below Background
Surface Soil (<5 ft)	IA-5	Di-n-octylphthalate	1/5	mg/kg	0.2	0.21	0.13	0.13	0.19	D	0.222	0.13	m	0	1/5	1.1E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-5	Fluoranthene	2/5	mg/kg	0.2	0.21	0.079	0.26	0.191	D	0.255	0.255	u	0.7	0/5	2.0E+02	N		Below Background
Surface Soil (<5 ft)	IA-5	Phenanthrene	1/5	mg/kg	0.2	0.21	0.078	0.078	0.18	D	0.234	0.078	m	0.28	0/5		N		Below Background
Surface Soil (<5 ft)	IA-5	Pyrene	2/5	mg/kg	0.2	0.21	0.29	0.31	0.243	D	0.293	0.293	u	0.66	0/5	1.5E+02	N		Below Background
Surface Soil (<5 ft)	IA-5	Toluene	5/10	mg/kg	0.003	0.003	0.0024	0.9	0.116	X	0.281	0.281	u	0.11	2/10	5.2E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-5	Actinium-227	34/43	pCi/g	0	0.27	0.19	292.7	10.4	Z	22	22	u	0.82	13/43		Y	Quant.	
Surface Soil (<5 ft)	IA-5	Americium-241	3/43	pCi/g	-5.04	0.2	0.5	1.5	-0.000233	D	0.212	0.212	u	0	3/43		Y	Quant.	
Surface Soil (<5 ft)	IA-5	Cesium-137	14/43	pCi/g	-0.03	0.09	0.04	2.35	0.0965	D	0.188	0.188	u	0.57	1/43		Y	Quant.	
Surface Soil (<5 ft)	IA-5	Potassium-40	42/43	pCi/g	5.21	5.21	10.66	17.12	14.3	X	14.8	14.8	u	16.8	2/43		Y	Quant.	
Surface Soil (<5 ft)	IA-5	Protactinium-231	12/43	pCi/g	-0.18	1.16	0.9	346.4	12.2	D	25.9	25.9	u	1.13	11/43		Y	Quant.	
Surface Soil (<5 ft)	IA-5	Radium-226	107/160	pCi/g	1	4.8	0.6	900	18.8	X	29.4	29.4	u	1.55	80/160		Y	Quant.	
Surface Soil (<5 ft)	IA-5	Radium-228	42/43	pCi/g	0.95	0.95	0.61	3.56	1.09	X	1.2	1.2	u	1.24	5/43		Y	Quant.	
Surface Soil (<5 ft)	IA-5	Thorium-228	42/43	pCi/g	1.04	1.04	0.71	3.56	1.32	X	1.44	1.44	u	2.04	1/43		Y	Quant.	
Surface Soil (<5 ft)	IA-5	Thorium-230	106/106	pCi/g			1	14680	419	X	662	662	u	2.89	97/106		Y	Quant.	
Surface Soil (<5 ft)	IA-5	Thorium-232	88/160	pCi/g	1	7.2	0.64	7.5	2.45	X	2.63	2.63	u	1.83	25/160		Y	Quant.	
Surface Soil (<5 ft)	IA-5	Uranium-235	30/43	pCi/g	-0.04	0.24	0.2	32.11	2.05	Z	3.45	3.45	u	0.25	25/43		Y	Quant.	
Surface Soil (<5 ft)	IA-5	Uranium-238	34/160	pCi/g	0.89	256	6	1000	40	D	51.6	51.6	u	2.02	34/160		Y	Quant.	
Surface Soil (<5 ft)	IA-6	Fluoride	1/1	mg/kg			62.9	62.9	62.9	D		62.9	m		NA	3.3E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-6	Cobalt	1/1	mg/kg			62.3	62.3	62.3	D		62.3	m	31.7	1/1	3.3E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-6	Magnesium	1/1	mg/kg			12200	12200	12200	D		12200	m	18400	0/1		N		Below Background
Surface Soil (<5 ft)	IA-6	Actinium-227	1/1	pCi/g			17.89	17.89	17.9	D		17.9	m	0.82	1/1		Y	Quant.	
Surface Soil (<5 ft)	IA-6	Potassium-40	1/1	pCi/g			13.87	13.87	13.9	D		13.9	m	16.8	0/1		N		Below Background
Surface Soil (<5 ft)	IA-6	Protactinium-231	1/1	pCi/g			18.78	18.78	18.8	D		18.8	m	1.13	1/1		Y	Quant.	
Surface Soil (<5 ft)	IA-6	Radium-226	11/24	pCi/g	1.6	2.6	1	39.4	5.98	D	9.62	9.62	u	1.55	9/24		Y	Quant.	
Surface Soil (<5 ft)	IA-6	Radium-228	1/1	pCi/g			1.37	1.37	1.37	D		1.37	m	1.24	1/1		Y	Quant.	
Surface Soil (<5 ft)	IA-6	Thorium-228	1/1	pCi/g			1.37	1.37	1.37	D		1.37	m	2.04	0/1		N		Below Background
Surface Soil (<5 ft)	IA-6	Thorium-230	15/15	pCi/g			1.4	2100	211	X	464	464	u	2.89	8/15		Y	Quant.	
Surface Soil (<5 ft)	IA-6	Thorium-232	8/24	pCi/g	2	4.9	1.2	7	3.04	D	3.45	3.45	u	1.83	6/24		Y	Quant.	
Surface Soil (<5 ft)	IA-6	Uranium-235	1/1	pCi/g			4.33	4.33	4.33	D		4.33	m	0.25	1/1		Y	Quant.	
Surface Soil (<5 ft)	IA-6	Uranium-238	7/24	pCi/g	6	127.4	12	32	33.6	D	42.9	32	m	2.02	7/24		Y	Quant.	
Surface Soil (<5 ft)	IA-7	Aluminum	2/2	mg/kg			15500	15700	15600	D	16200	15700	m	14700	2/2	7.5E+03	Y	Qual.	
Surface Soil (<5 ft)	IA-7	Arsenic	2/2	mg/kg			6.1	11.8	8.95	D	26.9	11.8	m	18	0/2	3.8E-01	N		Below Background
Surface Soil (<5 ft)	IA-7	Barium	4/4	mg/kg			195	13600	6700	D	15500	13600	m	279	2/4	5.2E+02	Y	Quant.	
Surface Soil (<5 ft)	IA-7	Beryllium	1/2	mg/kg	0.48	0.48	0.96	0.96	0.72	D	2.24	0.96	m	0.83	1/2	1.5E+01	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-7	Boron	2/2	mg/kg			9.4	11.6	10.5	D	17.4	11.6	m	9.9	1/2	4.9E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-7	Cadmium	2/4	mg/kg	0.295	0.315	1.5	3.2	1.33	D	2.94	2.94	u	0.62	2/4	3.7E+00	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-7	Calcium	2/2	mg/kg			3540	5120	4330	D	9320	5120	m	28900	0/2		N		Below Background
Surface Soil (<5 ft)	IA-7	Chromium	2/2	mg/kg			20	22.1	21.1	D	27.7	22.1	m	17.3	2/2	3.0E+01	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-7	Cobalt	4/4	mg/kg			6.8	6050	2430	D	5910	5910	u	31.7	2/4	3.3E+02	Y	Qual.	
Surface Soil (<5 ft)	IA-7	Copper	4/4	mg/kg			15.4	4400	1810	D	4370	4370	u	19.4	3/4	2.8E+02	Y	Qual.	
Surface Soil (<5 ft)	IA-7	Iron	2/2	mg/kg			19800	24600	22200	D	37400	24600	m	26600	0/2	2.2E+03	N		Below Background
Surface Soil (<5 ft)	IA-7	Lead	4/4	mg/kg			12.3	933	409	D	961	933	m	79.7	2/4	4.0E+01	Y	Qual.	
Surface Soil (<5 ft)	IA-7	Lithium	2/2	mg/kg			9	9.3	9.15	D	10.1	9.3	m	8.1	2/2	1.5E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	IA-7	Magnesium	2/2	mg/kg			3530	4120	3830	D	5690	4120	m	18400	0/2		N		Below Background
Surface Soil (<5 ft)	IA-7	Manganese	2/2	mg/kg			481	761	621	D	1500	761	m	2830	0/2	3.1E+02	N		Below Background
Surface Soil (<5 ft)	IA-7	Molybdenum	2/4	mg/kg	0.75	0.8	170	255	107	D	256	255	m	22.7	2/4	3.7E+01	Y	Quant.	
Surface Soil (<5 ft)	IA-7	Nickel	4/4	mg/kg			21.2	7570	3040	D	7380	7380	u	33.9	2/4	1.5E+02	Y	Quant.	
Surface Soil (<5 ft)	IA-7	Potassium	2/2	mg/kg			916	1320	1120	D	2390	1320	m	1140	1/2		N		Essential Nutrient (low conc.)
Surface Soil (<5 ft)	IA-7	Selenium	2/4	mg/kg	0.2	0.215	96	183	69.9	D	173	173	u	0.55	2/4	3.7E+01	Y	Quant.	
Surface Soil (<5 ft)	IA-7	Sodium	2/2	mg/kg			119	135	127	D	178	135	m	235	0/2		N		Below Background

Attachment 6. Determination of Surface[f] Soil Potential Chemicals of Concern by Aggregate (Page 10 of 14)
(only detected analytes are shown)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Surface Soil (<5 ft)	IA-7	Strontium	2/2	mg/kg			20.6	23.6	22.1	D	31.6	23.6	m	26	0/2	4.5E+03	N		Below Background
Surface Soil (<5 ft)	IA-7	Titanium	2/2	mg/kg			256	267	262	D	296	267	m	269	0/2		N		Below Background
Surface Soil (<5 ft)	IA-7	Vanadium	3/3	mg/kg			35	630	234	D	812	630	m	31	3/3	5.2E+01	Y	Quant.	
Surface Soil (<5 ft)	IA-7	Zinc	2/2	mg/kg			56.9	57.2	57.1	D	58	57.2	m	278	0/2	2.2E+03	N		Below Background
Surface Soil (<5 ft)	IA-7	1,2-Dichloroethane	1/2	mg/kg	0.0025	0.0025	0.001	0.001	0.00175	D	0.00649	0.001	m	0.009	0/2	3.4E-01	N		Below Background
Surface Soil (<5 ft)	IA-7	2-Butanone	1/2	mg/kg	0.005	0.005	0.001	0.001	0.003	D	0.0156	0.001	m	0.023	0/2	6.9E+02	N		Below Background
Surface Soil (<5 ft)	IA-7	Acetone	2/2	mg/kg			0.005	0.009	0.007	D	0.0196	0.009	m	0.017	0/2	1.4E+02	N		Below Background
Surface Soil (<5 ft)	IA-7	Actinium-227	9/19	pCi/g	-0.13	0.19	0.32	695.7	56.5	D	127	127	u	0.82	2/19		Y	Quant.	
Surface Soil (<5 ft)	IA-7	Americium-241	1/19	pCi/g	-2.6	0.05	0.08	0.08	-0.216	D	0.0716	0.0716	u	0	1/19		Y	Quant.	
Surface Soil (<5 ft)	IA-7	Potassium-40	18/19	pCi/g	11.07	11.07	13.87	16.6	15	X	15.5	15.5	u	16.8	0/19		N		Below Background
Surface Soil (<5 ft)	IA-7	Protactinium-231	10/19	pCi/g	0.1	0.92	1.2	685.8	56.4	X	126	126	u	1.13	10/19		Y	Quant.	
Surface Soil (<5 ft)	IA-7	Radium-226	87/92	pCi/g	1.5	5	0.7	1818	42.2	X	82.5	82.5	u	1.55	42/92		Y	Quant.	
Surface Soil (<5 ft)	IA-7	Radium-228	19/19	pCi/g			0.81	7.54	1.67	X	2.46	2.46	u	1.24	2/19		Y	Quant.	
Surface Soil (<5 ft)	IA-7	Thorium-228	19/19	pCi/g			1.02	7.54	1.95	X	2.71	2.71	u	2.04	2/19		Y	Quant.	
Surface Soil (<5 ft)	IA-7	Thorium-230	70/71	pCi/g	0.05	0.05	1	37780	965	X	2010	2010	u	2.89	48/71		Y	Quant.	
Surface Soil (<5 ft)	IA-7	Thorium-232	80/92	pCi/g	1	25.2	0.7	7.54	2.15	X	2.61	2.61	u	1.83	28/92		Y	Quant.	
Surface Soil (<5 ft)	IA-7	Uranium-235	5/19	pCi/g	0.04	0.17	0.24	54.18	4.7	D	10.3	10.3	u	0.25	4/19		Y	Quant.	
Surface Soil (<5 ft)	IA-7	Uranium-238	24/92	pCi/g	0.72	462	5	201.9	19.3	D	28.7	28.7	u	2.02	24/92		Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Aluminum	1/1	mg/kg			4400	4400	4400	D		4400	m	14700	0/1	7.5E+03	N		Below Background
Surface Soil (<0.5 ft)	IA-8	Arsenic	1/1	mg/kg			4.5	4.5	4.5	D		4.5	m	18	0/1	3.8E-01	N		Below Background
Surface Soil (<0.5 ft)	IA-8	Barium	1/1	mg/kg			105	105	105	D		105	m	279	0/1	5.2E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-8	Boron	1/1	mg/kg			7.2	7.2	7.2	D		7.2	m	9.9	0/1	4.9E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-8	Calcium	1/1	mg/kg			105000	105000	105000	D		105000	m	28900	1/1		N		Essential Nutrient (low conc.)
Surface Soil (<0.5 ft)	IA-8	Chromium	1/1	mg/kg			42.6	42.6	42.6	D		42.6	m	17.3	1/1	3.0E+01	Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Cobalt	1/1	mg/kg			23.2	23.2	23.2	D		23.2	m	31.7	0/1	3.3E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-8	Copper	1/1	mg/kg			85.1	85.1	85.1	D		85.1	m	19.4	1/1	2.8E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	Iron	1/1	mg/kg			13200	13200	13200	D		13200	m	26600	0/1	2.2E+03	N		Below Background
Surface Soil (<0.5 ft)	IA-8	Lead	1/1	mg/kg			500	500	500	D		500	m	79.7	1/1	4.0E+01	Y	Qual.	
Surface Soil (<0.5 ft)	IA-8	Magnesium	1/1	mg/kg			10000	10000	10000	D		10000	m	18400	0/1		N		Below Background
Surface Soil (<0.5 ft)	IA-8	Manganese	1/1	mg/kg			352	352	352	D		352	m	2830	0/1	3.1E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-8	Mercury	1/1	mg/kg			0.08	0.08	0.08	D		0.08	m	0.69	0/1	2.2E+00	N		Below Background
Surface Soil (<0.5 ft)	IA-8	Molybdenum	1/1	mg/kg			3.2	3.2	3.2	D		3.2	m	22.7	0/1	3.7E+01	N		Below Background
Surface Soil (<0.5 ft)	IA-8	Nickel	1/1	mg/kg			37.5	37.5	37.5	D		37.5	m	33.9	1/1	1.5E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	Potassium	1/1	mg/kg			481	481	481	D		481	m	1140	0/1		N		Below Background
Surface Soil (<0.5 ft)	IA-8	Selenium	1/1	mg/kg			0.62	0.62	0.62	D		0.62	m	0.55	1/1	3.7E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	Silver	1/1	mg/kg			0.62	0.62	0.62	D		0.62	m	2.6	0/1	3.7E+01	N		Below Background
Surface Soil (<0.5 ft)	IA-8	Sodium	1/1	mg/kg			630	630	630	D		630	m	235	1/1		N		Essential Nutrient (low conc.)
Surface Soil (<0.5 ft)	IA-8	Strontium	1/1	mg/kg			112	112	112	D		112	m	26	1/1	4.5E+03	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	Titanium	1/1	mg/kg			127	127	127	D		127	m	269	0/1		N		Below Background
Surface Soil (<0.5 ft)	IA-8	Vanadium	1/1	mg/kg			20.6	20.6	20.6	D		20.6	m	31	0/1	5.2E+01	N		Below Background
Surface Soil (<0.5 ft)	IA-8	Zinc	1/1	mg/kg			284	284	284	D		284	m	278	1/1	2.2E+03	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	MCPA	1/1	mg/kg			25	25	25	D		25	m	0	1/1	2.7E+00	Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Silvex	1/1	mg/kg			0.03	0.03	0.03	D		0.03	m	0	1/1	4.4E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	4,4'-DDT	1/1	mg/kg			0.0039	0.0039	0.0039	D		0.0039	m	0.00082	1/1	1.7E+00	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	2-Methylnaphthalene	1/1	mg/kg			0.36	0.36	0.36	D		0.36	m	0	1/1		Y	Qual.	
Surface Soil (<0.5 ft)	IA-8	Acenaphthene	1/1	mg/kg			0.085	0.085	0.085	D		0.085	m	0	1/1	2.6E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	Anthracene	1/1	mg/kg			0.28	0.28	0.28	D		0.28	m	0.031	1/1	1.4E+03	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	Benz(a)anthracene	1/1	mg/kg			1.4	1.4	1.4	D		1.4	m	0.3	1/1	5.6E-01	Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Benzo(a)pyrene	1/1	mg/kg			1.6	1.6	1.6	D		1.6	m	0.34	1/1	5.6E-02	Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Benzo(b)fluoranthene	1/1	mg/kg			2.1	2.1	2.1	D		2.1	m	0.31	1/1	5.6E-01	Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Benzo(ghi)perylene	1/1	mg/kg			0.91	0.91	0.91	D		0.91	m	0.39	1/1		Y	Qual.	
Surface Soil (<0.5 ft)	IA-8	Benzo(k)fluoranthene	1/1	mg/kg			1	1	1	D		1	m	0.29	1/1	5.6E+00	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	Butyl benzyl phthalate	1/1	mg/kg			0.21	0.21	0.21	D		0.21	m	0.25	0/1	9.3E+02	N		Below Background

Attachment 6. Determination of Surface[f] Soil Potential Chemicals of Concern by Aggregate (Page 11 of 14)
(only detected analytes are shown)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Surface Soil (<0.5 ft)	IA-8	Carbazole	1/1	mg/kg			0.21	0.21	0.21	D		0.21	m	0	1/1	2.2E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	Chrysene	1/1	mg/kg			1.8	1.8	1.8	D		1.8	m	0.57	1/1	5.6E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	Di-n-butyl phthalate	1/1	mg/kg			0.15	0.15	0.15	D		0.15	m	0	1/1	5.5E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	Dibenz(a,h)anthracene	1/1	mg/kg			0.28	0.28	0.28	D		0.28	m	0.035	1/1	5.6E-02	Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Dibenzofuran	1/1	mg/kg			0.046	0.046	0.046	D		0.046	m	0	1/1	2.1E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	Fluoranthene	1/1	mg/kg			3.3	3.3	3.3	D		3.3	m	0.7	1/1	2.0E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	Fluorene	1/1	mg/kg			0.11	0.11	0.11	D		0.11	m	0	1/1	1.8E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	Indeno(1,2,3-cd)pyrene	1/1	mg/kg			0.88	0.88	0.88	D		0.88	m	0.35	1/1	5.6E-01	Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Naphthalene	1/1	mg/kg			0.05	0.05	0.05	D		0.05	m	0	1/1	5.5E+00	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	Phenanthrene	1/1	mg/kg			1.6	1.6	1.6	D		1.6	m	0.28	1/1		Y	Qual.	
Surface Soil (<0.5 ft)	IA-8	Pyrene	1/1	mg/kg			2.8	2.8	2.8	D		2.8	m	0.66	1/1	1.5E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-8	Actinium-227	23/23	pCi/g			0.18	442.6	43	X	82.3	82.3	u	0.82	17/23		Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Americium-241	3/23	pCi/g	-3.35	0.11	0.12	0.29	-0.323	D	0.00473	0.00473	u	0	3/23		Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Cesium-137	21/23	pCi/g	-0.01	0.39	0.04	0.96	0.394	Z	0.472	0.472	u	0.57	3/23		Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Potassium-40	23/23	pCi/g			5.85	18.46	13.9	X	15.1	15.1	u	16.8	3/23		Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Protactinium-231	18/23	pCi/g	0	1.69	0.84	450.3	45.4	Z	86.5	86.5	u	1.13	17/23		Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Radium-226	85/86	pCi/g	2.1	2.1	0.7	436.4	23.5	X	34.7	34.7	u	1.55	73/86		Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Radium-228	23/23	pCi/g			0.28	4.76	1.29	X	1.64	1.64	u	1.24	4/23		Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Thorium-228	23/23	pCi/g			0.49	4.76	1.49	L	1.82	1.82	u	2.04	2/23		Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Thorium-230	83/84	pCi/g	0.36	0.36	2.9	20280	917	L	1750	1750	u	2.89	83/84		Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Thorium-232	71/86	pCi/g	0	6.8	0.4	5	1.81	Z	2.03	2.03	u	1.83	29/86		Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Uranium-235	21/23	pCi/g	0.09	0.19	0.32	38.87	5.35	L	20.2	20.2	u	0.25	21/23		Y	Quant.	
Surface Soil (<0.5 ft)	IA-8	Uranium-238	29/86	pCi/g	0	160.2	6	190.4	19.9	D	25.9	25.9	u	2.02	29/86		Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Aluminum	8/8	mg/kg			1770	11100	8230	N	10300	10300	u	14700	0/8	7.5E+03	N		Below Background
Surface Soil (<0.5 ft)	IA-9	Antimony	1/8	mg/kg	2.1	3.5	4.3	4.3	2.93	D	3.42	3.42	u	5.2	0/8	3.0E+00	N		Below Background
Surface Soil (<0.5 ft)	IA-9	Arsenic	8/8	mg/kg			5.5	41	12.9	X	21.4	21.4	u	18	2/8	3.8E-01	Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Barium	8/8	mg/kg			29.8	532	190	L	609	532	m	279	2/8	5.2E+02	Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Beryllium	6/8	mg/kg	0.2	0.255	0.71	1.9	0.826	L	2.14	1.9	m	0.83	2/8	1.5E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Boron	6/8	mg/kg	1.1	1.3	4.2	9.2	5.59	N	7.81	7.81	u	9.9	0/8	4.9E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-9	Cadmium	2/8	mg/kg	0.165	0.465	1.2	2	0.623	D	1.05	1.05	u	0.62	2/8	3.7E+00	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Calcium	8/8	mg/kg			1980	194000	33900	L	630000	194000	m	28900	1/8		N		Essential Nutrient (low conc.)
Surface Soil (<0.5 ft)	IA-9	Chromium	8/8	mg/kg			7.5	22.1	15.1	N	18.3	18.3	u	17.3	3/8	3.0E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Cobalt	8/8	mg/kg			2	864	171	L	174000	864	m	31.7	2/8	3.3E+02	Y	Qual.	
Surface Soil (<0.5 ft)	IA-9	Copper	8/8	mg/kg			7.2	632	137	L	4660	632	m	19.4	6/8	2.8E+02	Y	Qual.	
Surface Soil (<0.5 ft)	IA-9	Iron	8/8	mg/kg			4150	20800	14700	N	18200	18200	u	26600	0/8	2.2E+03	N		Below Background
Surface Soil (<0.5 ft)	IA-9	Lead	8/8	mg/kg			11.9	240	79.6	L	573	240	m	79.7	3/8	4.0E+01	Y	Qual.	
Surface Soil (<0.5 ft)	IA-9	Lithium	6/8	mg/kg	0.55	1.75	5.4	8.4	5.58	N	7.59	7.59	u	8.1	3/8	1.5E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Magnesium	8/8	mg/kg			1310	70100	12000	X	27800	27800	u	18400	1/8		N		Essential Nutrient (low conc.)
Surface Soil (<0.5 ft)	IA-9	Manganese	8/8	mg/kg			122	810	571	N	709	709	u	2830	0/8	3.1E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-9	Molybdenum	6/8	mg/kg	0.7	0.75	1.4	25.7	6.04	L	78	25.7	m	22.7	1/8	3.7E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Nickel	8/8	mg/kg			2.6	1080	219	L	46500	1080	m	33.9	3/8	1.5E+02	Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Potassium	7/8	mg/kg	119.5	119.5	786	1790	992	N	1310	1310	u	1140	3/8		N		Essential Nutrient (low conc.)
Surface Soil (<0.5 ft)	IA-9	Selenium	4/8	mg/kg	0.17	0.205	0.6	22.3	4.98	D	10.5	10.5	u	0.55	4/8	3.7E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Sodium	8/8	mg/kg			58.9	174	106	L	143	143	u	235	0/8		N		Below Background
Surface Soil (<0.5 ft)	IA-9	Strontium	8/8	mg/kg			10.3	111	37	L	89.9	89.9	u	26	5/8	4.5E+03	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Titanium	8/8	mg/kg			48	310	205	N	260	260	u	269	1/8		Y	Qual.	
Surface Soil (<0.5 ft)	IA-9	Uranium	2/8	mg/kg	4.4	6.15	53.6	118	25.3	D	52.8	52.8	u	0	2/8		Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Vanadium	8/8	mg/kg			10.7	185	53.5	L	191	185	m	31	4/8	5.2E+01	Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Zinc	8/8	mg/kg			24.2	131	71.7	L	131	131	u	278	0/8	2.2E+03	N		Below Background
Surface Soil (<0.5 ft)	IA-9	Silvex	3/8	mg/kg	0.0125	0.013	0.027	0.042	0.0201	D	0.0275	0.0275	u	0	3/8	4.4E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	4,4'-DDE	1/8	mg/kg	0.0018	0.0025	0.012	0.012	0.00337	D	0.00571	0.00571	u	0	1/8	1.7E+00	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	4,4'-DDT	1/8	mg/kg	0.0018	0.0025	0.033	0.033	0.00599	D	0.0133	0.0133	u	0.00082	1/8	1.7E+00	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Anthracene	2/8	mg/kg	0.185	0.25	0.061	0.064	0.176	D	0.225	0.064	m	0.031	2/8	1.4E+03	N		Max. detect < PRG

Attachment 6. Determination of Surface[f] Soil Potential Chemicals of Concern by Aggregate (Page 12 of 14)
(only detected analytes are shown)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Surface Soil (<0.5 ft)	IA-9	Benz(a)anthracene	8/8	mg/kg			0.13	0.5	0.265	L	0.468	0.468	u	0.3	3/8	5.6E-01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Benzo(a)pyrene	8/8	mg/kg			0.062	0.59	0.238	L	0.8	0.59	m	0.34	3/8	5.6E-02	Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Benzo(b)fluoranthene	8/8	mg/kg			0.14	0.55	0.319	L	0.541	0.541	u	0.31	4/8	5.6E-01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Benzo(ghi)perylene	4/8	mg/kg	0.185	0.25	0.11	0.54	0.246	D	0.338	0.338	u	0.39	1/8		Y	Qual.	
Surface Soil (<0.5 ft)	IA-9	Benzo(k)fluoranthene	4/8	mg/kg	0.185	0.25	0.13	0.43	0.232	D	0.297	0.297	u	0.29	2/8	5.6E+00	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Bis(2-ethylhexyl)phthalate	3/8	mg/kg	0.185	0.25	0.25	0.32	0.238	D	0.266	0.266	u	0.18	3/8	3.2E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Butyl benzyl phthalate	3/8	mg/kg	0.185	0.21	0.17	0.23	0.201	D	0.214	0.214	u	0.25	0/8	9.3E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-9	Carbazole	1/8	mg/kg	0.185	0.25	0.082	0.082	0.196	D	0.229	0.082	m	0	1/8	2.2E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Chrysene	5/8	mg/kg	0.185	0.215	0.11	0.91	0.373	L	0.885	0.885	u	0.57	2/8	5.6E+01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Di-n-butyl phthalate	1/8	mg/kg	0.185	0.25	0.049	0.049	0.193	D	0.234	0.049	m	0	1/8	5.5E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Di-n-octylphthalate	2/8	mg/kg	0.185	0.22	0.082	0.1	0.178	D	0.214	0.1	m	0	2/8	1.1E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Fluoranthene	8/8	mg/kg			0.085	1.1	0.468	L	3.16	1.1	m	0.7	3/8	2.0E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Indeno(1,2,3-cd)pyrene	5/8	mg/kg	0.185	0.215	0.057	0.47	0.22	L	0.457	0.457	u	0.35	1/8	5.6E-01	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Phenanthrene	8/8	mg/kg			0.082	0.39	0.205	L	0.45	0.39	m	0.28	3/8		Y	Qual.	
Surface Soil (<0.5 ft)	IA-9	Pyrene	8/8	mg/kg			0.12	0.94	0.408	L	1.29	0.94	m	0.66	2/8	1.5E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	2-Butanone	4/8	mg/kg	0.005	0.0065	0.007	0.034	0.0141	D	0.0222	0.0222	u	0.023	2/8	6.9E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Dimethylbenzene	2/8	mg/kg	0.0025	0.003	0.001	0.015	0.00406	D	0.00706	0.00706	u	0	2/8		Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Ethylbenzene	1/8	mg/kg	0.0025	0.003	0.002	0.002	0.00263	D	0.00286	0.002	m	0	1/8	2.3E+02	N		Max. detect < PRG
Surface Soil (<0.5 ft)	IA-9	Toluene	4/8	mg/kg	0.0025	0.003	0.002	0.016	0.00431	D	0.00749	0.00749	u	0.11	0/8	5.2E+02	N		Below Background
Surface Soil (<0.5 ft)	IA-9	Actinium-227	26/61	pCi/g	-0.04	0.22	0.16	46.85	1.39	D	2.84	2.84	u	0.82	3/61		Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Cesium-137	52/61	pCi/g	0	0.05	0.04	0.32	0.0844	Z	0.0955	0.0955	u	0.57	0/61		N		Below Background
Surface Soil (<0.5 ft)	IA-9	Potassium-40	61/61	pCi/g			5.93	18.62	15.1	X	15.7	15.7	u	16.8	10/61		Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Protactinium-231	25/61	pCi/g	-0.4	1.25	0.73	51.73	2.12	D	3.69	3.69	u	1.13	24/61		Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Radium-226	451/478	pCi/g	0	0.6	0.5	29.27	1.53	Z	1.69	1.69	u	1.55	135/478		Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Radium-228	61/61	pCi/g			0.26	1.29	0.924	X	0.964	0.964	u	1.24	2/61		Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Thorium-228	61/61	pCi/g			0.6	2.1	1.25	L	1.33	1.33	u	2.04	1/61		Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Thorium-230	510/523	pCi/g	0.1	0.8	0.51	2787	23.2	X	34.3	34.3	u	2.89	344/523		Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Thorium-232	443/474	pCi/g	0	2	0.47	5	1.59	Z	1.65	1.65	u	1.83	160/474		Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Uranium-235	13/61	pCi/g	-0.05	0.2	0.15	6.92	0.324	D	0.549	0.549	u	0.25	7/61		Y	Quant.	
Surface Soil (<0.5 ft)	IA-9	Uranium-238	19/479	pCi/g	0	18	3.6	42	5.65	D	6.01	6.01	u	2.02	19/479		N		<5% detected
Soil - All Depths	ROAD ROW	Aluminum	1/1	mg/kg			15800	15800	15800	D		15800	m	14700	1/1	7.5E+03	Y	Qual.	
Soil - All Depths	ROAD ROW	Arsenic	1/1	mg/kg			23.2	23.2	23.2	D		23.2	m	18	1/1	3.8E-01	Y	Quant.	
Soil - All Depths	ROAD ROW	Barium	1/1	mg/kg			350	350	350	D		350	m	279	1/1	5.2E+02	N		Max. detect < PRG
Soil - All Depths	ROAD ROW	Beryllium	1/1	mg/kg			1.5	1.5	1.5	D		1.5	m	0.83	1/1	1.5E+01	N		Max. detect < PRG
Soil - All Depths	ROAD ROW	Boron	1/1	mg/kg			18.8	18.8	18.8	D		18.8	m	9.9	1/1	4.9E+02	N		Max. detect < PRG
Soil - All Depths	ROAD ROW	Calcium	1/1	mg/kg			5050	5050	5050	D		5050	m	28900	0/1		N		Below Background
Soil - All Depths	ROAD ROW	Chromium	1/1	mg/kg			19.8	19.8	19.8	D		19.8	m	17.3	1/1	3.0E+01	N		Max. detect < PRG
Soil - All Depths	ROAD ROW	Cobalt	1/1	mg/kg			35.1	35.1	35.1	D		35.1	m	31.7	1/1	3.3E+02	N		Max. detect < PRG
Soil - All Depths	ROAD ROW	Copper	1/1	mg/kg			22.9	22.9	22.9	D		22.9	m	19.4	1/1	2.8E+02	N		Max. detect < PRG
Soil - All Depths	ROAD ROW	Iron	1/1	mg/kg			52100	52100	52100	D		52100	m	26600	1/1	2.2E+03	N		Essential Nutrient (low conc.)
Soil - All Depths	ROAD ROW	Lead	1/1	mg/kg			39.5	39.5	39.5	D		39.5	m	79.7	0/1	4.0E+01	N		Below Background
Soil - All Depths	ROAD ROW	Lithium	1/1	mg/kg			9.1	9.1	9.1	D		9.1	m	8.1	1/1	1.5E+02	N		Max. detect < PRG
Soil - All Depths	ROAD ROW	Magnesium	1/1	mg/kg			2770	2770	2770	D		2770	m	18400	0/1		N		Below Background
Soil - All Depths	ROAD ROW	Manganese	1/1	mg/kg			6320	6320	6320	D		6320	m	2830	1/1	3.1E+02	Y	Quant.	
Soil - All Depths	ROAD ROW	Molybdenum	1/1	mg/kg			2.1	2.1	2.1	D		2.1	m	22.7	0/1	3.7E+01	N		Below Background
Soil - All Depths	ROAD ROW	Nickel	1/1	mg/kg			32.9	32.9	32.9	D		32.9	m	33.9	0/1	1.5E+02	N		Below Background
Soil - All Depths	ROAD ROW	Potassium	1/1	mg/kg			1160	1160	1160	D		1160	m	1140	1/1		N		Essential Nutrient (low conc.)
Soil - All Depths	ROAD ROW	Sodium	1/1	mg/kg			932	932	932	D		932	m	235	1/1		N		Essential Nutrient (low conc.)
Soil - All Depths	ROAD ROW	Strontium	1/1	mg/kg			21.8	21.8	21.8	D		21.8	m	26	0/1	4.5E+03	N		Below Background
Soil - All Depths	ROAD ROW	Thallium	1/1	mg/kg			7.2	7.2	7.2	D		7.2	m	0	1/1	6.0E-01	Y	Quant.	
Soil - All Depths	ROAD ROW	Titanium	1/1	mg/kg			293	293	293	D		293	m	269	1/1		Y	Qual.	
Soil - All Depths	ROAD ROW	Vanadium	1/1	mg/kg			65.3	65.3	65.3	D		65.3	m	31	1/1	5.2E+01	Y	Quant.	
Soil - All Depths	ROAD ROW	Zinc	1/1	mg/kg			73	73	73	D		73	m	278	0/1	2.2E+03	N		Below Background

Attachment 6. Determination of Surface[f] Soil Potential Chemicals of Concern by Aggregate (Page 13 of 14)
(only detected analytes are shown)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Soil - All Depths	ROAD ROW	MCPP	1/1	mg/kg			120	120	120	D		120	m	0	1/1	5.5E+00	Y	Quant.	
Soil - All Depths	ROAD ROW	alpha-Chlordane	1/2	mg/kg	0.00115	0.00115	0.03	0.03	0.0156	D	0.107	0.03	m	0.014	1/2	1.6E+00	N		Max. detect < PRG
Soil - All Depths	ROAD ROW	Fluoranthene	1/1	mg/kg			0.1	0.1	0.1	D		0.1	m	0.7	0/1	2.0E+02	N		Below Background
Soil - All Depths	ROAD ROW	Pyrene	1/1	mg/kg			0.32	0.32	0.32	D		0.32	m	0.66	0/1	1.5E+02	N		Below Background
Soil - All Depths	ROAD ROW	2-Butanone	1/1	mg/kg			0.024	0.024	0.024	D		0.024	m	0.023	1/1	6.9E+02	N		Max. detect < PRG
Soil - All Depths	ROAD ROW	Acetone	1/1	mg/kg			0.077	0.077	0.077	D		0.077	m	0.017	1/1	1.4E+02	N		Max. detect < PRG
Soil - All Depths	ROAD ROW	Toluene	1/1	mg/kg			0.004	0.004	0.004	D		0.004	m	0.11	0/1	5.2E+02	N		Below Background
Soil - All Depths	ROAD ROW	Actinium-227	2/4	pCi/g	0.14	0.16	0.27	0.29	0.215	D	0.304	0.29	m	0.82	0/4		N		Below Background
Soil - All Depths	ROAD ROW	Americium-241	1/4	pCi/g	0.03	0.04	0.12	0.12	0.0575	D	0.107	0.107	u	0	1/4		Y	Quant.	
Soil - All Depths	ROAD ROW	Cesium-137	4/4	pCi/g			0.04	0.2	0.138	D	0.221	0.2	m	0.57	0/4		N		Below Background
Soil - All Depths	ROAD ROW	Potassium-40	4/4	pCi/g			12.81	16.18	14.5	D	16.1	16.1	u	16.8	0/4		N		Below Background
Soil - All Depths	ROAD ROW	Radium-226	1730/1757	pCi/g	0.4	4	0.4	92	2.7	X	2.89	2.89	u	1.55	1059/1757		Y	Quant.	
Soil - All Depths	ROAD ROW	Radium-228	4/4	pCi/g			0.8	1.02	0.925	D	1.04	1.02	m	1.24	0/4		N		Below Background
Soil - All Depths	ROAD ROW	Thorium-228	4/4	pCi/g			1.14	1.51	1.39	D	1.59	1.51	m	2.04	0/4		N		Below Background
Soil - All Depths	ROAD ROW	Thorium-230	2740/2784	pCi/g	0.3	1.5	0.3	5100	42.2	X	49.9	49.9	u	2.89	998/2784		Y	Quant.	
Soil - All Depths	ROAD ROW	Thorium-232	1520/1752	pCi/g	0	9	0.35	64	2.13	Z	2.22	2.22	u	1.83	917/1752		Y	Quant.	
Soil - All Depths	ROAD ROW	Uranium-235	1/4	pCi/g	0	0.17	0.24	0.24	0.133	D	0.251	0.24	m	0.25	0/4		N		Below Background
Soil - All Depths	ROAD ROW	Uranium-238	47/1754	pCi/g	0	69	2.1	78	11.2	D	11.5	11.5	u	2.02	47/1754		N		<5% detected
Surface Soil (<5 ft)	SLAPS	Fluoride	5/5	mg/kg			4.42	62.9	28.3	L	888	62.9	m		NA	3.3E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	SLAPS	Sulfide	1/4	mg/kg	0.00655	13.6	21	21	10.3	D	20.9	20.9	u		NA		Y	Qual.	
Surface Soil (<5 ft)	SLAPS	Aluminum	14/14	mg/kg			10700	23200	15400	L	17100	17100	u	14700	7/14	7.5E+03	Y	Qual.	
Surface Soil (<5 ft)	SLAPS	Antimony	2/52	mg/kg	0.19	6.8	5.3	53.2	5.99	D	7.6	7.6	u	5.2	2/52	3.0E+00	N		<5% detected
Surface Soil (<5 ft)	SLAPS	Arsenic	17/17	mg/kg			6.1	237	37.1	X	66.9	66.9	u	18	4/17	3.8E-01	Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Barium	19/19	mg/kg			152	13600	2030	X	3680	3680	u	279	6/19	5.2E+02	Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Beryllium	12/14	mg/kg	0.375	0.48	0.7	2.4	0.968	L	1.26	1.26	u	0.83	10/14	1.5E+01	N		Max. detect < PRG
Surface Soil (<5 ft)	SLAPS	Boron	13/14	mg/kg	4.45	4.45	2.3	15.1	8.88	N	10.4	10.4	u	9.9	3/14	4.9E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	SLAPS	Cadmium	12/52	mg/kg	0.14	0.55	0.52	50.4	1.83	D	3.45	3.45	u	0.62	11/52	3.7E+00	Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Calcium	14/14	mg/kg			2230	29500	6860	X	10100	10100	u	28900	1/14		N		Essential Nutrient (low conc.)
Surface Soil (<5 ft)	SLAPS	Chromium	15/15	mg/kg			15.1	3240	236	X	614	614	u	17.3	12/15	3.0E+01	Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Cobalt	32/32	mg/kg			4.7	6050	436	X	804	804	u	31.7	20/32	3.3E+02	Y	Qual.	
Surface Soil (<5 ft)	SLAPS	Copper	23/23	mg/kg			13.1	4400	432	X	807	807	u	19.4	15/23	2.8E+02	Y	Qual.	
Surface Soil (<5 ft)	SLAPS	Cyanide	1/6	mg/kg	0.3	0.3225	0.772	0.772	0.387	D	0.542	0.542	u		NA	1.1E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	SLAPS	Iron	14/14	mg/kg			16100	26800	20900	L	22400	22400	u	26600	1/14	2.2E+03	N		Essential Nutrient (low conc.)
Surface Soil (<5 ft)	SLAPS	Lead	19/19	mg/kg			8.6	1200	202	X	342	342	u	79.7	6/19	4.0E+01	Y	Qual.	
Surface Soil (<5 ft)	SLAPS	Lithium	14/14	mg/kg			6	14.6	9.4	L	10.5	10.5	u	8.1	11/14	1.5E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	SLAPS	Magnesium	27/27	mg/kg			2010	26900	8240	L	11000	11000	u	18400	2/27		N		Essential Nutrient (low conc.)
Surface Soil (<5 ft)	SLAPS	Manganese	14/14	mg/kg			172	1330	662	N	786	786	u	2830	0/14	3.1E+02	N		Below Background
Surface Soil (<5 ft)	SLAPS	Mercury	1/14	mg/kg	0.03	0.035	0.07	0.07	0.0332	D	0.0383	0.0383	u	0.69	0/14	2.2E+00	N		Below Background
Surface Soil (<5 ft)	SLAPS	Molybdenum	19/52	mg/kg	0.415	11.25	1.2	255	24.7	D	35.8	35.8	u	22.7	10/52	3.7E+01	Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Nickel	17/17	mg/kg			19	7570	860	X	1740	1740	u	33.9	7/17	1.5E+02	Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Potassium	14/14	mg/kg			827	2820	1380	L	1660	1660	u	1140	9/14		N		Essential Nutrient (low conc.)
Surface Soil (<5 ft)	SLAPS	Selenium	10/52	mg/kg	0.15	11.35	0.38	183	13.5	D	19.9	19.9	u	0.55	8/52	3.7E+01	Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Silver	1/14	mg/kg	0.315	0.41	0.81	0.81	0.396	D	0.454	0.454	u	2.6	0/14	3.7E+01	N		Below Background
Surface Soil (<5 ft)	SLAPS	Sodium	14/14	mg/kg			69.5	382	168	L	218	218	u	235	2/14		N		Essential Nutrient (low conc.)
Surface Soil (<5 ft)	SLAPS	Strontium	14/14	mg/kg			14.8	243	55.6	X	90.4	90.4	u	26	6/14	4.5E+03	N		Max. detect < PRG
Surface Soil (<5 ft)	SLAPS	Thallium	8/52	mg/kg	0.6	11.35	1	3.3	7.78	D	8.72	3.3	m	0	8/52	6.0E-01	Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Titanium	14/14	mg/kg			99.1	416	248	N	285	285	u	269	4/14		Y	Qual.	
Surface Soil (<5 ft)	SLAPS	Uranium	6/14	mg/kg	4.95	8.35	11.1	129	25	D	41.9	41.9	u	0	6/14		Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Vanadium	17/17	mg/kg			27.4	862	168	X	288	288	u	31	13/17	5.2E+01	Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Zinc	15/15	mg/kg			41.4	4330	343	X	844	844	u	278	1/15	2.2E+03	Y	Quant.	
Surface Soil (<5 ft)	SLAPS	TOX	1/2	UG/G	30.35	30.35	56.9	56.9	43.6	D	127	56.9	m		NA		Y	Qual.	
Surface Soil (<5 ft)	SLAPS	MCPP	2/11	mg/kg	4.5	10.5	11	30	8.74	D	12.8	12.8	u	0	2/11	5.5E+00	Y	Quant.	
Surface Soil (<5 ft)	SLAPS	PCB-1254	1/11	mg/kg	0.0185	0.1	0.26	0.26	0.0493	D	0.0896	0.0896	u	0	1/11	9.7E-02	Y	Quant.	

Attachment 6. Determination of Surface[f] Soil Potential Chemicals of Concern by Aggregate (Page 14 of 14)
(only detected analytes are shown)

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Surface Soil (<5 ft)	SLAPS	Benz(a)anthracene	3/11	mg/kg	0.19	0.225	0.09	0.19	0.192	D	0.212	0.19	m	0.3	0/11	5.6E-01	N		Below Background
Surface Soil (<5 ft)	SLAPS	Benzo(a)pyrene	2/11	mg/kg	0.19	0.225	0.077	0.18	0.193	D	0.215	0.18	m	0.34	0/11	5.6E-02	N		Below Background
Surface Soil (<5 ft)	SLAPS	Benzo(b)fluoranthene	2/11	mg/kg	0.185	0.225	0.083	0.36	0.208	D	0.243	0.243	u	0.31	1/11	5.6E-01	N		Max. detect < PRG
Surface Soil (<5 ft)	SLAPS	Benzo(ghi)perylene	1/11	mg/kg	0.19	0.225	0.19	0.19	0.205	D	0.21	0.19	m	0.39	0/11		N		Below Background
Surface Soil (<5 ft)	SLAPS	Benzo(k)fluoranthene	1/11	mg/kg	0.19	0.225	0.066	0.066	0.193	D	0.217	0.066	m	0.29	0/11	5.6E+00	N		Below Background
Surface Soil (<5 ft)	SLAPS	Bis(2-ethylhexyl)phthalate	1/11	mg/kg	0.185	0.295	0.21	0.21	0.212	D	0.228	0.21	m	0.18	1/11	3.2E+01	N		Max. detect < PRG
Surface Soil (<5 ft)	SLAPS	Butyl benzyl phthalate	2/11	mg/kg	0.185	0.225	0.1	0.31	0.205	D	0.231	0.231	u	0.25	1/11	9.3E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	SLAPS	Chrysene	2/11	mg/kg	0.19	0.225	0.14	0.21	0.2	D	0.212	0.21	m	0.57	0/11	5.6E+01	N		Below Background
Surface Soil (<5 ft)	SLAPS	Di-n-octylphthalate	1/11	mg/kg	0.185	0.225	0.13	0.13	0.197	D	0.21	0.13	m	0	1/11	1.1E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	SLAPS	Fluoranthene	4/11	mg/kg	0.19	0.225	0.079	0.31	0.2	D	0.235	0.235	u	0.7	0/11	2.0E+02	N		Below Background
Surface Soil (<5 ft)	SLAPS	Indeno(1,2,3-cd)pyrene	2/11	mg/kg	0.19	0.225	0.089	0.18	0.194	D	0.214	0.18	m	0.35	0/11	5.6E-01	N		Below Background
Surface Soil (<5 ft)	SLAPS	Phenanthrene	3/11	mg/kg	0.19	0.225	0.042	0.19	0.179	D	0.211	0.19	m	0.28	0/11		N		Below Background
Surface Soil (<5 ft)	SLAPS	Pyrene	4/11	mg/kg	0.19	0.225	0.046	0.31	0.215	D	0.253	0.253	u	0.66	0/11	1.5E+02	N		Below Background
Surface Soil (<5 ft)	SLAPS	1,2-Dichloroethane	1/11	mg/kg	0.0025	0.003	0.001	0.001	0.00277	D	0.0031	0.001	m	0.009	0/11	3.4E-01	N		Below Background
Surface Soil (<5 ft)	SLAPS	1,2-Dichloroethene	1/11	mg/kg	0.0025	0.003	0.003	0.003	0.00291	D	0.00302	0.003	m	0	1/11		Y	Quant.	
Surface Soil (<5 ft)	SLAPS	2-Butanone	1/11	mg/kg	0.005	0.0065	0.001	0.001	0.00541	D	0.00625	0.001	m	0.023	0/11	6.9E+02	N		Below Background
Surface Soil (<5 ft)	SLAPS	Acetone	2/10	mg/kg	0.006	0.017	0.005	0.009	0.00985	D	0.0125	0.009	m	0.017	0/10	1.4E+02	N		Below Background
Surface Soil (<5 ft)	SLAPS	Dimethylbenzene	1/11	mg/kg	0.0025	0.003	0.01	0.01	0.00355	D	0.00472	0.00472	u	0	1/11		Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Methylene chloride	1/11	mg/kg	0.0025	0.0075	0.13	0.13	0.0155	D	0.0363	0.0363	u	0.007	1/11	8.5E+00	N		Max. detect < PRG
Surface Soil (<5 ft)	SLAPS	Toluene	19/30	mg/kg	0.0025	0.003	0.0015	0.9	0.0483	X	0.1	0.1	u	0.11	3/30	5.2E+02	N		Max. detect < PRG
Surface Soil (<5 ft)	SLAPS	Trichloroethene	1/11	mg/kg	0.0025	0.003	0.005	0.005	0.00309	D	0.00345	0.00345	u	0	1/11	2.7E+00	N		Max. detect < PRG
Surface Soil (<5 ft)	SLAPS	Actinium-227	72/98	pCi/g	-0.13	2.6	0.18	695.7	18.3	Z	32.6	32.6	u	0.82	31/98		Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Americium-241	11/97	pCi/g	-5.04	0.37	0.06	2.58	0.0381	D	0.161	0.161	u	0	11/97		Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Cesium-137	30/97	pCi/g	-0.04	0.35	0.03	3.09	0.0926	D	0.159	0.159	u	0.57	2/97		Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Potassium-40	94/97	pCi/g	5.21	11.07	5.69	17.74	14	X	14.4	14.4	u	16.8	6/97		Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Protactinium-231	37/98	pCi/g	-0.18	5.2	0.9	685.8	19.5	D	34.1	34.1	u	1.13	36/98		Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Radium-226	323/456	pCi/g	1	5	0.6	2700	42.6	X	58.8	58.8	u	1.55	206/456		Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Radium-228	96/97	pCi/g	0.95	0.95	0.33	7.54	1.18	X	1.35	1.35	u	1.24	12/97		Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Thorium-228	96/97	pCi/g	1.04	1.04	0.34	7.54	1.42	X	1.59	1.59	u	2.04	5/97		Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Thorium-230	278/279	pCi/g	0.05	0.05	0	37780	530	Z	823	823	u	2.89	227/279		Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Thorium-232	264/454	pCi/g	0.5	25.2	0.4	63	2.7	X	2.98	2.98	u	1.83	78/454		Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Uranium-235	62/97	pCi/g	-0.04	0.24	0.2	54.18	2.84	Z	4.22	4.22	u	0.25	54/97		Y	Quant.	
Surface Soil (<5 ft)	SLAPS	Uranium-238	104/455	pCi/g	0.33	462	3.04	1200	41.9	D	49.6	49.6	u	2.02	104/455		Y	Quant.	

UCL95 = 95% upper confidence limit on the mean concentration

PRG = Preliminary Remediation Goal

PCOC = Potential Contaminant of Concern

[a] Distribution flags:

D = Not determined because fewer than 5 detects or < 50% detects; t-statistic used in calculations of UCL_{95}.

L = Lognormal; H-statistic used in calculations of UCL_{95}.

N = Normal; t-statistic used in calculations of UCL_{95}.

X = Neither normal nor lognormal; t-statistic used in calculations of UCL_{95}.

Z = Contains concentrations that are negative and/or zero; t-statistic used in calculations of UCL_{95}.

[b] Basis for determining the exposure concentration:

m = maximum detected concentration.

u = 95% upper confidence limit on the mean concentration.

[c] EPA Region IX residential soil PRG, based on a risk level of 10^{-6} or a hazard level of 0.1 (note that Region IX noncarcinogenic PRGs are provided for a hazard level of 1.0; these values have been adjusted to a hazard level of 0.1 for this screening).

[d] Based on the lack of available toxicity information, some PCOCs were evaluated qualitatively;

Qual. = Qualitative

Quant. = Quantitative.

[e] Justification for eliminating the analyte from the PCOC list.

[f] "Surface soil" is generally considered to be the top 0.5 ft but may be defined differently at some properties. For example, it is known that approximately the top 5 ft of SLAPS was regraded after much of the historical data were collected. The assessment therefore assumes that any result reported within the top 5 ft of soil should be considered as surface soil. At other properties the data are too limited to break into surface and subsurface intervals. In these cases data are aggregated and used in both surface and subsurface risk calculations.

Attachment 7. Determination of Subsurface Soil Potential Chemicals of Concern by Aggregate (Page 1 of 13)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Indust. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
09K220205/VP-54	Aluminum	10/10	mg/kg			4260	7880	5530	L	6180	6180	u	14700	0/10	1.0E+05	N		Below Background
09K220205/VP-54	Arsenic	10/10	mg/kg			0.84	11.9	5.85	N	7.75	7.75	u	18	0/10	3.0E+00	N		Below Background
09K220205/VP-54	Barium	10/10	mg/kg			40.7	279	143	N	183	183	u	279	0/10	1.0E+05	N		Below Background
09K220205/VP-54	Beryllium	10/10	mg/kg			0.41	0.56	0.489	L	0.524	0.524	u	0.83	0/10	3.4E+02	N		Below Background
09K220205/VP-54	Calcium	10/10	mg/kg			2320	15500	5190	X	7590	7590	u	28900	0/10		N		Below Background
09K220205/VP-54	Chromium	10/10	mg/kg			10	12	10.7	N	11.1	11.1	u	17.3	0/10	6.4E+01	N		Below Background
09K220205/VP-54	Cobalt	10/10	mg/kg			5.5	9.6	7.41	L	8.39	8.39	u	31.7	0/10	2.9E+03	N		Below Background
09K220205/VP-54	Copper	10/10	mg/kg			9.6	16.4	13.4	N	14.5	14.5	u	19.4	0/10	7.0E+03	N		Below Background
09K220205/VP-54	Iron	10/10	mg/kg			7270	28200	12800	L	16900	16900	u	26600	1/10	1.0E+05	N		Essential Nutrient (low conc.)
09K220205/VP-54	Lead	10/10	mg/kg			7.3	30.9	12.8	L	17.2	17.2	u	79.7	0/10	1.0E+02	N		Below Background
09K220205/VP-54	Magnesium	10/10	mg/kg			1610	9940	3550	X	5020	5020	u	18400	0/10		N		Below Background
09K220205/VP-54	Manganese	10/10	mg/kg			68.3	4690	1250	L	5960	4690	m	2830	2/10	4.5E+03	Y	Quant.	
09K220205/VP-54	Molybdenum	10/10	mg/kg			6.3	22.7	10.5	L	13.5	13.5	u	22.7	0/10	9.4E+02	N		Below Background
09K220205/VP-54	Nickel	10/10	mg/kg			10.1	23.4	14.6	L	17.7	17.7	u	33.9	0/10	3.7E+03	N		Below Background
09K220205/VP-54	Potassium	10/10	mg/kg			436	827	634	N	711	711	u	1140	0/10		N		Below Background
09K220205/VP-54	Silver	1/10	mg/kg	1.25	1.3	2.6	2.6	1.39	D	1.64	1.64	u	2.6	0/10	9.4E+02	N		Below Background
09K220205/VP-54	Sodium	10/10	mg/kg			51.8	78	66.5	N	71.8	71.8	u	235	0/10		N		Below Background
09K220205/VP-54	Vanadium	10/10	mg/kg			9.5	16.3	12.7	L	13.8	13.8	u	31	0/10	1.3E+03	N		Below Background
09K220205/VP-54	Zinc	10/10	mg/kg			30.6	52.8	40.6	L	44.8	44.8	u	278	0/10	1.0E+05	N		Below Background
09K220205/VP-54	Anthracene	1/10	mg/kg	0.205	0.22	0.031	0.031	0.194	D	0.227	0.031	m	0.031	0/10	2.2E+04	N		Below Background
09K220205/VP-54	Benz(a)anthracene	1/10	mg/kg	0.205	0.22	0.17	0.17	0.208	D	0.216	0.17	m	0.3	0/10	3.6E+00	N		Below Background
09K220205/VP-54	Benzo(a)pyrene	1/10	mg/kg	0.205	0.22	0.15	0.15	0.206	D	0.217	0.15	m	0.34	0/10	3.6E-01	N		Below Background
09K220205/VP-54	Benzo(b)fluoranthene	1/10	mg/kg	0.205	0.22	0.21	0.21	0.212	D	0.214	0.21	m	0.31	0/10	3.6E+00	N		Below Background
09K220205/VP-54	Benzo(ghi)perylene	1/10	mg/kg	0.205	0.22	0.084	0.084	0.199	D	0.222	0.084	m	0.39	0/10		N		Below Background
09K220205/VP-54	Benzo(k)fluoranthene	1/10	mg/kg	0.205	0.22	0.18	0.18	0.209	D	0.215	0.18	m	0.29	0/10	3.6E+01	N		Below Background
09K220205/VP-54	Chrysene	1/10	mg/kg	0.205	0.22	0.19	0.19	0.21	D	0.214	0.19	m	0.57	0/10	3.6E+02	N		Below Background
09K220205/VP-54	Dibenz(a,h)anthracene	1/10	mg/kg	0.205	0.22	0.035	0.035	0.194	D	0.227	0.035	m	0.035	0/10	3.6E-01	N		Below Background
09K220205/VP-54	Fluoranthene	1/10	mg/kg	0.205	0.22	0.41	0.41	0.232	D	0.268	0.268	u	0.7	0/10	3.7E+03	N		Below Background
09K220205/VP-54	Indeno(1,2,3-cd)pyrene	1/10	mg/kg	0.205	0.22	0.13	0.13	0.204	D	0.219	0.13	m	0.35	0/10	3.6E+00	N		Below Background
09K220205/VP-54	Phenanthrene	1/10	mg/kg	0.205	0.22	0.18	0.18	0.209	D	0.215	0.18	m	0.28	0/10		N		Below Background
09K220205/VP-54	Pyrene	1/10	mg/kg	0.205	0.22	0.34	0.34	0.225	D	0.248	0.248	u	0.66	0/10	2.6E+03	N		Below Background
09K220205/VP-54	Acetone	1/10	mg/kg	0.0065	0.0065	0.017	0.017	0.00755	D	0.00947	0.00947	u	0.017	0/10	6.1E+02	N		Below Background
09K220205/VP-54	Toluene	7/9	mg/kg	0.003	0.0065	0.002	0.11	0.0248	L	0.192	0.11	m	0.11	0/9	5.2E+02	N		Below Background
IA-1	Aluminum	1/1	mg/kg			8020	8020	8020	D		8020	m	14700	0/1	1.0E+05	N		Below Background
IA-1	Arsenic	1/1	mg/kg			3.9	3.9	3.9	D		3.9	m	18	0/1	3.0E+00	N		Below Background
IA-1	Barium	1/1	mg/kg			89.2	89.2	89.2	D		89.2	m	279	0/1	1.0E+05	N		Below Background
IA-1	Beryllium	1/1	mg/kg			0.55	0.55	0.55	D		0.55	m	0.83	0/1	3.4E+02	N		Below Background
IA-1	Boron	1/1	mg/kg			6.6	6.6	6.6	D		6.6	m	9.9	0/1	9.6E+03	N		Below Background
IA-1	Calcium	1/1	mg/kg			26400	26400	26400	D		26400	m	28900	0/1		N		Below Background
IA-1	Chromium	1/1	mg/kg			13.9	13.9	13.9	D		13.9	m	17.3	0/1	6.4E+01	N		Below Background
IA-1	Cobalt	1/1	mg/kg			5.3	5.3	5.3	D		5.3	m	31.7	0/1	2.9E+03	N		Below Background
IA-1	Copper	1/1	mg/kg			9.7	9.7	9.7	D		9.7	m	19.4	0/1	7.0E+03	N		Below Background
IA-1	Iron	1/1	mg/kg			15300	15300	15300	D		15300	m	26600	0/1	1.0E+05	N		Below Background
IA-1	Lead	1/1	mg/kg			8.4	8.4	8.4	D		8.4	m	79.7	0/1	1.0E+02	N		Below Background
IA-1	Lithium	1/1	mg/kg			5.4	5.4	5.4	D		5.4	m	8.1	0/1	3.7E+03	N		Below Background
IA-1	Magnesium	4/4	mg/kg			6110	15400	11000	D	15600	15400	m	18400	0/4		N		Below Background
IA-1	Manganese	1/1	mg/kg			601	601	601	D		601	m	2830	0/1	4.5E+03	N		Below Background
IA-1	Molybdenum	2/8	mg/kg	8.6	11.6	1.3	17.7	9.82	D	12.8	12.8	u	22.7	0/8	9.4E+02	N		Below Background
IA-1	Nickel	1/1	mg/kg			13.4	13.4	13.4	D		13.4	m	33.9	0/1	3.7E+03	N		Below Background

Attachment 7. Determination of Subsurface Soil Potential Chemicals of Concern by Aggregate (Page 2 of 13)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Indust. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
IA-1	Potassium	1/1	mg/kg			691	691	691	D		691	m	1140	0/1		N		Below Background
IA-1	Sodium	1/1	mg/kg			286	286	286	D		286	m	235	1/1		N		Essential Nutrient (low conc.)
IA-1	Strontium	1/1	mg/kg			24.2	24.2	24.2	D		24.2	m	26	0/1	1.0E+05	N		Below Background
IA-1	Titanium	1/1	mg/kg			239	239	239	D		239	m	269	0/1		N		Below Background
IA-1	Vanadium	1/1	mg/kg			19.1	19.1	19.1	D		19.1	m	31	0/1	1.3E+03	N		Below Background
IA-1	Zinc	1/1	mg/kg			48.3	48.3	48.3	D		48.3	m	278	0/1	1.0E+05	N		Below Background
IA-1	Toluene	2/3	mg/kg	0.003	0.003	0.003	0.0031	0.00303	D	0.00313	0.0031	m	0.11	0/3	5.2E+02	N		Below Background
IA-1	Trichloroethene	1/2	mg/kg	0.003	0.003	0.0066	0.0066	0.0048	D	0.0162	0.0066	m	0	1/2	6.1E+00	N		Max. detect < PRG
IA-1	trans-1,2-Dichloroethene	1/1	mg/kg			0.003	0.003	0.003	D		0.003	m		NA	2.1E+01	N		Max. detect < PRG
IA-1	Actinium-227	5/14	pCi/g	0.02	2.6	0.2	0.8	0.473	D	0.785	0.785	u	0.82	0/14		N		Below Background
IA-1	Potassium-40	11/11	pCi/g			12.38	16.76	14.8	L	15.7	15.7	u	16.8	0/11		N		Below Background
IA-1	Radium-226	26/35	pCi/g	1.6	3.9	0.8	2700	82	X	212	212	u	1.55	7/35		Y	Quant.	
IA-1	Radium-228	11/11	pCi/g			0.64	1.01	0.857	N	0.921	0.921	u	1.24	0/11		N		Below Background
IA-1	Thorium-228	11/11	pCi/g			0.7	1.63	1.21	L	1.42	1.42	u	2.04	0/11		N		Below Background
IA-1	Thorium-230	20/20	pCi/g			0	120	14.2	Z	27.7	27.7	u	2.89	6/20		Y	Quant.	
IA-1	Thorium-232	22/35	pCi/g	1	4.3	0.45	63	3.51	X	6.48	6.48	u	1.83	3/35		Y	Quant.	
IA-1	Uranium-235	2/11	pCi/g	0	0.16	0.22	0.25	0.112	D	0.155	0.155	u	0.25	0/11		N		Below Background
IA-1	Uranium-238	8/35	pCi/g	0.79	78.4	4.68	1200	52.9	D	110	110	u	2.02	8/35		Y	Quant.	
IA-10	Aluminum	4/4	mg/kg			6630	8720	7570	D	8580	8580	u	14700	0/4	1.0E+05	N		Below Background
IA-10	Antimony	1/14	mg/kg	1.7	7.5	195	195	18.7	D	42.7	42.7	u	5.2	1/14	7.5E+01	Y	Quant.	
IA-10	Arsenic	5/5	mg/kg			4.9	668	138	X	421	421	u	18	1/5	3.0E+00	Y	Quant.	
IA-10	Barium	4/4	mg/kg			136	156	146	D	157	156	m	279	0/4	1.0E+05	N		Below Background
IA-10	Boron	4/5	mg/kg	3.5	3.5	5.1	761	156	D	479	479	u	9.9	1/5	9.6E+03	N		Max. detect < PRG
IA-10	Cadmium	3/14	mg/kg	0.145	0.65	1.1	17.6	1.73	D	3.9	3.9	u	0.62	3/14	9.3E+01	N		Max. detect < PRG
IA-10	Calcium	4/4	mg/kg			2850	7120	4040	D	6460	6460	u	28900	0/4		N		Below Background
IA-10	Chromium	4/4	mg/kg			10.7	12.7	11.7	D	12.8	12.7	m	17.3	0/4	6.4E+01	N		Below Background
IA-10	Cobalt	5/5	mg/kg			4.8	185	41.5	X	118	118	u	31.7	1/5	2.9E+03	N		Max. detect < PRG
IA-10	Copper	4/4	mg/kg			11	12.5	12	D	12.9	12.5	m	19.4	0/4	7.0E+03	N		Below Background
IA-10	Iron	4/4	mg/kg			11600	13700	12700	D	13900	13700	m	26600	0/4	1.0E+05	N		Below Background
IA-10	Lead	4/4	mg/kg			13	21.8	17.4	D	21.7	21.7	u	79.7	0/4	1.0E+02	N		Below Background
IA-10	Lithium	3/4	mg/kg	2.6	2.6	4.1	4.5	3.83	D	4.81	4.5	m	8.1	0/4	3.7E+03	N		Below Background
IA-10	Magnesium	5/5	mg/kg			1850	7650	3470	L	9370	7650	m	18400	0/5		N		Below Background
IA-10	Manganese	4/4	mg/kg			474	843	576	D	786	786	u	2830	0/4	4.5E+03	N		Below Background
IA-10	Molybdenum	2/14	mg/kg	0.45	12.5	1.2	754	61.1	D	155	155	u	22.7	1/14	9.4E+02	N		Max. detect < PRG
IA-10	Nickel	4/4	mg/kg			11.3	16.1	13.3	D	15.7	15.7	u	33.9	0/4	3.7E+03	N		Below Background
IA-10	Potassium	4/4	mg/kg			696	971	846	D	981	971	m	1140	0/4		N		Below Background
IA-10	Selenium	2/14	mg/kg	0.15	12.5	29.9	704	58.7	D	147	147	u	0.55	2/14	9.4E+02	N		Max. detect < PRG
IA-10	Silver	1/5	mg/kg	0.35	0.38	13.9	13.9	3.08	D	8.84	8.84	u	2.6	1/5	9.4E+02	N		Max. detect < PRG
IA-10	Sodium	4/4	mg/kg			61.7	494	179	D	427	427	u	235	1/4		N		Essential Nutrient (low conc.)
IA-10	Strontium	4/4	mg/kg			13	15.9	14.8	D	16.2	15.9	m	26	0/4	1.0E+05	N		Below Background
IA-10	Thallium	2/14	mg/kg	0.375	12.5	1.3	726	59.1	D	150	150	u	0	2/14	1.5E+01	Y	Quant.	
IA-10	Titanium	4/4	mg/kg			208	243	229	D	248	243	m	269	0/4		N		Below Background
IA-10	Vanadium	4/4	mg/kg			18.2	20.8	19.7	D	21	20.8	m	31	0/4	1.3E+03	N		Below Background
IA-10	Zinc	4/4	mg/kg			40.8	53.1	47.5	D	53.7	53.1	m	278	0/4	1.0E+05	N		Below Background
IA-10	Benzo(a)pyrene	1/4	mg/kg	0.19	0.205	0.11	0.11	0.178	D	0.231	0.11	m	0.34	0/4	3.6E-01	N		Below Background
IA-10	Benzo(b)fluoranthene	1/4	mg/kg	0.19	0.205	0.24	0.24	0.21	D	0.235	0.235	u	0.31	0/4	3.6E+00	N		Below Background
IA-10	Benzo(ghi)perylene	1/4	mg/kg	0.19	0.205	0.18	0.18	0.195	D	0.209	0.18	m	0.39	0/4		N		Below Background
IA-10	Chrysene	1/4	mg/kg	0.19	0.205	0.15	0.15	0.188	D	0.218	0.15	m	0.57	0/4	3.6E+02	N		Below Background
IA-10	Fluoranthene	2/4	mg/kg	0.205	0.205	0.1	0.2	0.178	D	0.238	0.2	m	0.7	0/4	3.7E+03	N		Below Background

Attachment 7. Determination of Subsurface Soil Potential Chemicals of Concern by Aggregate (Page 3 of 13)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Indust. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
IA-10	Indeno(1,2,3-cd)pyrene	1/4	mg/kg	0.19	0.205	0.33	0.33	0.233	D	0.309	0.309	u	0.35	0/4	3.6E+00	N		Below Background
IA-10	Pyrene	1/4	mg/kg	0.19	0.205	0.3	0.3	0.225	D	0.284	0.284	u	0.66	0/4	2.6E+03	N		Below Background
IA-10	2-Butanone	1/4	mg/kg	0.0115	0.0125	0.013	0.013	0.0124	D	0.0131	0.013	m	0.023	0/4	2.7E+03	N		Below Background
IA-10	Toluene	7/10	mg/kg	0.003	0.003	0.002	0.048	0.0132	L	0.0521	0.048	m	0.11	0/10	5.2E+02	N		Below Background
IA-10	Radium-226	44/58	pCi/g	0	3	0.6	44	2.64	Z	4.36	4.36	u	1.55	17/58		Y	Quant.	
IA-10	Thorium-230	60/63	pCi/g	0	1	0.4	46	6.04	Z	7.83	7.83	u	2.89	42/63		Y	Quant.	
IA-10	Thorium-232	43/58	pCi/g	0	4.2	0.7	4	1.78	Z	2.04	2.04	u	1.83	27/58		Y	Quant.	
IA-10	Uranium-238	2/58	pCi/g	0	57	43.9	45	8.23	D	10.9	10.9	u	2.02	2/58		N		<5% detected
IA-2	Fluoride	1/1	mg/kg			32.4	32.4	32.4	D		32.4	m		NA	6.4E+03	N		Max. detect < PRG
IA-2	Aluminum	5/5	mg/kg			7180	17200	10100	L	16100	16100	u	14700	1/5	1.0E+05	N		Max. detect < PRG
IA-2	Arsenic	7/7	mg/kg			3.3	237	68.2	X	145	145	u	18	2/7	3.0E+00	Y	Quant.	
IA-2	Barium	5/5	mg/kg			76.1	218	131	L	219	218	m	279	0/5	1.0E+05	N		Below Background
IA-2	Beryllium	3/5	mg/kg	0.295	0.39	0.67	0.88	0.609	D	0.854	0.854	u	0.83	1/5	3.4E+02	N		Max. detect < PRG
IA-2	Boron	5/5	mg/kg			5.8	11.6	7.72	L	10.9	10.9	u	9.9	1/5	9.6E+03	N		Max. detect < PRG
IA-2	Cadmium	6/26	mg/kg	0.155	0.6	0.32	5.9	0.879	D	1.31	1.31	u	0.62	4/26	9.3E+01	N		Max. detect < PRG
IA-2	Calcium	5/5	mg/kg			4250	52900	17900	L	443000	52900	m	28900	1/5		N		Essential Nutrient (low conc.)
IA-2	Chromium	5/5	mg/kg			11.2	21.6	16	L	21.3	21.3	u	17.3	1/5	6.4E+01	N		Max. detect < PRG
IA-2	Cobalt	9/9	mg/kg			3.7	228	67.5	L	2810	228	m	31.7	4/9	2.9E+03	N		Max. detect < PRG
IA-2	Copper	8/8	mg/kg			10.7	440	124	X	235	235	u	19.4	3/8	7.0E+03	N		Max. detect < PRG
IA-2	Iron	5/5	mg/kg			11700	22400	17000	N	21700	21700	u	26600	0/5	1.0E+05	N		Below Background
IA-2	Lead	5/5	mg/kg			7.4	12.4	9.98	L	13.4	12.4	m	79.7	0/5	1.0E+02	N		Below Background
IA-2	Lithium	3/5	mg/kg	4	4.25	7.6	11.1	6.97	D	9.77	9.77	u	8.1	1/5	3.7E+03	N		Max. detect < PRG
IA-2	Magnesium	10/10	mg/kg			3510	24900	10600	L	17300	17300	u	18400	1/10		N		Essential Nutrient (low conc.)
IA-2	Manganese	5/5	mg/kg			165	772	459	L	1630	772	m	2830	0/5	4.5E+03	N		Below Background
IA-2	Molybdenum	6/26	mg/kg	0.465	12.05	1.2	151	19.2	D	30.8	30.8	u	22.7	3/26	9.4E+02	N		Max. detect < PRG
IA-2	Nickel	5/5	mg/kg			13.2	20	16.6	L	19.8	19.8	u	33.9	0/5	3.7E+03	N		Below Background
IA-2	Potassium	5/5	mg/kg			680	1710	1070	L	1730	1710	m	1140	1/5		N		Essential Nutrient (low conc.)
IA-2	Selenium	1/26	mg/kg	0.165	12.05	2.1	2.1	8.57	D	9.94	2.1	m	0.55	1/26	9.4E+02	N		Max. detect < PRG
IA-2	Sodium	5/5	mg/kg			114	285	196	L	362	285	m	235	2/5		N		Essential Nutrient (low conc.)
IA-2	Strontium	5/5	mg/kg			15.2	46.9	25.7	L	47.9	46.9	m	26	1/5	1.0E+05	N		Max. detect < PRG
IA-2	Titanium	5/5	mg/kg			238	312	273	L	313	312	m	269	2/5		Y	Qual.	
IA-2	Uranium	2/5	mg/kg	7.65	7.9	18	155	39.3	D	101	101	u	0	2/5		Y	Quant.	
IA-2	Vanadium	7/7	mg/kg			22	862	257	X	541	541	u	31	5/7	1.3E+03	N		Max. detect < PRG
IA-2	Zinc	5/5	mg/kg			38.6	60.3	48.7	L	59.6	59.6	u	278	0/5	1.0E+05	N		Below Background
IA-2	Toxaphene	1/5	mg/kg	0.042	0.11	0.05	0.05	0.0709	D	0.105	0.05	m	0	1/5	2.7E+00	N		Max. detect < PRG
IA-2	Benz(a)anthracene	1/5	mg/kg	0.205	0.215	0.1	0.1	0.188	D	0.235	0.1	m	0.3	0/5	3.6E+00	N		Below Background
IA-2	Benzo(a)pyrene	1/5	mg/kg	0.205	0.215	0.1	0.1	0.188	D	0.235	0.1	m	0.34	0/5	3.6E-01	N		Below Background
IA-2	Butyl benzyl phthalate	3/5	mg/kg	0.21	0.215	0.11	0.26	0.211	D	0.269	0.26	m	0.25	2/5	9.3E+02	N		Max. detect < PRG
IA-2	Chrysene	1/5	mg/kg	0.205	0.215	0.051	0.051	0.178	D	0.246	0.051	m	0.57	0/5	3.6E+02	N		Below Background
IA-2	Fluoranthene	1/5	mg/kg	0.205	0.215	0.12	0.12	0.192	D	0.231	0.12	m	0.7	0/5	3.7E+03	N		Below Background
IA-2	Indeno(1,2,3-cd)pyrene	1/5	mg/kg	0.205	0.215	0.091	0.091	0.186	D	0.237	0.091	m	0.35	0/5	3.6E+00	N		Below Background
IA-2	Phenanthrene	1/5	mg/kg	0.205	0.215	0.087	0.087	0.185	D	0.238	0.087	m	0.28	0/5		N		Below Background
IA-2	Pyrene	1/5	mg/kg	0.205	0.215	0.079	0.079	0.184	D	0.24	0.079	m	0.66	0/5	2.6E+03	N		Below Background
IA-2	1,2-Dichloroethene	1/5	mg/kg	0.003	0.003	0.022	0.022	0.0068	D	0.0149	0.0149	u	0	1/5		Y	Quant.	
IA-2	2-Butanone	1/5	mg/kg	0.006	0.0125	0.013	0.013	0.0089	D	0.0123	0.0123	u	0.023	0/5	2.7E+03	N		Below Background
IA-2	Toluene	9/12	mg/kg	0.003	0.003	0.0022	0.21	0.0225	X	0.0531	0.0531	u	0.11	1/12	5.2E+02	N		Max. detect < PRG
IA-2	Trichloroethene	2/6	mg/kg	0.003	0.003	0.0018	0.058	0.012	D	0.0305	0.0305	u	0	2/6	6.1E+00	N		Max. detect < PRG
IA-2	trans-1,2-Dichloroethene	1/1	mg/kg			0.0019	0.0019	0.0019	D		0.0019	m		NA	2.1E+01	N		Max. detect < PRG
IA-2	Actinium-227	44/57	pCi/g	0.04	0.25	0.18	130.4	3.27	X	7.14	7.14	u	0.82	11/57		Y	Quant.	

Attachment 7. Determination of Subsurface Soil Potential Chemicals of Concern by Aggregate (Page 4 of 13)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Indust. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
IA-2	Americium-241	4/57	pCi/g	-0.03	0.13	0.06	2.58	0.0921	D	0.17	0.17	u	0	4/57		Y	Quant.	
IA-2	Cesium-137	5/57	pCi/g	-0.02	0.08	0.07	3.09	0.0621	D	0.153	0.153	u	0.57	1/57		Y	Quant.	
IA-2	Potassium-40	56/57	pCi/g	8.43	8.43	9.82	25.2	15.7	X	16.4	16.4	u	16.8	14/57		Y	Quant.	
IA-2	Protactinium-231	5/57	pCi/g	-0.48	1.06	2.33	179.3	3.99	D	9.28	9.28	u	1.13	5/57		Y	Quant.	
IA-2	Radium-226	93/130	pCi/g	0.3	5	0.5	590	17.2	X	28.4	28.4	u	1.55	31/130		Y	Quant.	
IA-2	Radium-228	57/57	pCi/g			0.67	4.82	1.02	X	1.14	1.14	u	1.24	5/57		Y	Quant.	
IA-2	Thorium-228	57/57	pCi/g			0.74	4.82	1.43	X	1.58	1.58	u	2.04	5/57		Y	Quant.	
IA-2	Thorium-230	90/91	pCi/g	0	0	0	14070	198	Z	456	456	u	2.89	41/91		Y	Quant.	
IA-2	Thorium-232	78/130	pCi/g	0.4	7.6	0.6	4.82	2.16	X	2.35	2.35	u	1.83	11/130		Y	Quant.	
IA-2	Uranium-235	24/57	pCi/g	-0.04	0.25	0.19	37.21	1.16	D	2.28	2.28	u	0.25	20/57		Y	Quant.	
IA-2	Uranium-238	26/128	pCi/g	0.33	260	3.99	706	36.6	D	49.9	49.9	u	2.02	26/128		Y	Quant.	
IA-3	Aluminum	7/7	mg/kg			8660	23200	14200	L	19900	19900	u	14700	2/7	1.0E+05	N		Max. detect < PRG
IA-3	Antimony	3/25	mg/kg	1.65	11.9	3.8	53.2	7.63	D	11	11	u	5.2	2/25	7.5E+01	N		Max. detect < PRG
IA-3	Arsenic	7/7	mg/kg			3.7	11.7	7.36	N	9.28	9.28	u	18	0/7	3.0E+00	N		Below Background
IA-3	Barium	7/7	mg/kg			70.4	232	154	N	195	195	u	279	0/7	1.0E+05	N		Below Background
IA-3	Beryllium	5/7	mg/kg	0.31	0.34	0.84	2.4	1.02	L	2.74	2.4	m	0.83	5/7	3.4E+02	N		Max. detect < PRG
IA-3	Boron	7/7	mg/kg			6	14.8	9.27	L	12	12	u	9.9	2/7	9.6E+03	N		Max. detect < PRG
IA-3	Cadmium	7/25	mg/kg	0.14	1	0.48	50.4	2.67	D	6.07	6.07	u	0.62	5/25	9.3E+01	N		Max. detect < PRG
IA-3	Calcium	7/7	mg/kg			4090	81300	25800	L	237000	81300	m	28900	3/7		N		Essential Nutrient (low conc.)
IA-3	Chromium	8/8	mg/kg			14.7	3240	424	X	1190	1190	u	17.3	6/8	6.4E+01	Y	Quant.	
IA-3	Cobalt	10/10	mg/kg			4.8	770	111	X	251	251	u	31.7	3/10	2.9E+03	N		Max. detect < PRG
IA-3	Copper	9/9	mg/kg			12.9	909	130	X	313	313	u	19.4	4/9	7.0E+03	N		Max. detect < PRG
IA-3	Iron	7/7	mg/kg			11700	30200	21300	N	26000	26000	u	26600	2/7	1.0E+05	N		Essential Nutrient (low conc.)
IA-3	Lead	9/9	mg/kg			10.3	1200	197	X	441	441	u	79.7	3/9	1.0E+02	Y	Qual.	
IA-3	Lithium	7/7	mg/kg			7	14.6	9.84	L	12.3	12.3	u	8.1	5/7	3.7E+03	N		Max. detect < PRG
IA-3	Magnesium	13/13	mg/kg			21	20200	8720	N	11500	11500	u	18400	1/13		N		Essential Nutrient (low conc.)
IA-3	Manganese	7/7	mg/kg			281	1330	730	L	1570	1330	m	2830	0/7	4.5E+03	N		Below Background
IA-3	Mercury	1/7	mg/kg	0.03	0.035	0.07	0.07	0.0364	D	0.0474	0.0474	u	0.69	0/7	5.6E+01	N		Below Background
IA-3	Molybdenum	6/25	mg/kg	0.415	19.85	1.7	74.7	14	D	20	20	u	22.7	3/25	9.4E+02	N		Max. detect < PRG
IA-3	Nickel	8/8	mg/kg			15.4	1460	212	X	550	550	u	33.9	3/8	3.7E+03	N		Max. detect < PRG
IA-3	Potassium	7/7	mg/kg			553	4230	1730	L	3880	3880	u	1140	5/7		N		Essential Nutrient (low conc.)
IA-3	Sodium	7/7	mg/kg			124	405	250	L	384	384	u	235	3/7		N		Essential Nutrient (low conc.)
IA-3	Strontium	7/7	mg/kg			23.6	146	50.4	L	110	110	u	26	4/7	1.0E+05	N		Max. detect < PRG
IA-3	Thallium	6/25	mg/kg	0.8	19.85	0.96	1.8	8.69	D	10.5	1.8	m	0	6/25	1.5E+01	N		Max. detect < PRG
IA-3	Titanium	7/7	mg/kg			66.2	416	268	N	351	351	u	269	4/7		Y	Qual.	
IA-3	Uranium	2/7	mg/kg	6.9	8.15	15.6	129	26.1	D	59.5	59.5	u	0	2/7		Y	Quant.	
IA-3	Vanadium	7/7	mg/kg			18.9	57.2	33.9	L	49.6	49.6	u	31	4/7	1.3E+03	N		Max. detect < PRG
IA-3	Zinc	9/9	mg/kg			46.7	4330	598	X	1470	1470	u	278	2/9	1.0E+05	N		Max. detect < PRG
IA-3	MCPP	1/7	mg/kg	4.5	5.5	11	11	5.77	D	7.48	7.48	u	0	1/7	1.1E+02	N		Max. detect < PRG
IA-3	Benz(a)anthracene	2/7	mg/kg	0.19	0.22	0.09	0.18	0.186	D	0.218	0.18	m	0.3	0/7	3.6E+00	N		Below Background
IA-3	Benzo(a)pyrene	2/7	mg/kg	0.19	0.22	0.077	0.18	0.184	D	0.22	0.18	m	0.34	0/7	3.6E-01	N		Below Background
IA-3	Benzo(b)fluoranthene	1/7	mg/kg	0.185	0.22	0.083	0.083	0.185	D	0.22	0.083	m	0.31	0/7	3.6E+00	N		Below Background
IA-3	Benzo(ghi)perylene	1/7	mg/kg	0.19	0.22	0.19	0.19	0.202	D	0.211	0.19	m	0.39	0/7		N		Below Background
IA-3	Benzo(k)fluoranthene	1/7	mg/kg	0.19	0.22	0.066	0.066	0.184	D	0.224	0.066	m	0.29	0/7	3.6E+01	N		Below Background
IA-3	Butyl benzyl phthalate	1/7	mg/kg	0.185	0.22	0.1	0.1	0.188	D	0.218	0.1	m	0.25	0/7	9.3E+02	N		Below Background
IA-3	Chrysene	1/7	mg/kg	0.19	0.22	0.21	0.21	0.205	D	0.213	0.21	m	0.57	0/7	3.6E+02	N		Below Background
IA-3	Fluoranthene	2/7	mg/kg	0.19	0.22	0.1	0.31	0.206	D	0.251	0.251	u	0.7	0/7	3.7E+03	N		Below Background
IA-3	Indeno(1,2,3-cd)pyrene	2/7	mg/kg	0.19	0.22	0.089	0.18	0.186	D	0.219	0.18	m	0.35	0/7	3.6E+00	N		Below Background
IA-3	Phenanthrene	2/7	mg/kg	0.19	0.22	0.042	0.19	0.18	D	0.226	0.19	m	0.28	0/7		N		Below Background

Attachment 7. Determination of Subsurface Soil Potential Chemicals of Concern by Aggregate (Page 5 of 13)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Indust. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
IA-3	Pyrene	2/7	mg/kg	0.19	0.22	0.046	0.27	0.192	D	0.243	0.243	u	0.66	0/7	2.6E+03	N		Below Background
IA-3	1,2-Dichloroethene	1/7	mg/kg	0.003	0.0035	0.003	0.003	0.00307	D	0.00321	0.003	m	0	1/7		Y	Quant.	
IA-3	2-Butanone	1/7	mg/kg	0.0055	0.0065	0.006	0.006	0.00614	D	0.00642	0.006	m	0.023	0/7	2.7E+03	N		Below Background
IA-3	Dimethylbenzene	2/7	mg/kg	0.003	0.0035	0.006	0.01	0.0045	D	0.00645	0.00645	u	0	2/7		Y	Quant.	
IA-3	Methylene chloride	2/7	mg/kg	0.003	0.004	0.13	0.13	0.0394	D	0.0849	0.0849	u	0.007	2/7	2.0E+01	N		Max. detect < PRG
IA-3	Toluene	6/13	mg/kg	0.003	0.0035	0.0015	0.055	0.011	D	0.0193	0.0193	u	0.11	0/13	5.2E+02	N		Below Background
IA-3	Trichloroethene	6/11	mg/kg	0.003	0.0035	0.0016	0.054	0.00898	X	0.0174	0.0174	u	0	6/11	6.1E+00	N		Max. detect < PRG
IA-3	trans-1,2-Dichloroethene	3/3	mg/kg			0.0013	0.0077	0.00403	D	0.0096	0.0077	m		NA	2.1E+01	N		Max. detect < PRG
IA-3	Actinium-227	37/54	pCi/g	0	0.51	0.19	99.15	3.58	Z	6.98	6.98	u	0.82	15/54		Y	Quant.	
IA-3	Americium-241	5/53	pCi/g	-0.03	0.19	0.13	4.28	0.175	D	0.323	0.323	u	0	5/53		Y	Quant.	
IA-3	Cesium-137	5/53	pCi/g	-0.02	0.21	0.03	0.12	0.0145	D	0.024	0.024	u	0.57	0/53		N		Below Background
IA-3	Potassium-40	53/53	pCi/g			7.64	19.71	16	X	16.5	16.5	u	16.8	21/53		Y	Quant.	
IA-3	Protactinium-231	7/54	pCi/g	-0.41	1.31	1.5	56.27	2.24	D	4.25	4.25	u	1.13	7/54		Y	Quant.	
IA-3	Radium-226	132/167	pCi/g	1.5	4.7	0.7	5620	57.7	X	116	116	u	1.55	64/167		Y	Quant.	
IA-3	Radium-228	53/53	pCi/g			0.42	1.61	0.973	X	1.01	1.01	u	1.24	2/53		Y	Quant.	
IA-3	Thorium-228	53/53	pCi/g			0.59	1.79	1.18	N	1.24	1.24	u	2.04	0/53		N		Below Background
IA-3	Thorium-230	96/97	pCi/g	0	0	0.6	7241	189	Z	347	347	u	2.89	61/97		Y	Quant.	
IA-3	Thorium-232	114/166	pCi/g	0.5	50.4	0.4	5	2.23	X	2.74	2.74	u	1.83	22/166		Y	Quant.	
IA-3	Uranium-235	33/53	pCi/g	-0.04	0.31	0.19	17.99	1.04	Z	1.7	1.7	u	0.25	26/53		Y	Quant.	
IA-3	Uranium-238	47/167	pCi/g	0	212	3.04	1600	49.9	D	72.1	72.1	u	2.02	47/167		Y	Quant.	
IA-4	Fluoride	11/11	mg/kg			2.26	43.3	7.22	X	13.9	13.9	u		NA	6.4E+03	N		Max. detect < PRG
IA-4	Sulfide	3/11	mg/kg	6.4	13.6	13.8	23.8	10.8	D	14.3	14.3	u		NA		Y	Qual.	
IA-4	Aluminum	12/12	mg/kg			5990	19000	11500	L	14700	14700	u	14700	2/12	1.0E+05	N		Max. detect < PRG
IA-4	Arsenic	13/13	mg/kg			3.1	50.8	9.88	X	16.2	16.2	u	18	1/13	3.0E+00	Y	Quant.	
IA-4	Barium	14/14	mg/kg			58.5	3750	469	X	931	931	u	279	4/14	1.0E+05	N		Max. detect < PRG
IA-4	Beryllium	2/12	mg/kg	0.245	0.405	0.98	1	0.442	D	0.577	0.577	u	0.83	2/12	3.4E+02	N		Max. detect < PRG
IA-4	Boron	10/12	mg/kg	4.45	5.8	5.7	11.9	7.98	L	9.66	9.66	u	9.9	2/12	9.6E+03	N		Max. detect < PRG
IA-4	Cadmium	4/24	mg/kg	0.155	0.65	0.45	4.5	0.585	D	0.888	0.888	u	0.62	2/24	9.3E+01	N		Max. detect < PRG
IA-4	Calcium	12/12	mg/kg			3610	30200	13800	X	19700	19700	u	28900	1/12		N		Essential Nutrient (low conc.)
IA-4	Chromium	12/12	mg/kg			10.3	23.9	18.2	N	20.5	20.5	u	17.3	7/12	6.4E+01	N		Max. detect < PRG
IA-4	Cobalt	17/17	mg/kg			4.7	1510	133	X	289	289	u	31.7	5/17	2.9E+03	N		Max. detect < PRG
IA-4	Copper	14/14	mg/kg			9.8	876	89.5	X	200	200	u	19.4	3/14	7.0E+03	N		Max. detect < PRG
IA-4	Iron	12/12	mg/kg			2600	24200	15100	N	18100	18100	u	26600	0/12	1.0E+05	N		Below Background
IA-4	Lead	14/14	mg/kg			6.9	408	56.3	X	114	114	u	79.7	2/14	1.0E+02	Y	Qual.	
IA-4	Lithium	12/12	mg/kg			5.2	10.6	7.94	N	8.9	8.9	u	8.1	5/12	3.7E+03	N		Max. detect < PRG
IA-4	Magnesium	17/17	mg/kg			2690	18500	10100	X	12700	12700	u	18400	1/17		N		Essential Nutrient (low conc.)
IA-4	Manganese	12/12	mg/kg			110	1760	472	L	934	934	u	2830	0/12	4.5E+03	N		Below Background
IA-4	Mercury	1/12	mg/kg	0.03	0.035	0.07	0.07	0.0338	D	0.0397	0.0397	u	0.69	0/12	5.6E+01	N		Below Background
IA-4	Molybdenum	6/24	mg/kg	0.455	12.7	1.4	71.9	9.63	D	14.9	14.9	u	22.7	2/24	9.4E+02	N		Max. detect < PRG
IA-4	Nickel	13/13	mg/kg			11.4	2010	170	X	443	443	u	33.9	1/13	3.7E+03	N		Max. detect < PRG
IA-4	Potassium	12/12	mg/kg			562	1450	896	L	1090	1090	u	1140	3/12		N		Essential Nutrient (low conc.)
IA-4	Selenium	5/24	mg/kg	0.46	12.7	1.3	29.3	6.81	D	9.24	9.24	u	0.55	5/24	9.4E+02	N		Max. detect < PRG
IA-4	Sodium	12/12	mg/kg			197	300	263	N	281	281	u	235	10/12		N		Essential Nutrient (low conc.)
IA-4	Strontium	12/12	mg/kg			18.4	28.7	23.7	N	25.3	25.3	u	26	4/12	1.0E+05	N		Max. detect < PRG
IA-4	Thallium	11/24	mg/kg	0.21	12.7	0.53	3.3	6.07	D	7.84	3.3	m	0	11/24	1.5E+01	N		Max. detect < PRG
IA-4	Titanium	12/12	mg/kg			170	399	281	L	326	326	u	269	6/12		Y	Qual.	
IA-4	Uranium	2/12	mg/kg	7.6	7.95	20.7	73.6	14.3	D	24.2	24.2	u	0	2/12		Y	Quant.	
IA-4	Vanadium	12/12	mg/kg			18.2	39.3	30.7	N	34.2	34.2	u	31	6/12	1.3E+03	N		Max. detect < PRG
IA-4	Zinc	12/12	mg/kg			31.8	59.3	44.4	L	49.5	49.5	u	278	0/12	1.0E+05	N		Below Background

Attachment 7. Determination of Subsurface Soil Potential Chemicals of Concern by Aggregate (Page 6 of 13)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Indust. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
IA-4	Fluoranthene	1/4	mg/kg	0.21	0.21	0.077	0.077	0.177	D	0.255	0.077	m	0.7	0/4	3.7E+03	N		Below Background
IA-4	Pyrene	1/4	mg/kg	0.21	0.21	0.28	0.28	0.228	D	0.269	0.269	u	0.66	0/4	2.6E+03	N		Below Background
IA-4	Toluene	5/9	mg/kg	0.003	0.003	0.0018	0.12	0.0165	X	0.0406	0.0406	u	0.11	1/9	5.2E+02	N		Max. detect < PRG
IA-4	Actinium-227	26/41	pCi/g	0.08	0.39	0.16	16.18	0.797	X	1.47	1.47	u	0.82	3/41		Y	Quant.	
IA-4	Americium-241	5/40	pCi/g	-0.02	0.09	0.06	4.69	0.162	D	0.357	0.357	u	0	5/40		Y	Quant.	
IA-4	Cesium-137	1/40	pCi/g	-0.03	0.05	0.05	0.05	0.00225	D	0.00698	0.00698	u	0.57	0/40		N		Below Background
IA-4	Potassium-40	40/40	pCi/g			12.32	17.85	16.1	N	16.4	16.4	u	16.8	11/40		Y	Quant.	
IA-4	Protactinium-231	2/41	pCi/g	-0.48	2.72	2.49	3.98	0.41	D	0.628	0.628	u	1.13	2/41		N		<5% detected
IA-4	Radium-226	64/105	pCi/g	1.2	4.4	0.62	1740	74	X	118	118	u	1.55	27/105		Y	Quant.	
IA-4	Radium-228	40/40	pCi/g			0.78	1.25	0.93	X	0.955	0.955	u	1.24	1/40		Y	Quant.	
IA-4	Thorium-228	40/40	pCi/g			0.57	2.2	1.25	L	1.36	1.36	u	2.04	1/40		Y	Quant.	
IA-4	Thorium-230	74/74	pCi/g			1.08	2440	107	X	182	182	u	2.89	45/74		Y	Quant.	
IA-4	Thorium-232	50/103	pCi/g	2	18.9	0.56	7	3.18	D	3.69	3.69	u	1.83	11/103		Y	Quant.	
IA-4	Uranium-235	21/40	pCi/g	-0.04	0.19	0.18	82.19	2.46	Z	5.91	5.91	u	0.25	16/40		Y	Quant.	
IA-4	Uranium-238	12/104	pCi/g	0.76	352	3.34	1769	56.4	D	86.1	86.1	u	2.02	12/104		Y	Quant.	
IA-5	Fluoride	16/16	mg/kg			2.54	21.1	4.9	X	6.84	6.84	u		NA	6.4E+03	N		Max. detect < PRG
IA-5	Sulfide	2/19	mg/kg	0.00655	14.1	19.4	23.5	8.83	D	11	11	u		NA		Y	Qual.	
IA-5	Aluminum	26/26	mg/kg			6680	17100	9950	L	11000	11000	u	14700	2/26	1.0E+05	N		Max. detect < PRG
IA-5	Arsenic	26/26	mg/kg			2.9	26.2	8.38	L	10.8	10.8	u	18	1/26	3.0E+00	Y	Quant.	
IA-5	Barium	27/27	mg/kg			40.6	4550	318	X	599	599	u	279	2/27	1.0E+05	N		Max. detect < PRG
IA-5	Beryllium	8/26	mg/kg	0.255	0.4	0.75	1.4	0.51	D	0.617	0.617	u	0.83	6/26	3.4E+02	N		Max. detect < PRG
IA-5	Boron	23/26	mg/kg	1.15	1.2	2.3	12.8	8.15	X	9.35	9.35	u	9.9	8/26	9.6E+03	N		Max. detect < PRG
IA-5	Cadmium	4/48	mg/kg	0.155	0.8	0.79	4.2	0.491	D	0.64	0.64	u	0.62	4/48	9.3E+01	N		Max. detect < PRG
IA-5	Calcium	26/26	mg/kg			4050	35600	18000	X	21900	21900	u	28900	7/26		N		Essential Nutrient (low conc.)
IA-5	Chromium	26/26	mg/kg			11.4	21.8	16.4	L	17.5	17.5	u	17.3	9/26	6.4E+01	N		Max. detect < PRG
IA-5	Cobalt	33/33	mg/kg			5.1	308	54.2	X	81.2	81.2	u	31.7	10/33	2.9E+03	N		Max. detect < PRG
IA-5	Copper	28/29	mg/kg	5.85	5.85	6.1	191	31.7	X	46.6	46.6	u	19.4	6/29	7.0E+03	N		Max. detect < PRG
IA-5	Iron	26/26	mg/kg			9120	28300	18300	N	19800	19800	u	26600	2/26	1.0E+05	N		Essential Nutrient (low conc.)
IA-5	Lead	26/26	mg/kg			6	25.7	10	X	11.3	11.3	u	79.7	0/26	1.0E+02	N		Below Background
IA-5	Lithium	26/26	mg/kg			5.1	10.1	7.65	L	8.2	8.2	u	8.1	8/26	3.7E+03	N		Max. detect < PRG
IA-5	Magnesium	36/36	mg/kg			2730	26900	11700	X	13600	13600	u	18400	8/36		N		Essential Nutrient (low conc.)
IA-5	Manganese	26/26	mg/kg			109	1220	556	N	651	651	u	2830	0/26	4.5E+03	N		Below Background
IA-5	Molybdenum	21/48	mg/kg	0.455	12.4	1	29.8	8.29	D	10.1	10.1	u	22.7	4/48	9.4E+02	N		Max. detect < PRG
IA-5	Nickel	26/26	mg/kg			12.1	108	24.6	X	31.8	31.8	u	33.9	3/26	3.7E+03	N		Max. detect < PRG
IA-5	Potassium	26/26	mg/kg			570	1400	921	N	990	990	u	1140	3/26		N		Essential Nutrient (low conc.)
IA-5	Selenium	22/48	mg/kg	0.165	12.4	0.38	19.6	6.18	D	7.47	7.47	u	0.55	17/48	9.4E+02	N		Max. detect < PRG
IA-5	Silver	1/26	mg/kg	0.37	0.44	0.81	0.81	0.403	D	0.431	0.431	u	2.6	0/26	9.4E+02	N		Below Background
IA-5	Sodium	26/26	mg/kg			102	534	236	L	274	274	u	235	11/26		N		Essential Nutrient (low conc.)
IA-5	Strontium	26/26	mg/kg			16.6	210	32.4	X	44.6	44.6	u	26	11/26	1.0E+05	N		Max. detect < PRG
IA-5	Thallium	22/48	mg/kg	0.21	12.4	0.74	2.5	5.78	D	6.98	2.5	m	0	22/48	1.5E+01	N		Max. detect < PRG
IA-5	Titanium	26/26	mg/kg			99.1	347	257	X	275	275	u	269	9/26		Y	Qual.	
IA-5	Uranium	4/26	mg/kg	7.65	8.95	11.1	45.1	10.2	D	12.8	12.8	u	0	4/26		Y	Quant.	
IA-5	Vanadium	25/26	mg/kg	10.1	10.1	22	111	32.4	X	38.1	38.1	u	31	11/26	1.3E+03	N		Max. detect < PRG
IA-5	Zinc	26/26	mg/kg			26.7	67.9	46.5	N	49.8	49.8	u	278	0/26	1.0E+05	N		Below Background
IA-5	Dalapon	1/12	mg/kg	0.0245	0.05	0.15	0.15	0.0378	D	0.0565	0.0565	u	0	1/12	3.2E+03	N		Max. detect < PRG
IA-5	MCPA	2/12	mg/kg	4.9	23.5	19	49	11.4	D	18.3	18.3	u	0	2/12	5.3E+01	N		Max. detect < PRG
IA-5	Silvex	4/12	mg/kg	0.012	0.026	0.049	0.083	0.0323	D	0.0468	0.0468	u	0	4/12	8.6E+02	N		Max. detect < PRG
IA-5	2-Methylnaphthalene	1/12	mg/kg	0.205	0.215	0.1	0.1	0.2	D	0.217	0.1	m	0	1/12		Y	Qual.	
IA-5	Benz(a)anthracene	2/12	mg/kg	0.205	0.215	0.19	0.26	0.212	D	0.221	0.221	u	0.3	0/12	3.6E+00	N		Below Background

Attachment 7. Determination of Subsurface Soil Potential Chemicals of Concern by Aggregate (Page 7 of 13)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Indust. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
IA-5	Bis(2-ethylhexyl)phthalate	1/12	mg/kg	0.205	0.295	0.17	0.17	0.214	D	0.229	0.17	m	0.18	0/12	2.1E+02	N		Below Background
IA-5	Butyl benzyl phthalate	2/12	mg/kg	0.205	0.215	0.31	0.31	0.226	D	0.246	0.246	u	0.25	2/12	9.3E+02	N		Max. detect < PRG
IA-5	Chrysene	2/12	mg/kg	0.205	0.215	0.14	0.14	0.198	D	0.212	0.14	m	0.57	0/12	3.6E+02	N		Below Background
IA-5	Di-n-octylphthalate	2/12	mg/kg	0.205	0.215	0.13	0.15	0.198	D	0.213	0.15	m	0	2/12	1.0E+04	N		Max. detect < PRG
IA-5	Fluoranthene	2/12	mg/kg	0.205	0.215	0.079	0.15	0.194	D	0.214	0.15	m	0.7	0/12	3.7E+03	N		Below Background
IA-5	Naphthalene	1/12	mg/kg	0.205	0.215	0.13	0.13	0.203	D	0.215	0.13	m	0	1/12	1.9E+01	N		Max. detect < PRG
IA-5	Phenanthrene	3/12	mg/kg	0.205	0.215	0.069	0.23	0.189	D	0.217	0.217	u	0.28	0/12		N		Below Background
IA-5	Pyrene	3/12	mg/kg	0.205	0.215	0.29	0.37	0.236	D	0.263	0.263	u	0.66	0/12	2.6E+03	N		Below Background
IA-5	Acetone	2/12	mg/kg	0.006	0.0215	0.016	0.023	0.0115	D	0.015	0.015	u	0.017	1/12	6.1E+02	N		Max. detect < PRG
IA-5	Methylene chloride	1/12	mg/kg	0.003	0.018	0.001	0.001	0.00438	D	0.00667	0.001	m	0.007	0/12	2.0E+01	N		Below Background
IA-5	Toluene	8/18	mg/kg	0.003	0.003	0.0024	1.2	0.142	D	0.282	0.282	u	0.11	4/18	5.2E+02	N		Max. detect < PRG
IA-5	Actinium-227	89/131	pCi/g	-0.09	0.32	0.16	292.7	3.54	Z	7.31	7.31	u	0.82	16/131		Y	Quant.	
IA-5	Americium-241	7/131	pCi/g	-5.04	0.35	0.07	1.5	0.0227	D	0.091	0.091	u	0	7/131		Y	Quant.	
IA-5	Cesium-137	3/131	pCi/g	-0.03	0.06	0.06	2.35	0.0192	D	0.049	0.049	u	0.57	1/131		N		<5% detected
IA-5	Potassium-40	130/131	pCi/g	5.21	5.21	11.42	17.84	15	X	15.2	15.2	u	16.8	7/131		Y	Quant.	
IA-5	Protactinium-231	11/131	pCi/g	-0.42	1.16	1.21	346.4	4.03	D	8.48	8.48	u	1.13	11/131		Y	Quant.	
IA-5	Radium-226	232/315	pCi/g	1	5.3	0.59	900	13.4	X	19.3	19.3	u	1.55	116/315		Y	Quant.	
IA-5	Radium-228	130/131	pCi/g	0.95	0.95	0.71	3.56	0.944	X	0.983	0.983	u	1.24	5/131		Y	Quant.	
IA-5	Thorium-228	130/131	pCi/g	1.04	1.04	0.61	3.56	1.24	X	1.28	1.28	u	2.04	2/131		Y	Quant.	
IA-5	Thorium-230	246/246	pCi/g			0.78	14680	190	X	296	296	u	2.89	157/246		Y	Quant.	
IA-5	Thorium-232	197/316	pCi/g	1	12	0.42	7.5	2.19	X	2.33	2.33	u	1.83	35/316		Y	Quant.	
IA-5	Uranium-235	51/131	pCi/g	-0.05	0.26	0.17	32.11	0.715	D	1.18	1.18	u	0.25	32/131		Y	Quant.	
IA-5	Uranium-238	41/316	pCi/g	0.37	256	5.08	1000	27.3	D	33.6	33.6	u	2.02	41/316		Y	Quant.	
IA-6	Fluoride	2/2	mg/kg			40.7	62.9	51.8	D	122	62.9	m		NA	6.4E+03	N		Max. detect < PRG
IA-6	Cobalt	1/1	mg/kg			62.3	62.3	62.3	D		62.3	m	31.7	1/1	2.9E+03	N		Max. detect < PRG
IA-6	Magnesium	1/1	mg/kg			12200	12200	12200	D		12200	m	18400	0/1		N		Below Background
IA-6	Actinium-227	2/5	pCi/g	0.11	0.15	0.22	17.89	3.7	D	11.3	11.3	u	0.82	1/5		Y	Quant.	
IA-6	Potassium-40	5/5	pCi/g			13.87	16.42	15.4	N	16.4	16.4	u	16.8	0/5		N		Below Background
IA-6	Protactinium-231	1/5	pCi/g	-0.19	0.14	18.78	18.78	3.74	D	11.8	11.8	u	1.13	1/5		Y	Quant.	
IA-6	Radium-226	16/32	pCi/g	1.4	2.7	0.85	36	3.77	X	5.77	5.77	u	1.55	10/32		Y	Quant.	
IA-6	Radium-228	5/5	pCi/g			0.84	1.37	1	L	1.24	1.24	u	1.24	1/5		Y	Quant.	
IA-6	Thorium-228	5/5	pCi/g			1.33	1.67	1.46	L	1.61	1.61	u	2.04	0/5		N		Below Background
IA-6	Thorium-230	25/25	pCi/g			0.6	2100	138	X	287	287	u	2.89	10/25		Y	Quant.	
IA-6	Thorium-232	13/32	pCi/g	2	4	0.74	7	2.8	D	3.16	3.16	u	1.83	7/32		Y	Quant.	
IA-6	Uranium-235	3/5	pCi/g	0.08	0.1	0.2	4.33	1.03	D	2.79	2.79	u	0.25	2/5		Y	Quant.	
IA-6	Uranium-238	8/32	pCi/g	0.58	94.2	8.28	32	29	D	35.9	32	m	2.02	8/32		Y	Quant.	
IA-7	Fluoride	1/1	mg/kg			2.68	2.68	2.68	D		2.68	m		NA	6.4E+03	N		Max. detect < PRG
IA-7	Aluminum	10/10	mg/kg			5810	15700	9740	L	12400	12400	u	14700	2/10	1.0E+05	N		Max. detect < PRG
IA-7	Arsenic	10/10	mg/kg			2	11.8	5.71	L	8.83	8.83	u	18	0/10	3.0E+00	N		Below Background
IA-7	Barium	12/12	mg/kg			54.4	13600	2310	X	4950	4950	u	279	2/12	1.0E+05	N		Max. detect < PRG
IA-7	Beryllium	1/10	mg/kg	0.28	0.48	0.96	0.96	0.398	D	0.518	0.518	u	0.83	1/10	3.4E+02	N		Max. detect < PRG
IA-7	Boron	10/10	mg/kg			3.8	11.6	6.62	L	8.69	8.69	u	9.9	1/10	9.6E+03	N		Max. detect < PRG
IA-7	Cadmium	5/13	mg/kg	0.155	0.5	0.48	3.2	0.643	D	1.06	1.06	u	0.62	3/13	9.3E+01	N		Max. detect < PRG
IA-7	Calcium	10/10	mg/kg			2450	37000	12500	L	47400	37000	m	28900	1/10		N		Essential Nutrient (low conc.)
IA-7	Chromium	10/10	mg/kg			11.6	22.1	16.5	L	19.4	19.4	u	17.3	4/10	6.4E+01	N		Max. detect < PRG
IA-7	Cobalt	13/13	mg/kg			3.8	6050	755	X	1690	1690	u	31.7	3/13	2.9E+03	Y	Qual.	
IA-7	Copper	12/12	mg/kg			10.2	4400	612	X	1360	1360	u	19.4	3/12	7.0E+03	N		Max. detect < PRG
IA-7	Iron	10/10	mg/kg			9540	24600	15900	L	19100	19100	u	26600	0/10	1.0E+05	N		Below Background

Attachment 7. Determination of Subsurface Soil Potential Chemicals of Concern by Aggregate (Page 8 of 13)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Indust. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
IA-7	Lead	12/12	mg/kg			7.4	933	142	X	305	305	u	79.7	2/12	1.0E+02	Y	Qual.	
IA-7	Lithium	8/10	mg/kg	3	3.15	5.4	9.3	6.81	X	8.09	8.09	u	8.1	2/10	3.7E+03	N		Max. detect < PRG
IA-7	Magnesium	11/11	mg/kg			2740	23000	8440	L	16700	16700	u	18400	1/11		N		Essential Nutrient (low conc.)
IA-7	Manganese	10/10	mg/kg			83.1	2030	672	L	2770	2030	m	2830	0/10	4.5E+03	N		Below Background
IA-7	Mercury	5/10	mg/kg	0.03	0.035	0.08	2.1	0.468	X	0.876	0.876	u	0.69	3/10	5.6E+01	N		Max. detect < PRG
IA-7	Molybdenum	5/13	mg/kg	0.46	10.15	1	255	34.1	D	74.2	74.2	u	22.7	2/13	9.4E+02	N		Max. detect < PRG
IA-7	Nickel	12/12	mg/kg			8.7	7570	1020	X	2280	2280	u	33.9	2/12	3.7E+03	Y	Quant.	
IA-7	Potassium	10/10	mg/kg			436	1320	665	L	854	854	u	1140	1/10		N		Essential Nutrient (low conc.)
IA-7	Selenium	3/13	mg/kg	0.16	10.15	1.6	183	22.5	D	49.7	49.7	u	0.55	3/13	9.4E+02	N		Max. detect < PRG
IA-7	Sodium	10/10	mg/kg			78.5	216	118	L	142	142	u	235	0/10		N		Below Background
IA-7	Strontium	10/10	mg/kg			11.1	25.2	18.4	N	21.4	21.4	u	26	0/10	1.0E+05	N		Below Background
IA-7	Thallium	1/13	mg/kg	0.205	11.35	0.95	0.95	2.77	D	4.96	0.95	m	0	1/13	1.5E+01	N		Max. detect < PRG
IA-7	Titanium	10/10	mg/kg			215	373	274	L	305	305	u	269	4/10		Y	Qual.	
IA-7	Vanadium	11/11	mg/kg			17.2	630	82.4	X	182	182	u	31	4/11	1.3E+03	N		Max. detect < PRG
IA-7	Zinc	10/10	mg/kg			34.3	57.2	42.4	L	47.7	47.7	u	278	0/10	1.0E+05	N		Below Background
IA-7	1,2-Dichloroethane	1/9	mg/kg	0.0025	0.003	0.001	0.001	0.00272	D	0.00314	0.001	m	0.009	0/9	7.6E-01	N		Below Background
IA-7	2-Butanone	1/9	mg/kg	0.005	0.0065	0.001	0.001	0.00567	D	0.00679	0.001	m	0.023	0/9	2.7E+03	N		Below Background
IA-7	Acetone	3/9	mg/kg	0.0065	0.0135	0.005	0.028	0.0111	D	0.0154	0.0154	u	0.017	1/9	6.1E+02	N		Max. detect < PRG
IA-7	Toluene	1/9	mg/kg	0.0025	0.003	0.001	0.001	0.00267	D	0.00308	0.001	m	0.11	0/9	5.2E+02	N		Below Background
IA-7	Actinium-227	19/35	pCi/g	-0.13	0.32	0.19	0.68	0.269	Z	0.325	0.325	u	0.82	0/35		N		Below Background
IA-7	Americium-241	1/35	pCi/g	-0.03	0.08	0.08	0.08	0.0217	D	0.0296	0.0296	u	0	1/35		N		<5% detected
IA-7	Potassium-40	35/35	pCi/g			12.33	18.47	15.6	N	16	16	u	16.8	6/35		Y	Quant.	
IA-7	Protactinium-231	8/35	pCi/g	-0.3	0.92	1.2	2.38	0.628	D	0.828	0.828	u	1.13	8/35		Y	Quant.	
IA-7	Radium-226	86/90	pCi/g	1.5	1.8	0.65	27	2.05	X	2.62	2.62	u	1.55	28/90		Y	Quant.	
IA-7	Radium-228	35/35	pCi/g			0.66	1.15	0.937	N	0.967	0.967	u	1.24	0/35		N		Below Background
IA-7	Thorium-228	35/35	pCi/g			0.69	1.91	1.23	L	1.31	1.31	u	2.04	0/35		N		Below Background
IA-7	Thorium-230	72/73	pCi/g	0.05	0.05	0.86	1400	70.9	X	113	113	u	2.89	33/73		Y	Quant.	
IA-7	Thorium-232	80/90	pCi/g	1	3.5	0.59	4	1.61	X	1.75	1.75	u	1.83	21/90		Y	Quant.	
IA-7	Uranium-235	4/35	pCi/g	-0.03	0.17	0.24	0.48	0.108	D	0.137	0.137	u	0.25	3/35		Y	Quant.	
IA-7	Uranium-238	20/90	pCi/g	-1.76	31.2	5	39	8.12	D	9.59	9.59	u	2.02	20/90		Y	Quant.	
IA-8	Sulfate	1/1	mg/kg			860	860	860	D		860	m		NA		Y	Qual.	
IA-8	Aluminum	4/4	mg/kg			6340	13500	8780	D	12600	12600	u	14700	0/4	1.0E+05	N		Below Background
IA-8	Arsenic	4/4	mg/kg			4.4	8	6.23	D	7.99	7.99	u	18	0/4	3.0E+00	N		Below Background
IA-8	Barium	4/4	mg/kg			98.1	185	133	D	178	178	u	279	0/4	1.0E+05	N		Below Background
IA-8	Boron	3/3	mg/kg			4.3	6	5.27	D	6.74	6	m	9.9	0/3	9.6E+03	N		Below Background
IA-8	Cadmium	1/6	mg/kg	0.16	0.6	0.4	0.4	0.338	D	0.476	0.4	m	0.62	0/6	9.3E+01	N		Below Background
IA-8	Calcium	4/4	mg/kg			4460	21100	10800	D	20200	20200	u	28900	0/4		N		Below Background
IA-8	Chromium	4/4	mg/kg			12.2	17.7	14.2	D	17.1	17.1	u	17.3	1/4	6.4E+01	N		Max. detect < PRG
IA-8	Cobalt	4/4	mg/kg			3.8	16.7	7.83	D	14.9	14.9	u	31.7	0/4	2.9E+03	N		Below Background
IA-8	Copper	4/4	mg/kg			10.9	28.6	19.7	D	30.1	28.6	m	19.4	2/4	7.0E+03	N		Max. detect < PRG
IA-8	Iron	4/4	mg/kg			15100	18300	16300	D	17900	17900	u	26600	0/4	1.0E+05	N		Below Background
IA-8	Lead	4/4	mg/kg			8.3	44.5	18.3	D	38.9	38.9	u	79.7	0/4	1.0E+02	N		Below Background
IA-8	Lithium	2/4	mg/kg	3.1	4.35	6.1	8.8	5.59	D	8.49	8.49	u	8.1	1/4	3.7E+03	N		Max. detect < PRG
IA-8	Magnesium	4/4	mg/kg			3180	12700	7020	D	12500	12500	u	18400	0/4		N		Below Background
IA-8	Manganese	4/4	mg/kg			142	862	570	D	930	862	m	2830	0/4	4.5E+03	N		Below Background
IA-8	Molybdenum	3/6	mg/kg	0.465	12.1	1.3	1.7	4.18	D	8.13	1.7	m	22.7	0/6	9.4E+02	N		Below Background
IA-8	Nickel	4/4	mg/kg			12.6	30	19.2	D	28.4	28.4	u	33.9	0/4	3.7E+03	N		Below Background
IA-8	Potassium	4/4	mg/kg			785	1180	932	D	1130	1130	u	1140	1/4		N		Essential Nutrient (low conc.)
IA-8	Selenium	3/6	mg/kg	0.165	12.1	0.52	1.2	3.82	D	7.99	1.2	m	0.55	2/6	9.4E+02	N		Max. detect < PRG

Attachment 7. Determination of Subsurface Soil Potential Chemicals of Concern by Aggregate (Page 9 of 13)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Indust. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
IA-8	Silver	1/4	mg/kg	0.38	0.39	0.72	0.72	0.469	D	0.666	0.666	u	2.6	0/4	9.4E+02	N		Below Background
IA-8	Sodium	3/4	mg/kg	141.5	141.5	129	340	231	D	361	340	m	235	2/4		N		Essential Nutrient (low conc.)
IA-8	Strontium	4/4	mg/kg			16.9	21.1	19.2	D	21.4	21.1	m	26	0/4	1.0E+05	N		Below Background
IA-8	Titanium	4/4	mg/kg			166	274	242	D	303	274	m	269	2/4		Y	Qual.	
IA-8	Vanadium	3/4	mg/kg	11.7	11.7	22.1	25.1	20.8	D	28	25.1	m	31	0/4	1.3E+03	N		Below Background
IA-8	Zinc	4/4	mg/kg			39.8	75.6	58.2	D	75.5	75.5	u	278	0/4	1.0E+05	N		Below Background
IA-8	Benz(a)anthracene	1/4	mg/kg	0.21	0.215	0.2	0.2	0.209	D	0.216	0.2	m	0.3	0/4	3.6E+00	N		Below Background
IA-8	Benzo(a)pyrene	1/4	mg/kg	0.21	0.215	0.14	0.14	0.194	D	0.236	0.14	m	0.34	0/4	3.6E-01	N		Below Background
IA-8	Benzo(b)fluoranthene	1/4	mg/kg	0.21	0.215	0.29	0.29	0.231	D	0.277	0.277	u	0.31	0/4	3.6E+00	N		Below Background
IA-8	Butyl benzyl phthalate	2/4	mg/kg	0.21	0.215	0.18	0.27	0.219	D	0.263	0.263	u	0.25	1/4	9.3E+02	N		Max. detect < PRG
IA-8	Chrysene	1/4	mg/kg	0.21	0.215	0.07	0.07	0.176	D	0.26	0.07	m	0.57	0/4	3.6E+02	N		Below Background
IA-8	Fluoranthene	1/4	mg/kg	0.21	0.215	0.24	0.24	0.219	D	0.236	0.236	u	0.7	0/4	3.7E+03	N		Below Background
IA-8	Indeno(1,2,3-cd)pyrene	1/4	mg/kg	0.21	0.215	0.049	0.049	0.171	D	0.267	0.049	m	0.35	0/4	3.6E+00	N		Below Background
IA-8	Phenanthrene	1/4	mg/kg	0.21	0.215	0.14	0.14	0.194	D	0.236	0.14	m	0.28	0/4		N		Below Background
IA-8	Pyrene	1/4	mg/kg	0.21	0.215	0.25	0.25	0.221	D	0.244	0.244	u	0.66	0/4	2.6E+03	N		Below Background
IA-8	1,1,2-Trichloro-1,2,2-trifluoroethane	1/4	mg/kg	0.005	0.0065	0.005	0.005	0.00575	D	0.00677	0.005	m	0	1/4	5.6E+03	N		Max. detect < PRG
IA-8	Methylene chloride	1/4	mg/kg	0.0025	0.003	0.091	0.091	0.0249	D	0.0767	0.0767	u	0.007	1/4	2.0E+01	N		Max. detect < PRG
IA-8	Actinium-227	15/28	pCi/g	0.01	0.18	0.23	0.95	0.291	L	0.597	0.597	u	0.82	1/28		Y	Quant.	
IA-8	Americium-241	1/28	pCi/g	-0.06	0.11	0.07	0.07	0.0271	D	0.0387	0.0387	u	0	1/28		N		<5% detected
IA-8	Cesium-137	2/28	pCi/g	-0.03	0.02	0.03	0.08	0.00179	D	0.00852	0.00852	u	0.57	0/28		N		Below Background
IA-8	Potassium-40	28/28	pCi/g			13.91	18.26	15.9	L	16.3	16.3	u	16.8	8/28		Y	Quant.	
IA-8	Protactinium-231	6/28	pCi/g	-0.56	0.65	1.28	2.63	0.567	D	0.798	0.798	u	1.13	6/28		Y	Quant.	
IA-8	Radium-226	282/294	pCi/g	1	2.7	0.67	130	3.3	X	4.13	4.13	u	1.55	204/294		Y	Quant.	
IA-8	Radium-228	28/28	pCi/g			0.81	1.15	0.948	X	0.973	0.973	u	1.24	0/28		N		Below Background
IA-8	Thorium-228	28/28	pCi/g			0.68	1.98	1.27	N	1.38	1.38	u	2.04	0/28		N		Below Background
IA-8	Thorium-230	303/303	pCi/g			0.9	15000	91.1	X	175	175	u	2.89	125/303		Y	Quant.	
IA-8	Thorium-232	229/294	pCi/g	0.7	8	0.68	14	2.24	X	2.37	2.37	u	1.83	155/294		Y	Quant.	
IA-8	Uranium-235	9/28	pCi/g	-0.01	0.18	0.19	0.44	0.165	D	0.208	0.208	u	0.25	6/28		Y	Quant.	
IA-8	Uranium-238	24/294	pCi/g	0.54	58	3.87	66	12.7	D	13.6	13.6	u	2.02	24/294		Y	Quant.	
IA-9	Sulfate	1/1	mg/kg			863	863	863	D		863	m		NA		Y	Qual.	
IA-9	Aluminum	40/40	mg/kg			5070	19600	10900	L	12100	12100	u	14700	7/40	1.0E+05	N		Max. detect < PRG
IA-9	Antimony	2/61	mg/kg	1.75	7.55	6.1	20.4	3.8	D	4.47	4.47	u	5.2	2/61	7.5E+01	N		Max. detect < PRG
IA-9	Arsenic	41/41	mg/kg			1.8	98.4	9.88	X	13.7	13.7	u	18	1/41	3.0E+00	Y	Quant.	
IA-9	Barium	40/40	mg/kg			52.5	5830	434	X	702	702	u	279	7/40	1.0E+05	N		Max. detect < PRG
IA-9	Beryllium	25/40	mg/kg	0.25	0.38	0.64	1.4	0.631	X	0.707	0.707	u	0.83	7/40	3.4E+02	N		Max. detect < PRG
IA-9	Boron	39/40	mg/kg	2.6	2.6	4.1	11.5	6.92	N	7.46	7.46	u	9.9	3/40	9.6E+03	N		Max. detect < PRG
IA-9	Cadmium	16/61	mg/kg	0.15	0.65	0.32	4.8	0.47	D	0.602	0.602	u	0.62	7/61	9.3E+01	N		Max. detect < PRG
IA-9	Calcium	40/40	mg/kg			2110	34700	8200	X	10100	10100	u	28900	1/40		N		Essential Nutrient (low conc.)
IA-9	Chromium	40/40	mg/kg			10	21.7	15.3	L	16.1	16.1	u	17.3	7/40	6.4E+01	N		Max. detect < PRG
IA-9	Cobalt	41/41	mg/kg			3.8	648	36.5	X	64.5	64.5	u	31.7	6/41	2.9E+03	N		Max. detect < PRG
IA-9	Copper	40/40	mg/kg			10	599	37.1	X	62.5	62.5	u	19.4	6/40	7.0E+03	N		Max. detect < PRG
IA-9	Iron	40/40	mg/kg			7760	26400	17900	N	18900	18900	u	26600	0/40	1.0E+05	N		Below Background
IA-9	Lead	40/40	mg/kg			7	201	24.6	X	34.5	34.5	u	79.7	4/40	1.0E+02	Y	Qual.	
IA-9	Lithium	39/40	mg/kg	3.15	3.15	4.9	12.5	7.82	N	8.35	8.35	u	8.1	16/40	3.7E+03	N		Max. detect < PRG
IA-9	Magnesium	43/43	mg/kg			2150	21600	6090	X	7170	7170	u	18400	1/43		N		Essential Nutrient (low conc.)
IA-9	Manganese	40/40	mg/kg			97.9	1990	652	L	828	828	u	2830	0/40	4.5E+03	N		Below Background
IA-9	Mercury	2/40	mg/kg	0.03	0.035	0.07	0.15	0.0344	D	0.0397	0.0397	u	0.69	0/40	5.6E+01	N		Below Background
IA-9	Molybdenum	18/61	mg/kg	0.44	12.6	1	59.1	5.79	D	7.66	7.66	u	22.7	2/61	9.4E+02	N		Max. detect < PRG
IA-9	Nickel	40/40	mg/kg			11.8	843	53.5	X	89.7	89.7	u	33.9	7/40	3.7E+03	N		Max. detect < PRG

Attachment 7. Determination of Subsurface Soil Potential Chemicals of Concern by Aggregate (Page 10 of 13)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Indust. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
IA-9	Potassium	40/40	mg/kg			459	1960	1140	L	1250	1250	u	1140	18/40		N		Essential Nutrient (low conc.)
IA-9	Selenium	7/61	mg/kg	0.155	12.6	0.45	134	6.49	D	10.2	10.2	u	0.55	6/61	9.4E+02	N		Max. detect < PRG
IA-9	Sodium	40/40	mg/kg			82	310	152	L	166	166	u	235	2/40		N		Essential Nutrient (low conc.)
IA-9	Strontium	40/40	mg/kg			14.9	79.2	24.9	X	27.7	27.7	u	26	12/40	1.0E+05	N		Max. detect < PRG
IA-9	Thallium	7/61	mg/kg	0.195	12.6	0.46	148	6.51	D	10.6	10.6	u	0	7/61	1.5E+01	Y	Quant.	
IA-9	Titanium	40/40	mg/kg			174	506	277	L	297	297	u	269	21/40		Y	Qual.	
IA-9	Uranium	3/40	mg/kg	4.8	8.1	36	112	11.6	D	16.3	16.3	u	0	3/40		Y	Quant.	
IA-9	Vanadium	40/40	mg/kg			14.6	97.7	30.8	X	34.2	34.2	u	31	16/40	1.3E+03	N		Max. detect < PRG
IA-9	Zinc	40/40	mg/kg			35.6	78.4	53	L	55.9	55.9	u	278	0/40	1.0E+05	N		Below Background
IA-9	Dalapon	1/39	mg/kg	0.024	0.0475	0.061	0.061	0.0265	D	0.0283	0.0283	u	0	1/39	3.2E+03	N		Max. detect < PRG
IA-9	MCPP	2/39	mg/kg	4.75	9.5	19	62	6.91	D	9.44	9.44	u	0	2/39	1.1E+02	N		Max. detect < PRG
IA-9	Silvex	1/39	mg/kg	0.012	0.0235	0.031	0.031	0.0133	D	0.0142	0.0142	u	0	1/39	8.6E+02	N		Max. detect < PRG
IA-9	4,4'-DDD	2/39	mg/kg	0.00195	1.05	0.0022	0.003	0.0558	D	0.119	0.003	m	0	2/39	1.9E+01	N		Max. detect < PRG
IA-9	4,4'-DDE	1/39	mg/kg	0.001	1.05	0.0035	0.0035	0.0558	D	0.119	0.0035	m	0	1/39	1.3E+01	N		Max. detect < PRG
IA-9	Dieldrin	4/40	mg/kg	0.001	1.05	0.0039	0.23	0.0628	D	0.125	0.125	u	0.0036	4/40	1.9E-01	Y	Quant.	
IA-9	PCB-1260	1/39	mg/kg	0.0195	10.5	0.041	0.041	0.559	D	1.19	0.041	m	0	1/39	1.3E+00	N		Max. detect < PRG
IA-9	Benz(a)anthracene	3/39	mg/kg	0.195	0.22	0.22	0.25	0.208	D	0.211	0.211	u	0.3	0/39	3.6E+00	N		Below Background
IA-9	Benzo(a)pyrene	2/39	mg/kg	0.195	0.22	0.083	0.099	0.2	D	0.207	0.099	m	0.34	0/39	3.6E-01	N		Below Background
IA-9	Benzo(b)fluoranthene	5/39	mg/kg	0.195	0.22	0.073	0.24	0.199	D	0.207	0.207	u	0.31	0/39	3.6E+00	N		Below Background
IA-9	Benzo(ghi)perylene	4/39	mg/kg	0.195	0.22	0.13	0.18	0.201	D	0.205	0.18	m	0.39	0/39		N		Below Background
IA-9	Bis(2-ethylhexyl)phthalate	20/39	mg/kg	0.195	0.21	0.024	0.32	0.202	X	0.223	0.223	u	0.18	14/39	2.1E+02	N		Max. detect < PRG
IA-9	Butyl benzyl phthalate	8/39	mg/kg	0.195	0.215	0.29	0.31	0.224	D	0.234	0.234	u	0.25	8/39	9.3E+02	N		Max. detect < PRG
IA-9	Chrysene	6/39	mg/kg	0.195	0.22	0.12	0.18	0.199	D	0.204	0.18	m	0.57	0/39	3.6E+02	N		Below Background
IA-9	Di-n-butyl phthalate	4/39	mg/kg	0.195	0.22	0.026	0.1	0.193	D	0.204	0.1	m	0	4/39	1.1E+04	N		Max. detect < PRG
IA-9	Di-n-octylphthalate	1/39	mg/kg	0.195	0.22	0.069	0.069	0.202	D	0.208	0.069	m	0	1/39	1.0E+04	N		Max. detect < PRG
IA-9	Fluoranthene	2/39	mg/kg	0.195	0.22	0.082	0.093	0.2	D	0.207	0.093	m	0.7	0/39	3.7E+03	N		Below Background
IA-9	Indeno(1,2,3-cd)pyrene	4/39	mg/kg	0.195	0.22	0.11	0.32	0.211	D	0.219	0.219	u	0.35	0/39	3.6E+00	N		Below Background
IA-9	Pyrene	6/39	mg/kg	0.195	0.22	0.16	0.24	0.208	D	0.212	0.212	u	0.66	0/39	2.6E+03	N		Below Background
IA-9	1,1,1-Trichloroethane	6/46	mg/kg	0.0025	0.0035	0.0013	0.0017	0.00279	D	0.00291	0.0017	m	0	6/46	1.4E+03	N		Max. detect < PRG
IA-9	2-Butanone	7/40	mg/kg	0.005	0.0275	0.007	0.22	0.017	D	0.0267	0.0267	u	0.023	5/40	2.7E+03	N		Max. detect < PRG
IA-9	Acetone	1/36	mg/kg	0.005	0.06	0.76	0.76	0.0312	D	0.0666	0.0666	u	0.017	1/36	6.1E+02	N		Max. detect < PRG
IA-9	Carbon disulfide	2/40	mg/kg	0.0025	0.0035	0.016	0.021	0.00375	D	0.00468	0.00468	u	0	2/40	1.2E+02	N		Max. detect < PRG
IA-9	Carbon tetrachloride	1/40	mg/kg	0.0025	0.0035	0.002	0.002	0.00295	D	0.00301	0.002	m	0	1/40	5.2E-01	N		Max. detect < PRG
IA-9	Dimethylbenzene	1/40	mg/kg	0.0025	0.0035	0.004	0.004	0.00301	D	0.00307	0.00307	u	0	1/40		N		<5% detected
IA-9	Toluene	13/48	mg/kg	0.0025	0.0035	0.001	0.029	0.00422	D	0.00543	0.00543	u	0.11	0/48	5.2E+02	N		Below Background
IA-9	Trichloroethene	3/40	mg/kg	0.0025	0.0035	0.001	0.006	0.00298	D	0.00314	0.00314	u	0	3/40	6.1E+00	N		Max. detect < PRG
IA-9	Actinium-227	106/140	pCi/g	-0.02	0.22	0.09	189.9	2.85	Z	5.3	5.3	u	0.82	12/140		Y	Quant.	
IA-9	Americium-241	3/140	pCi/g	-2.29	0.44	0.06	0.12	0.017	D	0.0453	0.0453	u	0	3/140		N		<5% detected
IA-9	Cesium-137	16/140	pCi/g	-0.03	0.31	0.02	0.7	0.0191	D	0.0307	0.0307	u	0.57	1/140		Y	Quant.	
IA-9	Potassium-40	140/140	pCi/g			1.51	25.96	15.3	X	15.6	15.6	u	16.8	23/140		Y	Quant.	
IA-9	Protactinium-231	21/140	pCi/g	-0.46	1.1	1.02	217.1	3.23	D	6.05	6.05	u	1.13	20/140		Y	Quant.	
IA-9	Radium-226	420/427	pCi/g	0	1	0.15	230.7	2.29	Z	3.28	3.28	u	1.55	105/427		Y	Quant.	
IA-9	Radium-228	140/140	pCi/g			0.15	2.79	0.969	X	1	1	u	1.24	6/140		Y	Quant.	
IA-9	Thorium-228	139/140	pCi/g	0.93	0.93	0.6	15.78	1.38	X	1.56	1.56	u	2.04	8/140		Y	Quant.	
IA-9	Thorium-230	402/407	pCi/g	0.5	1.4	0.6	10140	57.2	X	105	105	u	2.89	132/407		Y	Quant.	
IA-9	Thorium-232	404/427	pCi/g	0.2	2.25	0.5	10.93	1.65	L	1.7	1.7	u	1.83	142/427		Y	Quant.	
IA-9	Uranium-235	30/140	pCi/g	-0.07	0.22	0.18	20.23	0.555	D	0.881	0.881	u	0.25	20/140		Y	Quant.	
IA-9	Uranium-238	13/427	pCi/g	0	24	2	119.7	6.03	D	6.64	6.64	u	2.02	12/427		N		<5% detected
ROAD ROW	Aluminum	1/1	mg/kg			15800	15800	15800	D		15800	m	14700	1/1	1.0E+05	N		Max. detect < PRG

Attachment 7. Determination of Subsurface Soil Potential Chemicals of Concern by Aggregate (Page 11 of 13)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL$_{95}$	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Indust. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
ROAD ROW	Arsenic	1/1	mg/kg			23.2	23.2	23.2	D		23.2	m	18	1/1	3.0E+00	Y	Quant.	
ROAD ROW	Barium	1/1	mg/kg			350	350	350	D		350	m	279	1/1	1.0E+05	N		Max. detect < PRG
ROAD ROW	Beryllium	1/1	mg/kg			1.5	1.5	1.5	D		1.5	m	0.83	1/1	3.4E+02	N		Max. detect < PRG
ROAD ROW	Boron	1/1	mg/kg			18.8	18.8	18.8	D		18.8	m	9.9	1/1	9.6E+03	N		Max. detect < PRG
ROAD ROW	Calcium	1/1	mg/kg			5050	5050	5050	D		5050	m	28900	0/1		N		Below Background
ROAD ROW	Chromium	1/1	mg/kg			19.8	19.8	19.8	D		19.8	m	17.3	1/1	6.4E+01	N		Max. detect < PRG
ROAD ROW	Cobalt	1/1	mg/kg			35.1	35.1	35.1	D		35.1	m	31.7	1/1	2.9E+03	N		Max. detect < PRG
ROAD ROW	Copper	1/1	mg/kg			22.9	22.9	22.9	D		22.9	m	19.4	1/1	7.0E+03	N		Max. detect < PRG
ROAD ROW	Iron	1/1	mg/kg			52100	52100	52100	D		52100	m	26600	1/1	1.0E+05	N		Essential Nutrient (low conc.)
ROAD ROW	Lead	1/1	mg/kg			39.5	39.5	39.5	D		39.5	m	79.7	0/1	1.0E+02	N		Below Background
ROAD ROW	Lithium	1/1	mg/kg			9.1	9.1	9.1	D		9.1	m	8.1	1/1	3.7E+03	N		Max. detect < PRG
ROAD ROW	Magnesium	1/1	mg/kg			2770	2770	2770	D		2770	m	18400	0/1		N		Below Background
ROAD ROW	Manganese	1/1	mg/kg			6320	6320	6320	D		6320	m	2830	1/1	4.5E+03	Y	Quant.	
ROAD ROW	Molybdenum	1/1	mg/kg			2.1	2.1	2.1	D		2.1	m	22.7	0/1	9.4E+02	N		Below Background
ROAD ROW	Nickel	1/1	mg/kg			32.9	32.9	32.9	D		32.9	m	33.9	0/1	3.7E+03	N		Below Background
ROAD ROW	Potassium	1/1	mg/kg			1160	1160	1160	D		1160	m	1140	1/1		N		Essential Nutrient (low conc.)
ROAD ROW	Sodium	1/1	mg/kg			932	932	932	D		932	m	235	1/1		N		Essential Nutrient (low conc.)
ROAD ROW	Strontium	1/1	mg/kg			21.8	21.8	21.8	D		21.8	m	26	0/1	1.0E+05	N		Below Background
ROAD ROW	Thallium	1/1	mg/kg			7.2	7.2	7.2	D		7.2	m	0	1/1	1.5E+01	N		Max. detect < PRG
ROAD ROW	Titanium	1/1	mg/kg			293	293	293	D		293	m	269	1/1		Y	Qual.	
ROAD ROW	Vanadium	1/1	mg/kg			65.3	65.3	65.3	D		65.3	m	31	1/1	1.3E+03	N		Max. detect < PRG
ROAD ROW	Zinc	1/1	mg/kg			73	73	73	D		73	m	278	0/1	1.0E+05	N		Below Background
ROAD ROW	MCPP	1/1	mg/kg			120	120	120	D		120	m	0	1/1	1.1E+02	Y	Quant.	
ROAD ROW	alpha-Chlordane	1/2	mg/kg	0.00115	0.00115	0.03	0.03	0.0156	D	0.107	0.03	m	0.014	1/2	1.2E+01	N		Max. detect < PRG
ROAD ROW	Fluoranthene	1/1	mg/kg			0.1	0.1	0.1	D		0.1	m	0.7	0/1	3.7E+03	N		Below Background
ROAD ROW	Pyrene	1/1	mg/kg			0.32	0.32	0.32	D		0.32	m	0.66	0/1	2.6E+03	N		Below Background
ROAD ROW	2-Butanone	1/1	mg/kg			0.024	0.024	0.024	D		0.024	m	0.023	1/1	2.7E+03	N		Max. detect < PRG
ROAD ROW	Acetone	1/1	mg/kg			0.077	0.077	0.077	D		0.077	m	0.017	1/1	6.1E+02	N		Max. detect < PRG
ROAD ROW	Toluene	1/1	mg/kg			0.004	0.004	0.004	D		0.004	m	0.11	0/1	5.2E+02	N		Below Background
ROAD ROW	Radium-226	1359/1381	pCi/g	0.7	4	0.4	39.9	1.99	X	2.07	2.07	u	1.55	789/1381		Y	Quant.	
ROAD ROW	Thorium-230	2328/2371	pCi/g	0.3	1.5	0.3	1100	11.7	X	13.4	13.4	u	2.89	706/2371		Y	Quant.	
ROAD ROW	Thorium-232	1199/1376	pCi/g	0.1	9	0.4	64	2.19	X	2.28	2.28	u	1.83	745/1376		Y	Quant.	
ROAD ROW	Uranium-238	11/1379	pCi/g	0	69	2.1	48.2	11.3	D	11.6	11.6	u	2.02	11/1379		N		<5% detected
SLAPS	Fluoride	31/31	mg/kg			2.26	62.9	9.57	X	14.1	14.1	u		NA	6.4E+03	N		Max. detect < PRG
SLAPS	Sulfide	5/31	mg/kg	0.00655	14.1	13.8	23.8	9.46	D	11.2	11.2	u		NA		Y	Qual.	
SLAPS	Aluminum	61/61	mg/kg			5810	23200	10700	L	11500	11500	u	14700	9/61	1.0E+05	N		Max. detect < PRG
SLAPS	Antimony	3/149	mg/kg	0.19	11.9	3.8	53.2	4.94	D	5.57	5.57	u	5.2	2/149	7.5E+01	N		Max. detect < PRG
SLAPS	Arsenic	64/64	mg/kg			2	237	14.6	X	22.6	22.6	u	18	4/64	3.0E+00	Y	Quant.	
SLAPS	Barium	66/66	mg/kg			40.6	13600	678	X	1160	1160	u	279	8/66	1.0E+05	N		Max. detect < PRG
SLAPS	Beryllium	20/61	mg/kg	0.245	0.48	0.55	2.4	0.545	D	0.628	0.628	u	0.83	15/61	3.4E+02	N		Max. detect < PRG
SLAPS	Boron	56/61	mg/kg	1.15	5.8	2.3	14.8	7.93	N	8.58	8.58	u	9.9	14/61	9.6E+03	N		Max. detect < PRG
SLAPS	Cadmium	26/149	mg/kg	0.14	1	0.32	50.4	0.952	D	1.52	1.52	u	0.62	18/149	9.3E+01	N		Max. detect < PRG
SLAPS	Calcium	61/61	mg/kg			2450	81300	17300	X	20500	20500	u	28900	13/61		N		Essential Nutrient (low conc.)
SLAPS	Chromium	62/62	mg/kg			10.3	3240	69.3	X	156	156	u	17.3	27/62	6.4E+01	Y	Quant.	
SLAPS	Cobalt	84/84	mg/kg			3.7	6050	186	X	328	328	u	31.7	26/84	2.9E+03	Y	Qual.	
SLAPS	Copper	72/73	mg/kg	5.85	5.85	6.1	4400	160	X	281	281	u	19.4	19/73	7.0E+03	N		Max. detect < PRG
SLAPS	Iron	61/61	mg/kg			2600	30200	17500	N	18600	18600	u	26600	4/61	1.0E+05	N		Essential Nutrient (low conc.)
SLAPS	Lead	67/67	mg/kg			6	1200	68.3	X	111	111	u	79.7	7/67	1.0E+02	Y	Qual.	
SLAPS	Lithium	57/61	mg/kg	3	4.25	5.1	14.6	7.73	N	8.17	8.17	u	8.1	21/61	3.7E+03	N		Max. detect < PRG

Attachment 7. Determination of Subsurface Soil Potential Chemicals of Concern by Aggregate (Page 12 of 13)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Indust. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
SLAPS	Magnesium	92/92	mg/kg			21	26900	10500	X	11500	11500	u	18400	12/92		N		Essential Nutrient (low conc.)
SLAPS	Manganese	61/61	mg/kg			83.1	2030	571	L	723	723	u	2830	0/61	4.5E+03	N		Below Background
SLAPS	Mercury	7/61	mg/kg	0.03	0.035	0.07	2.1	0.103	D	0.171	0.171	u	0.69	3/61	5.6E+01	N		Max. detect < PRG
SLAPS	Molybdenum	46/149	mg/kg	0.415	19.85	1	255	13.8	D	17.9	17.9	u	22.7	14/149	9.4E+02	N		Max. detect < PRG
SLAPS	Nickel	65/65	mg/kg			8.7	7570	260	X	491	491	u	33.9	9/65	3.7E+03	Y	Quant.	
SLAPS	Potassium	61/61	mg/kg			436	4230	976	L	1060	1060	u	1140	13/61		N		Essential Nutrient (low conc.)
SLAPS	Selenium	31/149	mg/kg	0.15	19.85	0.38	183	8.79	D	11.1	11.1	u	0.55	26/149	9.4E+02	N		Max. detect < PRG
SLAPS	Silver	1/61	mg/kg	0.34	0.44	0.81	0.81	0.39	D	0.402	0.402	u	2.6	0/61	9.4E+02	N		Below Background
SLAPS	Sodium	61/61	mg/kg			78.5	534	221	X	240	240	u	235	27/61		N		Essential Nutrient (low conc.)
SLAPS	Strontium	61/61	mg/kg			11.1	210	29.8	X	36	36	u	26	20/61	1.0E+05	N		Max. detect < PRG
SLAPS	Thallium	40/149	mg/kg	0.205	19.85	0.53	3.3	6.86	D	7.54	3.3	m	0	40/149	1.5E+01	N		Max. detect < PRG
SLAPS	Titanium	61/61	mg/kg			66.2	416	267	N	280	280	u	269	25/61		Y	Qual.	
SLAPS	Uranium	10/61	mg/kg	6.9	8.95	11.1	155	14.8	D	20.3	20.3	u	0	10/61		Y	Quant.	
SLAPS	Vanadium	63/64	mg/kg	10.1	10.1	17.2	862	65.2	X	97.9	97.9	u	31	30/64	1.3E+03	N		Max. detect < PRG
SLAPS	Zinc	63/63	mg/kg			26.7	4330	124	X	239	239	u	278	2/63	1.0E+05	N		Max. detect < PRG
SLAPS	Dalapon	1/38	mg/kg	0.0225	0.05	0.15	0.15	0.0292	D	0.0348	0.0348	u	0	1/38	3.2E+03	N		Max. detect < PRG
SLAPS	MCPA	2/38	mg/kg	4.5	23.5	19	49	6.99	D	9.16	9.16	u	0	2/38	5.3E+01	N		Max. detect < PRG
SLAPS	MCPP	1/38	mg/kg	4.5	10.5	11	11	5.29	D	5.65	5.65	u	0	1/38	1.1E+02	N		Max. detect < PRG
SLAPS	Silvex	4/38	mg/kg	0.0115	0.026	0.049	0.083	0.0189	D	0.0237	0.0237	u	0	4/38	8.6E+02	N		Max. detect < PRG
SLAPS	Toxaphene	1/36	mg/kg	0.042	0.5	0.05	0.05	0.112	D	0.131	0.05	m	0	1/36	2.7E+00	N		Max. detect < PRG
SLAPS	2-Methylnaphthalene	1/38	mg/kg	0.185	0.225	0.1	0.1	0.205	D	0.211	0.1	m	0	1/38		N		<5% detected
SLAPS	Benz(a)anthracene	5/38	mg/kg	0.19	0.225	0.09	0.26	0.203	D	0.211	0.211	u	0.3	0/38	3.6E+00	N		Below Background
SLAPS	Benzo(a)pyrene	3/38	mg/kg	0.19	0.225	0.077	0.18	0.202	D	0.21	0.18	m	0.34	0/38	3.6E-01	N		Below Background
SLAPS	Benzo(b)fluoranthene	1/38	mg/kg	0.185	0.225	0.083	0.083	0.205	D	0.211	0.083	m	0.31	0/38	3.6E+00	N		Below Background
SLAPS	Benzo(ghi)perylene	1/38	mg/kg	0.19	0.225	0.19	0.19	0.208	D	0.21	0.19	m	0.39	0/38		N		Below Background
SLAPS	Benzo(k)fluoranthene	1/38	mg/kg	0.19	0.225	0.066	0.066	0.205	D	0.212	0.066	m	0.29	0/38	3.6E+01	N		Below Background
SLAPS	Bis(2-ethylhexyl)phthalate	1/38	mg/kg	0.185	0.295	0.17	0.17	0.21	D	0.214	0.17	m	0.18	0/38	2.1E+02	N		Below Background
SLAPS	Butyl benzyl phthalate	6/38	mg/kg	0.185	0.225	0.1	0.31	0.211	D	0.221	0.221	u	0.25	4/38	9.3E+02	N		Max. detect < PRG
SLAPS	Chrysene	4/38	mg/kg	0.19	0.225	0.051	0.21	0.201	D	0.209	0.209	u	0.57	0/38	3.6E+02	N		Below Background
SLAPS	Di-n-octylphthalate	2/38	mg/kg	0.185	0.225	0.13	0.15	0.205	D	0.209	0.15	m	0	2/38	1.0E+04	N		Max. detect < PRG
SLAPS	Fluoranthene	6/38	mg/kg	0.19	0.225	0.077	0.31	0.198	D	0.21	0.21	u	0.7	0/38	3.7E+03	N		Below Background
SLAPS	Indeno(1,2,3-cd)pyrene	3/38	mg/kg	0.19	0.225	0.089	0.18	0.202	D	0.21	0.18	m	0.35	0/38	3.6E+00	N		Below Background
SLAPS	Naphthalene	1/38	mg/kg	0.185	0.225	0.13	0.13	0.206	D	0.21	0.13	m	0	1/38	1.9E+01	N		Max. detect < PRG
SLAPS	Phenanthrene	6/38	mg/kg	0.19	0.225	0.042	0.23	0.195	D	0.207	0.207	u	0.28	0/38		N		Below Background
SLAPS	Pyrene	7/38	mg/kg	0.19	0.225	0.046	0.37	0.214	D	0.227	0.227	u	0.66	0/38	2.6E+03	N		Below Background
SLAPS	1,2-Dichloroethane	1/38	mg/kg	0.0025	0.0035	0.001	0.001	0.00295	D	0.00304	0.001	m	0.009	0/38	7.6E-01	N		Below Background
SLAPS	1,2-Dichloroethene	2/38	mg/kg	0.0025	0.0035	0.003	0.022	0.00349	D	0.00433	0.00433	u	0	2/38		Y	Quant.	
SLAPS	2-Butanone	3/38	mg/kg	0.005	0.0125	0.001	0.013	0.00649	D	0.00697	0.00697	u	0.023	0/38	2.7E+03	N		Below Background
SLAPS	Acetone	5/36	mg/kg	0.006	0.06	0.005	0.028	0.0127	D	0.0156	0.0156	u	0.017	2/36	6.1E+02	N		Max. detect < PRG
SLAPS	Dimethylbenzene	2/38	mg/kg	0.0025	0.0035	0.006	0.01	0.00325	D	0.00359	0.00359	u	0	2/38		Y	Quant.	
SLAPS	Methylene chloride	3/37	mg/kg	0.0025	0.018	0.001	0.13	0.0104	D	0.0185	0.0185	u	0.007	2/37	2.0E+01	N		Max. detect < PRG
SLAPS	Toluene	31/64	mg/kg	0.0025	0.0035	0.001	1.2	0.0493	D	0.0886	0.0886	u	0.11	6/64	5.2E+02	N		Max. detect < PRG
SLAPS	Trichloroethene	9/44	mg/kg	0.0025	0.0035	0.0016	0.058	0.00578	D	0.00863	0.00863	u	0	9/44	6.1E+00	N		Max. detect < PRG
SLAPS	trans-1,2-Dichloroethene	5/5	mg/kg			0.0013	0.0077	0.0034	L	0.0119	0.0077	m		NA	2.1E+01	N		Max. detect < PRG
SLAPS	Actinium-227	222/337	pCi/g	-0.13	2.6	0.16	292.7	2.7	Z	4.39	4.39	u	0.82	46/337		Y	Quant.	
SLAPS	Americium-241	22/332	pCi/g	-5.04	0.35	0.06	4.69	0.0758	D	0.12	0.12	u	0	22/332		Y	Quant.	
SLAPS	Cesium-137	14/332	pCi/g	-0.03	0.21	0.03	3.09	0.0206	D	0.0401	0.0401	u	0.57	2/332		N		<5% detected
SLAPS	Potassium-40	330/332	pCi/g	5.21	8.43	7.64	25.2	15.5	X	15.7	15.7	u	16.8	59/332		Y	Quant.	
SLAPS	Protactinium-231	34/337	pCi/g	-0.48	5.2	1.2	346.4	2.8	D	4.76	4.76	u	1.13	34/337		Y	Quant.	
SLAPS	Radium-226	649/874	pCi/g	0.3	5.3	0.5	5620	31	X	44.5	44.5	u	1.55	283/874		Y	Quant.	

Attachment 7. Determination of Subsurface Soil Potential Chemicals of Concern by Aggregate (Page 13 of 13)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Indust. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
SLAPS	Radium-228	331/332	pCi/g	0.95	0.95	0.42	4.82	0.958	X	0.985	0.985	u	1.24	14/332		Y	Quant.	
SLAPS	Thorium-228	331/332	pCi/g	1.04	1.04	0.57	4.82	1.26	X	1.3	1.3	u	2.04	8/332		Y	Quant.	
SLAPS	Thorium-230	623/626	pCi/g	0	0.05	0	14680	159	Z	221	221	u	2.89	353/626		Y	Quant.	
SLAPS	Thorium-232	554/872	pCi/g	0.4	50.4	0.4	63	2.32	X	2.5	2.5	u	1.83	110/872		Y	Quant.	
SLAPS	Uranium-235	138/332	pCi/g	-0.05	0.31	0.17	82.19	0.975	D	1.47	1.47	u	0.25	99/332		Y	Quant.	
SLAPS	Uranium-238	162/872	pCi/g	-1.76	352	3.04	1769	35.6	D	42.3	42.3	u	2.02	162/872		Y	Quant.	

UCL95 = 95% upper confidence limit on the mean concentration

PRG = Preliminary Remediation Goal

PCOC = Potential Contaminant of Concern

[a] Distribution flags:

D = Not determined because fewer than 5 detects or < 50% detects; t-statistic used in calculations of UCL_{95}.

L = Lognormal; H-statistic used in calculations of UCL_{95}.

N = Normal; t-statistic used in calculations of UCL_{95}.

X = Neither normal nor lognormal; t-statistic used in calculations of UCL_{95}.

Z = Contains concentrations that are negative and/or zero; t-statistic used in calculations of UCL_{95}.

[b] Basis for determining the exposure concentration:

m = maximum detected concentration.

u = 95% upper confidence limit on the mean concentration.

[c] EPA Region IX industrial soil PRG, based on a risk level of 10^{-6} or a hazard level of 0.1 (note that Region IX noncarcinogenic PRGs are provided for a hazard level of 1.0; these values have been adjusted to a hazard level of 0.1 for this screening).

[d] Based on the lack of available toxicity information, some PCOCs were evaluated qualitatively;

Qual. = Qualitative

Quant. = Quantitative.

[e] Justification for eliminating the analyte from the PCOC list.

Attachment 8. Determination of Ground-Water Potential Chemicals of Concern by Aggregate (Page 1 of 5)
(only detected analytes are shown)

Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc.[b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Tap Water PRG[c]	PCOC	Type PCOC[d]	Justification[e]
HISS/DEEP																	
Chloride	2/2	mg/L			0.73	1.09	0.91	D	2.05	1.09	m	1.21	0/2		N		Below Background
Nitrate	1/3	mg/L	0.025	0.05	0.11	0.11	0.0617	D	0.135	0.11	m	0.1	1/3	1.0E+00	N		Max. detect < PRG
Ammonia	3/3	mg/L			9.31	12.5	10.5	D	13.4	12.5	m	6.7	3/3		Y	Quant.	
Phosphorous	2/2	mg/L			0.441	0.506	0.474	D	0.679	0.506	m	1.24	0/2		N		Below Background
Silicon	1/1	mg/L			10.2	10.2	10.2	D		10.2	m	8.36	1/1		Y	Qual.	
Arsenic	3/3	mg/L			0.016	0.0358	0.0259	D	0.0426	0.0358	m	0.0827	0/3	4.5E-05	N		Below Background
Barium	3/3	mg/L			0.619	0.862	0.779	D	1.01	0.862	m	0.424	3/3	2.6E-01	Y	Quant.	
Boron	3/3	mg/L			0.28	0.328	0.303	D	0.343	0.328	m	0.214	3/3	3.3E-01	N		Max. detect < PRG
Calcium	3/3	mg/L			109	125	118	D	131	125	m	113	2/3		N		Essential Nutrient (low conc.)
Cobalt	1/3	mg/L	0.0017	0.00255	0.0022	0.0022	0.00215	D	0.00287	0.0022	m	0	1/3	2.2E-01	N		Max. detect < PRG
Iron	3/3	mg/L			9.92	19.2	13	D	22	19.2	m	15.2	1/3	1.1E+00	N		Essential Nutrient (low conc.)
Lithium	1/2	mg/L	0.04115	0.04115	0.201	0.201	0.121	D	0.626	0.201	m	0	1/2	7.3E-02	Y	Qual.	
Magnesium	3/3	mg/L			46.9	54.3	51.4	D	58.1	54.3	m	42.6	3/3		N		Essential Nutrient (low conc.)
Manganese	3/3	mg/L			0.609	0.848	0.707	D	0.918	0.848	m	0.231	3/3	1.7E-01	Y	Quant.	
Molybdenum	1/3	mg/L	0.0036	0.00565	0.0011	0.0011	0.00345	D	0.00729	0.0011	m	0	1/3	1.8E-02	N		Max. detect < PRG
Nickel	1/3	mg/L	0.0043	0.0079	0.0051	0.0051	0.00577	D	0.00895	0.0051	m	0.0011	1/3	7.3E-02	N		Max. detect < PRG
Potassium	3/3	mg/L			18	35.3	24.6	D	40.4	35.3	m	3.51	3/3		N		Essential Nutrient (low conc.)
Silver	1/3	mg/L	0.001	0.00275	0.0083	0.0083	0.00402	D	0.0104	0.0083	m	0	1/3	1.8E-02	N		Max. detect < PRG
Sodium	3/3	mg/L			85.2	93.3	88.7	D	95.7	93.3	m	51	3/3		N		Essential Nutrient (low conc.)
Strontium	3/3	mg/L			1.1	1.7	1.39	D	1.89	1.7	m	0.742	3/3	2.2E+00	N		Max. detect < PRG
Thallium	1/3	mg/L	0.0014	0.0025	0.0028	0.0028	0.00223	D	0.00348	0.0028	m	0	1/3	2.9E-04	Y	Quant.	
Uranium	1/3	mg/L	0.03565	0.0675	0.0000786	0.0000786	0.0344	D	0.0913	0.0000786	m	0.000038	1/3		Y	Quant.	
Zinc	1/3	mg/L	0.0031	0.0058	0.0067	0.0067	0.0052	D	0.00836	0.0067	m	0.0549	0/3	1.1E+00	N		Below Background
Dalapon	1/2	mg/L	0.001	0.001	0.0051	0.0051	0.00305	D	0.016	0.0051	m	0	1/2	1.1E-01	N		Max. detect < PRG
MCPP	1/1	mg/L			0.47	0.47	0.47	D		0.47	m	0	1/1	3.7E-03	Y	Quant.	
Bis(2-ethylhexyl)phthalate	1/3	mg/L	0.005	0.005	0.002	0.002	0.004	D	0.00692	0.002	m	0.001	1/3	4.8E-03	N		Max. detect < PRG
Lead-210	1/1	pCi/L			2.57	2.57	2.57	D		2.57	m	0.502	1/1		Y	Quant.	
Radium-226	2/2	pCi/L			0.777	1.88	1.33	D	4.81	1.88	m	1.03	1/2		Y	Quant.	
Thorium-230	1/2	pCi/L	0.0207	0.0207	2.24	2.24	1.13	D	8.14	2.24	m	0.63	1/2		Y	Quant.	
HISS/SHALLOW																	
Chloride	37/37	mg/L			3.4	763	69.4	X	110	110	u	13.4	29/37		N		Essential Nutrient (low conc.)
Fluoride	19/41	mg/L	0.1	0.25	0.2	2.3	0.378	D	0.471	0.471	u	0.247	16/41	2.2E-01	Y	Quant.	
Nitrate	40/45	mg/L	0.025	0.05	1.41	2920	242	X	367	367	u	0.72	40/45	1.0E+00	Y	Quant.	
Nitrite	3/24	mg/L	0.0175	0.05	0.022	3.33	0.222	D	0.464	0.464	u	0	3/24	1.0E-01	Y	Quant.	
Sulfate	45/45	mg/L			3.84	281	104	X	120	120	u	376	0/45		N		Below Background
Ammonia	3/43	mg/L	0.025	0.5	1.52	5.7	0.421	D	0.651	0.651	u	0.292	3/43		Y	Quant.	
Phosphorous	25/28	mg/L	0.025	0.025	0.0593	0.882	0.125	X	0.18	0.18	u	0.0818	14/28		N		Essential Nutrient (low conc.)
Silicon	15/15	mg/L			5.66	10.8	8.85	N	9.38	9.38	u	7.95	13/15		Y	Qual.	
Aluminum	2/43	mg/L	0.004	0.14	0.675	1.39	0.068	D	0.127	0.127	u	0	2/43	3.7E+00	N		Max. detect < PRG
Arsenic	4/43	mg/L	0.0009	0.00375	0.0025	0.136	0.00722	D	0.0136	0.0136	u	0	4/43	4.5E-05	Y	Quant.	
Barium	43/43	mg/L			0.0712	0.78	0.223	L	0.26	0.26	u	0.198	20/43	2.6E-01	Y	Quant.	
Boron	20/43	mg/L	0.0066	0.0605	0.0286	0.156	0.0545	D	0.065	0.065	u	0.0638	15/43	3.3E-01	N		Max. detect < PRG
Cadmium	4/43	mg/L	0.00015	0.0105	0.0008	0.0049	0.00171	D	0.00227	0.00227	u	0.00042	4/43	1.8E-03	Y	Quant.	
Calcium	43/43	mg/L			68	1680	280	X	370	370	u	122	22/43		N		Essential Nutrient (low conc.)
Chromium	2/43	mg/L	0.0005	0.012	0.0026	0.0253	0.00217	D	0.00322	0.00322	u	0.013	1/43	1.8E-02	N		<5% detected
Cobalt	10/43	mg/L	0.0004	0.01275	0.00085	0.006	0.00214	D	0.00272	0.00272	u	0	10/43	2.2E-01	N		Max. detect < PRG
Copper	7/42	mg/L	0.0007	0.00975	0.0019	0.078	0.00388	D	0.00696	0.00696	u	0.0056	1/42	1.4E-01	N		Max. detect < PRG
Iron	16/43	mg/L	0.01	0.0675	0.141	11.3	0.69	D	1.26	1.26	u	0	16/43	1.1E+00	N		Essential Nutrient (low conc.)
Lead	3/43	mg/L	0.00045	0.0008	0.0017	0.0073	0.000849	D	0.00112	0.00112	u	0	3/43	4.0E-04	Y	Qual.	
Lithium	3/42	mg/L	0.0039	0.0335	0.0091	0.013	0.0108	D	0.013	0.013	u	0.0134	0/42	7.3E-02	N		Below Background
Magnesium	43/43	mg/L			19.3	367	90.1	X	111	111	u	57	20/43		N		Essential Nutrient (low conc.)
Manganese	26/39	mg/L	0.00015	0.0054	0.0193	3.98	0.343	L	4.49	3.98	m	1.58	3/39	1.7E-01	Y	Quant.	

Attachment 8. Determination of Ground-Water Potential Chemicals of Concern by Aggregate (Page 2 of 5)
(only detected analytes are shown)

Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Tap Water PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Molybdenum	21/43	mg/L	0.00045	0.018	0.0012	0.03	0.00616	D	0.00785	0.00785	u	0	21/43	1.8E-02	Y	Quant.	
Nickel	14/43	mg/L	0.00035	0.0395	0.0013	0.0129	0.00636	D	0.00802	0.00802	u	0	14/43	7.3E-02	N		Max. detect < PRG
Potassium	15/45	mg/L	0.08	5.5	0.525	35.4	2.18	D	3.5	3.5	u	2.17	5/45		N		Essential Nutrient (low conc.)
Selenium	30/43	mg/L	0.0012	0.0045	0.0081	0.513	0.11	X	0.146	0.146	u	0	30/43	1.8E-02	Y	Quant.	
Silver	1/43	mg/L	0.0005	0.01375	0.0352	0.0352	0.00283	D	0.00424	0.00424	u	0	1/43	1.8E-02	N		<5% detected
Sodium	45/45	mg/L			18.4	365	74.5	X	93	93	u	22	39/45		N		Essential Nutrient (low conc.)
Strontium	42/42	mg/L			0.198	5.74	0.876	X	1.16	1.16	u	0.323	29/42	2.2E+00	Y	Quant.	
Thallium	1/43	mg/L	0.00135	0.0025	0.004	0.004	0.00182	D	0.00199	0.00199	u	0	1/43	2.9E-04	N		<5% detected
Titanium	1/28	mg/L	0.0005	0.00225	0.0134	0.0134	0.00141	D	0.00218	0.00218	u	0	1/28		N		<5% detected
Uranium	19/45	mg/L	0.03565	0.337	0.000794	0.313	0.0553	D	0.0739	0.0739	u	0.00253	16/45		Y	Quant.	
Vanadium	7/43	mg/L	0.00055	0.01205	0.0011	0.125	0.00907	D	0.0149	0.0149	u	0	7/43	2.6E-02	Y	Quant.	
Zinc	16/43	mg/L	0.0024	0.01185	0.0024	0.583	0.0234	D	0.0461	0.0461	u	0.0142	8/43	1.1E+00	N		Max. detect < PRG
Dalapon	1/10	mg/L	0.001	0.001	0.0026	0.0026	0.00116	D	0.00145	0.00145	u	0	1/10	1.1E-01	N		Max. detect < PRG
Endosulfan I	1/15	mg/L	0.000025	0.000025	0.000076	0.000076	0.0000284	D	0.0000344	0.0000344	u	0	1/15		Y	Qual.	
alpha-Chlordane	1/15	mg/L	0.000025	0.000025	0.000082	0.000082	0.0000288	D	0.0000355	0.0000355	u	0	1/15	1.9E-04	N		Max. detect < PRG
Bis(2-ethylhexyl)phthalate	1/31	mg/L	0.0005	0.005	0.16	0.16	0.00806	D	0.0167	0.0167	u	0.006	1/31	4.8E-03	N		<5% detected
Diethyl phthalate	2/31	mg/L	0.005	0.005	0.001	0.001	0.00474	D	0.00505	0.001	m	0	2/31	2.9E+00	N		Max. detect < PRG
1,1,1-Trichloroethane	1/41	mg/L	0.0005	0.0025	0.021	0.021	0.00212	D	0.00296	0.00296	u	0	1/41	7.9E-02	N		Max. detect < PRG
1,2-Dichloroethene	2/41	mg/L	0.0005	0.025	0.002	0.003	0.00227	D	0.00326	0.003	m	0	2/41		N		<5% detected
Bromodichloromethane	2/41	mg/L	0.0005	0.025	0.001	0.001	0.00215	D	0.00314	0.001	m	0	2/41	1.8E-04	N		<5% detected
Chloroethane	1/41	mg/L	0.0005	0.05	0.002	0.002	0.00416	D	0.00617	0.002	m	0	1/41	8.6E-01	N		Max. detect < PRG
Chloroform	9/41	mg/L	0.0002	0.0025	0.001	0.077	0.00341	D	0.00652	0.00652	u	0	9/41	1.6E-04	Y	Quant.	
Chloromethane	4/41	mg/L	0.0005	0.05	0.002	0.005	0.00401	D	0.00603	0.005	m	0	4/41	1.5E-03	Y	Quant.	
Dimethylbenzene	3/41	mg/L	0.0005	0.025	0.006	0.026	0.00345	D	0.00509	0.00509	u	0	3/41		Y	Quant.	
Ethylbenzene	3/41	mg/L	0.0005	0.025	0.001	0.007	0.00233	D	0.00334	0.00334	u	0	3/41	1.3E-01	N		Max. detect < PRG
Methylene chloride	1/41	mg/L	0.0005	0.006	0.12	0.12	0.00513	D	0.00998	0.00998	u	0	1/41	4.3E-03	N		<5% detected
Toluene	5/41	mg/L	0.0005	0.025	0.001	0.014	0.00248	D	0.00358	0.00358	u	0	5/41	7.2E-02	N		Max. detect < PRG
Trichloroethene	7/41	mg/L	0.0005	0.0025	0.002	1.3	0.0731	D	0.138	0.138	u	0	7/41	1.6E-03	Y	Quant.	
Lead-210	14/17	pCi/L	0.598	1.18	0.87	3.8	1.49	L	1.84	1.84	u	0.617	14/17		Y	Quant.	
Radium-226	11/41	pCi/L	-0.5	2.05	0.163	2.11	0.258	D	0.389	0.389	u	0.91	1/41		Y	Quant.	
Radium-228	1/17	pCi/L	-0.0545	0.0317	0.112	0.112	0.0106	D	0.0242	0.0242	u	0.00155	1/17		Y	Quant.	
Thorium-228	2/37	pCi/L	-0.21	1.11	0.112	1.77	0.182	D	0.29	0.29	u	0.66	1/37		Y	Quant.	
Thorium-230	13/36	pCi/L	-0.14	2.06	0.106	5.77	1.04	D	1.43	1.43	u	1.18	9/36		Y	Quant.	
Uranium-234	17/23	pCi/L	-0.31	1.69	1.18	130.3	12.2	Z	23.4	23.4	u	6.07	5/23		Y	Quant.	
Uranium-235	2/24	pCi/L	-0.75	0.97	1.87	6.57	0.432	D	0.918	0.918	u	0.47	2/24		Y	Quant.	
Uranium-238	12/19	pCi/L	0	1.29	1.29	122.4	13.5	Z	26.2	26.2	u	2.28	7/19		Y	Quant.	
SLAPS/DEEP																	
Chloride	29/44	mg/L	0.2	0.5	0.299	12.7	1.34	X	1.81	1.81	u	1.21	19/44		N		Essential Nutrient (low conc.)
Fluoride	22/46	mg/L	0.006	0.25	0.23	1.2	0.373	D	0.435	0.435	u	0.237	21/46	2.2E-01	Y	Quant.	
Nitrate	12/49	mg/L	0.01	0.1	0.033	48.4	1.06	D	2.71	2.71	u	0.1	7/49	1.0E+00	Y	Quant.	
Nitrite	1/35	mg/L	0.0085	0.1	0.18	0.18	0.0445	D	0.0533	0.0533	u	0	1/35	1.0E-01	N		<5% detected
Sulfate	20/49	mg/L	0.1	1.25	0.717	173	15	D	23	23	u	6.93	10/49		Y	Qual.	
Ammonia	43/49	mg/L	0.025	0.5	0.146	7.73	3.46	X	4.04	4.04	u	6.7	5/49		Y	Quant.	
Phosphorous	33/34	mg/L	0.025	0.025	0.0586	1.38	0.537	X	0.658	0.658	u	1.24	3/34		N		Essential Nutrient (low conc.)
Silicon	14/14	mg/L			6.82	13.5	9.01	L	9.88	9.88	u	8.36	8/14		Y	Qual.	
Aluminum	16/48	mg/L	0.0103	0.201	0.0343	2.37	0.263	D	0.373	0.373	u	0.0506	15/48	3.7E+00	N		Max. detect < PRG
Antimony	1/48	mg/L	0.0008	0.02295	0.0341	0.0341	0.00997	D	0.0124	0.0124	u	0	1/48	1.5E-03	N		<5% detected
Arsenic	38/48	mg/L	0.0009	0.00125	0.0063	0.236	0.0551	X	0.0676	0.0676	u	0.0827	8/48	4.5E-05	Y	Quant.	
Barium	48/48	mg/L			0.0807	0.633	0.377	X	0.414	0.414	u	0.424	19/48	2.6E-01	Y	Quant.	
Beryllium	1/48	mg/L	0.0001	0.000405	0.00024	0.00024	0.000206	D	0.000225	0.000225	u	0	1/48	7.3E-03	N		Max. detect < PRG
Boron	37/48	mg/L	0.0092	0.1045	0.075	0.593	0.21	X	0.243	0.243	u	0.214	16/48	3.3E-01	Y	Quant.	
Cadmium	3/48	mg/L	0.00015	0.0021	0.0004	0.00078	0.000862	D	0.00105	0.00078	m	0	3/48	1.8E-03	N		Max. detect < PRG
Calcium	48/48	mg/L			11.1	160	95.3	X	102	102	u	113	8/48		N		Essential Nutrient (low conc.)

Attachment 8. Determination of Ground-Water Potential Chemicals of Concern by Aggregate (Page 3 of 5)
(only detected analytes are shown)

Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Tap Water PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Chromium	21/48	mg/L	0.0005	0.0043	0.0012	0.0185	0.00364	D	0.00462	0.00462	u	0.0051	8/48	1.8E-02	Y	Quant.	
Cobalt	19/48	mg/L	0.0004	0.00255	0.0016	0.131	0.00503	D	0.00955	0.00955	u	0	19/48	2.2E-01	N		Max. detect < PRG
Copper	4/48	mg/L	0.0007	0.0038	0.0023	0.016	0.00221	D	0.00275	0.00275	u	0.0041	2/48	1.4E-01	N		Max. detect < PRG
Iron	43/48	mg/L	0.02215	0.0965	0.171	18.3	8.56	X	10	10	u	15.2	6/48	1.1E+00	N		Essential Nutrient (low conc.)
Lead	9/48	mg/L	0.00045	0.0038	0.0012	0.0048	0.00113	D	0.00136	0.00136	u	0	9/48	4.0E-04	Y	Qual.	
Lithium	10/48	mg/L	0.0015	0.03	0.0094	0.0862	0.0162	D	0.0208	0.0208	u	0	10/48	7.3E-02	Y	Qual.	
Magnesium	48/48	mg/L			18.7	75.4	39.5	X	41.6	41.6	u	42.6	13/48		N		Essential Nutrient (low conc.)
Manganese	48/48	mg/L			0.114	4.41	0.855	X	1.12	1.12	u	0.231	44/48	1.7E-01	Y	Quant.	
Mercury	1/49	mg/L	0.00005	0.00012	0.00036	0.00036	0.0000599	D	0.0000708	0.0000708	u	0	1/49	1.1E-03	N		Max. detect < PRG
Molybdenum	23/48	mg/L	0.00115	0.008	0.0015	0.0231	0.00585	D	0.00695	0.00695	u	0	23/48	1.8E-02	Y	Quant.	
Nickel	18/48	mg/L	0.00105	0.0079	0.003	0.0171	0.00598	D	0.00671	0.00671	u	0.0011	18/48	7.3E-02	N		Max. detect < PRG
Potassium	33/49	mg/L	0.61	3.17	1.13	12.5	2.59	X	3.14	3.14	u	3.51	8/49		N		Essential Nutrient (low conc.)
Silver	3/48	mg/L	0.0005	0.003	0.0012	0.0039	0.00182	D	0.00207	0.00207	u	0	3/48	1.8E-02	N		Max. detect < PRG
Sodium	49/49	mg/L			43.1	128	55.1	X	58.3	58.3	u	51	26/49		N		Essential Nutrient (low conc.)
Strontium	48/48	mg/L			0.348	1.01	0.586	X	0.627	0.627	u	0.742	12/48	2.2E+00	N		Max. detect < PRG
Thallium	3/47	mg/L	0.00135	0.0025	0.0029	0.0046	0.00193	D	0.00211	0.00211	u	0	3/47	2.9E-04	Y	Quant.	
Titanium	7/34	mg/L	0.00065	0.01265	0.0019	0.0325	0.00466	D	0.00639	0.00639	u	0.0091	2/34		Y	Qual.	
Uranium	15/49	mg/L	0.02805	0.0675	0.0000305	0.0105	0.0281	D	0.033	0.0105	m	0.000038	14/49		Y	Quant.	
Vanadium	16/48	mg/L	0.00055	0.0152	0.0012	0.0124	0.00349	D	0.00421	0.00421	u	0	16/48	2.6E-02	N		Max. detect < PRG
Zinc	24/47	mg/L	0.0029	0.0225	0.0049	0.0253	0.0103	X	0.0119	0.0119	u	0.0549	0/47	1.1E+00	N		Below Background
Dalapon	1/18	mg/L	0.001	0.0011	0.0053	0.0053	0.00125	D	0.00166	0.00166	u	0	1/18	1.1E-01	N		Max. detect < PRG
2-Nitrophenol	1/36	mg/L	0.005	0.005	0.003	0.003	0.00494	D	0.00504	0.003	m	0	1/36		N		<5% detected
4-Methylphenol	1/36	mg/L	0.005	0.005	0.001	0.001	0.00489	D	0.00508	0.001	m	0	1/36	1.8E-02	N		Max. detect < PRG
Bis(2-ethylhexyl)phthalate	2/37	mg/L	0.0005	0.008	0.004	0.005	0.00392	D	0.00445	0.00445	u	0.001	2/37	4.8E-03	Y	Quant.	
Di-n-butyl phthalate	1/37	mg/L	0.0005	0.005	0.001	0.001	0.00465	D	0.00498	0.001	m	0	1/37	3.7E-01	N		Max. detect < PRG
Di-n-octylphthalate	1/37	mg/L	0.005	0.005	0.003	0.003	0.00495	D	0.00504	0.003	m	0	1/37	7.3E-02	N		Max. detect < PRG
Bromomethane	1/39	mg/L	0.0005	0.005	0.001	0.001	0.00328	D	0.00388	0.001	m	0	1/39	8.7E-04	N		<5% detected
Methylene chloride	1/38	mg/L	0.0005	0.006	0.008	0.008	0.00233	D	0.00272	0.00272	u	0	1/38	4.3E-03	N		<5% detected
Lead-210	11/15	pCi/L	0.398	1.69	0.743	3.06	1.65	N	2.05	2.05	u	0.502	11/15		Y	Quant.	
Radium-226	17/46	pCi/L	-0.13	2.28	0.212	2.5	0.599	D	0.748	0.748	u	1.03	1/46		Y	Quant.	
Radium-228	4/15	pCi/L	0.00776	0.0784	0.0353	0.0867	0.039	D	0.0501	0.0501	u	0	4/15		Y	Quant.	
Thorium-228	2/45	pCi/L	-0.28	1.76	1.72	2.44	0.422	D	0.565	0.565	u	0.62	2/45		N		<5% detected
Thorium-230	21/43	pCi/L	0	0.97	0.102	6.27	1.41	D	1.84	1.84	u	0.63	19/43		Y	Quant.	
Uranium-234	8/29	pCi/L	0	0.54	1.11	7.88	0.957	D	1.48	1.48	u	0	8/29		Y	Quant.	
Uranium-238	6/26	pCi/L	-0.35	1.43	0.29	3.8	0.599	D	0.942	0.942	u	0.11	6/26		Y	Quant.	

SLAPS/SHALLOW

Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Tap Water PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Chloride	94/96	mg/L	0.5	0.5	0.4	1600	148	L	353	353	u	13.4	65/96		N		Essential Nutrient (low conc.)
Fluoride	25/82	mg/L	0.006	2.5	0.152	1.66	0.394	D	0.482	0.482	u	0.247	18/82	2.2E-01	Y	Quant.	
Nitrate	84/97	mg/L	0.01	0.05	0.024	985	105	X	139	139	u	0.72	65/97	1.0E+00	Y	Quant.	
Nitrite	6/64	mg/L	0.0085	0.5	0.024	8.6	0.293	D	0.539	0.539	u	0	6/64	1.0E-01	Y	Quant.	
Sulfate	94/98	mg/L	0.1	1.25	2.5	6820	205	X	320	320	u	376	6/98		Y	Qual.	
Ammonia	27/97	mg/L	0.025	25	0.168	7.45	1.01	D	1.49	1.49	u	0.292	25/97		Y	Quant.	
Phosphorous	55/65	mg/L	0.025	0.025	0.0517	1.49	0.2	X	0.271	0.271	u	0.0818	36/65		N		Essential Nutrient (low conc.)
Silicon	26/26	mg/L			5.67	15.9	10.1	L	11.3	11.3	u	7.95	21/26		Y	Qual.	
Aluminum	16/91	mg/L	0.004	0.1575	0.027	0.723	0.0726	D	0.098	0.098	u	0	16/91	3.7E+00	N		Max. detect < PRG
Antimony	3/92	mg/L	0.0008	0.02295	0.0021	0.0525	0.00933	D	0.0109	0.0109	u	0	3/92	1.5E-03	N		<5% detected
Arsenic	13/92	mg/L	0.0009	0.0031	0.0025	0.0713	0.00287	D	0.00427	0.00427	u	0	13/92	4.5E-05	Y	Quant.	
Barium	92/92	mg/L			0.0505	0.712	0.249	X	0.28	0.28	u	0.198	45/92	2.6E-01	Y	Quant.	
Beryllium	2/92	mg/L	0.0001	0.00065	0.0002	0.00023	0.00023	D	0.000247	0.00023	m	0	2/92	7.3E-03	N		Max. detect < PRG
Boron	58/92	mg/L	0.0062	0.105	0.0201	0.375	0.112	X	0.128	0.128	u	0.0638	47/92	3.3E-01	Y	Quant.	
Cadmium	15/92	mg/L	0.00015	0.0021	0.00033	0.0042	0.000952	D	0.0011	0.0011	u	0.00042	11/92	1.8E-03	Y	Quant.	
Calcium	92/92	mg/L			15.5	789	225	X	256	256	u	122	57/92		N		Essential Nutrient (low conc.)
Chromium	31/92	mg/L	0.0005	0.00535	0.002	0.147	0.00902	D	0.013	0.013	u	0.013	13/92	1.8E-02	Y	Quant.	

Attachment 8. Determination of Ground-Water Potential Chemicals of Concern by Aggregate (Page 4 of 5)
(only detected analytes are shown)

Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Tap Water PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Cobalt	29/92	mg/L	0.0004	0.00255	0.00086	0.0142	0.00206	D	0.00243	0.00243	u	0	29/92	2.2E-01	N		Max. detect < PRG
Copper	13/91	mg/L	0.0007	0.0088	0.0015	0.099	0.00383	D	0.00567	0.00567	u	0.0056	5/91	1.4E-01	N		Max. detect < PRG
Iron	48/92	mg/L	0.00465	0.0915	0.0891	19.1	1.39	X	2.07	2.07	u	0	48/92	1.1E+00	N		Essential Nutrient (low conc.)
Lead	10/92	mg/L	0.00045	0.0011	0.00096	0.0075	0.000926	D	0.00113	0.00113	u	0	10/92	4.0E-04	Y	Qual.	
Lithium	5/89	mg/L	0.0015	0.02655	0.003	0.0119	0.00818	D	0.00941	0.00941	u	0.0134	0/89	7.3E-02	N		Below Background
Magnesium	92/92	mg/L			18.6	357	92.7	X	105	105	u	57	52/92		N		Essential Nutrient (low conc.)
Manganese	76/87	mg/L	0.00015	0.0048	0.005	9.79	0.724	X	0.96	0.96	u	1.58	13/87	1.7E-01	Y	Quant.	
Mercury	1/98	mg/L	0.00005	0.00011	0.00012	0.00012	0.0000537	D	0.0000561	0.0000561	u	0	1/98	1.1E-03	N		Max. detect < PRG
Molybdenum	27/92	mg/L	0.00045	0.00565	0.00091	0.0476	0.00579	D	0.0072	0.0072	u	0	27/92	1.8E-02	Y	Quant.	
Nickel	41/92	mg/L	0.0006	0.0079	0.0013	0.557	0.0374	D	0.0549	0.0549	u	0	41/92	7.3E-02	Y	Quant.	
Orthophosphate	1/30	mg/L	0.05	0.5	0.12	0.12	0.172	D	0.235	0.12	m	0	1/30		N		<5% detected
Potassium	55/98	mg/L	0.61	1.1	0.537	7.75	1.6	X	1.8	1.8	u	2.17	22/98		N		Essential Nutrient (low conc.)
Selenium	53/92	mg/L	0.0011	0.0028	0.0024	4.36	0.281	X	0.424	0.424	u	0	53/92	1.8E-02	Y	Quant.	
Silver	5/93	mg/L	0.0005	0.00455	0.0049	0.0172	0.00245	D	0.00294	0.00294	u	0	5/93	1.8E-02	N		Max. detect < PRG
Sodium	98/98	mg/L			8.97	454	76.6	X	92.8	92.8	u	22	74/98		N		Essential Nutrient (low conc.)
Strontium	92/92	mg/L			0.15	1.92	0.575	X	0.648	0.648	u	0.323	61/92	2.2E+00	N		Max. detect < PRG
Thallium	1/92	mg/L	0.00135	0.0025	0.003	0.003	0.00176	D	0.00184	0.00184	u	0	1/92	2.9E-04	N		<5% detected
Titanium	9/67	mg/L	0.0005	0.01615	0.0021	0.0238	0.00335	D	0.00424	0.00424	u	0	9/67		Y	Qual.	
Uranium	38/98	mg/L	0.02805	0.0675	0.000245	7.33	0.316	D	0.526	0.526	u	0.00253	29/98		Y	Quant.	
Vanadium	28/92	mg/L	0.00055	0.02455	0.0011	0.0294	0.00659	D	0.00792	0.00792	u	0	28/92	2.6E-02	Y	Quant.	
Zinc	49/91	mg/L	0.00035	0.02155	0.0024	0.0407	0.00964	X	0.0108	0.0108	u	0.0142	12/91	1.1E+00	N		Max. detect < PRG
Endosulfan I	1/45	mg/L	0.000025	0.000028	0.00014	0.00014	0.0000276	D	0.0000319	0.0000319	u	0	1/45		N		<5% detected
Endosulfan II	1/45	mg/L	0.000025	0.000055	0.000053	0.000053	0.0000413	D	0.0000444	0.0000444	u	0	1/45		N		<5% detected
Lindane	1/45	mg/L	0.000025	0.000028	0.000053	0.000053	0.0000257	D	0.0000267	0.0000267	u	0	1/45	5.2E-05	N		<5% detected
Methoxychlor	1/45	mg/L	0.00025	0.00028	0.0006	0.0006	0.000259	D	0.000272	0.000272	u	0	1/45	1.8E-02	N		Max. detect < PRG
2,4,5-Trichlorophenol	1/78	mg/L	0.005	0.0135	0.002	0.002	0.00931	D	0.01	0.002	m	0	1/78	3.7E-01	N		Max. detect < PRG
2,4-Dinitrophenol	1/78	mg/L	0.005	0.025	0.001	0.001	0.0103	D	0.0113	0.001	m	0	1/78	7.3E-03	N		Max. detect < PRG
2-Chlorophenol	1/78	mg/L	0.005	0.0055	0.001	0.001	0.00496	D	0.00505	0.001	m	0	1/78	3.8E-03	N		Max. detect < PRG
4-Chloro-3-methylphenol	1/78	mg/L	0.005	0.0055	0.001	0.001	0.00496	D	0.00505	0.001	m	0	1/78		N		<5% detected
4-Nitrophenol	1/78	mg/L	0.005	0.025	0.009	0.009	0.0104	D	0.0114	0.009	m	0	1/78	2.3E-01	N		Max. detect < PRG
Acenaphthene	1/83	mg/L	0.005	0.0055	0.001	0.001	0.00496	D	0.00505	0.001	m	0	1/83	3.7E-02	N		Max. detect < PRG
Benz(a)anthracene	1/83	mg/L	0.005	0.0055	0.001	0.001	0.00496	D	0.00505	0.001	m	0	1/83	9.2E-05	N		<5% detected
Bis(2-ethylhexyl)phthalate	7/83	mg/L	0.0005	0.0055	0.001	0.045	0.0047	D	0.00557	0.00557	u	0.006	2/83	4.8E-03	Y	Quant.	
Butyl benzyl phthalate	2/83	mg/L	0.005	0.0055	0.003	0.003	0.00496	D	0.00502	0.003	m	0	2/83	7.3E-01	N		Max. detect < PRG
Chrysene	1/53	mg/L	0.005	0.0055	0.001	0.001	0.00494	D	0.00507	0.001	m	0	1/53	9.2E-03	N		Max. detect < PRG
Di-n-butyl phthalate	2/83	mg/L	0.0005	0.0055	0.003	0.003	0.00486	D	0.00499	0.003	m	0.001	2/83	3.7E-01	N		Max. detect < PRG
Di-n-octylphthalate	1/83	mg/L	0.005	0.0055	0.003	0.003	0.00499	D	0.00503	0.003	m	0	1/83	7.3E-02	N		Max. detect < PRG
Dimethyl phthalate	1/53	mg/L	0.005	0.0055	0.003	0.003	0.00498	D	0.00505	0.003	m	0	1/53	3.7E+01	N		Max. detect < PRG
Fluoranthene	1/83	mg/L	0.005	0.0055	0.002	0.002	0.00498	D	0.00504	0.002	m	0	1/83	1.5E-01	N		Max. detect < PRG
Fluorene	1/83	mg/L	0.005	0.0055	0.002	0.002	0.00498	D	0.00504	0.002	m	0	1/83	2.4E-02	N		Max. detect < PRG
N-Nitroso-di-n-propylamine	1/83	mg/L	0.005	0.0055	0.006	0.006	0.00502	D	0.00505	0.00505	u	0	1/83	9.6E-06	N		<5% detected
Naphthalene	1/83	mg/L	0.005	0.0055	0.001	0.001	0.00496	D	0.00505	0.001	m	0	1/83	6.2E-04	N		<5% detected
Pentachlorophenol	1/78	mg/L	0.005	0.025	0.006	0.006	0.0104	D	0.0113	0.006	m	0	1/78	5.6E-04	N		<5% detected
Phenol	1/78	mg/L	0.005	0.0055	0.002	0.002	0.00497	D	0.00504	0.002	m	0	1/78	2.2E+00	N		Max. detect < PRG
Pyrene	1/83	mg/L	0.005	0.0055	0.001	0.001	0.00496	D	0.00505	0.001	m	0.001	0/83	1.8E-02	N		Below Background
1,1,1-Trichloroethane	4/85	mg/L	0.0005	0.0025	0.002	0.006	0.00189	D	0.00208	0.00208	u	0	4/85	7.9E-02	N		Max. detect < PRG
1,1-Dichloroethane	2/85	mg/L	0.0005	0.0025	0.002	0.003	0.00184	D	0.00201	0.00201	u	0	2/85	8.1E-02	N		Max. detect < PRG
1,1-Dichloroethene	1/85	mg/L	0.0005	0.0025	0.001	0.001	0.0018	D	0.00197	0.001	m	0	1/85	4.6E-05	N		<5% detected
1,2-Dichloroethene	16/85	mg/L	0.0005	0.0025	0.001	0.11	0.00428	D	0.00674	0.00674	u	0	16/85		Y	Quant.	
2-Butanone	1/81	mg/L	0.0025	0.01	0.001	0.001	0.00412	D	0.00438	0.001	m	0	1/81	1.9E-01	N		Max. detect < PRG
Acetone	1/68	mg/L	0.0025	0.011	0.033	0.033	0.00524	D	0.00601	0.00601	u	0	1/68	6.1E-02	N		Max. detect < PRG
Chloromethane	4/85	mg/L	0.0005	0.005	0.001	0.004	0.00329	D	0.00367	0.00367	u	0	4/85	1.5E-03	N		<5% detected
Methylene chloride	2/84	mg/L	0.0005	0.0065	0.001	0.006	0.00235	D	0.00258	0.00258	u	0	2/84	4.3E-03	N		<5% detected
Trichloroethene	24/85	mg/L	0.0005	0.0025	0.001	0.97	0.0426	D	0.0729	0.0729	u	0	24/85	1.6E-03	Y	Quant.	

Attachment 8. Determination of Ground-Water Potential Chemicals of Concern by Aggregate (Page 5 of 5)
(only detected analytes are shown)

Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Tap Water PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Lead-210	20/31	pCi/L	0.0419	1.03	0.835	15.7	2	L	3.6	3.6	u	0.617	20/31		Y	Quant.	
Radium-226	31/91	pCi/L	-0.75	1.47	0.102	1.82	0.328	D	0.4	0.4	u	0.91	5/91		Y	Quant.	
Radium-228	3/31	pCi/L	-0.00933	0.0403	0.0315	0.105	0.0182	D	0.0245	0.0245	u	0.00155	3/31		Y	Quant.	
Thorium-228	8/89	pCi/L	-0.31	1.9	0.105	4.09	0.476	D	0.618	0.618	u	0.66	6/89		Y	Quant.	
Thorium-230	36/87	pCi/L	0	3.18	0.128	6.27	1.13	D	1.37	1.37	u	1.18	25/87		Y	Quant.	
Uranium-234	45/61	pCi/L	0	1.67	1.01	1571	40.7	Z	83.7	83.7	u	6.07	20/61		Y	Quant.	
Uranium-235	8/57	pCi/L	-0.14	1.09	0.36	71.53	1.85	D	3.96	3.96	u	0.47	7/57		Y	Quant.	
Uranium-238	37/56	pCi/L	0	0.74	0.55	1549	42	Z	88.3	88.3	u	2.28	28/56		Y	Quant.	

UCL95 = 95% upper confidence limit on the mean concentration
PRG = Preliminary Remediation Goal
PCOC = Potential Contaminant of Concern

[a] Distribution flags:
D = Not determined because fewer than 5 detects or < 50% detects; t-statistic used in calculations of UCL_{95}.
L = Lognormal; H-statistic used in calculations of UCL_{95}.
N = Normal; t-statistic used in calculations of UCL_{95}.
X = Neither normal nor lognormal; t-statistic used in calculations of UCL_{95}.
Z = Includes concentrations that are negative or zero; t-statistic used in calculations of UCL_{95}.
[b] Basis for determining the exposure concentration:
m = maximum detected concentration.
u = 95% upper confidence limit on the mean concentration.
[c] EPA Region IX tap water PRG, based on a risk level of 10^{-6} or a hazard level of 0.1 (note that Region IX noncarcinogenic PRGs are provided for a hazard level of 1.0; these values have been adjusted to a hazard level of 0.1 for this screening).
[d] Based on the lack of available toxicity information, some PCOCs were evaluated qualitatively;
Qual. = Qualitative
Quant. = Quantitative.
[e] Justification for eliminating the analyte from the PCOC list.

Attachment 9. Determination of Surface Water Potential Chemicals of Concern by Aggregate (Page 1 of 4)
(only detected analytes are shown)

Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc.[b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Tap Water PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Reach A																	
Chloride	9/9	mg/L			94	190	136	L	171	171	u	240	0/9		N		Below Background
Fluoride	7/9	mg/L	0.25	0.25	0.7	1.7	0.833	N	1.12	1.12	u	1.1	2/9	2.2E-01	Y	Quant.	
Nitrate	10/10	mg/L			0.9	135	28.6	X	60.5	60.5	u	2.51	5/10	1.0E+00	Y	Quant.	
Nitrite	9/9	mg/L			0.1	0.82	0.301	L	0.707	0.707	u	0.19	3/9	1.0E-01	Y	Quant.	
Sulfate	9/9	mg/L			75.6	220	153	N	187	187	u	210	1/9		Y	Qual.	
Ammonia	9/9	mg/L			0.362	0.94	0.607	L	0.806	0.806	u	0.9	1/9		Y	Qual.	
Phosphorous	10/10	mg/L			0.13	0.62	0.303	X	0.416	0.416	u	0.54	2/10		N		Essential Nutrient (low conc.)
Aluminum	1/3	mg/L	0.117	0.1995	7.05	7.05	2.46	D	9.16	7.05	m	1.13	1/3	3.7E+00	Y	Qual.	
Antimony	3/6	mg/L	0.01455	0.02745	0.001	0.001	0.0105	D	0.0198	0.001	m	0.0402	0/6	1.5E-03	N		Below Background
Arsenic	4/6	mg/L	0.001	0.001	0.003	0.0073	0.00305	D	0.00494	0.00494	u	0.007	1/6	4.5E-05	Y	Quant.	
Barium	7/7	mg/L			0.087	0.212	0.125	L	0.173	0.173	u	0.166	1/7	2.6E-01	N		Max. detect < PRG
Beryllium	4/7	mg/L	0.0003	0.00055	0.0005	0.0005	0.00045	D	0.000526	0.0005	m	0.0005	0/7	7.3E-03	N		Below Background
Boron	8/9	mg/L	0.0515	0.0515	0.11	0.14	0.116	X	0.132	0.132	u	0.16	0/9	3.3E-01	N		Below Background
Cadmium	4/7	mg/L	0.00125	0.00195	0.0005	0.0006	0.000936	D	0.00135	0.0006	m	0.0031	0/7	1.8E-03	N		Below Background
Calcium	10/10	mg/L			56	159	91.5	L	120	120	u	101	2/10		N		Essential Nutrient (low conc.)
Chromium	5/7	mg/L	0.0021	0.0021	0.0027	0.05	0.0174	L	0.39	0.05	m	0.054	0/7	1.8E-02	N		Below Background
Cobalt	6/7	mg/L	0.0046	0.0046	0.001	0.0181	0.00594	X	0.0114	0.0114	u	0.001	2/7	2.2E-01	N		Max. detect < PRG
Copper	7/7	mg/L			0.003	0.0295	0.0149	L	0.0683	0.0295	m	0.0212	3/7	1.4E-01	N		Max. detect < PRG
Cyanide	3/3	mg/L			0.01	0.01	0.01	D	0.01	0.01	u	0.01	0/3	7.3E-02	N		Below Background
Iron	6/7	mg/L	0.03025	0.03025	0.02	9.32	1.41	X	3.97	3.97	u	2.15	1/7	1.1E+00	N		Essential Nutrient (low conc.)
Lead	5/7	mg/L	0.0008	0.00275	0.001	0.0297	0.00532	X	0.0132	0.0132	u	0.0109	1/7	4.0E-04	Y	Qual.	
Lithium	4/7	mg/L	0.0015	0.0107	0.04	0.04	0.0248	D	0.0389	0.0389	u	0.04	0/7	7.3E-02	N		Below Background
Magnesium	10/10	mg/L			26	38	31.2	L	34.2	34.2	u	38.1	0/10		N		Below Background
Manganese	7/7	mg/L			0.058	0.571	0.251	N	0.381	0.381	u	0.63	0/7	1.7E-01	N		Below Background
Mercury	4/7	mg/L	0.00005	0.00005	0.0001	0.0001	0.0000786	D	0.0000982	0.0000982	u	0.0001	0/7	1.1E-03	N		Below Background
Molybdenum	7/7	mg/L			0.01	0.05	0.0252	L	0.0534	0.05	m	0.01	6/7	1.8E-02	Y	Quant.	
Nickel	6/7	mg/L	0.01005	0.01005	0.003	0.0372	0.0135	L	0.0995	0.0372	m	0.006	2/7	7.3E-02	N		Max. detect < PRG
Orthophosphate	7/7	mg/L			0.1	0.52	0.274	L	0.739	0.52	m	0.46	2/7		Y	Qual.	
Potassium	10/10	mg/L			6.41	15	10.6	L	13.3	13.3	u	15	0/10		N		Below Background
Selenium	6/6	mg/L			0.001	0.752	0.253	X	0.565	0.565	u	0.0028	3/6	1.8E-02	Y	Quant.	
Silver	4/7	mg/L	0.00295	0.003	0.001	0.001	0.00185	D	0.00263	0.001	m	0.001	0/7	1.8E-02	N		Below Background
Sodium	10/10	mg/L			84.1	123	106	L	116	116	u	140	0/10		N		Below Background
Strontium	10/10	mg/L			0.39	1.56	0.618	X	0.821	0.821	u	0.618	3/10	2.2E+00	N		Max. detect < PRG
Thallium	3/6	mg/L	0.0014	0.00165	0.002	0.002	0.00178	D	0.00199	0.00199	u	0.002	0/6	2.9E-04	N		Below Background
Titanium	1/3	mg/L	0.0178	0.0243	0.185	0.185	0.0757	D	0.235	0.185	m	0.0349	1/3		Y	Qual.	
Uranium	31/32	mg/L	0.0675	0.0675	0.001	0.301	0.0256	X	0.0466	0.0466	u	0.00216	25/32		Y	Quant.	
Vanadium	6/7	mg/L	0.0183	0.0183	0.003	0.0177	0.0109	L	0.0322	0.0177	m	0.0199	0/7	2.6E-02	N		Below Background
Zinc	7/7	mg/L			0.013	0.0896	0.0274	X	0.0477	0.0477	u	0.0568	1/7	1.1E+00	N		Max. detect < PRG
2-Chlorophenol	1/6	mg/L	0.0025	0.005	0.0003	0.0003	0.00297	D	0.00444	0.0003	m	0.0013	0/6	3.8E-03	N		Below Background
Acenaphthene	1/6	mg/L	0.0025	0.005	0.0006	0.0006	0.00302	D	0.00442	0.0006	m	0.0007	0/6	3.7E-02	N		Below Background
Bis(2-ethylhexyl)phthalate	1/6	mg/L	0.0025	0.005	0.0084	0.0084	0.00432	D	0.00625	0.00625	u	0.005	1/6	4.8E-03	Y	Quant.	
Chrysene	4/6	mg/L	0.005	0.005	0.0003	0.01	0.00672	D	0.01	0.01	u	0.01	0/6	9.2E-03	N		Below Background
Di-n-butyl phthalate	1/6	mg/L	0.0025	0.005	0.0047	0.0047	0.0037	D	0.00479	0.0047	m	0	1/6	3.7E-01	N		Max. detect < PRG
Fluoranthene	4/6	mg/L	0.005	0.005	0.0003	0.0005	0.00193	D	0.00389	0.0005	m	0.0005	0/6	1.5E-01	N		Below Background
Fluorene	2/6	mg/L	0.0025	0.005	0.0004	0.005	0.0034	D	0.00497	0.00497	u	0.001	1/6	2.4E-02	N		Max. detect < PRG
Phenanthrene	3/6	mg/L	0.0025	0.005	0.00004	0.0005	0.00222	D	0.00413	0.0005	m	0.0017	0/6		N		Below Background
Phenol	1/6	mg/L	0.0025	0.005	0.0005	0.0005	0.003	D	0.00442	0.0005	m	0.0167	0/6	2.2E+00	N		Below Background
Pyrene	4/6	mg/L	0.005	0.005	0.0004	0.0005	0.00195	D	0.00389	0.0005	m	0.0005	0/6	1.8E-02	N		Below Background
1,2,3,5-Tetramethylbenzene	2/4	mg/L	0.0001	0.0001	0.0009	0.002	0.000775	D	0.00183	0.00183	u	0.0007	2/4		Y	Qual.	
1,2,3-Trimethylbenzene	2/4	mg/L	0.0001	0.0002	0.0008	0.0026	0.000925	D	0.00229	0.00229	u	0.0009	1/4		Y	Qual.	
1,2,4-Trimethylbenzene	2/4	mg/L	0.0001	0.0002	0.0007	0.0014	0.0006	D	0.0013	0.0013	u	0.0011	1/4	1.2E-03	Y	Qual.	
1,3,5-Trimethylbenzene	2/4	mg/L	0.0001	0.0001	0.0005	0.0014	0.000525	D	0.00125	0.00125	u	0.0005	1/4	1.2E-03	Y	Qual.	
1-Ethyl-2-methylbenzene	2/4	mg/L	0.0001	0.0002	0.0003	0.0011	0.000425	D	0.000963	0.000963	u	0	2/4		Y	Qual.	

Attachment 9. Determination of Surface Water Potential Chemicals of Concern by Aggregate (Page 2 of 4) (only detected analytes are shown)

Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL$_{95}$	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Tap Water PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Acetone	4/6	mg/L	0.0002	0.005	0.006	0.03	0.0107	D	0.0193	0.0193	u	0.017	1/6	6.1E-02	N		Max. detect < PRG
Chloroform	1/6	mg/L	0.0001	0.0025	0.0003	0.0003	0.000967	D	0.00195	0.0003	m	0.0003	0/6	1.6E-04	N		Below Background
Dimethylbenzene	1/6	mg/L	0.0001	0.0025	0.001	0.001	0.00107	D	0.00202	0.001	m	0.0008	1/6		Y	Quant.	
Methylene chloride	4/6	mg/L	0.0025	0.0025	0.0007	0.008	0.00302	D	0.0051	0.0051	u	0.0023	2/6	4.3E-03	Y	Quant.	
Tetrachloroethene	4/6	mg/L	0.0025	0.0025	0.00054	0.0033	0.00194	D	0.00276	0.00276	u	0.0013	3/6	1.1E-03	Y	Quant.	
Trichloroethene	4/6	mg/L	0.0002	0.0025	0.0006	0.014	0.00337	D	0.0077	0.0077	u	0.0014	2/6	1.6E-03	Y	Quant.	
cis-1,2-Dichloroethene	1/4	mg/L	0.0001	0.0002	0.0009	0.0009	0.00035	D	0.000785	0.000785	u	0.0009	0/4	6.1E-03	N		Below Background
Alpha activity	5/5	pCi/L			4.7	10.3	7.24	L	10.2	10.2	u	7.86	1/5		Y	Qual.	
Beta activity	5/5	pCi/L			14.7	30	20	L	28.3	28.3	u	41.8	0/5		N		Below Background
Radium-226	17/32	pCi/L	0.06	1	0.1	3.07	0.668	L	1.05	1.05	u	0.88	2/32		Y	Quant.	
Radium-228	1/19	pCi/L	0.07	1	0.36	0.36	0.552	D	0.728	0.36	m	0.34	1/19		Y	Quant.	
Thorium-228	2/7	pCi/L	0.07	0.4	0.36	5.05	0.947	D	2.28	2.28	u	3.12	1/7		Y	Quant.	
Thorium-230	11/32	pCi/L	-0.04	1	0.21	16.86	1.23	D	2.16	2.16	u	4.65	2/32		Y	Quant.	
Thorium-232	1/28	pCi/L	-0.01	1.21	0.25	0.25	0.425	D	0.572	0.25	m	0	1/28		N		<5% detected
Uranium-234	3/3	pCi/L			15.62	108.2	75.4	D	163	108	m	3.9	3/3		Y	Quant.	
Uranium-235	2/3	pCi/L	0.3	0.3	3.35	8.11	3.92	D	10.6	8.11	m	0	2/3		Y	Quant.	
Uranium-238	3/3	pCi/L			15.26	117.9	78.8	D	172	118	m	5.05	3/3		Y	Quant.	
Reach B																	
Chloride	1/1	mg/L			95	95	95	D		95	m	240	0/1		N		Below Background
Fluoride	1/1	mg/L			1	1	1	D		1	m	1.1	0/1	2.2E-01	N		Below Background
Nitrate	2/2	mg/L			1.5	2.1	1.8	D	3.69	2.1	m	2.51	0/2	1.0E+00	N		Below Background
Nitrite	1/1	mg/L			0.15	0.15	0.15	D		0.15	m	0.19	0/1	1.0E-01	N		Below Background
Sulfate	1/1	mg/L			190	190	190	D		190	m	210	0/1		N		Below Background
Ammonia	1/1	mg/L			0.32	0.32	0.32	D		0.32	m	0.9	0/1		N		Below Background
Phosphorous	2/2	mg/L			0.11	0.19	0.15	D	0.403	0.19	m	0.54	0/2		N		Below Background
Aluminum	2/2	mg/L			0.764	0.839	0.802	D	1.04	0.839	m	1.13	0/2	3.7E+00	N		Below Background
Antimony	1/3	mg/L	0.0182	0.0182	0.001	0.001	0.0125	D	0.0292	0.001	m	0.0402	0/3	1.5E-03	N		Below Background
Arsenic	1/3	mg/L	0.0009	0.0015	0.003	0.003	0.0018	D	0.00362	0.003	m	0.007	0/3	4.5E-05	N		Below Background
Barium	2/3	mg/L	0.082	0.082	0.1	0.151	0.111	D	0.171	0.151	m	0.166	0/3	2.6E-01	N		Below Background
Beryllium	2/3	mg/L	0.000415	0.000415	0.0005	0.00062	0.000512	D	0.000685	0.00062	m	0.0005	1/3	7.3E-03	N		Max. detect < PRG
Boron	1/3	mg/L	0.0381	0.0445	0.13	0.13	0.0709	D	0.157	0.13	m	0.16	0/3	3.3E-01	N		Below Background
Cadmium	1/3	mg/L	0.00195	0.00195	0.0005	0.0005	0.00147	D	0.00288	0.0005	m	0.0031	0/3	1.8E-03	N		Below Background
Calcium	3/3	mg/L			55	82.9	73.2	D	99.8	82.9	m	101	0/3		N		Below Background
Chromium	2/3	mg/L	0.0024	0.0024	0.0054	0.008	0.00527	D	0.00999	0.008	m	0.054	0/3	1.8E-02	N		Below Background
Cobalt	2/3	mg/L	0.00285	0.00285	0.001	0.0052	0.00302	D	0.00657	0.0052	m	0.001	1/3	2.2E-01	N		Max. detect < PRG
Copper	2/3	mg/L	0.00265	0.00265	0.003	0.0045	0.00338	D	0.00504	0.0045	m	0.0212	0/3	1.4E-01	N		Below Background
Cyanide	1/1	mg/L			0.01	0.01	0.01	D		0.01	m	0.01	0/1	7.3E-02	N		Below Background
Iron	3/3	mg/L			0.01	1.24	0.827	D	2.02	1.24	m	2.15	0/3	1.1E+00	N		Below Background
Lead	3/3	mg/L			0.001	0.0031	0.0024	D	0.00444	0.0031	m	0.0109	0/3	4.0E-04	N		Below Background
Lithium	1/3	mg/L	0.0103	0.01035	0.04	0.04	0.0202	D	0.0491	0.04	m	0.04	0/3	7.3E-02	N		Below Background
Magnesium	3/3	mg/L			25	32.3	29.7	D	36.5	32.3	m	38.1	0/3		N		Below Background
Manganese	3/3	mg/L			0.231	0.28	0.261	D	0.306	0.28	m	0.63	0/3	1.7E-01	N		Below Background
Mercury	1/3	mg/L	0.00005	0.00005	0.0001	0.0001	0.0000667	D	0.000115	0.0001	m	0.0001	0/3	1.1E-03	N		Below Background
Molybdenum	2/3	mg/L	0.00455	0.00455	0.0084	0.028	0.0137	D	0.0349	0.028	m	0.01	1/3	1.8E-02	Y	Quant.	
Nickel	2/3	mg/L	0.0053	0.0053	0.004	0.0108	0.0067	D	0.0128	0.0108	m	0.006	1/3	7.3E-02	N		Max. detect < PRG
Orthophosphate	1/1	mg/L			0.12	0.12	0.12	D		0.12	m	0.46	0/1		N		Below Background
Potassium	3/3	mg/L			6.2	8.3	7.13	D	8.93	8.3	m	15	0/3		N		Below Background
Selenium	2/3	mg/L	0.0012	0.0012	0.001	0.0101	0.0041	D	0.0129	0.0101	m	0.0028	1/3	1.8E-02	N		Max. detect < PRG
Silver	1/3	mg/L	0.00295	0.00295	0.001	0.001	0.0023	D	0.0042	0.001	m	0.001	0/3	1.8E-02	N		Below Background
Sodium	3/3	mg/L			69	92	77.6	D	98.8	92	m	140	0/3		N		Below Background
Strontium	3/3	mg/L			0.39	0.726	0.538	D	0.827	0.726	m	0.618	1/3	2.2E+00	N		Max. detect < PRG
Thallium	1/3	mg/L	0.0014	0.0014	0.002	0.002	0.0016	D	0.00218	0.002	m	0.002	0/3	2.9E-04	N		Below Background
Titanium	1/2	mg/L	0.00935	0.00935	0.0202	0.0202	0.0148	D	0.049	0.0202	m	0.0349	0/2		N		Below Background

Attachment 9. Determination of Surface Water Potential Chemicals of Concern by Aggregate (Page 3 of 4)
(only detected analytes are shown)

Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Tap Water PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Uranium	24/26	mg/L	0.0675	0.0675	0.00096	0.01602	0.0106	L	0.0155	0.0155	u	0.00216	21/26		Y	Quant.	
Vanadium	1/3	mg/L	0.0105	0.0112	0.004	0.004	0.00857	D	0.0153	0.004	m	0.0199	0/3	2.6E-02	N		Below Background
Zinc	3/3	mg/L			0.01	0.0904	0.0423	D	0.114	0.0904	m	0.0568	1/3	1.1E+00	N		Max. detect < PRG
Bis(2-ethylhexyl)phthalate	1/3	mg/L	0.0025	0.005	0.001	0.001	0.00283	D	0.00624	0.001	m	0.005	0/3	4.8E-03	N		Below Background
Chrysene	1/3	mg/L	0.005	0.005	0.01	0.01	0.00667	D	0.0115	0.01	m	0.01	0/3	9.2E-03	N		Below Background
Fluoranthene	1/3	mg/L	0.005	0.005	0.0003	0.0003	0.00343	D	0.00801	0.0003	m	0.0005	0/3	1.5E-01	N		Below Background
Pyrene	1/3	mg/L	0.005	0.005	0.0004	0.0004	0.00347	D	0.00794	0.0004	m	0.0005	0/3	1.8E-02	N		Below Background
Acetone	2/3	mg/L	0.005	0.005	0.003	0.179	0.0623	D	0.233	0.179	m	0.017	1/3	6.1E-02	Y	Quant.	
Methylene chloride	1/3	mg/L	0.0025	0.0025	0.0012	0.0012	0.00207	D	0.00333	0.0012	m	0.0023	0/3	4.3E-03	N		Below Background
Trichloroethene	1/3	mg/L	0.0025	0.0025	0.0003	0.0003	0.00177	D	0.00391	0.0003	m	0.0014	0/3	1.6E-03	N		Below Background
Radium-226	13/27	pCi/L	0.02	0.71	0.15	1.07	0.321	D	0.405	0.405	u	0.88	1/27		Y	Quant.	
Thorium-228	1/9	pCi/L	0.05	1.4	1.74	1.74	0.449	D	0.849	0.849	u	3.12	0/9		N		Below Background
Thorium-230	12/28	pCi/L	0.02	1.7	0.13	2.65	0.423	D	0.605	0.605	u	4.65	0/28		N		Below Background
Uranium	1/1	pCi/L			3.9	3.9	3.9	D		3.9	m	0.00216	1/1		Y	Qual.	
Uranium-234	2/2	pCi/L			2.36	6.78	4.57	D	18.5	6.78	m	3.9	1/2		Y	Quant.	
Uranium-238	1/2	pCi/L	1.66	1.66	6.46	6.46	4.06	D	19.2	6.46	m	5.05	1/2		Y	Quant.	
Reach C																	
Nitrate	1/1	mg/L			1.1	1.1	1.1	D		1.1	m	2.51	0/1	1.0E+00	N		Below Background
Phosphorous	1/1	mg/L			0.24	0.24	0.24	D		0.24	m	0.54	0/1		N		Below Background
Aluminum	2/2	mg/L			0.44	0.653	0.547	D	1.22	0.653	m	1.13	0/2	3.7E+00	N		Below Background
Arsenic	1/2	mg/L	0.00175	0.00175	0.0029	0.0029	0.00233	D	0.00596	0.0029	m	0.007	0/2	4.5E-05	N		Below Background
Barium	1/2	mg/L	0.0565	0.0565	0.149	0.149	0.103	D	0.395	0.149	m	0.166	0/2	2.6E-01	N		Below Background
Calcium	2/2	mg/L			58	76.6	67.3	D	126	76.6	m	101	0/2		N		Below Background
Iron	2/2	mg/L			0.661	0.925	0.793	D	1.63	0.925	m	2.15	0/2	1.1E+00	N		Below Background
Magnesium	2/2	mg/L			17.9	26	22	D	47.5	26	m	38.1	0/2		N		Below Background
Manganese	2/2	mg/L			0.118	0.219	0.169	D	0.487	0.219	m	0.63	0/2	1.7E-01	N		Below Background
Potassium	2/2	mg/L			6.12	6.21	6.17	D	6.45	6.21	m	15	0/2		N		Below Background
Sodium	2/2	mg/L			32.8	55	43.9	D	114	55	m	140	0/2		N		Below Background
Strontium	2/2	mg/L			0.484	0.977	0.731	D	2.29	0.977	m	0.618	1/2	2.2E+00	N		Max. detect < PRG
Titanium	1/2	mg/L	0.00695	0.00695	0.0096	0.0096	0.00828	D	0.0166	0.0096	m	0.0349	0/2		N		Below Background
Zinc	1/2	mg/L	0.00905	0.00905	0.0112	0.0112	0.0101	D	0.0169	0.0112	m	0.0568	0/2	1.1E+00	N		Below Background
Radium-226	1/2	pCi/L	0.46	0.46	4.03	4.03	2.25	D	13.5	4.03	m	0.88	1/2		Y	Quant.	
Thorium-228	1/2	pCi/L	0.76	0.76	2.46	2.46	1.61	D	6.98	2.46	m	3.12	0/2		N		Below Background
Thorium-230	2/2	pCi/L			1.38	2.03	1.71	D	3.76	2.03	m	4.65	0/2		N		Below Background
Uranium-234	2/2	pCi/L			1.48	1.62	1.55	D	1.99	1.62	m	3.9	0/2		N		Below Background
Uranium-238	1/2	pCi/L	0.84	0.84	1.76	1.76	1.3	D	4.2	1.76	m	5.05	0/2		N		Below Background

UCL_{95} = 95% upper confidence limit on the mean concentration
PRG = Preliminary Remediation Goal
PCOC = Potential Contaminant of Concern

[a] Distribution flags:
D = Not determined because fewer than 5 detects or < 50% detects; t-statistic used in calculations of UCL_{95}.
L = Lognormal; H-statistic used in calculations of UCL_{95}.
N = Normal; t-statistic used in calculations of UCL_{95}.
X = Neither normal nor lognormal; t-statistic used in calculations of UCL_{95}.
[b] Basis for determining the exposure concentration:
m = maximum detected concentration.
u = 95% upper confidence limit on the mean concentration.
[c] EPA Region IX tap water PRG, based on a risk level of 10^{-6} or a hazard level of 0.1 (note that Region IX noncarcinogenic PRGs are provided for a hazard level of 1.0; these values have been adjusted to a hazard level of 0.1 for this screening).
[d] Based on the lack of available toxicity information, some PCOCs were evaluated qualitatively;

Attachment 9. Determination of Surface Water Potential Chemicals of Concern by Aggregate (Page 4 of 4)
(only detected analytes are shown)

Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Tap Water PRG[c]	PCOC	Type PCOC[d]	Justification[e]

Qual. = Qualitative

Quant. = Quantitative.

[e] Justification for eliminating the analyte from the PCOC list.

Attachment 10. Determination of Sediment Potential Chemicals of Concern by Aggregate (Page 1 of 5)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
HS Group 1	Radium-226	6/9	pCi/g	0	0.7	1	3.2	1.4	Z	2.06	2.06	u	4.73	0/9		N		Below Background
HS Group 1	Thorium-230	6/9	pCi/g	0	1.2	3.3	128.7	33.7	Z	67.7	67.7	u	2.2	6/9		Y	Quant.	
HS Group 1	Thorium-232	7/9	pCi/g	0	1	1	4.9	2.06	Z	3.04	3.04	u	1.19	6/9		Y	Quant.	
HS Group 2	Radium-226	7/12	pCi/g	0.1	0.7	1.4	4.3	1.43	L	3.86	3.86	u	4.73	0/12		N		Below Background
HS Group 2	Thorium-230	10/12	pCi/g	0	0.4	1.5	84.7	25.2	Z	41.4	41.4	u	2.2	9/12		Y	Quant.	
HS Group 2	Thorium-232	6/12	pCi/g	0	1	1	3	1.05	Z	1.62	1.62	u	1.19	4/12		Y	Quant.	
Reach A	Phosphorous	4/4	mg/kg			900	1200	1080	D	1250	1200	m	1700	0/4		N		Below Background
Reach A	Aluminum	12/12	mg/kg			1640	53000	19500	X	31300	31300	u	51000	1/12	7.5E+03	Y	Qual.	
Reach A	Arsenic	7/12	mg/kg	5	12.55	4.9	10	8.05	N	9.52	9.52	u	13	0/12	3.8E-01	N		Below Background
Reach A	Barium	12/12	mg/kg			51.7	740	301	X	454	454	u	890	0/12	5.2E+02	N		Below Background
Reach A	Beryllium	5/12	mg/kg	0.185	0.65	0.86	1	0.623	D	0.801	0.801	u	2	0/12	1.5E+01	N		Below Background
Reach A	Cadmium	3/11	mg/kg	0.245	1	0.65	1.3	0.73	D	0.925	0.925	u	4	0/11	3.7E+00	N		Below Background
Reach A	Calcium	11/12	mg/kg	2770	2770	976	101000	43400	N	61100	61100	u	116000	0/12		N		Below Background
Reach A	Cerium	4/4	mg/kg			71	90	77.5	D	87.6	87.6	u	85	1/4		Y	Qual.	
Reach A	Chromium	12/12	mg/kg			8.3	91	44.7	L	111	91	m	140	0/12	3.0E+01	N		Below Background
Reach A	Cobalt	6/11	mg/kg	2.55	6.3	5.1	26	10.9	L	25.1	25.1	u	31	0/11	3.3E+02	N		Below Background
Reach A	Copper	10/12	mg/kg	9.45	13.35	12.4	120	44.4	L	98.6	98.6	u	330	0/12	2.8E+02	N		Below Background
Reach A	Gallium	4/4	mg/kg			10	12	11.3	D	12.4	12	m	18	0/4		N		Below Background
Reach A	Iron	12/12	mg/kg			6110	33000	17900	L	26700	26700	u	42000	0/12	2.2E+03	N		Below Background
Reach A	Lanthanum	4/4	mg/kg			35	40	36.8	D	39.4	39.4	u	38	1/4		Y	Qual.	
Reach A	Lead	11/12	mg/kg	9.75	9.75	25.1	333	89.6	L	216	216	u	380	0/12	4.0E+01	N		Below Background
Reach A	Lithium	5/9	mg/kg	0.455	1.15	5.4	20	9.46	X	15.3	15.3	u	22	0/9	1.5E+02	N		Below Background
Reach A	Magnesium	12/12	mg/kg			2760	12200	7730	N	8960	8960	u	21000	0/12		N		Below Background
Reach A	Manganese	12/12	mg/kg			262	1600	849	L	1190	1190	u	3200	0/12	3.1E+02	N		Below Background
Reach A	Molybdenum	3/12	mg/kg	0.55	11.5	2	25.1	4.79	D	8.62	8.62	u	6	1/12	3.7E+01	N		Max. detect < PRG
Reach A	Neodymium	4/4	mg/kg			33	37	34.5	D	36.5	36.5	u	35	1/4		Y	Qual.	
Reach A	Nickel	12/12	mg/kg			6.6	43	21.8	L	33.8	33.8	u	72	0/12	1.5E+02	N		Below Background
Reach A	Niobium	4/4	mg/kg			9	12	10.3	D	11.7	11.7	u	7	4/4		Y	Qual.	
Reach A	Potassium	6/12	mg/kg	124	630	327	16000	5540	X	9460	9460	u	15000	3/12		N		Essential Nutrient (low conc.)
Reach A	Scandium	4/4	mg/kg			7	8	7.5	D	8.18	8	m	8	0/4		N		Below Background
Reach A	Selenium	5/8	mg/kg	0.145	0.18	0.33	83.6	20.1	X	41.2	41.2	u	54.4	1/8	3.7E+01	Y	Quant.	
Reach A	Silver	2/12	mg/kg	0.355	1.15	2.6	3	1.06	D	1.51	1.51	u	4	0/12	3.7E+01	N		Below Background
Reach A	Sodium	5/12	mg/kg	73.5	630	172	9900	3370	D	5740	5740	u	10000	0/12		N		Below Background
Reach A	Strontium	9/9	mg/kg			43.3	180	127	N	159	159	u	380	0/9	4.5E+03	N		Below Background
Reach A	Thallium	2/8	mg/kg	0.455	12.55	1.4	1.6	4.91	D	8.48	1.6	m	0	2/8	6.0E-01	Y	Quant.	
Reach A	Thorium	4/4	mg/kg			7	11	9	D	10.9	10.9	u	9	1/4		Y	Qual.	
Reach A	Titanium	9/9	mg/kg			45.4	3000	1370	X	2320	2320	u	2800	4/9		Y	Qual.	
Reach A	Uranium	18/23	mg/kg	8.1	9.95	1.9	8.26	4.94	X	5.85	5.85	u	8.69	0/23		N		Below Background
Reach A	Vanadium	12/12	mg/kg			13.1	92	39.8	X	56.4	56.4	u	99	0/12	5.2E+01	N		Below Background
Reach A	Ytterbium	4/4	mg/kg			2	3	2.25	D	2.84	2.84	u	3	0/4		N		Below Background
Reach A	Yttrium	4/4	mg/kg			20	23	21.5	D	23	23	u	24	0/4		N		Below Background
Reach A	Zinc	12/12	mg/kg			39.2	250	129	L	197	197	u	1370	0/12	2.2E+03	N		Below Background
Reach A	4,4'-DDT	1/5	mg/kg	0.00485	0.0205	0.016	0.016	0.014	D	0.0208	0.016	m	0	1/5	1.7E+00	N		Max. detect < PRG
Reach A	Aldrin	1/5	mg/kg	0.002	0.0105	0.022	0.022	0.00982	D	0.0173	0.0173	u	0.023	0/5	2.6E-02	N		Below Background
Reach A	2-Methylnaphthalene	1/8	mg/kg	0.2	1.15	0.05	0.05	0.513	D	0.797	0.05	m	0	1/8		Y	Qual.	
Reach A	Acenaphthene	7/8	mg/kg	0.2	0.2	0.11	0.89	0.475	L	1.56	0.89	m	0.25	4/8	2.6E+02	N		Max. detect < PRG
Reach A	Anthracene	8/9	mg/kg	0.2	0.2	0.19	3.2	1.15	L	6.72	3.2	m	0.2	7/9	1.4E+03	N		Max. detect < PRG
Reach A	Benz(a)anthracene	11/12	mg/kg	0.2	0.2	0.12	6	2.37	N	3.36	3.36	u	2.3	5/12	5.6E-01	Y	Quant.	
Reach A	Benzo(a)pyrene	11/12	mg/kg	0.2	0.2	0.1	5.4	2.12	N	3.01	3.01	u	1.7	6/12	5.6E-02	Y	Quant.	
Reach A	Benzo(b)fluoranthene	11/12	mg/kg	0.2	0.2	0.088	5.1	1.98	L	9.1	5.1	m	1.5	6/12	5.6E-01	Y	Quant.	
Reach A	Benzo(ghi)perylene	11/12	mg/kg	0.2	0.2	0.093	4	1.51	L	6.19	4	m	1.8	4/12		Y	Qual.	
Reach A	Benzo(k)fluoranthene	11/12	mg/kg	0.2	0.2	0.11	4.9	1.81	N	2.56	2.56	u	1.4	6/12	5.6E+00	N		Max. detect < PRG

Attachment 10. Determination of Sediment Potential Chemicals of Concern by Aggregate (Page 2 of 5)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Reach A	Bis(2-ethylhexyl)phthalate	9/10	mg/kg	0.29	0.29	0.13	4.1	1.14	L	5.18	4.1	m	0.56	5/10	3.2E+01	N		Max. detect < PRG
Reach A	Butyl benzyl phthalate	1/8	mg/kg	0.2	1.15	0.75	0.75	0.599	D	0.859	0.75	m	0	1/8	9.3E+02	N		Max. detect < PRG
Reach A	Carbazole	1/5	mg/kg	0.21	1.05	0.3	0.3	0.551	D	0.893	0.3	m	0	1/5	2.2E+01	N		Max. detect < PRG
Reach A	Chrysene	9/11	mg/kg	0.2	0.205	0.87	13	3.38	L	25.4	13	m	2.4	6/11	5.6E+01	N		Max. detect < PRG
Reach A	Di-n-butyl phthalate	2/8	mg/kg	0.205	1.15	0.043	0.048	0.492	D	0.791	0.048	m	0.047	1/8	5.5E+02	N		Max. detect < PRG
Reach A	Di-n-octylphthalate	1/8	mg/kg	0.2	1.15	0.21	0.21	0.528	D	0.801	0.21	m	0	1/8	1.1E+02	N		Max. detect < PRG
Reach A	Dibenz(a,h)anthracene	2/10	mg/kg	0.2	1.15	0.7	1.8	0.676	D	0.986	0.986	u	0	2/10	5.6E-02	Y	Quant.	
Reach A	Dibenzofuran	7/8	mg/kg	0.2	0.2	0.093	0.76	0.324	L	0.798	0.76	m	0.086	7/8	2.1E+01	N		Max. detect < PRG
Reach A	Fluoranthene	12/12	mg/kg			0.14	24	7.43	L	56.7	24	m	7.1	5/12	2.0E+02	N		Max. detect < PRG
Reach A	Fluorene	7/8	mg/kg	0.2	0.2	0.19	1.6	0.67	L	2.25	1.6	m	0.2	6/8	1.8E+02	N		Max. detect < PRG
Reach A	Indeno(1,2,3-cd)pyrene	9/12	mg/kg	0.2	1.15	0.4	3	1.24	L	3.16	3	m	1.5	4/12	5.6E-01	Y	Quant.	
Reach A	Naphthalene	3/8	mg/kg	0.2	1.15	0.057	0.28	0.4	D	0.655	0.28	m	0.04	3/8	5.5E+00	N		Max. detect < PRG
Reach A	Phenanthrene	12/12	mg/kg			0.062	14	4.62	L	63	14	m	5.7	4/12		Y	Qual.	
Reach A	Pyrene	12/12	mg/kg			0.076	11	4.39	N	6.31	6.31	u	4	5/12	1.5E+02	N		Max. detect < PRG
Reach A	2-Butanone	1/6	mg/kg	0.006	0.0075	0.008	0.008	0.00683	D	0.00751	0.00751	u	0	1/6	6.9E+02	N		Max. detect < PRG
Reach A	Acetone	3/6	mg/kg	0.006	0.0075	0.034	0.037	0.0208	D	0.0336	0.0336	u	0	3/6	1.4E+02	N		Max. detect < PRG
Reach A	Acrylonitrile	1/3	mg/kg	0.006	0.007	0.002	0.002	0.005	D	0.00946	0.002	m	0	1/3	1.9E-01	N		Max. detect < PRG
Reach A	Chloroethane	1/6	mg/kg	0.006	0.0075	0.002	0.002	0.00575	D	0.00735	0.002	m	0	1/6	1.6E+03	N		Max. detect < PRG
Reach A	Methylene chloride	3/6	mg/kg	0.003	0.0035	0.031	0.045	0.0209	D	0.0373	0.0373	u	0.03	3/6	8.5E+00	N		Max. detect < PRG
Reach A	Toluene	2/6	mg/kg	0.003	0.0035	0.001	0.002	0.00267	D	0.00348	0.002	m	0.002	0/6	5.2E+02	N		Below Background
Reach A	Bismuth-211	1/1	pCi/g			3.5	3.5	3.5	D		3.5	m	2.9	1/1		Y	Quant.	
Reach A	Bismuth-212	1/1	pCi/g			2.2	2.2	2.2	D		2.2	m	1.6	1/1		Y	Quant.	
Reach A	Bismuth-214	1/1	pCi/g			1.1	1.1	1.1	D		1.1	m	0.97	1/1		Y	Quant.	
Reach A	Cesium-137	3/6	pCi/g	0.01	0.07	0.01	0.02	0.0267	D	0.0452	0.02	m	0	3/6		Y	Quant.	
Reach A	Lead-212	1/1	pCi/g			0.87	0.87	0.87	D		0.87	m	0.96	0/1		N		Below Background
Reach A	Potassium-40	5/5	pCi/g			8.06	13.52	10.3	L	14.1	13.5	m	15.6	0/5		N		Below Background
Reach A	Radium-226	271/280	pCi/g	0	0.8	0.3	25.1	1.16	Z	1.31	1.31	u	4.73	1/280		Y	Quant.	
Reach A	Radium-228	9/9	pCi/g			0.26	1.1	0.544	L	0.903	0.903	u	1.32	0/9		N		Below Background
Reach A	Thorium-228	10/10	pCi/g			0.4	1.31	0.806	N	0.994	0.994	u	1.32	0/10		N		Below Background
Reach A	Thorium-230	276/282	pCi/g	0	0.3	0.19	1398.7	9.85	Z	18.1	18.1	u	2.2	151/282		Y	Quant.	
Reach A	Thorium-232	260/278	pCi/g	0	0.9	0.2	3.4	0.713	Z	0.75	0.75	u	1.19	15/278		Y	Quant.	
Reach A	Uranium-238	240/268	pCi/g	0	1.4	0.2	10.9	0.82	Z	0.895	0.895	u	4.3	2/268		Y	Quant.	
Reach B	Phosphorous	1/1	mg/kg			1100	1100	1100	D		1100	m	1700	0/1		N		Below Background
Reach B	Aluminum	6/6	mg/kg			1330	51000	12400	L	322000	51000	m	51000	0/6	7.5E+03	N		Below Background
Reach B	Arsenic	5/6	mg/kg	5	5	3.5	20.6	8.3	L	22.7	20.6	m	13	1/6	3.8E-01	Y	Quant.	
Reach B	Barium	6/6	mg/kg			61.5	670	294	L	1790	670	m	890	0/6	5.2E+02	N		Below Background
Reach B	Beryllium	1/6	mg/kg	0.245	0.46	1	1	0.421	D	0.663	0.663	u	2	0/6	1.5E+01	N		Below Background
Reach B	Cadmium	3/6	mg/kg	0.345	1	0.67	1.6	0.88	D	1.27	1.27	u	4	0/6	3.7E+00	N		Below Background
Reach B	Calcium	6/6	mg/kg			27100	97600	57900	N	80400	80400	u	116000	0/6		N		Below Background
Reach B	Cerium	1/1	mg/kg			85	85	85	D		85	m	85	0/1		N		Below Background
Reach B	Chromium	3/3	mg/kg			39	75	56.3	D	86.7	75	m	140	0/3	3.0E+01	N		Below Background
Reach B	Cobalt	6/6	mg/kg			6.4	21	12.6	L	23.2	21	m	31	0/6	3.3E+02	N		Below Background
Reach B	Copper	3/6	mg/kg	5.35	11.05	16.6	59.2	26.9	D	47.3	47.3	u	330	0/6	2.8E+02	N		Below Background
Reach B	Gallium	1/1	mg/kg			12	12	12	D		12	m	18	0/1		N		Below Background
Reach B	Iron	6/6	mg/kg			8140	29000	16700	L	31400	29000	m	42000	0/6	2.2E+03	N		Below Background
Reach B	Lanthanum	1/1	mg/kg			39	39	39	D		39	m	38	1/1		Y	Qual.	
Reach B	Lead	6/6	mg/kg			15.3	83.2	53.8	N	76.8	76.8	u	380	0/6	4.0E+01	N		Below Background
Reach B	Lithium	4/6	mg/kg	1.15	2.6	1.2	20	5.34	D	11.3	11.3	u	22	0/6	1.5E+02	N		Below Background
Reach B	Magnesium	6/6	mg/kg			5200	14700	8820	L	14300	14300	u	21000	0/6		N		Below Background
Reach B	Manganese	6/6	mg/kg			715	3710	1970	L	5570	3710	m	3200	1/6	3.1E+02	Y	Quant.	
Reach B	Neodymium	1/1	mg/kg			35	35	35	D		35	m	35	0/1		N		Below Background
Reach B	Nickel	3/6	mg/kg	5.8	9.05	11.5	34	15.6	D	24.8	24.8	u	72	0/6	1.5E+02	N		Below Background
Reach B	Niobium	1/1	mg/kg			12	12	12	D		12	m	7	1/1		Y	Qual.	

Attachment 10. Determination of Sediment Potential Chemicals of Concern by Aggregate (Page 3 of 5)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Reach B	Potassium	5/6	mg/kg	129	129	525	16000	3200	L	1060000	16000	m	15000	1/6		N		Essential Nutrient (low conc.)
Reach B	Scandium	1/1	mg/kg			8	8	8	D		8	m	8	0/1		N		Below Background
Reach B	Sodium	4/6	mg/kg	95.5	153.5	200	9300	1710	D	4770	4770	u	10000	0/6		N		Below Background
Reach B	Strontium	6/6	mg/kg			58.1	180	93.6	L	148	148	u	380	0/6	4.5E+03	N		Below Background
Reach B	Thallium	1/5	mg/kg	0.6	0.85	4	4	1.36	D	2.77	2.77	u	0	1/5	6.0E-01	Y	Quant.	
Reach B	Thorium	1/1	mg/kg			9	9	9	D		9	m	9	0/1		N		Below Background
Reach B	Titanium	6/6	mg/kg			32.2	3000	600	L	149000	3000	m	2800	1/6		Y	Qual.	
Reach B	Uranium	22/27	mg/kg	8.5	11.85	1.8	7.2	4.87	L	5.88	5.88	u	8.69	0/27		N		Below Background
Reach B	Vanadium	6/6	mg/kg			17.9	88	33.6	X	56.3	56.3	u	99	0/6	5.2E+01	N		Below Background
Reach B	Ytterbium	1/1	mg/kg			2	2	2	D		2	m	3	0/1		N		Below Background
Reach B	Yttrium	1/1	mg/kg			22	22	22	D		22	m	24	0/1		N		Below Background
Reach B	Zinc	6/6	mg/kg			54.2	210	127	N	169	169	u	1370	0/6	2.2E+03	N		Below Background
Reach B	Aldrin	1/5	mg/kg	0.0105	0.045	0.022	0.022	0.0209	D	0.0344	0.022	m	0.023	0/5	2.6E-02	N		Below Background
Reach B	Endosulfan sulfate	1/5	mg/kg	0.0205	0.085	0.034	0.034	0.0384	D	0.0637	0.034	m	0	1/5		Y	Qual.	
Reach B	Endrin ketone	1/5	mg/kg	0.0205	0.085	0.1	0.1	0.0516	D	0.0877	0.0877	u	0	1/5		Y	Qual.	
Reach B	Lindane	1/5	mg/kg	0.0105	0.045	0.13	0.13	0.0425	D	0.0911	0.0911	u	0	1/5	4.2E-01	N		Max. detect < PRG
Reach B	gamma-Chlordane	1/5	mg/kg	0.0105	0.045	0.17	0.17	0.0505	D	0.116	0.116	u	0	1/5	1.6E+00	N		Max. detect < PRG
Reach B	Acenaphthene	2/5	mg/kg	0.21	0.95	5.9	7.8	3.01	D	6.43	6.43	u	0.25	2/5	2.6E+02	N		Max. detect < PRG
Reach B	Anthracene	4/5	mg/kg	0.21	0.21	0.088	23	8.17	D	18.7	18.7	u	0.2	3/5	1.4E+03	N		Max. detect < PRG
Reach B	Benz(a)anthracene	6/6	mg/kg			0.16	40	14	L	8730000	40	m	2.3	3/6	5.6E-01	Y	Quant.	
Reach B	Benzo(a)pyrene	6/6	mg/kg			0.16	35	11.7	L	3670000	35	m	1.7	3/6	5.6E-02	Y	Quant.	
Reach B	Benzo(b)fluoranthene	5/6	mg/kg	0.21	0.21	0.34	30	10.4	L	1660000	30	m	1.5	3/6	5.6E-01	Y	Quant.	
Reach B	Benzo(ghi)perylene	4/6	mg/kg	0.21	0.21	0.77	22	6.87	D	14.8	14.8	u	1.8	3/6		Y	Qual.	
Reach B	Benzo(k)fluoranthene	5/6	mg/kg	0.21	0.21	0.43	34	10.2	L	1220000	34	m	1.4	3/6	5.6E+00	Y	Quant.	
Reach B	Bis(2-ethylhexyl)phthalate	4/5	mg/kg	11	11	0.11	4.7	3.62	D	7.94	4.7	m	0.56	2/5	3.2E+01	N		Max. detect < PRG
Reach B	Butyl benzyl phthalate	1/5	mg/kg	0.21	14.5	0.051	0.051	5.34	D	11.9	0.051	m	0	1/5	9.3E+02	N		Max. detect < PRG
Reach B	Chrysene	6/6	mg/kg			0.22	47	14.9	L	4140000	47	m	2.4	3/6	5.6E+01	N		Max. detect < PRG
Reach B	Dibenzofuran	2/5	mg/kg	0.21	0.95	3.6	6.3	2.25	D	4.79	4.79	u	0.086	2/5	2.1E+01	N		Max. detect < PRG
Reach B	Fluoranthene	6/6	mg/kg			0.44	190	51.9	L	1080000000	190	m	7.1	3/6	2.0E+02	N		Max. detect < PRG
Reach B	Fluorene	3/5	mg/kg	0.21	0.21	0.2	9.2	3.42	D	7.67	7.67	u	0.2	2/5	1.8E+02	N		Max. detect < PRG
Reach B	Indeno(1,2,3-cd)pyrene	4/6	mg/kg	0.21	0.21	0.75	21	6.83	D	14.7	14.7	u	1.5	3/6	5.6E-01	Y	Quant.	
Reach B	Phenanthrene	6/6	mg/kg			0.12	93	29.7	L	4930000000	93	m	5.7	2/6		Y	Qual.	
Reach B	Pyrene	6/6	mg/kg			0.36	81	28.3	L	15100000	81	m	4	3/6	1.5E+02	N		Max. detect < PRG
Reach B	Acetone	1/2	mg/kg	0.0065	0.0065	0.028	0.028	0.0173	D	0.0851	0.028	m	0	1/2	1.4E+02	N		Max. detect < PRG
Reach B	Toluene	1/2	mg/kg	0.0035	0.0035	0.007	0.007	0.00525	D	0.0163	0.007	m	0.002	1/2	5.2E+02	N		Max. detect < PRG
Reach B	Actinium-227	2/5	pCi/g	0.02	0.31	0.23	0.32	0.188	D	0.322	0.32	m	0	2/5		Y	Quant.	
Reach B	Bismuth-211	2/2	pCi/g			2.8	3.1	2.95	D	3.9	3.1	m	2.9	1/2		Y	Quant.	
Reach B	Bismuth-214	2/2	pCi/g			0.86	0.94	0.9	D	1.15	0.94	m	0.97	0/2		N		Below Background
Reach B	Cesium-137	1/5	pCi/g	-0.004	0.02	0.02	0.02	0.0112	D	0.0206	0.02	m	0	1/5		Y	Quant.	
Reach B	Lead-212	2/2	pCi/g			0.65	0.75	0.7	D	1.02	0.75	m	0.96	0/2		N		Below Background
Reach B	Lead-214	2/2	pCi/g			1.3	1.4	1.35	D	1.67	1.4	m	0	2/2		Y	Quant.	
Reach B	Potassium-40	7/7	pCi/g			1.4	15.7	9.87	N	13.1	13.1	u	15.6	1/7		Y	Quant.	
Reach B	Radium-226	183/347	pCi/g	0	1.5	0.15	13.1	0.991	Z	1.09	1.09	u	4.73	3/347		Y	Quant.	
Reach B	Radium-228	12/14	pCi/g	0.29	0.6	0.14	1.27	0.734	N	0.887	0.887	u	1.32	0/14		N		Below Background
Reach B	Thorium-228	14/15	pCi/g	0.78	0.78	0.42	1.85	1	L	1.22	1.22	u	1.32	1/15		Y	Quant.	
Reach B	Thorium-230	205/352	pCi/g	0	3	0.7	198.7	8.16	Z	10.1	10.1	u	2.2	157/352		Y	Quant.	
Reach B	Thorium-232	202/348	pCi/g	0	2	0.4	7.8	1.18	Z	1.26	1.26	u	1.19	120/348		Y	Quant.	
Reach B	Uranium-238	24/330	pCi/g	0	8.3	0.79	9.9	0.395	D	0.525	0.525	u	4.3	5/330		Y	Quant.	
Reach C	Aluminum	6/6	mg/kg			6020	7900	7080	N	7580	7580	u	51000	0/6	7.5E+03	N		Below Background
Reach C	Arsenic	6/6	mg/kg			3.8	26.9	8.37	X	15.9	15.9	u	13	1/6	3.8E-01	Y	Quant.	
Reach C	Barium	6/6	mg/kg			110	288	147	X	205	205	u	890	0/6	5.2E+02	N		Below Background
Reach C	Beryllium	2/6	mg/kg	0.235	0.29	0.59	1.9	0.593	D	1.13	1.13	u	2	0/6	1.5E+01	N		Below Background
Reach C	Boron	1/6	mg/kg	1.5	4.55	3.4	3.4	2.43	D	3.47	3.4	m	75.9	0/6	4.9E+02	N		Below Background

Attachment 10. Determination of Sediment Potential Chemicals of Concern by Aggregate (Page 4 of 5)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc.[b]		Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]
Reach C	Calcium	6/6	mg/kg			2400	47100	12900	L	238000	47100	m	116000	0/6		N		Below Background
Reach C	Chromium	3/6	mg/kg	5.65	7.2	15.1	45	15.9	D	28.2	28.2	u	140	0/6	3.0E+01	N		Below Background
Reach C	Cobalt	5/6	mg/kg	3.1	3.1	6	28.6	9.72	L	36.8	28.6	m	31	0/6	3.3E+02	N		Below Background
Reach C	Copper	3/6	mg/kg	4.25	5.8	17.2	18.9	11.6	D	17.5	17.5	u	330	0/6	2.8E+02	N		Below Background
Reach C	Iron	6/6	mg/kg			11300	52600	19000	X	32500	32500	u	42000	1/6	2.2E+03	N		Essential Nutrient (low conc.)
Reach C	Lead	6/6	mg/kg			7.5	26.4	18.3	L	40.7	26.4	m	380	0/6	4.0E+01	N		Below Background
Reach C	Lithium	3/6	mg/kg	1.85	3.1	3.4	6.4	3.68	D	4.96	4.96	u	22	0/6	1.5E+02	N		Below Background
Reach C	Magnesium	6/6	mg/kg			1840	4010	2860	L	4300	4010	m	21000	0/6		N		Below Background
Reach C	Manganese	6/6	mg/kg			456	2830	924	X	1690	1690	u	3200	0/6	3.1E+02	N		Below Background
Reach C	Nickel	3/6	mg/kg	6.35	7.7	13.1	44.9	15.6	D	27.7	27.7	u	72	0/6	1.5E+02	N		Below Background
Reach C	Potassium	6/6	mg/kg			691	974	833	N	915	915	u	15000	0/6		N		Below Background
Reach C	Selenium	2/6	mg/kg	0.16	0.24	0.39	0.42	0.258	D	0.355	0.355	u	54.4	0/6	3.7E+01	N		Below Background
Reach C	Sodium	4/6	mg/kg	77	92	123	159	123	D	150	150	u	10000	0/6		N		Below Background
Reach C	Strontium	6/6	mg/kg			15	155	49.1	L	266	155	m	380	0/6	4.5E+03	N		Below Background
Reach C	Thallium	3/6	mg/kg	0.9	1.05	2.2	8.1	2.64	D	4.92	4.92	u	0	3/6	6.0E-01	Y	Quant.	
Reach C	Titanium	6/6	mg/kg			126	251	210	X	245	245	u	2800	0/6		N		Below Background
Reach C	Vanadium	6/6	mg/kg			17.2	63.1	26.6	X	41.4	41.4	u	99	0/6	5.2E+01	N		Below Background
Reach C	Zinc	6/6	mg/kg			34.8	131	71.6	L	158	131	m	1370	0/6	2.2E+03	N		Below Background
Reach C	4,4'-DDD	1/6	mg/kg	0.0023	0.0265	0.016	0.016	0.0137	D	0.0223	0.016	m	0	1/6	2.4E+00	N		Max. detect < PRG
Reach C	Aldrin	1/6	mg/kg	0.00115	0.0135	0.021	0.021	0.00914	D	0.0156	0.0156	u	0.023	0/6	2.6E-02	N		Below Background
Reach C	Endrin ketone	1/6	mg/kg	0.0023	0.0265	0.079	0.079	0.0242	D	0.0479	0.0479	u	0	1/6		Y	Qual.	
Reach C	4-Methylphenol	1/6	mg/kg	0.22	0.245	0.17	0.17	0.223	D	0.246	0.17	m	0	1/6	2.7E+01	N		Max. detect < PRG
Reach C	Anthracene	3/6	mg/kg	0.23	0.245	0.049	0.07	0.147	D	0.228	0.07	m	0.2	0/6	1.4E+03	N		Below Background
Reach C	Benz(a)anthracene	4/6	mg/kg	0.23	0.235	0.16	0.5	0.291	D	0.388	0.388	u	2.3	0/6	5.6E-01	N		Below Background
Reach C	Benzo(a)pyrene	4/6	mg/kg	0.23	0.235	0.18	0.67	0.344	D	0.495	0.495	u	1.7	0/6	5.6E-02	N		Below Background
Reach C	Benzo(b)fluoranthene	4/6	mg/kg	0.23	0.235	0.094	0.72	0.323	D	0.501	0.501	u	1.5	0/6	5.6E-01	N		Below Background
Reach C	Benzo(ghi)perylene	1/6	mg/kg	0.23	0.265	0.19	0.19	0.234	D	0.255	0.19	m	1.8	0/6		N		Below Background
Reach C	Benzo(k)fluoranthene	4/6	mg/kg	0.23	0.235	0.16	0.72	0.339	D	0.508	0.508	u	1.4	0/6	5.6E+00	N		Below Background
Reach C	Bis(2-ethylhexyl)phthalate	4/6	mg/kg	0.23	0.235	0.11	0.29	0.211	D	0.262	0.262	u	0.56	0/6	3.2E+01	N		Below Background
Reach C	Butyl benzyl phthalate	1/6	mg/kg	0.22	0.265	0.1	0.1	0.215	D	0.263	0.1	m	0	1/6	9.3E+02	N		Max. detect < PRG
Reach C	Chrysene	4/6	mg/kg	0.23	0.235	0.19	0.78	0.393	D	0.583	0.583	u	2.4	0/6	5.6E+01	N		Below Background
Reach C	Diethyl phthalate	2/6	mg/kg	0.23	0.245	0.072	0.083	0.184	D	0.252	0.083	m	0	2/6	4.4E+03	N		Max. detect < PRG
Reach C	Fluoranthene	4/6	mg/kg	0.23	0.235	0.37	1.3	0.616	D	0.964	0.964	u	7.1	0/6	2.0E+02	N		Below Background
Reach C	Fluorene	1/6	mg/kg	0.22	0.245	0.033	0.033	0.201	D	0.268	0.033	m	0.2	0/6	1.8E+02	N		Below Background
Reach C	Indeno(1,2,3-cd)pyrene	1/6	mg/kg	0.23	0.265	0.18	0.18	0.233	D	0.256	0.18	m	1.5	0/6	5.6E-01	N		Below Background
Reach C	Phenanthrene	4/6	mg/kg	0.23	0.235	0.23	0.47	0.328	D	0.418	0.418	u	5.7	0/6		N		Below Background
Reach C	Pyrene	4/6	mg/kg	0.23	0.235	0.35	1.2	0.598	D	0.924	0.924	u	4	0/6	1.5E+02	N		Below Background
Reach C	2-Butanone	1/2	mg/kg	0.0365	0.0365	0.002	0.002	0.0193	D	0.128	0.002	m	0	1/2	6.9E+02	N		Max. detect < PRG
Reach C	Acetone	1/2	mg/kg	0.155	0.155	0.12	0.12	0.138	D	0.248	0.12	m	0	1/2	1.4E+02	N		Max. detect < PRG
Reach C	Toluene	2/2	mg/kg			0.022	0.97	0.496	D	3.49	0.97	m	0.002	2/2	5.2E+02	N		Max. detect < PRG
Reach C	Cesium-137	2/6	pCi/g	0	0.05	0.03	0.03	0.02	D	0.0365	0.03	m	0	2/6		Y	Quant.	
Reach C	Potassium-40	4/6	pCi/g	0	0	7.89	14.61	8.24	D	13.8	13.8	u	15.6	0/6		N		Below Background
Reach C	Radium-226	85/145	pCi/g	0	1.7	0.5	4.6	1.1	Z	1.21	1.21	u	4.73	0/145		N		Below Background
Reach C	Radium-228	3/5	pCi/g	-0.01	-0.01	0.79	0.84	0.484	D	0.914	0.84	m	1.32	0/5		N		Below Background
Reach C	Thorium-228	6/6	pCi/g			0.87	1.62	1.09	L	1.38	1.38	u	1.32	1/6		Y	Quant.	
Reach C	Thorium-230	51/146	pCi/g	0	1.4	0.7	27.7	1.12	D	1.51	1.51	u	2.2	15/146		Y	Quant.	
Reach C	Thorium-232	81/146	pCi/g	0	2.1	0.6	3.6	1.28	Z	1.4	1.4	u	1.19	64/146		Y	Quant.	
Reach C	Uranium-238	7/146	pCi/g	0	7	1.2	8.4	0.368	D	0.556	0.556	u	4.3	3/146		N		<5% detected

UCL_{95} = 95% upper confidence limit on the mean concentration
PRG = Preliminary Remediation Goal
PCOC = Potential Contaminant of Concern

Attachment 10. Determination of Sediment Potential Chemicals of Concern by Aggregate (Page 5 of 5)
(only detected analytes are shown)

Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist.[a]	UCL_{95}	Expos. Conc. [b]	Back-ground Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG[c]	PCOC	Type PCOC[d]	Justification[e]

[a] Distribution flags:

D = Not determined because fewer than 5 detects or < 50% detects; t-statistic used in calculations of UCL_{95}.

L = Lognormal; H-statistic used in calculations of UCL_{95}.

N = Normal; t-statistic used in calculations of UCL_{95}.

X = Neither normal nor lognormal; t-statistic used in calculations of UCL_{95}.

Z = Has concentrations that are negative and/or zero; t-statistic used in calculations of UCL_{95}.

[b] Basis for determining the exposure concentration:

m = maximum detected concentration.

u = 95% upper confidence limit on the mean concentration.

[c] EPA Region IX residential soil PRG, based on a risk level of 10^{-6} or a hazard level of 0.1 (note that Region IX noncarcinogenic PRGs are provided for a hazard level of 1.0; these values have been adjusted to a hazard level of 0.1 for this screening).

[d] Based on the lack of available toxicity information, some PCOCs were evaluated qualitatively;

Qual. = Qualitative

Quant. = Quantitative.

[e] Justification for eliminating the analyte from the PCOC list.

Attachment 11. Toxicity and Chemical-specific Parameters used to Quantify Risks and Hazards (page 1 of 2)

	Reference Doses (mg/kg-day)						Cancer Slope Factors[b,c]				Chemical-specific Parameters							
PCOC[a]	Chronic Oral RfD	Subchr. Oral RfD	Chronic Dermal RfD	Subchr. Dermal RfD	Chronic Inhalation RfD	Subchr. Inhalation RfD	Oral Slope Factor[b]	Dermal Slope Factor[b]	Inhalation Slope Factor[b]	External Slope Factor[c]	ABS_{gi}[d]	ABS[e]	VF[f] (m^3/kg)	PEF[g] (m^3/kg)	H[h] (atm-m^3/mole)	PC[i]	EPA Class.	ICRP Lung Class[j]
Chemicals																		
1,2-Dichloroethene	9.00E-03	9.00E-03	7.20E-03	7.20E-03							0.8	0.01		1.32E+09		0.0011	NA	
Acetone	1.00E-01	1.00E+00	8.30E-02	8.30E-01							0.83	0.01	1.64E+04	1.32E+09	3.88E-05	0.0006	D	
Antimony	4.00E-04	4.00E-04	8.00E-06	8.00E-06							0.02	0.001		1.32E+09		0.001	NA	
Arsenic	3.00E-04	3.00E-04	1.23E-04	1.23E-04			1.50E+00	3.66E+00	1.51E+01		0.41	0.001		1.32E+09		0.001	A	
Barium	7.00E-02	7.00E-02	4.90E-03	4.90E-03	1.43E-04	1.43E-03					0.07	0.001		1.32E+09		0.001	D	
Benz(a)anthracene							7.30E-01	2.35E+00	3.10E-01		0.31	0.01		1.32E+09	3.34E-06	0.81	B2	
Benzo(a)pyrene							7.30E+00	2.35E+01	3.10E+00		0.31	0.01		1.32E+09	1.13E-06	1.2	B2	
Benzo(b)fluoranthene							7.30E-01	2.35E+00	3.10E-01		0.31	0.01		1.32E+09	1.11E-04	1.2	B2	
Benzo(k)fluoranthene							7.30E-02	2.35E-01	3.10E-02		0.31	0.01		1.32E+09	8.29E-07	0.6	B2	
Bis(2-ethylhexyl)phthalate	2.00E-02		3.80E-03				1.40E-02	7.37E-02			0.19	0.01		1.32E+09	1.02E-07	0.023	B2	
Boron	9.00E-02		8.10E-02		5.71E-03	5.71E-03					0.9	0.001		1.32E+09		0.001	NA	
Cadmium (Diet)[k]	1.00E-03		1.00E-05						6.30E+00		0.01	0.01		1.32E+09		0.001	B1	
Cadmium (Water)[k]	5.00E-04		5.00E-06						6.30E+00		0.01	0.01		1.32E+09		0.001	B1	
Chloroform	1.00E-02	1.00E-02	2.00E-03	2.00E-03			6.10E-03	3.05E-02	8.10E-02		0.2	0.01	3.47E+03	1.32E+09	3.66E-03	0.0089	B2	
Chloromethane						2.60E+00	1.30E-02	1.63E-02	6.30E-03		0.8	0.01	2.06E+03	1.32E+09	8.82E-03	0.0042	C	
Chromium VI (chromic acid mists)[l]	3.00E-03	2.00E-02	6.00E-05	4.00E-04	2.29E-06				4.10E+01		0.02	0.001		1.32E+09		0.001	A	
Chromium VI (particulates)[l]	3.00E-03	2.00E-02	6.00E-05	4.00E-04	2.86E-05				4.10E+01		0.02	0.001		1.32E+09		0.001	A	
Dibenz(a,h)anthracene							7.30E+00	2.35E+01	3.10E+00		0.31	0.01		1.32E+09	1.47E-08	2.7	B2	
Dieldrin	5.00E-05	5.00E-05	2.50E-05	2.50E-05			1.60E+01	3.20E+01	1.60E+01		0.5	0.01		1.32E+09	1.51E-05	0.016	B2	
Dimethylbenzene	2.00E+00	3.57E-01	1.84E+00	3.28E-01							0.92	0.01	8.92E+03	1.32E+09	5.25E-03	0.095	D	
Fluoride[m]	6.00E-02	6.00E-02	5.82E-02	5.82E-02							0.97	0.001		1.32E+09		0.001	NA	
Indeno(1,2,3-cd)pyrene							7.30E-01	2.35E+00	3.10E-01		0.31	0.01		1.32E+09	1.60E-06	1.9	B2	
MCPA	5.00E-04	5.00E-04	2.50E-04	2.50E-04							0.5	0.01		1.32E+09		0.0049	NA	
MCPP	1.00E-03	1.00E-02	5.00E-04	5.00E-03							0.5	0.01		1.32E+09		0.0066	NA	
Manganese	4.60E-02		1.84E-03		1.43E-05						0.04	0.001		1.32E+09		0.001	D	
Methylene chloride	6.00E-02	6.00E-02	5.70E-02	5.70E-02	8.57E-01	8.57E-01	7.50E-03	7.89E-03	1.65E-03		0.95	0.01	3.25E+03	1.32E+09	2.19E-03	0.0045	B2	
Molybdenum	5.00E-03	5.00E-03	1.90E-03	1.90E-03							0.38	0.001		1.32E+09		0.001	NA	
Nickel	2.00E-02	2.00E-02	5.40E-03	5.40E-03							0.27	0.001		1.32E+09		0.001	NA	
Nitrate	1.60E+00		8.00E-01								0.5	0.001		1.32E+09		0.001	NA	
Nitrite	1.00E-01	1.00E-01	5.00E-02	5.00E-02							0.5	0.001		1.32E+09		0.001	NA	
Selenium	5.00E-03	5.00E-03	2.20E-03	2.20E-03							0.44	0.001		1.32E+09		0.001	D	
Strontium	6.00E-01	6.00E-01	1.20E-01	1.20E-01							0.2	0.001		1.32E+09		0.001	NA	
Tetrachloroethene	1.00E-02	1.00E-01	1.00E-02	1.00E-01	1.71E-01		5.20E-02	5.20E-02	2.00E-03		1	0.01	3.33E+03	1.32E+09	1.84E-02	0.37	NA	
Thallium[n]	8.00E-05	8.00E-04	1.60E-05	1.60E-04							0.2	0.001		1.32E+09		0.001	D	
Trichloroethene	6.00E-03		9.00E-04				1.10E-02	7.33E-02	6.00E-03		0.15	0.01	4.25E+03	1.32E+09	1.03E-02	0.016	NA	
Uranium[o]	3.00E-03		2.55E-03								0.85	0.001		1.32E+09		0.001	NA	
Vanadium	7.00E-03	7.00E-03	7.00E-05	7.00E-05							0.01	0.001		1.32E+09		0.001	NA	

Attachment 11. Toxicity and Chemical-specific Parameters used to Quantify Risks and Hazards (page 2 of 2)

PCOC[a]	Reference Doses (mg/kg-day) Chronic Oral RfD	Subchr. Oral RfD	Chronic Dermal RfD	Subchr. Dermal RfD	Chronic Inhalation RfD	Subchr. Inhalation RfD	Cancer Slope Factors[b,c] Oral Slope Factor[b]	Dermal Slope Factor[b]	Inhalation Slope Factor[b]	External Slope Factor[c]	Chemical-specific Parameters ABS_{gi}[d]	ABS[e]	VF[f] (m^3/kg)	PEF[g] (m^3/kg)	H[h] (atm-m^3/mole)	PC[i]	EPA Class.	ICRP Lung Class[j]
Zinc	3.00E-01	3.00E-01	6.00E-02	6.00E-02							0.2	0.001		1.32E+09		0.001	D	
Radionuclides																		
Actinium-227+D[p]							6.26E-10		7.87E-08	9.30E-07	0.001			1.32E+09			A	Y
Lead-210+D[p]							1.01E-09		3.86E-09	1.45E-10	0.2			1.32E+09			A	D
Protactinium-231							1.49E-10		2.42E-08	2.71E-08	0.001			1.32E+09			A	Y
Radium-226+D[p]							2.96E-10		2.75E-09	6.74E-06	0.2			1.32E+09			A	W
Radium-228+D[p]							2.48E-10		9.94E-10	3.28E-06	0.2			1.32E+09			A	W
Thorium-228+D[p]							2.31E-10		9.68E-08	6.20E-06	0.0002			1.32E+09			A	Y
Thorium-230							3.75E-11		1.72E-08	4.40E-11	0.0002			1.32E+09			A	Y
Thorium-232							3.28E-11		1.93E-08	1.97E-11	0.0002			1.32E+09			A	Y
Uranium-234							4.44E-11		1.40E-08	2.14E-11	0.05			1.32E+09			A	Y
Uranium-235+D[p]							4.70E-11		1.30E-08	2.65E-07	0.05			1.32E+09			A	Y
Uranium-238+D[p]							6.20E-11		1.24E-08	6.57E-08	0.05			1.32E+09			A	Y

[a] PCOC = Potential Contaminant of Concern.

[b] Units for oral and inhalation cancer slope factors are $(mg/kg\text{-}day)^{-1}$ for chemicals and (risk/pCi) for radionuclides. Units for dermal cancer slope factors (chemicals only) are $(mg/kg\text{-}day)^{-1}$.

[c] Units for external exposure cancer slope factor (radionuclides only) are (risk/year per pCi/g soil).

[d] Chemical-specific gut absorption factor used to adjust oral toxicity in order to obtain dermal toxicity.

[e] Chemical-specific absorption factor used to estimate dermally absorbed intake from exposure to soils and dry sediments.

[f] Volitilization factor used to estimate intake from inhalation of dust.

[g] Particulate emission factor used to estimate intake from inhalation of dust.

[h] Henry's law constant used to estimate intake from inhalation of VOCs in ground water during household water use.

[i] Permeability constant used to estimate intake from dermal contact with ground water and surface water.

[j] ICRP Lung Classification categories: (Y) years; (W) weeks; (D) days.

[k] Cadmium was evaluated using the toxicity of Cadmium (Diet) for soil and sediment; cadmium was evaluated using the toxicity of Cadmium (Water) for ground water and surface water.

[l] Chromium was evaluated using the toxicity of Chromium VI (particulates) for soil and sediment; chromium was evaluated using the toxicity of Chromium VI (chromic acid mists) for ground water and surface water.

[m] Fluoride was evaluated using the toxicity of Fluorine (Soluble Fluoride).

[n] Thallium was evaluated using the toxicity of Thallium Sulfate.

[o] Uranium (as a non-radionuclide) was evaluated using the toxicity of Uranium (Soluble Salts).

[p] +D slope factors include contributions from short-lived daughter products.

Attachment 12. Radiological Doses and Risks for each Property (page 1 of 60)

			Exposure Point	RESIDENTIAL				INDUSTRIAL				MAINTENANCE			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Sub. (>0.5 ft)	09K120040/VP-3(C)	Ac-227	5.60E-02	7.4E-02	0.0E+00	2.0E-07	0.0E+00	1.9E-02	0.0E+00	5.7E-08	0.0E+00	6.5E-03	0.0E+00	5.0E-09	0.0E+00
Sub. (>0.5 ft)	09K120040/VP-3(C)	Pa-231	1.04E-01	4.6E-02	0.0E+00	2.2E-07	0.0E+00	7.8E-03	0.0E+00	5.3E-08	0.0E+00	5.3E-03	0.0E+00	1.7E-09	0.0E+00
Sub. (>0.5 ft)	09K120040/VP-3(C)	Pb-210	5.32E-01	1.3E-01	0.0E+00	2.9E-07	0.0E+00	1.7E-02	0.0E+00	3.5E-08	0.0E+00	1.6E-02	0.0E+00	1.3E-08	0.0E+00
Sub. (>0.5 ft)	09K120040/VP-3(C)	Ra-226	1.13E+00	4.1E+00	0.0E+00	5.8E-05	0.0E+00	1.3E+00	0.0E+00	1.6E-05	0.0E+00	2.0E-01	0.0E+00	7.5E-07	0.0E+00
Sub. (>0.5 ft)	09K120040/VP-3(C)	Th-230	3.63E+01	9.9E-01	4.5E+00	1.5E-05	6.3E-05	1.9E-01	1.3E+00	3.2E-06	1.6E-05	1.2E-01	3.1E-01	8.7E-08	7.2E-07
Sub. (>0.5 ft)	09K120040/VP-3(C)	Th-232	3.10E-01	4.2E-02	1.4E+00	1.8E-05	2.4E-05	8.1E-03	4.4E-01	4.3E-06	6.4E-06	5.2E-03	7.4E-02	6.4E-08	2.6E-07
Sub. (>0.5 ft)	09K120040/VP-3(C)	U-238	1.52E+00	8.6E-02	0.0E+00	7.9E-07	0.0E+00	2.5E-02	0.0E+00	2.1E-07	0.0E+00	5.6E-03	0.0E+00	1.3E-08	0.0E+00
Sub. (>0.5 ft)	09K120040/VP-3(C)	TOTAL		5.5E+00	5.9E+00	9.3E-05	8.7E-05	1.6E+00	1.7E+00	2.4E-05	2.3E-05	3.7E-01	3.8E-01	9.4E-07	9.8E-07
Surf. (<0.5 ft)	09K120040/VP-3(C)	Pb-210	1.86E-01	4.4E-02	0.0E+00	1.0E-07	0.0E+00	5.8E-03	0.0E+00	1.2E-08	0.0E+00	5.7E-03	0.0E+00	4.5E-09	0.0E+00
Surf. (<0.5 ft)	09K120040/VP-3(C)	Ra-226	6.50E-01	2.4E+00	0.0E+00	3.4E-05	0.0E+00	7.5E-01	0.0E+00	9.2E-06	0.0E+00	1.2E-01	0.0E+00	4.3E-07	0.0E+00
Surf. (<0.5 ft)	09K120040/VP-3(C)	Th-230	1.16E+01	3.2E-01	1.4E+00	4.8E-06	2.0E-05	6.2E-02	4.1E-01	1.0E-06	5.2E-06	3.9E-02	9.8E-02	2.8E-08	2.3E-07
Surf. (<0.5 ft)	09K120040/VP-3(C)	Th-232	1.01E+00	1.4E-01	4.6E+00	5.8E-05	7.9E-05	2.6E-02	1.4E+00	1.4E-05	2.1E-05	1.7E-02	2.4E-01	2.1E-07	8.5E-07
Surf. (<0.5 ft)	09K120040/VP-3(C)	U-238	8.69E+00	4.9E-01	0.0E+00	4.5E-06	0.0E+00	1.4E-01	0.0E+00	1.2E-06	0.0E+00	3.2E-02	0.0E+00	7.2E-08	0.0E+00
Surf. (<0.5 ft)	09K120040/VP-3(C)	TOTAL		3.4E+00	6.1E+00	1.0E-04	9.9E-05	9.8E-01	1.9E+00	2.5E-05	2.6E-05	2.1E-01	3.4E-01	7.5E-07	1.1E-06
All Depths	09K120040/VP-3(C)	Pb-210	1.99E-01	4.7E-02	0.0E+00	1.1E-07	0.0E+00	6.2E-03	0.0E+00	1.3E-08	0.0E+00	6.1E-03	0.0E+00	4.8E-09	0.0E+00
All Depths	09K120040/VP-3(C)	Ra-226	6.90E-01	2.5E+00	0.0E+00	3.6E-05	0.0E+00	7.9E-01	0.0E+00	9.7E-06	0.0E+00	1.2E-01	0.0E+00	4.6E-07	0.0E+00
All Depths	09K120040/VP-3(C)	Th-230	1.25E+01	3.4E-01	1.6E+00	5.2E-06	2.2E-05	6.7E-02	4.4E-01	1.1E-06	5.6E-06	4.2E-02	1.1E-01	3.0E-08	2.5E-07
All Depths	09K120040/VP-3(C)	Th-232	8.50E-01	1.1E-01	3.9E+00	4.9E-05	6.6E-05	2.2E-02	1.2E+00	1.2E-05	1.7E-05	1.4E-02	2.0E-01	1.7E-07	7.2E-07
All Depths	09K120040/VP-3(C)	U-238	1.52E+00	8.6E-02	0.0E+00	7.9E-07	0.0E+00	2.5E-02	0.0E+00	2.1E-07	0.0E+00	5.6E-03	0.0E+00	1.3E-08	0.0E+00
All Depths	09K120040/VP-3(C)	TOTAL		3.1E+00	5.5E+00	9.0E-05	8.8E-05	9.1E-01	1.7E+00	2.3E-05	2.3E-05	1.9E-01	3.1E-01	6.8E-07	9.7E-07
Sub. (>0.5 ft)	09K120116/VP-5(C)	Ac-227	2.17E-01	2.9E-01	0.0E+00	7.6E-07	0.0E+00	7.2E-02	0.0E+00	2.2E-07	0.0E+00	2.5E-02	0.0E+00	1.9E-08	0.0E+00
Sub. (>0.5 ft)	09K120116/VP-5(C)	Pa-231	2.88E-01	1.3E-01	0.0E+00	6.1E-07	0.0E+00	2.2E-02	0.0E+00	1.5E-07	0.0E+00	1.5E-02	0.0E+00	4.8E-09	0.0E+00
Sub. (>0.5 ft)	09K120116/VP-5(C)	Pb-210	8.54E-01	2.0E-01	0.0E+00	4.7E-07	0.0E+00	2.7E-02	0.0E+00	5.6E-08	0.0E+00	2.6E-02	0.0E+00	2.1E-08	0.0E+00
Sub. (>0.5 ft)	09K120116/VP-5(C)	Ra-226	8.90E-01	3.2E+00	0.0E+00	4.6E-05	0.0E+00	1.0E+00	0.0E+00	1.3E-05	0.0E+00	1.6E-01	0.0E+00	5.9E-07	0.0E+00
Sub. (>0.5 ft)	09K120116/VP-5(C)	Th-230	5.93E+01	1.6E+00	7.3E+00	2.5E-05	1.0E-04	3.1E-01	2.1E+00	5.3E-06	2.6E-05	2.0E-01	5.0E-01	1.4E-07	1.2E-06
Sub. (>0.5 ft)	09K120116/VP-5(C)	Th-232	8.90E-01	1.2E-01	4.1E+00	5.1E-05	6.9E-05	2.3E-02	1.3E+00	1.2E-05	1.8E-05	1.5E-02	2.1E-01	1.8E-07	7.5E-07
Sub. (>0.5 ft)	09K120116/VP-5(C)	U-238	4.45E+00	2.5E-01	0.0E+00	2.3E-06	0.0E+00	7.2E-02	0.0E+00	6.1E-07	0.0E+00	1.6E-02	0.0E+00	3.7E-08	0.0E+00
Sub. (>0.5 ft)	09K120116/VP-5(C)	TOTAL		5.8E+00	1.1E+01	1.3E-04	1.7E-04	1.6E+00	3.4E+00	3.1E-05	4.5E-05	4.6E-01	7.2E-01	1.0E-06	1.9E-06
Surf. (<0.5 ft)	09K120116/VP-5(C)	Pb-210	1.96E-01	4.6E-02	0.0E+00	1.1E-07	0.0E+00	6.1E-03	0.0E+00	1.3E-08	0.0E+00	6.0E-03	0.0E+00	4.7E-09	0.0E+00
Surf. (<0.5 ft)	09K120116/VP-5(C)	Ra-226	5.10E-01	1.9E+00	0.0E+00	2.6E-05	0.0E+00	5.9E-01	0.0E+00	7.2E-06	0.0E+00	9.2E-02	0.0E+00	3.4E-07	0.0E+00
Surf. (<0.5 ft)	09K120116/VP-5(C)	Th-230	1.23E+01	3.4E-01	1.5E+00	5.1E-06	2.1E-05	6.6E-02	4.3E-01	1.1E-06	5.5E-06	4.1E-02	1.0E-01	2.9E-08	2.4E-07
Surf. (<0.5 ft)	09K120116/VP-5(C)	Th-232	1.89E+00	2.5E-01	8.7E+00	1.1E-04	1.5E-04	4.9E-02	2.7E+00	2.6E-05	3.9E-05	3.1E-02	4.5E-01	3.9E-07	1.6E-06
Surf. (<0.5 ft)	09K120116/VP-5(C)	U-238	2.52E+00	1.4E-01	0.0E+00	1.3E-06	0.0E+00	4.1E-02	0.0E+00	3.5E-07	0.0E+00	9.2E-03	0.0E+00	2.1E-08	0.0E+00
Surf. (<0.5 ft)	09K120116/VP-5(C)	TOTAL		2.6E+00	1.0E+01	1.4E-04	1.7E-04	7.5E-01	3.1E+00	3.5E-05	4.4E-05	1.8E-01	5.6E-01	7.8E-07	1.8E-06
All Depths	09K120116/VP-5(C)	Pa-231	1.68E-02	7.4E-03	0.0E+00	3.6E-08	0.0E+00	1.3E-03	0.0E+00	8.6E-09	0.0E+00	8.6E-04	0.0E+00	2.8E-10	0.0E+00
All Depths	09K120116/VP-5(C)	Pb-210	3.79E-01	9.0E-02	0.0E+00	2.1E-07	0.0E+00	1.2E-02	0.0E+00	2.5E-08	0.0E+00	1.2E-02	0.0E+00	9.1E-09	0.0E+00
All Depths	09K120116/VP-5(C)	Ra-226	4.80E-01	1.7E+00	0.0E+00	2.5E-05	0.0E+00	5.5E-01	0.0E+00	6.8E-06	0.0E+00	8.7E-02	0.0E+00	3.2E-07	0.0E+00
All Depths	09K120116/VP-5(C)	Th-230	2.54E+01	6.9E-01	3.1E+00	1.1E-05	4.4E-05	1.4E-01	8.9E-01	2.3E-06	1.1E-05	8.5E-02	2.2E-01	6.1E-08	5.0E-07
All Depths	09K120116/VP-5(C)	Th-232	6.10E-01	8.2E-02	2.8E+00	3.5E-05	4.8E-05	1.6E-02	8.7E-01	8.5E-06	1.3E-05	1.0E-02	1.5E-01	1.3E-07	5.2E-07
All Depths	09K120116/VP-5(C)	U-238	2.52E+00	1.4E-01	0.0E+00	1.3E-06	0.0E+00	4.1E-02	0.0E+00	3.5E-07	0.0E+00	9.2E-03	0.0E+00	2.1E-08	0.0E+00
All Depths	09K120116/VP-5(C)	TOTAL		2.8E+00	6.0E+00	7.2E-05	9.1E-05	7.6E-01	1.8E+00	1.8E-05	2.4E-05	2.0E-01	3.6E-01	5.4E-07	1.0E-06
Sub. (>0.5 ft)	09K120127/VP-4(C)	Pb-210	5.36E-02	1.3E-02	0.0E+00	3.0E-08	0.0E+00	1.7E-03	0.0E+00	3.5E-09	0.0E+00	1.6E-03	0.0E+00	1.3E-09	0.0E+00
Sub. (>0.5 ft)	09K120127/VP-4(C)	Ra-226	1.50E-01	5.5E-01	0.0E+00	7.7E-06	0.0E+00	1.7E-01	0.0E+00	2.1E-06	0.0E+00	2.7E-02	0.0E+00	1.0E-07	0.0E+00
Sub. (>0.5 ft)	09K120127/VP-4(C)	Th-230	2.17E+00	5.9E-02	2.7E-01	9.0E-07	3.7E-06	1.2E-02	7.6E-02	1.9E-07	9.7E-07	7.3E-03	1.8E-02	5.2E-09	4.3E-08
Sub. (>0.5 ft)	09K120127/VP-4(C)	U-238	4.34E+00	2.4E-01	0.0E+00	2.3E-06	0.0E+00	7.1E-02	0.0E+00	6.0E-07	0.0E+00	1.6E-02	0.0E+00	3.6E-08	0.0E+00
Sub. (>0.5 ft)	09K120127/VP-4(C)	TOTAL		8.6E-01	2.7E-01	1.1E-05	3.7E-06	2.6E-01	7.6E-02	2.9E-06	9.7E-07	5.2E-02	1.8E-02	1.4E-07	4.3E-08

			Exposure Point	RESIDENTIAL				INDUSTRIAL				MAINTENANCE			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<0.5 ft)	09K120127/VP-4(C)	Pb-210	7.49E-02	1.8E-02	0.0E+00	4.1E-08	0.0E+00	2.3E-03	0.0E+00	4.9E-09	0.0E+00	2.3E-03	0.0E+00	1.8E-09	0.0E+00
Surf. (<0.5 ft)	09K120127/VP-4(C)	Ra-226	5.70E-01	2.1E+00	0.0E+00	2.9E-05	0.0E+00	6.5E-01	0.0E+00	8.0E-06	0.0E+00	1.0E-01	0.0E+00	3.8E-07	0.0E+00
Surf. (<0.5 ft)	09K120127/VP-4(C)	Th-230	3.69E+00	1.0E-01	4.6E-01	1.5E-06	6.4E-06	2.0E-02	1.3E-01	3.3E-07	1.6E-06	1.2E-02	3.1E-02	8.8E-09	7.3E-08
Surf. (<0.5 ft)	09K120127/VP-4(C)	Th-232	1.43E+00	1.9E-01	6.6E+00	8.2E-05	1.1E-04	3.7E-02	2.0E+00	2.0E-05	2.9E-05	2.4E-02	3.4E-01	2.9E-07	1.2E-06
Surf. (<0.5 ft)	09K120127/VP-4(C)	U-238	6.56E+00	3.7E-01	0.0E+00	3.4E-06	0.0E+00	1.1E-01	0.0E+00	9.0E-07	0.0E+00	2.4E-02	0.0E+00	5.4E-08	0.0E+00
Surf. (<0.5 ft)	09K120127/VP-4(C)	TOTAL		2.8E+00	7.0E+00	1.2E-04	1.2E-04	8.2E-01	2.2E+00	2.9E-05	3.1E-05	1.7E-01	3.7E-01	7.4E-07	1.3E-06
All Depths	09K120127/VP-4(C)	Pb-210	6.23E-02	1.5E-02	0.0E+00	3.4E-08	0.0E+00	1.9E-03	0.0E+00	4.1E-09	0.0E+00	1.9E-03	0.0E+00	1.5E-09	0.0E+00
All Depths	09K120127/VP-4(C)	Ra-226	4.40E-01	1.6E+00	0.0E+00	2.3E-05	0.0E+00	5.1E-01	0.0E+00	6.2E-06	0.0E+00	8.0E-02	0.0E+00	2.9E-07	0.0E+00
All Depths	09K120127/VP-4(C)	Th-230	2.79E+00	7.6E-02	3.5E-01	1.2E-06	4.8E-06	1.5E-02	9.8E-02	2.5E-07	1.2E-06	9.4E-03	2.4E-02	6.6E-09	5.5E-08
All Depths	09K120127/VP-4(C)	Th-232	1.16E+00	1.6E-01	5.3E+00	6.6E-05	9.0E-05	3.0E-02	1.7E+00	1.6E-05	2.4E-05	1.9E-02	2.8E-01	2.4E-07	9.8E-07
All Depths	09K120127/VP-4(C)	U-238	5.67E+00	3.2E-01	0.0E+00	3.0E-06	0.0E+00	9.2E-02	0.0E+00	7.8E-07	0.0E+00	2.1E-02	0.0E+00	4.7E-08	0.0E+00
All Depths	09K120127/VP-4(C)	TOTAL		2.2E+00	5.7E+00	9.3E-05	9.5E-05	6.4E-01	1.8E+00	2.3E-05	2.5E-05	1.3E-01	3.0E-01	5.9E-07	1.0E-06
Sub. (>0.5 ft)	09K130038/VP-62	Pb-210	4.76E-02	1.1E-02	0.0E+00	2.6E-08	0.0E+00	1.5E-03	0.0E+00	3.1E-09	0.0E+00	1.5E-03	0.0E+00	1.1E-09	0.0E+00
Sub. (>0.5 ft)	09K130038/VP-62	Th-230	1.74E+00	4.7E-02	2.2E-01	7.2E-07	3.0E-06	9.2E-03	6.1E-02	1.6E-07	7.8E-07	5.8E-03	1.5E-02	4.1E-09	3.4E-08
Sub. (>0.5 ft)	09K130038/VP-62	TOTAL		5.9E-02	2.2E-01	7.5E-07	3.0E-06	1.1E-02	6.1E-02	1.6E-07	7.8E-07	7.3E-03	1.5E-02	5.3E-09	3.4E-08
All Depths	09K130038/VP-62	Pb-210	4.76E-02	1.1E-02	0.0E+00	2.6E-08	0.0E+00	1.5E-03	0.0E+00	3.1E-09	0.0E+00	1.5E-03	0.0E+00	1.1E-09	0.0E+00
All Depths	09K130038/VP-62	Th-230	1.74E+00	4.7E-02	2.2E-01	7.2E-07	3.0E-06	9.2E-03	6.1E-02	1.6E-07	7.8E-07	5.8E-03	1.5E-02	4.1E-09	3.4E-08
All Depths	09K130038/VP-62	TOTAL		5.9E-02	2.2E-01	7.5E-07	3.0E-06	1.1E-02	6.1E-02	1.6E-07	7.8E-07	7.3E-03	1.5E-02	5.3E-09	3.4E-08
Sub. (>0.5 ft)	09K130104/VP-60	Pb-210	2.09E-02	4.9E-03	0.0E+00	1.1E-08	0.0E+00	6.5E-04	0.0E+00	1.4E-09	0.0E+00	6.4E-04	0.0E+00	5.0E-10	0.0E+00
Sub. (>0.5 ft)	09K130104/VP-60	TOTAL		4.9E-03	0.0E+00	1.1E-08	0.0E+00	6.5E-04	0.0E+00	1.4E-09	0.0E+00	6.4E-04	0.0E+00	5.0E-10	0.0E+00
All Depths	09K130104/VP-60	Pb-210	2.09E-02	4.9E-03	0.0E+00	1.1E-08	0.0E+00	6.5E-04	0.0E+00	1.4E-09	0.0E+00	6.4E-04	0.0E+00	5.0E-10	0.0E+00
All Depths	09K130104/VP-60	TOTAL		4.9E-03	0.0E+00	1.1E-08	0.0E+00	6.5E-04	0.0E+00	1.4E-09	0.0E+00	6.4E-04	0.0E+00	5.0E-10	0.0E+00
Sub. (>0.5 ft)	09K140015/VP-58	Ac-227	3.21E-01	4.2E-01	0.0E+00	1.1E-06	0.0E+00	1.1E-01	0.0E+00	3.3E-07	0.0E+00	3.7E-02	0.0E+00	2.9E-08	0.0E+00
Sub. (>0.5 ft)	09K140015/VP-58	Pa-231	4.06E-01	1.8E-01	0.0E+00	8.6E-07	0.0E+00	3.1E-02	0.0E+00	2.1E-07	0.0E+00	2.1E-02	0.0E+00	6.8E-09	0.0E+00
Sub. (>0.5 ft)	09K140015/VP-58	Pb-210	1.06E+00	2.5E-01	0.0E+00	5.8E-07	0.0E+00	3.3E-02	0.0E+00	6.9E-08	0.0E+00	3.2E-02	0.0E+00	2.6E-08	0.0E+00
Sub. (>0.5 ft)	09K140015/VP-58	Ra-226	2.75E+00	1.0E+01	0.0E+00	1.4E-04	0.0E+00	3.2E+00	0.0E+00	3.9E-05	0.0E+00	5.0E-01	0.0E+00	1.8E-06	0.0E+00
Sub. (>0.5 ft)	09K140015/VP-58	Th-230	7.41E+01	2.0E+00	9.2E+00	3.1E-05	1.3E-04	3.9E-01	2.6E+00	6.6E-06	3.3E-05	2.5E-01	6.3E-01	1.8E-07	1.5E-06
Sub. (>0.5 ft)	09K140015/VP-58	Th-232	2.12E+00	2.8E-01	9.8E+00	1.2E-04	1.7E-04	5.5E-02	3.0E+00	3.0E-05	4.4E-05	3.5E-02	5.1E-01	4.4E-07	1.8E-06
Sub. (>0.5 ft)	09K140015/VP-58	U-238	1.44E+01	8.1E-01	0.0E+00	7.5E-06	0.0E+00	2.3E-01	0.0E+00	2.0E-06	0.0E+00	5.3E-02	0.0E+00	1.2E-07	0.0E+00
Sub. (>0.5 ft)	09K140015/VP-58	TOTAL		1.4E+01	1.9E+01	3.0E-04	2.9E-04	4.0E+00	5.6E+00	7.8E-05	7.7E-05	9.2E-01	1.1E+00	2.6E-06	3.3E-06
Surf. (<0.5 ft)	09K140015/VP-58	Pb-210	5.42E-02	1.3E-02	0.0E+00	3.0E-08	0.0E+00	1.7E-03	0.0E+00	3.5E-09	0.0E+00	1.7E-03	0.0E+00	1.3E-09	0.0E+00
Surf. (<0.5 ft)	09K140015/VP-58	Ra-226	1.13E+00	4.1E+00	0.0E+00	5.8E-05	0.0E+00	1.3E+00	0.0E+00	1.6E-05	0.0E+00	2.0E-01	0.0E+00	7.5E-07	0.0E+00
Surf. (<0.5 ft)	09K140015/VP-58	Th-230	2.21E+00	6.0E-02	2.7E-01	9.1E-07	3.8E-06	1.2E-02	7.7E-02	2.0E-07	9.8E-07	7.4E-03	1.9E-02	5.3E-09	4.4E-08
Surf. (<0.5 ft)	09K140015/VP-58	Th-232	1.22E+00	1.6E-01	5.6E+00	7.0E-05	9.5E-05	3.2E-02	1.7E+00	1.7E-05	2.5E-05	2.0E-02	2.9E-01	2.5E-07	1.0E-06
Surf. (<0.5 ft)	09K140015/VP-58	U-238	9.92E+00	5.6E-01	0.0E+00	5.2E-06	0.0E+00	1.6E-01	0.0E+00	1.4E-06	0.0E+00	3.6E-02	0.0E+00	8.2E-08	0.0E+00
Surf. (<0.5 ft)	09K140015/VP-58	TOTAL		4.9E+00	5.9E+00	1.3E-04	9.9E-05	1.5E+00	1.8E+00	3.4E-05	2.6E-05	2.7E-01	3.1E-01	1.1E-06	1.1E-06
All Depths	09K140015/VP-58	Ac-227	6.30E-02	8.3E-02	0.0E+00	2.2E-07	0.0E+00	2.1E-02	0.0E+00	6.4E-08	0.0E+00	7.3E-03	0.0E+00	5.6E-09	0.0E+00
All Depths	09K140015/VP-58	Pa-231	1.12E-01	4.9E-02	0.0E+00	2.4E-07	0.0E+00	8.5E-03	0.0E+00	5.7E-08	0.0E+00	5.8E-03	0.0E+00	1.9E-09	0.0E+00
All Depths	09K140015/VP-58	Pb-210	5.46E-01	1.3E-01	0.0E+00	3.0E-07	0.0E+00	1.7E-02	0.0E+00	3.6E-08	0.0E+00	1.7E-02	0.0E+00	1.3E-08	0.0E+00
All Depths	09K140015/VP-58	Ra-226	1.83E+00	6.7E+00	0.0E+00	9.5E-05	0.0E+00	2.1E+00	0.0E+00	2.6E-05	0.0E+00	3.3E-01	0.0E+00	1.2E-06	0.0E+00
All Depths	09K140015/VP-58	Th-230	3.73E+01	1.0E+00	4.6E+00	1.5E-05	6.4E-05	2.0E-01	1.3E+00	3.3E-06	1.7E-05	1.3E-01	3.2E-01	8.9E-08	7.4E-07
All Depths	09K140015/VP-58	Th-232	1.39E+00	1.9E-01	6.4E+00	8.0E-05	1.1E-04	3.6E-02	2.0E+00	1.9E-05	2.9E-05	2.3E-02	3.3E-01	2.9E-07	1.2E-06
All Depths	09K140015/VP-58	U-238	1.15E+01	6.5E-01	0.0E+00	6.0E-06	0.0E+00	1.9E-01	0.0E+00	1.6E-06	0.0E+00	4.2E-02	0.0E+00	9.5E-08	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 3 of 60)

			Exposure Point Conc.	RESIDENTIAL				INDUSTRIAL				MAINTENANCE			
Data Group	Property	Isotope	(pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
All Depths	09K140015/VP-58	TOTAL		8.8E+00	1.1E+01	2.0E-04	1.7E-04	2.6E+00	3.3E+00	5.0E-05	4.5E-05	5.5E-01	6.5E-01	1.7E-06	1.9E-06
Sub. (>0.5 ft)	09K140026/VP-57	Pb-210	2.66E-01	6.3E-02	0.0E+00	1.5E-07	0.0E+00	8.3E-03	0.0E+00	1.7E-08	0.0E+00	8.1E-03	0.0E+00	6.4E-09	0.0E+00
Sub. (>0.5 ft)	09K140026/VP-57	Ra-226	1.05E+00	3.8E+00	0.0E+00	5.4E-05	0.0E+00	1.2E+00	0.0E+00	1.5E-05	0.0E+00	1.9E-01	0.0E+00	7.0E-07	0.0E+00
Sub. (>0.5 ft)	09K140026/VP-57	Th-230	1.73E+01	4.7E-01	2.1E+00	7.2E-06	3.0E-05	9.2E-02	6.1E-01	1.5E-06	7.7E-06	5.8E-02	1.5E-01	4.1E-08	3.4E-07
Sub. (>0.5 ft)	09K140026/VP-57	Th-232	1.90E-01	2.5E-02	8.7E-01	1.1E-05	1.5E-05	4.9E-03	2.7E-01	2.6E-06	3.9E-06	3.2E-03	4.6E-02	3.9E-08	1.6E-07
Sub. (>0.5 ft)	09K140026/VP-57	U-238	7.17E+00	4.0E-01	0.0E+00	3.7E-06	0.0E+00	1.2E-01	0.0E+00	9.9E-07	0.0E+00	2.6E-02	0.0E+00	5.9E-08	0.0E+00
Sub. (>0.5 ft)	09K140026/VP-57	TOTAL		4.8E+00	3.0E+00	7.6E-05	4.5E-05	1.4E+00	8.8E-01	2.0E-05	1.2E-05	2.9E-01	1.9E-01	8.5E-07	5.0E-07
Surf. (<0.5 ft)	09K140026/VP-57	Pb-210	2.38E-01	5.6E-02	0.0E+00	1.3E-07	0.0E+00	7.4E-03	0.0E+00	1.6E-08	0.0E+00	7.3E-03	0.0E+00	5.7E-09	0.0E+00
Surf. (<0.5 ft)	09K140026/VP-57	Ra-226	1.00E+00	3.6E+00	0.0E+00	5.2E-05	0.0E+00	1.1E+00	0.0E+00	1.4E-05	0.0E+00	1.8E-01	0.0E+00	6.7E-07	0.0E+00
Surf. (<0.5 ft)	09K140026/VP-57	Th-230	1.53E+01	4.2E-01	1.9E+00	6.3E-06	2.6E-05	8.1E-02	5.4E-01	1.4E-06	6.8E-06	5.1E-02	1.3E-01	3.7E-08	3.0E-07
Surf. (<0.5 ft)	09K140026/VP-57	Th-232	1.27E+00	1.7E-01	5.8E+00	7.3E-05	9.9E-05	3.3E-02	1.8E+00	1.8E-05	2.6E-05	2.1E-02	3.0E-01	2.6E-07	1.1E-06
Surf. (<0.5 ft)	09K140026/VP-57	U-238	1.16E+01	6.6E-01	0.0E+00	6.0E-06	0.0E+00	1.9E-01	0.0E+00	1.6E-06	0.0E+00	4.3E-02	0.0E+00	9.6E-08	0.0E+00
Surf. (<0.5 ft)	09K140026/VP-57	TOTAL		4.9E+00	7.7E+00	1.4E-04	1.3E-04	1.5E+00	2.4E+00	3.5E-05	3.3E-05	3.0E-01	4.3E-01	1.1E-06	1.4E-06
All Depths	09K140026/VP-57	Pb-210	2.66E-01	6.3E-02	0.0E+00	1.5E-07	0.0E+00	8.3E-03	0.0E+00	1.7E-08	0.0E+00	8.1E-03	0.0E+00	6.4E-09	0.0E+00
All Depths	09K140026/VP-57	Ra-226	8.50E-01	3.1E+00	0.0E+00	4.4E-05	0.0E+00	9.8E-01	0.0E+00	1.2E-05	0.0E+00	1.5E-01	0.0E+00	5.7E-07	0.0E+00
All Depths	09K140026/VP-57	Th-230	1.73E+01	4.7E-01	2.1E+00	7.2E-06	3.0E-05	9.2E-02	6.1E-01	1.5E-06	7.7E-06	5.8E-02	1.5E-01	4.1E-08	3.4E-07
All Depths	09K140026/VP-57	Th-232	1.19E+00	1.6E-01	5.5E+00	6.8E-05	9.3E-05	3.1E-02	1.7E+00	1.7E-05	2.4E-05	2.0E-02	2.9E-01	2.4E-07	1.0E-06
All Depths	09K140026/VP-57	U-238	9.32E+00	5.3E-01	0.0E+00	4.9E-06	0.0E+00	1.5E-01	0.0E+00	1.3E-06	0.0E+00	3.4E-02	0.0E+00	7.7E-08	0.0E+00
All Depths	09K140026/VP-57	TOTAL		4.3E+00	7.6E+00	1.2E-04	1.2E-04	1.3E+00	2.3E+00	3.1E-05	3.2E-05	2.7E-01	4.3E-01	9.4E-07	1.3E-06
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	Ac-227	3.15E-02	4.2E-02	0.0E+00	1.1E-07	0.0E+00	1.0E-02	0.0E+00	3.2E-08	0.0E+00	3.6E-03	0.0E+00	2.8E-09	0.0E+00
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	Pa-231	7.60E-02	3.3E-02	0.0E+00	1.6E-07	0.0E+00	5.7E-03	0.0E+00	3.9E-08	0.0E+00	3.9E-03	0.0E+00	1.3E-09	0.0E+00
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	Pb-210	4.83E-01	1.1E-01	0.0E+00	2.7E-07	0.0E+00	1.5E-02	0.0E+00	3.1E-08	0.0E+00	1.5E-02	0.0E+00	1.2E-08	0.0E+00
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	Ra-226	1.34E+00	4.9E+00	0.0E+00	6.9E-05	0.0E+00	1.5E+00	0.0E+00	1.9E-05	0.0E+00	2.4E-01	0.0E+00	8.9E-07	0.0E+00
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	Th-230	3.28E+01	8.9E-01	4.1E+00	1.4E-05	5.7E-05	1.7E-01	1.2E+00	2.9E-06	1.5E-05	1.1E-01	2.8E-01	7.8E-08	6.5E-07
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	Th-232	2.70E-01	3.6E-02	1.2E+00	1.5E-05	2.1E-05	7.0E-03	3.9E-01	3.8E-06	5.5E-06	4.5E-03	6.5E-02	5.5E-08	2.3E-07
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	U-238	6.36E+00	3.6E-01	0.0E+00	3.3E-06	0.0E+00	1.0E-01	0.0E+00	8.7E-07	0.0E+00	2.3E-02	0.0E+00	5.2E-08	0.0E+00
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	TOTAL		6.4E+00	5.3E+00	1.0E-04	7.8E-05	1.9E+00	1.5E+00	2.7E-05	2.0E-05	4.0E-01	3.4E-01	1.1E-06	8.8E-07
Surf. (<0.5 ft)	09K210206/VP-56,1(C)	Pb-210	8.15E-02	1.9E-02	0.0E+00	4.5E-08	0.0E+00	2.5E-03	0.0E+00	5.3E-09	0.0E+00	2.5E-03	0.0E+00	2.0E-09	0.0E+00
Surf. (<0.5 ft)	09K210206/VP-56,1(C)	Ra-226	1.08E+00	3.9E+00	0.0E+00	5.6E-05	0.0E+00	1.2E+00	0.0E+00	1.5E-05	0.0E+00	2.0E-01	0.0E+00	7.2E-07	0.0E+00
Surf. (<0.5 ft)	09K210206/VP-56,1(C)	Th-230	4.16E+00	1.1E-01	5.2E-01	1.7E-06	7.2E-06	2.2E-02	1.5E-01	3.7E-07	1.9E-06	1.4E-02	3.5E-02	9.9E-09	8.2E-08
Surf. (<0.5 ft)	09K210206/VP-56,1(C)	Th-232	1.79E+00	2.4E-01	8.2E+00	1.0E-04	1.4E-04	4.7E-02	2.6E+00	2.5E-05	3.7E-05	3.0E-02	4.3E-01	3.7E-07	1.5E-06
Surf. (<0.5 ft)	09K210206/VP-56,1(C)	U-238	1.06E+01	6.0E-01	0.0E+00	5.5E-06	0.0E+00	1.7E-01	0.0E+00	1.5E-06	0.0E+00	3.9E-02	0.0E+00	8.7E-08	0.0E+00
Surf. (<0.5 ft)	09K210206/VP-56,1(C)	TOTAL		4.9E+00	8.8E+00	1.7E-04	1.5E-04	1.5E+00	2.7E+00	4.2E-05	3.9E-05	2.8E-01	4.6E-01	1.2E-06	1.6E-06
All Depths	09K210206/VP-56,1(C)	Pb-210	1.65E-01	3.9E-02	0.0E+00	9.1E-08	0.0E+00	5.1E-03	0.0E+00	1.1E-08	0.0E+00	5.0E-03	0.0E+00	4.0E-09	0.0E+00
All Depths	09K210206/VP-56,1(C)	Ra-226	1.01E+00	3.7E+00	0.0E+00	5.2E-05	0.0E+00	1.2E+00	0.0E+00	1.4E-05	0.0E+00	1.8E-01	0.0E+00	6.7E-07	0.0E+00
All Depths	09K210206/VP-56,1(C)	Th-230	1.01E+01	2.8E-01	1.3E+00	4.2E-06	1.7E-05	5.4E-02	3.6E-01	9.1E-07	4.5E-06	3.4E-02	8.6E-02	2.4E-08	2.0E-07
All Depths	09K210206/VP-56,1(C)	Th-232	1.59E+00	2.1E-01	7.3E+00	9.1E-05	1.2E-04	4.1E-02	2.3E+00	2.2E-05	3.3E-05	2.6E-02	3.8E-01	3.3E-07	1.3E-06
All Depths	09K210206/VP-56,1(C)	U-238	9.42E+00	5.3E-01	0.0E+00	4.9E-06	0.0E+00	1.5E-01	0.0E+00	1.3E-06	0.0E+00	3.5E-02	0.0E+00	7.8E-08	0.0E+00
All Depths	09K210206/VP-56,1(C)	TOTAL		4.7E+00	8.6E+00	1.5E-04	1.4E-04	1.4E+00	2.6E+00	3.9E-05	3.7E-05	2.8E-01	4.7E-01	1.1E-06	1.5E-06
Sub. (>0.5 ft)	09K220029	Pb-210	1.54E-02	3.6E-03	0.0E+00	8.5E-09	0.0E+00	4.8E-04	0.0E+00	1.0E-09	0.0E+00	4.7E-04	0.0E+00	3.7E-10	0.0E+00
Sub. (>0.5 ft)	09K220029	TOTAL		3.6E-03	0.0E+00	8.5E-09	0.0E+00	4.8E-04	0.0E+00	1.0E-09	0.0E+00	4.7E-04	0.0E+00	3.7E-10	0.0E+00
All Depths	09K220029	Pb-210	1.54E-02	3.6E-03	0.0E+00	8.5E-09	0.0E+00	4.8E-04	0.0E+00	1.0E-09	0.0E+00	4.7E-04	0.0E+00	3.7E-10	0.0E+00
All Depths	09K220029	TOTAL		3.6E-03	0.0E+00	8.5E-09	0.0E+00	4.8E-04	0.0E+00	1.0E-09	0.0E+00	4.7E-04	0.0E+00	3.7E-10	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 4 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
Sub. (>0.5 ft)	09K220030/VP-44	Pb-210	2.23E-02	5.3E-03	0.0E+00	1.2E-08	0.0E+00	6.9E-04	0.0E+00	1.5E-09	0.0E+00	6.8E-04	0.0E+00	5.4E-10	0.0E+00
Sub. (>0.5 ft)	09K220030/VP-44	TOTAL		5.3E-03	0.0E+00	1.2E-08	0.0E+00	6.9E-04	0.0E+00	1.5E-09	0.0E+00	6.8E-04	0.0E+00	5.4E-10	0.0E+00
All Depths	09K220030/VP-44	Pb-210	2.23E-02	5.3E-03	0.0E+00	1.2E-08	0.0E+00	6.9E-04	0.0E+00	1.5E-09	0.0E+00	6.8E-04	0.0E+00	5.4E-10	0.0E+00
All Depths	09K220030/VP-44	TOTAL		5.3E-03	0.0E+00	1.2E-08	0.0E+00	6.9E-04	0.0E+00	1.5E-09	0.0E+00	6.8E-04	0.0E+00	5.4E-10	0.0E+00
Sub. (>0.5 ft)	09K220041/VP-42	Pb-210	3.54E-02	8.4E-03	0.0E+00	2.0E-08	0.0E+00	1.1E-03	0.0E+00	2.3E-09	0.0E+00	1.1E-03	0.0E+00	8.5E-10	0.0E+00
Sub. (>0.5 ft)	09K220041/VP-42	Th-230	8.70E-01	2.4E-02	1.1E-01	3.6E-07	1.5E-06	4.6E-03	3.0E-02	7.8E-08	3.9E-07	2.9E-03	7.4E-03	2.1E-09	1.7E-08
Sub. (>0.5 ft)	09K220041/VP-42	TOTAL		3.2E-02	1.1E-01	3.8E-07	1.5E-06	5.7E-03	3.0E-02	8.0E-08	3.9E-07	4.0E-03	7.4E-03	2.9E-09	1.7E-08
All Depths	09K220041/VP-42	Pb-210	3.54E-02	8.4E-03	0.0E+00	2.0E-08	0.0E+00	1.1E-03	0.0E+00	2.3E-09	0.0E+00	1.1E-03	0.0E+00	8.5E-10	0.0E+00
All Depths	09K220041/VP-42	Th-230	8.70E-01	2.4E-02	1.1E-01	3.6E-07	1.5E-06	4.6E-03	3.0E-02	7.8E-08	3.9E-07	2.9E-03	7.4E-03	2.1E-09	1.7E-08
All Depths	09K220041/VP-42	TOTAL		3.2E-02	1.1E-01	3.8E-07	1.5E-06	5.7E-03	3.0E-02	8.0E-08	3.9E-07	4.0E-03	7.4E-03	2.9E-09	1.7E-08
Sub. (>0.5 ft)	09K220074/VP-46	Pb-210	4.06E-02	9.6E-03	0.0E+00	2.2E-08	0.0E+00	1.3E-03	0.0E+00	2.6E-09	0.0E+00	1.2E-03	0.0E+00	9.8E-10	0.0E+00
Sub. (>0.5 ft)	09K220074/VP-46	Th-230	1.24E+00	3.4E-02	1.5E-01	5.1E-07	2.1E-06	6.6E-03	4.3E-02	1.1E-07	5.5E-07	4.2E-03	1.0E-02	3.0E-09	2.5E-08
Sub. (>0.5 ft)	09K220074/VP-46	TOTAL		4.3E-02	1.5E-01	5.3E-07	2.1E-06	7.8E-03	4.3E-02	1.1E-07	5.5E-07	5.4E-03	1.0E-02	3.9E-09	2.5E-08
All Depths	09K220074/VP-46	Pb-210	4.06E-02	9.6E-03	0.0E+00	2.2E-08	0.0E+00	1.3E-03	0.0E+00	2.6E-09	0.0E+00	1.2E-03	0.0E+00	9.8E-10	0.0E+00
All Depths	09K220074/VP-46	Th-230	1.24E+00	3.4E-02	1.5E-01	5.1E-07	2.1E-06	6.6E-03	4.3E-02	1.1E-07	5.5E-07	4.2E-03	1.0E-02	3.0E-09	2.5E-08
All Depths	09K220074/VP-46	TOTAL		4.3E-02	1.5E-01	5.3E-07	2.1E-06	7.8E-03	4.3E-02	1.1E-07	5.5E-07	5.4E-03	1.0E-02	3.9E-09	2.5E-08
Sub. (>0.5 ft)	09K220085/VP-47	Pb-210	2.66E-02	6.3E-03	0.0E+00	1.5E-08	0.0E+00	8.3E-04	0.0E+00	1.7E-09	0.0E+00	8.1E-04	0.0E+00	6.4E-10	0.0E+00
Sub. (>0.5 ft)	09K220085/VP-47	Th-230	2.40E-01	6.5E-03	3.0E-02	9.9E-08	4.1E-07	1.3E-03	8.4E-03	2.1E-08	1.1E-07	8.0E-04	2.0E-03	5.7E-10	4.7E-09
Sub. (>0.5 ft)	09K220085/VP-47	TOTAL		1.3E-02	3.0E-02	1.1E-07	4.1E-07	2.1E-03	8.4E-03	2.3E-08	1.1E-07	1.6E-03	2.0E-03	1.2E-09	4.7E-09
All Depths	09K220085/VP-47	Pb-210	2.66E-02	6.3E-03	0.0E+00	1.5E-08	0.0E+00	8.3E-04	0.0E+00	1.7E-09	0.0E+00	8.1E-04	0.0E+00	6.4E-10	0.0E+00
All Depths	09K220085/VP-47	Th-230	2.40E-01	6.5E-03	3.0E-02	9.9E-08	4.1E-07	1.3E-03	8.4E-03	2.1E-08	1.1E-07	8.0E-04	2.0E-03	5.7E-10	4.7E-09
All Depths	09K220085/VP-47	TOTAL		1.3E-02	3.0E-02	1.1E-07	4.1E-07	2.1E-03	8.4E-03	2.3E-08	1.1E-07	1.6E-03	2.0E-03	1.2E-09	4.7E-09
Sub. (>0.5 ft)	09K220140/VP-40	Pb-210	4.55E-02	1.1E-02	0.0E+00	2.5E-08	0.0E+00	1.4E-03	0.0E+00	3.0E-09	0.0E+00	1.4E-03	0.0E+00	1.1E-09	0.0E+00
Sub. (>0.5 ft)	09K220140/VP-40	Th-230	1.59E+00	4.3E-02	2.0E-01	6.6E-07	2.7E-06	8.4E-03	5.6E-02	1.4E-07	7.1E-07	5.3E-03	1.3E-02	3.8E-09	3.1E-08
Sub. (>0.5 ft)	09K220140/VP-40	TOTAL		5.4E-02	2.0E-01	6.8E-07	2.7E-06	9.9E-03	5.6E-02	1.4E-07	7.1E-07	6.7E-03	1.3E-02	4.9E-09	3.1E-08
All Depths	09K220140/VP-40	Pb-210	4.55E-02	1.1E-02	0.0E+00	2.5E-08	0.0E+00	1.4E-03	0.0E+00	3.0E-09	0.0E+00	1.4E-03	0.0E+00	1.1E-09	0.0E+00
All Depths	09K220140/VP-40	Th-230	1.59E+00	4.3E-02	2.0E-01	6.6E-07	2.7E-06	8.4E-03	5.6E-02	1.4E-07	7.1E-07	5.3E-03	1.3E-02	3.8E-09	3.1E-08
All Depths	09K220140/VP-40	TOTAL		5.4E-02	2.0E-01	6.8E-07	2.7E-06	9.9E-03	5.6E-02	1.4E-07	7.1E-07	6.7E-03	1.3E-02	4.9E-09	3.1E-08
Sub. (>0.5 ft)	09K220162/VP-53	Pb-210	2.80E-02	6.6E-03	0.0E+00	1.5E-08	0.0E+00	8.7E-04	0.0E+00	1.8E-09	0.0E+00	8.5E-04	0.0E+00	6.8E-10	0.0E+00
Sub. (>0.5 ft)	09K220162/VP-53	Th-230	3.40E-01	9.2E-03	4.2E-02	1.4E-07	5.9E-07	1.8E-03	1.2E-02	3.0E-08	1.5E-07	1.1E-03	2.9E-03	8.1E-10	6.7E-09
Sub. (>0.5 ft)	09K220162/VP-53	TOTAL		1.6E-02	4.2E-02	1.6E-07	5.9E-07	2.7E-03	1.2E-02	3.2E-08	1.5E-07	2.0E-03	2.9E-03	1.5E-09	6.7E-09
All Depths	09K220162/VP-53	Pb-210	2.80E-02	6.6E-03	0.0E+00	1.5E-08	0.0E+00	8.7E-04	0.0E+00	1.8E-09	0.0E+00	8.5E-04	0.0E+00	6.8E-10	0.0E+00
All Depths	09K220162/VP-53	Th-230	3.40E-01	9.2E-03	4.2E-02	1.4E-07	5.9E-07	1.8E-03	1.2E-02	3.0E-08	1.5E-07	1.1E-03	2.9E-03	8.1E-10	6.7E-09
All Depths	09K220162/VP-53	TOTAL		1.6E-02	4.2E-02	1.6E-07	5.9E-07	2.7E-03	1.2E-02	3.2E-08	1.5E-07	2.0E-03	2.9E-03	1.5E-09	6.7E-09
Sub. (>0.5 ft)	09K220173/VP-48(A)	Pb-210	2.94E-02	7.0E-03	0.0E+00	1.6E-08	0.0E+00	9.2E-04	0.0E+00	1.9E-09	0.0E+00	9.0E-04	0.0E+00	7.1E-10	0.0E+00
Sub. (>0.5 ft)	09K220173/VP-48(A)	Th-230	4.40E-01	1.2E-02	5.4E-02	1.8E-07	7.6E-07	2.3E-03	1.5E-02	3.9E-08	2.0E-07	1.5E-03	3.7E-03	1.0E-09	8.7E-09
Sub. (>0.5 ft)	09K220173/VP-48(A)	TOTAL		1.9E-02	5.4E-02	2.0E-07	7.6E-07	3.3E-03	1.5E-02	4.1E-08	2.0E-07	2.4E-03	3.7E-03	1.8E-09	8.7E-09
Surf. (<0.5 ft)	09K220173/VP-48(A)	Pb-210	2.94E-02	7.0E-03	0.0E+00	1.6E-08	0.0E+00	9.2E-04	0.0E+00	1.9E-09	0.0E+00	9.0E-04	0.0E+00	7.1E-10	0.0E+00
Surf. (<0.5 ft)	09K220173/VP-48(A)	Th-230	4.40E-01	1.2E-02	5.4E-02	1.8E-07	7.6E-07	2.3E-03	1.5E-02	3.9E-08	2.0E-07	1.5E-03	3.7E-03	1.0E-09	8.7E-09

Attachment 12. Radiological Doses and Risks for each Property (page 5 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
Surf. (<0.5 ft)	09K220173/VP-48(A)	Th-232	7.90E-01	1.1E-01	3.6E+00	4.5E-05	6.2E-05	2.1E-02	1.1E+00	1.1E-05	1.6E-05	1.3E-02	1.9E-01	1.6E-07	6.7E-07
Surf. (<0.5 ft)	09K220173/VP-48(A)	TOTAL		1.2E-01	3.7E+00	4.5E-05	6.2E-05	2.4E-02	1.1E+00	1.1E-05	1.6E-05	1.6E-02	1.9E-01	1.6E-07	6.8E-07
All Depths	09K220173/VP-48(A)	Pb-210	2.94E-02	7.0E-03	0.0E+00	1.6E-08	0.0E+00	9.2E-04	0.0E+00	1.9E-09	0.0E+00	9.0E-04	0.0E+00	7.1E-10	0.0E+00
All Depths	09K220173/VP-48(A)	Th-230	4.40E-01	1.2E-02	5.4E-02	1.8E-07	7.6E-07	2.3E-03	1.5E-02	3.9E-08	2.0E-07	1.5E-03	3.7E-03	1.0E-09	8.7E-09
All Depths	09K220173/VP-48(A)	Th-232	7.90E-01	1.1E-01	3.6E+00	4.5E-05	6.2E-05	2.1E-02	1.1E+00	1.1E-05	1.6E-05	1.3E-02	1.9E-01	1.6E-07	6.7E-07
All Depths	09K220173/VP-48(A)	TOTAL		1.2E-01	3.7E+00	4.5E-05	6.2E-05	2.4E-02	1.1E+00	1.1E-05	1.6E-05	1.6E-02	1.9E-01	1.6E-07	6.8E-07
Sub. (>0.5 ft)	09K220184/VP-48	Pb-210	1.13E-01	2.7E-02	0.0E+00	6.2E-08	0.0E+00	3.5E-03	0.0E+00	7.4E-09	0.0E+00	3.5E-03	0.0E+00	2.7E-09	0.0E+00
Sub. (>0.5 ft)	09K220184/VP-48	Th-230	6.44E+00	1.7E-01	8.0E-01	2.7E-06	1.1E-05	3.4E-02	2.3E-01	5.7E-07	2.9E-06	2.2E-02	5.4E-02	1.5E-08	1.3E-07
Sub. (>0.5 ft)	09K220184/VP-48	TOTAL		2.0E-01	8.0E-01	2.7E-06	1.1E-05	3.8E-02	2.3E-01	5.8E-07	2.9E-06	2.5E-02	5.4E-02	1.8E-08	1.3E-07
Surf. (<0.5 ft)	09K220184/VP-48	Pb-210	1.32E-02	3.1E-03	0.0E+00	7.2E-09	0.0E+00	4.1E-04	0.0E+00	8.6E-10	0.0E+00	4.0E-04	0.0E+00	3.2E-10	0.0E+00
Surf. (<0.5 ft)	09K220184/VP-48	Ra-226	7.50E-01	2.7E+00	0.0E+00	3.9E-05	0.0E+00	8.6E-01	0.0E+00	1.1E-05	0.0E+00	1.4E-01	0.0E+00	5.0E-07	0.0E+00
Surf. (<0.5 ft)	09K220184/VP-48	Th-232	4.90E-01	6.6E-02	2.3E+00	2.8E-05	3.8E-05	1.3E-02	7.0E-01	6.8E-06	1.0E-05	8.2E-03	1.2E-01	1.0E-07	4.1E-07
Surf. (<0.5 ft)	09K220184/VP-48	U-238	5.72E+00	3.2E-01	0.0E+00	3.0E-06	0.0E+00	9.3E-02	0.0E+00	7.9E-07	0.0E+00	2.1E-02	0.0E+00	4.7E-08	0.0E+00
Surf. (<0.5 ft)	09K220184/VP-48	TOTAL		3.1E+00	2.3E+00	7.0E-05	3.8E-05	9.7E-01	7.0E-01	1.8E-05	1.0E-05	1.7E-01	1.2E-01	6.5E-07	4.1E-07
All Depths	09K220184/VP-48	Pb-210	1.08E-01	2.6E-02	0.0E+00	5.9E-08	0.0E+00	3.4E-03	0.0E+00	7.0E-09	0.0E+00	3.3E-03	0.0E+00	2.6E-09	0.0E+00
All Depths	09K220184/VP-48	Ra-226	7.50E-01	2.7E+00	0.0E+00	3.9E-05	0.0E+00	8.6E-01	0.0E+00	1.1E-05	0.0E+00	1.4E-01	0.0E+00	5.0E-07	0.0E+00
All Depths	09K220184/VP-48	Th-230	6.05E+00	1.6E-01	7.5E-01	2.5E-06	1.0E-05	3.2E-02	2.1E-01	5.4E-07	2.7E-06	2.0E-02	5.1E-02	1.4E-08	1.2E-07
All Depths	09K220184/VP-48	Th-232	4.90E-01	6.6E-02	2.3E+00	2.8E-05	3.8E-05	1.3E-02	7.0E-01	6.8E-06	1.0E-05	8.2E-03	1.2E-01	1.0E-07	4.1E-07
All Depths	09K220184/VP-48	U-238	5.72E+00	3.2E-01	0.0E+00	3.0E-06	0.0E+00	9.3E-02	0.0E+00	7.9E-07	0.0E+00	2.1E-02	0.0E+00	4.7E-08	0.0E+00
All Depths	09K220184/VP-48	TOTAL		3.3E+00	3.0E+00	7.2E-05	4.9E-05	1.0E+00	9.1E-01	1.9E-05	1.3E-05	1.9E-01	1.7E-01	6.7E-07	5.3E-07
Sub. (>0.5 ft)	09K220195/VP-49	Pb-210	3.67E-02	8.7E-03	0.0E+00	2.0E-08	0.0E+00	1.1E-03	0.0E+00	2.4E-09	0.0E+00	1.1E-03	0.0E+00	8.8E-10	0.0E+00
Sub. (>0.5 ft)	09K220195/VP-49	Th-230	9.60E-01	2.6E-02	1.2E-01	4.0E-07	1.7E-06	5.1E-03	3.4E-02	8.6E-08	4.3E-07	3.2E-03	8.1E-03	2.3E-09	1.9E-08
Sub. (>0.5 ft)	09K220195/VP-49	TOTAL		3.5E-02	1.2E-01	4.2E-07	1.7E-06	6.2E-03	3.4E-02	8.8E-08	4.3E-07	4.3E-03	8.1E-03	3.2E-09	1.9E-08
All Depths	09K220195/VP-49	Pb-210	3.67E-02	8.7E-03	0.0E+00	2.0E-08	0.0E+00	1.1E-03	0.0E+00	2.4E-09	0.0E+00	1.1E-03	0.0E+00	8.8E-10	0.0E+00
All Depths	09K220195/VP-49	Th-230	9.60E-01	2.6E-02	1.2E-01	4.0E-07	1.7E-06	5.1E-03	3.4E-02	8.6E-08	4.3E-07	3.2E-03	8.1E-03	2.3E-09	1.9E-08
All Depths	09K220195/VP-49	TOTAL		3.5E-02	1.2E-01	4.2E-07	1.7E-06	6.2E-03	3.4E-02	8.8E-08	4.3E-07	4.3E-03	8.1E-03	3.2E-09	1.9E-08
Sub. (>0.5 ft)	09K310197/VP-50,51	Pb-210	2.38E-02	5.6E-03	0.0E+00	1.3E-08	0.0E+00	7.4E-04	0.0E+00	1.6E-09	0.0E+00	7.3E-04	0.0E+00	5.7E-10	0.0E+00
Sub. (>0.5 ft)	09K310197/VP-50,51	Th-230	4.00E-02	1.1E-03	5.0E-03	1.7E-08	6.9E-08	2.1E-04	1.4E-03	3.6E-09	1.8E-08	1.3E-04	3.4E-04	9.5E-11	7.9E-10
Sub. (>0.5 ft)	09K310197/VP-50,51	TOTAL		6.7E-03	5.0E-03	3.0E-08	6.9E-08	9.5E-04	1.4E-03	5.1E-09	1.8E-08	8.6E-04	3.4E-04	6.7E-10	7.9E-10
All Depths	09K310197/VP-50,51	Pb-210	2.38E-02	5.6E-03	0.0E+00	1.3E-08	0.0E+00	7.4E-04	0.0E+00	1.6E-09	0.0E+00	7.3E-04	0.0E+00	5.7E-10	0.0E+00
All Depths	09K310197/VP-50,51	Th-230	4.00E-02	1.1E-03	5.0E-03	1.7E-08	6.9E-08	2.1E-04	1.4E-03	3.6E-09	1.8E-08	1.3E-04	3.4E-04	9.5E-11	7.9E-10
All Depths	09K310197/VP-50,51	TOTAL		6.7E-03	5.0E-03	3.0E-08	6.9E-08	9.5E-04	1.4E-03	5.1E-09	1.8E-08	8.6E-04	3.4E-04	6.7E-10	7.9E-10
Sub. (>0.5 ft)	10K110021	Pb-210	2.10E-02	5.0E-03	0.0E+00	1.2E-08	0.0E+00	6.5E-04	0.0E+00	1.4E-09	0.0E+00	6.4E-04	0.0E+00	5.1E-10	0.0E+00
Sub. (>0.5 ft)	10K110021	TOTAL		5.0E-03	0.0E+00	1.2E-08	0.0E+00	6.5E-04	0.0E+00	1.4E-09	0.0E+00	6.4E-04	0.0E+00	5.1E-10	0.0E+00
Surf. (<0.5 ft)	10K110021	Pb-210	2.06E-02	4.9E-03	0.0E+00	1.1E-08	0.0E+00	6.4E-04	0.0E+00	1.3E-09	0.0E+00	6.3E-04	0.0E+00	5.0E-10	0.0E+00
Surf. (<0.5 ft)	10K110021	Ra-226	5.50E-01	2.0E+00	0.0E+00	2.8E-05	0.0E+00	6.3E-01	0.0E+00	7.8E-06	0.0E+00	1.0E-01	0.0E+00	3.7E-07	0.0E+00
Surf. (<0.5 ft)	10K110021	Th-232	9.50E-01	1.3E-01	4.4E+00	5.4E-05	7.4E-05	2.5E-02	1.4E+00	1.3E-05	2.0E-05	1.6E-02	2.3E-01	2.0E-07	8.0E-07
Surf. (<0.5 ft)	10K110021	U-238	6.22E+00	3.5E-01	0.0E+00	3.2E-06	0.0E+00	1.0E-01	0.0E+00	8.6E-07	0.0E+00	2.3E-02	0.0E+00	5.1E-08	0.0E+00
Surf. (<0.5 ft)	10K110021	TOTAL		2.5E+00	4.4E+00	8.6E-05	7.4E-05	7.6E-01	1.4E+00	2.2E-05	2.0E-05	1.4E-01	2.3E-01	6.1E-07	8.0E-07
All Depths	10K110021	Pb-210	2.04E-02	4.8E-03	0.0E+00	1.1E-08	0.0E+00	6.4E-04	0.0E+00	1.3E-09	0.0E+00	6.2E-04	0.0E+00	4.9E-10	0.0E+00
All Depths	10K110021	Ra-226	5.50E-01	2.0E+00	0.0E+00	2.8E-05	0.0E+00	6.3E-01	0.0E+00	7.8E-06	0.0E+00	1.0E-01	0.0E+00	3.7E-07	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 6 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
All Depths	10K110021	Th-232	9.50E-01	1.3E-01	4.4E+00	5.4E-05	7.4E-05	2.5E-02	1.4E+00	1.3E-05	2.0E-05	1.6E-02	2.3E-01	2.0E-07	8.0E-07
All Depths	10K110021	U-238	6.22E+00	3.5E-01	0.0E+00	3.2E-06	0.0E+00	1.0E-01	0.0E+00	8.6E-07	0.0E+00	2.3E-02	0.0E+00	5.1E-08	0.0E+00
All Depths	10K110021	TOTAL		2.5E+00	4.4E+00	8.6E-05	7.4E-05	7.6E-01	1.4E+00	2.2E-05	2.0E-05	1.4E-01	2.3E-01	6.1E-07	8.0E-07
Surf. (<0.5 ft)	10K130014	Pb-210	3.22E-02	7.6E-03	0.0E+00	1.8E-08	0.0E+00	1.0E-03	0.0E+00	2.1E-09	0.0E+00	9.8E-04	0.0E+00	7.8E-10	0.0E+00
Surf. (<0.5 ft)	10K130014	Ra-226	5.00E-02	1.8E-01	0.0E+00	2.6E-06	0.0E+00	5.7E-02	0.0E+00	7.1E-07	0.0E+00	9.1E-03	0.0E+00	3.3E-08	0.0E+00
Surf. (<0.5 ft)	10K130014	Th-230	6.40E-01	1.7E-02	7.9E-02	2.6E-07	1.1E-06	3.4E-03	2.2E-02	5.7E-08	2.9E-07	2.1E-03	5.4E-03	1.5E-09	1.3E-08
Surf. (<0.5 ft)	10K130014	Th-232	2.55E+00	3.4E-01	1.2E+01	1.5E-04	2.0E-04	6.6E-02	3.7E+00	3.6E-05	5.2E-05	4.2E-02	6.1E-01	5.2E-07	2.2E-06
Surf. (<0.5 ft)	10K130014	U-238	2.07E+01	1.2E+00	0.0E+00	1.1E-05	0.0E+00	3.4E-01	0.0E+00	2.8E-06	0.0E+00	7.6E-02	0.0E+00	1.7E-07	0.0E+00
Surf. (<0.5 ft)	10K130014	TOTAL		1.7E+00	1.2E+01	1.6E-04	2.0E-04	4.7E-01	3.7E+00	3.9E-05	5.3E-05	1.3E-01	6.2E-01	7.3E-07	2.2E-06
All Depths	10K130014	Pb-210	3.22E-02	7.6E-03	0.0E+00	1.8E-08	0.0E+00	1.0E-03	0.0E+00	2.1E-09	0.0E+00	9.8E-04	0.0E+00	7.8E-10	0.0E+00
All Depths	10K130014	Ra-226	5.00E-02	1.8E-01	0.0E+00	2.6E-06	0.0E+00	5.7E-02	0.0E+00	7.1E-07	0.0E+00	9.1E-03	0.0E+00	3.3E-08	0.0E+00
All Depths	10K130014	Th-230	6.40E-01	1.7E-02	7.9E-02	2.6E-07	1.1E-06	3.4E-03	2.2E-02	5.7E-08	2.9E-07	2.1E-03	5.4E-03	1.5E-09	1.3E-08
All Depths	10K130014	Th-232	2.55E+00	3.4E-01	1.2E+01	1.5E-04	2.0E-04	6.6E-02	3.7E+00	3.6E-05	5.2E-05	4.2E-02	6.1E-01	5.2E-07	2.2E-06
All Depths	10K130014	U-238	2.07E+01	1.2E+00	0.0E+00	1.1E-05	0.0E+00	3.4E-01	0.0E+00	2.8E-06	0.0E+00	7.6E-02	0.0E+00	1.7E-07	0.0E+00
All Depths	10K130014	TOTAL		1.7E+00	1.2E+01	1.6E-04	2.0E-04	4.7E-01	3.7E+00	3.9E-05	5.3E-05	1.3E-01	6.2E-01	7.3E-07	2.2E-06
Surf. (<0.5 ft)	10K140024/VP-10(C)	Pb-210	7.98E-02	1.9E-02	0.0E+00	4.4E-08	0.0E+00	2.5E-03	0.0E+00	5.2E-09	0.0E+00	2.4E-03	0.0E+00	1.9E-09	0.0E+00
Surf. (<0.5 ft)	10K140024/VP-10(C)	Ra-226	7.50E-01	2.7E+00	0.0E+00	3.9E-05	0.0E+00	8.6E-01	0.0E+00	1.1E-05	0.0E+00	1.4E-01	0.0E+00	5.0E-07	0.0E+00
Surf. (<0.5 ft)	10K140024/VP-10(C)	Th-230	4.04E+00	1.1E-01	5.0E-01	1.7E-06	7.0E-06	2.1E-02	1.4E-01	3.6E-07	1.8E-06	1.4E-02	3.4E-02	9.6E-09	8.0E-08
Surf. (<0.5 ft)	10K140024/VP-10(C)	Th-232	1.89E+00	2.5E-01	8.7E+00	1.1E-04	1.5E-04	4.9E-02	2.7E+00	2.6E-05	3.9E-05	3.1E-02	4.5E-01	3.9E-07	1.6E-06
Surf. (<0.5 ft)	10K140024/VP-10(C)	U-238	1.10E+01	6.2E-01	0.0E+00	5.7E-06	0.0E+00	1.8E-01	0.0E+00	1.5E-06	0.0E+00	4.0E-02	0.0E+00	9.1E-08	0.0E+00
Surf. (<0.5 ft)	10K140024/VP-10(C)	TOTAL		3.7E+00	9.2E+00	1.5E-04	1.5E-04	1.1E+00	2.8E+00	3.9E-05	4.1E-05	2.2E-01	4.9E-01	9.9E-07	1.7E-06
All Depths	10K140024/VP-10(C)	Pb-210	7.98E-02	1.9E-02	0.0E+00	4.4E-08	0.0E+00	2.5E-03	0.0E+00	5.2E-09	0.0E+00	2.4E-03	0.0E+00	1.9E-09	0.0E+00
All Depths	10K140024/VP-10(C)	Ra-226	7.50E-01	2.7E+00	0.0E+00	3.9E-05	0.0E+00	8.6E-01	0.0E+00	1.1E-05	0.0E+00	1.4E-01	0.0E+00	5.0E-07	0.0E+00
All Depths	10K140024/VP-10(C)	Th-230	4.04E+00	1.1E-01	5.0E-01	1.7E-06	7.0E-06	2.1E-02	1.4E-01	3.6E-07	1.8E-06	1.4E-02	3.4E-02	9.6E-09	8.0E-08
All Depths	10K140024/VP-10(C)	Th-232	1.89E+00	2.5E-01	8.7E+00	1.1E-04	1.5E-04	4.9E-02	2.7E+00	2.6E-05	3.9E-05	3.1E-02	4.5E-01	3.9E-07	1.6E-06
All Depths	10K140024/VP-10(C)	U-238	1.10E+01	6.2E-01	0.0E+00	5.7E-06	0.0E+00	1.8E-01	0.0E+00	1.5E-06	0.0E+00	4.0E-02	0.0E+00	9.1E-08	0.0E+00
All Depths	10K140024/VP-10(C)	TOTAL		3.7E+00	9.2E+00	1.5E-04	1.5E-04	1.1E+00	2.8E+00	3.9E-05	4.1E-05	2.2E-01	4.9E-01	9.9E-07	1.7E-06
Sub. (>0.5 ft)	10K210053/VP-17	Pb-210	3.51E-02	8.3E-03	0.0E+00	1.9E-08	0.0E+00	1.1E-03	0.0E+00	2.3E-09	0.0E+00	1.1E-03	0.0E+00	8.5E-10	0.0E+00
Sub. (>0.5 ft)	10K210053/VP-17	Th-230	8.50E-01	2.3E-02	1.1E-01	3.5E-07	1.5E-06	4.5E-03	3.0E-02	7.6E-08	3.8E-07	2.8E-03	7.2E-03	2.0E-09	1.7E-08
Sub. (>0.5 ft)	10K210053/VP-17	TOTAL		3.1E-02	1.1E-01	3.7E-07	1.5E-06	5.6E-03	3.0E-02	7.8E-08	3.8E-07	3.9E-03	7.2E-03	2.9E-09	1.7E-08
All Depths	10K210053/VP-17	Pb-210	3.51E-02	8.3E-03	0.0E+00	1.9E-08	0.0E+00	1.1E-03	0.0E+00	2.3E-09	0.0E+00	1.1E-03	0.0E+00	8.5E-10	0.0E+00
All Depths	10K210053/VP-17	Th-230	8.50E-01	2.3E-02	1.1E-01	3.5E-07	1.5E-06	4.5E-03	3.0E-02	7.6E-08	3.8E-07	2.8E-03	7.2E-03	2.0E-09	1.7E-08
All Depths	10K210053/VP-17	TOTAL		3.1E-02	1.1E-01	3.7E-07	1.5E-06	5.6E-03	3.0E-02	7.8E-08	3.8E-07	3.9E-03	7.2E-03	2.9E-09	1.7E-08
Sub. (>0.5 ft)	10K210064	Pb-210	6.93E-02	1.6E-02	0.0E+00	3.8E-08	0.0E+00	2.2E-03	0.0E+00	4.5E-09	0.0E+00	2.1E-03	0.0E+00	1.7E-09	0.0E+00
Sub. (>0.5 ft)	10K210064	Th-230	3.29E+00	8.9E-02	4.1E-01	1.4E-06	5.7E-06	1.7E-02	1.2E-01	2.9E-07	1.5E-06	1.1E-02	2.8E-02	7.8E-09	6.5E-08
Sub. (>0.5 ft)	10K210064	TOTAL		1.1E-01	4.1E-01	1.4E-06	5.7E-06	2.0E-02	1.2E-01	3.0E-07	1.5E-06	1.3E-02	2.8E-02	9.5E-09	6.5E-08
All Depths	10K210064	Pb-210	6.93E-02	1.6E-02	0.0E+00	3.8E-08	0.0E+00	2.2E-03	0.0E+00	4.5E-09	0.0E+00	2.1E-03	0.0E+00	1.7E-09	0.0E+00
All Depths	10K210064	Th-230	3.29E+00	8.9E-02	4.1E-01	1.4E-06	5.7E-06	1.7E-02	1.2E-01	2.9E-07	1.5E-06	1.1E-02	2.8E-02	7.8E-09	6.5E-08
All Depths	10K210064	TOTAL		1.1E-01	4.1E-01	1.4E-06	5.7E-06	2.0E-02	1.2E-01	3.0E-07	1.5E-06	1.3E-02	2.8E-02	9.5E-09	6.5E-08
Sub. (>0.5 ft)	10K230031/VP-19	Pb-210	1.07E-01	2.5E-02	0.0E+00	5.9E-08	0.0E+00	3.3E-03	0.0E+00	7.0E-09	0.0E+00	3.3E-03	0.0E+00	2.6E-09	0.0E+00
Sub. (>0.5 ft)	10K230031/VP-19	Th-230	5.99E+00	1.6E-01	7.4E-01	2.5E-06	1.0E-05	3.2E-02	2.1E-01	5.3E-07	2.7E-06	2.0E-02	5.1E-02	1.4E-08	1.2E-07
Sub. (>0.5 ft)	10K230031/VP-19	TOTAL		1.9E-01	7.4E-01	2.5E-06	1.0E-05	3.5E-02	2.1E-01	5.4E-07	2.7E-06	2.3E-02	5.1E-02	1.7E-08	1.2E-07

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
All Depths	10K230031/VP-19	Pb-210	1.07E-01	2.5E-02	0.0E+00	5.9E-08	0.0E+00	3.3E-03	0.0E+00	7.0E-09	0.0E+00	3.3E-03	0.0E+00	2.6E-09	0.0E+00
All Depths	10K230031/VP-19	Th-230	5.99E+00	1.6E-01	7.4E-01	2.5E-06	1.0E-05	3.2E-02	2.1E-01	5.3E-07	2.7E-06	2.0E-02	5.1E-02	1.4E-08	1.2E-07
All Depths	10K230031/VP-19	TOTAL		1.9E-01	7.4E-01	2.5E-06	1.0E-05	3.5E-02	2.1E-01	5.4E-07	2.7E-06	2.3E-02	5.1E-02	1.7E-08	1.2E-07
Sub. (>0.5 ft)	10K230040/VP-20	Pb-210	6.57E-02	1.6E-02	0.0E+00	3.6E-08	0.0E+00	2.0E-03	0.0E+00	4.3E-09	0.0E+00	2.0E-03	0.0E+00	1.6E-09	0.0E+00
Sub. (>0.5 ft)	10K230040/VP-20	Th-230	3.03E+00	8.2E-02	3.8E-01	1.3E-06	5.2E-06	1.6E-02	1.1E-01	2.7E-07	1.4E-06	1.0E-02	2.6E-02	7.2E-09	6.0E-08
Sub. (>0.5 ft)	10K230040/VP-20	TOTAL		9.8E-02	3.8E-01	1.3E-06	5.2E-06	1.8E-02	1.1E-01	2.7E-07	1.4E-06	1.2E-02	2.6E-02	8.8E-09	6.0E-08
All Depths	10K230040/VP-20	Pb-210	6.57E-02	1.6E-02	0.0E+00	3.6E-08	0.0E+00	2.0E-03	0.0E+00	4.3E-09	0.0E+00	2.0E-03	0.0E+00	1.6E-09	0.0E+00
All Depths	10K230040/VP-20	Th-230	3.03E+00	8.2E-02	3.8E-01	1.3E-06	5.2E-06	1.6E-02	1.1E-01	2.7E-07	1.4E-06	1.0E-02	2.6E-02	7.2E-09	6.0E-08
All Depths	10K230040/VP-20	TOTAL		9.8E-02	3.8E-01	1.3E-06	5.2E-06	1.8E-02	1.1E-01	2.7E-07	1.4E-06	1.2E-02	2.6E-02	8.8E-09	6.0E-08
Sub. (>0.5 ft)	10K230051/VP-18	Pb-210	3.82E-02	9.0E-03	0.0E+00	2.1E-08	0.0E+00	1.2E-03	0.0E+00	2.5E-09	0.0E+00	1.2E-03	0.0E+00	9.2E-10	0.0E+00
Sub. (>0.5 ft)	10K230051/VP-18	Th-230	1.07E+00	2.9E-02	1.3E-01	4.4E-07	1.8E-06	5.7E-03	3.7E-02	9.6E-08	4.8E-07	3.6E-03	9.1E-03	2.5E-09	2.1E-08
Sub. (>0.5 ft)	10K230051/VP-18	TOTAL		3.8E-02	1.3E-01	4.6E-07	1.8E-06	6.9E-03	3.7E-02	9.8E-08	4.8E-07	4.8E-03	9.1E-03	3.5E-09	2.1E-08
All Depths	10K230051/VP-18	Pb-210	3.82E-02	9.0E-03	0.0E+00	2.1E-08	0.0E+00	1.2E-03	0.0E+00	2.5E-09	0.0E+00	1.2E-03	0.0E+00	9.2E-10	0.0E+00
All Depths	10K230051/VP-18	Th-230	1.07E+00	2.9E-02	1.3E-01	4.4E-07	1.8E-06	5.7E-03	3.7E-02	9.6E-08	4.8E-07	3.6E-03	9.1E-03	2.5E-09	2.1E-08
All Depths	10K230051/VP-18	TOTAL		3.8E-02	1.3E-01	4.6E-07	1.8E-06	6.9E-03	3.7E-02	9.8E-08	4.8E-07	4.8E-03	9.1E-03	3.5E-09	2.1E-08
Sub. (>0.5 ft)	10K230073/VP-21	Pb-210	1.51E-02	3.6E-03	0.0E+00	8.3E-09	0.0E+00	4.7E-04	0.0E+00	9.9E-10	0.0E+00	4.6E-04	0.0E+00	3.6E-10	0.0E+00
Sub. (>0.5 ft)	10K230073/VP-21	TOTAL		3.6E-03	0.0E+00	8.3E-09	0.0E+00	4.7E-04	0.0E+00	9.9E-10	0.0E+00	4.6E-04	0.0E+00	3.6E-10	0.0E+00
Surf. (<0.5 ft)	10K230073/VP-21	Pb-210	2.80E-02	6.6E-03	0.0E+00	1.5E-08	0.0E+00	8.7E-04	0.0E+00	1.8E-09	0.0E+00	8.5E-04	0.0E+00	6.8E-10	0.0E+00
Surf. (<0.5 ft)	10K230073/VP-21	Ra-226	9.50E-01	3.5E+00	0.0E+00	4.9E-05	0.0E+00	1.1E+00	0.0E+00	1.3E-05	0.0E+00	1.7E-01	0.0E+00	6.3E-07	0.0E+00
Surf. (<0.5 ft)	10K230073/VP-21	Th-230	3.40E-01	9.2E-03	4.2E-02	1.4E-07	5.9E-07	1.8E-03	1.2E-02	3.0E-08	1.5E-07	1.1E-03	2.9E-03	8.1E-10	6.7E-09
Surf. (<0.5 ft)	10K230073/VP-21	Th-232	8.90E-01	1.2E-01	4.1E+00	5.1E-05	6.9E-05	2.3E-02	1.3E+00	1.2E-05	1.8E-05	1.5E-02	2.1E-01	1.8E-07	7.5E-07
Surf. (<0.5 ft)	10K230073/VP-21	U-238	7.98E+00	4.5E-01	0.0E+00	4.2E-06	0.0E+00	1.3E-01	0.0E+00	1.1E-06	0.0E+00	2.9E-02	0.0E+00	6.6E-08	0.0E+00
Surf. (<0.5 ft)	10K230073/VP-21	TOTAL		4.0E+00	4.1E+00	1.0E-04	7.0E-05	1.2E+00	1.3E+00	2.7E-05	1.8E-05	2.2E-01	2.2E-01	8.8E-07	7.6E-07
All Depths	10K230073/VP-21	Pb-210	2.11E-02	5.0E-03	0.0E+00	1.2E-08	0.0E+00	6.6E-04	0.0E+00	1.4E-09	0.0E+00	6.4E-04	0.0E+00	5.1E-10	0.0E+00
All Depths	10K230073/VP-21	Ra-226	9.50E-01	3.5E+00	0.0E+00	4.9E-05	0.0E+00	1.1E+00	0.0E+00	1.3E-05	0.0E+00	1.7E-01	0.0E+00	6.3E-07	0.0E+00
All Depths	10K230073/VP-21	Th-232	8.90E-01	1.2E-01	4.1E+00	5.1E-05	6.9E-05	2.3E-02	1.3E+00	1.2E-05	1.8E-05	1.5E-02	2.1E-01	1.8E-07	7.5E-07
All Depths	10K230073/VP-21	U-238	7.98E+00	4.5E-01	0.0E+00	4.2E-06	0.0E+00	1.3E-01	0.0E+00	1.1E-06	0.0E+00	2.9E-02	0.0E+00	6.6E-08	0.0E+00
All Depths	10K230073/VP-21	TOTAL		4.0E+00	4.1E+00	1.0E-04	6.9E-05	1.2E+00	1.3E+00	2.7E-05	1.8E-05	2.2E-01	2.1E-01	8.8E-07	7.5E-07
Sub. (>0.5 ft)	10K240094/VP-23	Pb-210	2.20E-02	5.2E-03	0.0E+00	1.2E-08	0.0E+00	6.9E-04	0.0E+00	1.4E-09	0.0E+00	6.7E-04	0.0E+00	5.3E-10	0.0E+00
Sub. (>0.5 ft)	10K240094/VP-23	TOTAL		5.2E-03	0.0E+00	1.2E-08	0.0E+00	6.9E-04	0.0E+00	1.4E-09	0.0E+00	6.7E-04	0.0E+00	5.3E-10	0.0E+00
Surf. (<0.5 ft)	10K240094/VP-23	Pb-210	2.21E-02	5.2E-03	0.0E+00	1.2E-08	0.0E+00	6.9E-04	0.0E+00	1.4E-09	0.0E+00	6.7E-04	0.0E+00	5.3E-10	0.0E+00
Surf. (<0.5 ft)	10K240094/VP-23	Ra-226	7.50E-01	2.7E+00	0.0E+00	3.9E-05	0.0E+00	8.6E-01	0.0E+00	1.1E-05	0.0E+00	1.4E-01	0.0E+00	5.0E-07	0.0E+00
Surf. (<0.5 ft)	10K240094/VP-23	Th-232	7.90E-01	1.1E-01	3.6E+00	4.5E-05	6.2E-05	2.1E-02	1.1E+00	1.1E-05	1.6E-05	1.3E-02	1.9E-01	1.6E-07	6.7E-07
Surf. (<0.5 ft)	10K240094/VP-23	U-238	2.83E+00	1.6E-01	0.0E+00	1.5E-06	0.0E+00	4.6E-02	0.0E+00	3.9E-07	0.0E+00	1.0E-02	0.0E+00	2.3E-08	0.0E+00
Surf. (<0.5 ft)	10K240094/VP-23	TOTAL		3.0E+00	3.6E+00	8.5E-05	6.2E-05	9.3E-01	1.1E+00	2.2E-05	1.6E-05	1.6E-01	1.9E-01	6.9E-07	6.7E-07
All Depths	10K240094/VP-23	Pb-210	2.27E-02	5.4E-03	0.0E+00	1.2E-08	0.0E+00	7.1E-04	0.0E+00	1.5E-09	0.0E+00	6.9E-04	0.0E+00	5.5E-10	0.0E+00
All Depths	10K240094/VP-23	Ra-226	7.50E-01	2.7E+00	0.0E+00	3.9E-05	0.0E+00	8.6E-01	0.0E+00	1.1E-05	0.0E+00	1.4E-01	0.0E+00	5.0E-07	0.0E+00
All Depths	10K240094/VP-23	Th-232	7.90E-01	1.1E-01	3.6E+00	4.5E-05	6.2E-05	2.1E-02	1.1E+00	1.1E-05	1.6E-05	1.3E-02	1.9E-01	1.6E-07	6.7E-07
All Depths	10K240094/VP-23	U-238	2.83E+00	1.6E-01	0.0E+00	1.5E-06	0.0E+00	4.6E-02	0.0E+00	3.9E-07	0.0E+00	1.0E-02	0.0E+00	2.3E-08	0.0E+00
All Depths	10K240094/VP-23	TOTAL		3.0E+00	3.6E+00	8.5E-05	6.2E-05	9.3E-01	1.1E+00	2.2E-05	1.6E-05	1.6E-01	1.9E-01	6.9E-07	6.7E-07
Sub. (>0.5 ft)	10K240106/VP-22	Pb-210	1.53E-02	3.6E-03	0.0E+00	8.4E-09	0.0E+00	4.8E-04	0.0E+00	1.0E-09	0.0E+00	4.7E-04	0.0E+00	3.7E-10	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 8 of 60)

			Exposure Point	RESIDENTIAL				INDUSTRIAL				MAINTENANCE			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Sub. (>0.5 ft)	10K240106/VP-22	TOTAL		3.6E-03	0.0E+00	8.4E-09	0.0E+00	4.8E-04	0.0E+00	1.0E-09	0.0E+00	4.7E-04	0.0E+00	3.7E-10	0.0E+00
Surf. (<0.5 ft)	10K240106/VP-22	Pb-210	3.22E-02	7.6E-03	0.0E+00	1.8E-08	0.0E+00	1.0E-03	0.0E+00	2.1E-09	0.0E+00	9.8E-04	0.0E+00	7.8E-10	0.0E+00
Surf. (<0.5 ft)	10K240106/VP-22	Ra-226	3.50E-01	1.3E+00	0.0E+00	1.8E-05	0.0E+00	4.0E-01	0.0E+00	4.9E-06	0.0E+00	6.3E-02	0.0E+00	2.3E-07	0.0E+00
Surf. (<0.5 ft)	10K240106/VP-22	Th-230	6.40E-01	1.7E-02	7.9E-02	2.6E-07	1.1E-06	3.4E-03	2.2E-02	5.7E-08	2.9E-07	2.1E-03	5.4E-03	1.5E-09	1.3E-08
Surf. (<0.5 ft)	10K240106/VP-22	Th-232	5.90E-01	7.9E-02	2.7E+00	3.4E-05	4.6E-05	1.5E-02	8.4E-01	8.2E-06	1.2E-05	9.8E-03	1.4E-01	1.2E-07	5.0E-07
Surf. (<0.5 ft)	10K240106/VP-22	U-238	3.82E+00	2.2E-01	0.0E+00	2.0E-06	0.0E+00	6.2E-02	0.0E+00	5.3E-07	0.0E+00	1.4E-02	0.0E+00	3.1E-08	0.0E+00
Surf. (<0.5 ft)	10K240106/VP-22	TOTAL		1.6E+00	2.8E+00	5.4E-05	4.7E-05	4.8E-01	8.7E-01	1.4E-05	1.2E-05	9.0E-02	1.5E-01	3.9E-07	5.1E-07
All Depths	10K240106/VP-22	Pb-210	2.20E-02	5.2E-03	0.0E+00	1.2E-08	0.0E+00	6.9E-04	0.0E+00	1.4E-09	0.0E+00	6.7E-04	0.0E+00	5.3E-10	0.0E+00
All Depths	10K240106/VP-22	Ra-226	3.50E-01	1.3E+00	0.0E+00	1.8E-05	0.0E+00	4.0E-01	0.0E+00	4.9E-06	0.0E+00	6.3E-02	0.0E+00	2.3E-07	0.0E+00
All Depths	10K240106/VP-22	Th-232	5.90E-01	7.9E-02	2.7E+00	3.4E-05	4.6E-05	1.5E-02	8.4E-01	8.2E-06	1.2E-05	9.8E-03	1.4E-01	1.2E-07	5.0E-07
All Depths	10K240106/VP-22	U-238	3.82E+00	2.2E-01	0.0E+00	2.0E-06	0.0E+00	6.2E-02	0.0E+00	5.3E-07	0.0E+00	1.4E-02	0.0E+00	3.1E-08	0.0E+00
All Depths	10K240106/VP-22	TOTAL		1.6E+00	2.7E+00	5.4E-05	4.6E-05	4.8E-01	8.4E-01	1.4E-05	1.2E-05	8.8E-02	1.4E-01	3.9E-07	5.0E-07
Surf. (<0.5 ft)	10K240182	Pb-210	2.27E-02	5.4E-03	0.0E+00	1.2E-08	0.0E+00	7.1E-04	0.0E+00	1.5E-09	0.0E+00	6.9E-04	0.0E+00	5.5E-10	0.0E+00
Surf. (<0.5 ft)	10K240182	TOTAL		5.4E-03	0.0E+00	1.2E-08	0.0E+00	7.1E-04	0.0E+00	1.5E-09	0.0E+00	6.9E-04	0.0E+00	5.5E-10	0.0E+00
All Depths	10K240182	Pb-210	2.27E-02	5.4E-03	0.0E+00	1.2E-08	0.0E+00	7.1E-04	0.0E+00	1.5E-09	0.0E+00	6.9E-04	0.0E+00	5.5E-10	0.0E+00
All Depths	10K240182	TOTAL		5.4E-03	0.0E+00	1.2E-08	0.0E+00	7.1E-04	0.0E+00	1.5E-09	0.0E+00	6.9E-04	0.0E+00	5.5E-10	0.0E+00
Sub. (>0.5 ft)	10K240207	Pb-210	5.95E-02	1.4E-02	0.0E+00	3.3E-08	0.0E+00	1.9E-03	0.0E+00	3.9E-09	0.0E+00	1.8E-03	0.0E+00	1.4E-09	0.0E+00
Sub. (>0.5 ft)	10K240207	Th-230	2.59E+00	7.0E-02	3.2E-01	1.1E-06	4.5E-06	1.4E-02	9.1E-02	2.3E-07	1.2E-06	8.7E-03	2.2E-02	6.2E-09	5.1E-08
Sub. (>0.5 ft)	10K240207	TOTAL		8.4E-02	3.2E-01	1.1E-06	4.5E-06	1.6E-02	9.1E-02	2.4E-07	1.2E-06	1.0E-02	2.2E-02	7.6E-09	5.1E-08
Surf. (<0.5 ft)	10K240207	Pb-210	4.90E-02	1.2E-02	0.0E+00	2.7E-08	0.0E+00	1.5E-03	0.0E+00	3.2E-09	0.0E+00	1.5E-03	0.0E+00	1.2E-09	0.0E+00
Surf. (<0.5 ft)	10K240207	Th-230	1.84E+00	5.0E-02	2.3E-01	7.6E-07	3.2E-06	9.8E-03	6.4E-02	1.6E-07	8.2E-07	6.2E-03	1.6E-02	4.4E-09	3.6E-08
Surf. (<0.5 ft)	10K240207	TOTAL		6.2E-02	2.3E-01	7.9E-07	3.2E-06	1.1E-02	6.4E-02	1.7E-07	8.2E-07	7.7E-03	1.6E-02	5.6E-09	3.6E-08
All Depths	10K240207	Pb-210	5.66E-02	1.3E-02	0.0E+00	3.1E-08	0.0E+00	1.8E-03	0.0E+00	3.7E-09	0.0E+00	1.7E-03	0.0E+00	1.4E-09	0.0E+00
All Depths	10K240207	Th-230	2.38E+00	6.5E-02	2.9E-01	9.8E-07	4.1E-06	1.3E-02	8.3E-02	2.1E-07	1.1E-06	8.0E-03	2.0E-02	5.7E-09	4.7E-08
All Depths	10K240207	TOTAL		7.8E-02	2.9E-01	1.0E-06	4.1E-06	1.4E-02	8.3E-02	2.2E-07	1.1E-06	9.7E-03	2.0E-02	7.0E-09	4.7E-08
Sub. (>0.5 ft)	10K330030/VP-27	Pb-210	8.27E-02	2.0E-02	0.0E+00	4.6E-08	0.0E+00	2.6E-03	0.0E+00	5.4E-09	0.0E+00	2.5E-03	0.0E+00	2.0E-09	0.0E+00
Sub. (>0.5 ft)	10K330030/VP-27	Th-230	4.25E+00	1.2E-01	5.3E-01	1.8E-06	7.3E-06	2.3E-02	1.5E-01	3.8E-07	1.9E-06	1.4E-02	3.6E-02	1.0E-08	8.4E-08
Sub. (>0.5 ft)	10K330030/VP-27	TOTAL		1.4E-01	5.3E-01	1.8E-06	7.3E-06	2.5E-02	1.5E-01	3.8E-07	1.9E-06	1.7E-02	3.6E-02	1.2E-08	8.4E-08
Surf. (<0.5 ft)	10K330030/VP-27	Pb-210	5.60E-02	1.3E-02	0.0E+00	3.1E-08	0.0E+00	1.7E-03	0.0E+00	3.7E-09	0.0E+00	1.7E-03	0.0E+00	1.4E-09	0.0E+00
Surf. (<0.5 ft)	10K330030/VP-27	Th-230	2.34E+00	6.4E-02	2.9E-01	9.7E-07	4.0E-06	1.2E-02	8.2E-02	2.1E-07	1.0E-06	7.8E-03	2.0E-02	5.6E-09	4.6E-08
Surf. (<0.5 ft)	10K330030/VP-27	TOTAL		7.7E-02	2.9E-01	1.0E-06	4.0E-06	1.4E-02	8.2E-02	2.1E-07	1.0E-06	9.6E-03	2.0E-02	6.9E-09	4.6E-08
All Depths	10K330030/VP-27	Pb-210	8.67E-02	2.1E-02	0.0E+00	4.8E-08	0.0E+00	2.7E-03	0.0E+00	5.7E-09	0.0E+00	2.6E-03	0.0E+00	2.1E-09	0.0E+00
All Depths	10K330030/VP-27	Th-230	4.53E+00	1.2E-01	5.6E-01	1.9E-06	7.8E-06	2.4E-02	1.6E-01	4.0E-07	2.0E-06	1.5E-02	3.8E-02	1.1E-08	9.0E-08
All Depths	10K330030/VP-27	TOTAL		1.4E-01	5.6E-01	1.9E-06	7.8E-06	2.7E-02	1.6E-01	4.1E-07	2.0E-06	1.8E-02	3.8E-02	1.3E-08	9.0E-08
Sub. (>0.5 ft)	10K330140/VP-24	Pb-210	1.93E-02	4.6E-03	0.0E+00	1.1E-08	0.0E+00	6.0E-04	0.0E+00	1.3E-09	0.0E+00	5.9E-04	0.0E+00	4.7E-10	0.0E+00
Sub. (>0.5 ft)	10K330140/VP-24	TOTAL		4.6E-03	0.0E+00	1.1E-08	0.0E+00	6.0E-04	0.0E+00	1.3E-09	0.0E+00	5.9E-04	0.0E+00	4.7E-10	0.0E+00
Surf. (<0.5 ft)	10K330140/VP-24	Pb-210	1.86E-02	4.4E-03	0.0E+00	1.0E-08	0.0E+00	5.8E-04	0.0E+00	1.2E-09	0.0E+00	5.7E-04	0.0E+00	4.5E-10	0.0E+00
Surf. (<0.5 ft)	10K330140/VP-24	Ra-226	5.40E-01	2.0E+00	0.0E+00	2.8E-05	0.0E+00	6.2E-01	0.0E+00	7.6E-06	0.0E+00	9.8E-02	0.0E+00	3.6E-07	0.0E+00
Surf. (<0.5 ft)	10K330140/VP-24	Th-232	5.90E-01	7.9E-02	2.7E+00	3.4E-05	4.6E-05	1.5E-02	8.4E-01	8.2E-06	1.2E-05	9.8E-03	1.4E-01	1.2E-07	5.0E-07
Surf. (<0.5 ft)	10K330140/VP-24	U-238	3.62E+00	2.0E-01	0.0E+00	1.9E-06	0.0E+00	5.9E-02	0.0E+00	5.0E-07	0.0E+00	1.3E-02	0.0E+00	3.0E-08	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 9 of 60)

			Exposure Point	RESIDENTIAL				INDUSTRIAL				MAINTENANCE			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<0.5 ft)	10K330140/VP-24	TOTAL		2.3E+00	2.7E+00	6.4E-05	4.6E-05	7.0E-01	8.4E-01	1.6E-05	1.2E-05	1.2E-01	1.4E-01	5.1E-07	5.0E-07
All Depths	10K330140/VP-24	Pb-210	1.89E-02	4.5E-03	0.0E+00	1.0E-08	0.0E+00	5.9E-04	0.0E+00	1.2E-09	0.0E+00	5.8E-04	0.0E+00	4.6E-10	0.0E+00
All Depths	10K330140/VP-24	Ra-226	5.40E-01	2.0E+00	0.0E+00	2.8E-05	0.0E+00	6.2E-01	0.0E+00	7.6E-06	0.0E+00	9.8E-02	0.0E+00	3.6E-07	0.0E+00
All Depths	10K330140/VP-24	Th-232	5.90E-01	7.9E-02	2.7E+00	3.4E-05	4.6E-05	1.5E-02	8.4E-01	8.2E-06	1.2E-05	9.8E-03	1.4E-01	1.2E-07	5.0E-07
All Depths	10K330140/VP-24	U-238	3.62E+00	2.0E-01	0.0E+00	1.9E-06	0.0E+00	5.9E-02	0.0E+00	5.0E-07	0.0E+00	1.3E-02	0.0E+00	3.0E-08	0.0E+00
All Depths	10K330140/VP-24	TOTAL		2.3E+00	2.7E+00	6.4E-05	4.6E-05	7.0E-01	8.4E-01	1.6E-05	1.2E-05	1.2E-01	1.4E-01	5.1E-07	5.0E-07
Sub. (>0.5 ft)	10K330223/VP-29	Pb-210	4.48E-02	1.1E-02	0.0E+00	2.5E-08	0.0E+00	1.4E-03	0.0E+00	2.9E-09	0.0E+00	1.4E-03	0.0E+00	1.1E-09	0.0E+00
Sub. (>0.5 ft)	10K330223/VP-29	Th-230	1.54E+00	4.2E-02	1.9E-01	6.4E-07	2.7E-06	8.2E-03	5.4E-02	1.4E-07	6.9E-07	5.2E-03	1.3E-02	3.7E-09	3.0E-08
Sub. (>0.5 ft)	10K330223/VP-29	TOTAL		5.2E-02	1.9E-01	6.6E-07	2.7E-06	9.6E-03	5.4E-02	1.4E-07	6.9E-07	6.5E-03	1.3E-02	4.7E-09	3.0E-08
All Depths	10K330223/VP-29	Pb-210	4.48E-02	1.1E-02	0.0E+00	2.5E-08	0.0E+00	1.4E-03	0.0E+00	2.9E-09	0.0E+00	1.4E-03	0.0E+00	1.1E-09	0.0E+00
All Depths	10K330223/VP-29	Th-230	1.54E+00	4.2E-02	1.9E-01	6.4E-07	2.7E-06	8.2E-03	5.4E-02	1.4E-07	6.9E-07	5.2E-03	1.3E-02	3.7E-09	3.0E-08
All Depths	10K330223/VP-29	TOTAL		5.2E-02	1.9E-01	6.6E-07	2.7E-06	9.6E-03	5.4E-02	1.4E-07	6.9E-07	6.5E-03	1.3E-02	4.7E-09	3.0E-08
Sub. (>0.5 ft)	10K330232/VP-30	Pb-210	2.66E-02	6.3E-03	0.0E+00	1.5E-08	0.0E+00	8.3E-04	0.0E+00	1.7E-09	0.0E+00	8.1E-04	0.0E+00	6.4E-10	0.0E+00
Sub. (>0.5 ft)	10K330232/VP-30	Th-230	2.40E-01	6.5E-03	3.0E-02	9.9E-08	4.1E-07	1.3E-03	8.4E-03	2.1E-08	1.1E-07	8.0E-04	2.0E-03	5.7E-10	4.7E-09
Sub. (>0.5 ft)	10K330232/VP-30	TOTAL		1.3E-02	3.0E-02	1.1E-07	4.1E-07	2.1E-03	8.4E-03	2.3E-08	1.1E-07	1.6E-03	2.0E-03	1.2E-09	4.7E-09
All Depths	10K330232/VP-30	Pb-210	2.66E-02	6.3E-03	0.0E+00	1.5E-08	0.0E+00	8.3E-04	0.0E+00	1.7E-09	0.0E+00	8.1E-04	0.0E+00	6.4E-10	0.0E+00
All Depths	10K330232/VP-30	Th-230	2.40E-01	6.5E-03	3.0E-02	9.9E-08	4.1E-07	1.3E-03	8.4E-03	2.1E-08	1.1E-07	8.0E-04	2.0E-03	5.7E-10	4.7E-09
All Depths	10K330232/VP-30	TOTAL		1.3E-02	3.0E-02	1.1E-07	4.1E-07	2.1E-03	8.4E-03	2.3E-08	1.1E-07	1.6E-03	2.0E-03	1.2E-09	4.7E-09
Sub. (>0.5 ft)	10K330241/VP-32	Pb-210	1.68E-01	4.0E-02	0.0E+00	9.3E-08	0.0E+00	5.2E-03	0.0E+00	1.1E-08	0.0E+00	5.1E-03	0.0E+00	4.1E-09	0.0E+00
Sub. (>0.5 ft)	10K330241/VP-32	Th-230	1.03E+01	2.8E-01	1.3E+00	4.3E-06	1.8E-05	5.5E-02	3.6E-01	9.2E-07	4.6E-06	3.5E-02	8.7E-02	2.5E-08	2.0E-07
Sub. (>0.5 ft)	10K330241/VP-32	TOTAL		3.2E-01	1.3E+00	4.4E-06	1.8E-05	6.0E-02	3.6E-01	9.3E-07	4.6E-06	4.0E-02	8.7E-02	2.9E-08	2.0E-07
Surf. (<0.5 ft)	10K330241/VP-32	Pb-210	5.08E-02	1.2E-02	0.0E+00	2.8E-08	0.0E+00	1.6E-03	0.0E+00	3.3E-09	0.0E+00	1.5E-03	0.0E+00	1.2E-09	0.0E+00
Surf. (<0.5 ft)	10K330241/VP-32	Th-230	1.97E+00	5.4E-02	2.4E-01	8.1E-07	3.4E-06	1.0E-02	6.9E-02	1.8E-07	8.8E-07	6.6E-03	1.7E-02	4.7E-09	3.9E-08
Surf. (<0.5 ft)	10K330241/VP-32	TOTAL		6.6E-02	2.4E-01	8.4E-07	3.4E-06	1.2E-02	6.9E-02	1.8E-07	8.8E-07	8.2E-03	1.7E-02	5.9E-09	3.9E-08
All Depths	10K330241/VP-32	Pb-210	9.13E-02	2.2E-02	0.0E+00	5.0E-08	0.0E+00	2.8E-03	0.0E+00	6.0E-09	0.0E+00	2.8E-03	0.0E+00	2.2E-09	0.0E+00
All Depths	10K330241/VP-32	Th-230	4.86E+00	1.3E-01	6.0E-01	2.0E-06	8.4E-06	2.6E-02	1.7E-01	4.3E-07	2.2E-06	1.6E-02	4.1E-02	1.2E-08	9.6E-08
All Depths	10K330241/VP-32	TOTAL		1.5E-01	6.0E-01	2.1E-06	8.4E-06	2.9E-02	1.7E-01	4.4E-07	2.2E-06	1.9E-02	4.1E-02	1.4E-08	9.6E-08
Sub. (>0.5 ft)	10K330250/VP-31A	Pb-210	1.76E-01	4.2E-02	0.0E+00	9.7E-08	0.0E+00	5.5E-03	0.0E+00	1.2E-08	0.0E+00	5.4E-03	0.0E+00	4.3E-09	0.0E+00
Sub. (>0.5 ft)	10K330250/VP-31A	Th-230	1.09E+01	3.0E-01	1.4E+00	4.5E-06	1.9E-05	5.8E-02	3.8E-01	9.8E-07	4.9E-06	3.7E-02	9.3E-02	2.6E-08	2.2E-07
Sub. (>0.5 ft)	10K330250/VP-31A	TOTAL		3.4E-01	1.4E+00	4.6E-06	1.9E-05	6.4E-02	3.8E-01	9.9E-07	4.9E-06	4.2E-02	9.3E-02	3.0E-08	2.2E-07
Surf. (<0.5 ft)	10K330250/VP-31A	Pb-210	1.96E-01	4.6E-02	0.0E+00	1.1E-07	0.0E+00	6.1E-03	0.0E+00	1.3E-08	0.0E+00	6.0E-03	0.0E+00	4.7E-09	0.0E+00
Surf. (<0.5 ft)	10K330250/VP-31A	Ra-226	3.50E-01	1.3E+00	0.0E+00	1.8E-05	0.0E+00	4.0E-01	0.0E+00	4.9E-06	0.0E+00	6.3E-02	0.0E+00	2.3E-07	0.0E+00
Surf. (<0.5 ft)	10K330250/VP-31A	Th-230	1.23E+01	3.4E-01	1.5E+00	5.1E-06	2.1E-05	6.6E-02	4.3E-01	1.1E-06	5.5E-06	4.1E-02	1.0E-01	2.9E-08	2.4E-07
Surf. (<0.5 ft)	10K330250/VP-31A	Th-232	8.90E-01	1.2E-01	4.1E+00	5.1E-05	6.9E-05	2.3E-02	1.3E+00	1.2E-05	1.8E-05	1.5E-02	2.1E-01	1.8E-07	7.5E-07
Surf. (<0.5 ft)	10K330250/VP-31A	TOTAL		1.8E+00	5.6E+00	7.4E-05	9.1E-05	5.0E-01	1.7E+00	1.8E-05	2.4E-05	1.3E-01	3.2E-01	4.5E-07	1.0E-06
All Depths	10K330250/VP-31A	Pb-210	1.55E-01	3.7E-02	0.0E+00	8.6E-08	0.0E+00	4.8E-03	0.0E+00	1.0E-08	0.0E+00	4.7E-03	0.0E+00	3.7E-09	0.0E+00
All Depths	10K330250/VP-31A	Ra-226	3.50E-01	1.3E+00	0.0E+00	1.8E-05	0.0E+00	4.0E-01	0.0E+00	4.9E-06	0.0E+00	6.3E-02	0.0E+00	2.3E-07	0.0E+00
All Depths	10K330250/VP-31A	Th-230	9.44E+00	2.6E-01	1.2E+00	3.9E-06	1.6E-05	5.0E-02	3.3E-01	8.4E-07	4.2E-06	3.2E-02	8.0E-02	2.2E-08	1.9E-07
All Depths	10K330250/VP-31A	Th-232	8.90E-01	1.2E-01	4.1E+00	5.1E-05	6.9E-05	2.3E-02	1.3E+00	1.2E-05	1.8E-05	1.5E-02	2.1E-01	1.8E-07	7.5E-07
All Depths	10K330250/VP-31A	TOTAL		1.7E+00	5.3E+00	7.3E-05	8.6E-05	4.8E-01	1.6E+00	1.8E-05	2.2E-05	1.1E-01	2.9E-01	4.4E-07	9.4E-07

Attachment 12. Radiological Doses and Risks for each Property (page 10 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
Sub. (>0.5 ft)	10K330324/VP-34	Pb-210	4.20E-02	9.9E-03	0.0E+00	2.3E-08	0.0E+00	1.3E-03	0.0E+00	2.7E-09	0.0E+00	1.3E-03	0.0E+00	1.0E-09	0.0E+00
Sub. (>0.5 ft)	10K330324/VP-34	Th-230	1.34E+00	3.6E-02	1.7E-01	5.5E-07	2.3E-06	7.1E-03	4.7E-02	1.2E-07	6.0E-07	4.5E-03	1.1E-02	3.2E-09	2.6E-08
Sub. (>0.5 ft)	10K330324/VP-34	TOTAL		4.6E-02	1.7E-01	5.8E-07	2.3E-06	8.4E-03	4.7E-02	1.2E-07	6.0E-07	5.8E-03	1.1E-02	4.2E-09	2.6E-08
All Depths	10K330324/VP-34	Pb-210	4.20E-02	9.9E-03	0.0E+00	2.3E-08	0.0E+00	1.3E-03	0.0E+00	2.7E-09	0.0E+00	1.3E-03	0.0E+00	1.0E-09	0.0E+00
All Depths	10K330324/VP-34	Th-230	1.34E+00	3.6E-02	1.7E-01	5.5E-07	2.3E-06	7.1E-03	4.7E-02	1.2E-07	6.0E-07	4.5E-03	1.1E-02	3.2E-09	2.6E-08
All Depths	10K330324/VP-34	TOTAL		4.6E-02	1.7E-01	5.8E-07	2.3E-06	8.4E-03	4.7E-02	1.2E-07	6.0E-07	5.8E-03	1.1E-02	4.2E-09	2.6E-08
Sub. (>0.5 ft)	10K330333/VP-33	Pb-210	4.19E-02	9.9E-03	0.0E+00	2.3E-08	0.0E+00	1.3E-03	0.0E+00	2.7E-09	0.0E+00	1.3E-03	0.0E+00	1.0E-09	0.0E+00
Sub. (>0.5 ft)	10K330333/VP-33	Th-230	1.33E+00	3.6E-02	1.6E-01	5.5E-07	2.3E-06	7.1E-03	4.7E-02	1.2E-07	5.9E-07	4.5E-03	1.1E-02	3.2E-09	2.6E-08
Sub. (>0.5 ft)	10K330333/VP-33	TOTAL		4.6E-02	1.6E-01	5.7E-07	2.3E-06	8.4E-03	4.7E-02	1.2E-07	5.9E-07	5.7E-03	1.1E-02	4.2E-09	2.6E-08
All Depths	10K330333/VP-33	Pb-210	4.19E-02	9.9E-03	0.0E+00	2.3E-08	0.0E+00	1.3E-03	0.0E+00	2.7E-09	0.0E+00	1.3E-03	0.0E+00	1.0E-09	0.0E+00
All Depths	10K330333/VP-33	Th-230	1.33E+00	3.6E-02	1.6E-01	5.5E-07	2.3E-06	7.1E-03	4.7E-02	1.2E-07	5.9E-07	4.5E-03	1.1E-02	3.2E-09	2.6E-08
All Depths	10K330333/VP-33	TOTAL		4.6E-02	1.6E-01	5.7E-07	2.3E-06	8.4E-03	4.7E-02	1.2E-07	5.9E-07	5.7E-03	1.1E-02	4.2E-09	2.6E-08
Sub. (>0.5 ft)	10K330342/VP-33	Pb-210	2.94E-02	7.0E-03	0.0E+00	1.6E-08	0.0E+00	9.2E-04	0.0E+00	1.9E-09	0.0E+00	9.0E-04	0.0E+00	7.1E-10	0.0E+00
Sub. (>0.5 ft)	10K330342/VP-33	Th-230	4.40E-01	1.2E-02	5.4E-02	1.8E-07	7.6E-07	2.3E-03	1.5E-02	3.9E-08	2.0E-07	1.5E-03	3.7E-03	1.0E-09	8.7E-09
Sub. (>0.5 ft)	10K330342/VP-33	TOTAL		1.9E-02	5.4E-02	2.0E-07	7.6E-07	3.3E-03	1.5E-02	4.1E-08	2.0E-07	2.4E-03	3.7E-03	1.8E-09	8.7E-09
All Depths	10K330342/VP-33	Pb-210	2.94E-02	7.0E-03	0.0E+00	1.6E-08	0.0E+00	9.2E-04	0.0E+00	1.9E-09	0.0E+00	9.0E-04	0.0E+00	7.1E-10	0.0E+00
All Depths	10K330342/VP-33	Th-230	4.40E-01	1.2E-02	5.4E-02	1.8E-07	7.6E-07	2.3E-03	1.5E-02	3.9E-08	2.0E-07	1.5E-03	3.7E-03	1.0E-09	8.7E-09
All Depths	10K330342/VP-33	TOTAL		1.9E-02	5.4E-02	2.0E-07	7.6E-07	3.3E-03	1.5E-02	4.1E-08	2.0E-07	2.4E-03	3.7E-03	1.8E-09	8.7E-09
Sub. (>0.5 ft)	10K330351/VP-28	Pb-210	5.46E-02	1.3E-02	0.0E+00	3.0E-08	0.0E+00	1.7E-03	0.0E+00	3.6E-09	0.0E+00	1.7E-03	0.0E+00	1.3E-09	0.0E+00
Sub. (>0.5 ft)	10K330351/VP-28	Th-230	2.24E+00	6.1E-02	2.8E-01	9.3E-07	3.9E-06	1.2E-02	7.8E-02	2.0E-07	1.0E-06	7.5E-03	1.9E-02	5.3E-09	4.4E-08
Sub. (>0.5 ft)	10K330351/VP-28	TOTAL		7.4E-02	2.8E-01	9.6E-07	3.9E-06	1.4E-02	7.8E-02	2.0E-07	1.0E-06	9.2E-03	1.9E-02	6.6E-09	4.4E-08
All Depths	10K330351/VP-28	Pb-210	5.46E-02	1.3E-02	0.0E+00	3.0E-08	0.0E+00	1.7E-03	0.0E+00	3.6E-09	0.0E+00	1.7E-03	0.0E+00	1.3E-09	0.0E+00
All Depths	10K330351/VP-28	Th-230	2.24E+00	6.1E-02	2.8E-01	9.3E-07	3.9E-06	1.2E-02	7.8E-02	2.0E-07	1.0E-06	7.5E-03	1.9E-02	5.3E-09	4.4E-08
All Depths	10K330351/VP-28	TOTAL		7.4E-02	2.8E-01	9.6E-07	3.9E-06	1.4E-02	7.8E-02	2.0E-07	1.0E-06	9.2E-03	1.9E-02	6.6E-09	4.4E-08
Surf. (<0.5 ft)	10K420010/VP-9(C)	Pb-210	8.19E-02	1.9E-02	0.0E+00	4.5E-08	0.0E+00	2.6E-03	0.0E+00	5.3E-09	0.0E+00	2.5E-03	0.0E+00	2.0E-09	0.0E+00
Surf. (<0.5 ft)	10K420010/VP-9(C)	Ra-226	7.50E-01	2.7E+00	0.0E+00	3.9E-05	0.0E+00	8.6E-01	0.0E+00	1.1E-05	0.0E+00	1.4E-01	0.0E+00	5.0E-07	0.0E+00
Surf. (<0.5 ft)	10K420010/VP-9(C)	Th-230	4.19E+00	1.1E-01	5.2E-01	1.7E-06	7.2E-06	2.2E-02	1.5E-01	3.7E-07	1.9E-06	1.4E-02	3.5E-02	1.0E-08	8.3E-08
Surf. (<0.5 ft)	10K420010/VP-9(C)	Th-232	1.40E-01	1.9E-02	6.4E-01	8.0E-06	1.1E-05	3.6E-03	2.0E-01	2.0E-06	2.9E-06	2.3E-03	3.4E-02	2.9E-08	1.2E-07
Surf. (<0.5 ft)	10K420010/VP-9(C)	U-238	9.12E+00	5.1E-01	0.0E+00	4.7E-06	0.0E+00	1.5E-01	0.0E+00	1.3E-06	0.0E+00	3.3E-02	0.0E+00	7.5E-08	0.0E+00
Surf. (<0.5 ft)	10K420010/VP-9(C)	TOTAL		3.4E+00	1.2E+00	5.3E-05	1.8E-05	1.0E+00	3.5E-01	1.4E-05	4.7E-06	1.9E-01	6.9E-02	6.2E-07	2.0E-07
All Depths	10K420010/VP-9(C)	Pb-210	8.19E-02	1.9E-02	0.0E+00	4.5E-08	0.0E+00	2.6E-03	0.0E+00	5.3E-09	0.0E+00	2.5E-03	0.0E+00	2.0E-09	0.0E+00
All Depths	10K420010/VP-9(C)	Ra-226	7.50E-01	2.7E+00	0.0E+00	3.9E-05	0.0E+00	8.6E-01	0.0E+00	1.1E-05	0.0E+00	1.4E-01	0.0E+00	5.0E-07	0.0E+00
All Depths	10K420010/VP-9(C)	Th-230	4.19E+00	1.1E-01	5.2E-01	1.7E-06	7.2E-06	2.2E-02	1.5E-01	3.7E-07	1.9E-06	1.4E-02	3.5E-02	1.0E-08	8.3E-08
All Depths	10K420010/VP-9(C)	Th-232	1.40E-01	1.9E-02	6.4E-01	8.0E-06	1.1E-05	3.6E-03	2.0E-01	2.0E-06	2.9E-06	2.3E-03	3.4E-02	2.9E-08	1.2E-07
All Depths	10K420010/VP-9(C)	U-238	9.12E+00	5.1E-01	0.0E+00	4.7E-06	0.0E+00	1.5E-01	0.0E+00	1.3E-06	0.0E+00	3.3E-02	0.0E+00	7.5E-08	0.0E+00
All Depths	10K420010/VP-9(C)	TOTAL		3.4E+00	1.2E+00	5.3E-05	1.8E-05	1.0E+00	3.5E-01	1.4E-05	4.7E-06	1.9E-01	6.9E-02	6.2E-07	2.0E-07
Surf. (<0.5 ft)	10K430042/VP-63	Pb-210	3.64E-02	8.6E-03	0.0E+00	2.0E-08	0.0E+00	1.1E-03	0.0E+00	2.4E-09	0.0E+00	1.1E-03	0.0E+00	8.8E-10	0.0E+00
Surf. (<0.5 ft)	10K430042/VP-63	Th-230	9.40E-01	2.6E-02	1.2E-01	3.9E-07	1.6E-06	5.0E-03	3.3E-02	8.4E-08	4.2E-07	3.2E-03	8.0E-03	2.2E-09	1.9E-08
Surf. (<0.5 ft)	10K430042/VP-63	TOTAL		3.4E-02	1.2E-01	4.1E-07	1.6E-06	6.1E-03	3.3E-02	8.6E-08	4.2E-07	4.3E-03	8.0E-03	3.1E-09	1.9E-08
All Depths	10K430042/VP-63	Pb-210	3.64E-02	8.6E-03	0.0E+00	2.0E-08	0.0E+00	1.1E-03	0.0E+00	2.4E-09	0.0E+00	1.1E-03	0.0E+00	8.8E-10	0.0E+00
All Depths	10K430042/VP-63	Th-230	9.40E-01	2.6E-02	1.2E-01	3.9E-07	1.6E-06	5.0E-03	3.3E-02	8.4E-08	4.2E-07	3.2E-03	8.0E-03	2.2E-09	1.9E-08

Attachment 12. Radiological Doses and Risks for each Property (page 11 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
All Depths	10K430042/VP-63	TOTAL		3.4E-02	1.2E-01	4.1E-07	1.6E-06	6.1E-03	3.3E-02	8.6E-08	4.2E-07	4.3E-03	8.0E-03	3.1E-09	1.9E-08
Sub. (>0.5 ft)	10K440074/VP-8(C)	Pb-210	3.25E-01	7.7E-02	0.0E+00	1.8E-07	0.0E+00	1.0E-02	0.0E+00	2.1E-08	0.0E+00	9.9E-03	0.0E+00	7.8E-09	0.0E+00
Sub. (>0.5 ft)	10K440074/VP-8(C)	Ra-226	8.80E-01	3.2E+00	0.0E+00	4.5E-05	0.0E+00	1.0E+00	0.0E+00	1.2E-05	0.0E+00	1.6E-01	0.0E+00	5.9E-07	0.0E+00
Sub. (>0.5 ft)	10K440074/VP-8(C)	Th-230	2.15E+01	5.9E-01	2.7E+00	8.9E-06	3.7E-05	1.1E-01	7.5E-01	1.9E-06	9.6E-06	7.2E-02	1.8E-01	5.1E-08	4.3E-07
Sub. (>0.5 ft)	10K440074/VP-8(C)	Th-232	6.10E-01	8.2E-02	2.8E+00	3.5E-05	4.8E-05	1.6E-02	8.7E-01	8.5E-06	1.3E-05	1.0E-02	1.5E-01	1.3E-07	5.2E-07
Sub. (>0.5 ft)	10K440074/VP-8(C)	U-238	6.29E+00	3.5E-01	0.0E+00	3.3E-06	0.0E+00	1.0E-01	0.0E+00	8.6E-07	0.0E+00	2.3E-02	0.0E+00	5.2E-08	0.0E+00
Sub. (>0.5 ft)	10K440074/VP-8(C)	TOTAL		4.3E+00	5.5E+00	9.3E-05	8.5E-05	1.3E+00	1.6E+00	2.4E-05	2.2E-05	2.7E-01	3.3E-01	8.2E-07	9.4E-07
Surf. (<0.5 ft)	10K440074/VP-8(C)	Pb-210	1.74E-01	4.1E-02	0.0E+00	9.6E-08	0.0E+00	5.4E-03	0.0E+00	1.1E-08	0.0E+00	5.3E-03	0.0E+00	4.2E-09	0.0E+00
Surf. (<0.5 ft)	10K440074/VP-8(C)	Ra-226	8.50E-01	3.1E+00	0.0E+00	4.4E-05	0.0E+00	9.8E-01	0.0E+00	1.2E-05	0.0E+00	1.5E-01	0.0E+00	5.7E-07	0.0E+00
Surf. (<0.5 ft)	10K440074/VP-8(C)	Th-230	1.07E+01	2.9E-01	1.3E+00	4.4E-06	1.8E-05	5.7E-02	3.8E-01	9.6E-07	4.8E-06	3.6E-02	9.1E-02	2.6E-08	2.1E-07
Surf. (<0.5 ft)	10K440074/VP-8(C)	Th-232	1.55E+00	2.1E-01	7.1E+00	8.9E-05	1.2E-04	4.0E-02	2.2E+00	2.2E-05	3.2E-05	2.6E-02	3.7E-01	3.2E-07	1.3E-06
Surf. (<0.5 ft)	10K440074/VP-8(C)	U-238	3.02E+00	1.7E-01	0.0E+00	1.6E-06	0.0E+00	4.9E-02	0.0E+00	4.2E-07	0.0E+00	1.1E-02	0.0E+00	2.5E-08	0.0E+00
Surf. (<0.5 ft)	10K440074/VP-8(C)	TOTAL		3.8E+00	8.5E+00	1.4E-04	1.4E-04	1.1E+00	2.6E+00	3.5E-05	3.7E-05	2.3E-01	4.6E-01	9.4E-07	1.5E-06
All Depths	10K440074/VP-8(C)	Pb-210	1.61E-01	3.8E-02	0.0E+00	8.9E-08	0.0E+00	5.0E-03	0.0E+00	1.0E-08	0.0E+00	4.9E-03	0.0E+00	3.9E-09	0.0E+00
All Depths	10K440074/VP-8(C)	Ra-226	6.80E-01	2.5E+00	0.0E+00	3.5E-05	0.0E+00	7.8E-01	0.0E+00	9.6E-06	0.0E+00	1.2E-01	0.0E+00	4.5E-07	0.0E+00
All Depths	10K440074/VP-8(C)	Th-230	9.84E+00	2.7E-01	1.2E+00	4.1E-06	1.7E-05	5.2E-02	3.4E-01	8.8E-07	4.4E-06	3.3E-02	8.3E-02	2.3E-08	1.9E-07
All Depths	10K440074/VP-8(C)	Th-232	1.09E+00	1.5E-01	5.0E+00	6.2E-05	8.5E-05	2.8E-02	1.6E+00	1.5E-05	2.2E-05	1.8E-02	2.6E-01	2.2E-07	9.2E-07
All Depths	10K440074/VP-8(C)	U-238	3.02E+00	1.7E-01	0.0E+00	1.6E-06	0.0E+00	4.9E-02	0.0E+00	4.2E-07	0.0E+00	1.1E-02	0.0E+00	2.5E-08	0.0E+00
All Depths	10K440074/VP-8(C)	TOTAL		3.1E+00	6.2E+00	1.0E-04	1.0E-04	9.2E-01	1.9E+00	2.6E-05	2.7E-05	1.9E-01	3.4E-01	7.3E-07	1.1E-06
Sub. (>0.5 ft)	10K440096	Ac-227	1.54E-01	2.0E-01	0.0E+00	5.4E-07	0.0E+00	5.1E-02	0.0E+00	1.6E-07	0.0E+00	1.8E-02	0.0E+00	1.4E-08	0.0E+00
Sub. (>0.5 ft)	10K440096	Pa-231	2.16E-01	9.5E-02	0.0E+00	4.6E-07	0.0E+00	1.6E-02	0.0E+00	1.1E-07	0.0E+00	1.1E-02	0.0E+00	3.6E-09	0.0E+00
Sub. (>0.5 ft)	10K440096	Pb-210	7.28E-01	1.7E-01	0.0E+00	4.0E-07	0.0E+00	2.3E-02	0.0E+00	4.7E-08	0.0E+00	2.2E-02	0.0E+00	1.8E-08	0.0E+00
Sub. (>0.5 ft)	10K440096	Ra-226	8.40E-01	3.1E+00	0.0E+00	4.3E-05	0.0E+00	9.7E-01	0.0E+00	1.2E-05	0.0E+00	1.5E-01	0.0E+00	5.6E-07	0.0E+00
Sub. (>0.5 ft)	10K440096	Th-230	5.03E+01	1.4E+00	6.2E+00	2.1E-05	8.7E-05	2.7E-01	1.8E+00	4.5E-06	2.2E-05	1.7E-01	4.3E-01	1.2E-07	1.0E-06
Sub. (>0.5 ft)	10K440096	Th-232	3.30E-01	4.4E-02	1.5E+00	1.9E-05	2.6E-05	8.6E-03	4.7E-01	4.6E-06	6.8E-06	5.5E-03	7.9E-02	6.8E-08	2.8E-07
Sub. (>0.5 ft)	10K440096	U-238	5.41E+00	3.1E-01	0.0E+00	2.8E-06	0.0E+00	8.8E-02	0.0E+00	7.4E-07	0.0E+00	2.0E-02	0.0E+00	4.5E-08	0.0E+00
Sub. (>0.5 ft)	10K440096	TOTAL		5.3E+00	7.8E+00	8.7E-05	1.1E-04	1.4E+00	2.2E+00	2.2E-05	2.9E-05	4.0E-01	5.1E-01	8.3E-07	1.3E-06
Surf. (<0.5 ft)	10K440096	Pb-210	1.02E-01	2.4E-02	0.0E+00	5.6E-08	0.0E+00	3.2E-03	0.0E+00	6.7E-09	0.0E+00	3.1E-03	0.0E+00	2.5E-09	0.0E+00
Surf. (<0.5 ft)	10K440096	Ra-226	5.20E-01	1.9E+00	0.0E+00	2.7E-05	0.0E+00	6.0E-01	0.0E+00	7.3E-06	0.0E+00	9.4E-02	0.0E+00	3.5E-07	0.0E+00
Surf. (<0.5 ft)	10K440096	Th-230	5.65E+00	1.5E-01	7.0E-01	2.3E-06	9.7E-06	3.0E-02	2.0E-01	5.0E-07	2.5E-06	1.9E-02	4.8E-02	1.3E-08	1.1E-07
Surf. (<0.5 ft)	10K440096	Th-232	8.70E-01	1.2E-01	4.0E+00	5.0E-05	6.8E-05	2.3E-02	1.2E+00	1.2E-05	1.8E-05	1.4E-02	2.1E-01	1.8E-07	7.3E-07
Surf. (<0.5 ft)	10K440096	U-238	3.62E+00	2.0E-01	0.0E+00	1.9E-06	0.0E+00	5.9E-02	0.0E+00	5.0E-07	0.0E+00	1.3E-02	0.0E+00	3.0E-08	0.0E+00
Surf. (<0.5 ft)	10K440096	TOTAL		2.4E+00	4.7E+00	8.1E-05	7.7E-05	7.1E-01	1.4E+00	2.0E-05	2.0E-05	1.4E-01	2.6E-01	5.7E-07	8.5E-07
All Depths	10K440096	Pb-210	1.27E-01	3.0E-02	0.0E+00	7.0E-08	0.0E+00	4.0E-03	0.0E+00	8.3E-09	0.0E+00	3.9E-03	0.0E+00	3.1E-09	0.0E+00
All Depths	10K440096	Ra-226	4.80E-01	1.7E+00	0.0E+00	2.5E-05	0.0E+00	5.5E-01	0.0E+00	6.8E-06	0.0E+00	8.7E-02	0.0E+00	3.2E-07	0.0E+00
All Depths	10K440096	Th-230	7.41E+00	2.0E-01	9.2E-01	3.1E-06	1.3E-05	3.9E-02	2.6E-01	6.6E-07	3.3E-06	2.5E-02	6.3E-02	1.8E-08	1.5E-07
All Depths	10K440096	Th-232	6.90E-01	9.2E-02	3.2E+00	3.9E-05	5.4E-05	1.8E-02	9.9E-01	9.6E-06	1.4E-05	1.1E-02	1.7E-01	1.4E-07	5.8E-07
All Depths	10K440096	U-238	3.62E+00	2.0E-01	0.0E+00	1.9E-06	0.0E+00	5.9E-02	0.0E+00	5.0E-07	0.0E+00	1.3E-02	0.0E+00	3.0E-08	0.0E+00
All Depths	10K440096	TOTAL		2.3E+00	4.1E+00	6.9E-05	6.6E-05	6.7E-01	1.2E+00	1.8E-05	1.7E-05	1.4E-01	2.3E-01	5.1E-07	7.3E-07
Surf. (<0.5 ft)	10K440104/VP-6(C)	Pb-210	2.66E-02	6.3E-03	0.0E+00	1.5E-08	0.0E+00	8.3E-04	0.0E+00	1.7E-09	0.0E+00	8.1E-04	0.0E+00	6.4E-10	0.0E+00
Surf. (<0.5 ft)	10K440104/VP-6(C)	Ra-226	4.50E-01	1.6E+00	0.0E+00	2.3E-05	0.0E+00	5.2E-01	0.0E+00	6.3E-06	0.0E+00	8.1E-02	0.0E+00	3.0E-07	0.0E+00
Surf. (<0.5 ft)	10K440104/VP-6(C)	Th-230	2.40E-01	6.5E-03	3.0E-02	9.9E-08	4.1E-07	1.3E-03	8.4E-03	2.1E-08	1.1E-07	8.0E-04	2.0E-03	5.7E-10	4.7E-09
Surf. (<0.5 ft)	10K440104/VP-6(C)	Th-232	6.90E-01	9.2E-02	3.2E+00	3.9E-05	5.4E-05	1.8E-02	9.9E-01	9.6E-06	1.4E-05	1.1E-02	1.7E-01	1.4E-07	5.8E-07
Surf. (<0.5 ft)	10K440104/VP-6(C)	U-238	5.62E+00	3.2E-01	0.0E+00	2.9E-06	0.0E+00	9.1E-02	0.0E+00	7.7E-07	0.0E+00	2.1E-02	0.0E+00	4.6E-08	0.0E+00
Surf. (<0.5 ft)	10K440104/VP-6(C)	TOTAL		2.1E+00	3.2E+00	6.6E-05	5.4E-05	6.3E-01	1.0E+00	1.7E-05	1.4E-05	1.2E-01	1.7E-01	4.9E-07	5.9E-07

Attachment 12. Radiological Doses and Risks for each Property (page 12 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
All Depths	10K440104/VP-6(C)	Pb-210	2.66E-02	6.3E-03	0.0E+00	1.5E-08	0.0E+00	8.3E-04	0.0E+00	1.7E-09	0.0E+00	8.1E-04	0.0E+00	6.4E-10	0.0E+00
All Depths	10K440104/VP-6(C)	Ra-226	4.50E-01	1.6E+00	0.0E+00	2.3E-05	0.0E+00	5.2E-01	0.0E+00	6.3E-06	0.0E+00	8.1E-02	0.0E+00	3.0E-07	0.0E+00
All Depths	10K440104/VP-6(C)	Th-230	2.40E-01	6.5E-03	3.0E-02	9.9E-08	4.1E-07	1.3E-03	8.4E-03	2.1E-08	1.1E-07	8.0E-04	2.0E-03	5.7E-10	4.7E-09
All Depths	10K440104/VP-6(C)	Th-232	6.90E-01	9.2E-02	3.2E+00	3.9E-05	5.4E-05	1.8E-02	9.9E-01	9.6E-06	1.4E-05	1.1E-02	1.7E-01	1.4E-07	5.8E-07
All Depths	10K440104/VP-6(C)	U-238	5.62E+00	3.2E-01	0.0E+00	2.9E-06	0.0E+00	9.1E-02	0.0E+00	7.7E-07	0.0E+00	2.1E-02	0.0E+00	4.6E-08	0.0E+00
All Depths	10K440104/VP-6(C)	TOTAL		2.1E+00	3.2E+00	6.6E-05	5.4E-05	6.3E-01	1.0E+00	1.7E-05	1.4E-05	1.2E-01	1.7E-01	4.9E-07	5.9E-07
Surf. (<0.5 ft)	10K440113/VP-7(C)	Pb-210	7.28E-02	1.7E-02	0.0E+00	4.0E-08	0.0E+00	2.3E-03	0.0E+00	4.7E-09	0.0E+00	2.2E-03	0.0E+00	1.8E-09	0.0E+00
Surf. (<0.5 ft)	10K440113/VP-7(C)	Ra-226	6.50E-01	2.4E+00	0.0E+00	3.4E-05	0.0E+00	7.5E-01	0.0E+00	9.2E-06	0.0E+00	1.2E-01	0.0E+00	4.3E-07	0.0E+00
Surf. (<0.5 ft)	10K440113/VP-7(C)	Th-230	3.54E+00	9.6E-02	4.4E-01	1.5E-06	6.1E-06	1.9E-02	1.2E-01	3.2E-07	1.6E-06	1.2E-02	3.0E-02	8.4E-09	7.0E-08
Surf. (<0.5 ft)	10K440113/VP-7(C)	Th-232	1.89E+00	2.5E-01	8.7E+00	1.1E-04	1.5E-04	4.9E-02	2.7E+00	2.6E-05	3.9E-05	3.1E-02	4.5E-01	3.9E-07	1.6E-06
Surf. (<0.5 ft)	10K440113/VP-7(C)	U-238	3.04E+01	1.7E+00	0.0E+00	1.6E-05	0.0E+00	4.9E-01	0.0E+00	4.2E-06	0.0E+00	1.1E-01	0.0E+00	2.5E-07	0.0E+00
Surf. (<0.5 ft)	10K440113/VP-7(C)	TOTAL		4.5E+00	9.1E+00	1.6E-04	1.5E-04	1.3E+00	2.8E+00	4.0E-05	4.0E-05	2.7E-01	4.8E-01	1.1E-06	1.7E-06
All Depths	10K440113/VP-7(C)	Pb-210	7.28E-02	1.7E-02	0.0E+00	4.0E-08	0.0E+00	2.3E-03	0.0E+00	4.7E-09	0.0E+00	2.2E-03	0.0E+00	1.8E-09	0.0E+00
All Depths	10K440113/VP-7(C)	Ra-226	6.50E-01	2.4E+00	0.0E+00	3.4E-05	0.0E+00	7.5E-01	0.0E+00	9.2E-06	0.0E+00	1.2E-01	0.0E+00	4.3E-07	0.0E+00
All Depths	10K440113/VP-7(C)	Th-230	3.54E+00	9.6E-02	4.4E-01	1.5E-06	6.1E-06	1.9E-02	1.2E-01	3.2E-07	1.6E-06	1.2E-02	3.0E-02	8.4E-09	7.0E-08
All Depths	10K440113/VP-7(C)	Th-232	1.89E+00	2.5E-01	8.7E+00	1.1E-04	1.5E-04	4.9E-02	2.7E+00	2.6E-05	3.9E-05	3.1E-02	4.5E-01	3.9E-07	1.6E-06
All Depths	10K440113/VP-7(C)	U-238	3.04E+01	1.7E+00	0.0E+00	1.6E-05	0.0E+00	4.9E-01	0.0E+00	4.2E-06	0.0E+00	1.1E-01	0.0E+00	2.5E-07	0.0E+00
All Depths	10K440113/VP-7(C)	TOTAL		4.5E+00	9.1E+00	1.6E-04	1.5E-04	1.3E+00	2.8E+00	4.0E-05	4.0E-05	2.7E-01	4.8E-01	1.1E-06	1.7E-06
Sub. (>0.5 ft)	10K510067/VP-6(L)	Pb-210	9.17E-02	2.2E-02	0.0E+00	5.0E-08	0.0E+00	2.9E-03	0.0E+00	6.0E-09	0.0E+00	2.8E-03	0.0E+00	2.2E-09	0.0E+00
Sub. (>0.5 ft)	10K510067/VP-6(L)	Ra-226	7.60E-01	2.8E+00	0.0E+00	3.9E-05	0.0E+00	8.7E-01	0.0E+00	1.1E-05	0.0E+00	1.4E-01	0.0E+00	5.1E-07	0.0E+00
Sub. (>0.5 ft)	10K510067/VP-6(L)	Th-230	4.89E+00	1.3E-01	6.1E-01	2.0E-06	8.4E-06	2.6E-02	1.7E-01	4.4E-07	2.2E-06	1.6E-02	4.1E-02	1.2E-08	9.7E-08
Sub. (>0.5 ft)	10K510067/VP-6(L)	Th-232	2.06E+00	2.8E-01	9.5E+00	1.2E-04	1.6E-04	5.4E-02	2.9E+00	2.9E-05	4.2E-05	3.4E-02	4.9E-01	4.2E-07	1.7E-06
Sub. (>0.5 ft)	10K510067/VP-6(L)	U-238	8.12E+00	4.6E-01	0.0E+00	4.2E-06	0.0E+00	1.3E-01	0.0E+00	1.1E-06	0.0E+00	3.0E-02	0.0E+00	6.7E-08	0.0E+00
Sub. (>0.5 ft)	10K510067/VP-6(L)	TOTAL		3.7E+00	1.0E+01	1.6E-04	1.7E-04	1.1E+00	3.1E+00	4.1E-05	4.4E-05	2.2E-01	5.4E-01	1.0E-06	1.8E-06
Surf. (<0.5 ft)	10K510067/VP-6(L)	Pb-210	8.78E-02	2.1E-02	0.0E+00	4.8E-08	0.0E+00	2.7E-03	0.0E+00	5.7E-09	0.0E+00	2.7E-03	0.0E+00	2.1E-09	0.0E+00
Surf. (<0.5 ft)	10K510067/VP-6(L)	Ra-226	5.30E-01	1.9E+00	0.0E+00	2.7E-05	0.0E+00	6.1E-01	0.0E+00	7.5E-06	0.0E+00	9.6E-02	0.0E+00	3.5E-07	0.0E+00
Surf. (<0.5 ft)	10K510067/VP-6(L)	Th-230	4.61E+00	1.3E-01	5.7E-01	1.9E-06	7.9E-06	2.4E-02	1.6E-01	4.1E-07	2.1E-06	1.5E-02	3.9E-02	1.1E-08	9.1E-08
Surf. (<0.5 ft)	10K510067/VP-6(L)	Th-232	8.90E-01	1.2E-01	4.1E+00	5.1E-05	6.9E-05	2.3E-02	1.3E+00	1.2E-05	1.8E-05	1.5E-02	2.1E-01	1.8E-07	7.5E-07
Surf. (<0.5 ft)	10K510067/VP-6(L)	U-238	7.73E+00	4.4E-01	0.0E+00	4.0E-06	0.0E+00	1.3E-01	0.0E+00	1.1E-06	0.0E+00	2.8E-02	0.0E+00	6.4E-08	0.0E+00
Surf. (<0.5 ft)	10K510067/VP-6(L)	TOTAL		2.6E+00	4.7E+00	8.4E-05	7.7E-05	7.9E-01	1.4E+00	2.1E-05	2.0E-05	1.6E-01	2.5E-01	6.1E-07	8.4E-07
All Depths	10K510067/VP-6(L)	Pb-210	8.23E-02	1.9E-02	0.0E+00	4.5E-08	0.0E+00	2.6E-03	0.0E+00	5.4E-09	0.0E+00	2.5E-03	0.0E+00	2.0E-09	0.0E+00
All Depths	10K510067/VP-6(L)	Ra-226	5.30E-01	1.9E+00	0.0E+00	2.7E-05	0.0E+00	6.1E-01	0.0E+00	7.5E-06	0.0E+00	9.6E-02	0.0E+00	3.5E-07	0.0E+00
All Depths	10K510067/VP-6(L)	Th-230	4.22E+00	1.1E-01	5.2E-01	1.7E-06	7.3E-06	2.2E-02	1.5E-01	3.8E-07	1.9E-06	1.4E-02	3.6E-02	1.0E-08	8.3E-08
All Depths	10K510067/VP-6(L)	Th-232	1.00E+00	1.3E-01	4.6E+00	5.7E-05	7.8E-05	2.6E-02	1.4E+00	1.4E-05	2.1E-05	1.7E-02	2.4E-01	2.1E-07	8.4E-07
All Depths	10K510067/VP-6(L)	U-238	7.63E+00	4.3E-01	0.0E+00	4.0E-06	0.0E+00	1.2E-01	0.0E+00	1.0E-06	0.0E+00	2.8E-02	0.0E+00	6.3E-08	0.0E+00
All Depths	10K510067/VP-6(L)	TOTAL		2.6E+00	5.1E+00	9.0E-05	8.5E-05	7.8E-01	1.6E+00	2.3E-05	2.2E-05	1.6E-01	2.8E-01	6.3E-07	9.3E-07
Sub. (>0.5 ft)	10K520022/VP-3(L)	Ac-227	7.63E-02	1.0E-01	0.0E+00	2.7E-07	0.0E+00	2.5E-02	0.0E+00	7.8E-08	0.0E+00	8.8E-03	0.0E+00	6.8E-09	0.0E+00
Sub. (>0.5 ft)	10K520022/VP-3(L)	Pa-231	1.27E-01	5.6E-02	0.0E+00	2.7E-07	0.0E+00	9.6E-03	0.0E+00	6.5E-08	0.0E+00	6.5E-03	0.0E+00	2.1E-09	0.0E+00
Sub. (>0.5 ft)	10K520022/VP-3(L)	Pb-210	5.73E-01	1.4E-01	0.0E+00	3.2E-07	0.0E+00	1.8E-02	0.0E+00	3.7E-08	0.0E+00	1.7E-02	0.0E+00	1.4E-08	0.0E+00
Sub. (>0.5 ft)	10K520022/VP-3(L)	Ra-226	1.01E+00	3.7E+00	0.0E+00	5.2E-05	0.0E+00	1.2E+00	0.0E+00	1.4E-05	0.0E+00	1.8E-01	0.0E+00	6.7E-07	0.0E+00
Sub. (>0.5 ft)	10K520022/VP-3(L)	Th-230	3.92E+01	1.1E+00	4.9E+00	1.6E-05	6.8E-05	2.1E-01	1.4E+00	3.5E-06	1.7E-05	1.3E-01	3.3E-01	9.3E-08	7.8E-07
Sub. (>0.5 ft)	10K520022/VP-3(L)	Th-232	1.08E+00	1.4E-01	5.0E+00	6.2E-05	8.4E-05	2.8E-02	1.5E+00	1.5E-05	2.2E-05	1.8E-02	2.6E-01	2.2E-07	9.1E-07
Sub. (>0.5 ft)	10K520022/VP-3(L)	U-238	1.02E+01	5.8E-01	0.0E+00	5.3E-06	0.0E+00	1.7E-01	0.0E+00	1.4E-06	0.0E+00	3.7E-02	0.0E+00	8.4E-08	0.0E+00
Sub. (>0.5 ft)	10K520022/VP-3(L)	TOTAL		5.8E+00	9.8E+00	1.4E-04	1.5E-04	1.6E+00	2.9E+00	3.4E-05	4.0E-05	4.0E-01	5.9E-01	1.1E-06	1.7E-06

Attachment 12. Radiological Doses and Risks for each Property (page 13 of 60)

			Exposure Point	RESIDENTIAL				INDUSTRIAL				MAINTENANCE			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<0.5 ft)	10K520022/VP-3(L)	Ac-227	2.35E-01	3.1E-01	0.0E+00	8.2E-07	0.0E+00	7.8E-02	0.0E+00	2.4E-07	0.0E+00	2.7E-02	0.0E+00	2.1E-08	0.0E+00
Surf. (<0.5 ft)	10K520022/VP-3(L)	Pa-231	3.08E-01	1.4E-01	0.0E+00	6.6E-07	0.0E+00	2.3E-02	0.0E+00	1.6E-07	0.0E+00	1.6E-02	0.0E+00	5.1E-09	0.0E+00
Surf. (<0.5 ft)	10K520022/VP-3(L)	Pb-210	8.89E-01	2.1E-01	0.0E+00	4.9E-07	0.0E+00	2.8E-02	0.0E+00	5.8E-08	0.0E+00	2.7E-02	0.0E+00	2.1E-08	0.0E+00
Surf. (<0.5 ft)	10K520022/VP-3(L)	Ra-226	1.14E+00	4.2E+00	0.0E+00	5.9E-05	0.0E+00	1.3E+00	0.0E+00	1.6E-05	0.0E+00	2.1E-01	0.0E+00	7.6E-07	0.0E+00
Surf. (<0.5 ft)	10K520022/VP-3(L)	Th-230	6.18E+01	1.7E+00	7.7E+00	2.6E-05	1.1E-04	3.3E-01	2.2E+00	5.5E-06	2.8E-05	2.1E-01	5.2E-01	1.5E-07	1.2E-06
Surf. (<0.5 ft)	10K520022/VP-3(L)	Th-232	1.09E+00	1.5E-01	5.0E+00	6.2E-05	8.5E-05	2.8E-02	1.6E+00	1.5E-05	2.2E-05	1.8E-02	2.6E-01	2.2E-07	9.2E-07
Surf. (<0.5 ft)	10K520022/VP-3(L)	U-238	8.78E+00	5.0E-01	0.0E+00	4.6E-06	0.0E+00	1.4E-01	0.0E+00	1.2E-06	0.0E+00	3.2E-02	0.0E+00	7.2E-08	0.0E+00
Surf. (<0.5 ft)	10K520022/VP-3(L)	TOTAL		7.1E+00	1.3E+01	1.5E-04	1.9E-04	1.9E+00	3.7E+00	3.8E-05	5.0E-05	5.3E-01	7.8E-01	1.3E-06	2.1E-06
All Depths	10K520022/VP-3(L)	Ac-227	5.74E-02	7.6E-02	0.0E+00	2.0E-07	0.0E+00	1.9E-02	0.0E+00	5.9E-08	0.0E+00	6.6E-03	0.0E+00	5.1E-09	0.0E+00
All Depths	10K520022/VP-3(L)	Pa-231	1.06E-01	4.6E-02	0.0E+00	2.2E-07	0.0E+00	8.0E-03	0.0E+00	5.4E-08	0.0E+00	5.4E-03	0.0E+00	1.8E-09	0.0E+00
All Depths	10K520022/VP-3(L)	Pb-210	5.35E-01	1.3E-01	0.0E+00	2.9E-07	0.0E+00	1.7E-02	0.0E+00	3.5E-08	0.0E+00	1.6E-02	0.0E+00	1.3E-08	0.0E+00
All Depths	10K520022/VP-3(L)	Ra-226	9.80E-01	3.6E+00	0.0E+00	5.1E-05	0.0E+00	1.1E+00	0.0E+00	1.4E-05	0.0E+00	1.8E-01	0.0E+00	6.5E-07	0.0E+00
All Depths	10K520022/VP-3(L)	Th-230	3.65E+01	9.9E-01	4.5E+00	1.5E-05	6.3E-05	1.9E-01	1.3E+00	3.3E-06	1.6E-05	1.2E-01	3.1E-01	8.7E-08	7.2E-07
All Depths	10K520022/VP-3(L)	Th-232	1.03E+00	1.4E-01	4.7E+00	5.9E-05	8.0E-05	2.7E-02	1.5E+00	1.4E-05	2.1E-05	1.7E-02	2.5E-01	2.1E-07	8.7E-07
All Depths	10K520022/VP-3(L)	U-238	9.72E+00	5.5E-01	0.0E+00	5.1E-06	0.0E+00	1.6E-01	0.0E+00	1.3E-06	0.0E+00	3.6E-02	0.0E+00	8.0E-08	0.0E+00
All Depths	10K520022/VP-3(L)	TOTAL		5.5E+00	9.3E+00	1.3E-04	1.4E-04	1.5E+00	2.8E+00	3.3E-05	3.7E-05	3.8E-01	5.6E-01	1.1E-06	1.6E-06
Sub. (>0.5 ft)	10K520033/VP-5(L)	Pb-210	2.58E-02	6.1E-03	0.0E+00	1.4E-08	0.0E+00	8.0E-04	0.0E+00	1.7E-09	0.0E+00	7.9E-04	0.0E+00	6.2E-10	0.0E+00
Sub. (>0.5 ft)	10K520033/VP-5(L)	Ra-226	8.50E-01	3.1E+00	0.0E+00	4.4E-05	0.0E+00	9.8E-01	0.0E+00	1.2E-05	0.0E+00	1.5E-01	0.0E+00	5.7E-07	0.0E+00
Sub. (>0.5 ft)	10K520033/VP-5(L)	Th-230	1.80E-01	4.9E-03	2.2E-02	7.4E-08	3.1E-07	9.6E-04	6.3E-03	1.6E-08	8.0E-08	6.0E-04	1.5E-03	4.3E-10	3.6E-09
Sub. (>0.5 ft)	10K520033/VP-5(L)	Th-232	1.48E+00	2.0E-01	6.8E+00	8.5E-05	1.2E-04	3.8E-02	2.1E+00	2.1E-05	3.0E-05	2.5E-02	3.5E-01	3.0E-07	1.2E-06
Sub. (>0.5 ft)	10K520033/VP-5(L)	U-238	1.04E+01	5.9E-01	0.0E+00	5.4E-06	0.0E+00	1.7E-01	0.0E+00	1.4E-06	0.0E+00	3.8E-02	0.0E+00	8.6E-08	0.0E+00
Sub. (>0.5 ft)	10K520033/VP-5(L)	TOTAL		3.9E+00	6.8E+00	1.3E-04	1.2E-04	1.2E+00	2.1E+00	3.4E-05	3.0E-05	2.2E-01	3.6E-01	9.6E-07	1.3E-06
Surf. (<0.5 ft)	10K520033/VP-5(L)	Pb-210	1.10E-01	2.6E-02	0.0E+00	6.0E-08	0.0E+00	3.4E-03	0.0E+00	7.1E-09	0.0E+00	3.3E-03	0.0E+00	2.6E-09	0.0E+00
Surf. (<0.5 ft)	10K520033/VP-5(L)	Ra-226	6.70E-01	2.4E+00	0.0E+00	3.5E-05	0.0E+00	7.7E-01	0.0E+00	9.4E-06	0.0E+00	1.2E-01	0.0E+00	4.5E-07	0.0E+00
Surf. (<0.5 ft)	10K520033/VP-5(L)	Th-230	6.17E+00	1.7E-01	7.6E-01	2.6E-06	1.1E-05	3.3E-02	2.2E-01	5.5E-07	2.7E-06	2.1E-02	5.2E-02	1.5E-08	1.2E-07
Surf. (<0.5 ft)	10K520033/VP-5(L)	Th-232	8.50E-01	1.1E-01	3.9E+00	4.9E-05	6.6E-05	2.2E-02	1.2E+00	1.2E-05	1.7E-05	1.4E-02	2.0E-01	1.7E-07	7.2E-07
Surf. (<0.5 ft)	10K520033/VP-5(L)	U-238	8.18E+00	4.6E-01	0.0E+00	4.3E-06	0.0E+00	1.3E-01	0.0E+00	1.1E-06	0.0E+00	3.0E-02	0.0E+00	6.7E-08	0.0E+00
Surf. (<0.5 ft)	10K520033/VP-5(L)	TOTAL		3.2E+00	4.7E+00	9.0E-05	7.7E-05	9.6E-01	1.4E+00	2.3E-05	2.0E-05	1.9E-01	2.6E-01	7.1E-07	8.4E-07
All Depths	10K520033/VP-5(L)	Pb-210	3.29E-02	7.8E-03	0.0E+00	1.8E-08	0.0E+00	1.0E-03	0.0E+00	2.1E-09	0.0E+00	1.0E-03	0.0E+00	7.9E-10	0.0E+00
All Depths	10K520033/VP-5(L)	Ra-226	7.70E-01	2.8E+00	0.0E+00	4.0E-05	0.0E+00	8.8E-01	0.0E+00	1.1E-05	0.0E+00	1.4E-01	0.0E+00	5.1E-07	0.0E+00
All Depths	10K520033/VP-5(L)	Th-230	6.90E-01	1.9E-02	8.5E-02	2.9E-07	1.2E-06	3.7E-03	2.4E-02	6.2E-08	3.1E-07	2.3E-03	5.8E-03	1.6E-09	1.4E-08
All Depths	10K520033/VP-5(L)	Th-232	1.33E+00	1.8E-01	6.1E+00	7.6E-05	1.0E-04	3.5E-02	1.9E+00	1.9E-05	2.7E-05	2.2E-02	3.2E-01	2.7E-07	1.1E-06
All Depths	10K520033/VP-5(L)	U-238	9.92E+00	5.6E-01	0.0E+00	5.2E-06	0.0E+00	1.6E-01	0.0E+00	1.4E-06	0.0E+00	3.6E-02	0.0E+00	8.2E-08	0.0E+00
All Depths	10K520033/VP-5(L)	TOTAL		3.6E+00	6.2E+00	1.2E-04	1.0E-04	1.1E+00	1.9E+00	3.1E-05	2.8E-05	2.0E-01	3.2E-01	8.7E-07	1.1E-06
Sub. (>0.5 ft)	10K520044/VP-4(L)	Pb-210	1.82E-01	4.3E-02	0.0E+00	1.0E-07	0.0E+00	5.7E-03	0.0E+00	1.2E-08	0.0E+00	5.5E-03	0.0E+00	4.4E-09	0.0E+00
Sub. (>0.5 ft)	10K520044/VP-4(L)	Ra-226	7.50E-01	2.7E+00	0.0E+00	3.9E-05	0.0E+00	8.6E-01	0.0E+00	1.1E-05	0.0E+00	1.4E-01	0.0E+00	5.0E-07	0.0E+00
Sub. (>0.5 ft)	10K520044/VP-4(L)	Th-230	1.13E+01	3.1E-01	1.4E+00	4.7E-06	2.0E-05	6.0E-02	4.0E-01	1.0E-06	5.1E-06	3.8E-02	9.6E-02	2.7E-08	2.2E-07
Sub. (>0.5 ft)	10K520044/VP-4(L)	Th-232	9.90E-01	1.3E-01	4.6E+00	5.7E-05	7.7E-05	2.6E-02	1.4E+00	1.4E-05	2.0E-05	1.6E-02	2.4E-01	2.0E-07	8.4E-07
Sub. (>0.5 ft)	10K520044/VP-4(L)	U-238	8.36E+00	4.7E-01	0.0E+00	4.4E-06	0.0E+00	1.4E-01	0.0E+00	1.1E-06	0.0E+00	3.1E-02	0.0E+00	6.9E-08	0.0E+00
Sub. (>0.5 ft)	10K520044/VP-4(L)	TOTAL		3.7E+00	6.0E+00	1.0E-04	9.7E-05	1.1E+00	1.8E+00	2.7E-05	2.5E-05	2.3E-01	3.3E-01	8.0E-07	1.1E-06
Surf. (<0.5 ft)	10K520044/VP-4(L)	Ac-227	3.76E-01	5.0E-01	0.0E+00	1.3E-06	0.0E+00	1.2E-01	0.0E+00	3.8E-07	0.0E+00	4.3E-02	0.0E+00	3.4E-08	0.0E+00
Surf. (<0.5 ft)	10K520044/VP-4(L)	Pa-231	4.70E-01	2.1E-01	0.0E+00	1.0E-06	0.0E+00	3.5E-02	0.0E+00	2.4E-07	0.0E+00	2.4E-02	0.0E+00	7.8E-09	0.0E+00
Surf. (<0.5 ft)	10K520044/VP-4(L)	Pb-210	1.17E+00	2.8E-01	0.0E+00	6.5E-07	0.0E+00	3.7E-02	0.0E+00	7.6E-08	0.0E+00	3.6E-02	0.0E+00	2.8E-08	0.0E+00
Surf. (<0.5 ft)	10K520044/VP-4(L)	Ra-226	2.13E+00	7.8E+00	0.0E+00	1.1E-04	0.0E+00	2.4E+00	0.0E+00	3.0E-05	0.0E+00	3.9E-01	0.0E+00	1.4E-06	0.0E+00
Surf. (<0.5 ft)	10K520044/VP-4(L)	Th-230	8.20E+01	2.2E+00	1.0E+01	3.4E-05	1.4E-04	4.4E-01	2.9E+00	7.3E-06	3.7E-05	2.7E-01	6.9E-01	2.0E-07	1.6E-06
Surf. (<0.5 ft)	10K520044/VP-4(L)	Th-232	7.00E-01	9.4E-02	3.2E+00	4.0E-05	5.5E-05	1.8E-02	1.0E+00	9.8E-06	1.4E-05	1.2E-02	1.7E-01	1.4E-07	5.9E-07

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
Surf. (<0.5 ft)	10K520044/VP-4(L)	U-238	8.51E+00	4.8E-01	0.0E+00	4.4E-06	0.0E+00	1.4E-01	0.0E+00	1.2E-06	0.0E+00	3.1E-02	0.0E+00	7.0E-08	0.0E+00
Surf. (<0.5 ft)	10K520044/VP-4(L)	TOTAL		1.2E+01	1.3E+01	1.9E-04	2.0E-04	3.2E+00	3.9E+00	4.9E-05	5.1E-05	8.1E-01	8.6E-01	1.9E-06	2.2E-06
All Depths	10K520044/VP-4(L)	Pb-210	2.98E-01	7.1E-02	0.0E+00	1.6E-07	0.0E+00	9.3E-03	0.0E+00	1.9E-08	0.0E+00	9.1E-03	0.0E+00	7.2E-09	0.0E+00
All Depths	10K520044/VP-4(L)	Ra-226	9.20E-01	3.4E+00	0.0E+00	4.8E-05	0.0E+00	1.1E+00	0.0E+00	1.3E-05	0.0E+00	1.7E-01	0.0E+00	6.1E-07	0.0E+00
All Depths	10K520044/VP-4(L)	Th-230	1.96E+01	5.3E-01	2.4E+00	8.1E-06	3.4E-05	1.0E-01	6.9E-01	1.8E-06	8.8E-06	6.6E-02	1.7E-01	4.7E-08	3.9E-07
All Depths	10K520044/VP-4(L)	Th-232	8.60E-01	1.2E-01	4.0E+00	4.9E-05	6.7E-05	2.2E-02	1.2E+00	1.2E-05	1.8E-05	1.4E-02	2.1E-01	1.8E-07	7.3E-07
All Depths	10K520044/VP-4(L)	U-238	8.20E+00	4.6E-01	0.0E+00	4.3E-06	0.0E+00	1.3E-01	0.0E+00	1.1E-06	0.0E+00	3.0E-02	0.0E+00	6.7E-08	0.0E+00
All Depths	10K520044/VP-4(L)	TOTAL		4.5E+00	6.4E+00	1.1E-04	1.0E-04	1.3E+00	1.9E+00	2.8E-05	2.6E-05	2.9E-01	3.7E-01	9.1E-07	1.1E-06
Sub. (>0.5 ft)	10K520066/VP-37	Pb-210	8.83E-02	2.1E-02	0.0E+00	4.9E-08	0.0E+00	2.8E-03	0.0E+00	5.8E-09	0.0E+00	2.7E-03	0.0E+00	2.1E-09	0.0E+00
Sub. (>0.5 ft)	10K520066/VP-37	Ra-226	6.10E-01	2.2E+00	0.0E+00	3.2E-05	0.0E+00	7.0E-01	0.0E+00	8.6E-06	0.0E+00	1.1E-01	0.0E+00	4.1E-07	0.0E+00
Sub. (>0.5 ft)	10K520066/VP-37	Th-230	4.65E+00	1.3E-01	5.8E-01	1.9E-06	8.0E-06	2.5E-02	1.6E-01	4.2E-07	2.1E-06	1.6E-02	3.9E-02	1.1E-08	9.2E-08
Sub. (>0.5 ft)	10K520066/VP-37	Th-232	1.06E+00	1.4E-01	4.9E+00	6.1E-05	8.3E-05	2.8E-02	1.5E+00	1.5E-05	2.2E-05	1.8E-02	2.5E-01	2.2E-07	9.0E-07
Sub. (>0.5 ft)	10K520066/VP-37	U-238	7.85E+00	4.4E-01	0.0E+00	4.1E-06	0.0E+00	1.3E-01	0.0E+00	1.1E-06	0.0E+00	2.9E-02	0.0E+00	6.5E-08	0.0E+00
Sub. (>0.5 ft)	10K520066/VP-37	TOTAL		3.0E+00	5.5E+00	9.8E-05	9.1E-05	8.8E-01	1.7E+00	2.5E-05	2.4E-05	1.8E-01	2.9E-01	7.0E-07	9.9E-07
Surf. (<0.5 ft)	10K520066/VP-37	Ac-227	7.07E-01	9.4E-01	0.0E+00	2.5E-06	0.0E+00	2.3E-01	0.0E+00	7.2E-07	0.0E+00	8.2E-02	0.0E+00	6.3E-08	0.0E+00
Surf. (<0.5 ft)	10K520066/VP-37	Pa-231	8.48E-01	3.7E-01	0.0E+00	1.8E-06	0.0E+00	6.4E-02	0.0E+00	4.4E-07	0.0E+00	4.4E-02	0.0E+00	1.4E-08	0.0E+00
Surf. (<0.5 ft)	10K520066/VP-37	Pb-210	1.83E+00	4.3E-01	0.0E+00	1.0E-06	0.0E+00	5.7E-02	0.0E+00	1.2E-07	0.0E+00	5.6E-02	0.0E+00	4.4E-08	0.0E+00
Surf. (<0.5 ft)	10K520066/VP-37	Ra-226	8.90E-01	3.2E+00	0.0E+00	4.6E-05	0.0E+00	1.0E+00	0.0E+00	1.3E-05	0.0E+00	1.6E-01	0.0E+00	5.9E-07	0.0E+00
Surf. (<0.5 ft)	10K520066/VP-37	Th-230	1.29E+02	3.5E+00	1.6E+01	5.3E-05	2.2E-04	6.9E-01	4.5E+00	1.2E-05	5.8E-05	4.3E-01	1.1E+00	3.1E-07	2.6E-06
Surf. (<0.5 ft)	10K520066/VP-37	Th-232	1.51E+00	2.0E-01	6.9E+00	8.6E-05	1.2E-04	3.9E-02	2.2E+00	2.1E-05	3.1E-05	2.5E-02	3.6E-01	3.1E-07	1.3E-06
Surf. (<0.5 ft)	10K520066/VP-37	U-234	4.42E-01	5.7E-03	0.0E+00	1.8E-08	0.0E+00	1.1E-03	0.0E+00	2.6E-09	0.0E+00	7.1E-04	0.0E+00	6.2E-10	0.0E+00
Surf. (<0.5 ft)	10K520066/VP-37	U-235	8.12E-03	2.1E-03	0.0E+00	1.6E-08	0.0E+00	6.6E-04	0.0E+00	4.4E-09	0.0E+00	1.1E-04	0.0E+00	2.3E-10	0.0E+00
Surf. (<0.5 ft)	10K520066/VP-37	U-238	1.02E+01	5.8E-01	0.0E+00	5.3E-06	0.0E+00	1.7E-01	0.0E+00	1.4E-06	0.0E+00	3.7E-02	0.0E+00	8.4E-08	0.0E+00
Surf. (<0.5 ft)	10K520066/VP-37	TOTAL		9.3E+00	2.3E+01	2.0E-04	3.4E-04	2.3E+00	6.7E+00	4.8E-05	8.9E-05	8.4E-01	1.5E+00	1.4E-06	3.8E-06
All Depths	10K520066/VP-37	Pb-210	3.43E-01	8.1E-02	0.0E+00	1.9E-07	0.0E+00	1.1E-02	0.0E+00	2.2E-08	0.0E+00	1.0E-02	0.0E+00	8.3E-09	0.0E+00
All Depths	10K520066/VP-37	Ra-226	5.90E-01	2.2E+00	0.0E+00	3.0E-05	0.0E+00	6.8E-01	0.0E+00	8.3E-06	0.0E+00	1.1E-01	0.0E+00	3.9E-07	0.0E+00
All Depths	10K520066/VP-37	Th-230	2.28E+01	6.2E-01	2.8E+00	9.4E-06	3.9E-05	1.2E-01	8.0E-01	2.0E-06	1.0E-05	7.7E-02	1.9E-01	5.4E-08	4.5E-07
All Depths	10K520066/VP-37	Th-232	1.04E+00	1.4E-01	4.8E+00	6.0E-05	8.1E-05	2.7E-02	1.5E+00	1.4E-05	2.1E-05	1.7E-02	2.5E-01	2.1E-07	8.8E-07
All Depths	10K520066/VP-37	U-238	7.88E+00	4.4E-01	0.0E+00	4.1E-06	0.0E+00	1.3E-01	0.0E+00	1.1E-06	0.0E+00	2.9E-02	0.0E+00	6.5E-08	0.0E+00
All Depths	10K520066/VP-37	TOTAL		3.4E+00	7.6E+00	1.0E-04	1.2E-04	9.7E-01	2.3E+00	2.6E-05	3.2E-05	2.4E-01	4.4E-01	7.3E-07	1.3E-06
Surf. (<0.5 ft)	10K520165	Pb-210	1.54E-01	3.6E-02	0.0E+00	8.5E-08	0.0E+00	4.8E-03	0.0E+00	1.0E-08	0.0E+00	4.7E-03	0.0E+00	3.7E-09	0.0E+00
Surf. (<0.5 ft)	10K520165	Ra-226	1.45E+00	5.3E+00	0.0E+00	7.5E-05	0.0E+00	1.7E+00	0.0E+00	2.0E-05	0.0E+00	2.6E-01	0.0E+00	9.7E-07	0.0E+00
Surf. (<0.5 ft)	10K520165	Th-230	9.34E+00	2.5E-01	1.2E+00	3.9E-06	1.6E-05	5.0E-02	3.3E-01	8.3E-07	4.2E-06	3.1E-02	7.9E-02	2.2E-08	1.8E-07
Surf. (<0.5 ft)	10K520165	Th-232	2.59E+00	3.5E-01	1.2E+01	1.5E-04	2.0E-04	6.7E-02	3.7E+00	3.6E-05	5.3E-05	4.3E-02	6.2E-01	5.3E-07	2.2E-06
Surf. (<0.5 ft)	10K520165	U-238	1.06E+01	6.0E-01	0.0E+00	5.5E-06	0.0E+00	1.7E-01	0.0E+00	1.5E-06	0.0E+00	3.9E-02	0.0E+00	8.7E-08	0.0E+00
Surf. (<0.5 ft)	10K520165	TOTAL		6.5E+00	1.3E+01	2.3E-04	2.2E-04	2.0E+00	4.0E+00	5.9E-05	5.7E-05	3.8E-01	7.0E-01	1.6E-06	2.4E-06
All Depths	10K520165	Pb-210	1.54E-01	3.6E-02	0.0E+00	8.5E-08	0.0E+00	4.8E-03	0.0E+00	1.0E-08	0.0E+00	4.7E-03	0.0E+00	3.7E-09	0.0E+00
All Depths	10K520165	Ra-226	1.45E+00	5.3E+00	0.0E+00	7.5E-05	0.0E+00	1.7E+00	0.0E+00	2.0E-05	0.0E+00	2.6E-01	0.0E+00	9.7E-07	0.0E+00
All Depths	10K520165	Th-230	9.34E+00	2.5E-01	1.2E+00	3.9E-06	1.6E-05	5.0E-02	3.3E-01	8.3E-07	4.2E-06	3.1E-02	7.9E-02	2.2E-08	1.8E-07
All Depths	10K520165	Th-232	2.59E+00	3.5E-01	1.2E+01	1.5E-04	2.0E-04	6.7E-02	3.7E+00	3.6E-05	5.3E-05	4.3E-02	6.2E-01	5.3E-07	2.2E-06
All Depths	10K520165	U-238	1.06E+01	6.0E-01	0.0E+00	5.5E-06	0.0E+00	1.7E-01	0.0E+00	1.5E-06	0.0E+00	3.9E-02	0.0E+00	8.7E-08	0.0E+00
All Depths	10K520165	TOTAL		6.5E+00	1.3E+01	2.3E-04	2.2E-04	2.0E+00	4.0E+00	5.9E-05	5.7E-05	3.8E-01	7.0E-01	1.6E-06	2.4E-06
Surf. (<0.5 ft)	10K530076	Pb-210	8.82E-02	2.1E-02	0.0E+00	4.9E-08	0.0E+00	2.7E-03	0.0E+00	5.8E-09	0.0E+00	2.7E-03	0.0E+00	2.1E-09	0.0E+00
Surf. (<0.5 ft)	10K530076	Th-230	4.64E+00	1.3E-01	5.7E-01	1.9E-06	8.0E-06	2.5E-02	1.6E-01	4.1E-07	2.1E-06	1.6E-02	3.9E-02	1.1E-08	9.2E-08
Surf. (<0.5 ft)	10K530076	TOTAL		1.5E-01	5.7E-01	2.0E-06	8.0E-06	2.7E-02	1.6E-01	4.2E-07	2.1E-06	1.8E-02	3.9E-02	1.3E-08	9.2E-08

Attachment 12. Radiological Doses and Risks for each Property (page 15 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
All Depths	10K530076	Pb-210	8.82E-02	2.1E-02	0.0E+00	4.9E-08	0.0E+00	2.7E-03	0.0E+00	5.8E-09	0.0E+00	2.7E-03	0.0E+00	2.1E-09	0.0E+00
All Depths	10K530076	Th-230	4.64E+00	1.3E-01	5.7E-01	1.9E-06	8.0E-06	2.5E-02	1.6E-01	4.1E-07	2.1E-06	1.6E-02	3.9E-02	1.1E-08	9.2E-08
All Depths	10K530076	TOTAL		1.5E-01	5.7E-01	2.0E-06	8.0E-06	2.7E-02	1.6E-01	4.2E-07	2.1E-06	1.8E-02	3.9E-02	1.3E-08	9.2E-08
Sub. (>0.5 ft)	10K530087	Pb-210	8.29E-02	2.0E-02	0.0E+00	4.6E-08	0.0E+00	2.6E-03	0.0E+00	5.4E-09	0.0E+00	2.5E-03	0.0E+00	2.0E-09	0.0E+00
Sub. (>0.5 ft)	10K530087	Ra-226	5.00E-01	1.8E+00	0.0E+00	2.6E-05	0.0E+00	5.7E-01	0.0E+00	7.1E-06	0.0E+00	9.1E-02	0.0E+00	3.3E-07	0.0E+00
Sub. (>0.5 ft)	10K530087	Th-230	4.26E+00	1.2E-01	5.3E-01	1.8E-06	7.3E-06	2.3E-02	1.5E-01	3.8E-07	1.9E-06	1.4E-02	3.6E-02	1.0E-08	8.4E-08
Sub. (>0.5 ft)	10K530087	Th-232	6.50E-01	8.7E-02	3.0E+00	3.7E-05	5.1E-05	1.7E-02	9.3E-01	9.1E-06	1.3E-05	1.1E-02	1.6E-01	1.3E-07	5.5E-07
Sub. (>0.5 ft)	10K530087	U-238	7.71E+00	4.3E-01	0.0E+00	4.0E-06	0.0E+00	1.3E-01	0.0E+00	1.1E-06	0.0E+00	2.8E-02	0.0E+00	6.3E-08	0.0E+00
Sub. (>0.5 ft)	10K530087	TOTAL		2.5E+00	3.5E+00	6.9E-05	5.8E-05	7.4E-01	1.1E+00	1.8E-05	1.5E-05	1.5E-01	1.9E-01	5.4E-07	6.3E-07
Surf. (<0.5 ft)	10K530087	Ac-227	2.30E+00	3.0E+00	0.0E+00	8.0E-06	0.0E+00	7.6E-01	0.0E+00	2.3E-06	0.0E+00	2.6E-01	0.0E+00	2.0E-07	0.0E+00
Surf. (<0.5 ft)	10K530087	Pa-231	2.66E+00	1.2E+00	0.0E+00	5.7E-06	0.0E+00	2.0E-01	0.0E+00	1.4E-06	0.0E+00	1.4E-01	0.0E+00	4.5E-08	0.0E+00
Surf. (<0.5 ft)	10K530087	Pb-210	5.01E+00	1.2E+00	0.0E+00	2.8E-06	0.0E+00	1.6E-01	0.0E+00	3.3E-07	0.0E+00	1.5E-01	0.0E+00	1.2E-07	0.0E+00
Surf. (<0.5 ft)	10K530087	Ra-226	2.47E+00	9.0E+00	0.0E+00	1.3E-04	0.0E+00	2.8E+00	0.0E+00	3.5E-05	0.0E+00	4.5E-01	0.0E+00	1.6E-06	0.0E+00
Surf. (<0.5 ft)	10K530087	Th-230	3.56E+02	9.7E+00	4.4E+01	1.5E-04	6.1E-04	1.9E+00	1.2E+01	3.2E-05	1.6E-04	1.2E+00	3.0E+00	8.5E-07	7.0E-06
Surf. (<0.5 ft)	10K530087	Th-232	1.50E+00	2.0E-01	6.9E+00	8.6E-05	1.2E-04	3.9E-02	2.1E+00	2.1E-05	3.1E-05	2.5E-02	3.6E-01	3.1E-07	1.3E-06
Surf. (<0.5 ft)	10K530087	U-234	3.17E+00	4.1E-02	0.0E+00	1.3E-07	0.0E+00	7.6E-03	0.0E+00	1.9E-08	0.0E+00	5.1E-03	0.0E+00	4.4E-09	0.0E+00
Surf. (<0.5 ft)	10K530087	U-235	1.26E-01	3.3E-02	0.0E+00	2.5E-07	0.0E+00	1.0E-02	0.0E+00	6.9E-08	0.0E+00	1.7E-03	0.0E+00	3.5E-09	0.0E+00
Surf. (<0.5 ft)	10K530087	U-238	1.10E+01	6.2E-01	0.0E+00	5.7E-06	0.0E+00	1.8E-01	0.0E+00	1.5E-06	0.0E+00	4.0E-02	0.0E+00	9.1E-08	0.0E+00
Surf. (<0.5 ft)	10K530087	TOTAL		2.5E+01	5.1E+01	3.8E-04	7.3E-04	6.1E+00	1.5E+01	9.3E-05	1.9E-04	2.3E+00	3.4E+00	3.3E-06	8.3E-06
All Depths	10K530087	Ac-227	1.80E-01	2.4E-01	0.0E+00	6.3E-07	0.0E+00	5.9E-02	0.0E+00	1.8E-07	0.0E+00	2.1E-02	0.0E+00	1.6E-08	0.0E+00
All Depths	10K530087	Pa-231	2.46E-01	1.1E-01	0.0E+00	5.2E-07	0.0E+00	1.9E-02	0.0E+00	1.3E-07	0.0E+00	1.3E-02	0.0E+00	4.1E-09	0.0E+00
All Depths	10K530087	Pb-210	7.80E-01	1.8E-01	0.0E+00	4.3E-07	0.0E+00	2.4E-02	0.0E+00	5.1E-08	0.0E+00	2.4E-02	0.0E+00	1.9E-08	0.0E+00
All Depths	10K530087	Ra-226	1.15E+00	4.2E+00	0.0E+00	5.9E-05	0.0E+00	1.3E+00	0.0E+00	1.6E-05	0.0E+00	2.1E-01	0.0E+00	7.7E-07	0.0E+00
All Depths	10K530087	Th-230	5.40E+01	1.5E+00	6.7E+00	2.2E-05	9.3E-05	2.9E-01	1.9E+00	4.8E-06	2.4E-05	1.8E-01	4.6E-01	1.3E-07	1.1E-06
All Depths	10K530087	Th-232	9.30E-01	1.2E-01	4.3E+00	5.3E-05	7.2E-05	2.4E-02	1.3E+00	1.3E-05	1.9E-05	1.5E-02	2.2E-01	1.9E-07	7.9E-07
All Depths	10K530087	U-238	8.65E+00	4.9E-01	0.0E+00	4.5E-06	0.0E+00	1.4E-01	0.0E+00	1.2E-06	0.0E+00	3.2E-02	0.0E+00	7.1E-08	0.0E+00
All Depths	10K530087	TOTAL		6.8E+00	1.1E+01	1.4E-04	1.7E-04	1.9E+00	3.2E+00	3.6E-05	4.3E-05	4.9E-01	6.8E-01	1.2E-06	1.9E-06
Sub. (>0.5 ft)	10K530098/VP-1(L)	Pb-210	9.91E-02	2.3E-02	0.0E+00	5.5E-08	0.0E+00	3.1E-03	0.0E+00	6.5E-09	0.0E+00	3.0E-03	0.0E+00	2.4E-09	0.0E+00
Sub. (>0.5 ft)	10K530098/VP-1(L)	Ra-226	6.60E-01	2.4E+00	0.0E+00	3.4E-05	0.0E+00	7.6E-01	0.0E+00	9.3E-06	0.0E+00	1.2E-01	0.0E+00	4.4E-07	0.0E+00
Sub. (>0.5 ft)	10K530098/VP-1(L)	Th-230	5.42E+00	1.5E-01	6.7E-01	2.2E-06	9.3E-06	2.9E-02	1.9E-01	4.8E-07	2.4E-06	1.8E-02	4.6E-02	1.3E-08	1.1E-07
Sub. (>0.5 ft)	10K530098/VP-1(L)	Th-232	8.40E-01	1.1E-01	3.9E+00	4.8E-05	6.5E-05	2.2E-02	1.2E+00	1.2E-05	1.7E-05	1.4E-02	2.0E-01	1.7E-07	7.1E-07
Sub. (>0.5 ft)	10K530098/VP-1(L)	U-238	4.62E+00	2.6E-01	0.0E+00	2.4E-06	0.0E+00	7.5E-02	0.0E+00	6.4E-07	0.0E+00	1.7E-02	0.0E+00	3.8E-08	0.0E+00
Sub. (>0.5 ft)	10K530098/VP-1(L)	TOTAL		2.9E+00	4.5E+00	8.7E-05	7.5E-05	8.9E-01	1.4E+00	2.2E-05	2.0E-05	1.7E-01	2.5E-01	6.7E-07	8.2E-07
Surf. (<0.5 ft)	10K530098/VP-1(L)	Ac-227	1.03E+00	1.4E+00	0.0E+00	3.6E-06	0.0E+00	3.4E-01	0.0E+00	1.1E-06	0.0E+00	1.2E-01	0.0E+00	9.2E-08	0.0E+00
Surf. (<0.5 ft)	10K530098/VP-1(L)	Pa-231	1.22E+00	5.3E-01	0.0E+00	2.6E-06	0.0E+00	9.2E-02	0.0E+00	6.2E-07	0.0E+00	6.2E-02	0.0E+00	2.0E-08	0.0E+00
Surf. (<0.5 ft)	10K530098/VP-1(L)	Pb-210	2.48E+00	5.9E-01	0.0E+00	1.4E-06	0.0E+00	7.7E-02	0.0E+00	1.6E-07	0.0E+00	7.6E-02	0.0E+00	6.0E-08	0.0E+00
Surf. (<0.5 ft)	10K530098/VP-1(L)	Ra-226	1.49E+00	5.4E+00	0.0E+00	7.7E-05	0.0E+00	1.7E+00	0.0E+00	2.1E-05	0.0E+00	2.7E-01	0.0E+00	9.9E-07	0.0E+00
Surf. (<0.5 ft)	10K530098/VP-1(L)	Th-230	1.75E+02	4.8E+00	2.2E+01	7.2E-05	3.0E-04	9.3E-01	6.1E+00	1.6E-05	7.8E-05	5.9E-01	1.5E+00	4.2E-07	3.5E-06
Surf. (<0.5 ft)	10K530098/VP-1(L)	Th-232	3.08E+00	4.1E-01	1.4E+01	1.8E-04	2.4E-04	8.0E-02	4.4E+00	4.3E-05	6.3E-05	5.1E-02	7.4E-01	6.3E-07	2.6E-06
Surf. (<0.5 ft)	10K530098/VP-1(L)	U-234	9.94E-01	1.3E-02	0.0E+00	4.0E-08	0.0E+00	2.4E-03	0.0E+00	5.9E-09	0.0E+00	1.6E-03	0.0E+00	1.4E-09	0.0E+00
Surf. (<0.5 ft)	10K530098/VP-1(L)	U-235	3.20E-02	8.4E-03	0.0E+00	6.4E-08	0.0E+00	2.6E-03	0.0E+00	1.8E-08	0.0E+00	4.4E-04	0.0E+00	9.0E-10	0.0E+00
Surf. (<0.5 ft)	10K530098/VP-1(L)	U-238	1.11E+01	6.3E-01	0.0E+00	5.8E-06	0.0E+00	1.8E-01	0.0E+00	1.5E-06	0.0E+00	4.1E-02	0.0E+00	9.2E-08	0.0E+00
Surf. (<0.5 ft)	10K530098/VP-1(L)	TOTAL		1.4E+01	3.6E+01	3.4E-04	5.4E-04	3.4E+00	1.1E+01	8.3E-05	1.4E-04	1.2E+00	2.2E+00	2.3E-06	6.1E-06
All Depths	10K530098/VP-1(L)	Ac-227	2.74E-01	3.6E-01	0.0E+00	9.6E-07	0.0E+00	9.1E-02	0.0E+00	2.8E-07	0.0E+00	3.2E-02	0.0E+00	2.4E-08	0.0E+00
All Depths	10K530098/VP-1(L)	Pa-231	3.54E-01	1.6E-01	0.0E+00	7.5E-07	0.0E+00	2.7E-02	0.0E+00	1.8E-07	0.0E+00	1.8E-02	0.0E+00	5.9E-09	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 16 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
All Depths	10K530098/VP-1(L)	Pb-210	9.69E-01	2.3E-01	0.0E+00	5.3E-07	0.0E+00	3.0E-02	0.0E+00	6.3E-08	0.0E+00	3.0E-02	0.0E+00	2.3E-08	0.0E+00
All Depths	10K530098/VP-1(L)	Ra-226	9.20E-01	3.4E+00	0.0E+00	4.8E-05	0.0E+00	1.1E+00	0.0E+00	1.3E-05	0.0E+00	1.7E-01	0.0E+00	6.1E-07	0.0E+00
All Depths	10K530098/VP-1(L)	Th-230	6.75E+01	1.8E+00	8.4E+00	2.8E-05	1.2E-04	3.6E-01	2.4E+00	6.0E-06	3.0E-05	2.3E-01	5.7E-01	1.6E-07	1.3E-06
All Depths	10K530098/VP-1(L)	Th-232	9.70E-01	1.3E-01	4.5E+00	5.6E-05	7.6E-05	2.5E-02	1.4E+00	1.4E-05	2.0E-05	1.6E-02	2.3E-01	2.0E-07	8.2E-07
All Depths	10K530098/VP-1(L)	U-238	4.62E+00	2.6E-01	0.0E+00	2.4E-06	0.0E+00	7.5E-02	0.0E+00	6.4E-07	0.0E+00	1.7E-02	0.0E+00	3.8E-08	0.0E+00
All Depths	10K530098/VP-1(L)	TOTAL		6.3E+00	1.3E+01	1.4E-04	1.9E-04	1.7E+00	3.8E+00	3.4E-05	5.0E-05	5.1E-01	8.0E-01	1.1E-06	2.2E-06
Sub. (>0.5 ft)	10K540031/VP-41	Pb-210	3.30E-02	7.8E-03	0.0E+00	1.8E-08	0.0E+00	1.0E-03	0.0E+00	2.2E-09	0.0E+00	1.0E-03	0.0E+00	8.0E-10	0.0E+00
Sub. (>0.5 ft)	10K540031/VP-41	Th-230	7.00E-01	1.9E-02	8.7E-02	2.9E-07	1.2E-06	3.7E-03	2.5E-02	6.2E-08	3.1E-07	2.3E-03	5.9E-03	1.7E-09	1.4E-08
Sub. (>0.5 ft)	10K540031/VP-41	TOTAL		2.7E-02	8.7E-02	3.1E-07	1.2E-06	4.7E-03	2.5E-02	6.5E-08	3.1E-07	3.4E-03	5.9E-03	2.5E-09	1.4E-08
All Depths	10K540031/VP-41	Pb-210	3.30E-02	7.8E-03	0.0E+00	1.8E-08	0.0E+00	1.0E-03	0.0E+00	2.2E-09	0.0E+00	1.0E-03	0.0E+00	8.0E-10	0.0E+00
All Depths	10K540031/VP-41	Th-230	7.00E-01	1.9E-02	8.7E-02	2.9E-07	1.2E-06	3.7E-03	2.5E-02	6.2E-08	3.1E-07	2.3E-03	5.9E-03	1.7E-09	1.4E-08
All Depths	10K540031/VP-41	TOTAL		2.7E-02	8.7E-02	3.1E-07	1.2E-06	4.7E-03	2.5E-02	6.5E-08	3.1E-07	3.4E-03	5.9E-03	2.5E-09	1.4E-08
Sub. (>0.5 ft)	10K540075/VP-43	Pb-210	2.14E-02	5.1E-03	0.0E+00	1.2E-08	0.0E+00	6.7E-04	0.0E+00	1.4E-09	0.0E+00	6.5E-04	0.0E+00	5.2E-10	0.0E+00
Sub. (>0.5 ft)	10K540075/VP-43	TOTAL		5.1E-03	0.0E+00	1.2E-08	0.0E+00	6.7E-04	0.0E+00	1.4E-09	0.0E+00	6.5E-04	0.0E+00	5.2E-10	0.0E+00
All Depths	10K540075/VP-43	Pb-210	2.14E-02	5.1E-03	0.0E+00	1.2E-08	0.0E+00	6.7E-04	0.0E+00	1.4E-09	0.0E+00	6.5E-04	0.0E+00	5.2E-10	0.0E+00
All Depths	10K540075/VP-43	TOTAL		5.1E-03	0.0E+00	1.2E-08	0.0E+00	6.7E-04	0.0E+00	1.4E-09	0.0E+00	6.5E-04	0.0E+00	5.2E-10	0.0E+00
Sub. (>0.5 ft)	10K540097/VP-38	Pb-210	4.96E-02	1.2E-02	0.0E+00	2.7E-08	0.0E+00	1.5E-03	0.0E+00	3.2E-09	0.0E+00	1.5E-03	0.0E+00	1.2E-09	0.0E+00
Sub. (>0.5 ft)	10K540097/VP-38	Ra-226	5.50E-01	2.0E+00	0.0E+00	2.8E-05	0.0E+00	6.3E-01	0.0E+00	7.8E-06	0.0E+00	1.0E-01	0.0E+00	3.7E-07	0.0E+00
Sub. (>0.5 ft)	10K540097/VP-38	Th-230	1.88E+00	5.1E-02	2.3E-01	7.8E-07	3.2E-06	1.0E-02	6.6E-02	1.7E-07	8.4E-07	6.3E-03	1.6E-02	4.5E-09	3.7E-08
Sub. (>0.5 ft)	10K540097/VP-38	Th-232	1.10E+00	1.5E-01	5.1E+00	6.3E-05	8.6E-05	2.9E-02	1.6E+00	1.5E-05	2.3E-05	1.8E-02	2.6E-01	2.3E-07	9.3E-07
Sub. (>0.5 ft)	10K540097/VP-38	U-238	9.02E+00	5.1E-01	0.0E+00	4.7E-06	0.0E+00	1.5E-01	0.0E+00	1.2E-06	0.0E+00	3.3E-02	0.0E+00	7.4E-08	0.0E+00
Sub. (>0.5 ft)	10K540097/VP-38	TOTAL		2.7E+00	5.3E+00	9.7E-05	8.9E-05	8.2E-01	1.6E+00	2.4E-05	2.3E-05	1.6E-01	2.8E-01	6.7E-07	9.7E-07
Surf. (<0.5 ft)	10K540097/VP-38	Pb-210	1.89E-01	4.5E-02	0.0E+00	1.0E-07	0.0E+00	5.9E-03	0.0E+00	1.2E-08	0.0E+00	5.8E-03	0.0E+00	4.6E-09	0.0E+00
Surf. (<0.5 ft)	10K540097/VP-38	Ra-226	1.10E+00	4.0E+00	0.0E+00	5.7E-05	0.0E+00	1.3E+00	0.0E+00	1.6E-05	0.0E+00	2.0E-01	0.0E+00	7.3E-07	0.0E+00
Surf. (<0.5 ft)	10K540097/VP-38	Th-230	1.18E+01	3.2E-01	1.5E+00	4.9E-06	2.0E-05	6.3E-02	4.1E-01	1.1E-06	5.3E-06	4.0E-02	1.0E-01	2.8E-08	2.3E-07
Surf. (<0.5 ft)	10K540097/VP-38	Th-232	1.05E+00	1.4E-01	4.8E+00	6.0E-05	8.2E-05	2.7E-02	1.5E+00	1.5E-05	2.2E-05	1.7E-02	2.5E-01	2.2E-07	8.9E-07
Surf. (<0.5 ft)	10K540097/VP-38	U-238	9.42E+00	5.3E-01	0.0E+00	4.9E-06	0.0E+00	1.5E-01	0.0E+00	1.3E-06	0.0E+00	3.5E-02	0.0E+00	7.8E-08	0.0E+00
Surf. (<0.5 ft)	10K540097/VP-38	TOTAL		5.0E+00	6.3E+00	1.3E-04	1.0E-04	1.5E+00	1.9E+00	3.3E-05	2.7E-05	3.0E-01	3.5E-01	1.1E-06	1.1E-06
All Depths	10K540097/VP-38	Pb-210	6.43E-02	1.5E-02	0.0E+00	3.5E-08	0.0E+00	2.0E-03	0.0E+00	4.2E-09	0.0E+00	2.0E-03	0.0E+00	1.5E-09	0.0E+00
All Depths	10K540097/VP-38	Ra-226	6.20E-01	2.3E+00	0.0E+00	3.2E-05	0.0E+00	7.1E-01	0.0E+00	8.7E-06	0.0E+00	1.1E-01	0.0E+00	4.1E-07	0.0E+00
All Depths	10K540097/VP-38	Th-230	2.93E+00	8.0E-02	3.6E-01	1.2E-06	5.0E-06	1.6E-02	1.0E-01	2.6E-07	1.3E-06	9.8E-03	2.5E-02	7.0E-09	5.8E-08
All Depths	10K540097/VP-38	Th-232	1.06E+00	1.4E-01	4.9E+00	6.1E-05	8.3E-05	2.8E-02	1.5E+00	1.5E-05	2.2E-05	1.8E-02	2.5E-01	2.2E-07	9.0E-07
All Depths	10K540097/VP-38	U-238	8.92E+00	5.0E-01	0.0E+00	4.6E-06	0.0E+00	1.5E-01	0.0E+00	1.2E-06	0.0E+00	3.3E-02	0.0E+00	7.3E-08	0.0E+00
All Depths	10K540097/VP-38	TOTAL		3.0E+00	5.2E+00	9.9E-05	8.8E-05	9.0E-01	1.6E+00	2.5E-05	2.3E-05	1.7E-01	2.8E-01	7.1E-07	9.5E-07
Sub. (>0.5 ft)	10K610178/VP-35	Pb-210	3.09E-02	7.3E-03	0.0E+00	1.7E-08	0.0E+00	9.6E-04	0.0E+00	2.0E-09	0.0E+00	9.4E-04	0.0E+00	7.5E-10	0.0E+00
Sub. (>0.5 ft)	10K610178/VP-35	Ra-226	7.30E-01	2.7E+00	0.0E+00	3.8E-05	0.0E+00	8.4E-01	0.0E+00	1.0E-05	0.0E+00	1.3E-01	0.0E+00	4.9E-07	0.0E+00
Sub. (>0.5 ft)	10K610178/VP-35	Th-230	5.50E-01	1.5E-02	6.8E-02	2.3E-07	9.5E-07	2.9E-03	1.9E-02	4.9E-08	2.5E-07	1.8E-03	4.7E-03	1.3E-09	1.1E-08
Sub. (>0.5 ft)	10K610178/VP-35	Th-232	1.61E+00	2.2E-01	7.4E+00	9.2E-05	1.3E-04	4.2E-02	2.3E+00	2.2E-05	3.3E-05	2.7E-02	3.9E-01	3.3E-07	1.4E-06
Sub. (>0.5 ft)	10K610178/VP-35	U-238	1.00E+01	5.7E-01	0.0E+00	5.2E-06	0.0E+00	1.6E-01	0.0E+00	1.4E-06	0.0E+00	3.7E-02	0.0E+00	8.2E-08	0.0E+00
Sub. (>0.5 ft)	10K610178/VP-35	TOTAL		3.5E+00	7.5E+00	1.4E-04	1.3E-04	1.0E+00	2.3E+00	3.4E-05	3.3E-05	2.0E-01	3.9E-01	9.0E-07	1.4E-06
Surf. (<0.5 ft)	10K610178/VP-35	Pb-210	3.25E-02	7.7E-03	0.0E+00	1.8E-08	0.0E+00	1.0E-03	0.0E+00	2.1E-09	0.0E+00	9.9E-04	0.0E+00	7.8E-10	0.0E+00
Surf. (<0.5 ft)	10K610178/VP-35	Ra-226	6.70E-01	2.4E+00	0.0E+00	3.5E-05	0.0E+00	7.7E-01	0.0E+00	9.4E-06	0.0E+00	1.2E-01	0.0E+00	4.5E-07	0.0E+00
Surf. (<0.5 ft)	10K610178/VP-35	Th-230	6.60E-01	1.8E-02	8.2E-02	2.7E-07	1.1E-06	3.5E-03	2.3E-02	5.9E-08	2.9E-07	2.2E-03	5.6E-03	1.6E-09	1.3E-08

Attachment 12. Radiological Doses and Risks for each Property (page 17 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
Surf. (<0.5 ft)	10K610178/VP-35	Th-232	9.90E-01	1.3E-01	4.6E+00	5.7E-05	7.7E-05	2.6E-02	1.4E+00	1.4E-05	2.0E-05	1.6E-02	2.4E-01	2.0E-07	8.4E-07
Surf. (<0.5 ft)	10K610178/VP-35	U-238	8.67E+00	4.9E-01	0.0E+00	4.5E-06	0.0E+00	1.4E-01	0.0E+00	1.2E-06	0.0E+00	3.2E-02	0.0E+00	7.1E-08	0.0E+00
Surf. (<0.5 ft)	10K610178/VP-35	TOTAL		3.1E+00	4.6E+00	9.6E-05	7.8E-05	9.4E-01	1.4E+00	2.4E-05	2.1E-05	1.7E-01	2.4E-01	7.2E-07	8.5E-07
All Depths	10K610178/VP-35	Pb-210	3.18E-02	7.5E-03	0.0E+00	1.7E-08	0.0E+00	9.9E-04	0.0E+00	2.1E-09	0.0E+00	9.7E-04	0.0E+00	7.7E-10	0.0E+00
All Depths	10K610178/VP-35	Ra-226	6.60E-01	2.4E+00	0.0E+00	3.4E-05	0.0E+00	7.6E-01	0.0E+00	9.3E-06	0.0E+00	1.2E-01	0.0E+00	4.4E-07	0.0E+00
All Depths	10K610178/VP-35	Th-230	6.10E-01	1.7E-02	7.6E-02	2.5E-07	1.0E-06	3.2E-03	2.1E-02	5.4E-08	2.7E-07	2.0E-03	5.2E-03	1.5E-09	1.2E-08
All Depths	10K610178/VP-35	Th-232	1.01E+00	1.4E-01	4.6E+00	5.8E-05	7.9E-05	2.6E-02	1.4E+00	1.4E-05	2.1E-05	1.7E-02	2.4E-01	2.1E-07	8.5E-07
All Depths	10K610178/VP-35	U-238	8.72E+00	4.9E-01	0.0E+00	4.5E-06	0.0E+00	1.4E-01	0.0E+00	1.2E-06	0.0E+00	3.2E-02	0.0E+00	7.2E-08	0.0E+00
All Depths	10K610178/VP-35	TOTAL		3.1E+00	4.7E+00	9.7E-05	8.0E-05	9.3E-01	1.5E+00	2.5E-05	2.1E-05	1.7E-01	2.5E-01	7.2E-07	8.7E-07
Sub. (>0.5 ft)	10K610189/VP-36	Pb-210	3.23E-02	7.7E-03	0.0E+00	1.8E-08	0.0E+00	1.0E-03	0.0E+00	2.1E-09	0.0E+00	9.9E-04	0.0E+00	7.8E-10	0.0E+00
Sub. (>0.5 ft)	10K610189/VP-36	Th-230	6.50E-01	1.8E-02	8.0E-02	2.7E-07	1.1E-06	3.5E-03	2.3E-02	5.8E-08	2.9E-07	2.2E-03	5.5E-03	1.5E-09	1.3E-08
Sub. (>0.5 ft)	10K610189/VP-36	TOTAL		2.5E-02	8.0E-02	2.9E-07	1.1E-06	4.5E-03	2.3E-02	6.0E-08	2.9E-07	3.2E-03	5.5E-03	2.3E-09	1.3E-08
All Depths	10K610189/VP-36	Pb-210	3.23E-02	7.7E-03	0.0E+00	1.8E-08	0.0E+00	1.0E-03	0.0E+00	2.1E-09	0.0E+00	9.9E-04	0.0E+00	7.8E-10	0.0E+00
All Depths	10K610189/VP-36	Th-230	6.50E-01	1.8E-02	8.0E-02	2.7E-07	1.1E-06	3.5E-03	2.3E-02	5.8E-08	2.9E-07	2.2E-03	5.5E-03	1.5E-09	1.3E-08
All Depths	10K610189/VP-36	TOTAL		2.5E-02	8.0E-02	2.9E-07	1.1E-06	4.5E-03	2.3E-02	6.0E-08	2.9E-07	3.2E-03	5.5E-03	2.3E-09	1.3E-08
Surf. (<0.5 ft)	10K620412	Pb-210	9.24E-02	2.2E-02	0.0E+00	5.1E-08	0.0E+00	2.9E-03	0.0E+00	6.0E-09	0.0E+00	2.8E-03	0.0E+00	2.2E-09	0.0E+00
Surf. (<0.5 ft)	10K620412	Ra-226	6.50E-01	2.4E+00	0.0E+00	3.4E-05	0.0E+00	7.5E-01	0.0E+00	9.2E-06	0.0E+00	1.2E-01	0.0E+00	4.3E-07	0.0E+00
Surf. (<0.5 ft)	10K620412	Th-230	4.94E+00	1.3E-01	6.1E-01	2.0E-06	8.5E-06	2.6E-02	1.7E-01	4.4E-07	2.2E-06	1.7E-02	4.2E-02	1.2E-08	9.8E-08
Surf. (<0.5 ft)	10K620412	Th-232	1.90E-01	2.5E-02	8.7E-01	1.1E-05	1.5E-05	4.9E-03	2.7E-01	2.6E-06	3.9E-06	3.2E-03	4.6E-02	3.9E-08	1.6E-07
Surf. (<0.5 ft)	10K620412	U-238	1.32E+00	7.4E-02	0.0E+00	6.9E-07	0.0E+00	2.1E-02	0.0E+00	1.8E-07	0.0E+00	4.8E-03	0.0E+00	1.1E-08	0.0E+00
Surf. (<0.5 ft)	10K620412	TOTAL		2.6E+00	1.5E+00	4.7E-05	2.3E-05	8.0E-01	4.5E-01	1.2E-05	6.1E-06	1.5E-01	8.7E-02	5.0E-07	2.6E-07
All Depths	10K620412	Pb-210	9.24E-02	2.2E-02	0.0E+00	5.1E-08	0.0E+00	2.9E-03	0.0E+00	6.0E-09	0.0E+00	2.8E-03	0.0E+00	2.2E-09	0.0E+00
All Depths	10K620412	Ra-226	6.50E-01	2.4E+00	0.0E+00	3.4E-05	0.0E+00	7.5E-01	0.0E+00	9.2E-06	0.0E+00	1.2E-01	0.0E+00	4.3E-07	0.0E+00
All Depths	10K620412	Th-230	4.94E+00	1.3E-01	6.1E-01	2.0E-06	8.5E-06	2.6E-02	1.7E-01	4.4E-07	2.2E-06	1.7E-02	4.2E-02	1.2E-08	9.8E-08
All Depths	10K620412	Th-232	1.90E-01	2.5E-02	8.7E-01	1.1E-05	1.5E-05	4.9E-03	2.7E-01	2.6E-06	3.9E-06	3.2E-03	4.6E-02	3.9E-08	1.6E-07
All Depths	10K620412	U-238	1.32E+00	7.4E-02	0.0E+00	6.9E-07	0.0E+00	2.1E-02	0.0E+00	1.8E-07	0.0E+00	4.8E-03	0.0E+00	1.1E-08	0.0E+00
All Depths	10K620412	TOTAL		2.6E+00	1.5E+00	4.7E-05	2.3E-05	8.0E-01	4.5E-01	1.2E-05	6.1E-06	1.5E-01	8.7E-02	5.0E-07	2.6E-07
Surf. (<0.5 ft)	10K620452	Pb-210	1.12E-02	2.7E-03	0.0E+00	6.2E-09	0.0E+00	3.5E-04	0.0E+00	7.3E-10	0.0E+00	3.4E-04	0.0E+00	2.7E-10	0.0E+00
Surf. (<0.5 ft)	10K620452	TOTAL		2.7E-03	0.0E+00	6.2E-09	0.0E+00	3.5E-04	0.0E+00	7.3E-10	0.0E+00	3.4E-04	0.0E+00	2.7E-10	0.0E+00
All Depths	10K620452	Pb-210	1.12E-02	2.7E-03	0.0E+00	6.2E-09	0.0E+00	3.5E-04	0.0E+00	7.3E-10	0.0E+00	3.4E-04	0.0E+00	2.7E-10	0.0E+00
All Depths	10K620452	TOTAL		2.7E-03	0.0E+00	6.2E-09	0.0E+00	3.5E-04	0.0E+00	7.3E-10	0.0E+00	3.4E-04	0.0E+00	2.7E-10	0.0E+00
Sub. (>0.5 ft)	10K630363/VP-39	Pb-210	3.50E-02	8.3E-03	0.0E+00	1.9E-08	0.0E+00	1.1E-03	0.0E+00	2.3E-09	0.0E+00	1.1E-03	0.0E+00	8.4E-10	0.0E+00
Sub. (>0.5 ft)	10K630363/VP-39	Ra-226	5.80E-01	2.1E+00	0.0E+00	3.0E-05	0.0E+00	6.7E-01	0.0E+00	8.2E-06	0.0E+00	1.1E-01	0.0E+00	3.9E-07	0.0E+00
Sub. (>0.5 ft)	10K630363/VP-39	Th-230	8.40E-01	2.3E-02	1.0E-01	3.5E-07	1.4E-06	4.5E-03	2.9E-02	7.5E-08	3.7E-07	2.8E-03	7.1E-03	2.0E-09	1.7E-08
Sub. (>0.5 ft)	10K630363/VP-39	Th-232	1.03E+00	1.4E-01	4.7E+00	5.9E-05	8.0E-05	2.7E-02	1.5E+00	1.4E-05	2.1E-05	1.7E-02	2.5E-01	2.1E-07	8.7E-07
Sub. (>0.5 ft)	10K630363/VP-39	U-238	9.12E+00	5.1E-01	0.0E+00	4.7E-06	0.0E+00	1.5E-01	0.0E+00	1.3E-06	0.0E+00	3.3E-02	0.0E+00	7.5E-08	0.0E+00
Sub. (>0.5 ft)	10K630363/VP-39	TOTAL		2.8E+00	4.8E+00	9.4E-05	8.2E-05	8.5E-01	1.5E+00	2.4E-05	2.2E-05	1.6E-01	2.5E-01	6.8E-07	8.9E-07
Surf. (<0.5 ft)	10K630363/VP-39	Pb-210	1.72E-01	4.1E-02	0.0E+00	9.5E-08	0.0E+00	5.4E-03	0.0E+00	1.1E-08	0.0E+00	5.3E-03	0.0E+00	4.2E-09	0.0E+00
Surf. (<0.5 ft)	10K630363/VP-39	Ra-226	2.80E-01	1.0E+00	0.0E+00	1.4E-05	0.0E+00	3.2E-01	0.0E+00	3.9E-06	0.0E+00	5.1E-02	0.0E+00	1.9E-07	0.0E+00
Surf. (<0.5 ft)	10K630363/VP-39	Th-230	1.06E+01	2.9E-01	1.3E+00	4.4E-06	1.8E-05	5.6E-02	3.7E-01	9.5E-07	4.7E-06	3.6E-02	9.0E-02	2.5E-08	2.1E-07
Surf. (<0.5 ft)	10K630363/VP-39	Th-232	6.60E-01	8.8E-02	3.0E+00	3.8E-05	5.1E-05	1.7E-02	9.5E-01	9.2E-06	1.4E-05	1.1E-02	1.6E-01	1.4E-07	5.6E-07
Surf. (<0.5 ft)	10K630363/VP-39	U-238	6.71E+00	3.8E-01	0.0E+00	3.5E-06	0.0E+00	1.1E-01	0.0E+00	9.2E-07	0.0E+00	2.5E-02	0.0E+00	5.5E-08	0.0E+00
Surf. (<0.5 ft)	10K630363/VP-39	TOTAL		1.8E+00	4.4E+00	6.0E-05	7.0E-05	5.1E-01	1.3E+00	1.5E-05	1.8E-05	1.3E-01	2.5E-01	4.1E-07	7.7E-07

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
All Depths	10K630363/VP-39	Pb-210	6.22E-02	1.5E-02	0.0E+00	3.4E-08	0.0E+00	1.9E-03	0.0E+00	4.1E-09	0.0E+00	1.9E-03	0.0E+00	1.5E-09	0.0E+00
All Depths	10K630363/VP-39	Ra-226	4.80E-01	1.7E+00	0.0E+00	2.5E-05	0.0E+00	5.5E-01	0.0E+00	6.8E-06	0.0E+00	8.7E-02	0.0E+00	3.2E-07	0.0E+00
All Depths	10K630363/VP-39	Th-230	2.78E+00	7.6E-02	3.4E-01	1.1E-06	4.8E-06	1.5E-02	9.7E-02	2.5E-07	1.2E-06	9.3E-03	2.4E-02	6.6E-09	5.5E-08
All Depths	10K630363/VP-39	Th-232	9.00E-01	1.2E-01	4.1E+00	5.2E-05	7.0E-05	2.3E-02	1.3E+00	1.3E-05	1.8E-05	1.5E-02	2.2E-01	1.8E-07	7.6E-07
All Depths	10K630363/VP-39	U-238	8.37E+00	4.7E-01	0.0E+00	4.4E-06	0.0E+00	1.4E-01	0.0E+00	1.2E-06	0.0E+00	3.1E-02	0.0E+00	6.9E-08	0.0E+00
All Depths	10K630363/VP-39	TOTAL		2.4E+00	4.5E+00	8.2E-05	7.5E-05	7.3E-01	1.4E+00	2.1E-05	2.0E-05	1.4E-01	2.4E-01	5.8E-07	8.2E-07
Sub. (>0.5 ft)	10L220893/VP-1	Pb-210	2.52E-02	6.0E-03	0.0E+00	1.4E-08	0.0E+00	7.9E-04	0.0E+00	1.6E-09	0.0E+00	7.7E-04	0.0E+00	6.1E-10	0.0E+00
Sub. (>0.5 ft)	10L220893/VP-1	Th-230	1.40E-01	3.8E-03	1.7E-02	5.8E-08	2.4E-07	7.4E-04	4.9E-03	1.2E-08	6.2E-08	4.7E-04	1.2E-03	3.3E-10	2.8E-09
Sub. (>0.5 ft)	10L220893/VP-1	TOTAL		9.8E-03	1.7E-02	7.2E-08	2.4E-07	1.5E-03	4.9E-03	1.4E-08	6.2E-08	1.2E-03	1.2E-03	9.4E-10	2.8E-09
All Depths	10L220893/VP-1	Pb-210	2.52E-02	6.0E-03	0.0E+00	1.4E-08	0.0E+00	7.9E-04	0.0E+00	1.6E-09	0.0E+00	7.7E-04	0.0E+00	6.1E-10	0.0E+00
All Depths	10L220893/VP-1	Th-230	1.40E-01	3.8E-03	1.7E-02	5.8E-08	2.4E-07	7.4E-04	4.9E-03	1.2E-08	6.2E-08	4.7E-04	1.2E-03	3.3E-10	2.8E-09
All Depths	10L220893/VP-1	TOTAL		9.8E-03	1.7E-02	7.2E-08	2.4E-07	1.5E-03	4.9E-03	1.4E-08	6.2E-08	1.2E-03	1.2E-03	9.4E-10	2.8E-09
Sub. (>0.5 ft)	10L240093/VP-2	Pb-210	2.86E-02	6.8E-03	0.0E+00	1.6E-08	0.0E+00	8.9E-04	0.0E+00	1.9E-09	0.0E+00	8.7E-04	0.0E+00	6.9E-10	0.0E+00
Sub. (>0.5 ft)	10L240093/VP-2	Th-230	3.80E-01	1.0E-02	4.7E-02	1.6E-07	6.5E-07	2.0E-03	1.3E-02	3.4E-08	1.7E-07	1.3E-03	3.2E-03	9.0E-10	7.5E-09
Sub. (>0.5 ft)	10L240093/VP-2	TOTAL		1.7E-02	4.7E-02	1.7E-07	6.5E-07	2.9E-03	1.3E-02	3.6E-08	1.7E-07	2.1E-03	3.2E-03	1.6E-09	7.5E-09
All Depths	10L240093/VP-2	Pb-210	2.86E-02	6.8E-03	0.0E+00	1.6E-08	0.0E+00	8.9E-04	0.0E+00	1.9E-09	0.0E+00	8.7E-04	0.0E+00	6.9E-10	0.0E+00
All Depths	10L240093/VP-2	Th-230	3.80E-01	1.0E-02	4.7E-02	1.6E-07	6.5E-07	2.0E-03	1.3E-02	3.4E-08	1.7E-07	1.3E-03	3.2E-03	9.0E-10	7.5E-09
All Depths	10L240093/VP-2	TOTAL		1.7E-02	4.7E-02	1.7E-07	6.5E-07	2.9E-03	1.3E-02	3.6E-08	1.7E-07	2.1E-03	3.2E-03	1.6E-09	7.5E-09
Sub. (>0.5 ft)	10L310011/VP-13	Ac-227	1.60E-01	2.1E-01	0.0E+00	5.6E-07	0.0E+00	5.3E-02	0.0E+00	1.6E-07	0.0E+00	1.8E-02	0.0E+00	1.4E-08	0.0E+00
Sub. (>0.5 ft)	10L310011/VP-13	Pa-231	2.23E-01	9.8E-02	0.0E+00	4.7E-07	0.0E+00	1.7E-02	0.0E+00	1.1E-07	0.0E+00	1.1E-02	0.0E+00	3.7E-09	0.0E+00
Sub. (>0.5 ft)	10L310011/VP-13	Pb-210	7.41E-01	1.8E-01	0.0E+00	4.1E-07	0.0E+00	2.3E-02	0.0E+00	4.8E-08	0.0E+00	2.3E-02	0.0E+00	1.8E-08	0.0E+00
Sub. (>0.5 ft)	10L310011/VP-13	Ra-226	1.45E+00	5.3E+00	0.0E+00	7.5E-05	0.0E+00	1.7E+00	0.0E+00	2.0E-05	0.0E+00	2.6E-01	0.0E+00	9.7E-07	0.0E+00
Sub. (>0.5 ft)	10L310011/VP-13	Th-230	5.12E+01	1.4E+00	6.3E+00	2.1E-05	8.8E-05	2.7E-01	1.8E+00	4.6E-06	2.3E-05	1.7E-01	4.3E-01	1.2E-07	1.0E-06
Sub. (>0.5 ft)	10L310011/VP-13	Th-232	1.29E+00	1.7E-01	5.9E+00	7.4E-05	1.0E-04	3.4E-02	1.8E+00	1.8E-05	2.6E-05	2.1E-02	3.1E-01	2.7E-07	1.1E-06
Sub. (>0.5 ft)	10L310011/VP-13	U-238	9.42E+00	5.3E-01	0.0E+00	4.9E-06	0.0E+00	1.5E-01	0.0E+00	1.3E-06	0.0E+00	3.5E-02	0.0E+00	7.8E-08	0.0E+00
Sub. (>0.5 ft)	10L310011/VP-13	TOTAL		7.9E+00	1.2E+01	1.8E-04	1.9E-04	2.2E+00	3.6E+00	4.5E-05	4.9E-05	5.4E-01	7.4E-01	1.5E-06	2.1E-06
Surf. (<0.5 ft)	10L310011/VP-13	Pb-210	2.94E-01	7.0E-02	0.0E+00	1.6E-07	0.0E+00	9.2E-03	0.0E+00	1.9E-08	0.0E+00	9.0E-03	0.0E+00	7.1E-09	0.0E+00
Surf. (<0.5 ft)	10L310011/VP-13	Ra-226	7.50E-01	2.7E+00	0.0E+00	3.9E-05	0.0E+00	8.6E-01	0.0E+00	1.1E-05	0.0E+00	1.4E-01	0.0E+00	5.0E-07	0.0E+00
Surf. (<0.5 ft)	10L310011/VP-13	Th-230	1.93E+01	5.3E-01	2.4E+00	8.0E-06	3.3E-05	1.0E-01	6.8E-01	1.7E-06	8.6E-06	6.5E-02	1.6E-01	4.6E-08	3.8E-07
Surf. (<0.5 ft)	10L310011/VP-13	Th-232	1.90E-01	2.5E-02	8.7E-01	1.1E-05	1.5E-05	4.9E-03	2.7E-01	2.6E-06	3.9E-06	3.2E-03	4.6E-02	3.9E-08	1.6E-07
Surf. (<0.5 ft)	10L310011/VP-13	TOTAL		3.4E+00	3.3E+00	5.8E-05	4.8E-05	9.8E-01	9.5E-01	1.5E-05	1.3E-05	2.1E-01	2.1E-01	5.9E-07	5.4E-07
All Depths	10L310011/VP-13	Ac-227	1.54E-01	2.0E-01	0.0E+00	5.4E-07	0.0E+00	5.1E-02	0.0E+00	1.6E-07	0.0E+00	1.8E-02	0.0E+00	1.4E-08	0.0E+00
All Depths	10L310011/VP-13	Pa-231	2.16E-01	9.5E-02	0.0E+00	4.6E-07	0.0E+00	1.6E-02	0.0E+00	1.1E-07	0.0E+00	1.1E-02	0.0E+00	3.6E-09	0.0E+00
All Depths	10L310011/VP-13	Pb-210	7.28E-01	1.7E-01	0.0E+00	4.0E-07	0.0E+00	2.3E-02	0.0E+00	4.7E-08	0.0E+00	2.2E-02	0.0E+00	1.8E-08	0.0E+00
All Depths	10L310011/VP-13	Ra-226	1.36E+00	5.0E+00	0.0E+00	7.0E-05	0.0E+00	1.6E+00	0.0E+00	1.9E-05	0.0E+00	2.5E-01	0.0E+00	9.1E-07	0.0E+00
All Depths	10L310011/VP-13	Th-230	5.03E+01	1.4E+00	6.2E+00	2.1E-05	8.7E-05	2.7E-01	1.8E+00	4.5E-06	2.2E-05	1.7E-01	4.3E-01	1.2E-07	1.0E-06
All Depths	10L310011/VP-13	Th-232	1.20E+00	1.6E-01	5.5E+00	6.9E-05	9.3E-05	3.1E-02	1.7E+00	1.7E-05	2.5E-05	2.0E-02	2.9E-01	2.5E-07	1.0E-06
All Depths	10L310011/VP-13	U-238	9.82E+00	5.5E-01	0.0E+00	5.1E-06	0.0E+00	1.6E-01	0.0E+00	1.4E-06	0.0E+00	3.6E-02	0.0E+00	8.1E-08	0.0E+00
All Depths	10L310011/VP-13	TOTAL		7.5E+00	1.2E+01	1.7E-04	1.8E-04	2.1E+00	3.5E+00	4.2E-05	4.7E-05	5.2E-01	7.1E-01	1.4E-06	2.0E-06
Sub. (>0.5 ft)	10L330022/VP-8	Pb-210	1.61E-01	3.8E-02	0.0E+00	8.9E-08	0.0E+00	5.0E-03	0.0E+00	1.0E-08	0.0E+00	4.9E-03	0.0E+00	3.9E-09	0.0E+00
Sub. (>0.5 ft)	10L330022/VP-8	Th-230	9.84E+00	2.7E-01	1.2E+00	4.1E-06	1.7E-05	5.2E-02	3.4E-01	8.8E-07	4.4E-06	3.3E-02	8.3E-02	2.3E-08	1.9E-07
Sub. (>0.5 ft)	10L330022/VP-8	TOTAL		3.1E-01	1.2E+00	4.2E-06	1.7E-05	5.7E-02	3.4E-01	8.9E-07	4.4E-06	3.8E-02	8.3E-02	2.7E-08	1.9E-07

Attachment 12. Radiological Doses and Risks for each Property (page 19 of 60)

			Exposure Point	RESIDENTIAL				INDUSTRIAL				MAINTENANCE			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
All Depths	10L330022/VP-8	Pb-210	1.61E-01	3.8E-02	0.0E+00	8.9E-08	0.0E+00	5.0E-03	0.0E+00	1.0E-08	0.0E+00	4.9E-03	0.0E+00	3.9E-09	0.0E+00
All Depths	10L330022/VP-8	Th-230	9.84E+00	2.7E-01	1.2E+00	4.1E-06	1.7E-05	5.2E-02	3.4E-01	8.8E-07	4.4E-06	3.3E-02	8.3E-02	2.3E-08	1.9E-07
All Depths	10L330022/VP-8	TOTAL		3.1E-01	1.2E+00	4.2E-06	1.7E-05	5.7E-02	3.4E-01	8.9E-07	4.4E-06	3.8E-02	8.3E-02	2.7E-08	1.9E-07
Sub. (>0.5 ft)	10L330031/VP-7	Pb-210	1.60E-01	3.8E-02	0.0E+00	8.8E-08	0.0E+00	5.0E-03	0.0E+00	1.0E-08	0.0E+00	4.9E-03	0.0E+00	3.8E-09	0.0E+00
Sub. (>0.5 ft)	10L330031/VP-7	Th-230	9.74E+00	2.6E-01	1.2E+00	4.0E-06	1.7E-05	5.2E-02	3.4E-01	8.7E-07	4.3E-06	3.3E-02	8.2E-02	2.3E-08	1.9E-07
Sub. (>0.5 ft)	10L330031/VP-7	TOTAL		3.0E-01	1.2E+00	4.1E-06	1.7E-05	5.7E-02	3.4E-01	8.8E-07	4.3E-06	3.8E-02	8.2E-02	2.7E-08	1.9E-07
All Depths	10L330031/VP-7	Pb-210	1.60E-01	3.8E-02	0.0E+00	8.8E-08	0.0E+00	5.0E-03	0.0E+00	1.0E-08	0.0E+00	4.9E-03	0.0E+00	3.8E-09	0.0E+00
All Depths	10L330031/VP-7	Th-230	9.74E+00	2.6E-01	1.2E+00	4.0E-06	1.7E-05	5.2E-02	3.4E-01	8.7E-07	4.3E-06	3.3E-02	8.2E-02	2.3E-08	1.9E-07
All Depths	10L330031/VP-7	TOTAL		3.0E-01	1.2E+00	4.1E-06	1.7E-05	5.7E-02	3.4E-01	8.8E-07	4.3E-06	3.8E-02	8.2E-02	2.7E-08	1.9E-07
Sub. (>0.5 ft)	10L330040/VP-6	Pb-210	3.57E-02	8.5E-03	0.0E+00	2.0E-08	0.0E+00	1.1E-03	0.0E+00	2.3E-09	0.0E+00	1.1E-03	0.0E+00	8.6E-10	0.0E+00
Sub. (>0.5 ft)	10L330040/VP-6	Th-230	8.90E-01	2.4E-02	1.1E-01	3.7E-07	1.5E-06	4.7E-03	3.1E-02	7.9E-08	4.0E-07	3.0E-03	7.5E-03	2.1E-09	1.8E-08
Sub. (>0.5 ft)	10L330040/VP-6	TOTAL		3.3E-02	1.1E-01	3.9E-07	1.5E-06	5.8E-03	3.1E-02	8.2E-08	4.0E-07	4.1E-03	7.5E-03	3.0E-09	1.8E-08
All Depths	10L330040/VP-6	Pb-210	3.57E-02	8.5E-03	0.0E+00	2.0E-08	0.0E+00	1.1E-03	0.0E+00	2.3E-09	0.0E+00	1.1E-03	0.0E+00	8.6E-10	0.0E+00
All Depths	10L330040/VP-6	Th-230	8.90E-01	2.4E-02	1.1E-01	3.7E-07	1.5E-06	4.7E-03	3.1E-02	7.9E-08	4.0E-07	3.0E-03	7.5E-03	2.1E-09	1.8E-08
All Depths	10L330040/VP-6	TOTAL		3.3E-02	1.1E-01	3.9E-07	1.5E-06	5.8E-03	3.1E-02	8.2E-08	4.0E-07	4.1E-03	7.5E-03	3.0E-09	1.8E-08
Sub. (>0.5 ft)	10L330073/VP-9	Pb-210	1.68E-01	4.0E-02	0.0E+00	9.3E-08	0.0E+00	5.2E-03	0.0E+00	1.1E-08	0.0E+00	5.1E-03	0.0E+00	4.1E-09	0.0E+00
Sub. (>0.5 ft)	10L330073/VP-9	Th-230	1.03E+01	2.8E-01	1.3E+00	4.3E-06	1.8E-05	5.5E-02	3.6E-01	9.2E-07	4.6E-06	3.5E-02	8.7E-02	2.5E-08	2.0E-07
Sub. (>0.5 ft)	10L330073/VP-9	TOTAL		3.2E-01	1.3E+00	4.4E-06	1.8E-05	6.0E-02	3.6E-01	9.3E-07	4.6E-06	4.0E-02	8.7E-02	2.9E-08	2.0E-07
All Depths	10L330073/VP-9	Pb-210	1.68E-01	4.0E-02	0.0E+00	9.3E-08	0.0E+00	5.2E-03	0.0E+00	1.1E-08	0.0E+00	5.1E-03	0.0E+00	4.1E-09	0.0E+00
All Depths	10L330073/VP-9	Th-230	1.03E+01	2.8E-01	1.3E+00	4.3E-06	1.8E-05	5.5E-02	3.6E-01	9.2E-07	4.6E-06	3.5E-02	8.7E-02	2.5E-08	2.0E-07
All Depths	10L330073/VP-9	TOTAL		3.2E-01	1.3E+00	4.4E-06	1.8E-05	6.0E-02	3.6E-01	9.3E-07	4.6E-06	4.0E-02	8.7E-02	2.9E-08	2.0E-07
Sub. (>0.5 ft)	10L330114/VP-4,5	Pb-210	3.49E-02	8.3E-03	0.0E+00	1.9E-08	0.0E+00	1.1E-03	0.0E+00	2.3E-09	0.0E+00	1.1E-03	0.0E+00	8.4E-10	0.0E+00
Sub. (>0.5 ft)	10L330114/VP-4,5	Th-230	8.30E-01	2.3E-02	1.0E-01	3.4E-07	1.4E-06	4.4E-03	2.9E-02	7.4E-08	3.7E-07	2.8E-03	7.0E-03	2.0E-09	1.6E-08
Sub. (>0.5 ft)	10L330114/VP-4,5	TOTAL		3.1E-02	1.0E-01	3.6E-07	1.4E-06	5.5E-03	2.9E-02	7.6E-08	3.7E-07	3.8E-03	7.0E-03	2.8E-09	1.6E-08
All Depths	10L330114/VP-4,5	Pb-210	3.49E-02	8.3E-03	0.0E+00	1.9E-08	0.0E+00	1.1E-03	0.0E+00	2.3E-09	0.0E+00	1.1E-03	0.0E+00	8.4E-10	0.0E+00
All Depths	10L330114/VP-4,5	Th-230	8.30E-01	2.3E-02	1.0E-01	3.4E-07	1.4E-06	4.4E-03	2.9E-02	7.4E-08	3.7E-07	2.8E-03	7.0E-03	2.0E-09	1.6E-08
All Depths	10L330114/VP-4,5	TOTAL		3.1E-02	1.0E-01	3.6E-07	1.4E-06	5.5E-03	2.9E-02	7.6E-08	3.7E-07	3.8E-03	7.0E-03	2.8E-09	1.6E-08
Sub. (>0.5 ft)	10L330123/VP-3	Pb-210	5.46E-02	1.3E-02	0.0E+00	3.0E-08	0.0E+00	1.7E-03	0.0E+00	3.6E-09	0.0E+00	1.7E-03	0.0E+00	1.3E-09	0.0E+00
Sub. (>0.5 ft)	10L330123/VP-3	Th-230	2.24E+00	6.1E-02	2.8E-01	9.3E-07	3.9E-06	1.2E-02	7.8E-02	2.0E-07	1.0E-06	7.5E-03	1.9E-02	5.3E-09	4.4E-08
Sub. (>0.5 ft)	10L330123/VP-3	TOTAL		7.4E-02	2.8E-01	9.6E-07	3.9E-06	1.4E-02	7.8E-02	2.0E-07	1.0E-06	9.2E-03	1.9E-02	6.6E-09	4.4E-08
All Depths	10L330123/VP-3	Pb-210	5.46E-02	1.3E-02	0.0E+00	3.0E-08	0.0E+00	1.7E-03	0.0E+00	3.6E-09	0.0E+00	1.7E-03	0.0E+00	1.3E-09	0.0E+00
All Depths	10L330123/VP-3	Th-230	2.24E+00	6.1E-02	2.8E-01	9.3E-07	3.9E-06	1.2E-02	7.8E-02	2.0E-07	1.0E-06	7.5E-03	1.9E-02	5.3E-09	4.4E-08
All Depths	10L330123/VP-3	TOTAL		7.4E-02	2.8E-01	9.6E-07	3.9E-06	1.4E-02	7.8E-02	2.0E-07	1.0E-06	9.2E-03	1.9E-02	6.6E-09	4.4E-08
Sub. (>0.5 ft)	10L340041/VP-40A	Pb-210	3.23E-01	7.7E-02	0.0E+00	1.8E-07	0.0E+00	1.0E-02	0.0E+00	2.1E-08	0.0E+00	9.9E-03	0.0E+00	7.8E-09	0.0E+00
Sub. (>0.5 ft)	10L340041/VP-40A	Ra-226	2.13E+00	7.8E+00	0.0E+00	1.1E-04	0.0E+00	2.4E+00	0.0E+00	3.0E-05	0.0E+00	3.9E-01	0.0E+00	1.4E-06	0.0E+00
Sub. (>0.5 ft)	10L340041/VP-40A	Th-230	2.14E+01	5.8E-01	2.7E+00	8.9E-06	3.7E-05	1.1E-01	7.5E-01	1.9E-06	9.6E-06	7.2E-02	1.8E-01	5.1E-08	4.2E-07
Sub. (>0.5 ft)	10L340041/VP-40A	Th-232	7.90E-01	1.1E-01	3.6E+00	4.5E-05	6.2E-05	2.1E-02	1.1E+00	1.1E-05	1.6E-05	1.3E-02	1.9E-01	1.6E-07	6.7E-07
Sub. (>0.5 ft)	10L340041/VP-40A	U-238	8.10E+00	4.6E-01	0.0E+00	4.2E-06	0.0E+00	1.3E-01	0.0E+00	1.1E-06	0.0E+00	3.0E-02	0.0E+00	6.7E-08	0.0E+00
Sub. (>0.5 ft)	10L340041/VP-40A	TOTAL		9.0E+00	6.3E+00	1.7E-04	9.8E-05	2.7E+00	1.9E+00	4.4E-05	2.6E-05	5.1E-01	3.7E-01	1.7E-06	1.1E-06
Surf. (<0.5 ft)	10L340041/VP-40A	Ac-227	1.20E-01	1.6E-01	0.0E+00	4.2E-07	0.0E+00	4.0E-02	0.0E+00	1.2E-07	0.0E+00	1.4E-02	0.0E+00	1.1E-08	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 20 of 60)

			Exposure Point	RESIDENTIAL				INDUSTRIAL				MAINTENANCE			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<0.5 ft)	10L340041/VP-40A	Pb-210	4.69E+00	1.1E+00	0.0E+00	2.6E-06	0.0E+00	1.5E-01	0.0E+00	3.1E-07	0.0E+00	1.4E-01	0.0E+00	1.1E-07	0.0E+00
Surf. (<0.5 ft)	10L340041/VP-40A	Ra-226	1.34E+01	4.9E+01	0.0E+00	6.9E-04	0.0E+00	1.5E+01	0.0E+00	1.9E-04	0.0E+00	2.4E+00	0.0E+00	8.9E-06	0.0E+00
Surf. (<0.5 ft)	10L340041/VP-40A	Th-230	3.33E+02	9.1E+00	4.1E+01	1.4E-04	5.7E-04	1.8E+00	1.2E+01	3.0E-05	1.5E-04	1.1E+00	2.8E+00	7.9E-07	6.6E-06
Surf. (<0.5 ft)	10L340041/VP-40A	Th-232	9.50E-01	1.3E-01	4.4E+00	5.4E-05	7.4E-05	2.5E-02	1.4E+00	1.3E-05	2.0E-05	1.6E-02	2.3E-01	2.0E-07	8.0E-07
Surf. (<0.5 ft)	10L340041/VP-40A	U-234	2.89E+00	3.7E-02	0.0E+00	1.2E-07	0.0E+00	6.9E-03	0.0E+00	1.7E-08	0.0E+00	4.7E-03	0.0E+00	4.1E-09	0.0E+00
Surf. (<0.5 ft)	10L340041/VP-40A	U-235	1.28E-01	3.4E-02	0.0E+00	2.6E-07	0.0E+00	1.0E-02	0.0E+00	7.0E-08	0.0E+00	1.8E-03	0.0E+00	3.6E-09	0.0E+00
Surf. (<0.5 ft)	10L340041/VP-40A	U-238	1.19E+01	6.7E-01	0.0E+00	6.2E-06	0.0E+00	1.9E-01	0.0E+00	1.6E-06	0.0E+00	4.4E-02	0.0E+00	9.8E-08	0.0E+00
Surf. (<0.5 ft)	10L340041/VP-40A	TOTAL		6.0E+01	4.6E+01	8.9E-04	6.5E-04	1.8E+01	1.3E+01	2.3E-04	1.7E-04	3.8E+00	3.0E+00	1.0E-05	7.4E-06
All Depths	10L340041/VP-40A	Ac-227	1.20E-01	1.6E-01	0.0E+00	4.2E-07	0.0E+00	4.0E-02	0.0E+00	1.2E-07	0.0E+00	1.4E-02	0.0E+00	1.1E-08	0.0E+00
All Depths	10L340041/VP-40A	Pb-210	2.53E+00	6.0E-01	0.0E+00	1.4E-06	0.0E+00	7.9E-02	0.0E+00	1.7E-07	0.0E+00	7.7E-02	0.0E+00	6.1E-08	0.0E+00
All Depths	10L340041/VP-40A	Ra-226	6.61E+00	2.4E+01	0.0E+00	3.4E-04	0.0E+00	7.6E+00	0.0E+00	9.3E-05	0.0E+00	1.2E+00	0.0E+00	4.4E-06	0.0E+00
All Depths	10L340041/VP-40A	Th-230	1.79E+02	4.9E+00	2.2E+01	7.4E-05	3.1E-04	9.5E-01	6.3E+00	1.6E-05	8.0E-05	6.0E-01	1.5E+00	4.3E-07	3.5E-06
All Depths	10L340041/VP-40A	Th-232	8.30E-01	1.1E-01	3.8E+00	4.8E-05	6.5E-05	2.2E-02	1.2E+00	1.2E-05	1.7E-05	1.4E-02	2.0E-01	1.7E-07	7.0E-07
All Depths	10L340041/VP-40A	U-234	1.04E+00	1.3E-02	0.0E+00	4.2E-08	0.0E+00	2.5E-03	0.0E+00	6.2E-09	0.0E+00	1.7E-03	0.0E+00	1.5E-09	0.0E+00
All Depths	10L340041/VP-40A	U-235	1.28E-01	3.4E-02	0.0E+00	2.6E-07	0.0E+00	1.0E-02	0.0E+00	7.0E-08	0.0E+00	1.8E-03	0.0E+00	3.6E-09	0.0E+00
All Depths	10L340041/VP-40A	U-238	9.42E+00	5.3E-01	0.0E+00	4.9E-06	0.0E+00	1.5E-01	0.0E+00	1.3E-06	0.0E+00	3.5E-02	0.0E+00	7.8E-08	0.0E+00
All Depths	10L340041/VP-40A	TOTAL		3.0E+01	2.6E+01	4.7E-04	3.7E-04	8.9E+00	7.5E+00	1.2E-04	9.7E-05	1.9E+00	1.7E+00	5.2E-06	4.2E-06
Sub. (>0.5 ft)	10L340142/VP-12	Pb-210	1.16E-01	2.7E-02	0.0E+00	6.4E-08	0.0E+00	3.6E-03	0.0E+00	7.6E-09	0.0E+00	3.5E-03	0.0E+00	2.8E-09	0.0E+00
Sub. (>0.5 ft)	10L340142/VP-12	Ra-226	8.40E-01	3.1E+00	0.0E+00	4.3E-05	0.0E+00	9.7E-01	0.0E+00	1.2E-05	0.0E+00	1.5E-01	0.0E+00	5.6E-07	0.0E+00
Sub. (>0.5 ft)	10L340142/VP-12	Th-230	6.61E+00	1.8E-01	8.2E-01	2.7E-06	1.1E-05	3.5E-02	2.3E-01	5.9E-07	2.9E-06	2.2E-02	5.6E-02	1.6E-08	1.3E-07
Sub. (>0.5 ft)	10L340142/VP-12	Th-232	8.00E-01	1.1E-01	3.7E+00	4.6E-05	6.2E-05	2.1E-02	1.1E+00	1.1E-05	1.6E-05	1.3E-02	1.9E-01	1.6E-07	6.8E-07
Sub. (>0.5 ft)	10L340142/VP-12	U-238	1.02E+01	5.8E-01	0.0E+00	5.3E-06	0.0E+00	1.7E-01	0.0E+00	1.4E-06	0.0E+00	3.7E-02	0.0E+00	8.4E-08	0.0E+00
Sub. (>0.5 ft)	10L340142/VP-12	TOTAL		4.0E+00	4.5E+00	9.7E-05	7.4E-05	1.2E+00	1.4E+00	2.5E-05	1.9E-05	2.3E-01	2.5E-01	8.3E-07	8.1E-07
Surf. (<0.5 ft)	10L340142/VP-12	Ac-227	1.75E+00	2.3E+00	0.0E+00	6.1E-06	0.0E+00	5.8E-01	0.0E+00	1.8E-06	0.0E+00	2.0E-01	0.0E+00	1.6E-07	0.0E+00
Surf. (<0.5 ft)	10L340142/VP-12	Pa-231	2.04E+00	9.0E-01	0.0E+00	4.3E-06	0.0E+00	1.5E-01	0.0E+00	1.0E-06	0.0E+00	1.0E-01	0.0E+00	3.4E-08	0.0E+00
Surf. (<0.5 ft)	10L340142/VP-12	Pb-210	3.92E+00	9.3E-01	0.0E+00	2.2E-06	0.0E+00	1.2E-01	0.0E+00	2.6E-07	0.0E+00	1.2E-01	0.0E+00	9.5E-08	0.0E+00
Surf. (<0.5 ft)	10L340142/VP-12	Ra-226	2.45E+00	8.9E+00	0.0E+00	1.3E-04	0.0E+00	2.8E+00	0.0E+00	3.5E-05	0.0E+00	4.4E-01	0.0E+00	1.6E-06	0.0E+00
Surf. (<0.5 ft)	10L340142/VP-12	Th-230	2.78E+02	7.6E+00	3.4E+01	1.2E-04	4.8E-04	1.5E+00	9.7E+00	2.5E-05	1.2E-04	9.3E-01	2.4E+00	6.6E-07	5.5E-06
Surf. (<0.5 ft)	10L340142/VP-12	Th-232	8.10E-01	1.1E-01	3.7E+00	4.6E-05	6.3E-05	2.1E-02	1.2E+00	1.1E-05	1.7E-05	1.3E-02	1.9E-01	1.7E-07	6.8E-07
Surf. (<0.5 ft)	10L340142/VP-12	U-234	2.23E+00	2.9E-02	0.0E+00	8.9E-08	0.0E+00	5.3E-03	0.0E+00	1.3E-08	0.0E+00	3.6E-03	0.0E+00	3.1E-09	0.0E+00
Surf. (<0.5 ft)	10L340142/VP-12	U-235	8.56E-02	2.2E-02	0.0E+00	1.7E-07	0.0E+00	7.0E-03	0.0E+00	4.7E-08	0.0E+00	1.2E-03	0.0E+00	2.4E-09	0.0E+00
Surf. (<0.5 ft)	10L340142/VP-12	U-238	8.61E+00	4.9E-01	0.0E+00	4.5E-06	0.0E+00	1.4E-01	0.0E+00	1.2E-06	0.0E+00	3.2E-02	0.0E+00	7.1E-08	0.0E+00
Surf. (<0.5 ft)	10L340142/VP-12	TOTAL		2.1E+01	3.8E+01	3.1E-04	5.4E-04	5.3E+00	1.1E+01	7.5E-05	1.4E-04	1.9E+00	2.5E+00	2.8E-06	6.2E-06
All Depths	10L340142/VP-12	Ac-227	9.10E-03	1.2E-02	0.0E+00	3.2E-08	0.0E+00	3.0E-03	0.0E+00	9.3E-09	0.0E+00	1.1E-03	0.0E+00	8.1E-10	0.0E+00
All Depths	10L340142/VP-12	Pa-231	5.04E-02	2.2E-02	0.0E+00	1.1E-07	0.0E+00	3.8E-03	0.0E+00	2.6E-08	0.0E+00	2.6E-03	0.0E+00	8.4E-10	0.0E+00
All Depths	10L340142/VP-12	Pb-210	4.38E-01	1.0E-01	0.0E+00	2.4E-07	0.0E+00	1.4E-02	0.0E+00	2.9E-08	0.0E+00	1.3E-02	0.0E+00	1.1E-08	0.0E+00
All Depths	10L340142/VP-12	Ra-226	9.20E-01	3.4E+00	0.0E+00	4.8E-05	0.0E+00	1.1E+00	0.0E+00	1.3E-05	0.0E+00	1.7E-01	0.0E+00	6.1E-07	0.0E+00
All Depths	10L340142/VP-12	Th-230	2.96E+01	8.1E-01	3.7E+00	1.2E-05	5.1E-05	1.6E-01	1.0E+00	2.6E-06	1.3E-05	9.9E-02	2.5E-01	7.1E-08	5.9E-07
All Depths	10L340142/VP-12	Th-232	7.10E-01	9.5E-02	3.3E+00	4.1E-05	5.5E-05	1.8E-02	1.0E+00	9.9E-06	1.5E-05	1.2E-02	1.7E-01	1.5E-07	6.0E-07
All Depths	10L340142/VP-12	U-238	9.32E+00	5.3E-01	0.0E+00	4.9E-06	0.0E+00	1.5E-01	0.0E+00	1.3E-06	0.0E+00	3.4E-02	0.0E+00	7.7E-08	0.0E+00
All Depths	10L340142/VP-12	TOTAL		4.9E+00	6.9E+00	1.1E-04	1.1E-04	1.4E+00	2.1E+00	2.7E-05	2.8E-05	3.3E-01	4.2E-01	9.2E-07	1.2E-06
Sub. (>0.5 ft)	10L340151/VP-10,11	Pb-210	7.70E-02	1.8E-02	0.0E+00	4.2E-08	0.0E+00	2.4E-03	0.0E+00	5.0E-09	0.0E+00	2.3E-03	0.0E+00	1.9E-09	0.0E+00
Sub. (>0.5 ft)	10L340151/VP-10,11	Th-230	3.84E+00	1.0E-01	4.8E-01	1.6E-06	6.6E-06	2.0E-02	1.3E-01	3.4E-07	1.7E-06	1.3E-02	3.2E-02	9.1E-09	7.6E-08
Sub. (>0.5 ft)	10L340151/VP-10,11	TOTAL		1.2E-01	4.8E-01	1.6E-06	6.6E-06	2.3E-02	1.3E-01	3.5E-07	1.7E-06	1.5E-02	3.2E-02	1.1E-08	7.6E-08
All Depths	10L340151/VP-10,11	Pb-210	7.70E-02	1.8E-02	0.0E+00	4.2E-08	0.0E+00	2.4E-03	0.0E+00	5.0E-09	0.0E+00	2.3E-03	0.0E+00	1.9E-09	0.0E+00
All Depths	10L340151/VP-10,11	Th-230	3.84E+00	1.0E-01	4.8E-01	1.6E-06	6.6E-06	2.0E-02	1.3E-01	3.4E-07	1.7E-06	1.3E-02	3.2E-02	9.1E-09	7.6E-08

Attachment 12. Radiological Doses and Risks for each Property (page 21 of 60)

			Exposure Point	RESIDENTIAL				INDUSTRIAL				MAINTENANCE			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
All Depths	10L340151/VP-10,11	TOTAL		1.2E-01	4.8E-01	1.6E-06	6.6E-06	2.3E-02	1.3E-01	3.5E-07	1.7E-06	1.5E-02	3.2E-02	1.1E-08	7.6E-08
Sub. (>0.5 ft)	11K510035/VP-14	Pb-210	2.94E-02	7.0E-03	0.0E+00	1.6E-08	0.0E+00	9.2E-04	0.0E+00	1.9E-09	0.0E+00	9.0E-04	0.0E+00	7.1E-10	0.0E+00
Sub. (>0.5 ft)	11K510035/VP-14	Th-230	4.40E-01	1.2E-02	5.4E-02	1.8E-07	7.6E-07	2.3E-03	1.5E-02	3.9E-08	2.0E-07	1.5E-03	3.7E-03	1.0E-09	8.7E-09
Sub. (>0.5 ft)	11K510035/VP-14	TOTAL		1.9E-02	5.4E-02	2.0E-07	7.6E-07	3.3E-03	1.5E-02	4.1E-08	2.0E-07	2.4E-03	3.7E-03	1.8E-09	8.7E-09
All Depths	11K510035/VP-14	Pb-210	2.94E-02	7.0E-03	0.0E+00	1.6E-08	0.0E+00	9.2E-04	0.0E+00	1.9E-09	0.0E+00	9.0E-04	0.0E+00	7.1E-10	0.0E+00
All Depths	11K510035/VP-14	Th-230	4.40E-01	1.2E-02	5.4E-02	1.8E-07	7.6E-07	2.3E-03	1.5E-02	3.9E-08	2.0E-07	1.5E-03	3.7E-03	1.0E-09	8.7E-09
All Depths	11K510035/VP-14	TOTAL		1.9E-02	5.4E-02	2.0E-07	7.6E-07	3.3E-03	1.5E-02	4.1E-08	2.0E-07	2.4E-03	3.7E-03	1.8E-09	8.7E-09
Sub. (>0.5 ft)	11K520056/VP-15	Pb-210	3.72E-02	8.8E-03	0.0E+00	2.1E-08	0.0E+00	1.2E-03	0.0E+00	2.4E-09	0.0E+00	1.1E-03	0.0E+00	9.0E-10	0.0E+00
Sub. (>0.5 ft)	11K520056/VP-15	Th-230	1.00E+00	2.7E-02	1.2E-01	4.1E-07	1.7E-06	5.3E-03	3.5E-02	8.9E-08	4.5E-07	3.4E-03	8.5E-03	2.4E-09	2.0E-08
Sub. (>0.5 ft)	11K520056/VP-15	TOTAL		3.6E-02	1.2E-01	4.3E-07	1.7E-06	6.5E-03	3.5E-02	9.2E-08	4.5E-07	4.5E-03	8.5E-03	3.3E-09	2.0E-08
All Depths	11K520056/VP-15	Pb-210	3.72E-02	8.8E-03	0.0E+00	2.1E-08	0.0E+00	1.2E-03	0.0E+00	2.4E-09	0.0E+00	1.1E-03	0.0E+00	9.0E-10	0.0E+00
All Depths	11K520056/VP-15	Th-230	1.00E+00	2.7E-02	1.2E-01	4.1E-07	1.7E-06	5.3E-03	3.5E-02	8.9E-08	4.5E-07	3.4E-03	8.5E-03	2.4E-09	2.0E-08
All Depths	11K520056/VP-15	TOTAL		3.6E-02	1.2E-01	4.3E-07	1.7E-06	6.5E-03	3.5E-02	9.2E-08	4.5E-07	4.5E-03	8.5E-03	3.3E-09	2.0E-08
Surf. (<0.5 ft)	11K630221	Ac-227	8.10E-02	1.1E-01	0.0E+00	2.8E-07	0.0E+00	2.7E-02	0.0E+00	8.3E-08	0.0E+00	9.3E-03	0.0E+00	7.2E-09	0.0E+00
Surf. (<0.5 ft)	11K630221	Pb-210	1.69E-01	4.0E-02	0.0E+00	9.3E-08	0.0E+00	5.3E-03	0.0E+00	1.1E-08	0.0E+00	5.2E-03	0.0E+00	4.1E-09	0.0E+00
Surf. (<0.5 ft)	11K630221	Th-230	1.04E+01	2.8E-01	1.3E+00	4.3E-06	1.8E-05	5.5E-02	3.7E-01	9.3E-07	4.7E-06	3.5E-02	8.8E-02	2.5E-08	2.1E-07
Surf. (<0.5 ft)	11K630221	TOTAL		4.3E-01	1.3E+00	4.7E-06	1.8E-05	8.7E-02	3.7E-01	1.0E-06	4.7E-06	5.0E-02	8.8E-02	3.6E-08	2.1E-07
All Depths	11K630221	Ac-227	8.10E-02	1.1E-01	0.0E+00	2.8E-07	0.0E+00	2.7E-02	0.0E+00	8.3E-08	0.0E+00	9.3E-03	0.0E+00	7.2E-09	0.0E+00
All Depths	11K630221	Pb-210	1.69E-01	4.0E-02	0.0E+00	9.3E-08	0.0E+00	5.3E-03	0.0E+00	1.1E-08	0.0E+00	5.2E-03	0.0E+00	4.1E-09	0.0E+00
All Depths	11K630221	Th-230	1.04E+01	2.8E-01	1.3E+00	4.3E-06	1.8E-05	5.5E-02	3.7E-01	9.3E-07	4.7E-06	3.5E-02	8.8E-02	2.5E-08	2.1E-07
All Depths	11K630221	TOTAL		4.3E-01	1.3E+00	4.7E-06	1.8E-05	8.7E-02	3.7E-01	1.0E-06	4.7E-06	5.0E-02	8.8E-02	3.6E-08	2.1E-07
Sub. (>0.5 ft)	11L520011	Pb-210	3.36E-02	8.0E-03	0.0E+00	1.9E-08	0.0E+00	1.0E-03	0.0E+00	2.2E-09	0.0E+00	1.0E-03	0.0E+00	8.1E-10	0.0E+00
Sub. (>0.5 ft)	11L520011	Ra-226	8.50E-01	3.1E+00	0.0E+00	4.4E-05	0.0E+00	9.8E-01	0.0E+00	1.2E-05	0.0E+00	1.5E-01	0.0E+00	5.7E-07	0.0E+00
Sub. (>0.5 ft)	11L520011	Th-230	7.40E-01	2.0E-02	9.2E-02	3.1E-07	1.3E-06	3.9E-03	2.6E-02	6.6E-08	3.3E-07	2.5E-03	6.3E-03	1.8E-09	1.5E-08
Sub. (>0.5 ft)	11L520011	Th-232	6.90E-01	9.2E-02	3.2E+00	3.9E-05	5.4E-05	1.8E-02	9.9E-01	9.6E-06	1.4E-05	1.1E-02	1.7E-01	1.4E-07	5.8E-07
Sub. (>0.5 ft)	11L520011	U-238	1.84E+01	1.0E+00	0.0E+00	9.6E-06	0.0E+00	3.0E-01	0.0E+00	2.5E-06	0.0E+00	6.8E-02	0.0E+00	1.5E-07	0.0E+00
Sub. (>0.5 ft)	11L520011	TOTAL		4.3E+00	3.3E+00	9.3E-05	5.5E-05	1.3E+00	1.0E+00	2.4E-05	1.4E-05	2.4E-01	1.7E-01	8.6E-07	6.0E-07
Surf. (<0.5 ft)	11L520011	Pb-210	4.48E-02	1.1E-02	0.0E+00	2.5E-08	0.0E+00	1.4E-03	0.0E+00	2.9E-09	0.0E+00	1.4E-03	0.0E+00	1.1E-09	0.0E+00
Surf. (<0.5 ft)	11L520011	Th-230	1.54E+00	4.2E-02	1.9E-01	6.4E-07	2.7E-06	8.2E-03	5.4E-02	1.4E-07	6.9E-07	5.2E-03	1.3E-02	3.7E-09	3.0E-08
Surf. (<0.5 ft)	11L520011	TOTAL		5.2E-02	1.9E-01	6.6E-07	2.7E-06	9.6E-03	5.4E-02	1.4E-07	6.9E-07	6.5E-03	1.3E-02	4.7E-09	3.0E-08
All Depths	11L520011	Pb-210	3.63E-02	8.6E-03	0.0E+00	2.0E-08	0.0E+00	1.1E-03	0.0E+00	2.4E-09	0.0E+00	1.1E-03	0.0E+00	8.7E-10	0.0E+00
All Depths	11L520011	Ra-226	8.50E-01	3.1E+00	0.0E+00	4.4E-05	0.0E+00	9.8E-01	0.0E+00	1.2E-05	0.0E+00	1.5E-01	0.0E+00	5.7E-07	0.0E+00
All Depths	11L520011	Th-230	9.30E-01	2.5E-02	1.2E-01	3.8E-07	1.6E-06	4.9E-03	3.3E-02	8.3E-08	4.1E-07	3.1E-03	7.9E-03	2.2E-09	1.8E-08
All Depths	11L520011	Th-232	6.90E-01	9.2E-02	3.2E+00	3.9E-05	5.4E-05	1.8E-02	9.9E-01	9.6E-06	1.4E-05	1.1E-02	1.7E-01	1.4E-07	5.8E-07
All Depths	11L520011	U-238	1.84E+01	1.0E+00	0.0E+00	9.6E-06	0.0E+00	3.0E-01	0.0E+00	2.5E-06	0.0E+00	6.8E-02	0.0E+00	1.5E-07	0.0E+00
All Depths	11L520011	TOTAL		4.3E+00	3.3E+00	9.3E-05	5.5E-05	1.3E+00	1.0E+00	2.4E-05	1.5E-05	2.4E-01	1.7E-01	8.6E-07	6.0E-07
Surf. (<0.5 ft)	CWC	Ac-227	1.73E+00									2.0E-01	0.0E+00	1.5E-07	0.0E+00
Surf. (<0.5 ft)	CWC	Pa-231	2.09E+00									1.1E-01	0.0E+00	3.5E-08	0.0E+00
Surf. (<0.5 ft)	CWC	Pb-210	4.22E+00									1.3E-01	0.0E+00	1.0E-07	0.0E+00
Surf. (<0.5 ft)	CWC	Ra-226	7.10E-01									1.3E-01	0.0E+00	4.7E-07	0.0E+00
Surf. (<0.5 ft)	CWC	Th-228	7.90E-01									1.3E-01	0.0E+00	2.0E-07	0.0E+00
Surf. (<0.5 ft)	CWC	Th-230	1.31E+00									4.4E-03	1.1E-02	3.1E-09	2.6E-08

Attachment 12. Radiological Doses and Risks for each Property (page 22 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
Surf. (<0.5 ft)	CWC	Th-232	8.60E-01									1.4E-02	2.1E-01	1.8E-07	7.3E-07
Surf. (<0.5 ft)	CWC	U-234	4.56E+00									7.3E-03	0.0E+00	6.4E-09	0.0E+00
Surf. (<0.5 ft)	CWC	U-235	2.02E-01									2.8E-03	0.0E+00	5.7E-09	0.0E+00
Surf. (<0.5 ft)	CWC	U-238	4.51E+00									1.7E-02	0.0E+00	3.7E-08	0.0E+00
Surf. (<0.5 ft)	CWC	TOTAL										7.4E-01	2.2E-01	1.2E-06	7.5E-07
All Depths	CWC	Ac-227	1.73E+00									2.0E-01	0.0E+00	1.5E-07	0.0E+00
All Depths	CWC	Pa-231	2.09E+00									1.1E-01	0.0E+00	3.5E-08	0.0E+00
All Depths	CWC	Pb-210	4.22E+00									1.3E-01	0.0E+00	1.0E-07	0.0E+00
All Depths	CWC	Ra-226	7.10E-01									1.3E-01	0.0E+00	4.7E-07	0.0E+00
All Depths	CWC	Th-228	7.90E-01									1.3E-01	0.0E+00	2.0E-07	0.0E+00
All Depths	CWC	Th-230	1.31E+00									4.4E-03	1.1E-02	3.1E-09	2.6E-08
All Depths	CWC	Th-232	8.60E-01									1.4E-02	2.1E-01	1.8E-07	7.3E-07
All Depths	CWC	U-234	4.56E+00									7.3E-03	0.0E+00	6.4E-09	0.0E+00
All Depths	CWC	U-235	2.02E-01									2.8E-03	0.0E+00	5.7E-09	0.0E+00
All Depths	CWC	U-238	4.51E+00									1.7E-02	0.0E+00	3.7E-08	0.0E+00
All Depths	CWC	TOTAL										7.4E-01	2.2E-01	1.2E-06	7.5E-07
All Depths	Futura	Ac-227	5.04E+01	6.7E+01	0.0E+00	1.8E-04	0.0E+00	1.7E+01	0.0E+00	5.1E-05	0.0E+00	5.8E+00	0.0E+00	4.5E-06	0.0E+00
All Depths	Futura	Pa-231	5.96E+01	2.6E+01	0.0E+00	1.3E-04	0.0E+00	4.5E+00	0.0E+00	3.1E-05	0.0E+00	3.1E+00	0.0E+00	1.0E-06	0.0E+00
All Depths	Futura	Pb-210	1.10E+02	2.6E+01	0.0E+00	6.1E-05	0.0E+00	3.4E+00	0.0E+00	7.2E-06	0.0E+00	3.4E+00	0.0E+00	2.7E-06	0.0E+00
All Depths	Futura	Ra-226	4.50E+01	1.6E+02	0.0E+00	2.3E-03	0.0E+00	5.2E+01	0.0E+00	6.3E-04	0.0E+00	8.1E+00	0.0E+00	3.0E-05	0.0E+00
All Depths	Futura	Th-228	1.15E+00	3.8E+00	0.0E+00	7.3E-06	0.0E+00	1.2E+00	0.0E+00	2.2E-06	0.0E+00	1.9E-01	0.0E+00	2.8E-07	0.0E+00
All Depths	Futura	Th-230	1.00E+02	2.7E+00	1.2E+01	4.1E-05	1.7E-04	5.3E-01	3.5E+00	9.0E-06	4.5E-05	3.4E-01	8.5E-01	2.4E-07	2.0E-06
All Depths	Futura	Th-232	1.22E+00	1.6E-01	5.6E+00	7.0E-05	9.5E-05	3.2E-02	1.7E+00	1.7E-05	2.5E-05	2.0E-02	2.9E-01	2.5E-07	1.0E-06
All Depths	Futura	U-234	5.31E+01	6.9E-01	0.0E+00	2.1E-06	0.0E+00	1.3E-01	0.0E+00	3.2E-07	0.0E+00	8.5E-02	0.0E+00	7.5E-08	0.0E+00
All Depths	Futura	U-235	2.43E+00	6.4E-01	0.0E+00	4.8E-06	0.0E+00	2.0E-01	0.0E+00	1.3E-06	0.0E+00	3.3E-02	0.0E+00	6.8E-08	0.0E+00
All Depths	Futura	U-238	5.30E+01	3.0E+00	0.0E+00	2.8E-05	0.0E+00	8.6E-01	0.0E+00	7.3E-06	0.0E+00	1.9E-01	0.0E+00	4.4E-07	0.0E+00
All Depths	Futura	TOTAL		2.9E+02	1.8E+01	2.8E-03	2.7E-04	7.9E+01	5.3E+00	7.6E-04	7.0E-05	2.1E+01	1.1E+00	4.0E-05	3.0E-06
All Depths	HISS	Ac-227	1.47E+00	1.9E+00	0.0E+00	5.1E-06	0.0E+00	4.9E-01	0.0E+00	1.5E-06	0.0E+00	1.7E-01	0.0E+00	1.3E-07	0.0E+00
All Depths	HISS	Pa-231	1.48E+00	6.5E-01	0.0E+00	3.1E-06	0.0E+00	1.1E-01	0.0E+00	7.6E-07	0.0E+00	7.6E-02	0.0E+00	2.5E-08	0.0E+00
All Depths	HISS	Pb-210	2.30E+01	5.5E+00	0.0E+00	1.3E-05	0.0E+00	7.2E-01	0.0E+00	1.5E-06	0.0E+00	7.0E-01	0.0E+00	5.6E-07	0.0E+00
All Depths	HISS	Ra-226	8.55E+00	3.1E+01	0.0E+00	4.4E-04	0.0E+00	9.8E+00	0.0E+00	1.2E-04	0.0E+00	1.5E+00	0.0E+00	5.7E-06	0.0E+00
All Depths	HISS	Ra-228	9.00E-03	1.8E-02	0.0E+00	1.9E-07	0.0E+00	5.6E-03	0.0E+00	5.9E-08	0.0E+00	9.0E-04	0.0E+00	4.6E-09	0.0E+00
All Depths	HISS	Th-230	5.02E+01	1.4E+00	6.2E+00	2.1E-05	8.6E-05	2.7E-01	1.8E+00	4.5E-06	2.2E-05	1.7E-01	4.3E-01	1.2E-07	9.9E-07
All Depths	HISS	Th-232	6.80E-01	9.1E-02	3.1E+00	3.9E-05	5.3E-05	1.8E-02	9.7E-01	9.5E-06	1.4E-05	1.1E-02	1.6E-01	1.4E-07	5.7E-07
All Depths	HISS	U-234	1.60E+01	2.1E-01	0.0E+00	6.4E-07	0.0E+00	3.8E-02	0.0E+00	9.5E-08	0.0E+00	2.6E-02	0.0E+00	2.2E-08	0.0E+00
All Depths	HISS	U-235	1.53E+00	4.0E-01	0.0E+00	3.0E-06	0.0E+00	1.2E-01	0.0E+00	8.4E-07	0.0E+00	2.1E-02	0.0E+00	4.3E-08	0.0E+00
All Depths	HISS	U-238	1.59E+01	9.0E-01	0.0E+00	8.3E-06	0.0E+00	2.6E-01	0.0E+00	2.2E-06	0.0E+00	5.8E-02	0.0E+00	1.3E-07	0.0E+00
All Depths	HISS	TOTAL		4.2E+01	9.3E+00	5.3E-04	1.4E-04	1.2E+01	2.7E+00	1.4E-04	3.6E-05	2.8E+00	5.9E-01	6.9E-06	1.6E-06
Sub. (>0.5 ft)	IA-1	Ac-227	5.76E-01	7.6E-01	0.0E+00	2.0E-06	0.0E+00	1.9E-01	0.0E+00	5.9E-07	0.0E+00	6.6E-02	0.0E+00	5.1E-08	0.0E+00
Sub. (>0.5 ft)	IA-1	Pa-231	1.13E+00	4.9E-01	0.0E+00	2.4E-06	0.0E+00	8.5E-02	0.0E+00	5.8E-07	0.0E+00	5.8E-02	0.0E+00	1.9E-08	0.0E+00
Sub. (>0.5 ft)	IA-1	Pb-210	3.60E+02	8.5E+01	0.0E+00	2.0E-04	0.0E+00	1.1E+01	0.0E+00	2.4E-05	0.0E+00	1.1E+01	0.0E+00	8.7E-06	0.0E+00
Sub. (>0.5 ft)	IA-1	Ra-226	2.11E+02	7.7E+02	0.0E+00	1.1E-02	0.0E+00	2.4E+02	0.0E+00	3.0E-03	0.0E+00	3.8E+01	0.0E+00	1.4E-04	0.0E+00
Sub. (>0.5 ft)	IA-1	Th-228	2.40E-01	7.9E-01	0.0E+00	1.5E-06	0.0E+00	2.5E-01	0.0E+00	4.5E-07	0.0E+00	3.9E-02	0.0E+00	5.9E-08	0.0E+00
Sub. (>0.5 ft)	IA-1	Th-230	2.60E+01	7.1E-01	3.2E+00	1.1E-05	4.5E-05	1.4E-01	9.1E-01	2.3E-06	1.2E-05	8.7E-02	2.2E-01	6.2E-08	5.1E-07
Sub. (>0.5 ft)	IA-1	Th-232	5.37E+00	7.2E-01	2.5E+01	3.1E-04	4.2E-04	1.4E-01	7.7E+00	7.5E-05	1.1E-04	8.9E-02	1.3E+00	1.1E-06	4.5E-06
Sub. (>0.5 ft)	IA-1	U-234	1.09E+02	1.4E+00	0.0E+00	4.3E-06	0.0E+00	2.6E-01	0.0E+00	6.5E-07	0.0E+00	1.8E-01	0.0E+00	1.5E-07	0.0E+00
Sub. (>0.5 ft)	IA-1	U-235	9.32E-02	2.4E-02	0.0E+00	1.9E-07	0.0E+00	7.6E-03	0.0E+00	5.1E-08	0.0E+00	1.3E-03	0.0E+00	2.6E-09	0.0E+00
Sub. (>0.5 ft)	IA-1	U-238	1.09E+02	6.1E+00	0.0E+00	5.7E-05	0.0E+00	1.8E+00	0.0E+00	1.5E-05	0.0E+00	4.0E-01	0.0E+00	9.0E-07	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 23 of 60)

			Exposure Point	RESIDENTIAL				INDUSTRIAL				MAINTENANCE			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Sub. (>0.5 ft)	IA-1	TOTAL		8.7E+02	2.8E+01	1.1E-02	4.6E-04	2.6E+02	8.6E+00	3.1E-03	1.2E-04	5.0E+01	1.5E+00	1.5E-04	5.0E-06
Surf. (<5 ft)	IA-1	Ac-227	5.38E+02	7.1E+02	0.0E+00	1.9E-03	0.0E+00	1.8E+02	0.0E+00	5.5E-04	0.0E+00	6.2E+01	0.0E+00	4.8E-05	0.0E+00
Surf. (<5 ft)	IA-1	Pa-231	5.85E+02	2.6E+02	0.0E+00	1.2E-03	0.0E+00	4.4E+01	0.0E+00	3.0E-04	0.0E+00	3.0E+01	0.0E+00	9.8E-06	0.0E+00
Surf. (<5 ft)	IA-1	Pb-210	9.95E+02	2.4E+02	0.0E+00	5.5E-04	0.0E+00	3.1E+01	0.0E+00	6.5E-05	0.0E+00	3.0E+01	0.0E+00	2.4E-05	0.0E+00
Surf. (<5 ft)	IA-1	Ra-226	5.84E+02	2.1E+03	0.0E+00	3.0E-02	0.0E+00	6.7E+02	0.0E+00	8.2E-03	0.0E+00	1.1E+02	0.0E+00	3.9E-04	0.0E+00
Surf. (<5 ft)	IA-1	Ra-228	3.36E+00	6.6E+00	0.0E+00	7.0E-05	0.0E+00	2.1E+00	0.0E+00	2.2E-05	0.0E+00	3.4E-01	0.0E+00	1.7E-06	0.0E+00
Surf. (<5 ft)	IA-1	Th-228	1.20E+01	3.9E+01	0.0E+00	7.6E-05	0.0E+00	1.2E+01	0.0E+00	2.3E-05	0.0E+00	2.0E+00	0.0E+00	3.0E-06	0.0E+00
Surf. (<5 ft)	IA-1	Th-230	9.26E+01	2.5E+00	1.1E+01	3.8E-05	1.6E-04	4.9E-01	3.2E+00	8.3E-06	4.1E-05	3.1E-01	7.8E-01	2.2E-07	1.8E-06
Surf. (<5 ft)	IA-1	Th-232	1.44E+01	1.9E+00	6.6E+01	8.2E-04	1.1E-03	3.7E-01	2.1E+01	2.0E-04	3.0E-04	2.4E-01	3.5E+00	3.0E-06	1.2E-05
Surf. (<5 ft)	IA-1	U-234	2.86E+02	3.7E+00	0.0E+00	1.1E-05	0.0E+00	6.8E-01	0.0E+00	1.7E-06	0.0E+00	4.6E-01	0.0E+00	4.0E-07	0.0E+00
Surf. (<5 ft)	IA-1	U-235	1.31E+01	3.4E+00	0.0E+00	2.6E-05	0.0E+00	1.1E+00	0.0E+00	7.2E-06	0.0E+00	1.8E-01	0.0E+00	3.7E-07	0.0E+00
Surf. (<5 ft)	IA-1	U-238	2.86E+02	1.6E+01	0.0E+00	1.5E-04	0.0E+00	4.7E+00	0.0E+00	3.9E-05	0.0E+00	1.0E+00	0.0E+00	2.4E-06	0.0E+00
Surf. (<5 ft)	IA-1	TOTAL		3.4E+03	7.8E+01	3.5E-02	1.3E-03	9.5E+02	2.4E+01	9.5E-03	3.4E-04	2.3E+02	4.2E+00	4.8E-04	1.4E-05
Sub. (>0.5 ft)	IA-10	Ac-227	3.80E+00	5.0E+00	0.0E+00	1.3E-05	0.0E+00	1.3E+00	0.0E+00	3.9E-06	0.0E+00	4.4E-01	0.0E+00	3.4E-07	0.0E+00
Sub. (>0.5 ft)	IA-10	Pa-231	4.16E+00	1.8E+00	0.0E+00	8.8E-06	0.0E+00	3.1E-01	0.0E+00	2.1E-06	0.0E+00	2.1E-01	0.0E+00	7.0E-08	0.0E+00
Sub. (>0.5 ft)	IA-10	Pb-210	7.41E+00	1.8E+00	0.0E+00	4.1E-06	0.0E+00	2.3E-01	0.0E+00	4.8E-07	0.0E+00	2.3E-01	0.0E+00	1.8E-07	0.0E+00
Sub. (>0.5 ft)	IA-10	Ra-226	3.31E+00	1.2E+01	0.0E+00	1.7E-04	0.0E+00	3.8E+00	0.0E+00	4.7E-05	0.0E+00	6.0E-01	0.0E+00	2.2E-06	0.0E+00
Sub. (>0.5 ft)	IA-10	Th-228	5.54E-01	1.8E+00	0.0E+00	3.5E-06	0.0E+00	5.8E-01	0.0E+00	1.0E-06	0.0E+00	9.0E-02	0.0E+00	1.4E-07	0.0E+00
Sub. (>0.5 ft)	IA-10	Th-230	6.17E+00	1.7E-01	7.6E-01	2.6E-06	1.1E-05	3.3E-02	2.2E-01	5.5E-07	2.7E-06	2.1E-02	5.2E-02	1.5E-08	1.2E-07
Sub. (>0.5 ft)	IA-10	Th-232	9.30E-01	1.2E-01	4.3E+00	5.3E-05	7.2E-05	2.4E-02	1.3E+00	1.3E-05	1.9E-05	1.5E-02	2.2E-01	1.9E-07	7.9E-07
Sub. (>0.5 ft)	IA-10	U-234	9.77E+00	1.3E-01	0.0E+00	3.9E-07	0.0E+00	2.3E-02	0.0E+00	5.8E-08	0.0E+00	1.6E-02	0.0E+00	1.4E-08	0.0E+00
Sub. (>0.5 ft)	IA-10	U-235	4.41E-01	1.2E-01	0.0E+00	8.8E-07	0.0E+00	3.6E-02	0.0E+00	2.4E-07	0.0E+00	6.0E-03	0.0E+00	1.2E-08	0.0E+00
Sub. (>0.5 ft)	IA-10	U-238	9.72E+00	5.5E-01	0.0E+00	5.1E-06	0.0E+00	1.6E-01	0.0E+00	1.3E-06	0.0E+00	3.6E-02	0.0E+00	8.0E-08	0.0E+00
Sub. (>0.5 ft)	IA-10	TOTAL		2.4E+01	5.0E+00	2.6E-04	8.3E-05	6.5E+00	1.5E+00	6.9E-05	2.2E-05	1.7E+00	2.8E-01	3.2E-06	9.1E-07
Surf. (<0.5 ft)	IA-10	Ac-227	8.00E-03	1.1E-02	0.0E+00	2.8E-08	0.0E+00	2.6E-03	0.0E+00	8.2E-09	0.0E+00	9.2E-04	0.0E+00	7.1E-10	0.0E+00
Surf. (<0.5 ft)	IA-10	Pa-231	1.10E-01	4.8E-02	0.0E+00	2.3E-07	0.0E+00	8.3E-03	0.0E+00	5.6E-08	0.0E+00	5.7E-03	0.0E+00	1.8E-09	0.0E+00
Surf. (<0.5 ft)	IA-10	Pb-210	2.19E+00	5.2E-01	0.0E+00	1.2E-06	0.0E+00	6.8E-02	0.0E+00	1.4E-07	0.0E+00	6.7E-02	0.0E+00	5.3E-08	0.0E+00
Surf. (<0.5 ft)	IA-10	Ra-226	2.40E-01	8.7E-01	0.0E+00	1.2E-05	0.0E+00	2.8E-01	0.0E+00	3.4E-06	0.0E+00	4.3E-02	0.0E+00	1.6E-07	0.0E+00
Surf. (<0.5 ft)	IA-10	Th-228	1.05E+00	3.4E+00	0.0E+00	6.6E-06	0.0E+00	1.1E+00	0.0E+00	2.0E-06	0.0E+00	1.7E-01	0.0E+00	2.6E-07	0.0E+00
Surf. (<0.5 ft)	IA-10	Th-230	2.78E+00	7.6E-02	3.4E-01	1.1E-06	4.8E-06	1.5E-02	9.7E-02	2.5E-07	1.2E-06	9.3E-03	2.4E-02	6.6E-09	5.5E-08
Surf. (<0.5 ft)	IA-10	Th-232	4.10E-01	5.5E-02	1.9E+00	2.3E-05	3.2E-05	1.1E-02	5.9E-01	5.7E-06	8.4E-06	6.8E-03	9.8E-02	8.4E-08	3.5E-07
Surf. (<0.5 ft)	IA-10	U-234	4.32E+00	5.6E-02	0.0E+00	1.7E-07	0.0E+00	1.0E-02	0.0E+00	2.6E-08	0.0E+00	7.0E-03	0.0E+00	6.1E-09	0.0E+00
Surf. (<0.5 ft)	IA-10	U-235	1.18E-01	3.1E-02	0.0E+00	2.4E-07	0.0E+00	9.6E-03	0.0E+00	6.5E-08	0.0E+00	1.6E-03	0.0E+00	3.3E-09	0.0E+00
Surf. (<0.5 ft)	IA-10	U-238	4.27E+00	2.4E-01	0.0E+00	2.2E-06	0.0E+00	6.9E-02	0.0E+00	5.9E-07	0.0E+00	1.6E-02	0.0E+00	3.5E-08	0.0E+00
Surf. (<0.5 ft)	IA-10	TOTAL		5.4E+00	2.2E+00	4.8E-05	3.7E-05	1.6E+00	6.8E-01	1.2E-05	9.7E-06	3.3E-01	1.2E-01	6.1E-07	4.0E-07
Surf. (<5 ft)	IA-11	Th-230	2.40E-01	6.5E-03	3.0E-02	9.9E-08	4.1E-07	1.3E-03	8.4E-03	2.1E-08	1.1E-07	8.0E-04	2.0E-03	5.7E-10	4.7E-09
Surf. (<5 ft)	IA-11	TOTAL		6.5E-03	3.0E-02	9.9E-08	4.1E-07	1.3E-03	8.4E-03	2.1E-08	1.1E-07	8.0E-04	2.0E-03	5.7E-10	4.7E-09
Sub. (>0.5 ft)	IA-12	Ac-227	2.02E+00	2.7E+00	0.0E+00	7.1E-06	0.0E+00	6.7E-01	0.0E+00	2.1E-06	0.0E+00	2.3E-01	0.0E+00	1.8E-07	0.0E+00
Sub. (>0.5 ft)	IA-12	Pa-231	2.12E+00	9.3E-01	0.0E+00	4.5E-06	0.0E+00	1.6E-01	0.0E+00	1.1E-06	0.0E+00	1.1E-01	0.0E+00	3.5E-08	0.0E+00
Sub. (>0.5 ft)	IA-12	Pb-210	4.35E+00	1.0E+00	0.0E+00	2.4E-06	0.0E+00	1.4E-01	0.0E+00	2.8E-07	0.0E+00	1.3E-01	0.0E+00	1.0E-07	0.0E+00
Sub. (>0.5 ft)	IA-12	Ra-226	1.51E+00	5.5E+00	0.0E+00	7.8E-05	0.0E+00	1.7E+00	0.0E+00	2.1E-05	0.0E+00	2.7E-01	0.0E+00	1.0E-06	0.0E+00
Sub. (>0.5 ft)	IA-12	Ra-228	2.33E-01	4.6E-01	0.0E+00	4.8E-06	0.0E+00	1.4E-01	0.0E+00	1.5E-06	0.0E+00	2.3E-02	0.0E+00	1.2E-07	0.0E+00
Sub. (>0.5 ft)	IA-12	Th-228	5.40E-01	1.8E+00	0.0E+00	3.4E-06	0.0E+00	5.6E-01	0.0E+00	1.0E-06	0.0E+00	8.8E-02	0.0E+00	1.3E-07	0.0E+00
Sub. (>0.5 ft)	IA-12	Th-230	7.32E+01	2.0E+00	9.1E+00	3.0E-05	1.3E-04	3.9E-01	2.6E+00	6.5E-06	3.3E-05	2.5E-01	6.2E-01	1.7E-07	1.4E-06
Sub. (>0.5 ft)	IA-12	Th-232	9.00E-01	1.2E-01	4.1E+00	5.2E-05	7.0E-05	2.3E-02	1.3E+00	1.3E-05	1.8E-05	1.5E-02	2.2E-01	1.8E-07	7.6E-07
Sub. (>0.5 ft)	IA-12	U-234	8.34E+00	1.1E-01	0.0E+00	3.3E-07	0.0E+00	2.0E-02	0.0E+00	5.0E-08	0.0E+00	1.3E-02	0.0E+00	1.2E-08	0.0E+00
Sub. (>0.5 ft)	IA-12	U-235	1.69E+00	4.4E-01	0.0E+00	3.4E-06	0.0E+00	1.4E-01	0.0E+00	9.3E-07	0.0E+00	2.3E-02	0.0E+00	4.7E-08	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 24 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
Sub. (>0.5 ft)	IA-12	U-238	8.29E+00	4.7E-01	0.0E+00	4.3E-06	0.0E+00	1.3E-01	0.0E+00	1.1E-06	0.0E+00	3.0E-02	0.0E+00	6.8E-08	0.0E+00
Sub. (>0.5 ft)	IA-12	TOTAL		1.6E+01	1.3E+01	1.9E-04	2.0E-04	4.1E+00	3.9E+00	4.8E-05	5.1E-05	1.2E+00	8.4E-01	2.1E-06	2.2E-06
Surf. (<0.5 ft)	IA-12	Ac-227	3.67E+00	4.9E+00	0.0E+00	1.3E-05	0.0E+00	1.2E+00	0.0E+00	3.8E-06	0.0E+00	4.2E-01	0.0E+00	3.3E-07	0.0E+00
Surf. (<0.5 ft)	IA-12	Pa-231	4.02E+00	1.8E+00	0.0E+00	8.6E-06	0.0E+00	3.0E-01	0.0E+00	2.1E-06	0.0E+00	2.1E-01	0.0E+00	6.7E-08	0.0E+00
Surf. (<0.5 ft)	IA-12	Pb-210	7.17E+00	1.7E+00	0.0E+00	4.0E-06	0.0E+00	2.2E-01	0.0E+00	4.7E-07	0.0E+00	2.2E-01	0.0E+00	1.7E-07	0.0E+00
Surf. (<0.5 ft)	IA-12	Ra-226	3.17E+00	1.2E+01	0.0E+00	1.6E-04	0.0E+00	3.6E+00	0.0E+00	4.5E-05	0.0E+00	5.7E-01	0.0E+00	2.1E-06	0.0E+00
Surf. (<0.5 ft)	IA-12	Th-228	2.74E-01	9.0E-01	0.0E+00	1.7E-06	0.0E+00	2.8E-01	0.0E+00	5.2E-07	0.0E+00	4.5E-02	0.0E+00	6.8E-08	0.0E+00
Surf. (<0.5 ft)	IA-12	Th-230	3.17E+02	8.6E+00	3.9E+01	1.3E-04	5.5E-04	1.7E+00	1.1E+01	2.8E-05	1.4E-04	1.1E+00	2.7E+00	7.6E-07	6.3E-06
Surf. (<0.5 ft)	IA-12	Th-232	6.00E-01	8.0E-02	2.8E+00	3.4E-05	4.7E-05	1.6E-02	8.6E-01	8.4E-06	1.2E-05	1.0E-02	1.4E-01	1.2E-07	5.1E-07
Surf. (<0.5 ft)	IA-12	U-234	1.12E+01	1.4E-01	0.0E+00	4.4E-07	0.0E+00	2.7E-02	0.0E+00	6.7E-08	0.0E+00	1.8E-02	0.0E+00	1.6E-08	0.0E+00
Surf. (<0.5 ft)	IA-12	U-235	5.06E-01	1.3E-01	0.0E+00	1.0E-06	0.0E+00	4.1E-02	0.0E+00	2.8E-07	0.0E+00	6.9E-03	0.0E+00	1.4E-08	0.0E+00
Surf. (<0.5 ft)	IA-12	U-238	1.11E+01	6.3E-01	0.0E+00	5.8E-06	0.0E+00	1.8E-01	0.0E+00	1.5E-06	0.0E+00	4.1E-02	0.0E+00	9.2E-08	0.0E+00
Surf. (<0.5 ft)	IA-12	TOTAL		3.0E+01	4.2E+01	3.6E-04	5.9E-04	7.6E+00	1.2E+01	9.0E-05	1.5E-04	2.6E+00	2.8E+00	3.8E-06	6.8E-06
Sub. (>0.5 ft)	IA-13	Ac-227	1.65E+00	2.2E+00	0.0E+00	5.8E-06	0.0E+00	5.4E-01	0.0E+00	1.7E-06	0.0E+00	1.9E-01	0.0E+00	1.5E-07	0.0E+00
Sub. (>0.5 ft)	IA-13	Pa-231	1.82E+00	8.0E-01	0.0E+00	3.9E-06	0.0E+00	1.4E-01	0.0E+00	9.3E-07	0.0E+00	9.3E-02	0.0E+00	3.0E-08	0.0E+00
Sub. (>0.5 ft)	IA-13	Pb-210	3.43E+00	8.1E-01	0.0E+00	1.9E-06	0.0E+00	1.1E-01	0.0E+00	2.2E-07	0.0E+00	1.0E-01	0.0E+00	8.3E-08	0.0E+00
Sub. (>0.5 ft)	IA-13	Ra-226	9.70E-01	3.5E+00	0.0E+00	5.0E-05	0.0E+00	1.1E+00	0.0E+00	1.4E-05	0.0E+00	1.8E-01	0.0E+00	6.5E-07	0.0E+00
Sub. (>0.5 ft)	IA-13	Th-228	6.05E-01	2.0E+00	0.0E+00	3.8E-06	0.0E+00	6.3E-01	0.0E+00	1.1E-06	0.0E+00	9.8E-02	0.0E+00	1.5E-07	0.0E+00
Sub. (>0.5 ft)	IA-13	Th-230	1.58E+00	4.3E-02	2.0E-01	6.5E-07	2.7E-06	8.4E-03	5.5E-02	1.4E-07	7.0E-07	5.3E-03	1.3E-02	3.8E-09	3.1E-08
Sub. (>0.5 ft)	IA-13	Th-232	9.90E-01	1.3E-01	4.6E+00	5.7E-05	7.7E-05	2.6E-02	1.4E+00	1.4E-05	2.0E-05	1.6E-02	2.4E-01	2.0E-07	8.4E-07
Sub. (>0.5 ft)	IA-13	U-234	9.67E+00	1.3E-01	0.0E+00	3.9E-07	0.0E+00	2.3E-02	0.0E+00	5.8E-08	0.0E+00	1.6E-02	0.0E+00	1.4E-08	0.0E+00
Sub. (>0.5 ft)	IA-13	U-235	4.37E-01	1.1E-01	0.0E+00	8.7E-07	0.0E+00	3.6E-02	0.0E+00	2.4E-07	0.0E+00	6.0E-03	0.0E+00	1.2E-08	0.0E+00
Sub. (>0.5 ft)	IA-13	U-238	9.62E+00	5.4E-01	0.0E+00	5.0E-06	0.0E+00	1.6E-01	0.0E+00	1.3E-06	0.0E+00	3.5E-02	0.0E+00	7.9E-08	0.0E+00
Sub. (>0.5 ft)	IA-13	TOTAL		1.0E+01	4.8E+00	1.3E-04	8.0E-05	2.8E+00	1.5E+00	3.3E-05	2.1E-05	7.4E-01	2.5E-01	1.4E-06	8.7E-07
Surf. (<0.5 ft)	IA-13	Ac-227	1.73E-01	2.3E-01	0.0E+00	6.0E-07	0.0E+00	5.7E-02	0.0E+00	1.8E-07	0.0E+00	2.0E-02	0.0E+00	1.5E-08	0.0E+00
Surf. (<0.5 ft)	IA-13	Pa-231	3.19E-01	1.4E-01	0.0E+00	6.8E-07	0.0E+00	2.4E-02	0.0E+00	1.6E-07	0.0E+00	1.6E-02	0.0E+00	5.3E-09	0.0E+00
Surf. (<0.5 ft)	IA-13	Pb-210	2.70E+00	6.4E-01	0.0E+00	1.5E-06	0.0E+00	8.4E-02	0.0E+00	1.8E-07	0.0E+00	8.2E-02	0.0E+00	6.5E-08	0.0E+00
Surf. (<0.5 ft)	IA-13	Ra-226	5.40E-01	2.0E+00	0.0E+00	2.8E-05	0.0E+00	6.2E-01	0.0E+00	7.6E-06	0.0E+00	9.8E-02	0.0E+00	3.6E-07	0.0E+00
Surf. (<0.5 ft)	IA-13	Th-228	2.00E-02	6.6E-02	0.0E+00	1.3E-07	0.0E+00	2.1E-02	0.0E+00	3.8E-08	0.0E+00	3.3E-03	0.0E+00	4.9E-09	0.0E+00
Surf. (<0.5 ft)	IA-13	Th-230	1.37E+01	3.7E-01	1.7E+00	5.7E-06	2.4E-05	7.3E-02	4.8E-01	1.2E-06	6.1E-06	4.6E-02	1.2E-01	3.3E-08	2.7E-07
Surf. (<0.5 ft)	IA-13	Th-232	4.30E-01	5.8E-02	2.0E+00	2.5E-05	3.3E-05	1.1E-02	6.2E-01	6.0E-06	8.8E-06	7.2E-03	1.0E-01	8.8E-08	3.6E-07
Surf. (<0.5 ft)	IA-13	U-234	2.90E+00	3.8E-02	0.0E+00	1.2E-07	0.0E+00	6.9E-03	0.0E+00	1.7E-08	0.0E+00	4.7E-03	0.0E+00	4.1E-09	0.0E+00
Surf. (<0.5 ft)	IA-13	U-235	1.33E-01	3.5E-02	0.0E+00	2.7E-07	0.0E+00	1.1E-02	0.0E+00	7.3E-08	0.0E+00	1.8E-03	0.0E+00	3.7E-09	0.0E+00
Surf. (<0.5 ft)	IA-13	U-238	2.85E+00	1.6E-01	0.0E+00	1.5E-06	0.0E+00	4.6E-02	0.0E+00	3.9E-07	0.0E+00	1.0E-02	0.0E+00	2.3E-08	0.0E+00
Surf. (<0.5 ft)	IA-13	TOTAL		3.7E+00	3.7E+00	6.3E-05	5.7E-05	9.6E-01	1.1E+00	1.6E-05	1.5E-05	2.9E-01	2.2E-01	6.0E-07	6.3E-07
Sub. (>0.5 ft)	IA-2	Ac-227	6.93E+00	9.2E+00	0.0E+00	2.4E-05	0.0E+00	2.3E+00	0.0E+00	7.1E-06	0.0E+00	8.0E-01	0.0E+00	6.2E-07	0.0E+00
Sub. (>0.5 ft)	IA-2	Pa-231	9.09E+00	4.0E+00	0.0E+00	1.9E-05	0.0E+00	6.9E-01	0.0E+00	4.7E-06	0.0E+00	4.7E-01	0.0E+00	1.5E-07	0.0E+00
Sub. (>0.5 ft)	IA-2	Pb-210	4.83E+01	1.1E+01	0.0E+00	2.7E-05	0.0E+00	1.5E+00	0.0E+00	3.1E-06	0.0E+00	1.5E+00	0.0E+00	1.2E-06	0.0E+00
Sub. (>0.5 ft)	IA-2	Ra-226	2.74E+01	1.0E+02	0.0E+00	1.4E-03	0.0E+00	3.1E+01	0.0E+00	3.9E-04	0.0E+00	5.0E+00	0.0E+00	1.8E-05	0.0E+00
Sub. (>0.5 ft)	IA-2	Ra-228	1.63E-01	3.2E-01	0.0E+00	3.4E-06	0.0E+00	1.0E-01	0.0E+00	1.1E-06	0.0E+00	1.6E-02	0.0E+00	8.4E-08	0.0E+00
Sub. (>0.5 ft)	IA-2	Th-228	4.00E-01	1.3E+00	0.0E+00	2.5E-06	0.0E+00	4.2E-01	0.0E+00	7.6E-07	0.0E+00	6.5E-02	0.0E+00	9.9E-08	0.0E+00
Sub. (>0.5 ft)	IA-2	Th-230	4.54E+02	1.2E+01	5.6E+01	1.9E-04	7.8E-04	2.4E+00	1.6E+01	4.1E-05	2.0E-04	1.5E+00	3.8E+00	1.1E-06	9.0E-06
Sub. (>0.5 ft)	IA-2	Th-232	1.24E+00	1.7E-01	5.7E+00	7.1E-05	9.7E-05	3.2E-02	1.8E+00	1.7E-05	2.5E-05	2.1E-02	3.0E-01	2.5E-07	1.0E-06
Sub. (>0.5 ft)	IA-2	U-234	4.88E+01	6.3E-01	0.0E+00	1.9E-06	0.0E+00	1.2E-01	0.0E+00	2.9E-07	0.0E+00	7.9E-02	0.0E+00	6.9E-08	0.0E+00
Sub. (>0.5 ft)	IA-2	U-235	2.22E+00	5.8E-01	0.0E+00	4.4E-06	0.0E+00	1.8E-01	0.0E+00	1.2E-06	0.0E+00	3.0E-02	0.0E+00	6.2E-08	0.0E+00
Sub. (>0.5 ft)	IA-2	U-238	4.87E+01	2.7E+00	0.0E+00	2.5E-05	0.0E+00	7.9E-01	0.0E+00	6.7E-06	0.0E+00	1.8E-01	0.0E+00	4.0E-07	0.0E+00
Sub. (>0.5 ft)	IA-2	TOTAL		1.4E+02	6.2E+01	1.8E-03	8.8E-04	4.0E+01	1.8E+01	4.7E-04	2.3E-04	9.6E+00	4.1E+00	2.2E-05	1.0E-05

Attachment 12. Radiological Doses and Risks for each Property (page 25 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
Surf. (<5 ft)	IA-2	Ac-227	3.07E+01	4.1E+01	0.0E+00	1.1E-04	0.0E+00	1.0E+01	0.0E+00	3.1E-05	0.0E+00	3.5E+00	0.0E+00	2.7E-06	0.0E+00
Surf. (<5 ft)	IA-2	Pa-231	4.12E+01	1.8E+01	0.0E+00	8.8E-05	0.0E+00	3.1E+00	0.0E+00	2.1E-05	0.0E+00	2.1E+00	0.0E+00	6.9E-07	0.0E+00
Surf. (<5 ft)	IA-2	Pb-210	1.16E+02	2.7E+01	0.0E+00	6.4E-05	0.0E+00	3.6E+00	0.0E+00	7.6E-06	0.0E+00	3.5E+00	0.0E+00	2.8E-06	0.0E+00
Surf. (<5 ft)	IA-2	Ra-226	6.72E+01	2.4E+02	0.0E+00	3.5E-03	0.0E+00	7.7E+01	0.0E+00	9.5E-04	0.0E+00	1.2E+01	0.0E+00	4.5E-05	0.0E+00
Surf. (<5 ft)	IA-2	Ra-228	7.63E-01	1.5E+00	0.0E+00	1.6E-05	0.0E+00	4.7E-01	0.0E+00	5.0E-06	0.0E+00	7.6E-02	0.0E+00	3.9E-07	0.0E+00
Surf. (<5 ft)	IA-2	Th-228	7.40E-01	2.4E+00	0.0E+00	4.7E-06	0.0E+00	7.7E-01	0.0E+00	1.4E-06	0.0E+00	1.2E-01	0.0E+00	1.8E-07	0.0E+00
Surf. (<5 ft)	IA-2	Th-230	1.38E+03	3.7E+01	1.7E+02	5.7E-04	2.4E-03	7.3E+00	4.8E+01	1.2E-04	6.1E-04	4.6E+00	1.2E+01	3.3E-06	2.7E-05
Surf. (<5 ft)	IA-2	Th-232	2.04E+00	2.7E-01	9.4E+00	1.2E-04	1.6E-04	5.3E-02	2.9E+00	2.8E-05	4.2E-05	3.4E-02	4.9E-01	4.2E-07	1.7E-06
Surf. (<5 ft)	IA-2	U-234	9.70E+01	1.3E+00	0.0E+00	3.9E-06	0.0E+00	2.3E-01	0.0E+00	5.8E-07	0.0E+00	1.6E-01	0.0E+00	1.4E-07	0.0E+00
Surf. (<5 ft)	IA-2	U-235	9.62E+00	2.5E+00	0.0E+00	1.9E-05	0.0E+00	7.8E-01	0.0E+00	5.3E-06	0.0E+00	1.3E-01	0.0E+00	2.7E-07	0.0E+00
Surf. (<5 ft)	IA-2	U-238	9.69E+01	5.5E+00	0.0E+00	5.0E-05	0.0E+00	1.6E+00	0.0E+00	1.3E-05	0.0E+00	3.6E-01	0.0E+00	8.0E-07	0.0E+00
Surf. (<5 ft)	IA-2	TOTAL		3.8E+02	1.8E+02	4.5E-03	2.5E-03	1.1E+02	5.1E+01	1.2E-03	6.6E-04	2.7E+01	1.2E+01	5.7E-05	2.9E-05
Sub. (>0.5 ft)	IA-3	Ac-227	6.77E+00	9.0E+00	0.0E+00	2.4E-05	0.0E+00	2.2E+00	0.0E+00	6.9E-06	0.0E+00	7.8E-01	0.0E+00	6.0E-07	0.0E+00
Sub. (>0.5 ft)	IA-3	Pa-231	4.06E+00	1.8E+00	0.0E+00	8.6E-06	0.0E+00	3.1E-01	0.0E+00	2.1E-06	0.0E+00	2.1E-01	0.0E+00	6.8E-08	0.0E+00
Sub. (>0.5 ft)	IA-3	Pb-210	1.97E+02	4.7E+01	0.0E+00	1.1E-04	0.0E+00	6.1E+00	0.0E+00	1.3E-05	0.0E+00	6.0E+00	0.0E+00	4.8E-06	0.0E+00
Sub. (>0.5 ft)	IA-3	Ra-226	1.15E+02	4.2E+02	0.0E+00	5.9E-03	0.0E+00	1.3E+02	0.0E+00	1.6E-03	0.0E+00	2.1E+01	0.0E+00	7.7E-05	0.0E+00
Sub. (>0.5 ft)	IA-3	Ra-228	3.30E-02	6.5E-02	0.0E+00	6.8E-07	0.0E+00	2.0E-02	0.0E+00	2.2E-07	0.0E+00	3.3E-03	0.0E+00	1.7E-08	0.0E+00
Sub. (>0.5 ft)	IA-3	Th-228	6.00E-02	2.0E-01	0.0E+00	3.8E-07	0.0E+00	6.2E-02	0.0E+00	1.1E-07	0.0E+00	9.8E-03	0.0E+00	1.5E-08	0.0E+00
Sub. (>0.5 ft)	IA-3	Th-230	3.45E+02	9.4E+00	4.3E+01	1.4E-04	5.9E-04	1.8E+00	1.2E+01	3.1E-05	1.5E-04	1.2E+00	2.9E+00	8.2E-07	6.8E-06
Sub. (>0.5 ft)	IA-3	Th-232	1.63E+00	2.2E-01	7.5E+00	9.3E-05	1.3E-04	4.2E-02	2.3E+00	2.3E-05	3.3E-05	2.7E-02	3.9E-01	3.3E-07	1.4E-06
Sub. (>0.5 ft)	IA-3	U-234	7.10E+01	9.2E-01	0.0E+00	2.8E-06	0.0E+00	1.7E-01	0.0E+00	4.2E-07	0.0E+00	1.1E-01	0.0E+00	1.0E-07	0.0E+00
Sub. (>0.5 ft)	IA-3	U-235	1.64E+00	4.3E-01	0.0E+00	3.3E-06	0.0E+00	1.3E-01	0.0E+00	9.0E-07	0.0E+00	2.2E-02	0.0E+00	4.6E-08	0.0E+00
Sub. (>0.5 ft)	IA-3	U-238	7.09E+01	4.0E+00	0.0E+00	3.7E-05	0.0E+00	1.2E+00	0.0E+00	9.8E-06	0.0E+00	2.6E-01	0.0E+00	5.8E-07	0.0E+00
Sub. (>0.5 ft)	IA-3	TOTAL		4.9E+02	5.0E+01	6.4E-03	7.2E-04	1.4E+02	1.4E+01	1.7E-03	1.9E-04	2.9E+01	3.3E+00	8.4E-05	8.2E-06
Surf. (<5 ft)	IA-3	Ac-227	1.05E+01	1.4E+01	0.0E+00	3.7E-05	0.0E+00	3.5E+00	0.0E+00	1.1E-05	0.0E+00	1.2E+00	0.0E+00	9.4E-07	0.0E+00
Surf. (<5 ft)	IA-3	Pa-231	7.67E+00	3.4E+00	0.0E+00	1.6E-05	0.0E+00	5.8E-01	0.0E+00	3.9E-06	0.0E+00	3.9E-01	0.0E+00	1.3E-07	0.0E+00
Surf. (<5 ft)	IA-3	Pb-210	2.70E+01	6.4E+00	0.0E+00	1.5E-05	0.0E+00	8.4E-01	0.0E+00	1.8E-06	0.0E+00	8.2E-01	0.0E+00	6.5E-07	0.0E+00
Surf. (<5 ft)	IA-3	Ra-226	1.49E+01	5.4E+01	0.0E+00	7.7E-04	0.0E+00	1.7E+01	0.0E+00	2.1E-04	0.0E+00	2.7E+00	0.0E+00	9.9E-06	0.0E+00
Surf. (<5 ft)	IA-3	Ra-228	1.23E-01	2.4E-01	0.0E+00	2.5E-06	0.0E+00	7.6E-02	0.0E+00	8.1E-07	0.0E+00	1.2E-02	0.0E+00	6.3E-08	0.0E+00
Surf. (<5 ft)	IA-3	Th-228	5.00E-02	1.6E-01	0.0E+00	3.2E-07	0.0E+00	5.2E-02	0.0E+00	9.4E-08	0.0E+00	8.1E-03	0.0E+00	1.2E-08	0.0E+00
Surf. (<5 ft)	IA-3	Th-230	4.80E+02	1.3E+01	5.9E+01	2.0E-04	8.3E-04	2.5E+00	1.7E+01	4.3E-05	2.1E-04	1.6E+00	4.1E+00	1.1E-06	9.5E-06
Surf. (<5 ft)	IA-3	Th-232	1.16E+00	1.6E-01	5.3E+00	6.6E-05	9.0E-05	3.0E-02	1.7E+00	1.6E-05	2.4E-05	1.9E-02	2.8E-01	2.4E-07	9.8E-07
Surf. (<5 ft)	IA-3	U-234	3.03E+01	3.9E-01	0.0E+00	1.2E-06	0.0E+00	7.2E-02	0.0E+00	1.8E-07	0.0E+00	4.9E-02	0.0E+00	4.3E-08	0.0E+00
Surf. (<5 ft)	IA-3	U-235	2.55E+00	6.7E-01	0.0E+00	5.1E-06	0.0E+00	2.1E-01	0.0E+00	1.4E-06	0.0E+00	3.5E-02	0.0E+00	7.2E-08	0.0E+00
Surf. (<5 ft)	IA-3	U-238	3.02E+01	1.7E+00	0.0E+00	1.6E-05	0.0E+00	4.9E-01	0.0E+00	4.2E-06	0.0E+00	1.1E-01	0.0E+00	2.5E-07	0.0E+00
Surf. (<5 ft)	IA-3	TOTAL		9.4E+01	6.5E+01	1.1E-03	9.2E-04	2.5E+01	1.8E+01	2.9E-04	2.4E-04	7.0E+00	4.3E+00	1.3E-05	1.0E-05
Sub. (>0.5 ft)	IA-4	Ac-227	1.26E+00	1.7E+00	0.0E+00	4.4E-06	0.0E+00	4.2E-01	0.0E+00	1.3E-06	0.0E+00	1.5E-01	0.0E+00	1.1E-07	0.0E+00
Sub. (>0.5 ft)	IA-4	Pa-231	4.33E-01	1.9E-01	0.0E+00	9.2E-07	0.0E+00	3.3E-02	0.0E+00	2.2E-07	0.0E+00	2.2E-02	0.0E+00	7.2E-09	0.0E+00
Sub. (>0.5 ft)	IA-4	Pb-210	2.01E+02	4.7E+01	0.0E+00	1.1E-04	0.0E+00	6.3E+00	0.0E+00	1.3E-05	0.0E+00	6.1E+00	0.0E+00	4.8E-06	0.0E+00
Sub. (>0.5 ft)	IA-4	Ra-226	1.17E+02	4.3E+02	0.0E+00	6.0E-03	0.0E+00	1.3E+02	0.0E+00	1.6E-03	0.0E+00	2.1E+01	0.0E+00	7.8E-05	0.0E+00
Sub. (>0.5 ft)	IA-4	Th-228	1.80E-01	5.9E-01	0.0E+00	1.1E-06	0.0E+00	1.9E-01	0.0E+00	3.4E-07	0.0E+00	2.9E-02	0.0E+00	4.4E-08	0.0E+00
Sub. (>0.5 ft)	IA-4	Th-230	1.80E+02	4.9E+00	2.2E+01	7.5E-05	3.1E-04	9.6E-01	6.3E+00	1.6E-05	8.0E-05	6.0E-01	1.5E+00	4.3E-07	3.6E-06
Sub. (>0.5 ft)	IA-4	Th-232	2.58E+00	3.5E-01	1.2E+01	1.5E-04	2.0E-04	6.7E-02	3.7E+00	3.6E-05	5.3E-05	4.3E-02	6.2E-01	5.3E-07	2.2E-06
Sub. (>0.5 ft)	IA-4	U-234	8.50E+01	1.1E+00	0.0E+00	3.4E-06	0.0E+00	2.0E-01	0.0E+00	5.1E-07	0.0E+00	1.4E-01	0.0E+00	1.2E-07	0.0E+00
Sub. (>0.5 ft)	IA-4	U-235	5.85E+00	1.5E+00	0.0E+00	1.2E-05	0.0E+00	4.8E-01	0.0E+00	3.2E-06	0.0E+00	8.0E-02	0.0E+00	1.6E-07	0.0E+00
Sub. (>0.5 ft)	IA-4	U-238	8.49E+01	4.8E+00	0.0E+00	4.4E-05	0.0E+00	1.4E+00	0.0E+00	1.2E-05	0.0E+00	3.1E-01	0.0E+00	7.0E-07	0.0E+00
Sub. (>0.5 ft)	IA-4	TOTAL		4.9E+02	3.4E+01	6.4E-03	5.1E-04	1.4E+02	1.0E+01	1.7E-03	1.3E-04	2.9E+01	2.1E+00	8.5E-05	5.7E-06
Surf. (<5 ft)	IA-4	Ac-227	4.55E+00	6.0E+00	0.0E+00	1.6E-05	0.0E+00	1.5E+00	0.0E+00	4.7E-06	0.0E+00	5.3E-01	0.0E+00	4.1E-07	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 26 of 60)

			Exposure Point	RESIDENTIAL				INDUSTRIAL				MAINTENANCE			
Data Group	**Property**	**Isotope**	**Conc. (pCi/g)**	**Dose Year=0.0**	**Dose Year=1000**	**Risk Year=0.0**	**Risk Year=1000**	**Dose Year=0.0**	**Dose Year=1000**	**Risk Year=0.0**	**Risk Year=1000**	**Dose Year=0.0**	**Dose Year=1000**	**Risk Year=0.0**	**Risk Year=1000**
Surf. (<5 ft)	IA-4	Pa-231	3.10E+00	1.4E+00	0.0E+00	6.6E-06	0.0E+00	2.3E-01	0.0E+00	1.6E-06	0.0E+00	1.6E-01	0.0E+00	5.2E-08	0.0E+00
Surf. (<5 ft)	IA-4	Pb-210	4.54E+02	1.1E+02	0.0E+00	2.5E-04	0.0E+00	1.4E+01	0.0E+00	3.0E-05	0.0E+00	1.4E+01	0.0E+00	1.1E-05	0.0E+00
Surf. (<5 ft)	IA-4	Ra-226	2.66E+02	9.7E+02	0.0E+00	1.4E-02	0.0E+00	3.1E+02	0.0E+00	3.7E-03	0.0E+00	4.8E+01	0.0E+00	1.8E-04	0.0E+00
Surf. (<5 ft)	IA-4	Ra-228	1.53E-01	3.0E-01	0.0E+00	3.2E-06	0.0E+00	9.5E-02	0.0E+00	1.0E-06	0.0E+00	1.5E-02	0.0E+00	7.9E-08	0.0E+00
Surf. (<5 ft)	IA-4	Th-228	6.80E-01	2.2E+00	0.0E+00	4.3E-06	0.0E+00	7.1E-01	0.0E+00	1.3E-06	0.0E+00	1.1E-01	0.0E+00	1.7E-07	0.0E+00
Surf. (<5 ft)	IA-4	Th-230	2.44E+03	6.6E+01	3.0E+02	1.0E-03	4.2E-03	1.3E+01	8.5E+01	2.2E-04	1.1E-03	8.2E+00	2.1E+01	5.8E-06	4.8E-05
Surf. (<5 ft)	IA-4	Th-232	2.89E+00	3.9E-01	1.3E+01	1.7E-04	2.3E-04	7.5E-02	4.1E+00	4.0E-05	5.9E-05	4.8E-02	6.9E-01	5.9E-07	2.4E-06
Surf. (<5 ft)	IA-4	U-234	7.13E+01	9.2E-01	0.0E+00	2.8E-06	0.0E+00	1.7E-01	0.0E+00	4.2E-07	0.0E+00	1.1E-01	0.0E+00	1.0E-07	0.0E+00
Surf. (<5 ft)	IA-4	U-235	3.00E+00	7.8E-01	0.0E+00	6.0E-06	0.0E+00	2.4E-01	0.0E+00	1.6E-06	0.0E+00	4.1E-02	0.0E+00	8.4E-08	0.0E+00
Surf. (<5 ft)	IA-4	U-238	7.12E+01	4.0E+00	0.0E+00	3.7E-05	0.0E+00	1.2E+00	0.0E+00	9.8E-06	0.0E+00	2.6E-01	0.0E+00	5.9E-07	0.0E+00
Surf. (<5 ft)	IA-4	TOTAL		1.2E+03	3.2E+02	1.5E-02	4.4E-03	3.4E+02	9.0E+01	4.1E-03	1.1E-03	7.1E+01	2.1E+01	2.0E-04	5.1E-05
Sub. (>0.5 ft)	IA-5	Ac-227	7.10E+00	9.4E+00	0.0E+00	2.5E-05	0.0E+00	2.3E+00	0.0E+00	7.3E-06	0.0E+00	8.2E-01	0.0E+00	6.3E-07	0.0E+00
Sub. (>0.5 ft)	IA-5	Pa-231	8.29E+00	3.6E+00	0.0E+00	1.8E-05	0.0E+00	6.3E-01	0.0E+00	4.3E-06	0.0E+00	4.3E-01	0.0E+00	1.4E-07	0.0E+00
Sub. (>0.5 ft)	IA-5	Pb-210	3.28E+01	7.8E+00	0.0E+00	1.8E-05	0.0E+00	1.0E+00	0.0E+00	2.1E-06	0.0E+00	1.0E+00	0.0E+00	7.9E-07	0.0E+00
Sub. (>0.5 ft)	IA-5	Ra-226	1.83E+01	6.7E+01	0.0E+00	9.4E-04	0.0E+00	2.1E+01	0.0E+00	2.6E-04	0.0E+00	3.3E+00	0.0E+00	1.2E-05	0.0E+00
Sub. (>0.5 ft)	IA-5	Ra-228	6.00E-03	1.2E-02	0.0E+00	1.2E-07	0.0E+00	3.7E-03	0.0E+00	3.9E-08	0.0E+00	6.0E-04	0.0E+00	3.1E-09	0.0E+00
Sub. (>0.5 ft)	IA-5	Th-228	1.00E-01	3.3E-01	0.0E+00	6.3E-07	0.0E+00	1.0E-01	0.0E+00	1.9E-07	0.0E+00	1.6E-02	0.0E+00	2.5E-08	0.0E+00
Sub. (>0.5 ft)	IA-5	Th-230	2.94E+02	8.0E+00	3.6E+01	1.2E-04	5.1E-04	1.6E+00	1.0E+01	2.6E-05	1.3E-04	9.9E-01	2.5E+00	7.0E-07	5.8E-06
Sub. (>0.5 ft)	IA-5	Th-232	1.22E+00	1.6E-01	5.6E+00	7.0E-05	9.5E-05	3.2E-02	1.7E+00	1.7E-05	2.5E-05	2.0E-02	2.9E-01	2.5E-07	1.0E-06
Sub. (>0.5 ft)	IA-5	U-234	3.25E+01	4.2E-01	0.0E+00	1.3E-06	0.0E+00	7.8E-02	0.0E+00	1.9E-07	0.0E+00	5.2E-02	0.0E+00	4.6E-08	0.0E+00
Sub. (>0.5 ft)	IA-5	U-235	1.12E+00	2.9E-01	0.0E+00	2.2E-06	0.0E+00	9.1E-02	0.0E+00	6.1E-07	0.0E+00	1.5E-02	0.0E+00	3.1E-08	0.0E+00
Sub. (>0.5 ft)	IA-5	U-238	3.24E+01	1.8E+00	0.0E+00	1.7E-05	0.0E+00	5.3E-01	0.0E+00	4.5E-06	0.0E+00	1.2E-01	0.0E+00	2.7E-07	0.0E+00
Sub. (>0.5 ft)	IA-5	TOTAL		9.8E+01	4.2E+01	1.2E-03	6.0E-04	2.7E+01	1.2E+01	3.2E-04	1.6E-04	6.8E+00	2.8E+00	1.5E-05	6.8E-06
Surf. (<5 ft)	IA-5	Ac-227	2.18E+01	2.9E+01	0.0E+00	7.6E-05	0.0E+00	7.2E+00	0.0E+00	2.2E-05	0.0E+00	2.5E+00	0.0E+00	1.9E-06	0.0E+00
Surf. (<5 ft)	IA-5	Pa-231	2.57E+01	1.1E+01	0.0E+00	5.5E-05	0.0E+00	1.9E+00	0.0E+00	1.3E-05	0.0E+00	1.3E+00	0.0E+00	4.3E-07	0.0E+00
Surf. (<5 ft)	IA-5	Pb-210	5.00E+01	1.2E+01	0.0E+00	2.8E-05	0.0E+00	1.6E+00	0.0E+00	3.3E-06	0.0E+00	1.5E+00	0.0E+00	1.2E-06	0.0E+00
Surf. (<5 ft)	IA-5	Ra-226	2.84E+01	1.0E+02	0.0E+00	1.5E-03	0.0E+00	3.3E+01	0.0E+00	4.0E-04	0.0E+00	5.1E+00	0.0E+00	1.9E-05	0.0E+00
Surf. (<5 ft)	IA-5	Ra-228	2.23E-01	4.4E-01	0.0E+00	4.6E-06	0.0E+00	1.4E-01	0.0E+00	1.5E-06	0.0E+00	2.2E-02	0.0E+00	1.1E-07	0.0E+00
Surf. (<5 ft)	IA-5	Th-228	2.60E-01	8.5E-01	0.0E+00	1.6E-06	0.0E+00	2.7E-01	0.0E+00	4.9E-07	0.0E+00	4.2E-02	0.0E+00	6.4E-08	0.0E+00
Surf. (<5 ft)	IA-5	Th-230	6.60E+02	1.8E+01	8.2E+01	2.7E-04	1.1E-03	3.5E+00	2.3E+01	5.9E-05	2.9E-04	2.2E+00	5.6E+00	1.6E-06	1.3E-05
Surf. (<5 ft)	IA-5	Th-232	1.52E+00	2.0E-01	7.0E+00	8.7E-05	1.2E-04	4.0E-02	2.2E+00	2.1E-05	3.1E-05	2.5E-02	3.6E-01	3.1E-07	1.3E-06
Surf. (<5 ft)	IA-5	U-234	5.05E+01	6.5E-01	0.0E+00	2.0E-06	0.0E+00	1.2E-01	0.0E+00	3.0E-07	0.0E+00	8.1E-02	0.0E+00	7.1E-08	0.0E+00
Surf. (<5 ft)	IA-5	U-235	3.39E+00	8.9E-01	0.0E+00	6.7E-06	0.0E+00	2.8E-01	0.0E+00	1.9E-06	0.0E+00	4.6E-02	0.0E+00	9.5E-08	0.0E+00
Surf. (<5 ft)	IA-5	U-238	5.04E+01	2.8E+00	0.0E+00	2.6E-05	0.0E+00	8.2E-01	0.0E+00	6.9E-06	0.0E+00	1.8E-01	0.0E+00	4.1E-07	0.0E+00
Surf. (<5 ft)	IA-5	TOTAL		1.8E+02	8.9E+01	2.0E-03	1.3E-03	4.8E+01	2.5E+01	5.3E-04	3.3E-04	1.3E+01	6.0E+00	2.5E-05	1.4E-05
Sub. (>0.5 ft)	IA-6	Ac-227	1.11E+01	1.5E+01	0.0E+00	3.9E-05	0.0E+00	3.7E+00	0.0E+00	1.1E-05	0.0E+00	1.3E+00	0.0E+00	9.9E-07	0.0E+00
Sub. (>0.5 ft)	IA-6	Pa-231	1.16E+01	5.1E+00	0.0E+00	2.5E-05	0.0E+00	8.8E-01	0.0E+00	6.0E-06	0.0E+00	6.0E-01	0.0E+00	1.9E-07	0.0E+00
Sub. (>0.5 ft)	IA-6	Pb-210	9.81E+00	2.3E+00	0.0E+00	5.4E-06	0.0E+00	3.1E-01	0.0E+00	6.4E-07	0.0E+00	3.0E-01	0.0E+00	2.4E-07	0.0E+00
Sub. (>0.5 ft)	IA-6	Ra-226	4.72E+00	1.7E+01	0.0E+00	2.4E-04	0.0E+00	5.4E+00	0.0E+00	6.7E-05	0.0E+00	8.5E-01	0.0E+00	3.2E-06	0.0E+00
Sub. (>0.5 ft)	IA-6	Ra-228	2.63E-01	5.2E-01	0.0E+00	5.4E-06	0.0E+00	1.6E-01	0.0E+00	1.7E-06	0.0E+00	2.6E-02	0.0E+00	1.4E-07	0.0E+00
Sub. (>0.5 ft)	IA-6	Th-228	4.30E-01	1.4E+00	0.0E+00	2.7E-06	0.0E+00	4.5E-01	0.0E+00	8.1E-07	0.0E+00	7.0E-02	0.0E+00	1.1E-07	0.0E+00
Sub. (>0.5 ft)	IA-6	Th-230	2.85E+02	7.8E+00	3.5E+01	1.2E-04	4.9E-04	1.5E+00	1.0E+01	2.5E-05	1.3E-04	9.6E-01	2.4E+00	6.8E-07	5.6E-06
Sub. (>0.5 ft)	IA-6	Th-232	2.05E+00	2.7E-01	9.4E+00	1.2E-04	1.6E-04	5.3E-02	2.9E+00	2.9E-05	4.2E-05	3.4E-02	4.9E-01	4.2E-07	1.7E-06
Sub. (>0.5 ft)	IA-6	U-234	3.09E+01	4.0E-01	0.0E+00	1.2E-06	0.0E+00	7.4E-02	0.0E+00	1.8E-07	0.0E+00	5.0E-02	0.0E+00	4.3E-08	0.0E+00
Sub. (>0.5 ft)	IA-6	U-235	2.73E+00	7.1E-01	0.0E+00	5.4E-06	0.0E+00	2.2E-01	0.0E+00	1.5E-06	0.0E+00	3.7E-02	0.0E+00	7.7E-08	0.0E+00
Sub. (>0.5 ft)	IA-6	U-238	3.08E+01	1.7E+00	0.0E+00	1.6E-05	0.0E+00	5.0E-01	0.0E+00	4.2E-06	0.0E+00	1.1E-01	0.0E+00	2.5E-07	0.0E+00
Sub. (>0.5 ft)	IA-6	TOTAL		5.2E+01	4.5E+01	5.8E-04	6.5E-04	1.3E+01	1.3E+01	1.5E-04	1.7E-04	4.3E+00	2.9E+00	6.3E-06	7.4E-06
Surf. (<5 ft)	IA-6	Ac-227	1.77E+01	2.3E+01	0.0E+00	6.2E-05	0.0E+00	5.8E+00	0.0E+00	1.8E-05	0.0E+00	2.0E+00	0.0E+00	1.6E-06	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 27 of 60)

			Exposure Point	RESIDENTIAL				INDUSTRIAL				MAINTENANCE			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<5 ft)	IA-6	Pa-231	1.86E+01	8.2E+00	0.0E+00	4.0E-05	0.0E+00	1.4E+00	0.0E+00	9.5E-06	0.0E+00	9.6E-01	0.0E+00	3.1E-07	0.0E+00
Surf. (<5 ft)	IA-6	Pb-210	1.64E+01	3.9E+00	0.0E+00	9.0E-06	0.0E+00	5.1E-01	0.0E+00	1.1E-06	0.0E+00	5.0E-01	0.0E+00	3.9E-07	0.0E+00
Surf. (<5 ft)	IA-6	Ra-226	8.57E+00	3.1E+01	0.0E+00	4.4E-04	0.0E+00	9.8E+00	0.0E+00	1.2E-04	0.0E+00	1.6E+00	0.0E+00	5.7E-06	0.0E+00
Surf. (<5 ft)	IA-6	Ra-228	3.93E-01	7.8E-01	0.0E+00	8.1E-06	0.0E+00	2.4E-01	0.0E+00	2.6E-06	0.0E+00	3.9E-02	0.0E+00	2.0E-07	0.0E+00
Surf. (<5 ft)	IA-6	Th-228	1.90E-01	6.2E-01	0.0E+00	1.2E-06	0.0E+00	2.0E-01	0.0E+00	3.6E-07	0.0E+00	3.1E-02	0.0E+00	4.7E-08	0.0E+00
Surf. (<5 ft)	IA-6	Th-230	4.62E+02	1.3E+01	5.7E+01	1.9E-04	8.0E-04	2.5E+00	1.6E+01	4.1E-05	2.1E-04	1.5E+00	3.9E+00	1.1E-06	9.1E-06
Surf. (<5 ft)	IA-6	Th-232	2.34E+00	3.1E-01	1.1E+01	1.3E-04	1.8E-04	6.1E-02	3.4E+00	3.3E-05	4.8E-05	3.9E-02	5.6E-01	4.8E-07	2.0E-06
Surf. (<5 ft)	IA-6	U-234	3.09E+01	4.0E-01	0.0E+00	1.2E-06	0.0E+00	7.4E-02	0.0E+00	1.8E-07	0.0E+00	5.0E-02	0.0E+00	4.3E-08	0.0E+00
Surf. (<5 ft)	IA-6	U-235	4.27E+00	1.1E+00	0.0E+00	8.5E-06	0.0E+00	3.5E-01	0.0E+00	2.3E-06	0.0E+00	5.8E-02	0.0E+00	1.2E-07	0.0E+00
Surf. (<5 ft)	IA-6	U-238	3.08E+01	1.7E+00	0.0E+00	1.6E-05	0.0E+00	5.0E-01	0.0E+00	4.2E-06	0.0E+00	1.1E-01	0.0E+00	2.5E-07	0.0E+00
Surf. (<5 ft)	IA-6	TOTAL		8.4E+01	6.8E+01	9.1E-04	9.8E-04	2.1E+01	2.0E+01	2.3E-04	2.5E-04	6.9E+00	4.5E+00	1.0E-05	1.1E-05
Sub. (>0.5 ft)	IA-7	Ac-227	1.16E-01	1.5E-01	0.0E+00	4.1E-07	0.0E+00	3.8E-02	0.0E+00	1.2E-07	0.0E+00	1.3E-02	0.0E+00	1.0E-08	0.0E+00
Sub. (>0.5 ft)	IA-7	Pa-231	6.33E-01	2.8E-01	0.0E+00	1.3E-06	0.0E+00	4.8E-02	0.0E+00	3.2E-07	0.0E+00	3.3E-02	0.0E+00	1.1E-08	0.0E+00
Sub. (>0.5 ft)	IA-7	Pb-210	4.45E+00	1.1E+00	0.0E+00	2.5E-06	0.0E+00	1.4E-01	0.0E+00	2.9E-07	0.0E+00	1.4E-01	0.0E+00	1.1E-07	0.0E+00
Sub. (>0.5 ft)	IA-7	Ra-226	1.57E+00	5.7E+00	0.0E+00	8.1E-05	0.0E+00	1.8E+00	0.0E+00	2.2E-05	0.0E+00	2.8E-01	0.0E+00	1.0E-06	0.0E+00
Sub. (>0.5 ft)	IA-7	Th-228	1.30E-01	4.3E-01	0.0E+00	8.2E-07	0.0E+00	1.3E-01	0.0E+00	2.5E-07	0.0E+00	2.1E-02	0.0E+00	3.2E-08	0.0E+00
Sub. (>0.5 ft)	IA-7	Th-230	1.11E+02	3.0E+00	1.4E+01	4.6E-05	1.9E-04	5.9E-01	3.9E+00	9.9E-06	5.0E-05	3.7E-01	9.4E-01	2.7E-07	2.2E-06
Sub. (>0.5 ft)	IA-7	Th-232	6.40E-01	8.6E-02	2.9E+00	3.7E-05	5.0E-05	1.7E-02	9.2E-01	8.9E-06	1.3E-05	1.1E-02	1.5E-01	1.3E-07	5.4E-07
Sub. (>0.5 ft)	IA-7	U-234	8.46E+00	1.1E-01	0.0E+00	3.4E-07	0.0E+00	2.0E-02	0.0E+00	5.0E-08	0.0E+00	1.4E-02	0.0E+00	1.2E-08	0.0E+00
Sub. (>0.5 ft)	IA-7	U-235	7.52E-02	2.0E-02	0.0E+00	1.5E-07	0.0E+00	6.1E-03	0.0E+00	4.1E-08	0.0E+00	1.0E-03	0.0E+00	2.1E-09	0.0E+00
Sub. (>0.5 ft)	IA-7	U-238	8.41E+00	4.7E-01	0.0E+00	4.4E-06	0.0E+00	1.4E-01	0.0E+00	1.2E-06	0.0E+00	3.1E-02	0.0E+00	6.9E-08	0.0E+00
Sub. (>0.5 ft)	IA-7	TOTAL		1.1E+01	1.7E+01	1.7E-04	2.4E-04	2.9E+00	4.8E+00	4.3E-05	6.3E-05	9.2E-01	1.1E+00	1.7E-06	2.7E-06
Surf. (<5 ft)	IA-7	Ac-227	1.27E+02	1.7E+02	0.0E+00	4.4E-04	0.0E+00	4.2E+01	0.0E+00	1.3E-04	0.0E+00	1.5E+01	0.0E+00	1.1E-05	0.0E+00
Surf. (<5 ft)	IA-7	Pa-231	1.26E+02	5.5E+01	0.0E+00	2.7E-04	0.0E+00	9.5E+00	0.0E+00	6.5E-05	0.0E+00	6.5E+00	0.0E+00	2.1E-06	0.0E+00
Surf. (<5 ft)	IA-7	Pb-210	1.40E+02	3.3E+01	0.0E+00	7.7E-05	0.0E+00	4.4E+00	0.0E+00	9.1E-06	0.0E+00	4.3E+00	0.0E+00	3.4E-06	0.0E+00
Surf. (<5 ft)	IA-7	Ra-226	8.15E+01	3.0E+02	0.0E+00	4.2E-03	0.0E+00	9.4E+01	0.0E+00	1.1E-03	0.0E+00	1.5E+01	0.0E+00	5.4E-05	0.0E+00
Surf. (<5 ft)	IA-7	Ra-228	1.48E+00	2.9E+00	0.0E+00	3.1E-05	0.0E+00	9.2E-01	0.0E+00	9.7E-06	0.0E+00	1.5E-01	0.0E+00	7.6E-07	0.0E+00
Surf. (<5 ft)	IA-7	Th-228	1.53E+00	5.0E+00	0.0E+00	9.7E-06	0.0E+00	1.6E+00	0.0E+00	2.9E-06	0.0E+00	2.5E-01	0.0E+00	3.8E-07	0.0E+00
Surf. (<5 ft)	IA-7	Th-230	2.01E+03	5.5E+01	2.5E+02	8.3E-04	3.5E-03	1.1E+01	7.0E+01	1.8E-04	8.9E-04	6.7E+00	1.7E+01	4.8E-06	4.0E-05
Surf. (<5 ft)	IA-7	Th-232	1.50E+00	2.0E-01	6.9E+00	8.6E-05	1.2E-04	3.9E-02	2.1E+00	2.1E-05	3.1E-05	2.5E-02	3.6E-01	3.1E-07	1.3E-06
Surf. (<5 ft)	IA-7	U-234	2.76E+01	3.6E-01	0.0E+00	1.1E-06	0.0E+00	6.6E-02	0.0E+00	1.6E-07	0.0E+00	4.4E-02	0.0E+00	3.9E-08	0.0E+00
Surf. (<5 ft)	IA-7	U-235	1.02E+01	2.7E+00	0.0E+00	2.0E-05	0.0E+00	8.3E-01	0.0E+00	5.6E-06	0.0E+00	1.4E-01	0.0E+00	2.9E-07	0.0E+00
Surf. (<5 ft)	IA-7	U-238	2.75E+01	1.6E+00	0.0E+00	1.4E-05	0.0E+00	4.5E-01	0.0E+00	3.8E-06	0.0E+00	1.0E-01	0.0E+00	2.3E-07	0.0E+00
Surf. (<5 ft)	IA-7	TOTAL		6.2E+02	2.6E+02	6.0E-03	3.6E-03	1.6E+02	7.2E+01	1.6E-03	9.3E-04	4.8E+01	1.7E+01	7.8E-05	4.1E-05
Sub. (>0.5 ft)	IA-8	Ac-227	3.88E-01	5.1E-01	0.0E+00	1.4E-06	0.0E+00	1.3E-01	0.0E+00	4.0E-07	0.0E+00	4.5E-02	0.0E+00	3.5E-08	0.0E+00
Sub. (>0.5 ft)	IA-8	Pa-231	6.03E-01	2.7E-01	0.0E+00	1.3E-06	0.0E+00	4.6E-02	0.0E+00	3.1E-07	0.0E+00	3.1E-02	0.0E+00	1.0E-08	0.0E+00
Sub. (>0.5 ft)	IA-8	Pb-210	7.02E+00	1.7E+00	0.0E+00	3.9E-06	0.0E+00	2.2E-01	0.0E+00	4.6E-07	0.0E+00	2.1E-01	0.0E+00	1.7E-07	0.0E+00
Sub. (>0.5 ft)	IA-8	Ra-226	3.08E+00	1.1E+01	0.0E+00	1.6E-04	0.0E+00	3.5E+00	0.0E+00	4.3E-05	0.0E+00	5.6E-01	0.0E+00	2.1E-06	0.0E+00
Sub. (>0.5 ft)	IA-8	Th-228	2.00E-01	6.6E-01	0.0E+00	1.3E-06	0.0E+00	2.1E-01	0.0E+00	3.8E-07	0.0E+00	3.3E-02	0.0E+00	4.9E-08	0.0E+00
Sub. (>0.5 ft)	IA-8	Th-230	1.73E+02	4.7E+00	2.1E+01	7.2E-05	3.0E-04	9.2E-01	6.1E+00	1.5E-05	7.7E-05	5.8E-01	1.5E+00	4.1E-07	3.4E-06
Sub. (>0.5 ft)	IA-8	Th-232	1.26E+00	1.7E-01	5.8E+00	7.2E-05	9.8E-05	3.3E-02	1.8E+00	1.8E-05	2.6E-05	2.1E-02	3.0E-01	2.6E-07	1.1E-06
Sub. (>0.5 ft)	IA-8	U-234	1.25E+01	1.6E-01	0.0E+00	5.0E-07	0.0E+00	3.0E-02	0.0E+00	7.4E-08	0.0E+00	2.0E-02	0.0E+00	1.8E-08	0.0E+00
Sub. (>0.5 ft)	IA-8	U-235	1.46E-01	3.8E-02	0.0E+00	2.9E-07	0.0E+00	1.2E-02	0.0E+00	8.0E-08	0.0E+00	2.0E-03	0.0E+00	4.1E-09	0.0E+00
Sub. (>0.5 ft)	IA-8	U-238	1.24E+01	7.0E-01	0.0E+00	6.5E-06	0.0E+00	2.0E-01	0.0E+00	1.7E-06	0.0E+00	4.6E-02	0.0E+00	1.0E-07	0.0E+00
Sub. (>0.5 ft)	IA-8	TOTAL		2.0E+01	2.7E+01	3.2E-04	4.0E-04	5.3E+00	7.9E+00	8.0E-05	1.0E-04	1.5E+00	1.8E+00	3.1E-06	4.5E-06
Surf. (<0.5 ft)	IA-8	Ac-227	8.21E+01	1.1E+02	0.0E+00	2.9E-04	0.0E+00	2.7E+01	0.0E+00	8.4E-05	0.0E+00	9.5E+00	0.0E+00	7.3E-06	0.0E+00
Surf. (<0.5 ft)	IA-8	Pa-231	8.63E+01	3.8E+01	0.0E+00	1.8E-04	0.0E+00	6.5E+00	0.0E+00	4.4E-05	0.0E+00	4.4E+00	0.0E+00	1.4E-06	0.0E+00
Surf. (<0.5 ft)	IA-8	Pb-210	5.90E+01	1.4E+01	0.0E+00	3.2E-05	0.0E+00	1.8E+00	0.0E+00	3.8E-06	0.0E+00	1.8E+00	0.0E+00	1.4E-06	0.0E+00

			Exposure Point	RESIDENTIAL				INDUSTRIAL				MAINTENANCE			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<0.5 ft)	IA-8	Ra-226	3.37E+01	1.2E+02	0.0E+00	1.7E-03	0.0E+00	3.9E+01	0.0E+00	4.7E-04	0.0E+00	6.1E+00	0.0E+00	2.2E-05	0.0E+00
Surf. (<0.5 ft)	IA-8	Ra-228	6.63E-01	1.3E+00	0.0E+00	1.4E-05	0.0E+00	4.1E-01	0.0E+00	4.3E-06	0.0E+00	6.6E-02	0.0E+00	3.4E-07	0.0E+00
Surf. (<0.5 ft)	IA-8	Th-228	6.40E-01	2.1E+00	0.0E+00	4.0E-06	0.0E+00	6.6E-01	0.0E+00	1.2E-06	0.0E+00	1.0E-01	0.0E+00	1.6E-07	0.0E+00
Surf. (<0.5 ft)	IA-8	Th-230	1.75E+03	4.8E+01	2.2E+02	7.2E-04	3.0E-03	9.3E+00	6.1E+01	1.6E-04	7.8E-04	5.9E+00	1.5E+01	4.2E-06	3.5E-05
Surf. (<0.5 ft)	IA-8	Th-232	9.20E-01	1.2E-01	4.2E+00	5.3E-05	7.2E-05	2.4E-02	1.3E+00	1.3E-05	1.9E-05	1.5E-02	2.2E-01	1.9E-07	7.8E-07
Surf. (<0.5 ft)	IA-8	U-234	2.48E+01	3.2E-01	0.0E+00	9.9E-07	0.0E+00	5.9E-02	0.0E+00	1.5E-07	0.0E+00	4.0E-02	0.0E+00	3.5E-08	0.0E+00
Surf. (<0.5 ft)	IA-8	U-235	2.01E+01	5.3E+00	0.0E+00	4.0E-05	0.0E+00	1.6E+00	0.0E+00	1.1E-05	0.0E+00	2.8E-01	0.0E+00	5.7E-07	0.0E+00
Surf. (<0.5 ft)	IA-8	U-238	2.47E+01	1.4E+00	0.0E+00	1.3E-05	0.0E+00	4.0E-01	0.0E+00	3.4E-06	0.0E+00	9.1E-02	0.0E+00	2.0E-07	0.0E+00
Surf. (<0.5 ft)	IA-8	TOTAL		3.4E+02	2.2E+02	3.1E-03	3.1E-03	8.7E+01	6.3E+01	8.0E-04	8.0E-04	2.8E+01	1.5E+01	3.8E-05	3.5E-05
Sub. (>0.5 ft)	IA-9	Ac-227	5.09E+00	6.7E+00	0.0E+00	1.8E-05	0.0E+00	1.7E+00	0.0E+00	5.2E-06	0.0E+00	5.9E-01	0.0E+00	4.5E-07	0.0E+00
Sub. (>0.5 ft)	IA-9	Pa-231	5.86E+00	2.6E+00	0.0E+00	1.2E-05	0.0E+00	4.4E-01	0.0E+00	3.0E-06	0.0E+00	3.0E-01	0.0E+00	9.8E-08	0.0E+00
Sub. (>0.5 ft)	IA-9	Pb-210	5.58E+00	1.3E+00	0.0E+00	3.1E-06	0.0E+00	1.7E-01	0.0E+00	3.6E-07	0.0E+00	1.7E-01	0.0E+00	1.3E-07	0.0E+00
Sub. (>0.5 ft)	IA-9	Ra-226	2.23E+00	8.1E+00	0.0E+00	1.2E-04	0.0E+00	2.6E+00	0.0E+00	3.1E-05	0.0E+00	4.0E-01	0.0E+00	1.5E-06	0.0E+00
Sub. (>0.5 ft)	IA-9	Ra-228	2.30E-02	4.5E-02	0.0E+00	4.8E-07	0.0E+00	1.4E-02	0.0E+00	1.5E-07	0.0E+00	2.3E-03	0.0E+00	1.2E-08	0.0E+00
Sub. (>0.5 ft)	IA-9	Th-228	3.80E-01	1.2E+00	0.0E+00	2.4E-06	0.0E+00	3.9E-01	0.0E+00	7.2E-07	0.0E+00	6.2E-02	0.0E+00	9.4E-08	0.0E+00
Sub. (>0.5 ft)	IA-9	Th-230	1.03E+02	2.8E+00	1.3E+01	4.3E-05	1.8E-04	5.5E-01	3.6E+00	9.2E-06	4.6E-05	3.5E-01	8.7E-01	2.5E-07	2.0E-06
Sub. (>0.5 ft)	IA-9	Th-232	5.90E-01	7.9E-02	2.7E+00	3.4E-05	4.6E-05	1.5E-02	8.4E-01	8.2E-06	1.2E-05	9.8E-03	1.4E-01	1.2E-07	5.0E-07
Sub. (>0.5 ft)	IA-9	U-234	5.51E+00	7.1E-02	0.0E+00	2.2E-07	0.0E+00	1.3E-02	0.0E+00	3.3E-08	0.0E+00	8.9E-03	0.0E+00	7.7E-09	0.0E+00
Sub. (>0.5 ft)	IA-9	U-235	8.19E-01	2.1E-01	0.0E+00	1.6E-06	0.0E+00	6.7E-02	0.0E+00	4.5E-07	0.0E+00	1.1E-02	0.0E+00	2.3E-08	0.0E+00
Sub. (>0.5 ft)	IA-9	U-238	5.46E+00	3.1E-01	0.0E+00	2.8E-06	0.0E+00	8.9E-02	0.0E+00	7.5E-07	0.0E+00	2.0E-02	0.0E+00	4.5E-08	0.0E+00
Sub. (>0.5 ft)	IA-9	TOTAL		2.4E+01	1.6E+01	2.3E-04	2.2E-04	6.0E+00	4.5E+00	6.0E-05	5.8E-05	1.9E+00	1.0E+00	2.7E-06	2.5E-06
Surf. (<0.5 ft)	IA-9	Ac-227	2.63E+00	3.5E+00	0.0E+00	9.2E-06	0.0E+00	8.7E-01	0.0E+00	2.7E-06	0.0E+00	3.0E-01	0.0E+00	2.3E-07	0.0E+00
Surf. (<0.5 ft)	IA-9	Pa-231	3.50E+00	1.5E+00	0.0E+00	7.4E-06	0.0E+00	2.6E-01	0.0E+00	1.8E-06	0.0E+00	1.8E-01	0.0E+00	5.8E-08	0.0E+00
Surf. (<0.5 ft)	IA-9	Pb-210	2.87E+00	6.8E-01	0.0E+00	1.6E-06	0.0E+00	9.0E-02	0.0E+00	1.9E-07	0.0E+00	8.8E-02	0.0E+00	6.9E-08	0.0E+00
Surf. (<0.5 ft)	IA-9	Ra-226	6.40E-01	2.3E+00	0.0E+00	3.3E-05	0.0E+00	7.4E-01	0.0E+00	9.0E-06	0.0E+00	1.2E-01	0.0E+00	4.3E-07	0.0E+00
Surf. (<0.5 ft)	IA-9	Th-228	1.50E-01	4.9E-01	0.0E+00	9.5E-07	0.0E+00	1.6E-01	0.0E+00	2.8E-07	0.0E+00	2.4E-02	0.0E+00	3.7E-08	0.0E+00
Surf. (<0.5 ft)	IA-9	Th-230	3.26E+01	8.9E-01	4.0E+00	1.3E-05	5.6E-05	1.7E-01	1.1E+00	2.9E-06	1.5E-05	1.1E-01	2.8E-01	7.8E-08	6.5E-07
Surf. (<0.5 ft)	IA-9	Th-232	5.40E-01	7.2E-02	2.5E+00	3.1E-05	4.2E-05	1.4E-02	7.7E-01	7.5E-06	1.1E-05	9.0E-03	1.3E-01	1.1E-07	4.6E-07
Surf. (<0.5 ft)	IA-9	U-234	4.88E+00	6.3E-02	0.0E+00	1.9E-07	0.0E+00	1.2E-02	0.0E+00	2.9E-08	0.0E+00	7.9E-03	0.0E+00	6.9E-09	0.0E+00
Surf. (<0.5 ft)	IA-9	U-235	4.87E-01	1.3E-01	0.0E+00	9.7E-07	0.0E+00	4.0E-02	0.0E+00	2.7E-07	0.0E+00	6.7E-03	0.0E+00	1.4E-08	0.0E+00
Surf. (<0.5 ft)	IA-9	U-238	4.83E+00	2.7E-01	0.0E+00	2.5E-06	0.0E+00	7.9E-02	0.0E+00	6.6E-07	0.0E+00	1.8E-02	0.0E+00	4.0E-08	0.0E+00
Surf. (<0.5 ft)	IA-9	TOTAL		9.9E+00	6.5E+00	1.0E-04	9.8E-05	2.4E+00	1.9E+00	2.5E-05	2.6E-05	8.6E-01	4.1E-01	1.1E-06	1.1E-06
Sub. (>0.5 ft)	Norfork Southern	Pb-210	2.35E-01									7.2E-03	0.0E+00	5.7E-09	0.0E+00
Sub. (>0.5 ft)	Norfork Southern	Ra-226	2.01E+00									3.6E-01	0.0E+00	1.3E-06	0.0E+00
Sub. (>0.5 ft)	Norfork Southern	Th-230	1.51E+01									5.1E-02	1.3E-01	3.6E-08	3.0E-07
Sub. (>0.5 ft)	Norfork Southern	Th-232	8.50E-01									1.4E-02	2.0E-01	1.7E-07	7.2E-07
Sub. (>0.5 ft)	Norfork Southern	U-238	1.01E+01									3.7E-02	0.0E+00	8.3E-08	0.0E+00
Sub. (>0.5 ft)	Norfork Southern	TOTAL										4.7E-01	3.3E-01	1.6E-06	1.0E-06
Surf. (<0.5 ft)	Norfork Southern	Ac-227	4.20E-03									4.8E-04	0.0E+00	3.7E-10	0.0E+00
Surf. (<0.5 ft)	Norfork Southern	Pa-231	4.48E-02									2.3E-03	0.0E+00	7.5E-10	0.0E+00
Surf. (<0.5 ft)	Norfork Southern	Pb-210	4.28E-01									1.3E-02	0.0E+00	1.0E-08	0.0E+00
Surf. (<0.5 ft)	Norfork Southern	Ra-226	1.98E+00									3.6E-01	0.0E+00	1.3E-06	0.0E+00
Surf. (<0.5 ft)	Norfork Southern	Th-230	2.89E+01									9.7E-02	2.4E-01	6.9E-08	5.7E-07
Surf. (<0.5 ft)	Norfork Southern	Th-232	7.50E-01									1.2E-02	1.8E-01	1.5E-07	6.3E-07
Surf. (<0.5 ft)	Norfork Southern	U-238	1.01E+01									3.7E-02	0.0E+00	8.3E-08	0.0E+00
Surf. (<0.5 ft)	Norfork Southern	TOTAL										5.2E-01	4.2E-01	1.6E-06	1.2E-06
All Depths	Norfork Southern	Pb-210	2.44E-01									7.4E-03	0.0E+00	5.9E-09	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 29 of 60)

			Exposure	RESIDENTIAL				INDUSTRIAL				MAINTENANCE			
			Point												
			Conc.	Dose	Dose	Risk	Risk	Dose	Dose	Risk	Risk	Dose	Dose	Risk	Risk
Data Group	Property	Isotope	(pCi/g)	Year=0.0	Year=1000	Year=0.0	Year=1000	Year=0.0	Year=1000	Year=0.0	Year=1000	Year=0.0	Year=1000	Year=0.0	Year=1000
All Depths	Norfork Southern	Ra-226	1.83E+00									3.3E-01	0.0E+00	1.2E-06	0.0E+00
All Depths	Norfork Southern	Th-230	1.57E+01									5.3E-02	1.3E-01	3.7E-08	3.1E-07
All Depths	Norfork Southern	Th-232	7.60E-01									1.3E-02	1.8E-01	1.6E-07	6.4E-07
All Depths	Norfork Southern	U-238	9.72E+00									3.6E-02	0.0E+00	8.0E-08	0.0E+00
All Depths	Norfork Southern	TOTAL										4.4E-01	3.2E-01	1.5E-06	9.5E-07
Sub. (>0.5 ft)	ROAD ROW	Pb-210	1.88E-01	4.4E-02	0.0E+00	1.0E-07	0.0E+00	5.8E-03	0.0E+00	1.2E-08	0.0E+00	5.7E-03	0.0E+00	4.5E-09	0.0E+00
Sub. (>0.5 ft)	ROAD ROW	Ra-226	1.02E+00	3.7E+00	0.0E+00	5.3E-05	0.0E+00	1.2E+00	0.0E+00	1.4E-05	0.0E+00	1.8E-01	0.0E+00	6.8E-07	0.0E+00
Sub. (>0.5 ft)	ROAD ROW	Th-230	1.17E+01	3.2E-01	1.5E+00	4.9E-06	2.0E-05	6.2E-02	4.1E-01	1.0E-06	5.2E-06	3.9E-02	9.9E-02	2.8E-08	2.3E-07
Sub. (>0.5 ft)	ROAD ROW	Th-232	1.17E+00	1.6E-01	5.4E+00	6.7E-05	9.1E-05	3.0E-02	1.7E+00	1.6E-05	2.4E-05	1.9E-02	2.8E-01	2.4E-07	9.9E-07
Sub. (>0.5 ft)	ROAD ROW	U-238	1.04E+01	5.9E-01	0.0E+00	5.4E-06	0.0E+00	1.7E-01	0.0E+00	1.4E-06	0.0E+00	3.8E-02	0.0E+00	8.6E-08	0.0E+00
Sub. (>0.5 ft)	ROAD ROW	TOTAL		4.8E+00	6.8E+00	1.3E-04	1.1E-04	1.4E+00	2.1E+00	3.3E-05	2.9E-05	2.9E-01	3.8E-01	1.0E-06	1.2E-06
Surf. (<0.5 ft)	ROAD ROW	Ac-227	8.10E-02	1.1E-01	0.0E+00	2.8E-07	0.0E+00	2.7E-02	0.0E+00	8.3E-08	0.0E+00	9.3E-03	0.0E+00	7.2E-09	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	Pa-231	5.42E-01	2.4E-01	0.0E+00	1.2E-06	0.0E+00	4.1E-02	0.0E+00	2.8E-07	0.0E+00	2.8E-02	0.0E+00	9.1E-09	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	Pb-210	3.72E+00	8.8E-01	0.0E+00	2.1E-06	0.0E+00	1.2E-01	0.0E+00	2.4E-07	0.0E+00	1.1E-01	0.0E+00	9.0E-08	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	Ra-226	5.04E+00	1.8E+01	0.0E+00	2.6E-04	0.0E+00	5.8E+00	0.0E+00	7.1E-05	0.0E+00	9.1E-01	0.0E+00	3.4E-06	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	Ra-228	4.30E-02	8.5E-02	0.0E+00	8.9E-07	0.0E+00	2.7E-02	0.0E+00	2.8E-07	0.0E+00	4.3E-03	0.0E+00	2.2E-08	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	Th-228	3.30E-01	1.1E+00	0.0E+00	2.1E-06	0.0E+00	3.4E-01	0.0E+00	6.2E-07	0.0E+00	5.4E-02	0.0E+00	8.1E-08	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	Th-230	2.64E+02	7.2E+00	3.3E+01	1.1E-04	4.5E-04	1.4E+00	9.3E+00	2.4E-05	1.2E-04	8.9E-01	2.2E+00	6.3E-07	5.2E-06
Surf. (<0.5 ft)	ROAD ROW	Th-232	1.03E+00	1.4E-01	4.7E+00	5.9E-05	8.0E-05	2.7E-02	1.5E+00	1.4E-05	2.1E-05	1.7E-02	2.5E-01	2.1E-07	8.7E-07
Surf. (<0.5 ft)	ROAD ROW	U-234	2.06E+00	2.7E-02	0.0E+00	8.2E-08	0.0E+00	4.9E-03	0.0E+00	1.2E-08	0.0E+00	3.3E-03	0.0E+00	2.9E-09	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	U-235	1.78E-01	4.7E-02	0.0E+00	3.5E-07	0.0E+00	1.4E-02	0.0E+00	9.8E-08	0.0E+00	2.4E-03	0.0E+00	5.0E-09	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	U-238	1.06E+01	6.0E-01	0.0E+00	5.5E-06	0.0E+00	1.7E-01	0.0E+00	1.5E-06	0.0E+00	3.9E-02	0.0E+00	8.7E-08	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	TOTAL		2.9E+01	3.7E+01	4.4E-04	5.4E-04	8.0E+00	1.1E+01	1.1E-04	1.4E-04	2.1E+00	2.5E+00	4.5E-06	6.1E-06
All Depths	ROAD ROW	Ac-227	8.10E-02	1.1E-01	0.0E+00	2.8E-07	0.0E+00	2.7E-02	0.0E+00	8.3E-08	0.0E+00	9.3E-03	0.0E+00	7.2E-09	0.0E+00
All Depths	ROAD ROW	Pa-231	5.42E-01	2.4E-01	0.0E+00	1.2E-06	0.0E+00	4.1E-02	0.0E+00	2.8E-07	0.0E+00	2.8E-02	0.0E+00	9.1E-09	0.0E+00
All Depths	ROAD ROW	Pb-210	6.99E-01	1.7E-01	0.0E+00	3.8E-07	0.0E+00	2.2E-02	0.0E+00	4.6E-08	0.0E+00	2.1E-02	0.0E+00	1.7E-08	0.0E+00
All Depths	ROAD ROW	Ra-226	1.84E+00	6.7E+00	0.0E+00	9.5E-05	0.0E+00	2.1E+00	0.0E+00	2.6E-05	0.0E+00	3.3E-01	0.0E+00	1.2E-06	0.0E+00
All Depths	ROAD ROW	Ra-228	4.30E-02	8.5E-02	0.0E+00	8.9E-07	0.0E+00	2.7E-02	0.0E+00	2.8E-07	0.0E+00	4.3E-03	0.0E+00	2.2E-08	0.0E+00
All Depths	ROAD ROW	Th-228	3.30E-01	1.1E+00	0.0E+00	2.1E-06	0.0E+00	3.4E-01	0.0E+00	6.2E-07	0.0E+00	5.4E-02	0.0E+00	8.1E-08	0.0E+00
All Depths	ROAD ROW	Th-230	4.82E+01	1.3E+00	6.0E+00	2.0E-05	8.3E-05	2.6E-01	1.7E+00	4.3E-06	2.1E-05	1.6E-01	4.1E-01	1.1E-07	9.5E-07
All Depths	ROAD ROW	Th-232	1.11E+00	1.5E-01	5.1E+00	6.4E-05	8.6E-05	2.9E-02	1.6E+00	1.5E-05	2.3E-05	1.8E-02	2.7E-01	2.3E-07	9.4E-07
All Depths	ROAD ROW	U-235	1.78E-01	4.7E-02	0.0E+00	3.5E-07	0.0E+00	1.4E-02	0.0E+00	9.8E-08	0.0E+00	2.4E-03	0.0E+00	5.0E-09	0.0E+00
All Depths	ROAD ROW	U-238	1.03E+01	5.8E-01	0.0E+00	5.4E-06	0.0E+00	1.7E-01	0.0E+00	1.4E-06	0.0E+00	3.8E-02	0.0E+00	8.5E-08	0.0E+00
All Depths	ROAD ROW	TOTAL		1.0E+01	1.1E+01	1.9E-04	1.7E-04	3.0E+00	3.3E+00	4.9E-05	4.4E-05	6.7E-01	6.7E-01	1.8E-06	1.9E-06
Sub. (>0.5 ft)	SLAPS	Ac-227	4.18E+00	5.5E+00	0.0E+00	1.5E-05	0.0E+00	1.4E+00	0.0E+00	4.3E-06	0.0E+00	4.8E-01	0.0E+00	3.7E-07	0.0E+00
Sub. (>0.5 ft)	SLAPS	Pa-231	4.57E+00	2.0E+00	0.0E+00	9.7E-06	0.0E+00	3.4E-01	0.0E+00	2.3E-06	0.0E+00	2.3E-01	0.0E+00	7.6E-08	0.0E+00
Sub. (>0.5 ft)	SLAPS	Pb-210	7.57E+01	1.8E+01	0.0E+00	4.2E-05	0.0E+00	2.4E+00	0.0E+00	4.9E-06	0.0E+00	2.3E+00	0.0E+00	1.8E-06	0.0E+00
Sub. (>0.5 ft)	SLAPS	Ra-226	4.35E+01	1.6E+02	0.0E+00	2.2E-03	0.0E+00	5.0E+01	0.0E+00	6.1E-04	0.0E+00	7.9E+00	0.0E+00	2.9E-05	0.0E+00
Sub. (>0.5 ft)	SLAPS	Ra-228	8.00E-03	1.6E-02	0.0E+00	1.7E-07	0.0E+00	5.0E-03	0.0E+00	5.2E-08	0.0E+00	8.0E-04	0.0E+00	4.1E-09	0.0E+00
Sub. (>0.5 ft)	SLAPS	Th-228	1.20E-01	3.9E-01	0.0E+00	7.6E-07	0.0E+00	1.2E-01	0.0E+00	2.3E-07	0.0E+00	2.0E-02	0.0E+00	3.0E-08	0.0E+00
Sub. (>0.5 ft)	SLAPS	Th-230	2.19E+02	6.0E+00	2.7E+01	9.1E-05	3.8E-04	1.2E+00	7.7E+00	2.0E-05	9.8E-05	7.4E-01	1.9E+00	5.2E-07	4.3E-06
Sub. (>0.5 ft)	SLAPS	Th-232	1.39E+00	1.9E-01	6.4E+00	8.0E-05	1.1E-04	3.6E-02	2.0E+00	1.9E-05	2.9E-05	2.3E-02	3.3E-01	2.9E-07	1.2E-06
Sub. (>0.5 ft)	SLAPS	U-234	4.12E+01	5.3E-01	0.0E+00	1.6E-06	0.0E+00	9.9E-02	0.0E+00	2.5E-07	0.0E+00	6.6E-02	0.0E+00	5.8E-08	0.0E+00
Sub. (>0.5 ft)	SLAPS	U-235	1.41E+00	3.7E-01	0.0E+00	2.8E-06	0.0E+00	1.1E-01	0.0E+00	7.7E-07	0.0E+00	1.9E-02	0.0E+00	4.0E-08	0.0E+00
Sub. (>0.5 ft)	SLAPS	U-238	4.11E+01	2.3E+00	0.0E+00	2.1E-05	0.0E+00	6.7E-01	0.0E+00	5.7E-06	0.0E+00	1.5E-01	0.0E+00	3.4E-07	0.0E+00
Sub. (>0.5 ft)	SLAPS	TOTAL		1.9E+02	3.4E+01	2.5E-03	4.9E-04	5.6E+01	9.7E+00	6.7E-04	1.3E-04	1.2E+01	2.2E+00	3.3E-05	5.5E-06
Surf. (<5 ft)	SLAPS	Ac-227	3.24E+01	4.3E+01	0.0E+00	1.1E-04	0.0E+00	1.1E+01	0.0E+00	3.3E-05	0.0E+00	3.7E+00	0.0E+00	2.9E-06	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 30 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL Dose Year=0.0	RESIDENTIAL Dose Year=1000	RESIDENTIAL Risk Year=0.0	RESIDENTIAL Risk Year=1000	INDUSTRIAL Dose Year=0.0	INDUSTRIAL Dose Year=1000	INDUSTRIAL Risk Year=0.0	INDUSTRIAL Risk Year=1000	MAINTENANCE Dose Year=0.0	MAINTENANCE Dose Year=1000	MAINTENANCE Risk Year=0.0	MAINTENANCE Risk Year=1000
Surf. (<5 ft)	SLAPS	Pa-231	3.39E+01	1.5E+01	0.0E+00	7.2E-05	0.0E+00	2.6E+00	0.0E+00	1.7E-05	0.0E+00	1.7E+00	0.0E+00	5.7E-07	0.0E+00
Surf. (<5 ft)	SLAPS	Pb-210	1.00E+02	2.4E+01	0.0E+00	5.5E-05	0.0E+00	3.1E+00	0.0E+00	6.5E-06	0.0E+00	3.0E+00	0.0E+00	2.4E-06	0.0E+00
Surf. (<5 ft)	SLAPS	Ra-226	5.78E+01	2.1E+02	0.0E+00	3.0E-03	0.0E+00	6.6E+01	0.0E+00	8.1E-04	0.0E+00	1.0E+01	0.0E+00	3.9E-05	0.0E+00
Surf. (<5 ft)	SLAPS	Ra-228	3.73E-01	7.4E-01	0.0E+00	7.7E-06	0.0E+00	2.3E-01	0.0E+00	2.4E-06	0.0E+00	3.7E-02	0.0E+00	1.9E-07	0.0E+00
Surf. (<5 ft)	SLAPS	Th-228	4.10E-01	1.3E+00	0.0E+00	2.6E-06	0.0E+00	4.3E-01	0.0E+00	7.7E-07	0.0E+00	6.7E-02	0.0E+00	1.0E-07	0.0E+00
Surf. (<5 ft)	SLAPS	Th-230	8.21E+02	2.2E+01	1.0E+02	3.4E-04	1.4E-03	4.4E+00	2.9E+01	7.3E-05	3.7E-04	2.8E+00	6.9E+00	2.0E-06	1.6E-05
Surf. (<5 ft)	SLAPS	Th-232	1.87E+00	2.5E-01	8.6E+00	1.1E-04	1.5E-04	4.9E-02	2.7E+00	2.6E-05	3.8E-05	3.1E-02	4.5E-01	3.8E-07	1.6E-06
Surf. (<5 ft)	SLAPS	U-234	4.85E+01	6.3E-01	0.0E+00	1.9E-06	0.0E+00	1.2E-01	0.0E+00	2.9E-07	0.0E+00	7.8E-02	0.0E+00	6.8E-08	0.0E+00
Surf. (<5 ft)	SLAPS	U-235	4.16E+00	1.1E+00	0.0E+00	8.3E-06	0.0E+00	3.4E-01	0.0E+00	2.3E-06	0.0E+00	5.7E-02	0.0E+00	1.2E-07	0.0E+00
Surf. (<5 ft)	SLAPS	U-238	4.84E+01	2.7E+00	0.0E+00	2.5E-05	0.0E+00	7.9E-01	0.0E+00	6.7E-06	0.0E+00	1.8E-01	0.0E+00	4.0E-07	0.0E+00
Surf. (<5 ft)	SLAPS	TOTAL		3.2E+02	1.1E+02	3.7E-03	1.6E-03	8.9E+01	3.1E+01	9.8E-04	4.0E-04	2.2E+01	7.4E+00	4.8E-05	1.8E-05
All Depths	Stone Container	Ac-227	2.78E+00	3.7E+00	0.0E+00	9.7E-06	0.0E+00	9.2E-01	0.0E+00	2.8E-06	0.0E+00	3.2E-01	0.0E+00	2.5E-07	0.0E+00
All Depths	Stone Container	Pa-231	3.34E+00	1.5E+00	0.0E+00	7.1E-06	0.0E+00	2.5E-01	0.0E+00	1.7E-06	0.0E+00	1.7E-01	0.0E+00	5.6E-08	0.0E+00
All Depths	Stone Container	Pb-210	6.53E+00	1.5E+00	0.0E+00	3.6E-06	0.0E+00	2.0E-01	0.0E+00	4.3E-07	0.0E+00	2.0E-01	0.0E+00	1.6E-07	0.0E+00
All Depths	Stone Container	Ra-226	1.67E+00	6.1E+00	0.0E+00	8.6E-05	0.0E+00	1.9E+00	0.0E+00	2.4E-05	0.0E+00	3.0E-01	0.0E+00	1.1E-06	0.0E+00
All Depths	Stone Container	Ra-228	8.30E-02	1.6E-01	0.0E+00	1.7E-06	0.0E+00	5.1E-02	0.0E+00	5.4E-07	0.0E+00	8.3E-03	0.0E+00	4.3E-08	0.0E+00
All Depths	Stone Container	Th-230	1.17E+02	3.2E+00	1.5E+01	4.9E-05	2.0E-04	6.2E-01	4.1E+00	1.0E-05	5.2E-05	3.9E-01	9.9E-01	2.8E-07	2.3E-06
All Depths	Stone Container	Th-232	8.40E-01	1.1E-01	3.9E+00	4.8E-05	6.5E-05	2.2E-02	1.2E+00	1.2E-05	1.7E-05	1.4E-02	2.0E-01	1.7E-07	7.1E-07
All Depths	Stone Container	U-234	9.17E+00	1.2E-01	0.0E+00	3.7E-07	0.0E+00	2.2E-02	0.0E+00	5.5E-08	0.0E+00	1.5E-02	0.0E+00	1.3E-08	0.0E+00
All Depths	Stone Container	U-235	4.14E-01	1.1E-01	0.0E+00	8.2E-07	0.0E+00	3.4E-02	0.0E+00	2.3E-07	0.0E+00	5.7E-03	0.0E+00	1.2E-08	0.0E+00
All Depths	Stone Container	U-238	9.12E+00	5.1E-01	0.0E+00	4.7E-06	0.0E+00	1.5E-01	0.0E+00	1.3E-06	0.0E+00	3.3E-02	0.0E+00	7.5E-08	0.0E+00
All Depths	Stone Container	TOTAL		1.7E+01	1.8E+01	2.1E-04	2.7E-04	4.2E+00	5.3E+00	5.3E-05	7.0E-05	1.5E+00	1.2E+00	2.2E-06	3.0E-06
Sub. (>0.5 ft)	Wabash/VP-2(C)	Pb-210	9.24E-02	2.2E-02	0.0E+00	5.1E-08	0.0E+00	2.9E-03	0.0E+00	6.0E-09	0.0E+00	2.8E-03	0.0E+00	2.2E-09	0.0E+00
Sub. (>0.5 ft)	Wabash/VP-2(C)	Ra-226	1.80E-01	6.6E-01	0.0E+00	9.3E-06	0.0E+00	2.1E-01	0.0E+00	2.5E-06	0.0E+00	3.3E-02	0.0E+00	1.2E-07	0.0E+00
Sub. (>0.5 ft)	Wabash/VP-2(C)	Th-230	4.94E+00	1.3E-01	6.1E-01	2.0E-06	8.5E-06	2.6E-02	1.7E-01	4.4E-07	2.2E-06	1.7E-02	4.2E-02	1.2E-08	9.8E-08
Sub. (>0.5 ft)	Wabash/VP-2(C)	Th-232	8.50E-01	1.1E-01	3.9E+00	4.9E-05	6.6E-05	2.2E-02	1.2E+00	1.2E-05	1.7E-05	1.4E-02	2.0E-01	1.7E-07	7.2E-07
Sub. (>0.5 ft)	Wabash/VP-2(C)	U-238	6.72E+00	3.8E-01	0.0E+00	3.5E-06	0.0E+00	1.1E-01	0.0E+00	9.2E-07	0.0E+00	2.5E-02	0.0E+00	5.5E-08	0.0E+00
Sub. (>0.5 ft)	Wabash/VP-2(C)	TOTAL		1.3E+00	4.5E+00	6.4E-05	7.5E-05	3.7E-01	1.4E+00	1.6E-05	2.0E-05	9.1E-02	2.5E-01	3.6E-07	8.2E-07
Surf. (<0.5 ft)	Wabash/VP-2(C)	Pb-210	9.35E-02	2.2E-02	0.0E+00	5.1E-08	0.0E+00	2.9E-03	0.0E+00	6.1E-09	0.0E+00	2.9E-03	0.0E+00	2.3E-09	0.0E+00
Surf. (<0.5 ft)	Wabash/VP-2(C)	Ra-226	1.13E+00	4.1E+00	0.0E+00	5.8E-05	0.0E+00	1.3E+00	0.0E+00	1.6E-05	0.0E+00	2.0E-01	0.0E+00	7.5E-07	0.0E+00
Surf. (<0.5 ft)	Wabash/VP-2(C)	Th-230	5.02E+00	1.4E-01	6.2E-01	2.1E-06	8.6E-06	2.7E-02	1.8E-01	4.5E-07	2.2E-06	1.7E-02	4.2E-02	1.2E-08	9.9E-08
Surf. (<0.5 ft)	Wabash/VP-2(C)	Th-232	1.37E+00	1.8E-01	6.3E+00	7.8E-05	1.1E-04	3.6E-02	2.0E+00	1.9E-05	2.8E-05	2.3E-02	3.3E-01	2.8E-07	1.2E-06
Surf. (<0.5 ft)	Wabash/VP-2(C)	U-238	1.12E+01	6.3E-01	0.0E+00	5.8E-06	0.0E+00	1.8E-01	0.0E+00	1.5E-06	0.0E+00	4.1E-02	0.0E+00	9.2E-08	0.0E+00
Surf. (<0.5 ft)	Wabash/VP-2(C)	TOTAL		5.1E+00	6.9E+00	1.4E-04	1.2E-04	1.5E+00	2.1E+00	3.7E-05	3.0E-05	2.9E-01	3.7E-01	1.1E-06	1.3E-06
All Depths	Wabash/VP-2(C)	Pb-210	8.65E-02	2.0E-02	0.0E+00	4.8E-08	0.0E+00	2.7E-03	0.0E+00	5.6E-09	0.0E+00	2.6E-03	0.0E+00	2.1E-09	0.0E+00
All Depths	Wabash/VP-2(C)	Ra-226	8.80E-01	3.2E+00	0.0E+00	4.5E-05	0.0E+00	1.0E+00	0.0E+00	1.2E-05	0.0E+00	1.6E-01	0.0E+00	5.9E-07	0.0E+00
All Depths	Wabash/VP-2(C)	Th-230	4.52E+00	1.2E-01	5.6E-01	1.9E-06	7.8E-06	2.4E-02	1.6E-01	4.0E-07	2.0E-06	1.5E-02	3.8E-02	1.1E-08	8.9E-08
All Depths	Wabash/VP-2(C)	Th-232	1.08E+00	1.4E-01	5.0E+00	6.2E-05	8.4E-05	2.8E-02	1.5E+00	1.5E-05	2.2E-05	1.8E-02	2.6E-01	2.2E-07	9.1E-07
All Depths	Wabash/VP-2(C)	U-238	9.72E+00	5.5E-01	0.0E+00	5.1E-06	0.0E+00	1.6E-01	0.0E+00	1.3E-06	0.0E+00	3.6E-02	0.0E+00	8.0E-08	0.0E+00
All Depths	Wabash/VP-2(C)	TOTAL		4.0E+00	5.5E+00	1.1E-04	9.2E-05	1.2E+00	1.7E+00	2.9E-05	2.4E-05	2.3E-01	3.0E-01	9.0E-07	1.0E-06

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	RECREATIONAL/TRESPASSER Dose Year=1000	RECREATIONAL/TRESPASSER Risk Year=0.0	RECREATIONAL/TRESPASSER Risk Year=1000	CONSTRUCTION Dose Year=0.0	CONSTRUCTION Dose Year=1000	CONSTRUCTION Risk Year=0.0	CONSTRUCTION Risk Year=1000
Sub. (>0.5 ft)	09K120040/VP-3(C)	Ac-227	5.60E-02	9.0E-04	0.0E+00	1.9E-09	0.0E+00	7.4E-02	0.0E+00	1.3E-08	0.0E+00
Sub. (>0.5 ft)	09K120040/VP-3(C)	Pa-231	1.04E-01	2.9E-04	0.0E+00	6.8E-10	0.0E+00	5.4E-02	0.0E+00	1.3E-09	0.0E+00
Sub. (>0.5 ft)	09K120040/VP-3(C)	Pb-210	5.32E-01	4.4E-04	0.0E+00	4.4E-10	0.0E+00	1.6E-01	0.0E+00	2.1E-08	0.0E+00
Sub. (>0.5 ft)	09K120040/VP-3(C)	Ra-226	1.13E+00	7.1E-02	0.0E+00	3.5E-07	0.0E+00	2.8E+00	0.0E+00	1.6E-06	0.0E+00
Sub. (>0.5 ft)	09K120040/VP-3(C)	Th-230	3.63E+01	7.8E-03	6.6E-02	2.7E-08	3.2E-07	1.3E+00	3.8E+00	8.3E-08	1.4E-06
Sub. (>0.5 ft)	09K120040/VP-3(C)	Th-232	3.10E-01	3.2E-04	2.4E-02	4.1E-08	1.3E-07	5.6E-02	9.9E-01	6.7E-10	5.4E-07
Sub. (>0.5 ft)	09K120040/VP-3(C)	U-238	1.52E+00	1.3E-03	0.0E+00	4.8E-09	0.0E+00	6.9E-02	0.0E+00	2.6E-08	0.0E+00
Sub. (>0.5 ft)	09K120040/VP-3(C)	TOTAL		8.2E-02	9.0E-02	4.3E-07	4.4E-07	4.5E+00	4.8E+00	1.8E-06	2.0E-06
Surf. (<0.5 ft)	09K120040/VP-3(C)	Pb-210	1.86E-01	1.6E-04	0.0E+00	1.5E-10	0.0E+00	5.5E-02	0.0E+00	7.5E-09	0.0E+00
Surf. (<0.5 ft)	09K120040/VP-3(C)	Ra-226	6.50E-01	4.1E-02	0.0E+00	2.0E-07	0.0E+00	1.6E+00	0.0E+00	9.4E-07	0.0E+00
Surf. (<0.5 ft)	09K120040/VP-3(C)	Th-230	1.16E+01	2.5E-03	2.1E-02	8.6E-09	1.0E-07	4.2E-01	1.2E+00	2.6E-08	4.6E-07
Surf. (<0.5 ft)	09K120040/VP-3(C)	Th-232	1.01E+00	1.1E-03	7.9E-02	1.3E-07	4.1E-07	1.8E-01	3.2E+00	2.2E-09	1.8E-06
Surf. (<0.5 ft)	09K120040/VP-3(C)	U-238	8.69E+00	7.4E-03	0.0E+00	2.7E-08	0.0E+00	4.0E-01	0.0E+00	1.5E-07	0.0E+00
Surf. (<0.5 ft)	09K120040/VP-3(C)	TOTAL		5.2E-02	1.0E-01	3.7E-07	5.1E-07	2.7E+00	4.4E+00	1.1E-06	2.2E-06
All Depths	09K120040/VP-3(C)	Pb-210	1.99E-01	1.7E-04	0.0E+00	1.7E-10	0.0E+00	5.8E-02	0.0E+00	8.0E-09	0.0E+00
All Depths	09K120040/VP-3(C)	Ra-226	6.90E-01	4.3E-02	0.0E+00	2.2E-07	0.0E+00	1.7E+00	0.0E+00	1.0E-06	0.0E+00
All Depths	09K120040/VP-3(C)	Th-230	1.25E+01	2.7E-03	2.3E-02	9.2E-09	1.1E-07	4.6E-01	1.3E+00	2.9E-08	5.0E-07
All Depths	09K120040/VP-3(C)	Th-232	8.50E-01	8.9E-04	6.6E-02	1.1E-07	3.4E-07	1.5E-01	2.7E+00	1.8E-09	1.5E-06
All Depths	09K120040/VP-3(C)	U-238	1.52E+00	1.3E-03	0.0E+00	4.8E-09	0.0E+00	6.9E-02	0.0E+00	2.6E-08	0.0E+00
All Depths	09K120040/VP-3(C)	TOTAL		4.8E-02	8.9E-02	3.4E-07	4.5E-07	2.4E+00	4.0E+00	1.1E-06	2.0E-06
Sub. (>0.5 ft)	09K120116/VP-5(C)	Ac-227	2.17E-01	3.5E-03	0.0E+00	7.3E-09	0.0E+00	2.9E-01	0.0E+00	5.0E-08	0.0E+00
Sub. (>0.5 ft)	09K120116/VP-5(C)	Pa-231	2.88E-01	8.1E-04	0.0E+00	1.9E-09	0.0E+00	1.5E-01	0.0E+00	3.7E-09	0.0E+00
Sub. (>0.5 ft)	09K120116/VP-5(C)	Pb-210	8.54E-01	7.1E-04	0.0E+00	7.1E-10	0.0E+00	2.5E-01	0.0E+00	3.4E-08	0.0E+00
Sub. (>0.5 ft)	09K120116/VP-5(C)	Ra-226	8.90E-01	5.6E-02	0.0E+00	2.8E-07	0.0E+00	2.2E+00	0.0E+00	1.3E-06	0.0E+00
Sub. (>0.5 ft)	09K120116/VP-5(C)	Th-230	5.93E+01	1.3E-02	1.1E-01	4.4E-08	5.2E-07	2.2E+00	6.2E+00	1.3E-07	2.4E-06
Sub. (>0.5 ft)	09K120116/VP-5(C)	Th-232	8.90E-01	9.3E-04	6.9E-02	1.2E-07	3.6E-07	1.6E-01	2.8E+00	1.9E-09	1.6E-06
Sub. (>0.5 ft)	09K120116/VP-5(C)	U-238	4.45E+00	3.8E-03	0.0E+00	1.4E-08	0.0E+00	2.0E-01	0.0E+00	7.7E-08	0.0E+00
Sub. (>0.5 ft)	09K120116/VP-5(C)	TOTAL		7.8E-02	1.8E-01	4.7E-07	8.8E-07	5.4E+00	9.0E+00	1.6E-06	3.9E-06
Surf. (<0.5 ft)	09K120116/VP-5(C)	Pb-210	1.96E-01	1.6E-04	0.0E+00	1.6E-10	0.0E+00	5.7E-02	0.0E+00	7.9E-09	0.0E+00
Surf. (<0.5 ft)	09K120116/VP-5(C)	Ra-226	5.10E-01	3.2E-02	0.0E+00	1.6E-07	0.0E+00	1.3E+00	0.0E+00	7.4E-07	0.0E+00
Surf. (<0.5 ft)	09K120116/VP-5(C)	Th-230	1.23E+01	2.6E-03	2.2E-02	9.1E-09	1.1E-07	4.5E-01	1.3E+00	2.8E-08	4.9E-07
Surf. (<0.5 ft)	09K120116/VP-5(C)	Th-232	1.89E+00	2.0E-03	1.5E-01	2.5E-07	7.6E-07	3.4E-01	6.1E+00	4.1E-09	3.3E-06
Surf. (<0.5 ft)	09K120116/VP-5(C)	U-238	2.52E+00	2.2E-03	0.0E+00	7.9E-09	0.0E+00	1.1E-01	0.0E+00	4.4E-08	0.0E+00
Surf. (<0.5 ft)	09K120116/VP-5(C)	TOTAL		3.9E-02	1.7E-01	4.3E-07	8.7E-07	2.2E+00	7.3E+00	8.2E-07	3.8E-06
All Depths	09K120116/VP-5(C)	Pa-231	1.68E-02	4.7E-05	0.0E+00	1.1E-10	0.0E+00	8.8E-03	0.0E+00	2.2E-10	0.0E+00
All Depths	09K120116/VP-5(C)	Pb-210	3.79E-01	3.2E-04	0.0E+00	3.2E-10	0.0E+00	1.1E-01	0.0E+00	1.5E-08	0.0E+00
All Depths	09K120116/VP-5(C)	Ra-226	4.80E-01	3.0E-02	0.0E+00	1.5E-07	0.0E+00	1.2E+00	0.0E+00	7.0E-07	0.0E+00
All Depths	09K120116/VP-5(C)	Th-230	2.54E+01	5.4E-03	4.6E-02	1.9E-08	2.2E-07	9.3E-01	2.6E+00	5.8E-08	1.0E-06
All Depths	09K120116/VP-5(C)	Th-232	6.10E-01	6.4E-04	4.7E-02	8.1E-08	2.5E-07	1.1E-01	2.0E+00	1.3E-09	1.1E-06
All Depths	09K120116/VP-5(C)	U-238	2.52E+00	2.2E-03	0.0E+00	7.9E-09	0.0E+00	1.1E-01	0.0E+00	4.4E-08	0.0E+00
All Depths	09K120116/VP-5(C)	TOTAL		3.9E-02	9.4E-02	2.6E-07	4.7E-07	2.5E+00	4.6E+00	8.1E-07	2.1E-06
Sub. (>0.5 ft)	09K120127/VP-4(C)	Pb-210	5.36E-02	4.5E-05	0.0E+00	4.5E-11	0.0E+00	1.6E-02	0.0E+00	2.2E-09	0.0E+00
Sub. (>0.5 ft)	09K120127/VP-4(C)	Ra-226	1.50E-01	9.4E-03	0.0E+00	4.7E-08	0.0E+00	3.7E-01	0.0E+00	2.2E-07	0.0E+00
Sub. (>0.5 ft)	09K120127/VP-4(C)	Th-230	2.17E+00	4.6E-04	4.0E-03	1.6E-09	1.9E-08	7.9E-02	2.3E-01	4.9E-09	8.7E-08
Sub. (>0.5 ft)	09K120127/VP-4(C)	U-238	4.34E+00	3.7E-03	0.0E+00	1.4E-08	0.0E+00	2.0E-01	0.0E+00	7.5E-08	0.0E+00
Sub. (>0.5 ft)	09K120127/VP-4(C)	TOTAL		1.4E-02	4.0E-03	6.2E-08	1.9E-08	6.6E-01	2.3E-01	3.0E-07	8.7E-08

Attachment 12. Radiological Doses and Risks for each Property (page 32 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	RECREATIONAL/TRESPASSER Dose Year=1000	RECREATIONAL/TRESPASSER Risk Year=0.0	RECREATIONAL/TRESPASSER Risk Year=1000	CONSTRUCTION Dose Year=0.0	CONSTRUCTION Dose Year=1000	CONSTRUCTION Risk Year=0.0	CONSTRUCTION Risk Year=1000
Surf. (<0.5 ft)	09K120127/VP-4(C)	Pb-210	7.49E-02	6.2E-05	0.0E+00	6.2E-11	0.0E+00	2.2E-02	0.0E+00	3.0E-09	0.0E+00
Surf. (<0.5 ft)	09K120127/VP-4(C)	Ra-226	5.70E-01	3.6E-02	0.0E+00	1.8E-07	0.0E+00	1.4E+00	0.0E+00	8.3E-07	0.0E+00
Surf. (<0.5 ft)	09K120127/VP-4(C)	Th-230	3.69E+00	7.9E-04	6.7E-03	2.7E-09	3.2E-08	1.3E-01	3.8E-01	8.4E-09	1.5E-07
Surf. (<0.5 ft)	09K120127/VP-4(C)	Th-232	1.43E+00	1.5E-03	1.1E-01	1.9E-07	5.8E-07	2.6E-01	4.6E+00	3.1E-09	2.5E-06
Surf. (<0.5 ft)	09K120127/VP-4(C)	U-238	6.56E+00	5.6E-03	0.0E+00	2.1E-08	0.0E+00	3.0E-01	0.0E+00	1.1E-07	0.0E+00
Surf. (<0.5 ft)	09K120127/VP-4(C)	TOTAL		4.4E-02	1.2E-01	3.9E-07	6.1E-07	2.1E+00	5.0E+00	9.5E-07	2.6E-06
All Depths	09K120127/VP-4(C)	Pb-210	6.23E-02	5.2E-05	0.0E+00	5.2E-11	0.0E+00	1.8E-02	0.0E+00	2.5E-09	0.0E+00
All Depths	09K120127/VP-4(C)	Ra-226	4.40E-01	2.8E-02	0.0E+00	1.4E-07	0.0E+00	1.1E+00	0.0E+00	6.4E-07	0.0E+00
All Depths	09K120127/VP-4(C)	Th-230	2.79E+00	6.0E-04	5.1E-03	2.1E-09	2.4E-08	1.0E-01	2.9E-01	6.3E-09	1.1E-07
All Depths	09K120127/VP-4(C)	Th-232	1.16E+00	1.2E-03	9.0E-02	1.5E-07	4.7E-07	2.1E-01	3.7E+00	2.5E-09	2.0E-06
All Depths	09K120127/VP-4(C)	U-238	5.67E+00	4.8E-03	0.0E+00	1.8E-08	0.0E+00	2.6E-01	0.0E+00	9.8E-08	0.0E+00
All Depths	09K120127/VP-4(C)	TOTAL		3.4E-02	9.5E-02	3.1E-07	4.9E-07	1.7E+00	4.0E+00	7.5E-07	2.1E-06
Sub. (>0.5 ft)	09K130038/VP-62	Pb-210	4.76E-02	4.0E-05	0.0E+00	4.0E-11	0.0E+00	1.4E-02	0.0E+00	1.9E-09	0.0E+00
Sub. (>0.5 ft)	09K130038/VP-62	Th-230	1.74E+00	3.7E-04	3.2E-03	1.3E-09	1.5E-08	6.3E-02	1.8E-01	4.0E-09	6.9E-08
Sub. (>0.5 ft)	09K130038/VP-62	TOTAL		4.1E-04	3.2E-03	1.3E-09	1.5E-08	7.7E-02	1.8E-01	5.9E-09	6.9E-08
All Depths	09K130038/VP-62	Pb-210	4.76E-02	4.0E-05	0.0E+00	4.0E-11	0.0E+00	1.4E-02	0.0E+00	1.9E-09	0.0E+00
All Depths	09K130038/VP-62	Th-230	1.74E+00	3.7E-04	3.2E-03	1.3E-09	1.5E-08	6.3E-02	1.8E-01	4.0E-09	6.9E-08
All Depths	09K130038/VP-62	TOTAL		4.1E-04	3.2E-03	1.3E-09	1.5E-08	7.7E-02	1.8E-01	5.9E-09	6.9E-08
Sub. (>0.5 ft)	09K130104/VP-60	Pb-210	2.09E-02	1.7E-05	0.0E+00	1.7E-11	0.0E+00	6.1E-03	0.0E+00	8.4E-10	0.0E+00
Sub. (>0.5 ft)	09K130104/VP-60	TOTAL		1.7E-05	0.0E+00	1.7E-11	0.0E+00	6.1E-03	0.0E+00	8.4E-10	0.0E+00
All Depths	09K130104/VP-60	Pb-210	2.09E-02	1.7E-05	0.0E+00	1.7E-11	0.0E+00	6.1E-03	0.0E+00	8.4E-10	0.0E+00
All Depths	09K130104/VP-60	TOTAL		1.7E-05	0.0E+00	1.7E-11	0.0E+00	6.1E-03	0.0E+00	8.4E-10	0.0E+00
Sub. (>0.5 ft)	09K140015/VP-58	Ac-227	3.21E-01	5.2E-03	0.0E+00	1.1E-08	0.0E+00	4.3E-01	0.0E+00	7.4E-08	0.0E+00
Sub. (>0.5 ft)	09K140015/VP-58	Pa-231	4.06E-01	1.1E-03	0.0E+00	2.7E-09	0.0E+00	2.1E-01	0.0E+00	5.3E-09	0.0E+00
Sub. (>0.5 ft)	09K140015/VP-58	Pb-210	1.06E+00	8.9E-04	0.0E+00	8.8E-10	0.0E+00	3.1E-01	0.0E+00	4.3E-08	0.0E+00
Sub. (>0.5 ft)	09K140015/VP-58	Ra-226	2.75E+00	1.7E-01	0.0E+00	8.6E-07	0.0E+00	6.8E+00	0.0E+00	4.0E-06	0.0E+00
Sub. (>0.5 ft)	09K140015/VP-58	Th-230	7.41E+01	1.6E-02	1.4E-01	5.5E-08	6.5E-07	2.7E+00	7.7E+00	1.7E-07	3.0E-06
Sub. (>0.5 ft)	09K140015/VP-58	Th-232	2.12E+00	2.2E-03	1.6E-01	2.8E-07	8.6E-07	3.8E-01	6.8E+00	4.6E-09	3.7E-06
Sub. (>0.5 ft)	09K140015/VP-58	U-238	1.44E+01	1.2E-02	0.0E+00	4.5E-08	0.0E+00	6.6E-01	0.0E+00	2.5E-07	0.0E+00
Sub. (>0.5 ft)	09K140015/VP-58	TOTAL		2.1E-01	3.0E-01	1.3E-06	1.5E-06	1.1E+01	1.4E+01	4.5E-06	6.7E-06
Surf. (<0.5 ft)	09K140015/VP-58	Pb-210	5.42E-02	4.5E-05	0.0E+00	4.5E-11	0.0E+00	1.6E-02	0.0E+00	2.2E-09	0.0E+00
Surf. (<0.5 ft)	09K140015/VP-58	Ra-226	1.13E+00	7.1E-02	0.0E+00	3.5E-07	0.0E+00	2.8E+00	0.0E+00	1.6E-06	0.0E+00
Surf. (<0.5 ft)	09K140015/VP-58	Th-230	2.21E+00	4.7E-04	4.0E-03	1.6E-09	1.9E-08	8.1E-02	2.3E-01	5.0E-09	8.8E-08
Surf. (<0.5 ft)	09K140015/VP-58	Th-232	1.22E+00	1.3E-03	9.5E-02	1.6E-07	4.9E-07	2.2E-01	3.9E+00	2.6E-09	2.1E-06
Surf. (<0.5 ft)	09K140015/VP-58	U-238	9.92E+00	8.5E-03	0.0E+00	3.1E-08	0.0E+00	4.5E-01	0.0E+00	1.7E-07	0.0E+00
Surf. (<0.5 ft)	09K140015/VP-58	TOTAL		8.1E-02	9.9E-02	5.5E-07	5.1E-07	3.5E+00	4.1E+00	1.8E-06	2.2E-06
All Depths	09K140015/VP-58	Ac-227	6.30E-02	1.0E-03	0.0E+00	2.1E-09	0.0E+00	8.4E-02	0.0E+00	1.5E-08	0.0E+00
All Depths	09K140015/VP-58	Pa-231	1.12E-01	3.2E-04	0.0E+00	7.4E-10	0.0E+00	5.8E-02	0.0E+00	1.5E-09	0.0E+00
All Depths	09K140015/VP-58	Pb-210	5.46E-01	4.6E-04	0.0E+00	4.5E-10	0.0E+00	1.6E-01	0.0E+00	2.2E-08	0.0E+00
All Depths	09K140015/VP-58	Ra-226	1.83E+00	1.1E-01	0.0E+00	5.7E-07	0.0E+00	4.5E+00	0.0E+00	2.7E-06	0.0E+00
All Depths	09K140015/VP-58	Th-230	3.73E+01	8.0E-03	6.8E-02	2.7E-08	3.3E-07	1.4E+00	3.9E+00	8.5E-08	1.5E-06
All Depths	09K140015/VP-58	Th-232	1.39E+00	1.4E-03	1.1E-01	1.9E-07	5.6E-07	2.5E-01	4.5E+00	3.0E-09	2.4E-06
All Depths	09K140015/VP-58	U-238	1.15E+01	9.8E-03	0.0E+00	3.6E-08	0.0E+00	5.2E-01	0.0E+00	2.0E-07	0.0E+00

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	RECREATIONAL/TRESPASSER Dose Year=1000	RECREATIONAL/TRESPASSER Risk Year=0.0	RECREATIONAL/TRESPASSER Risk Year=1000	CONSTRUCTION Dose Year=0.0	CONSTRUCTION Dose Year=1000	CONSTRUCTION Risk Year=0.0	CONSTRUCTION Risk Year=1000
All Depths	09K140015/VP-58	TOTAL		1.4E-01	1.8E-01	8.3E-07	8.9E-07	6.9E+00	8.3E+00	3.0E-06	3.9E-06
Sub. (>0.5 ft)	09K140026/VP-57	Pb-210	2.66E-01	2.2E-04	0.0E+00	2.2E-10	0.0E+00	7.8E-02	0.0E+00	1.1E-08	0.0E+00
Sub. (>0.5 ft)	09K140026/VP-57	Ra-226	1.05E+00	6.6E-02	0.0E+00	3.3E-07	0.0E+00	2.6E+00	0.0E+00	1.5E-06	0.0E+00
Sub. (>0.5 ft)	09K140026/VP-57	Th-230	1.73E+01	3.7E-03	3.2E-02	1.3E-08	1.5E-07	6.3E-01	1.8E+00	3.9E-08	6.9E-07
Sub. (>0.5 ft)	09K140026/VP-57	Th-232	1.90E-01	2.0E-04	1.5E-02	2.5E-08	7.7E-08	3.4E-02	6.1E-01	4.1E-10	3.3E-07
Sub. (>0.5 ft)	09K140026/VP-57	U-238	7.17E+00	6.1E-03	0.0E+00	2.2E-08	0.0E+00	3.3E-01	0.0E+00	1.2E-07	0.0E+00
Sub. (>0.5 ft)	09K140026/VP-57	TOTAL		7.6E-02	4.6E-02	3.9E-07	2.3E-07	3.6E+00	2.4E+00	1.7E-06	1.0E-06
Surf. (<0.5 ft)	09K140026/VP-57	Pb-210	2.38E-01	2.0E-04	0.0E+00	2.0E-10	0.0E+00	7.0E-02	0.0E+00	9.6E-09	0.0E+00
Surf. (<0.5 ft)	09K140026/VP-57	Ra-226	1.00E+00	6.3E-02	0.0E+00	3.1E-07	0.0E+00	2.5E+00	0.0E+00	1.4E-06	0.0E+00
Surf. (<0.5 ft)	09K140026/VP-57	Th-230	1.53E+01	3.3E-03	2.8E-02	1.1E-08	1.3E-07	5.6E-01	1.6E+00	3.5E-08	6.1E-07
Surf. (<0.5 ft)	09K140026/VP-57	Th-232	1.27E+00	1.3E-03	9.9E-02	1.7E-07	5.1E-07	2.3E-01	4.1E+00	2.7E-09	2.2E-06
Surf. (<0.5 ft)	09K140026/VP-57	U-238	1.16E+01	9.9E-03	0.0E+00	3.6E-08	0.0E+00	5.3E-01	0.0E+00	2.0E-07	0.0E+00
Surf. (<0.5 ft)	09K140026/VP-57	TOTAL		7.7E-02	1.3E-01	5.3E-07	6.5E-07	3.8E+00	5.7E+00	1.7E-06	2.8E-06
All Depths	09K140026/VP-57	Pb-210	2.66E-01	2.2E-04	0.0E+00	2.2E-10	0.0E+00	7.8E-02	0.0E+00	1.1E-08	0.0E+00
All Depths	09K140026/VP-57	Ra-226	8.50E-01	5.3E-02	0.0E+00	2.7E-07	0.0E+00	2.1E+00	0.0E+00	1.2E-06	0.0E+00
All Depths	09K140026/VP-57	Th-230	1.73E+01	3.7E-03	3.2E-02	1.3E-08	1.5E-07	6.3E-01	1.8E+00	3.9E-08	6.9E-07
All Depths	09K140026/VP-57	Th-232	1.19E+00	1.2E-03	9.3E-02	1.6E-07	4.8E-07	2.2E-01	3.8E+00	2.6E-09	2.1E-06
All Depths	09K140026/VP-57	U-238	9.32E+00	8.0E-03	0.0E+00	2.9E-08	0.0E+00	4.2E-01	0.0E+00	1.6E-07	0.0E+00
All Depths	09K140026/VP-57	TOTAL		6.6E-02	1.2E-01	4.7E-07	6.3E-07	3.4E+00	5.6E+00	1.4E-06	2.8E-06
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	Ac-227	3.15E-02	5.1E-04	0.0E+00	1.1E-09	0.0E+00	4.2E-02	0.0E+00	7.3E-09	0.0E+00
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	Pa-231	7.60E-02	2.1E-04	0.0E+00	5.0E-10	0.0E+00	4.0E-02	0.0E+00	9.8E-10	0.0E+00
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	Pb-210	4.83E-01	4.0E-04	0.0E+00	4.0E-10	0.0E+00	1.4E-01	0.0E+00	1.9E-08	0.0E+00
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	Ra-226	1.34E+00	8.4E-02	0.0E+00	4.2E-07	0.0E+00	3.3E+00	0.0E+00	1.9E-06	0.0E+00
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	Th-230	3.28E+01	7.0E-03	6.0E-02	2.4E-08	2.9E-07	1.2E+00	3.4E+00	7.5E-08	1.3E-06
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	Th-232	2.70E-01	2.8E-04	2.1E-02	3.6E-08	1.1E-07	4.9E-02	8.6E-01	5.8E-10	4.7E-07
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	U-238	6.36E+00	5.4E-03	0.0E+00	2.0E-08	0.0E+00	2.9E-01	0.0E+00	1.1E-07	0.0E+00
Sub. (>0.5 ft)	09K210206/VP-56,1(C)	TOTAL		9.8E-02	8.1E-02	5.0E-07	4.0E-07	5.0E+00	4.3E+00	2.2E-06	1.8E-06
Surf. (<0.5 ft)	09K210206/VP-56,1(C)	Pb-210	8.15E-02	6.8E-05	0.0E+00	6.8E-11	0.0E+00	2.4E-02	0.0E+00	3.3E-09	0.0E+00
Surf. (<0.5 ft)	09K210206/VP-56,1(C)	Ra-226	1.08E+00	6.8E-02	0.0E+00	3.4E-07	0.0E+00	2.7E+00	0.0E+00	1.6E-06	0.0E+00
Surf. (<0.5 ft)	09K210206/VP-56,1(C)	Th-230	4.16E+00	8.9E-04	7.6E-03	3.1E-09	3.6E-08	1.5E-01	4.3E-01	9.5E-09	1.7E-07
Surf. (<0.5 ft)	09K210206/VP-56,1(C)	Th-232	1.79E+00	1.9E-03	1.4E-01	2.4E-07	7.2E-07	3.2E-01	5.7E+00	3.9E-09	3.1E-06
Surf. (<0.5 ft)	09K210206/VP-56,1(C)	U-238	1.06E+01	9.1E-03	0.0E+00	3.3E-08	0.0E+00	4.8E-01	0.0E+00	1.8E-07	0.0E+00
Surf. (<0.5 ft)	09K210206/VP-56,1(C)	TOTAL		8.0E-02	1.5E-01	6.1E-07	7.6E-07	3.6E+00	6.2E+00	1.8E-06	3.3E-06
All Depths	09K210206/VP-56,1(C)	Pb-210	1.65E-01	1.4E-04	0.0E+00	1.4E-10	0.0E+00	4.8E-02	0.0E+00	6.6E-09	0.0E+00
All Depths	09K210206/VP-56,1(C)	Ra-226	1.01E+00	6.3E-02	0.0E+00	3.2E-07	0.0E+00	2.5E+00	0.0E+00	1.5E-06	0.0E+00
All Depths	09K210206/VP-56,1(C)	Th-230	1.01E+01	2.2E-03	1.8E-02	7.5E-09	8.8E-08	3.7E-01	1.1E+00	2.3E-08	4.0E-07
All Depths	09K210206/VP-56,1(C)	Th-232	1.59E+00	1.7E-03	1.2E-01	2.1E-07	6.4E-07	2.9E-01	5.1E+00	3.4E-09	2.8E-06
All Depths	09K210206/VP-56,1(C)	U-238	9.42E+00	8.1E-03	0.0E+00	3.0E-08	0.0E+00	4.3E-01	0.0E+00	1.6E-07	0.0E+00
All Depths	09K210206/VP-56,1(C)	TOTAL		7.5E-02	1.4E-01	5.7E-07	7.3E-07	3.6E+00	6.1E+00	1.7E-06	3.2E-06
Sub. (>0.5 ft)	09K220029	Pb-210	1.54E-02	1.3E-05	0.0E+00	1.3E-11	0.0E+00	4.5E-03	0.0E+00	6.2E-10	0.0E+00
Sub. (>0.5 ft)	09K220029	TOTAL		1.3E-05	0.0E+00	1.3E-11	0.0E+00	4.5E-03	0.0E+00	6.2E-10	0.0E+00
All Depths	09K220029	Pb-210	1.54E-02	1.3E-05	0.0E+00	1.3E-11	0.0E+00	4.5E-03	0.0E+00	6.2E-10	0.0E+00
All Depths	09K220029	TOTAL		1.3E-05	0.0E+00	1.3E-11	0.0E+00	4.5E-03	0.0E+00	6.2E-10	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 34 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	CONSTRUCTION Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Sub. (>0.5 ft)	09K220030/VP-44	Pb-210	2.23E-02	1.9E-05	0.0E+00	1.9E-11	0.0E+00	6.5E-03	0.0E+00	8.9E-10	0.0E+00
Sub. (>0.5 ft)	09K220030/VP-44	TOTAL		1.9E-05	0.0E+00	1.9E-11	0.0E+00	6.5E-03	0.0E+00	8.9E-10	0.0E+00
All Depths	09K220030/VP-44	Pb-210	2.23E-02	1.9E-05	0.0E+00	1.9E-11	0.0E+00	6.5E-03	0.0E+00	8.9E-10	0.0E+00
All Depths	09K220030/VP-44	TOTAL		1.9E-05	0.0E+00	1.9E-11	0.0E+00	6.5E-03	0.0E+00	8.9E-10	0.0E+00
Sub. (>0.5 ft)	09K220041/VP-42	Pb-210	3.54E-02	3.0E-05	0.0E+00	2.9E-11	0.0E+00	1.0E-02	0.0E+00	1.4E-09	0.0E+00
Sub. (>0.5 ft)	09K220041/VP-42	Th-230	8.70E-01	1.9E-04	1.6E-03	6.4E-10	7.6E-09	3.2E-02	9.0E-02	2.0E-09	3.5E-08
Sub. (>0.5 ft)	09K220041/VP-42	TOTAL		2.2E-04	1.6E-03	6.7E-10	7.6E-09	4.2E-02	9.0E-02	3.4E-09	3.5E-08
All Depths	09K220041/VP-42	Pb-210	3.54E-02	3.0E-05	0.0E+00	2.9E-11	0.0E+00	1.0E-02	0.0E+00	1.4E-09	0.0E+00
All Depths	09K220041/VP-42	Th-230	8.70E-01	1.9E-04	1.6E-03	6.4E-10	7.6E-09	3.2E-02	9.0E-02	2.0E-09	3.5E-08
All Depths	09K220041/VP-42	TOTAL		2.2E-04	1.6E-03	6.7E-10	7.6E-09	4.2E-02	9.0E-02	3.4E-09	3.5E-08
Sub. (>0.5 ft)	09K220074/VP-46	Pb-210	4.06E-02	3.4E-05	0.0E+00	3.4E-11	0.0E+00	1.2E-02	0.0E+00	1.6E-09	0.0E+00
Sub. (>0.5 ft)	09K220074/VP-46	Th-230	1.24E+00	2.7E-04	2.3E-03	9.1E-10	1.1E-08	4.5E-02	1.3E-01	2.8E-09	4.9E-08
Sub. (>0.5 ft)	09K220074/VP-46	TOTAL		3.0E-04	2.3E-03	9.5E-10	1.1E-08	5.7E-02	1.3E-01	4.5E-09	4.9E-08
All Depths	09K220074/VP-46	Pb-210	4.06E-02	3.4E-05	0.0E+00	3.4E-11	0.0E+00	1.2E-02	0.0E+00	1.6E-09	0.0E+00
All Depths	09K220074/VP-46	Th-230	1.24E+00	2.7E-04	2.3E-03	9.1E-10	1.1E-08	4.5E-02	1.3E-01	2.8E-09	4.9E-08
All Depths	09K220074/VP-46	TOTAL		3.0E-04	2.3E-03	9.5E-10	1.1E-08	5.7E-02	1.3E-01	4.5E-09	4.9E-08
Sub. (>0.5 ft)	09K220085/VP-47	Pb-210	2.66E-02	2.2E-05	0.0E+00	2.2E-11	0.0E+00	7.8E-03	0.0E+00	1.1E-09	0.0E+00
Sub. (>0.5 ft)	09K220085/VP-47	Th-230	2.40E-01	5.1E-05	4.4E-04	1.8E-10	2.1E-09	8.8E-03	2.5E-02	5.5E-10	9.6E-09
Sub. (>0.5 ft)	09K220085/VP-47	TOTAL		7.4E-05	4.4E-04	2.0E-10	2.1E-09	1.7E-02	2.5E-02	1.6E-09	9.6E-09
All Depths	09K220085/VP-47	Pb-210	2.66E-02	2.2E-05	0.0E+00	2.2E-11	0.0E+00	7.8E-03	0.0E+00	1.1E-09	0.0E+00
All Depths	09K220085/VP-47	Th-230	2.40E-01	5.1E-05	4.4E-04	1.8E-10	2.1E-09	8.8E-03	2.5E-02	5.5E-10	9.6E-09
All Depths	09K220085/VP-47	TOTAL		7.4E-05	4.4E-04	2.0E-10	2.1E-09	1.7E-02	2.5E-02	1.6E-09	9.6E-09
Sub. (>0.5 ft)	09K220140/VP-40	Pb-210	4.55E-02	3.8E-05	0.0E+00	3.8E-11	0.0E+00	1.3E-02	0.0E+00	1.8E-09	0.0E+00
Sub. (>0.5 ft)	09K220140/VP-40	Th-230	1.59E+00	3.4E-04	2.9E-03	1.2E-09	1.4E-08	5.8E-02	1.6E-01	3.6E-09	6.3E-08
Sub. (>0.5 ft)	09K220140/VP-40	TOTAL		3.8E-04	2.9E-03	1.2E-09	1.4E-08	7.1E-02	1.6E-01	5.4E-09	6.3E-08
All Depths	09K220140/VP-40	Pb-210	4.55E-02	3.8E-05	0.0E+00	3.8E-11	0.0E+00	1.3E-02	0.0E+00	1.8E-09	0.0E+00
All Depths	09K220140/VP-40	Th-230	1.59E+00	3.4E-04	2.9E-03	1.2E-09	1.4E-08	5.8E-02	1.6E-01	3.6E-09	6.3E-08
All Depths	09K220140/VP-40	TOTAL		3.8E-04	2.9E-03	1.2E-09	1.4E-08	7.1E-02	1.6E-01	5.4E-09	6.3E-08
Sub. (>0.5 ft)	09K220162/VP-53	Pb-210	2.80E-02	2.3E-05	0.0E+00	2.3E-11	0.0E+00	8.2E-03	0.0E+00	1.1E-09	0.0E+00
Sub. (>0.5 ft)	09K220162/VP-53	Th-230	3.40E-01	7.3E-05	6.2E-04	2.5E-10	3.0E-09	1.2E-02	3.5E-02	7.7E-10	1.4E-08
Sub. (>0.5 ft)	09K220162/VP-53	TOTAL		9.6E-05	6.2E-04	2.7E-10	3.0E-09	2.1E-02	3.5E-02	1.9E-09	1.4E-08
All Depths	09K220162/VP-53	Pb-210	2.80E-02	2.3E-05	0.0E+00	2.3E-11	0.0E+00	8.2E-03	0.0E+00	1.1E-09	0.0E+00
All Depths	09K220162/VP-53	Th-230	3.40E-01	7.3E-05	6.2E-04	2.5E-10	3.0E-09	1.2E-02	3.5E-02	7.7E-10	1.4E-08
All Depths	09K220162/VP-53	TOTAL		9.6E-05	6.2E-04	2.7E-10	3.0E-09	2.1E-02	3.5E-02	1.9E-09	1.4E-08
Sub. (>0.5 ft)	09K220173/VP-48(A)	Pb-210	2.94E-02	2.5E-05	0.0E+00	2.4E-11	0.0E+00	8.6E-03	0.0E+00	1.2E-09	0.0E+00
Sub. (>0.5 ft)	09K220173/VP-48(A)	Th-230	4.40E-01	9.4E-05	8.0E-04	3.2E-10	3.8E-09	1.6E-02	4.6E-02	1.0E-09	1.8E-08
Sub. (>0.5 ft)	09K220173/VP-48(A)	TOTAL		1.2E-04	8.0E-04	3.5E-10	3.8E-09	2.5E-02	4.6E-02	2.2E-09	1.8E-08
Surf. (<0.5 ft)	09K220173/VP-48(A)	Pb-210	2.94E-02	2.5E-05	0.0E+00	2.4E-11	0.0E+00	8.6E-03	0.0E+00	1.2E-09	0.0E+00
Surf. (<0.5 ft)	09K220173/VP-48(A)	Th-230	4.40E-01	9.4E-05	8.0E-04	3.2E-10	3.8E-09	1.6E-02	4.6E-02	1.0E-09	1.8E-08

Attachment 12. Radiological Doses and Risks for each Property (page 35 of 60)

			Exposure Point	RECREATIONAL/TRESPASSER				CONSTRUCTION			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<0.5 ft)	09K220173/VP-48(A)	Th-232	7.90E-01	8.2E-04	6.1E-02	1.1E-07	3.2E-07	1.4E-01	2.5E+00	1.7E-09	1.4E-06
Surf. (<0.5 ft)	09K220173/VP-48(A)	TOTAL		9.4E-04	6.2E-02	1.1E-07	3.2E-07	1.7E-01	2.6E+00	3.9E-09	1.4E-06
All Depths	09K220173/VP-48(A)	Pb-210	2.94E-02	2.5E-05	0.0E+00	2.4E-11	0.0E+00	8.6E-03	0.0E+00	1.2E-09	0.0E+00
All Depths	09K220173/VP-48(A)	Th-230	4.40E-01	9.4E-05	8.0E-04	3.2E-10	3.8E-09	1.6E-02	4.6E-02	1.0E-09	1.8E-08
All Depths	09K220173/VP-48(A)	Th-232	7.90E-01	8.2E-04	6.1E-02	1.1E-07	3.2E-07	1.4E-01	2.5E+00	1.7E-09	1.4E-06
All Depths	09K220173/VP-48(A)	TOTAL		9.4E-04	6.2E-02	1.1E-07	3.2E-07	1.7E-01	2.6E+00	3.9E-09	1.4E-06
Sub. (>0.5 ft)	09K220184/VP-48	Pb-210	1.13E-01	9.5E-05	0.0E+00	9.4E-11	0.0E+00	3.3E-02	0.0E+00	4.6E-09	0.0E+00
Sub. (>0.5 ft)	09K220184/VP-48	Th-230	6.44E+00	1.4E-03	1.2E-02	4.7E-09	5.6E-08	2.3E-01	6.7E-01	1.5E-08	2.6E-07
Sub. (>0.5 ft)	09K220184/VP-48	TOTAL		1.5E-03	1.2E-02	4.8E-09	5.6E-08	2.7E-01	6.7E-01	1.9E-08	2.6E-07
Surf. (<0.5 ft)	09K220184/VP-48	Pb-210	1.32E-02	1.1E-05	0.0E+00	1.1E-11	0.0E+00	3.9E-03	0.0E+00	5.3E-10	0.0E+00
Surf. (<0.5 ft)	09K220184/VP-48	Ra-226	7.50E-01	4.7E-02	0.0E+00	2.4E-07	0.0E+00	1.8E+00	0.0E+00	1.1E-06	0.0E+00
Surf. (<0.5 ft)	09K220184/VP-48	Th-232	4.90E-01	5.1E-04	3.8E-02	6.5E-08	2.0E-07	8.9E-02	1.6E+00	1.1E-09	8.5E-07
Surf. (<0.5 ft)	09K220184/VP-48	U-238	5.72E+00	4.9E-03	0.0E+00	1.8E-08	0.0E+00	2.6E-01	0.0E+00	9.9E-08	0.0E+00
Surf. (<0.5 ft)	09K220184/VP-48	TOTAL		5.2E-02	3.8E-02	3.2E-07	2.0E-07	2.2E+00	1.6E+00	1.2E-06	8.5E-07
All Depths	09K220184/VP-48	Pb-210	1.08E-01	9.0E-05	0.0E+00	9.0E-11	0.0E+00	3.2E-02	0.0E+00	4.3E-09	0.0E+00
All Depths	09K220184/VP-48	Ra-226	7.50E-01	4.7E-02	0.0E+00	2.4E-07	0.0E+00	1.8E+00	0.0E+00	1.1E-06	0.0E+00
All Depths	09K220184/VP-48	Th-230	6.05E+00	1.3E-03	1.1E-02	4.4E-09	5.3E-08	2.2E-01	6.3E-01	1.4E-08	2.4E-07
All Depths	09K220184/VP-48	Th-232	4.90E-01	5.1E-04	3.8E-02	6.5E-08	2.0E-07	8.9E-02	1.6E+00	1.1E-09	8.5E-07
All Depths	09K220184/VP-48	U-238	5.72E+00	4.9E-03	0.0E+00	1.8E-08	0.0E+00	2.6E-01	0.0E+00	9.9E-08	0.0E+00
All Depths	09K220184/VP-48	TOTAL		5.4E-02	4.9E-02	3.2E-07	2.5E-07	2.4E+00	2.2E+00	1.2E-06	1.1E-06
Sub. (>0.5 ft)	09K220195/VP-49	Pb-210	3.67E-02	3.1E-05	0.0E+00	3.1E-11	0.0E+00	1.1E-02	0.0E+00	1.5E-09	0.0E+00
Sub. (>0.5 ft)	09K220195/VP-49	Th-230	9.60E-01	2.1E-04	1.7E-03	7.1E-10	8.4E-09	3.5E-02	1.0E-01	2.2E-09	3.8E-08
Sub. (>0.5 ft)	09K220195/VP-49	TOTAL		2.4E-04	1.7E-03	7.4E-10	8.4E-09	4.6E-02	1.0E-01	3.7E-09	3.8E-08
All Depths	09K220195/VP-49	Pb-210	3.67E-02	3.1E-05	0.0E+00	3.1E-11	0.0E+00	1.1E-02	0.0E+00	1.5E-09	0.0E+00
All Depths	09K220195/VP-49	Th-230	9.60E-01	2.1E-04	1.7E-03	7.1E-10	8.4E-09	3.5E-02	1.0E-01	2.2E-09	3.8E-08
All Depths	09K220195/VP-49	TOTAL		2.4E-04	1.7E-03	7.4E-10	8.4E-09	4.6E-02	1.0E-01	3.7E-09	3.8E-08
Sub. (>0.5 ft)	09K310197/VP-50,51	Pb-210	2.38E-02	2.0E-05	0.0E+00	2.0E-11	0.0E+00	7.0E-03	0.0E+00	9.6E-10	0.0E+00
Sub. (>0.5 ft)	09K310197/VP-50,51	Th-230	4.00E-02	8.6E-06	7.3E-05	2.9E-11	3.5E-10	1.5E-03	4.1E-03	9.1E-11	1.6E-09
Sub. (>0.5 ft)	09K310197/VP-50,51	TOTAL		2.8E-05	7.3E-05	4.9E-11	3.5E-10	8.4E-03	4.1E-03	1.0E-09	1.6E-09
All Depths	09K310197/VP-50,51	Pb-210	2.38E-02	2.0E-05	0.0E+00	2.0E-11	0.0E+00	7.0E-03	0.0E+00	9.6E-10	0.0E+00
All Depths	09K310197/VP-50,51	Th-230	4.00E-02	8.6E-06	7.3E-05	2.9E-11	3.5E-10	1.5E-03	4.1E-03	9.1E-11	1.6E-09
All Depths	09K310197/VP-50,51	TOTAL		2.8E-05	7.3E-05	4.9E-11	3.5E-10	8.4E-03	4.1E-03	1.0E-09	1.6E-09
Sub. (>0.5 ft)	10K110021	Pb-210	2.10E-02	1.8E-05	0.0E+00	1.7E-11	0.0E+00	6.1E-03	0.0E+00	8.4E-10	0.0E+00
Sub. (>0.5 ft)	10K110021	TOTAL		1.8E-05	0.0E+00	1.7E-11	0.0E+00	6.1E-03	0.0E+00	8.4E-10	0.0E+00
Surf. (<0.5 ft)	10K110021	Pb-210	2.06E-02	1.7E-05	0.0E+00	1.7E-11	0.0E+00	6.0E-03	0.0E+00	8.3E-10	0.0E+00
Surf. (<0.5 ft)	10K110021	Ra-226	5.50E-01	3.4E-02	0.0E+00	1.7E-07	0.0E+00	1.4E+00	0.0E+00	8.0E-07	0.0E+00
Surf. (<0.5 ft)	10K110021	Th-232	9.50E-01	9.9E-04	7.4E-02	1.3E-07	3.8E-07	1.7E-01	3.0E+00	2.1E-09	1.7E-06
Surf. (<0.5 ft)	10K110021	U-238	6.22E+00	5.3E-03	0.0E+00	1.9E-08	0.0E+00	2.8E-01	0.0E+00	1.1E-07	0.0E+00
Surf. (<0.5 ft)	10K110021	TOTAL		4.1E-02	7.4E-02	3.2E-07	3.8E-07	1.8E+00	3.0E+00	9.1E-07	1.7E-06
All Depths	10K110021	Pb-210	2.04E-02	1.7E-05	0.0E+00	1.7E-11	0.0E+00	6.0E-03	0.0E+00	8.2E-10	0.0E+00
All Depths	10K110021	Ra-226	5.50E-01	3.4E-02	0.0E+00	1.7E-07	0.0E+00	1.4E+00	0.0E+00	8.0E-07	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 36 of 60)

			Exposure Point	RECREATIONAL/TRESPASSER				CONSTRUCTION			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
All Depths	10K110021	Th-232	9.50E-01	9.9E-04	7.4E-02	1.3E-07	3.8E-07	1.7E-01	3.0E+00	2.1E-09	1.7E-06
All Depths	10K110021	U-238	6.22E+00	5.3E-03	0.0E+00	1.9E-08	0.0E+00	2.8E-01	0.0E+00	1.1E-07	0.0E+00
All Depths	10K110021	TOTAL		4.1E-02	7.4E-02	3.2E-07	3.8E-07	1.8E+00	3.0E+00	9.1E-07	1.7E-06
Surf. (<0.5 ft)	10K130014	Pb-210	3.22E-02	2.7E-05	0.0E+00	2.7E-11	0.0E+00	9.4E-03	0.0E+00	1.3E-09	0.0E+00
Surf. (<0.5 ft)	10K130014	Ra-226	5.00E-02	3.1E-03	0.0E+00	1.6E-08	0.0E+00	1.2E-01	0.0E+00	7.2E-08	0.0E+00
Surf. (<0.5 ft)	10K130014	Th-230	6.40E-01	1.4E-04	1.2E-03	4.7E-10	5.6E-09	2.3E-02	6.6E-02	1.5E-09	2.6E-08
Surf. (<0.5 ft)	10K130014	Th-232	2.55E+00	2.7E-03	2.0E-01	3.4E-07	1.0E-06	4.6E-01	8.2E+00	5.5E-09	4.4E-06
Surf. (<0.5 ft)	10K130014	U-238	2.07E+01	1.8E-02	0.0E+00	6.5E-08	0.0E+00	9.4E-01	0.0E+00	3.6E-07	0.0E+00
Surf. (<0.5 ft)	10K130014	TOTAL		2.4E-02	2.0E-01	4.2E-07	1.0E-06	1.6E+00	8.2E+00	4.4E-07	4.5E-06
All Depths	10K130014	Pb-210	3.22E-02	2.7E-05	0.0E+00	2.7E-11	0.0E+00	9.4E-03	0.0E+00	1.3E-09	0.0E+00
All Depths	10K130014	Ra-226	5.00E-02	3.1E-03	0.0E+00	1.6E-08	0.0E+00	1.2E-01	0.0E+00	7.2E-08	0.0E+00
All Depths	10K130014	Th-230	6.40E-01	1.4E-04	1.2E-03	4.7E-10	5.6E-09	2.3E-02	6.6E-02	1.5E-09	2.6E-08
All Depths	10K130014	Th-232	2.55E+00	2.7E-03	2.0E-01	3.4E-07	1.0E-06	4.6E-01	8.2E+00	5.5E-09	4.4E-06
All Depths	10K130014	U-238	2.07E+01	1.8E-02	0.0E+00	6.5E-08	0.0E+00	9.4E-01	0.0E+00	3.6E-07	0.0E+00
All Depths	10K130014	TOTAL		2.4E-02	2.0E-01	4.2E-07	1.0E-06	1.6E+00	8.2E+00	4.4E-07	4.5E-06
Surf. (<0.5 ft)	10K140024/VP-10(C)	Pb-210	7.98E-02	6.7E-05	0.0E+00	6.6E-11	0.0E+00	2.3E-02	0.0E+00	3.2E-09	0.0E+00
Surf. (<0.5 ft)	10K140024/VP-10(C)	Ra-226	7.50E-01	4.7E-02	0.0E+00	2.4E-07	0.0E+00	1.8E+00	0.0E+00	1.1E-06	0.0E+00
Surf. (<0.5 ft)	10K140024/VP-10(C)	Th-230	4.04E+00	8.6E-04	7.4E-03	3.0E-09	3.5E-08	1.5E-01	4.2E-01	9.2E-09	1.6E-07
Surf. (<0.5 ft)	10K140024/VP-10(C)	Th-232	1.89E+00	2.0E-03	1.5E-01	2.5E-07	7.6E-07	3.4E-01	6.1E+00	4.1E-09	3.3E-06
Surf. (<0.5 ft)	10K140024/VP-10(C)	U-238	1.10E+01	9.4E-03	0.0E+00	3.5E-08	0.0E+00	5.0E-01	0.0E+00	1.9E-07	0.0E+00
Surf. (<0.5 ft)	10K140024/VP-10(C)	TOTAL		5.9E-02	1.5E-01	5.3E-07	8.0E-07	2.9E+00	6.5E+00	1.3E-06	3.5E-06
All Depths	10K140024/VP-10(C)	Pb-210	7.98E-02	6.7E-05	0.0E+00	6.6E-11	0.0E+00	2.3E-02	0.0E+00	3.2E-09	0.0E+00
All Depths	10K140024/VP-10(C)	Ra-226	7.50E-01	4.7E-02	0.0E+00	2.4E-07	0.0E+00	1.8E+00	0.0E+00	1.1E-06	0.0E+00
All Depths	10K140024/VP-10(C)	Th-230	4.04E+00	8.6E-04	7.4E-03	3.0E-09	3.5E-08	1.5E-01	4.2E-01	9.2E-09	1.6E-07
All Depths	10K140024/VP-10(C)	Th-232	1.89E+00	2.0E-03	1.5E-01	2.5E-07	7.6E-07	3.4E-01	6.1E+00	4.1E-09	3.3E-06
All Depths	10K140024/VP-10(C)	U-238	1.10E+01	9.4E-03	0.0E+00	3.5E-08	0.0E+00	5.0E-01	0.0E+00	1.9E-07	0.0E+00
All Depths	10K140024/VP-10(C)	TOTAL		5.9E-02	1.5E-01	5.3E-07	8.0E-07	2.9E+00	6.5E+00	1.3E-06	3.5E-06
Sub. (>0.5 ft)	10K210053/VP-17	Pb-210	3.51E-02	2.9E-05	0.0E+00	2.9E-11	0.0E+00	1.0E-02	0.0E+00	1.4E-09	0.0E+00
Sub. (>0.5 ft)	10K210053/VP-17	Th-230	8.50E-01	1.8E-04	1.5E-03	6.2E-10	7.4E-09	3.1E-02	8.8E-02	1.9E-09	3.4E-08
Sub. (>0.5 ft)	10K210053/VP-17	TOTAL		2.1E-04	1.5E-03	6.5E-10	7.4E-09	4.1E-02	8.8E-02	3.3E-09	3.4E-08
All Depths	10K210053/VP-17	Pb-210	3.51E-02	2.9E-05	0.0E+00	2.9E-11	0.0E+00	1.0E-02	0.0E+00	1.4E-09	0.0E+00
All Depths	10K210053/VP-17	Th-230	8.50E-01	1.8E-04	1.5E-03	6.2E-10	7.4E-09	3.1E-02	8.8E-02	1.9E-09	3.4E-08
All Depths	10K210053/VP-17	TOTAL		2.1E-04	1.5E-03	6.5E-10	7.4E-09	4.1E-02	8.8E-02	3.3E-09	3.4E-08
Sub. (>0.5 ft)	10K210064	Pb-210	6.93E-02	5.8E-05	0.0E+00	5.8E-11	0.0E+00	2.0E-02	0.0E+00	2.8E-09	0.0E+00
Sub. (>0.5 ft)	10K210064	Th-230	3.29E+00	7.0E-04	6.0E-03	2.4E-09	2.9E-08	1.2E-01	3.4E-01	7.5E-09	1.3E-07
Sub. (>0.5 ft)	10K210064	TOTAL		7.6E-04	6.0E-03	2.5E-09	2.9E-08	1.4E-01	3.4E-01	1.0E-08	1.3E-07
All Depths	10K210064	Pb-210	6.93E-02	5.8E-05	0.0E+00	5.8E-11	0.0E+00	2.0E-02	0.0E+00	2.8E-09	0.0E+00
All Depths	10K210064	Th-230	3.29E+00	7.0E-04	6.0E-03	2.4E-09	2.9E-08	1.2E-01	3.4E-01	7.5E-09	1.3E-07
All Depths	10K210064	TOTAL		7.6E-04	6.0E-03	2.5E-09	2.9E-08	1.4E-01	3.4E-01	1.0E-08	1.3E-07
Sub. (>0.5 ft)	10K230031/VP-19	Pb-210	1.07E-01	8.9E-05	0.0E+00	8.9E-11	0.0E+00	3.1E-02	0.0E+00	4.3E-09	0.0E+00
Sub. (>0.5 ft)	10K230031/VP-19	Th-230	5.99E+00	1.3E-03	1.1E-02	4.4E-09	5.2E-08	2.2E-01	6.2E-01	1.4E-08	2.4E-07
Sub. (>0.5 ft)	10K230031/VP-19	TOTAL		1.4E-03	1.1E-02	4.5E-09	5.2E-08	2.5E-01	6.2E-01	1.8E-08	2.4E-07

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	CONSTRUCTION Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
All Depths	10K230031/VP-19	Pb-210	1.07E-01	8.9E-05	0.0E+00	8.9E-11	0.0E+00	3.1E-02	0.0E+00	4.3E-09	0.0E+00
All Depths	10K230031/VP-19	Th-230	5.99E+00	1.3E-03	1.1E-02	4.4E-09	5.2E-08	2.2E-01	6.2E-01	1.4E-08	2.4E-07
All Depths	10K230031/VP-19	TOTAL		1.4E-03	1.1E-02	4.5E-09	5.2E-08	2.5E-01	6.2E-01	1.8E-08	2.4E-07
Sub. (>0.5 ft)	10K230040/VP-20	Pb-210	6.57E-02	5.5E-05	0.0E+00	5.5E-11	0.0E+00	1.9E-02	0.0E+00	2.6E-09	0.0E+00
Sub. (>0.5 ft)	10K230040/VP-20	Th-230	3.03E+00	6.5E-04	5.5E-03	2.2E-09	2.6E-08	1.1E-01	3.1E-01	6.9E-09	1.2E-07
Sub. (>0.5 ft)	10K230040/VP-20	TOTAL		7.0E-04	5.5E-03	2.3E-09	2.6E-08	1.3E-01	3.1E-01	9.5E-09	1.2E-07
All Depths	10K230040/VP-20	Pb-210	6.57E-02	5.5E-05	0.0E+00	5.5E-11	0.0E+00	1.9E-02	0.0E+00	2.6E-09	0.0E+00
All Depths	10K230040/VP-20	Th-230	3.03E+00	6.5E-04	5.5E-03	2.2E-09	2.6E-08	1.1E-01	3.1E-01	6.9E-09	1.2E-07
All Depths	10K230040/VP-20	TOTAL		7.0E-04	5.5E-03	2.3E-09	2.6E-08	1.3E-01	3.1E-01	9.5E-09	1.2E-07
Sub. (>0.5 ft)	10K230051/VP-18	Pb-210	3.82E-02	3.2E-05	0.0E+00	3.2E-11	0.0E+00	1.1E-02	0.0E+00	1.5E-09	0.0E+00
Sub. (>0.5 ft)	10K230051/VP-18	Th-230	1.07E+00	2.3E-04	1.9E-03	7.9E-10	9.3E-09	3.9E-02	1.1E-01	2.4E-09	4.3E-08
Sub. (>0.5 ft)	10K230051/VP-18	TOTAL		2.6E-04	1.9E-03	8.2E-10	9.3E-09	5.0E-02	1.1E-01	4.0E-09	4.3E-08
All Depths	10K230051/VP-18	Pb-210	3.82E-02	3.2E-05	0.0E+00	3.2E-11	0.0E+00	1.1E-02	0.0E+00	1.5E-09	0.0E+00
All Depths	10K230051/VP-18	Th-230	1.07E+00	2.3E-04	1.9E-03	7.9E-10	9.3E-09	3.9E-02	1.1E-01	2.4E-09	4.3E-08
All Depths	10K230051/VP-18	TOTAL		2.6E-04	1.9E-03	8.2E-10	9.3E-09	5.0E-02	1.1E-01	4.0E-09	4.3E-08
Sub. (>0.5 ft)	10K230073/VP-21	Pb-210	1.51E-02	1.3E-05	0.0E+00	1.3E-11	0.0E+00	4.4E-03	0.0E+00	6.1E-10	0.0E+00
Sub. (>0.5 ft)	10K230073/VP-21	TOTAL		1.3E-05	0.0E+00	1.3E-11	0.0E+00	4.4E-03	0.0E+00	6.1E-10	0.0E+00
Surf. (<0.5 ft)	10K230073/VP-21	Pb-210	2.80E-02	2.3E-05	0.0E+00	2.3E-11	0.0E+00	8.2E-03	0.0E+00	1.1E-09	0.0E+00
Surf. (<0.5 ft)	10K230073/VP-21	Ra-226	9.50E-01	6.0E-02	0.0E+00	3.0E-07	0.0E+00	2.3E+00	0.0E+00	1.4E-06	0.0E+00
Surf. (<0.5 ft)	10K230073/VP-21	Th-230	3.40E-01	7.3E-05	6.2E-04	2.5E-10	3.0E-09	1.2E-02	3.5E-02	7.7E-10	1.4E-08
Surf. (<0.5 ft)	10K230073/VP-21	Th-232	8.90E-01	9.3E-04	6.9E-02	1.2E-07	3.6E-07	1.6E-01	2.8E+00	1.9E-09	1.6E-06
Surf. (<0.5 ft)	10K230073/VP-21	U-238	7.98E+00	6.8E-03	0.0E+00	2.5E-08	0.0E+00	3.6E-01	0.0E+00	1.4E-07	0.0E+00
Surf. (<0.5 ft)	10K230073/VP-21	TOTAL		6.7E-02	7.0E-02	4.4E-07	3.6E-07	2.9E+00	2.9E+00	1.5E-06	1.6E-06
All Depths	10K230073/VP-21	Pb-210	2.11E-02	1.8E-05	0.0E+00	1.8E-11	0.0E+00	6.2E-03	0.0E+00	8.5E-10	0.0E+00
All Depths	10K230073/VP-21	Ra-226	9.50E-01	6.0E-02	0.0E+00	3.0E-07	0.0E+00	2.3E+00	0.0E+00	1.4E-06	0.0E+00
All Depths	10K230073/VP-21	Th-232	8.90E-01	9.3E-04	6.9E-02	1.2E-07	3.6E-07	1.6E-01	2.8E+00	1.9E-09	1.6E-06
All Depths	10K230073/VP-21	U-238	7.98E+00	6.8E-03	0.0E+00	2.5E-08	0.0E+00	3.6E-01	0.0E+00	1.4E-07	0.0E+00
All Depths	10K230073/VP-21	TOTAL		6.7E-02	6.9E-02	4.4E-07	3.6E-07	2.9E+00	2.8E+00	1.5E-06	1.6E-06
Sub. (>0.5 ft)	10K240094/VP-23	Pb-210	2.20E-02	1.8E-05	0.0E+00	1.8E-11	0.0E+00	6.4E-03	0.0E+00	8.8E-10	0.0E+00
Sub. (>0.5 ft)	10K240094/VP-23	TOTAL		1.8E-05	0.0E+00	1.8E-11	0.0E+00	6.4E-03	0.0E+00	8.8E-10	0.0E+00
Surf. (<0.5 ft)	10K240094/VP-23	Pb-210	2.21E-02	1.8E-05	0.0E+00	1.8E-11	0.0E+00	6.5E-03	0.0E+00	8.9E-10	0.0E+00
Surf. (<0.5 ft)	10K240094/VP-23	Ra-226	7.50E-01	4.7E-02	0.0E+00	2.4E-07	0.0E+00	1.8E+00	0.0E+00	1.1E-06	0.0E+00
Surf. (<0.5 ft)	10K240094/VP-23	Th-232	7.90E-01	8.2E-04	6.1E-02	1.1E-07	3.2E-07	1.4E-01	2.5E+00	1.7E-09	1.4E-06
Surf. (<0.5 ft)	10K240094/VP-23	U-238	2.83E+00	2.4E-03	0.0E+00	8.9E-09	0.0E+00	1.3E-01	0.0E+00	4.9E-08	0.0E+00
Surf. (<0.5 ft)	10K240094/VP-23	TOTAL		5.0E-02	6.1E-02	3.5E-07	3.2E-07	2.1E+00	2.5E+00	1.1E-06	1.4E-06
All Depths	10K240094/VP-23	Pb-210	2.27E-02	1.9E-05	0.0E+00	1.9E-11	0.0E+00	6.6E-03	0.0E+00	9.1E-10	0.0E+00
All Depths	10K240094/VP-23	Ra-226	7.50E-01	4.7E-02	0.0E+00	2.4E-07	0.0E+00	1.8E+00	0.0E+00	1.1E-06	0.0E+00
All Depths	10K240094/VP-23	Th-232	7.90E-01	8.2E-04	6.1E-02	1.1E-07	3.2E-07	1.4E-01	2.5E+00	1.7E-09	1.4E-06
All Depths	10K240094/VP-23	U-238	2.83E+00	2.4E-03	0.0E+00	8.9E-09	0.0E+00	1.3E-01	0.0E+00	4.9E-08	0.0E+00
All Depths	10K240094/VP-23	TOTAL		5.0E-02	6.1E-02	3.5E-07	3.2E-07	2.1E+00	2.5E+00	1.1E-06	1.4E-06
Sub. (>0.5 ft)	10K240106/VP-22	Pb-210	1.53E-02	1.3E-05	0.0E+00	1.3E-11	0.0E+00	4.5E-03	0.0E+00	6.1E-10	0.0E+00

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	RECREATIONAL/TRESPASSER Dose Year=1000	RECREATIONAL/TRESPASSER Risk Year=0.0	RECREATIONAL/TRESPASSER Risk Year=1000	CONSTRUCTION Dose Year=0.0	CONSTRUCTION Dose Year=1000	CONSTRUCTION Risk Year=0.0	CONSTRUCTION Risk Year=1000
Sub. (>0.5 ft)	10K240106/VP-22	TOTAL		1.3E-05	0.0E+00	1.3E-11	0.0E+00	4.5E-03	0.0E+00	6.1E-10	0.0E+00
Surf. (<0.5 ft)	10K240106/VP-22	Pb-210	3.22E-02	2.7E-05	0.0E+00	2.7E-11	0.0E+00	9.4E-03	0.0E+00	1.3E-09	0.0E+00
Surf. (<0.5 ft)	10K240106/VP-22	Ra-226	3.50E-01	2.2E-02	0.0E+00	1.1E-07	0.0E+00	8.6E-01	0.0E+00	5.1E-07	0.0E+00
Surf. (<0.5 ft)	10K240106/VP-22	Th-230	6.40E-01	1.4E-04	1.2E-03	4.7E-10	5.6E-09	2.3E-02	6.6E-02	1.5E-09	2.6E-08
Surf. (<0.5 ft)	10K240106/VP-22	Th-232	5.90E-01	6.1E-04	4.6E-02	7.9E-08	2.4E-07	1.1E-01	1.9E+00	1.3E-09	1.0E-06
Surf. (<0.5 ft)	10K240106/VP-22	U-238	3.82E+00	3.3E-03	0.0E+00	1.2E-08	0.0E+00	1.7E-01	0.0E+00	6.6E-08	0.0E+00
Surf. (<0.5 ft)	10K240106/VP-22	TOTAL		2.6E-02	4.7E-02	2.0E-07	2.4E-07	1.2E+00	2.0E+00	5.8E-07	1.1E-06
All Depths	10K240106/VP-22	Pb-210	2.20E-02	1.8E-05	0.0E+00	1.8E-11	0.0E+00	6.4E-03	0.0E+00	8.8E-10	0.0E+00
All Depths	10K240106/VP-22	Ra-226	3.50E-01	2.2E-02	0.0E+00	1.1E-07	0.0E+00	8.6E-01	0.0E+00	5.1E-07	0.0E+00
All Depths	10K240106/VP-22	Th-232	5.90E-01	6.1E-04	4.6E-02	7.9E-08	2.4E-07	1.1E-01	1.9E+00	1.3E-09	1.0E-06
All Depths	10K240106/VP-22	U-238	3.82E+00	3.3E-03	0.0E+00	1.2E-08	0.0E+00	1.7E-01	0.0E+00	6.6E-08	0.0E+00
All Depths	10K240106/VP-22	TOTAL		2.6E-02	4.6E-02	2.0E-07	2.4E-07	1.1E+00	1.9E+00	5.8E-07	1.0E-06
Surf. (<0.5 ft)	10K240182	Pb-210	2.27E-02	1.9E-05	0.0E+00	1.9E-11	0.0E+00	6.6E-03	0.0E+00	9.1E-10	0.0E+00
Surf. (<0.5 ft)	10K240182	TOTAL		1.9E-05	0.0E+00	1.9E-11	0.0E+00	6.6E-03	0.0E+00	9.1E-10	0.0E+00
All Depths	10K240182	Pb-210	2.27E-02	1.9E-05	0.0E+00	1.9E-11	0.0E+00	6.6E-03	0.0E+00	9.1E-10	0.0E+00
All Depths	10K240182	TOTAL		1.9E-05	0.0E+00	1.9E-11	0.0E+00	6.6E-03	0.0E+00	9.1E-10	0.0E+00
Sub. (>0.5 ft)	10K240207	Pb-210	5.95E-02	5.0E-05	0.0E+00	4.9E-11	0.0E+00	1.7E-02	0.0E+00	2.4E-09	0.0E+00
Sub. (>0.5 ft)	10K240207	Th-230	2.59E+00	5.5E-04	4.7E-03	1.9E-09	2.3E-08	9.5E-02	2.7E-01	5.9E-09	1.0E-07
Sub. (>0.5 ft)	10K240207	TOTAL		6.0E-04	4.7E-03	2.0E-09	2.3E-08	1.1E-01	2.7E-01	8.3E-09	1.0E-07
Surf. (<0.5 ft)	10K240207	Pb-210	4.90E-02	4.1E-05	0.0E+00	4.1E-11	0.0E+00	1.4E-02	0.0E+00	2.0E-09	0.0E+00
Surf. (<0.5 ft)	10K240207	Th-230	1.84E+00	3.9E-04	3.4E-03	1.4E-09	1.6E-08	6.7E-02	1.9E-01	4.2E-09	7.3E-08
Surf. (<0.5 ft)	10K240207	TOTAL		4.3E-04	3.4E-03	1.4E-09	1.6E-08	8.1E-02	1.9E-01	6.2E-09	7.3E-08
All Depths	10K240207	Pb-210	5.66E-02	4.7E-05	0.0E+00	4.7E-11	0.0E+00	1.7E-02	0.0E+00	2.3E-09	0.0E+00
All Depths	10K240207	Th-230	2.38E+00	5.1E-04	4.3E-03	1.7E-09	2.1E-08	8.7E-02	2.5E-01	5.4E-09	9.5E-08
All Depths	10K240207	TOTAL		5.6E-04	4.3E-03	1.8E-09	2.1E-08	1.0E-01	2.5E-01	7.7E-09	9.5E-08
Sub. (>0.5 ft)	10K330030/VP-27	Pb-210	8.27E-02	6.9E-05	0.0E+00	6.9E-11	0.0E+00	2.4E-02	0.0E+00	3.3E-09	0.0E+00
Sub. (>0.5 ft)	10K330030/VP-27	Th-230	4.25E+00	9.1E-04	7.7E-03	3.1E-09	3.7E-08	1.6E-01	4.4E-01	9.7E-09	1.7E-07
Sub. (>0.5 ft)	10K330030/VP-27	TOTAL		9.8E-04	7.7E-03	3.2E-09	3.7E-08	1.8E-01	4.4E-01	1.3E-08	1.7E-07
Surf. (<0.5 ft)	10K330030/VP-27	Pb-210	5.60E-02	4.7E-05	0.0E+00	4.7E-11	0.0E+00	1.6E-02	0.0E+00	2.2E-09	0.0E+00
Surf. (<0.5 ft)	10K330030/VP-27	Th-230	2.34E+00	5.0E-04	4.3E-03	1.7E-09	2.0E-08	8.5E-02	2.4E-01	5.3E-09	9.3E-08
Surf. (<0.5 ft)	10K330030/VP-27	TOTAL		5.5E-04	4.3E-03	1.8E-09	2.0E-08	1.0E-01	2.4E-01	7.6E-09	9.3E-08
All Depths	10K330030/VP-27	Pb-210	8.67E-02	7.2E-05	0.0E+00	7.2E-11	0.0E+00	2.5E-02	0.0E+00	3.5E-09	0.0E+00
All Depths	10K330030/VP-27	Th-230	4.53E+00	9.7E-04	8.3E-03	3.3E-09	3.9E-08	1.7E-01	4.7E-01	1.0E-08	1.8E-07
All Depths	10K330030/VP-27	TOTAL		1.0E-03	8.3E-03	3.4E-09	3.9E-08	1.9E-01	4.7E-01	1.4E-08	1.8E-07
Sub. (>0.5 ft)	10K330140/VP-24	Pb-210	1.93E-02	1.6E-05	0.0E+00	1.6E-11	0.0E+00	5.7E-03	0.0E+00	7.8E-10	0.0E+00
Sub. (>0.5 ft)	10K330140/VP-24	TOTAL		1.6E-05	0.0E+00	1.6E-11	0.0E+00	5.7E-03	0.0E+00	7.8E-10	0.0E+00
Surf. (<0.5 ft)	10K330140/VP-24	Pb-210	1.86E-02	1.6E-05	0.0E+00	1.5E-11	0.0E+00	5.5E-03	0.0E+00	7.5E-10	0.0E+00
Surf. (<0.5 ft)	10K330140/VP-24	Ra-226	5.40E-01	3.4E-02	0.0E+00	1.7E-07	0.0E+00	1.3E+00	0.0E+00	7.8E-07	0.0E+00
Surf. (<0.5 ft)	10K330140/VP-24	Th-232	5.90E-01	6.1E-04	4.6E-02	7.9E-08	2.4E-07	1.1E-01	1.9E+00	1.3E-09	1.0E-06
Surf. (<0.5 ft)	10K330140/VP-24	U-238	3.62E+00	3.1E-03	0.0E+00	1.1E-08	0.0E+00	1.6E-01	0.0E+00	6.3E-08	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 39 of 60)

			Exposure Point	RECREATIONAL/TRESPASSER				CONSTRUCTION			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<0.5 ft)	10K330140/VP-24	TOTAL		3.8E-02	4.6E-02	2.6E-07	2.4E-07	1.6E+00	1.9E+00	8.5E-07	1.0E-06
All Depths	10K330140/VP-24	Pb-210	1.89E-02	1.6E-05	0.0E+00	1.6E-11	0.0E+00	5.5E-03	0.0E+00	7.6E-10	0.0E+00
All Depths	10K330140/VP-24	Ra-226	5.40E-01	3.4E-02	0.0E+00	1.7E-07	0.0E+00	1.3E+00	0.0E+00	7.8E-07	0.0E+00
All Depths	10K330140/VP-24	Th-232	5.90E-01	6.1E-04	4.6E-02	7.9E-08	2.4E-07	1.1E-01	1.9E+00	1.3E-09	1.0E-06
All Depths	10K330140/VP-24	U-238	3.62E+00	3.1E-03	0.0E+00	1.1E-08	0.0E+00	1.6E-01	0.0E+00	6.3E-08	0.0E+00
All Depths	10K330140/VP-24	TOTAL		3.8E-02	4.6E-02	2.6E-07	2.4E-07	1.6E+00	1.9E+00	8.5E-07	1.0E-06
Sub. (>0.5 ft)	10K330223/VP-29	Pb-210	4.48E-02	3.7E-05	0.0E+00	3.7E-11	0.0E+00	1.3E-02	0.0E+00	1.8E-09	0.0E+00
Sub. (>0.5 ft)	10K330223/VP-29	Th-230	1.54E+00	3.3E-04	2.8E-03	1.1E-09	1.3E-08	5.6E-02	1.6E-01	3.5E-09	6.1E-08
Sub. (>0.5 ft)	10K330223/VP-29	TOTAL		3.7E-04	2.8E-03	1.2E-09	1.3E-08	6.9E-02	1.6E-01	5.3E-09	6.1E-08
All Depths	10K330223/VP-29	Pb-210	4.48E-02	3.7E-05	0.0E+00	3.7E-11	0.0E+00	1.3E-02	0.0E+00	1.8E-09	0.0E+00
All Depths	10K330223/VP-29	Th-230	1.54E+00	3.3E-04	2.8E-03	1.1E-09	1.3E-08	5.6E-02	1.6E-01	3.5E-09	6.1E-08
All Depths	10K330223/VP-29	TOTAL		3.7E-04	2.8E-03	1.2E-09	1.3E-08	6.9E-02	1.6E-01	5.3E-09	6.1E-08
Sub. (>0.5 ft)	10K330232/VP-30	Pb-210	2.66E-02	2.2E-05	0.0E+00	2.2E-11	0.0E+00	7.8E-03	0.0E+00	1.1E-09	0.0E+00
Sub. (>0.5 ft)	10K330232/VP-30	Th-230	2.40E-01	5.1E-05	4.4E-04	1.8E-10	2.1E-09	8.8E-03	2.5E-02	5.5E-10	9.6E-09
Sub. (>0.5 ft)	10K330232/VP-30	TOTAL		7.4E-05	4.4E-04	2.0E-10	2.1E-09	1.7E-02	2.5E-02	1.6E-09	9.6E-09
All Depths	10K330232/VP-30	Pb-210	2.66E-02	2.2E-05	0.0E+00	2.2E-11	0.0E+00	7.8E-03	0.0E+00	1.1E-09	0.0E+00
All Depths	10K330232/VP-30	Th-230	2.40E-01	5.1E-05	4.4E-04	1.8E-10	2.1E-09	8.8E-03	2.5E-02	5.5E-10	9.6E-09
All Depths	10K330232/VP-30	TOTAL		7.4E-05	4.4E-04	2.0E-10	2.1E-09	1.7E-02	2.5E-02	1.6E-09	9.6E-09
Sub. (>0.5 ft)	10K330241/VP-32	Pb-210	1.68E-01	1.4E-04	0.0E+00	1.4E-10	0.0E+00	4.9E-02	0.0E+00	6.7E-09	0.0E+00
Sub. (>0.5 ft)	10K330241/VP-32	Th-230	1.03E+01	2.2E-03	1.9E-02	7.6E-09	9.0E-08	3.8E-01	1.1E+00	2.4E-08	4.1E-07
Sub. (>0.5 ft)	10K330241/VP-32	TOTAL		2.4E-03	1.9E-02	7.7E-09	9.0E-08	4.3E-01	1.1E+00	3.0E-08	4.1E-07
Surf. (<0.5 ft)	10K330241/VP-32	Pb-210	5.08E-02	4.2E-05	0.0E+00	4.2E-11	0.0E+00	1.5E-02	0.0E+00	2.0E-09	0.0E+00
Surf. (<0.5 ft)	10K330241/VP-32	Th-230	1.97E+00	4.2E-04	3.6E-03	1.4E-09	1.7E-08	7.2E-02	2.0E-01	4.5E-09	7.9E-08
Surf. (<0.5 ft)	10K330241/VP-32	TOTAL		4.6E-04	3.6E-03	1.5E-09	1.7E-08	8.7E-02	2.0E-01	6.5E-09	7.9E-08
All Depths	10K330241/VP-32	Pb-210	9.13E-02	7.6E-05	0.0E+00	7.6E-11	0.0E+00	2.7E-02	0.0E+00	3.7E-09	0.0E+00
All Depths	10K330241/VP-32	Th-230	4.86E+00	1.0E-03	8.9E-03	3.6E-09	4.2E-08	1.8E-01	5.0E-01	1.1E-08	1.9E-07
All Depths	10K330241/VP-32	TOTAL		1.1E-03	8.9E-03	3.6E-09	4.2E-08	2.0E-01	5.0E-01	1.5E-08	1.9E-07
Sub. (>0.5 ft)	10K330250/VP-31A	Pb-210	1.76E-01	1.5E-04	0.0E+00	1.5E-10	0.0E+00	5.2E-02	0.0E+00	7.1E-09	0.0E+00
Sub. (>0.5 ft)	10K330250/VP-31A	Th-230	1.09E+01	2.3E-03	2.0E-02	8.0E-09	9.5E-08	4.0E-01	1.1E+00	2.5E-08	4.4E-07
Sub. (>0.5 ft)	10K330250/VP-31A	TOTAL		2.5E-03	2.0E-02	8.2E-09	9.5E-08	4.5E-01	1.1E+00	3.2E-08	4.4E-07
Surf. (<0.5 ft)	10K330250/VP-31A	Pb-210	1.96E-01	1.6E-04	0.0E+00	1.6E-10	0.0E+00	5.7E-02	0.0E+00	7.9E-09	0.0E+00
Surf. (<0.5 ft)	10K330250/VP-31A	Ra-226	3.50E-01	2.2E-02	0.0E+00	1.1E-07	0.0E+00	8.6E-01	0.0E+00	5.1E-07	0.0E+00
Surf. (<0.5 ft)	10K330250/VP-31A	Th-230	1.23E+01	2.6E-03	2.2E-02	9.1E-09	1.1E-07	4.5E-01	1.3E+00	2.8E-08	4.9E-07
Surf. (<0.5 ft)	10K330250/VP-31A	Th-232	8.90E-01	9.3E-04	6.9E-02	1.2E-07	3.6E-07	1.6E-01	2.8E+00	1.9E-09	1.6E-06
Surf. (<0.5 ft)	10K330250/VP-31A	TOTAL		2.6E-02	9.2E-02	2.4E-07	4.7E-07	1.5E+00	4.1E+00	5.5E-07	2.0E-06
All Depths	10K330250/VP-31A	Pb-210	1.55E-01	1.3E-04	0.0E+00	1.3E-10	0.0E+00	4.6E-02	0.0E+00	6.2E-09	0.0E+00
All Depths	10K330250/VP-31A	Ra-226	3.50E-01	2.2E-02	0.0E+00	1.1E-07	0.0E+00	8.6E-01	0.0E+00	5.1E-07	0.0E+00
All Depths	10K330250/VP-31A	Th-230	9.44E+00	2.0E-03	1.7E-02	6.9E-09	8.2E-08	3.4E-01	9.8E-01	2.1E-08	3.8E-07
All Depths	10K330250/VP-31A	Th-232	8.90E-01	9.3E-04	6.9E-02	1.2E-07	3.6E-07	1.6E-01	2.8E+00	1.9E-09	1.6E-06
All Depths	10K330250/VP-31A	TOTAL		2.5E-02	8.6E-02	2.4E-07	4.4E-07	1.4E+00	3.8E+00	5.4E-07	1.9E-06

Attachment 12. Radiological Doses and Risks for each Property (page 40 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	RECREATIONAL/TRESPASSER Dose Year=1000	RECREATIONAL/TRESPASSER Risk Year=0.0	RECREATIONAL/TRESPASSER Risk Year=1000	CONSTRUCTION Dose Year=0.0	CONSTRUCTION Dose Year=1000	CONSTRUCTION Risk Year=0.0	CONSTRUCTION Risk Year=1000
Sub. (>0.5 ft)	10K330324/VP-34	Pb-210	4.20E-02	3.5E-05	0.0E+00	3.5E-11	0.0E+00	1.2E-02	0.0E+00	1.7E-09	0.0E+00
Sub. (>0.5 ft)	10K330324/VP-34	Th-230	1.34E+00	2.9E-04	2.4E-03	9.9E-10	1.2E-08	4.9E-02	1.4E-01	3.0E-09	5.3E-08
Sub. (>0.5 ft)	10K330324/VP-34	TOTAL		3.2E-04	2.4E-03	1.0E-09	1.2E-08	6.1E-02	1.4E-01	4.7E-09	5.3E-08
All Depths	10K330324/VP-34	Pb-210	4.20E-02	3.5E-05	0.0E+00	3.5E-11	0.0E+00	1.2E-02	0.0E+00	1.7E-09	0.0E+00
All Depths	10K330324/VP-34	Th-230	1.34E+00	2.9E-04	2.4E-03	9.9E-10	1.2E-08	4.9E-02	1.4E-01	3.0E-09	5.3E-08
All Depths	10K330324/VP-34	TOTAL		3.2E-04	2.4E-03	1.0E-09	1.2E-08	6.1E-02	1.4E-01	4.7E-09	5.3E-08
Sub. (>0.5 ft)	10K330333/VP-33	Pb-210	4.19E-02	3.5E-05	0.0E+00	3.5E-11	0.0E+00	1.2E-02	0.0E+00	1.7E-09	0.0E+00
Sub. (>0.5 ft)	10K330333/VP-33	Th-230	1.33E+00	2.8E-04	2.4E-03	9.8E-10	1.2E-08	4.9E-02	1.4E-01	3.0E-09	5.3E-08
Sub. (>0.5 ft)	10K330333/VP-33	TOTAL		3.2E-04	2.4E-03	1.0E-09	1.2E-08	6.1E-02	1.4E-01	4.7E-09	5.3E-08
All Depths	10K330333/VP-33	Pb-210	4.19E-02	3.5E-05	0.0E+00	3.5E-11	0.0E+00	1.2E-02	0.0E+00	1.7E-09	0.0E+00
All Depths	10K330333/VP-33	Th-230	1.33E+00	2.8E-04	2.4E-03	9.8E-10	1.2E-08	4.9E-02	1.4E-01	3.0E-09	5.3E-08
All Depths	10K330333/VP-33	TOTAL		3.2E-04	2.4E-03	1.0E-09	1.2E-08	6.1E-02	1.4E-01	4.7E-09	5.3E-08
Sub. (>0.5 ft)	10K330342/VP-33	Pb-210	2.94E-02	2.5E-05	0.0E+00	2.4E-11	0.0E+00	8.6E-03	0.0E+00	1.2E-09	0.0E+00
Sub. (>0.5 ft)	10K330342/VP-33	Th-230	4.40E-01	9.4E-05	8.0E-04	3.2E-10	3.8E-09	1.6E-02	4.6E-02	1.0E-09	1.8E-08
Sub. (>0.5 ft)	10K330342/VP-33	TOTAL		1.2E-04	8.0E-04	3.5E-10	3.8E-09	2.5E-02	4.6E-02	2.2E-09	1.8E-08
All Depths	10K330342/VP-33	Pb-210	2.94E-02	2.5E-05	0.0E+00	2.4E-11	0.0E+00	8.6E-03	0.0E+00	1.2E-09	0.0E+00
All Depths	10K330342/VP-33	Th-230	4.40E-01	9.4E-05	8.0E-04	3.2E-10	3.8E-09	1.6E-02	4.6E-02	1.0E-09	1.8E-08
All Depths	10K330342/VP-33	TOTAL		1.2E-04	8.0E-04	3.5E-10	3.8E-09	2.5E-02	4.6E-02	2.2E-09	1.8E-08
Sub. (>0.5 ft)	10K330351/VP-28	Pb-210	5.46E-02	4.6E-05	0.0E+00	4.5E-11	0.0E+00	1.6E-02	0.0E+00	2.2E-09	0.0E+00
Sub. (>0.5 ft)	10K330351/VP-28	Th-230	2.24E+00	4.8E-04	4.1E-03	1.6E-09	2.0E-08	8.2E-02	2.3E-01	5.1E-09	8.9E-08
Sub. (>0.5 ft)	10K330351/VP-28	TOTAL		5.2E-04	4.1E-03	1.7E-09	2.0E-08	9.8E-02	2.3E-01	7.3E-09	8.9E-08
All Depths	10K330351/VP-28	Pb-210	5.46E-02	4.6E-05	0.0E+00	4.5E-11	0.0E+00	1.6E-02	0.0E+00	2.2E-09	0.0E+00
All Depths	10K330351/VP-28	Th-230	2.24E+00	4.8E-04	4.1E-03	1.6E-09	2.0E-08	8.2E-02	2.3E-01	5.1E-09	8.9E-08
All Depths	10K330351/VP-28	TOTAL		5.2E-04	4.1E-03	1.7E-09	2.0E-08	9.8E-02	2.3E-01	7.3E-09	8.9E-08
Surf. (<0.5 ft)	10K420010/VP-9(C)	Pb-210	8.19E-02	6.8E-05	0.0E+00	6.8E-11	0.0E+00	2.4E-02	0.0E+00	3.3E-09	0.0E+00
Surf. (<0.5 ft)	10K420010/VP-9(C)	Ra-226	7.50E-01	4.7E-02	0.0E+00	2.4E-07	0.0E+00	1.8E+00	0.0E+00	1.1E-06	0.0E+00
Surf. (<0.5 ft)	10K420010/VP-9(C)	Th-230	4.19E+00	9.0E-04	7.6E-03	3.1E-09	3.7E-08	1.5E-01	4.3E-01	9.5E-09	1.7E-07
Surf. (<0.5 ft)	10K420010/VP-9(C)	Th-232	1.40E-01	1.5E-04	1.1E-02	1.9E-08	5.7E-08	2.5E-02	4.5E-01	3.0E-10	2.4E-07
Surf. (<0.5 ft)	10K420010/VP-9(C)	U-238	9.12E+00	7.8E-03	0.0E+00	2.9E-08	0.0E+00	4.2E-01	0.0E+00	1.6E-07	0.0E+00
Surf. (<0.5 ft)	10K420010/VP-9(C)	TOTAL		5.6E-02	1.9E-02	2.9E-07	9.3E-08	2.5E+00	8.8E-01	1.3E-06	4.1E-07
All Depths	10K420010/VP-9(C)	Pb-210	8.19E-02	6.8E-05	0.0E+00	6.8E-11	0.0E+00	2.4E-02	0.0E+00	3.3E-09	0.0E+00
All Depths	10K420010/VP-9(C)	Ra-226	7.50E-01	4.7E-02	0.0E+00	2.4E-07	0.0E+00	1.8E+00	0.0E+00	1.1E-06	0.0E+00
All Depths	10K420010/VP-9(C)	Th-230	4.19E+00	9.0E-04	7.6E-03	3.1E-09	3.7E-08	1.5E-01	4.3E-01	9.5E-09	1.7E-07
All Depths	10K420010/VP-9(C)	Th-232	1.40E-01	1.5E-04	1.1E-02	1.9E-08	5.7E-08	2.5E-02	4.5E-01	3.0E-10	2.4E-07
All Depths	10K420010/VP-9(C)	U-238	9.12E+00	7.8E-03	0.0E+00	2.9E-08	0.0E+00	4.2E-01	0.0E+00	1.6E-07	0.0E+00
All Depths	10K420010/VP-9(C)	TOTAL		5.6E-02	1.9E-02	2.9E-07	9.3E-08	2.5E+00	8.8E-01	1.3E-06	4.1E-07
Surf. (<0.5 ft)	10K430042/VP-63	Pb-210	3.64E-02	3.0E-05	0.0E+00	3.0E-11	0.0E+00	1.1E-02	0.0E+00	1.5E-09	0.0E+00
Surf. (<0.5 ft)	10K430042/VP-63	Th-230	9.40E-01	2.0E-04	1.7E-03	6.9E-10	8.2E-09	3.4E-02	9.7E-02	2.1E-09	3.8E-08
Surf. (<0.5 ft)	10K430042/VP-63	TOTAL		2.3E-04	1.7E-03	7.2E-10	8.2E-09	4.5E-02	9.7E-02	3.6E-09	3.8E-08
All Depths	10K430042/VP-63	Pb-210	3.64E-02	3.0E-05	0.0E+00	3.0E-11	0.0E+00	1.1E-02	0.0E+00	1.5E-09	0.0E+00
All Depths	10K430042/VP-63	Th-230	9.40E-01	2.0E-04	1.7E-03	6.9E-10	8.2E-09	3.4E-02	9.7E-02	2.1E-09	3.8E-08

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	CONSTRUCTION Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
All Depths	10K430042/VP-63	TOTAL		2.3E-04	1.7E-03	7.2E-10	8.2E-09	4.5E-02	9.7E-02	3.6E-09	3.8E-08
Sub. (>0.5 ft)	10K440074/VP-8(C)	Pb-210	3.25E-01	2.7E-04	0.0E+00	2.7E-10	0.0E+00	9.5E-02	0.0E+00	1.3E-08	0.0E+00
Sub. (>0.5 ft)	10K440074/VP-8(C)	Ra-226	8.80E-01	5.5E-02	0.0E+00	2.8E-07	0.0E+00	2.2E+00	0.0E+00	1.3E-06	0.0E+00
Sub. (>0.5 ft)	10K440074/VP-8(C)	Th-230	2.15E+01	4.6E-03	3.9E-02	1.6E-08	1.9E-07	7.9E-01	2.2E+00	4.9E-08	8.6E-07
Sub. (>0.5 ft)	10K440074/VP-8(C)	Th-232	6.10E-01	6.4E-04	4.7E-02	8.1E-08	2.5E-07	1.1E-01	2.0E+00	1.3E-09	1.1E-06
Sub. (>0.5 ft)	10K440074/VP-8(C)	U-238	6.29E+00	5.4E-03	0.0E+00	2.0E-08	0.0E+00	2.9E-01	0.0E+00	1.1E-07	0.0E+00
Sub. (>0.5 ft)	10K440074/VP-8(C)	TOTAL		6.6E-02	8.7E-02	3.9E-07	4.3E-07	3.4E+00	4.2E+00	1.4E-06	1.9E-06
Surf. (<0.5 ft)	10K440074/VP-8(C)	Pb-210	1.74E-01	1.4E-04	0.0E+00	1.4E-10	0.0E+00	5.1E-02	0.0E+00	7.0E-09	0.0E+00
Surf. (<0.5 ft)	10K440074/VP-8(C)	Ra-226	8.50E-01	5.3E-02	0.0E+00	2.7E-07	0.0E+00	2.1E+00	0.0E+00	1.2E-06	0.0E+00
Surf. (<0.5 ft)	10K440074/VP-8(C)	Th-230	1.07E+01	2.3E-03	2.0E-02	7.9E-09	9.4E-08	3.9E-01	1.1E+00	2.4E-08	4.3E-07
Surf. (<0.5 ft)	10K440074/VP-8(C)	Th-232	1.55E+00	1.6E-03	1.2E-01	2.1E-07	6.3E-07	2.8E-01	5.0E+00	3.3E-09	2.7E-06
Surf. (<0.5 ft)	10K440074/VP-8(C)	U-238	3.02E+00	2.6E-03	0.0E+00	9.5E-09	0.0E+00	1.4E-01	0.0E+00	5.2E-08	0.0E+00
Surf. (<0.5 ft)	10K440074/VP-8(C)	TOTAL		6.0E-02	1.4E-01	4.9E-07	7.2E-07	2.9E+00	6.1E+00	1.3E-06	3.1E-06
All Depths	10K440074/VP-8(C)	Pb-210	1.61E-01	1.3E-04	0.0E+00	1.3E-10	0.0E+00	4.7E-02	0.0E+00	6.5E-09	0.0E+00
All Depths	10K440074/VP-8(C)	Ra-226	6.80E-01	4.3E-02	0.0E+00	2.1E-07	0.0E+00	1.7E+00	0.0E+00	9.9E-07	0.0E+00
All Depths	10K440074/VP-8(C)	Th-230	9.84E+00	2.1E-03	1.8E-02	7.2E-09	8.6E-08	3.6E-01	1.0E+00	2.2E-08	3.9E-07
All Depths	10K440074/VP-8(C)	Th-232	1.09E+00	1.1E-03	8.5E-02	1.5E-07	4.4E-07	2.0E-01	3.5E+00	2.4E-09	1.9E-06
All Depths	10K440074/VP-8(C)	U-238	3.02E+00	2.6E-03	0.0E+00	9.5E-09	0.0E+00	1.4E-01	0.0E+00	5.2E-08	0.0E+00
All Depths	10K440074/VP-8(C)	TOTAL		4.9E-02	1.0E-01	3.8E-07	5.3E-07	2.4E+00	4.5E+00	1.1E-06	2.3E-06
Sub. (>0.5 ft)	10K440096	Ac-227	1.54E-01	2.5E-03	0.0E+00	5.2E-09	0.0E+00	2.0E-01	0.0E+00	3.6E-08	0.0E+00
Sub. (>0.5 ft)	10K440096	Pa-231	2.16E-01	6.1E-04	0.0E+00	1.4E-09	0.0E+00	1.1E-01	0.0E+00	2.8E-09	0.0E+00
Sub. (>0.5 ft)	10K440096	Pb-210	7.28E-01	6.1E-04	0.0E+00	6.1E-10	0.0E+00	2.1E-01	0.0E+00	2.9E-08	0.0E+00
Sub. (>0.5 ft)	10K440096	Ra-226	8.40E-01	5.3E-02	0.0E+00	2.6E-07	0.0E+00	2.1E+00	0.0E+00	1.2E-06	0.0E+00
Sub. (>0.5 ft)	10K440096	Th-230	5.03E+01	1.1E-02	9.2E-02	3.7E-08	4.4E-07	1.8E+00	5.2E+00	1.1E-07	2.0E-06
Sub. (>0.5 ft)	10K440096	Th-232	3.30E-01	3.4E-04	2.6E-02	4.4E-08	1.3E-07	6.0E-02	1.1E+00	7.1E-10	5.8E-07
Sub. (>0.5 ft)	10K440096	U-238	5.41E+00	4.6E-03	0.0E+00	1.7E-08	0.0E+00	2.5E-01	0.0E+00	9.3E-08	0.0E+00
Sub. (>0.5 ft)	10K440096	TOTAL		7.2E-02	1.2E-01	3.7E-07	5.7E-07	4.7E+00	6.3E+00	1.5E-06	2.6E-06
Surf. (<0.5 ft)	10K440096	Pb-210	1.02E-01	8.5E-05	0.0E+00	8.5E-11	0.0E+00	3.0E-02	0.0E+00	4.1E-09	0.0E+00
Surf. (<0.5 ft)	10K440096	Ra-226	5.20E-01	3.3E-02	0.0E+00	1.6E-07	0.0E+00	1.3E+00	0.0E+00	7.5E-07	0.0E+00
Surf. (<0.5 ft)	10K440096	Th-230	5.65E+00	1.2E-03	1.0E-02	4.2E-09	4.9E-08	2.1E-01	5.9E-01	1.3E-08	2.3E-07
Surf. (<0.5 ft)	10K440096	Th-232	8.70E-01	9.1E-04	6.8E-02	1.2E-07	3.5E-07	1.6E-01	2.8E+00	1.9E-09	1.5E-06
Surf. (<0.5 ft)	10K440096	U-238	3.62E+00	3.1E-03	0.0E+00	1.1E-08	0.0E+00	1.6E-01	0.0E+00	6.3E-08	0.0E+00
Surf. (<0.5 ft)	10K440096	TOTAL		3.8E-02	7.8E-02	2.9E-07	4.0E-07	1.8E+00	3.4E+00	8.3E-07	1.7E-06
All Depths	10K440096	Pb-210	1.27E-01	1.1E-04	0.0E+00	1.1E-10	0.0E+00	3.7E-02	0.0E+00	5.1E-09	0.0E+00
All Depths	10K440096	Ra-226	4.80E-01	3.0E-02	0.0E+00	1.5E-07	0.0E+00	1.2E+00	0.0E+00	7.0E-07	0.0E+00
All Depths	10K440096	Th-230	7.41E+00	1.6E-03	1.4E-02	5.4E-09	6.5E-08	2.7E-01	7.7E-01	1.7E-08	3.0E-07
All Depths	10K440096	Th-232	6.90E-01	7.2E-04	5.4E-02	9.2E-08	2.8E-07	1.3E-01	2.2E+00	1.5E-09	1.2E-06
All Depths	10K440096	U-238	3.62E+00	3.1E-03	0.0E+00	1.1E-08	0.0E+00	1.6E-01	0.0E+00	6.3E-08	0.0E+00
All Depths	10K440096	TOTAL		3.6E-02	6.7E-02	2.6E-07	3.4E-07	1.8E+00	3.0E+00	7.8E-07	1.5E-06
Surf. (<0.5 ft)	10K440104/VP-6(C)	Pb-210	2.66E-02	2.2E-05	0.0E+00	2.2E-11	0.0E+00	7.8E-03	0.0E+00	1.1E-09	0.0E+00
Surf. (<0.5 ft)	10K440104/VP-6(C)	Ra-226	4.50E-01	2.8E-02	0.0E+00	1.4E-07	0.0E+00	1.1E+00	0.0E+00	6.5E-07	0.0E+00
Surf. (<0.5 ft)	10K440104/VP-6(C)	Th-230	2.40E-01	5.1E-05	4.4E-04	1.8E-10	2.1E-09	8.8E-03	2.5E-02	5.5E-10	9.6E-09
Surf. (<0.5 ft)	10K440104/VP-6(C)	Th-232	6.90E-01	7.2E-04	5.4E-02	9.2E-08	2.8E-07	1.3E-01	2.2E+00	1.5E-09	1.2E-06
Surf. (<0.5 ft)	10K440104/VP-6(C)	U-238	5.62E+00	4.8E-03	0.0E+00	1.8E-08	0.0E+00	2.6E-01	0.0E+00	9.7E-08	0.0E+00
Surf. (<0.5 ft)	10K440104/VP-6(C)	TOTAL		3.4E-02	5.4E-02	2.5E-07	2.8E-07	1.5E+00	2.2E+00	7.5E-07	1.2E-06

			Exposure Point	RECREATIONAL/TRESPASSER				CONSTRUCTION			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
All Depths	10K440104/VP-6(C)	Pb-210	2.66E-02	2.2E-05	0.0E+00	2.2E-11	0.0E+00	7.8E-03	0.0E+00	1.1E-09	0.0E+00
All Depths	10K440104/VP-6(C)	Ra-226	4.50E-01	2.8E-02	0.0E+00	1.4E-07	0.0E+00	1.1E+00	0.0E+00	6.5E-07	0.0E+00
All Depths	10K440104/VP-6(C)	Th-230	2.40E-01	5.1E-05	4.4E-04	1.8E-10	2.1E-09	8.8E-03	2.5E-02	5.5E-10	9.6E-09
All Depths	10K440104/VP-6(C)	Th-232	6.90E-01	7.2E-04	5.4E-02	9.2E-08	2.8E-07	1.3E-01	2.2E+00	1.5E-09	1.2E-06
All Depths	10K440104/VP-6(C)	U-238	5.62E+00	4.8E-03	0.0E+00	1.8E-08	0.0E+00	2.6E-01	0.0E+00	9.7E-08	0.0E+00
All Depths	10K440104/VP-6(C)	TOTAL		3.4E-02	5.4E-02	2.5E-07	2.8E-07	1.5E+00	2.2E+00	7.5E-07	1.2E-06
Surf. (<0.5 ft)	10K440113/VP-7(C)	Pb-210	7.28E-02	6.1E-05	0.0E+00	6.1E-11	0.0E+00	2.1E-02	0.0E+00	2.9E-09	0.0E+00
Surf. (<0.5 ft)	10K440113/VP-7(C)	Ra-226	6.50E-01	4.1E-02	0.0E+00	2.0E-07	0.0E+00	1.6E+00	0.0E+00	9.4E-07	0.0E+00
Surf. (<0.5 ft)	10K440113/VP-7(C)	Th-230	3.54E+00	7.6E-04	6.4E-03	2.6E-09	3.1E-08	1.3E-01	3.7E-01	8.1E-09	1.4E-07
Surf. (<0.5 ft)	10K440113/VP-7(C)	Th-232	1.89E+00	2.0E-03	1.5E-01	2.5E-07	7.6E-07	3.4E-01	6.1E+00	4.1E-09	3.3E-06
Surf. (<0.5 ft)	10K440113/VP-7(C)	U-238	3.04E+01	2.6E-02	0.0E+00	9.5E-08	0.0E+00	1.4E+00	0.0E+00	5.3E-07	0.0E+00
Surf. (<0.5 ft)	10K440113/VP-7(C)	TOTAL		7.0E-02	1.5E-01	5.5E-07	7.9E-07	3.5E+00	6.4E+00	1.5E-06	3.4E-06
All Depths	10K440113/VP-7(C)	Pb-210	7.28E-02	6.1E-05	0.0E+00	6.1E-11	0.0E+00	2.1E-02	0.0E+00	2.9E-09	0.0E+00
All Depths	10K440113/VP-7(C)	Ra-226	6.50E-01	4.1E-02	0.0E+00	2.0E-07	0.0E+00	1.6E+00	0.0E+00	9.4E-07	0.0E+00
All Depths	10K440113/VP-7(C)	Th-230	3.54E+00	7.6E-04	6.4E-03	2.6E-09	3.1E-08	1.3E-01	3.7E-01	8.1E-09	1.4E-07
All Depths	10K440113/VP-7(C)	Th-232	1.89E+00	2.0E-03	1.5E-01	2.5E-07	7.6E-07	3.4E-01	6.1E+00	4.1E-09	3.3E-06
All Depths	10K440113/VP-7(C)	U-238	3.04E+01	2.6E-02	0.0E+00	9.5E-08	0.0E+00	1.4E+00	0.0E+00	5.3E-07	0.0E+00
All Depths	10K440113/VP-7(C)	TOTAL		7.0E-02	1.5E-01	5.5E-07	7.9E-07	3.5E+00	6.4E+00	1.5E-06	3.4E-06
Sub. (>0.5 ft)	10K510067/VP-6(L)	Pb-210	9.17E-02	7.6E-05	0.0E+00	7.6E-11	0.0E+00	2.7E-02	0.0E+00	3.7E-09	0.0E+00
Sub. (>0.5 ft)	10K510067/VP-6(L)	Ra-226	7.60E-01	4.8E-02	0.0E+00	2.4E-07	0.0E+00	1.9E+00	0.0E+00	1.1E-06	0.0E+00
Sub. (>0.5 ft)	10K510067/VP-6(L)	Th-230	4.89E+00	1.0E-03	8.9E-03	3.6E-09	4.3E-08	1.8E-01	5.1E-01	1.1E-08	2.0E-07
Sub. (>0.5 ft)	10K510067/VP-6(L)	Th-232	2.06E+00	2.1E-03	1.6E-01	2.7E-07	8.3E-07	3.7E-01	6.6E+00	4.4E-09	3.6E-06
Sub. (>0.5 ft)	10K510067/VP-6(L)	U-238	8.12E+00	6.9E-03	0.0E+00	2.5E-08	0.0E+00	3.7E-01	0.0E+00	1.4E-07	0.0E+00
Sub. (>0.5 ft)	10K510067/VP-6(L)	TOTAL		5.8E-02	1.7E-01	5.4E-07	8.8E-07	2.8E+00	7.1E+00	1.3E-06	3.8E-06
Surf. (<0.5 ft)	10K510067/VP-6(L)	Pb-210	8.78E-02	7.3E-05	0.0E+00	7.3E-11	0.0E+00	2.6E-02	0.0E+00	3.5E-09	0.0E+00
Surf. (<0.5 ft)	10K510067/VP-6(L)	Ra-226	5.30E-01	3.3E-02	0.0E+00	1.7E-07	0.0E+00	1.3E+00	0.0E+00	7.7E-07	0.0E+00
Surf. (<0.5 ft)	10K510067/VP-6(L)	Th-230	4.61E+00	9.9E-04	8.4E-03	3.4E-09	4.0E-08	1.7E-01	4.8E-01	1.0E-08	1.8E-07
Surf. (<0.5 ft)	10K510067/VP-6(L)	Th-232	8.90E-01	9.3E-04	6.9E-02	1.2E-07	3.6E-07	1.6E-01	2.8E+00	1.9E-09	1.6E-06
Surf. (<0.5 ft)	10K510067/VP-6(L)	U-238	7.73E+00	6.6E-03	0.0E+00	2.4E-08	0.0E+00	3.5E-01	0.0E+00	1.3E-07	0.0E+00
Surf. (<0.5 ft)	10K510067/VP-6(L)	TOTAL		4.2E-02	7.8E-02	3.1E-07	4.0E-07	2.0E+00	3.3E+00	9.2E-07	1.7E-06
All Depths	10K510067/VP-6(L)	Pb-210	8.23E-02	6.9E-05	0.0E+00	6.8E-11	0.0E+00	2.4E-02	0.0E+00	3.3E-09	0.0E+00
All Depths	10K510067/VP-6(L)	Ra-226	5.30E-01	3.3E-02	0.0E+00	1.7E-07	0.0E+00	1.3E+00	0.0E+00	7.7E-07	0.0E+00
All Depths	10K510067/VP-6(L)	Th-230	4.22E+00	9.0E-04	7.7E-03	3.1E-09	3.7E-08	1.5E-01	4.4E-01	9.6E-09	1.7E-07
All Depths	10K510067/VP-6(L)	Th-232	1.00E+00	1.0E-03	7.8E-02	1.3E-07	4.0E-07	1.8E-01	3.2E+00	2.2E-09	1.7E-06
All Depths	10K510067/VP-6(L)	U-238	7.63E+00	6.5E-03	0.0E+00	2.4E-08	0.0E+00	3.5E-01	0.0E+00	1.3E-07	0.0E+00
All Depths	10K510067/VP-6(L)	TOTAL		4.2E-02	8.5E-02	3.3E-07	4.4E-07	2.0E+00	3.6E+00	9.1E-07	1.9E-06
Sub. (>0.5 ft)	10K520022/VP-3(L)	Ac-227	7.63E-02	1.2E-03	0.0E+00	2.6E-09	0.0E+00	1.0E-01	0.0E+00	1.8E-08	0.0E+00
Sub. (>0.5 ft)	10K520022/VP-3(L)	Pa-231	1.27E-01	3.6E-04	0.0E+00	8.4E-10	0.0E+00	6.6E-02	0.0E+00	1.6E-09	0.0E+00
Sub. (>0.5 ft)	10K520022/VP-3(L)	Pb-210	5.73E-01	4.8E-04	0.0E+00	4.8E-10	0.0E+00	1.7E-01	0.0E+00	2.3E-08	0.0E+00
Sub. (>0.5 ft)	10K520022/VP-3(L)	Ra-226	1.01E+00	6.3E-02	0.0E+00	3.2E-07	0.0E+00	2.5E+00	0.0E+00	1.5E-06	0.0E+00
Sub. (>0.5 ft)	10K520022/VP-3(L)	Th-230	3.92E+01	8.4E-03	7.1E-02	2.9E-08	3.4E-07	1.4E+00	4.1E+00	8.9E-08	1.6E-06
Sub. (>0.5 ft)	10K520022/VP-3(L)	Th-232	1.08E+00	1.1E-03	8.4E-02	1.4E-07	4.4E-07	2.0E-01	3.5E+00	2.3E-09	1.9E-06
Sub. (>0.5 ft)	10K520022/VP-3(L)	U-238	1.02E+01	8.7E-03	0.0E+00	3.2E-08	0.0E+00	4.7E-01	0.0E+00	1.8E-07	0.0E+00
Sub. (>0.5 ft)	10K520022/VP-3(L)	TOTAL		8.4E-02	1.6E-01	5.3E-07	7.8E-07	4.9E+00	7.5E+00	1.8E-06	3.4E-06

			Exposure Point Conc.	RECREATIONAL/TRESPASSER				CONSTRUCTION			
Data Group	Property	Isotope	(pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<0.5 ft)	10K520022/VP-3(L)	Ac-227	2.35E-01	3.8E-03	0.0E+00	7.9E-09	0.0E+00	3.1E-01	0.0E+00	5.4E-08	0.0E+00
Surf. (<0.5 ft)	10K520022/VP-3(L)	Pa-231	3.08E-01	8.7E-04	0.0E+00	2.0E-09	0.0E+00	1.6E-01	0.0E+00	4.0E-09	0.0E+00
Surf. (<0.5 ft)	10K520022/VP-3(L)	Pb-210	8.89E-01	7.4E-04	0.0E+00	7.4E-10	0.0E+00	2.6E-01	0.0E+00	3.6E-08	0.0E+00
Surf. (<0.5 ft)	10K520022/VP-3(L)	Ra-226	1.14E+00	7.2E-02	0.0E+00	3.6E-07	0.0E+00	2.8E+00	0.0E+00	1.7E-06	0.0E+00
Surf. (<0.5 ft)	10K520022/VP-3(L)	Th-230	6.18E+01	1.3E-02	1.1E-01	4.5E-08	5.4E-07	2.3E+00	6.4E+00	1.4E-07	2.5E-06
Surf. (<0.5 ft)	10K520022/VP-3(L)	Th-232	1.09E+00	1.1E-03	8.5E-02	1.5E-07	4.4E-07	2.0E-01	3.5E+00	2.4E-09	1.9E-06
Surf. (<0.5 ft)	10K520022/VP-3(L)	U-238	8.78E+00	7.5E-03	0.0E+00	2.8E-08	0.0E+00	4.0E-01	0.0E+00	1.5E-07	0.0E+00
Surf. (<0.5 ft)	10K520022/VP-3(L)	TOTAL		9.9E-02	2.0E-01	5.9E-07	9.8E-07	6.4E+00	9.9E+00	2.0E-06	4.4E-06
All Depths	10K520022/VP-3(L)	Ac-227	5.74E-02	9.2E-04	0.0E+00	1.9E-09	0.0E+00	7.6E-02	0.0E+00	1.3E-08	0.0E+00
All Depths	10K520022/VP-3(L)	Pa-231	1.06E-01	3.0E-04	0.0E+00	6.9E-10	0.0E+00	5.5E-02	0.0E+00	1.4E-09	0.0E+00
All Depths	10K520022/VP-3(L)	Pb-210	5.35E-01	4.5E-04	0.0E+00	4.4E-10	0.0E+00	1.6E-01	0.0E+00	2.1E-08	0.0E+00
All Depths	10K520022/VP-3(L)	Ra-226	9.80E-01	6.1E-02	0.0E+00	3.1E-07	0.0E+00	2.4E+00	0.0E+00	1.4E-06	0.0E+00
All Depths	10K520022/VP-3(L)	Th-230	3.65E+01	7.8E-03	6.7E-02	2.7E-08	3.2E-07	1.3E+00	3.8E+00	8.3E-08	1.5E-06
All Depths	10K520022/VP-3(L)	Th-232	1.03E+00	1.1E-03	8.0E-02	1.4E-07	4.2E-07	1.9E-01	3.3E+00	2.2E-09	1.8E-06
All Depths	10K520022/VP-3(L)	U-238	9.72E+00	8.3E-03	0.0E+00	3.0E-08	0.0E+00	4.4E-01	0.0E+00	1.7E-07	0.0E+00
All Depths	10K520022/VP-3(L)	TOTAL		8.0E-02	1.5E-01	5.1E-07	7.3E-07	4.7E+00	7.1E+00	1.7E-06	3.3E-06
Sub. (>0.5 ft)	10K520033/VP-5(L)	Pb-210	2.58E-02	2.1E-05	0.0E+00	2.1E-11	0.0E+00	7.5E-03	0.0E+00	1.0E-09	0.0E+00
Sub. (>0.5 ft)	10K520033/VP-5(L)	Ra-226	8.50E-01	5.3E-02	0.0E+00	2.7E-07	0.0E+00	2.1E+00	0.0E+00	1.2E-06	0.0E+00
Sub. (>0.5 ft)	10K520033/VP-5(L)	Th-230	1.80E-01	3.9E-05	3.3E-04	1.3E-10	1.6E-09	6.6E-03	1.9E-02	4.1E-10	7.2E-09
Sub. (>0.5 ft)	10K520033/VP-5(L)	Th-232	1.48E+00	1.5E-03	1.2E-01	2.0E-07	6.0E-07	2.7E-01	4.7E+00	3.2E-09	2.6E-06
Sub. (>0.5 ft)	10K520033/VP-5(L)	U-238	1.04E+01	8.9E-03	0.0E+00	3.3E-08	0.0E+00	4.7E-01	0.0E+00	1.8E-07	0.0E+00
Sub. (>0.5 ft)	10K520033/VP-5(L)	TOTAL		6.4E-02	1.2E-01	5.0E-07	6.0E-07	2.8E+00	4.8E+00	1.4E-06	2.6E-06
Surf. (<0.5 ft)	10K520033/VP-5(L)	Pb-210	1.10E-01	9.1E-05	0.0E+00	9.1E-11	0.0E+00	3.2E-02	0.0E+00	4.4E-09	0.0E+00
Surf. (<0.5 ft)	10K520033/VP-5(L)	Ra-226	6.70E-01	4.2E-02	0.0E+00	2.1E-07	0.0E+00	1.6E+00	0.0E+00	9.7E-07	0.0E+00
Surf. (<0.5 ft)	10K520033/VP-5(L)	Th-230	6.17E+00	1.3E-03	1.1E-02	4.5E-09	5.4E-08	2.3E-01	6.4E-01	1.4E-08	2.5E-07
Surf. (<0.5 ft)	10K520033/VP-5(L)	Th-232	8.50E-01	8.9E-04	6.6E-02	1.1E-07	3.4E-07	1.5E-01	2.7E+00	1.8E-09	1.5E-06
Surf. (<0.5 ft)	10K520033/VP-5(L)	U-238	8.18E+00	7.0E-03	0.0E+00	2.6E-08	0.0E+00	3.7E-01	0.0E+00	1.4E-07	0.0E+00
Surf. (<0.5 ft)	10K520033/VP-5(L)	TOTAL		5.1E-02	7.7E-02	3.5E-07	4.0E-07	2.4E+00	3.4E+00	1.1E-06	1.7E-06
All Depths	10K520033/VP-5(L)	Pb-210	3.29E-02	2.7E-05	0.0E+00	2.7E-11	0.0E+00	9.6E-03	0.0E+00	1.3E-09	0.0E+00
All Depths	10K520033/VP-5(L)	Ra-226	7.70E-01	4.8E-02	0.0E+00	2.4E-07	0.0E+00	1.9E+00	0.0E+00	1.1E-06	0.0E+00
All Depths	10K520033/VP-5(L)	Th-230	6.90E-01	1.5E-04	1.3E-03	5.1E-10	6.0E-09	2.5E-02	7.2E-02	1.6E-09	2.8E-08
All Depths	10K520033/VP-5(L)	Th-232	1.33E+00	1.4E-03	1.0E-01	1.8E-07	5.4E-07	2.4E-01	4.3E+00	2.9E-09	2.3E-06
All Depths	10K520033/VP-5(L)	U-238	9.92E+00	8.5E-03	0.0E+00	3.1E-08	0.0E+00	4.5E-01	0.0E+00	1.7E-07	0.0E+00
All Depths	10K520033/VP-5(L)	TOTAL		5.8E-02	1.0E-01	4.5E-07	5.4E-07	2.6E+00	4.3E+00	1.3E-06	2.3E-06
Sub. (>0.5 ft)	10K520044/VP-4(L)	Pb-210	1.82E-01	1.5E-04	0.0E+00	1.5E-10	0.0E+00	5.3E-02	0.0E+00	7.3E-09	0.0E+00
Sub. (>0.5 ft)	10K520044/VP-4(L)	Ra-226	7.50E-01	4.7E-02	0.0E+00	2.4E-07	0.0E+00	1.8E+00	0.0E+00	1.1E-06	0.0E+00
Sub. (>0.5 ft)	10K520044/VP-4(L)	Th-230	1.13E+01	2.4E-03	2.1E-02	8.3E-09	9.9E-08	4.1E-01	1.2E+00	2.6E-08	4.5E-07
Sub. (>0.5 ft)	10K520044/VP-4(L)	Th-232	9.90E-01	1.0E-03	7.7E-02	1.3E-07	4.0E-07	1.8E-01	3.2E+00	2.1E-09	1.7E-06
Sub. (>0.5 ft)	10K520044/VP-4(L)	U-238	8.36E+00	7.1E-03	0.0E+00	2.6E-08	0.0E+00	3.8E-01	0.0E+00	1.4E-07	0.0E+00
Sub. (>0.5 ft)	10K520044/VP-4(L)	TOTAL		5.8E-02	9.8E-02	4.0E-07	5.0E-07	2.9E+00	4.3E+00	1.3E-06	2.2E-06
Surf. (<0.5 ft)	10K520044/VP-4(L)	Ac-227	3.76E-01	6.1E-03	0.0E+00	1.3E-08	0.0E+00	5.0E-01	0.0E+00	8.7E-08	0.0E+00
Surf. (<0.5 ft)	10K520044/VP-4(L)	Pa-231	4.70E-01	1.3E-03	0.0E+00	3.1E-09	0.0E+00	2.4E-01	0.0E+00	6.1E-09	0.0E+00
Surf. (<0.5 ft)	10K520044/VP-4(L)	Pb-210	1.17E+00	9.8E-04	0.0E+00	9.7E-10	0.0E+00	3.4E-01	0.0E+00	4.7E-08	0.0E+00
Surf. (<0.5 ft)	10K520044/VP-4(L)	Ra-226	2.13E+00	1.3E-01	0.0E+00	6.7E-07	0.0E+00	5.2E+00	0.0E+00	3.1E-06	0.0E+00
Surf. (<0.5 ft)	10K520044/VP-4(L)	Th-230	8.20E+01	1.8E-02	1.5E-01	6.0E-08	7.1E-07	3.0E+00	8.5E+00	1.9E-07	3.3E-06
Surf. (<0.5 ft)	10K520044/VP-4(L)	Th-232	7.00E-01	7.3E-04	5.4E-02	9.3E-08	2.8E-07	1.3E-01	2.2E+00	1.5E-09	1.2E-06

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	RECREATIONAL/TRESPASSER Dose Year=1000	RECREATIONAL/TRESPASSER Risk Year=0.0	RECREATIONAL/TRESPASSER Risk Year=1000	CONSTRUCTION Dose Year=0.0	CONSTRUCTION Dose Year=1000	CONSTRUCTION Risk Year=0.0	CONSTRUCTION Risk Year=1000
Surf. (<0.5 ft)	10K520044/VP-4(L)	U-238	8.51E+00	7.3E-03	0.0E+00	2.7E-08	0.0E+00	3.9E-01	0.0E+00	1.5E-07	0.0E+00
Surf. (<0.5 ft)	10K520044/VP-4(L)	TOTAL		1.7E-01	2.0E-01	8.7E-07	1.0E-06	9.8E+00	1.1E+01	3.6E-06	4.5E-06
All Depths	10K520044/VP-4(L)	Pb-210	2.98E-01	2.5E-04	0.0E+00	2.5E-10	0.0E+00	8.7E-02	0.0E+00	1.2E-08	0.0E+00
All Depths	10K520044/VP-4(L)	Ra-226	9.20E-01	5.8E-02	0.0E+00	2.9E-07	0.0E+00	2.3E+00	0.0E+00	1.3E-06	0.0E+00
All Depths	10K520044/VP-4(L)	Th-230	1.96E+01	4.2E-03	3.6E-02	1.4E-08	1.7E-07	7.2E-01	2.0E+00	4.5E-08	7.8E-07
All Depths	10K520044/VP-4(L)	Th-232	8.60E-01	9.0E-04	6.7E-02	1.1E-07	3.5E-07	1.6E-01	2.8E+00	1.9E-09	1.5E-06
All Depths	10K520044/VP-4(L)	U-238	8.20E+00	7.0E-03	0.0E+00	2.6E-08	0.0E+00	3.7E-01	0.0E+00	1.4E-07	0.0E+00
All Depths	10K520044/VP-4(L)	TOTAL		7.0E-02	1.0E-01	4.4E-07	5.2E-07	3.6E+00	4.8E+00	1.5E-06	2.3E-06
Sub. (>0.5 ft)	10K520066/VP-37	Pb-210	8.83E-02	7.4E-05	0.0E+00	7.3E-11	0.0E+00	2.6E-02	0.0E+00	3.5E-09	0.0E+00
Sub. (>0.5 ft)	10K520066/VP-37	Ra-226	6.10E-01	3.8E-02	0.0E+00	1.9E-07	0.0E+00	1.5E+00	0.0E+00	8.8E-07	0.0E+00
Sub. (>0.5 ft)	10K520066/VP-37	Th-230	4.65E+00	1.0E-03	8.5E-03	3.4E-09	4.1E-08	1.7E-01	4.8E-01	1.1E-08	1.9E-07
Sub. (>0.5 ft)	10K520066/VP-37	Th-232	1.06E+00	1.1E-03	8.2E-02	1.4E-07	4.3E-07	1.9E-01	3.4E+00	2.3E-09	1.8E-06
Sub. (>0.5 ft)	10K520066/VP-37	U-238	7.85E+00	6.7E-03	0.0E+00	2.5E-08	0.0E+00	3.6E-01	0.0E+00	1.4E-07	0.0E+00
Sub. (>0.5 ft)	10K520066/VP-37	TOTAL		4.7E-02	9.1E-02	3.6E-07	4.7E-07	2.2E+00	3.9E+00	1.0E-06	2.0E-06
Surf. (<0.5 ft)	10K520066/VP-37	Ac-227	7.07E-01	1.1E-02	0.0E+00	2.4E-08	0.0E+00	9.4E-01	0.0E+00	1.6E-07	0.0E+00
Surf. (<0.5 ft)	10K520066/VP-37	Pa-231	8.48E-01	2.4E-03	0.0E+00	5.6E-09	0.0E+00	4.4E-01	0.0E+00	1.1E-08	0.0E+00
Surf. (<0.5 ft)	10K520066/VP-37	Pb-210	1.83E+00	1.5E-03	0.0E+00	1.5E-09	0.0E+00	5.4E-01	0.0E+00	7.4E-08	0.0E+00
Surf. (<0.5 ft)	10K520066/VP-37	Ra-226	8.90E-01	5.6E-02	0.0E+00	2.8E-07	0.0E+00	2.2E+00	0.0E+00	1.3E-06	0.0E+00
Surf. (<0.5 ft)	10K520066/VP-37	Th-230	1.29E+02	2.8E-02	2.4E-01	9.5E-08	1.1E-06	4.7E+00	1.3E+01	2.9E-07	5.2E-06
Surf. (<0.5 ft)	10K520066/VP-37	Th-232	1.51E+00	1.6E-03	1.2E-01	2.0E-07	6.1E-07	2.7E-01	4.8E+00	3.3E-09	2.6E-06
Surf. (<0.5 ft)	10K520066/VP-37	U-234	4.42E-01	4.1E-05	0.0E+00	4.1E-11	0.0E+00	7.6E-03	0.0E+00	1.1E-09	0.0E+00
Surf. (<0.5 ft)	10K520066/VP-37	U-235	8.12E-03	3.6E-05	0.0E+00	1.0E-10	0.0E+00	1.5E-03	0.0E+00	5.0E-10	0.0E+00
Surf. (<0.5 ft)	10K520066/VP-37	U-238	1.02E+01	8.7E-03	0.0E+00	3.2E-08	0.0E+00	4.7E-01	0.0E+00	1.8E-07	0.0E+00
Surf. (<0.5 ft)	10K520066/VP-37	TOTAL		1.1E-01	3.5E-01	6.4E-07	1.7E-06	9.6E+00	1.8E+01	2.0E-06	7.8E-06
All Depths	10K520066/VP-37	Pb-210	3.43E-01	2.9E-04	0.0E+00	2.9E-10	0.0E+00	1.0E-01	0.0E+00	1.4E-08	0.0E+00
All Depths	10K520066/VP-37	Ra-226	5.90E-01	3.7E-02	0.0E+00	1.9E-07	0.0E+00	1.4E+00	0.0E+00	8.5E-07	0.0E+00
All Depths	10K520066/VP-37	Th-230	2.28E+01	4.9E-03	4.2E-02	1.7E-08	2.0E-07	8.3E-01	2.4E+00	5.2E-08	9.1E-07
All Depths	10K520066/VP-37	Th-232	1.04E+00	1.1E-03	8.1E-02	1.4E-07	4.2E-07	1.9E-01	3.3E+00	2.2E-09	1.8E-06
All Depths	10K520066/VP-37	U-238	7.88E+00	6.7E-03	0.0E+00	2.5E-08	0.0E+00	3.6E-01	0.0E+00	1.4E-07	0.0E+00
All Depths	10K520066/VP-37	TOTAL		5.0E-02	1.2E-01	3.7E-07	6.2E-07	2.9E+00	5.7E+00	1.1E-06	2.7E-06
Surf. (<0.5 ft)	10K520165	Pb-210	1.54E-01	1.3E-04	0.0E+00	1.3E-10	0.0E+00	4.5E-02	0.0E+00	6.2E-09	0.0E+00
Surf. (<0.5 ft)	10K520165	Ra-226	1.45E+00	9.1E-02	0.0E+00	4.6E-07	0.0E+00	3.6E+00	0.0E+00	2.1E-06	0.0E+00
Surf. (<0.5 ft)	10K520165	Th-230	9.34E+00	2.0E-03	1.7E-02	6.9E-09	8.1E-08	3.4E-01	9.7E-01	2.1E-08	3.7E-07
Surf. (<0.5 ft)	10K520165	Th-232	2.59E+00	2.7E-03	2.0E-01	3.5E-07	1.0E-06	4.7E-01	8.3E+00	5.6E-09	4.5E-06
Surf. (<0.5 ft)	10K520165	U-238	1.06E+01	9.1E-03	0.0E+00	3.3E-08	0.0E+00	4.8E-01	0.0E+00	1.8E-07	0.0E+00
Surf. (<0.5 ft)	10K520165	TOTAL		1.0E-01	2.2E-01	8.4E-07	1.1E-06	4.9E+00	9.3E+00	2.3E-06	4.9E-06
All Depths	10K520165	Pb-210	1.54E-01	1.3E-04	0.0E+00	1.3E-10	0.0E+00	4.5E-02	0.0E+00	6.2E-09	0.0E+00
All Depths	10K520165	Ra-226	1.45E+00	9.1E-02	0.0E+00	4.6E-07	0.0E+00	3.6E+00	0.0E+00	2.1E-06	0.0E+00
All Depths	10K520165	Th-230	9.34E+00	2.0E-03	1.7E-02	6.9E-09	8.1E-08	3.4E-01	9.7E-01	2.1E-08	3.7E-07
All Depths	10K520165	Th-232	2.59E+00	2.7E-03	2.0E-01	3.5E-07	1.0E-06	4.7E-01	8.3E+00	5.6E-09	4.5E-06
All Depths	10K520165	U-238	1.06E+01	9.1E-03	0.0E+00	3.3E-08	0.0E+00	4.8E-01	0.0E+00	1.8E-07	0.0E+00
All Depths	10K520165	TOTAL		1.0E-01	2.2E-01	8.4E-07	1.1E-06	4.9E+00	9.3E+00	2.3E-06	4.9E-06
Surf. (<0.5 ft)	10K530076	Pb-210	8.82E-02	7.4E-05	0.0E+00	7.3E-11	0.0E+00	2.6E-02	0.0E+00	3.5E-09	0.0E+00
Surf. (<0.5 ft)	10K530076	Th-230	4.64E+00	9.9E-04	8.5E-03	3.4E-09	4.0E-08	1.7E-01	4.8E-01	1.1E-08	1.9E-07
Surf. (<0.5 ft)	10K530076	TOTAL		1.1E-03	8.5E-03	3.5E-09	4.0E-08	2.0E-01	4.8E-01	1.4E-08	1.9E-07

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	RECREATIONAL/TRESPASSER Dose Year=1000	RECREATIONAL/TRESPASSER Risk Year=0.0	RECREATIONAL/TRESPASSER Risk Year=1000	CONSTRUCTION Dose Year=0.0	CONSTRUCTION Dose Year=1000	CONSTRUCTION Risk Year=0.0	CONSTRUCTION Risk Year=1000
All Depths	10K530076	Pb-210	8.82E-02	7.4E-05	0.0E+00	7.3E-11	0.0E+00	2.6E-02	0.0E+00	3.5E-09	0.0E+00
All Depths	10K530076	Th-230	4.64E+00	9.9E-04	8.5E-03	3.4E-09	4.0E-08	1.7E-01	4.8E-01	1.1E-08	1.9E-07
All Depths	10K530076	TOTAL		1.1E-03	8.5E-03	3.5E-09	4.0E-08	2.0E-01	4.8E-01	1.4E-08	1.9E-07
Sub. (>0.5 ft)	10K530087	Pb-210	8.29E-02	6.9E-05	0.0E+00	6.9E-11	0.0E+00	2.4E-02	0.0E+00	3.3E-09	0.0E+00
Sub. (>0.5 ft)	10K530087	Ra-226	5.00E-01	3.1E-02	0.0E+00	1.6E-07	0.0E+00	1.2E+00	0.0E+00	7.2E-07	0.0E+00
Sub. (>0.5 ft)	10K530087	Th-230	4.26E+00	9.1E-04	7.8E-03	3.1E-09	3.7E-08	1.6E-01	4.4E-01	9.7E-09	1.7E-07
Sub. (>0.5 ft)	10K530087	Th-232	6.50E-01	6.8E-04	5.1E-02	8.7E-08	2.6E-07	1.2E-01	2.1E+00	1.4E-09	1.1E-06
Sub. (>0.5 ft)	10K530087	U-238	7.71E+00	6.6E-03	0.0E+00	2.4E-08	0.0E+00	3.5E-01	0.0E+00	1.3E-07	0.0E+00
Sub. (>0.5 ft)	10K530087	TOTAL		4.0E-02	5.8E-02	2.7E-07	3.0E-07	1.9E+00	2.5E+00	8.7E-07	1.3E-06
Surf. (<0.5 ft)	10K530087	Ac-227	2.30E+00	3.7E-02	0.0E+00	7.7E-08	0.0E+00	3.0E+00	0.0E+00	5.3E-07	0.0E+00
Surf. (<0.5 ft)	10K530087	Pa-231	2.66E+00	7.5E-03	0.0E+00	1.7E-08	0.0E+00	1.4E+00	0.0E+00	3.5E-08	0.0E+00
Surf. (<0.5 ft)	10K530087	Pb-210	5.01E+00	4.2E-03	0.0E+00	4.2E-09	0.0E+00	1.5E+00	0.0E+00	2.0E-07	0.0E+00
Surf. (<0.5 ft)	10K530087	Ra-226	2.47E+00	1.5E-01	0.0E+00	7.8E-07	0.0E+00	6.1E+00	0.0E+00	3.6E-06	0.0E+00
Surf. (<0.5 ft)	10K530087	Th-230	3.56E+02	7.6E-02	6.5E-01	2.6E-07	3.1E-06	1.3E+01	3.7E+01	8.1E-07	1.4E-05
Surf. (<0.5 ft)	10K530087	Th-232	1.50E+00	1.6E-03	1.2E-01	2.0E-07	6.1E-07	2.7E-01	4.8E+00	3.2E-09	2.6E-06
Surf. (<0.5 ft)	10K530087	U-234	3.17E+00	2.9E-04	0.0E+00	2.9E-10	0.0E+00	5.4E-02	0.0E+00	7.5E-09	0.0E+00
Surf. (<0.5 ft)	10K530087	U-235	1.26E-01	5.6E-04	0.0E+00	1.6E-09	0.0E+00	2.3E-02	0.0E+00	7.8E-09	0.0E+00
Surf. (<0.5 ft)	10K530087	U-238	1.10E+01	9.4E-03	0.0E+00	3.5E-08	0.0E+00	5.0E-01	0.0E+00	1.9E-07	0.0E+00
Surf. (<0.5 ft)	10K530087	TOTAL		2.9E-01	7.7E-01	1.4E-06	3.7E-06	2.6E+01	4.2E+01	5.4E-06	1.7E-05
All Depths	10K530087	Ac-227	1.80E-01	2.9E-03	0.0E+00	6.1E-09	0.0E+00	2.4E-01	0.0E+00	4.2E-08	0.0E+00
All Depths	10K530087	Pa-231	2.46E-01	6.9E-04	0.0E+00	1.6E-09	0.0E+00	1.3E-01	0.0E+00	3.2E-09	0.0E+00
All Depths	10K530087	Pb-210	7.80E-01	6.5E-04	0.0E+00	6.5E-10	0.0E+00	2.3E-01	0.0E+00	3.1E-08	0.0E+00
All Depths	10K530087	Ra-226	1.15E+00	7.2E-02	0.0E+00	3.6E-07	0.0E+00	2.8E+00	0.0E+00	1.7E-06	0.0E+00
All Depths	10K530087	Th-230	5.40E+01	1.2E-02	9.8E-02	4.0E-08	4.7E-07	2.0E+00	5.6E+00	1.2E-07	2.2E-06
All Depths	10K530087	Th-232	9.30E-01	9.7E-04	7.2E-02	1.2E-07	3.8E-07	1.7E-01	3.0E+00	2.0E-09	1.6E-06
All Depths	10K530087	U-238	8.65E+00	7.4E-03	0.0E+00	2.7E-08	0.0E+00	3.9E-01	0.0E+00	1.5E-07	0.0E+00
All Depths	10K530087	TOTAL		9.6E-02	1.7E-01	5.6E-07	8.5E-07	6.0E+00	8.6E+00	2.0E-06	3.8E-06
Sub. (>0.5 ft)	10K530098/VP-1(L)	Pb-210	9.91E-02	8.3E-05	0.0E+00	8.2E-11	0.0E+00	2.9E-02	0.0E+00	4.0E-09	0.0E+00
Sub. (>0.5 ft)	10K530098/VP-1(L)	Ra-226	6.60E-01	4.1E-02	0.0E+00	2.1E-07	0.0E+00	1.6E+00	0.0E+00	9.6E-07	0.0E+00
Sub. (>0.5 ft)	10K530098/VP-1(L)	Th-230	5.42E+00	1.2E-03	9.9E-03	4.0E-09	4.7E-08	2.0E-01	5.6E-01	1.2E-08	2.2E-07
Sub. (>0.5 ft)	10K530098/VP-1(L)	Th-232	8.40E-01	8.8E-04	6.5E-02	1.1E-07	3.4E-07	1.5E-01	2.7E+00	1.8E-09	1.5E-06
Sub. (>0.5 ft)	10K530098/VP-1(L)	U-238	4.62E+00	3.9E-03	0.0E+00	1.4E-08	0.0E+00	2.1E-01	0.0E+00	8.0E-08	0.0E+00
Sub. (>0.5 ft)	10K530098/VP-1(L)	TOTAL		4.7E-02	7.5E-02	3.4E-07	3.9E-07	2.2E+00	3.3E+00	1.1E-06	1.7E-06
Surf. (<0.5 ft)	10K530098/VP-1(L)	Ac-227	1.03E+00	1.7E-02	0.0E+00	3.5E-08	0.0E+00	1.4E+00	0.0E+00	2.4E-07	0.0E+00
Surf. (<0.5 ft)	10K530098/VP-1(L)	Pa-231	1.22E+00	3.4E-03	0.0E+00	8.0E-09	0.0E+00	6.3E-01	0.0E+00	1.6E-08	0.0E+00
Surf. (<0.5 ft)	10K530098/VP-1(L)	Pb-210	2.48E+00	2.1E-03	0.0E+00	2.1E-09	0.0E+00	7.3E-01	0.0E+00	9.9E-08	0.0E+00
Surf. (<0.5 ft)	10K530098/VP-1(L)	Ra-226	1.49E+00	9.3E-02	0.0E+00	4.7E-07	0.0E+00	3.7E+00	0.0E+00	2.2E-06	0.0E+00
Surf. (<0.5 ft)	10K530098/VP-1(L)	Th-230	1.75E+02	3.8E-02	3.2E-01	1.3E-07	1.5E-06	6.4E+00	1.8E+01	4.0E-07	7.0E-06
Surf. (<0.5 ft)	10K530098/VP-1(L)	Th-232	3.08E+00	3.2E-03	2.4E-01	4.1E-07	1.2E-06	5.6E-01	9.9E+00	6.6E-09	5.4E-06
Surf. (<0.5 ft)	10K530098/VP-1(L)	U-234	9.94E-01	9.2E-05	0.0E+00	9.1E-11	0.0E+00	1.7E-02	0.0E+00	2.4E-09	0.0E+00
Surf. (<0.5 ft)	10K530098/VP-1(L)	U-235	3.20E-02	1.4E-04	0.0E+00	4.1E-10	0.0E+00	5.8E-03	0.0E+00	2.0E-09	0.0E+00
Surf. (<0.5 ft)	10K530098/VP-1(L)	U-238	1.11E+01	9.5E-03	0.0E+00	3.5E-08	0.0E+00	5.1E-01	0.0E+00	1.9E-07	0.0E+00
Surf. (<0.5 ft)	10K530098/VP-1(L)	TOTAL		1.7E-01	5.6E-01	1.1E-06	2.8E-06	1.4E+01	2.8E+01	3.1E-06	1.2E-05
All Depths	10K530098/VP-1(L)	Ac-227	2.74E-01	4.4E-03	0.0E+00	9.3E-09	0.0E+00	3.6E-01	0.0E+00	6.4E-08	0.0E+00
All Depths	10K530098/VP-1(L)	Pa-231	3.54E-01	1.0E-03	0.0E+00	2.3E-09	0.0E+00	1.8E-01	0.0E+00	4.6E-09	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 46 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	CONSTRUCTION Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
All Depths	10K530098/VP-1(L)	Pb-210	9.69E-01	8.1E-04	0.0E+00	8.1E-10	0.0E+00	2.8E-01	0.0E+00	3.9E-08	0.0E+00
All Depths	10K530098/VP-1(L)	Ra-226	9.20E-01	5.8E-02	0.0E+00	2.9E-07	0.0E+00	2.3E+00	0.0E+00	1.3E-06	0.0E+00
All Depths	10K530098/VP-1(L)	Th-230	6.75E+01	1.4E-02	1.2E-01	5.0E-08	5.9E-07	2.5E+00	7.0E+00	1.5E-07	2.7E-06
All Depths	10K530098/VP-1(L)	Th-232	9.70E-01	1.0E-03	7.5E-02	1.3E-07	3.9E-07	1.8E-01	3.1E+00	2.1E-09	1.7E-06
All Depths	10K530098/VP-1(L)	U-238	4.62E+00	3.9E-03	0.0E+00	1.4E-08	0.0E+00	2.1E-01	0.0E+00	8.0E-08	0.0E+00
All Depths	10K530098/VP-1(L)	TOTAL		8.3E-02	2.0E-01	4.9E-07	9.8E-07	5.9E+00	1.0E+01	1.7E-06	4.4E-06
Sub. (>0.5 ft)	10K540031/VP-41	Pb-210	3.30E-02	2.8E-05	0.0E+00	2.7E-11	0.0E+00	9.7E-03	0.0E+00	1.3E-09	0.0E+00
Sub. (>0.5 ft)	10K540031/VP-41	Th-230	7.00E-01	1.5E-04	1.3E-03	5.1E-10	6.1E-09	2.6E-02	7.3E-02	1.6E-09	2.8E-08
Sub. (>0.5 ft)	10K540031/VP-41	TOTAL		1.8E-04	1.3E-03	5.4E-10	6.1E-09	3.5E-02	7.3E-02	2.9E-09	2.8E-08
All Depths	10K540031/VP-41	Pb-210	3.30E-02	2.8E-05	0.0E+00	2.7E-11	0.0E+00	9.7E-03	0.0E+00	1.3E-09	0.0E+00
All Depths	10K540031/VP-41	Th-230	7.00E-01	1.5E-04	1.3E-03	5.1E-10	6.1E-09	2.6E-02	7.3E-02	1.6E-09	2.8E-08
All Depths	10K540031/VP-41	TOTAL		1.8E-04	1.3E-03	5.4E-10	6.1E-09	3.5E-02	7.3E-02	2.9E-09	2.8E-08
Sub. (>0.5 ft)	10K540075/VP-43	Pb-210	2.14E-02	1.8E-05	0.0E+00	1.8E-11	0.0E+00	6.3E-03	0.0E+00	8.6E-10	0.0E+00
Sub. (>0.5 ft)	10K540075/VP-43	TOTAL		1.8E-05	0.0E+00	1.8E-11	0.0E+00	6.3E-03	0.0E+00	8.6E-10	0.0E+00
All Depths	10K540075/VP-43	Pb-210	2.14E-02	1.8E-05	0.0E+00	1.8E-11	0.0E+00	6.3E-03	0.0E+00	8.6E-10	0.0E+00
All Depths	10K540075/VP-43	TOTAL		1.8E-05	0.0E+00	1.8E-11	0.0E+00	6.3E-03	0.0E+00	8.6E-10	0.0E+00
Sub. (>0.5 ft)	10K540097/VP-38	Pb-210	4.96E-02	4.1E-05	0.0E+00	4.1E-11	0.0E+00	1.5E-02	0.0E+00	2.0E-09	0.0E+00
Sub. (>0.5 ft)	10K540097/VP-38	Ra-226	5.50E-01	3.4E-02	0.0E+00	1.7E-07	0.0E+00	1.4E+00	0.0E+00	8.0E-07	0.0E+00
Sub. (>0.5 ft)	10K540097/VP-38	Th-230	1.88E+00	4.0E-04	3.4E-03	1.4E-09	1.6E-08	6.9E-02	1.9E-01	4.3E-09	7.5E-08
Sub. (>0.5 ft)	10K540097/VP-38	Th-232	1.10E+00	1.1E-03	8.6E-02	1.5E-07	4.4E-07	2.0E-01	3.5E+00	2.4E-09	1.9E-06
Sub. (>0.5 ft)	10K540097/VP-38	U-238	9.02E+00	7.7E-03	0.0E+00	2.8E-08	0.0E+00	4.1E-01	0.0E+00	1.6E-07	0.0E+00
Sub. (>0.5 ft)	10K540097/VP-38	TOTAL		4.4E-02	8.9E-02	3.5E-07	4.6E-07	2.0E+00	3.7E+00	9.6E-07	2.0E-06
Surf. (<0.5 ft)	10K540097/VP-38	Pb-210	1.89E-01	1.6E-04	0.0E+00	1.6E-10	0.0E+00	5.5E-02	0.0E+00	7.6E-09	0.0E+00
Surf. (<0.5 ft)	10K540097/VP-38	Ra-226	1.10E+00	6.9E-02	0.0E+00	3.5E-07	0.0E+00	2.7E+00	0.0E+00	1.6E-06	0.0E+00
Surf. (<0.5 ft)	10K540097/VP-38	Th-230	1.18E+01	2.5E-03	2.2E-02	8.7E-09	1.0E-07	4.3E-01	1.2E+00	2.7E-08	4.7E-07
Surf. (<0.5 ft)	10K540097/VP-38	Th-232	1.05E+00	1.1E-03	8.2E-02	1.4E-07	4.2E-07	1.9E-01	3.4E+00	2.3E-09	1.8E-06
Surf. (<0.5 ft)	10K540097/VP-38	U-238	9.42E+00	8.1E-03	0.0E+00	3.0E-08	0.0E+00	4.3E-01	0.0E+00	1.6E-07	0.0E+00
Surf. (<0.5 ft)	10K540097/VP-38	TOTAL		8.1E-02	1.0E-01	5.2E-07	5.3E-07	3.8E+00	4.6E+00	1.8E-06	2.3E-06
All Depths	10K540097/VP-38	Pb-210	6.43E-02	5.4E-05	0.0E+00	5.3E-11	0.0E+00	1.9E-02	0.0E+00	2.6E-09	0.0E+00
All Depths	10K540097/VP-38	Ra-226	6.20E-01	3.9E-02	0.0E+00	1.9E-07	0.0E+00	1.5E+00	0.0E+00	9.0E-07	0.0E+00
All Depths	10K540097/VP-38	Th-230	2.93E+00	6.3E-04	5.3E-03	2.2E-09	2.6E-08	1.1E-01	3.0E-01	6.7E-09	1.2E-07
All Depths	10K540097/VP-38	Th-232	1.06E+00	1.1E-03	8.2E-02	1.4E-07	4.3E-07	1.9E-01	3.4E+00	2.3E-09	1.8E-06
All Depths	10K540097/VP-38	U-238	8.92E+00	7.6E-03	0.0E+00	2.8E-08	0.0E+00	4.1E-01	0.0E+00	1.5E-07	0.0E+00
All Depths	10K540097/VP-38	TOTAL		4.8E-02	8.8E-02	3.7E-07	4.5E-07	2.2E+00	3.7E+00	1.1E-06	2.0E-06
Sub. (>0.5 ft)	10K610178/VP-35	Pb-210	3.09E-02	2.6E-05	0.0E+00	2.6E-11	0.0E+00	9.1E-03	0.0E+00	1.2E-09	0.0E+00
Sub. (>0.5 ft)	10K610178/VP-35	Ra-226	7.30E-01	4.6E-02	0.0E+00	2.3E-07	0.0E+00	1.8E+00	0.0E+00	1.1E-06	0.0E+00
Sub. (>0.5 ft)	10K610178/VP-35	Th-230	5.50E-01	1.2E-04	1.0E-03	4.0E-10	4.8E-09	2.0E-02	5.7E-02	1.3E-09	2.2E-08
Sub. (>0.5 ft)	10K610178/VP-35	Th-232	1.61E+00	1.7E-03	1.3E-01	2.1E-07	6.5E-07	2.9E-01	5.2E+00	3.5E-09	2.8E-06
Sub. (>0.5 ft)	10K610178/VP-35	U-238	1.00E+01	8.6E-03	0.0E+00	3.1E-08	0.0E+00	4.6E-01	0.0E+00	1.7E-07	0.0E+00
Sub. (>0.5 ft)	10K610178/VP-35	TOTAL		5.6E-02	1.3E-01	4.8E-07	6.6E-07	2.6E+00	5.2E+00	1.2E-06	2.8E-06
Surf. (<0.5 ft)	10K610178/VP-35	Pb-210	3.25E-02	2.7E-05	0.0E+00	2.7E-11	0.0E+00	9.5E-03	0.0E+00	1.3E-09	0.0E+00
Surf. (<0.5 ft)	10K610178/VP-35	Ra-226	6.70E-01	4.2E-02	0.0E+00	2.1E-07	0.0E+00	1.6E+00	0.0E+00	9.7E-07	0.0E+00
Surf. (<0.5 ft)	10K610178/VP-35	Th-230	6.60E-01	1.4E-04	1.2E-03	4.9E-10	5.7E-09	2.4E-02	6.8E-02	1.5E-09	2.6E-08

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	CONSTRUCTION Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<0.5 ft)	10K610178/VP-35	Th-232	9.90E-01	1.0E-03	7.7E-02	1.3E-07	4.0E-07	1.8E-01	3.2E+00	2.1E-09	1.7E-06
Surf. (<0.5 ft)	10K610178/VP-35	U-238	8.67E+00	7.4E-03	0.0E+00	2.7E-08	0.0E+00	4.0E-01	0.0E+00	1.5E-07	0.0E+00
Surf. (<0.5 ft)	10K610178/VP-35	TOTAL		5.1E-02	7.8E-02	3.7E-07	4.1E-07	2.3E+00	3.2E+00	1.1E-06	1.8E-06
All Depths	10K610178/VP-35	Pb-210	3.18E-02	2.7E-05	0.0E+00	2.6E-11	0.0E+00	9.3E-03	0.0E+00	1.3E-09	0.0E+00
All Depths	10K610178/VP-35	Ra-226	6.60E-01	4.1E-02	0.0E+00	2.1E-07	0.0E+00	1.6E+00	0.0E+00	9.6E-07	0.0E+00
All Depths	10K610178/VP-35	Th-230	6.10E-01	1.3E-04	1.1E-03	4.5E-10	5.3E-09	2.2E-02	6.3E-02	1.4E-09	2.4E-08
All Depths	10K610178/VP-35	Th-232	1.01E+00	1.1E-03	7.9E-02	1.3E-07	4.1E-07	1.8E-01	3.2E+00	2.2E-09	1.8E-06
All Depths	10K610178/VP-35	U-238	8.72E+00	7.5E-03	0.0E+00	2.7E-08	0.0E+00	4.0E-01	0.0E+00	1.5E-07	0.0E+00
All Depths	10K610178/VP-35	TOTAL		5.0E-02	8.0E-02	3.7E-07	4.1E-07	2.2E+00	3.3E+00	1.1E-06	1.8E-06
Sub. (>0.5 ft)	10K610189/VP-36	Pb-210	3.23E-02	2.7E-05	0.0E+00	2.7E-11	0.0E+00	9.5E-03	0.0E+00	1.3E-09	0.0E+00
Sub. (>0.5 ft)	10K610189/VP-36	Th-230	6.50E-01	1.4E-04	1.2E-03	4.8E-10	5.7E-09	2.4E-02	6.7E-02	1.5E-09	2.6E-08
Sub. (>0.5 ft)	10K610189/VP-36	TOTAL		1.7E-04	1.2E-03	5.0E-10	5.7E-09	3.3E-02	6.7E-02	2.8E-09	2.6E-08
All Depths	10K610189/VP-36	Pb-210	3.23E-02	2.7E-05	0.0E+00	2.7E-11	0.0E+00	9.5E-03	0.0E+00	1.3E-09	0.0E+00
All Depths	10K610189/VP-36	Th-230	6.50E-01	1.4E-04	1.2E-03	4.8E-10	5.7E-09	2.4E-02	6.7E-02	1.5E-09	2.6E-08
All Depths	10K610189/VP-36	TOTAL		1.7E-04	1.2E-03	5.0E-10	5.7E-09	3.3E-02	6.7E-02	2.8E-09	2.6E-08
Surf. (<0.5 ft)	10K620412	Pb-210	9.24E-02	7.7E-05	0.0E+00	7.7E-11	0.0E+00	2.7E-02	0.0E+00	3.7E-09	0.0E+00
Surf. (<0.5 ft)	10K620412	Ra-226	6.50E-01	4.1E-02	0.0E+00	2.0E-07	0.0E+00	1.6E+00	0.0E+00	9.4E-07	0.0E+00
Surf. (<0.5 ft)	10K620412	Th-230	4.94E+00	1.1E-03	9.0E-03	3.6E-09	4.3E-08	1.8E-01	5.1E-01	1.1E-08	2.0E-07
Surf. (<0.5 ft)	10K620412	Th-232	1.90E-01	2.0E-04	1.5E-02	2.5E-08	7.7E-08	3.4E-02	6.1E-01	4.1E-10	3.3E-07
Surf. (<0.5 ft)	10K620412	U-238	1.32E+00	1.1E-03	0.0E+00	4.1E-09	0.0E+00	6.0E-02	0.0E+00	2.3E-08	0.0E+00
Surf. (<0.5 ft)	10K620412	TOTAL		4.3E-02	2.4E-02	2.4E-07	1.2E-07	1.9E+00	1.1E+00	9.8E-07	5.3E-07
All Depths	10K620412	Pb-210	9.24E-02	7.7E-05	0.0E+00	7.7E-11	0.0E+00	2.7E-02	0.0E+00	3.7E-09	0.0E+00
All Depths	10K620412	Ra-226	6.50E-01	4.1E-02	0.0E+00	2.0E-07	0.0E+00	1.6E+00	0.0E+00	9.4E-07	0.0E+00
All Depths	10K620412	Th-230	4.94E+00	1.1E-03	9.0E-03	3.6E-09	4.3E-08	1.8E-01	5.1E-01	1.1E-08	2.0E-07
All Depths	10K620412	Th-232	1.90E-01	2.0E-04	1.5E-02	2.5E-08	7.7E-08	3.4E-02	6.1E-01	4.1E-10	3.3E-07
All Depths	10K620412	U-238	1.32E+00	1.1E-03	0.0E+00	4.1E-09	0.0E+00	6.0E-02	0.0E+00	2.3E-08	0.0E+00
All Depths	10K620412	TOTAL		4.3E-02	2.4E-02	2.4E-07	1.2E-07	1.9E+00	1.1E+00	9.8E-07	5.3E-07
Surf. (<0.5 ft)	10K620452	Pb-210	1.12E-02	9.3E-06	0.0E+00	9.3E-12	0.0E+00	3.3E-03	0.0E+00	4.5E-10	0.0E+00
Surf. (<0.5 ft)	10K620452	TOTAL		9.3E-06	0.0E+00	9.3E-12	0.0E+00	3.3E-03	0.0E+00	4.5E-10	0.0E+00
All Depths	10K620452	Pb-210	1.12E-02	9.3E-06	0.0E+00	9.3E-12	0.0E+00	3.3E-03	0.0E+00	4.5E-10	0.0E+00
All Depths	10K620452	TOTAL		9.3E-06	0.0E+00	9.3E-12	0.0E+00	3.3E-03	0.0E+00	4.5E-10	0.0E+00
Sub. (>0.5 ft)	10K630363/VP-39	Pb-210	3.50E-02	2.9E-05	0.0E+00	2.9E-11	0.0E+00	1.0E-02	0.0E+00	1.4E-09	0.0E+00
Sub. (>0.5 ft)	10K630363/VP-39	Ra-226	5.80E-01	3.6E-02	0.0E+00	1.8E-07	0.0E+00	1.4E+00	0.0E+00	8.4E-07	0.0E+00
Sub. (>0.5 ft)	10K630363/VP-39	Th-230	8.40E-01	1.8E-04	1.5E-03	6.2E-10	7.3E-09	3.1E-02	8.7E-02	1.9E-09	3.4E-08
Sub. (>0.5 ft)	10K630363/VP-39	Th-232	1.03E+00	1.1E-03	8.0E-02	1.4E-07	4.2E-07	1.9E-01	3.3E+00	2.2E-09	1.8E-06
Sub. (>0.5 ft)	10K630363/VP-39	U-238	9.12E+00	7.8E-03	0.0E+00	2.9E-08	0.0E+00	4.2E-01	0.0E+00	1.6E-07	0.0E+00
Sub. (>0.5 ft)	10K630363/VP-39	TOTAL		4.5E-02	8.2E-02	3.5E-07	4.2E-07	2.1E+00	3.4E+00	1.0E-06	1.8E-06
Surf. (<0.5 ft)	10K630363/VP-39	Pb-210	1.72E-01	1.4E-04	0.0E+00	1.4E-10	0.0E+00	5.0E-02	0.0E+00	6.9E-09	0.0E+00
Surf. (<0.5 ft)	10K630363/VP-39	Ra-226	2.80E-01	1.8E-02	0.0E+00	8.8E-08	0.0E+00	6.9E-01	0.0E+00	4.1E-07	0.0E+00
Surf. (<0.5 ft)	10K630363/VP-39	Th-230	1.06E+01	2.3E-03	1.9E-02	7.8E-09	9.3E-08	3.9E-01	1.1E+00	2.4E-08	4.2E-07
Surf. (<0.5 ft)	10K630363/VP-39	Th-232	6.60E-01	6.9E-04	5.1E-02	8.8E-08	2.7E-07	1.2E-01	2.1E+00	1.4E-09	1.2E-06
Surf. (<0.5 ft)	10K630363/VP-39	U-238	6.71E+00	5.7E-03	0.0E+00	2.1E-08	0.0E+00	3.1E-01	0.0E+00	1.2E-07	0.0E+00
Surf. (<0.5 ft)	10K630363/VP-39	TOTAL		2.6E-02	7.1E-02	2.0E-07	3.6E-07	1.6E+00	3.2E+00	5.5E-07	1.6E-06

			Exposure Point	RECREATIONAL/TRESPASSER				CONSTRUCTION			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
All Depths	10K630363/VP-39	Pb-210	6.22E-02	5.2E-05	0.0E+00	5.2E-11	0.0E+00	1.8E-02	0.0E+00	2.5E-09	0.0E+00
All Depths	10K630363/VP-39	Ra-226	4.80E-01	3.0E-02	0.0E+00	1.5E-07	0.0E+00	1.2E+00	0.0E+00	7.0E-07	0.0E+00
All Depths	10K630363/VP-39	Th-230	2.78E+00	5.9E-04	5.1E-03	2.0E-09	2.4E-08	1.0E-01	2.9E-01	6.3E-09	1.1E-07
All Depths	10K630363/VP-39	Th-232	9.00E-01	9.4E-04	7.0E-02	1.2E-07	3.6E-07	1.6E-01	2.9E+00	1.9E-09	1.6E-06
All Depths	10K630363/VP-39	U-238	8.37E+00	7.2E-03	0.0E+00	2.6E-08	0.0E+00	3.8E-01	0.0E+00	1.4E-07	0.0E+00
All Depths	10K630363/VP-39	TOTAL		3.9E-02	7.5E-02	3.0E-07	3.9E-07	1.8E+00	3.2E+00	8.5E-07	1.7E-06
Sub. (>0.5 ft)	10L220893/VP-1	Pb-210	2.52E-02	2.1E-05	0.0E+00	2.1E-11	0.0E+00	7.4E-03	0.0E+00	1.0E-09	0.0E+00
Sub. (>0.5 ft)	10L220893/VP-1	Th-230	1.40E-01	3.0E-05	2.6E-04	1.0E-10	1.2E-09	5.1E-03	1.5E-02	3.2E-10	5.6E-09
Sub. (>0.5 ft)	10L220893/VP-1	TOTAL		5.1E-05	2.6E-04	1.2E-10	1.2E-09	1.2E-02	1.5E-02	1.3E-09	5.6E-09
All Depths	10L220893/VP-1	Pb-210	2.52E-02	2.1E-05	0.0E+00	2.1E-11	0.0E+00	7.4E-03	0.0E+00	1.0E-09	0.0E+00
All Depths	10L220893/VP-1	Th-230	1.40E-01	3.0E-05	2.6E-04	1.0E-10	1.2E-09	5.1E-03	1.5E-02	3.2E-10	5.6E-09
All Depths	10L220893/VP-1	TOTAL		5.1E-05	2.6E-04	1.2E-10	1.2E-09	1.2E-02	1.5E-02	1.3E-09	5.6E-09
Sub. (>0.5 ft)	10L240093/VP-2	Pb-210	2.86E-02	2.4E-05	0.0E+00	2.4E-11	0.0E+00	8.4E-03	0.0E+00	1.1E-09	0.0E+00
Sub. (>0.5 ft)	10L240093/VP-2	Th-230	3.80E-01	8.1E-05	6.9E-04	2.8E-10	3.3E-09	1.4E-02	3.9E-02	8.6E-10	1.5E-08
Sub. (>0.5 ft)	10L240093/VP-2	TOTAL		1.1E-04	6.9E-04	3.0E-10	3.3E-09	2.2E-02	3.9E-02	2.0E-09	1.5E-08
All Depths	10L240093/VP-2	Pb-210	2.86E-02	2.4E-05	0.0E+00	2.4E-11	0.0E+00	8.4E-03	0.0E+00	1.1E-09	0.0E+00
All Depths	10L240093/VP-2	Th-230	3.80E-01	8.1E-05	6.9E-04	2.8E-10	3.3E-09	1.4E-02	3.9E-02	8.6E-10	1.5E-08
All Depths	10L240093/VP-2	TOTAL		1.1E-04	6.9E-04	3.0E-10	3.3E-09	2.2E-02	3.9E-02	2.0E-09	1.5E-08
Sub. (>0.5 ft)	10L310011/VP-13	Ac-227	1.60E-01	2.6E-03	0.0E+00	5.4E-09	0.0E+00	2.1E-01	0.0E+00	3.7E-08	0.0E+00
Sub. (>0.5 ft)	10L310011/VP-13	Pa-231	2.23E-01	6.3E-04	0.0E+00	1.5E-09	0.0E+00	1.2E-01	0.0E+00	2.9E-09	0.0E+00
Sub. (>0.5 ft)	10L310011/VP-13	Pb-210	7.41E-01	6.2E-04	0.0E+00	6.2E-10	0.0E+00	2.2E-01	0.0E+00	3.0E-08	0.0E+00
Sub. (>0.5 ft)	10L310011/VP-13	Ra-226	1.45E+00	9.1E-02	0.0E+00	4.6E-07	0.0E+00	3.6E+00	0.0E+00	2.1E-06	0.0E+00
Sub. (>0.5 ft)	10L310011/VP-13	Th-230	5.12E+01	1.1E-02	9.3E-02	3.8E-08	4.5E-07	1.9E+00	5.3E+00	1.2E-07	2.0E-06
Sub. (>0.5 ft)	10L310011/VP-13	Th-232	1.29E+00	1.3E-03	1.0E-01	1.7E-07	5.2E-07	2.3E-01	4.1E+00	2.8E-09	2.2E-06
Sub. (>0.5 ft)	10L310011/VP-13	U-238	9.42E+00	8.1E-03	0.0E+00	3.0E-08	0.0E+00	4.3E-01	0.0E+00	1.6E-07	0.0E+00
Sub. (>0.5 ft)	10L310011/VP-13	TOTAL		1.2E-01	1.9E-01	7.0E-07	9.7E-07	6.6E+00	9.4E+00	2.5E-06	4.3E-06
Surf. (<0.5 ft)	10L310011/VP-13	Pb-210	2.94E-01	2.5E-04	0.0E+00	2.4E-10	0.0E+00	8.6E-02	0.0E+00	1.2E-08	0.0E+00
Surf. (<0.5 ft)	10L310011/VP-13	Ra-226	7.50E-01	4.7E-02	0.0E+00	2.4E-07	0.0E+00	1.8E+00	0.0E+00	1.1E-06	0.0E+00
Surf. (<0.5 ft)	10L310011/VP-13	Th-230	1.93E+01	4.1E-03	3.5E-02	1.4E-08	1.7E-07	7.1E-01	2.0E+00	4.4E-08	7.7E-07
Surf. (<0.5 ft)	10L310011/VP-13	Th-232	1.90E-01	2.0E-04	1.5E-02	2.5E-08	7.7E-08	3.4E-02	6.1E-01	4.1E-10	3.3E-07
Surf. (<0.5 ft)	10L310011/VP-13	TOTAL		5.2E-02	5.0E-02	2.8E-07	2.5E-07	2.7E+00	2.6E+00	1.1E-06	1.1E-06
All Depths	10L310011/VP-13	Ac-227	1.54E-01	2.5E-03	0.0E+00	5.2E-09	0.0E+00	2.0E-01	0.0E+00	3.6E-08	0.0E+00
All Depths	10L310011/VP-13	Pa-231	2.16E-01	6.1E-04	0.0E+00	1.4E-09	0.0E+00	1.1E-01	0.0E+00	2.8E-09	0.0E+00
All Depths	10L310011/VP-13	Pb-210	7.28E-01	6.1E-04	0.0E+00	6.1E-10	0.0E+00	2.1E-01	0.0E+00	2.9E-08	0.0E+00
All Depths	10L310011/VP-13	Ra-226	1.36E+00	8.5E-02	0.0E+00	4.3E-07	0.0E+00	3.3E+00	0.0E+00	2.0E-06	0.0E+00
All Depths	10L310011/VP-13	Th-230	5.03E+01	1.1E-02	9.2E-02	3.7E-08	4.4E-07	1.8E+00	5.2E+00	1.1E-07	2.0E-06
All Depths	10L310011/VP-13	Th-232	1.20E+00	1.3E-03	9.3E-02	1.6E-07	4.9E-07	2.2E-01	3.8E+00	2.6E-09	2.1E-06
All Depths	10L310011/VP-13	U-238	9.82E+00	8.4E-03	0.0E+00	3.1E-08	0.0E+00	4.5E-01	0.0E+00	1.7E-07	0.0E+00
All Depths	10L310011/VP-13	TOTAL		1.1E-01	1.9E-01	6.6E-07	9.2E-07	6.4E+00	9.1E+00	2.3E-06	4.1E-06
Sub. (>0.5 ft)	10L330022/VP-8	Pb-210	1.61E-01	1.3E-04	0.0E+00	1.3E-10	0.0E+00	4.7E-02	0.0E+00	6.5E-09	0.0E+00
Sub. (>0.5 ft)	10L330022/VP-8	Th-230	9.84E+00	2.1E-03	1.8E-02	7.2E-09	8.6E-08	3.6E-01	1.0E+00	2.2E-08	3.9E-07
Sub. (>0.5 ft)	10L330022/VP-8	TOTAL		2.2E-03	1.8E-02	7.4E-09	8.6E-08	4.1E-01	1.0E+00	2.9E-08	3.9E-07

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	CONSTRUCTION Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
All Depths	10L330022/VP-8	Pb-210	1.61E-01	1.3E-04	0.0E+00	1.3E-10	0.0E+00	4.7E-02	0.0E+00	6.5E-09	0.0E+00
All Depths	10L330022/VP-8	Th-230	9.84E+00	2.1E-03	1.8E-02	7.2E-09	8.6E-08	3.6E-01	1.0E+00	2.2E-08	3.9E-07
All Depths	10L330022/VP-8	TOTAL		2.2E-03	1.8E-02	7.4E-09	8.6E-08	4.1E-01	1.0E+00	2.9E-08	3.9E-07
Sub. (>0.5 ft)	10L330031/VP-7	Pb-210	1.60E-01	1.3E-04	0.0E+00	1.3E-10	0.0E+00	4.7E-02	0.0E+00	6.4E-09	0.0E+00
Sub. (>0.5 ft)	10L330031/VP-7	Th-230	9.74E+00	2.1E-03	1.8E-02	7.2E-09	8.5E-08	3.6E-01	1.0E+00	2.2E-08	3.9E-07
Sub. (>0.5 ft)	10L330031/VP-7	TOTAL		2.2E-03	1.8E-02	7.3E-09	8.5E-08	4.0E-01	1.0E+00	2.9E-08	3.9E-07
All Depths	10L330031/VP-7	Pb-210	1.60E-01	1.3E-04	0.0E+00	1.3E-10	0.0E+00	4.7E-02	0.0E+00	6.4E-09	0.0E+00
All Depths	10L330031/VP-7	Th-230	9.74E+00	2.1E-03	1.8E-02	7.2E-09	8.5E-08	3.6E-01	1.0E+00	2.2E-08	3.9E-07
All Depths	10L330031/VP-7	TOTAL		2.2E-03	1.8E-02	7.3E-09	8.5E-08	4.0E-01	1.0E+00	2.9E-08	3.9E-07
Sub. (>0.5 ft)	10L330040/VP-6	Pb-210	3.57E-02	3.0E-05	0.0E+00	3.0E-11	0.0E+00	1.0E-02	0.0E+00	1.4E-09	0.0E+00
Sub. (>0.5 ft)	10L330040/VP-6	Th-230	8.90E-01	1.9E-04	1.6E-03	6.5E-10	7.8E-09	3.2E-02	9.2E-02	2.0E-09	3.6E-08
Sub. (>0.5 ft)	10L330040/VP-6	TOTAL		2.2E-04	1.6E-03	6.8E-10	7.8E-09	4.3E-02	9.2E-02	3.5E-09	3.6E-08
All Depths	10L330040/VP-6	Pb-210	3.57E-02	3.0E-05	0.0E+00	3.0E-11	0.0E+00	1.0E-02	0.0E+00	1.4E-09	0.0E+00
All Depths	10L330040/VP-6	Th-230	8.90E-01	1.9E-04	1.6E-03	6.5E-10	7.8E-09	3.2E-02	9.2E-02	2.0E-09	3.6E-08
All Depths	10L330040/VP-6	TOTAL		2.2E-04	1.6E-03	6.8E-10	7.8E-09	4.3E-02	9.2E-02	3.5E-09	3.6E-08
Sub. (>0.5 ft)	10L330073/VP-9	Pb-210	1.68E-01	1.4E-04	0.0E+00	1.4E-10	0.0E+00	4.9E-02	0.0E+00	6.7E-09	0.0E+00
Sub. (>0.5 ft)	10L330073/VP-9	Th-230	1.03E+01	2.2E-03	1.9E-02	7.6E-09	9.0E-08	3.8E-01	1.1E+00	2.4E-08	4.1E-07
Sub. (>0.5 ft)	10L330073/VP-9	TOTAL		2.4E-03	1.9E-02	7.7E-09	9.0E-08	4.3E-01	1.1E+00	3.0E-08	4.1E-07
All Depths	10L330073/VP-9	Pb-210	1.68E-01	1.4E-04	0.0E+00	1.4E-10	0.0E+00	4.9E-02	0.0E+00	6.7E-09	0.0E+00
All Depths	10L330073/VP-9	Th-230	1.03E+01	2.2E-03	1.9E-02	7.6E-09	9.0E-08	3.8E-01	1.1E+00	2.4E-08	4.1E-07
All Depths	10L330073/VP-9	TOTAL		2.4E-03	1.9E-02	7.7E-09	9.0E-08	4.3E-01	1.1E+00	3.0E-08	4.1E-07
Sub. (>0.5 ft)	10L330114/VP-4,5	Pb-210	3.49E-02	2.9E-05	0.0E+00	2.9E-11	0.0E+00	1.0E-02	0.0E+00	1.4E-09	0.0E+00
Sub. (>0.5 ft)	10L330114/VP-4,5	Th-230	8.30E-01	1.8E-04	1.5E-03	6.1E-10	7.2E-09	3.0E-02	8.6E-02	1.9E-09	3.3E-08
Sub. (>0.5 ft)	10L330114/VP-4,5	TOTAL		2.1E-04	1.5E-03	6.4E-10	7.2E-09	4.0E-02	8.6E-02	3.3E-09	3.3E-08
All Depths	10L330114/VP-4,5	Pb-210	3.49E-02	2.9E-05	0.0E+00	2.9E-11	0.0E+00	1.0E-02	0.0E+00	1.4E-09	0.0E+00
All Depths	10L330114/VP-4,5	Th-230	8.30E-01	1.8E-04	1.5E-03	6.1E-10	7.2E-09	3.0E-02	8.6E-02	1.9E-09	3.3E-08
All Depths	10L330114/VP-4,5	TOTAL		2.1E-04	1.5E-03	6.4E-10	7.2E-09	4.0E-02	8.6E-02	3.3E-09	3.3E-08
Sub. (>0.5 ft)	10L330123/VP-3	Pb-210	5.46E-02	4.6E-05	0.0E+00	4.5E-11	0.0E+00	1.6E-02	0.0E+00	2.2E-09	0.0E+00
Sub. (>0.5 ft)	10L330123/VP-3	Th-230	2.24E+00	4.8E-04	4.1E-03	1.6E-09	2.0E-08	8.2E-02	2.3E-01	5.1E-09	8.9E-08
Sub. (>0.5 ft)	10L330123/VP-3	TOTAL		5.2E-04	4.1E-03	1.7E-09	2.0E-08	9.8E-02	2.3E-01	7.3E-09	8.9E-08
All Depths	10L330123/VP-3	Pb-210	5.46E-02	4.6E-05	0.0E+00	4.5E-11	0.0E+00	1.6E-02	0.0E+00	2.2E-09	0.0E+00
All Depths	10L330123/VP-3	Th-230	2.24E+00	4.8E-04	4.1E-03	1.6E-09	2.0E-08	8.2E-02	2.3E-01	5.1E-09	8.9E-08
All Depths	10L330123/VP-3	TOTAL		5.2E-04	4.1E-03	1.7E-09	2.0E-08	9.8E-02	2.3E-01	7.3E-09	8.9E-08
Sub. (>0.5 ft)	10L340041/VP-40A	Pb-210	3.23E-01	2.7E-04	0.0E+00	2.7E-10	0.0E+00	9.5E-02	0.0E+00	1.3E-08	0.0E+00
Sub. (>0.5 ft)	10L340041/VP-40A	Ra-226	2.13E+00	1.3E-01	0.0E+00	6.7E-07	0.0E+00	5.2E+00	0.0E+00	3.1E-06	0.0E+00
Sub. (>0.5 ft)	10L340041/VP-40A	Th-230	2.14E+01	4.6E-03	3.9E-02	1.6E-08	1.9E-07	7.8E-01	2.2E+00	4.9E-08	8.6E-07
Sub. (>0.5 ft)	10L340041/VP-40A	Th-232	7.90E-01	8.2E-04	6.1E-02	1.1E-07	3.2E-07	1.4E-01	2.5E+00	1.7E-09	1.4E-06
Sub. (>0.5 ft)	10L340041/VP-40A	U-238	8.10E+00	6.9E-03	0.0E+00	2.5E-08	0.0E+00	3.7E-01	0.0E+00	1.4E-07	0.0E+00
Sub. (>0.5 ft)	10L340041/VP-40A	TOTAL		1.5E-01	1.0E-01	8.2E-07	5.1E-07	6.6E+00	4.8E+00	3.3E-06	2.2E-06
Surf. (<0.5 ft)	10L340041/VP-40A	Ac-227	1.20E-01	1.9E-03	0.0E+00	4.1E-09	0.0E+00	1.6E-01	0.0E+00	2.8E-08	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 50 of 60)

			Exposure Point	RECREATIONAL/TRESPASSER				CONSTRUCTION			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<0.5 ft)	10L340041/VP-40A	Pb-210	4.69E+00	3.9E-03	0.0E+00	3.9E-09	0.0E+00	1.4E+00	0.0E+00	1.9E-07	0.0E+00
Surf. (<0.5 ft)	10L340041/VP-40A	Ra-226	1.34E+01	8.4E-01	0.0E+00	4.2E-06	0.0E+00	3.3E+01	0.0E+00	1.9E-05	0.0E+00
Surf. (<0.5 ft)	10L340041/VP-40A	Th-230	3.33E+02	7.1E-02	6.1E-01	2.5E-07	2.9E-06	1.2E+01	3.5E+01	7.6E-07	1.3E-05
Surf. (<0.5 ft)	10L340041/VP-40A	Th-232	9.50E-01	9.9E-04	7.4E-02	1.3E-07	3.8E-07	1.7E-01	3.0E+00	2.1E-09	1.7E-06
Surf. (<0.5 ft)	10L340041/VP-40A	U-234	2.89E+00	2.7E-04	0.0E+00	2.6E-10	0.0E+00	5.0E-02	0.0E+00	6.9E-09	0.0E+00
Surf. (<0.5 ft)	10L340041/VP-40A	U-235	1.28E-01	5.7E-04	0.0E+00	1.6E-09	0.0E+00	2.3E-02	0.0E+00	7.9E-09	0.0E+00
Surf. (<0.5 ft)	10L340041/VP-40A	U-238	1.19E+01	1.0E-02	0.0E+00	3.7E-08	0.0E+00	5.4E-01	0.0E+00	2.1E-07	0.0E+00
Surf. (<0.5 ft)	10L340041/VP-40A	TOTAL		9.3E-01	6.8E-01	4.6E-06	3.3E-06	4.7E+01	3.8E+01	2.1E-05	1.5E-05
All Depths	10L340041/VP-40A	Ac-227	1.20E-01	1.9E-03	0.0E+00	4.1E-09	0.0E+00	1.6E-01	0.0E+00	2.8E-08	0.0E+00
All Depths	10L340041/VP-40A	Pb-210	2.53E+00	2.1E-03	0.0E+00	2.1E-09	0.0E+00	7.4E-01	0.0E+00	1.0E-07	0.0E+00
All Depths	10L340041/VP-40A	Ra-226	6.61E+00	4.1E-01	0.0E+00	2.1E-06	0.0E+00	1.6E+01	0.0E+00	9.6E-06	0.0E+00
All Depths	10L340041/VP-40A	Th-230	1.79E+02	3.8E-02	3.3E-01	1.3E-07	1.6E-06	6.5E+00	1.9E+01	4.1E-07	7.2E-06
All Depths	10L340041/VP-40A	Th-232	8.30E-01	8.6E-04	6.5E-02	1.1E-07	3.4E-07	1.5E-01	2.7E+00	1.8E-09	1.4E-06
All Depths	10L340041/VP-40A	U-234	1.04E+00	9.7E-05	0.0E+00	9.6E-11	0.0E+00	1.8E-02	0.0E+00	2.5E-09	0.0E+00
All Depths	10L340041/VP-40A	U-235	1.28E-01	5.7E-04	0.0E+00	1.6E-09	0.0E+00	2.3E-02	0.0E+00	7.9E-09	0.0E+00
All Depths	10L340041/VP-40A	U-238	9.42E+00	8.1E-03	0.0E+00	3.0E-08	0.0E+00	4.3E-01	0.0E+00	1.6E-07	0.0E+00
All Depths	10L340041/VP-40A	TOTAL		4.7E-01	3.9E-01	2.4E-06	1.9E-06	2.4E+01	2.1E+01	1.0E-05	8.6E-06
Sub. (>0.5 ft)	10L340142/VP-12	Pb-210	1.16E-01	9.7E-05	0.0E+00	9.6E-11	0.0E+00	3.4E-02	0.0E+00	4.6E-09	0.0E+00
Sub. (>0.5 ft)	10L340142/VP-12	Ra-226	8.40E-01	5.3E-02	0.0E+00	2.6E-07	0.0E+00	2.1E+00	0.0E+00	1.2E-06	0.0E+00
Sub. (>0.5 ft)	10L340142/VP-12	Th-230	6.61E+00	1.4E-03	1.2E-02	4.9E-09	5.8E-08	2.4E-01	6.9E-01	1.5E-08	2.6E-07
Sub. (>0.5 ft)	10L340142/VP-12	Th-232	8.00E-01	8.3E-04	6.2E-02	1.1E-07	3.2E-07	1.5E-01	2.6E+00	1.7E-09	1.4E-06
Sub. (>0.5 ft)	10L340142/VP-12	U-238	1.02E+01	8.7E-03	0.0E+00	3.2E-08	0.0E+00	4.7E-01	0.0E+00	1.8E-07	0.0E+00
Sub. (>0.5 ft)	10L340142/VP-12	TOTAL		6.4E-02	7.4E-02	4.1E-07	3.8E-07	2.9E+00	3.2E+00	1.4E-06	1.7E-06
Surf. (<0.5 ft)	10L340142/VP-12	Ac-227	1.75E+00	2.8E-02	0.0E+00	5.9E-08	0.0E+00	2.3E+00	0.0E+00	4.1E-07	0.0E+00
Surf. (<0.5 ft)	10L340142/VP-12	Pa-231	2.04E+00	5.7E-03	0.0E+00	1.3E-08	0.0E+00	1.1E+00	0.0E+00	2.6E-08	0.0E+00
Surf. (<0.5 ft)	10L340142/VP-12	Pb-210	3.92E+00	3.3E-03	0.0E+00	3.3E-09	0.0E+00	1.1E+00	0.0E+00	1.6E-07	0.0E+00
Surf. (<0.5 ft)	10L340142/VP-12	Ra-226	2.45E+00	1.5E-01	0.0E+00	7.7E-07	0.0E+00	6.0E+00	0.0E+00	3.6E-06	0.0E+00
Surf. (<0.5 ft)	10L340142/VP-12	Th-230	2.78E+02	6.0E-02	5.1E-01	2.0E-07	2.4E-06	1.0E+01	2.9E+01	6.3E-07	1.1E-05
Surf. (<0.5 ft)	10L340142/VP-12	Th-232	8.10E-01	8.4E-04	6.3E-02	1.1E-07	3.3E-07	1.5E-01	2.6E+00	1.7E-09	1.4E-06
Surf. (<0.5 ft)	10L340142/VP-12	U-234	2.23E+00	2.1E-04	0.0E+00	2.0E-10	0.0E+00	3.8E-02	0.0E+00	5.3E-09	0.0E+00
Surf. (<0.5 ft)	10L340142/VP-12	U-235	8.56E-02	3.8E-04	0.0E+00	1.1E-09	0.0E+00	1.6E-02	0.0E+00	5.3E-09	0.0E+00
Surf. (<0.5 ft)	10L340142/VP-12	U-238	8.61E+00	7.4E-03	0.0E+00	2.7E-08	0.0E+00	3.9E-01	0.0E+00	1.5E-07	0.0E+00
Surf. (<0.5 ft)	10L340142/VP-12	TOTAL		2.6E-01	5.7E-01	1.2E-06	2.8E-06	2.1E+01	3.1E+01	4.9E-06	1.3E-05
All Depths	10L340142/VP-12	Ac-227	9.10E-03	1.5E-04	0.0E+00	3.1E-10	0.0E+00	1.2E-02	0.0E+00	2.1E-09	0.0E+00
All Depths	10L340142/VP-12	Pa-231	5.04E-02	1.4E-04	0.0E+00	3.3E-10	0.0E+00	2.6E-02	0.0E+00	6.5E-10	0.0E+00
All Depths	10L340142/VP-12	Pb-210	4.38E-01	3.7E-04	0.0E+00	3.6E-10	0.0E+00	1.3E-01	0.0E+00	1.8E-08	0.0E+00
All Depths	10L340142/VP-12	Ra-226	9.20E-01	5.8E-02	0.0E+00	2.9E-07	0.0E+00	2.3E+00	0.0E+00	1.3E-06	0.0E+00
All Depths	10L340142/VP-12	Th-230	2.96E+01	6.3E-03	5.4E-02	2.2E-08	2.6E-07	1.1E+00	3.1E+00	6.7E-08	1.2E-06
All Depths	10L340142/VP-12	Th-232	7.10E-01	7.4E-04	5.5E-02	9.5E-08	2.9E-07	1.3E-01	2.3E+00	1.5E-09	1.2E-06
All Depths	10L340142/VP-12	U-238	9.32E+00	8.0E-03	0.0E+00	2.9E-08	0.0E+00	4.2E-01	0.0E+00	1.6E-07	0.0E+00
All Depths	10L340142/VP-12	TOTAL		7.3E-02	1.1E-01	4.4E-07	5.5E-07	4.1E+00	5.3E+00	1.6E-06	2.4E-06
Sub. (>0.5 ft)	10L340151/VP-10,11	Pb-210	7.70E-02	6.4E-05	0.0E+00	6.4E-11	0.0E+00	2.3E-02	0.0E+00	3.1E-09	0.0E+00
Sub. (>0.5 ft)	10L340151/VP-10,11	Th-230	3.84E+00	8.2E-04	7.0E-03	2.8E-09	3.3E-08	1.4E-01	4.0E-01	8.7E-09	1.5E-07
Sub. (>0.5 ft)	10L340151/VP-10,11	TOTAL		8.9E-04	7.0E-03	2.9E-09	3.3E-08	1.6E-01	4.0E-01	1.2E-08	1.5E-07
All Depths	10L340151/VP-10,11	Pb-210	7.70E-02	6.4E-05	0.0E+00	6.4E-11	0.0E+00	2.3E-02	0.0E+00	3.1E-09	0.0E+00
All Depths	10L340151/VP-10,11	Th-230	3.84E+00	8.2E-04	7.0E-03	2.8E-09	3.3E-08	1.4E-01	4.0E-01	8.7E-09	1.5E-07

Attachment 12. Radiological Doses and Risks for each Property (page 51 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	CONSTRUCTION Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
All Depths	10L340151/VP-10,11	TOTAL		8.9E-04	7.0E-03	2.9E-09	3.3E-08	1.6E-01	4.0E-01	1.2E-08	1.5E-07
Sub. (>0.5 ft)	11K510035/VP-14	Pb-210	2.94E-02	2.5E-05	0.0E+00	2.4E-11	0.0E+00	8.6E-03	0.0E+00	1.2E-09	0.0E+00
Sub. (>0.5 ft)	11K510035/VP-14	Th-230	4.40E-01	9.4E-05	8.0E-04	3.2E-10	3.8E-09	1.6E-02	4.6E-02	1.0E-09	1.8E-08
Sub. (>0.5 ft)	11K510035/VP-14	TOTAL		1.2E-04	8.0E-04	3.5E-10	3.8E-09	2.5E-02	4.6E-02	2.2E-09	1.8E-08
All Depths	11K510035/VP-14	Pb-210	2.94E-02	2.5E-05	0.0E+00	2.4E-11	0.0E+00	8.6E-03	0.0E+00	1.2E-09	0.0E+00
All Depths	11K510035/VP-14	Th-230	4.40E-01	9.4E-05	8.0E-04	3.2E-10	3.8E-09	1.6E-02	4.6E-02	1.0E-09	1.8E-08
All Depths	11K510035/VP-14	TOTAL		1.2E-04	8.0E-04	3.5E-10	3.8E-09	2.5E-02	4.6E-02	2.2E-09	1.8E-08
Sub. (>0.5 ft)	11K520056/VP-15	Pb-210	3.72E-02	3.1E-05	0.0E+00	3.1E-11	0.0E+00	1.1E-02	0.0E+00	1.5E-09	0.0E+00
Sub. (>0.5 ft)	11K520056/VP-15	Th-230	1.00E+00	2.1E-04	1.8E-03	7.4E-10	8.7E-09	3.6E-02	1.0E-01	2.3E-09	4.0E-08
Sub. (>0.5 ft)	11K520056/VP-15	TOTAL		2.5E-04	1.8E-03	7.7E-10	8.7E-09	4.7E-02	1.0E-01	3.8E-09	4.0E-08
All Depths	11K520056/VP-15	Pb-210	3.72E-02	3.1E-05	0.0E+00	3.1E-11	0.0E+00	1.1E-02	0.0E+00	1.5E-09	0.0E+00
All Depths	11K520056/VP-15	Th-230	1.00E+00	2.1E-04	1.8E-03	7.4E-10	8.7E-09	3.6E-02	1.0E-01	2.3E-09	4.0E-08
All Depths	11K520056/VP-15	TOTAL		2.5E-04	1.8E-03	7.7E-10	8.7E-09	4.7E-02	1.0E-01	3.8E-09	4.0E-08
Surf. (<0.5 ft)	11K630221	Ac-227	8.10E-02	1.3E-03	0.0E+00	2.7E-09	0.0E+00	1.1E-01	0.0E+00	1.9E-08	0.0E+00
Surf. (<0.5 ft)	11K630221	Pb-210	1.69E-01	1.4E-04	0.0E+00	1.4E-10	0.0E+00	5.0E-02	0.0E+00	6.8E-09	0.0E+00
Surf. (<0.5 ft)	11K630221	Th-230	1.04E+01	2.2E-03	1.9E-02	7.7E-09	9.1E-08	3.8E-01	1.1E+00	2.4E-08	4.2E-07
Surf. (<0.5 ft)	11K630221	TOTAL		3.7E-03	1.9E-02	1.1E-08	9.1E-08	5.4E-01	1.1E+00	4.9E-08	4.2E-07
All Depths	11K630221	Ac-227	8.10E-02	1.3E-03	0.0E+00	2.7E-09	0.0E+00	1.1E-01	0.0E+00	1.9E-08	0.0E+00
All Depths	11K630221	Pb-210	1.69E-01	1.4E-04	0.0E+00	1.4E-10	0.0E+00	5.0E-02	0.0E+00	6.8E-09	0.0E+00
All Depths	11K630221	Th-230	1.04E+01	2.2E-03	1.9E-02	7.7E-09	9.1E-08	3.8E-01	1.1E+00	2.4E-08	4.2E-07
All Depths	11K630221	TOTAL		3.7E-03	1.9E-02	1.1E-08	9.1E-08	5.4E-01	1.1E+00	4.9E-08	4.2E-07
Sub. (>0.5 ft)	11L520011	Pb-210	3.36E-02	2.8E-05	0.0E+00	2.8E-11	0.0E+00	9.8E-03	0.0E+00	1.3E-09	0.0E+00
Sub. (>0.5 ft)	11L520011	Ra-226	8.50E-01	5.3E-02	0.0E+00	2.7E-07	0.0E+00	2.1E+00	0.0E+00	1.2E-06	0.0E+00
Sub. (>0.5 ft)	11L520011	Th-230	7.40E-01	1.6E-04	1.3E-03	5.4E-10	6.4E-09	2.7E-02	7.7E-02	1.7E-09	3.0E-08
Sub. (>0.5 ft)	11L520011	Th-232	6.90E-01	7.2E-04	5.4E-02	9.2E-08	2.8E-07	1.3E-01	2.2E+00	1.5E-09	1.2E-06
Sub. (>0.5 ft)	11L520011	U-238	1.84E+01	1.6E-02	0.0E+00	5.8E-08	0.0E+00	8.4E-01	0.0E+00	3.2E-07	0.0E+00
Sub. (>0.5 ft)	11L520011	TOTAL		7.0E-02	5.5E-02	4.2E-07	2.9E-07	3.1E+00	2.3E+00	1.6E-06	1.2E-06
Surf. (<0.5 ft)	11L520011	Pb-210	4.48E-02	3.7E-05	0.0E+00	3.7E-11	0.0E+00	1.3E-02	0.0E+00	1.8E-09	0.0E+00
Surf. (<0.5 ft)	11L520011	Th-230	1.54E+00	3.3E-04	2.8E-03	1.1E-09	1.3E-08	5.6E-02	1.6E-01	3.5E-09	6.1E-08
Surf. (<0.5 ft)	11L520011	TOTAL		3.7E-04	2.8E-03	1.2E-09	1.3E-08	6.9E-02	1.6E-01	5.3E-09	6.1E-08
All Depths	11L520011	Pb-210	3.63E-02	3.0E-05	0.0E+00	3.0E-11	0.0E+00	1.1E-02	0.0E+00	1.5E-09	0.0E+00
All Depths	11L520011	Ra-226	8.50E-01	5.3E-02	0.0E+00	2.7E-07	0.0E+00	2.1E+00	0.0E+00	1.2E-06	0.0E+00
All Depths	11L520011	Th-230	9.30E-01	2.0E-04	1.7E-03	6.8E-10	8.1E-09	3.4E-02	9.6E-02	2.1E-09	3.7E-08
All Depths	11L520011	Th-232	6.90E-01	7.2E-04	5.4E-02	9.2E-08	2.8E-07	1.3E-01	2.2E+00	1.5E-09	1.2E-06
All Depths	11L520011	U-238	1.84E+01	1.6E-02	0.0E+00	5.8E-08	0.0E+00	8.4E-01	0.0E+00	3.2E-07	0.0E+00
All Depths	11L520011	TOTAL		7.0E-02	5.5E-02	4.2E-07	2.9E-07	3.1E+00	2.3E+00	1.6E-06	1.2E-06
Surf. (<0.5 ft)	CWC	Ac-227	1.73E+00	2.8E-02	0.0E+00	5.8E-08	0.0E+00	2.3E+00	0.0E+00	4.0E-07	0.0E+00
Surf. (<0.5 ft)	CWC	Pa-231	2.09E+00	5.9E-03	0.0E+00	1.4E-08	0.0E+00	1.1E+00	0.0E+00	2.7E-08	0.0E+00
Surf. (<0.5 ft)	CWC	Pb-210	4.22E+00	3.5E-03	0.0E+00	3.5E-09	0.0E+00	1.2E+00	0.0E+00	1.7E-07	0.0E+00
Surf. (<0.5 ft)	CWC	Ra-226	7.10E-01	4.5E-02	0.0E+00	2.2E-07	0.0E+00	1.7E+00	0.0E+00	1.0E-06	0.0E+00
Surf. (<0.5 ft)	CWC	Th-228	7.90E-01	4.5E-02	0.0E+00	7.4E-08	0.0E+00	1.7E+00	0.0E+00	1.1E-06	0.0E+00
Surf. (<0.5 ft)	CWC	Th-230	1.31E+00	2.8E-04	2.4E-03	9.6E-10	1.1E-08	4.8E-02	1.4E-01	3.0E-09	5.2E-08

			Exposure Point	RECREATIONAL/TRESPASSER				CONSTRUCTION			
Data Group	Property	Isotope	Conc. (pCi/g)	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<0.5 ft)	CWC	Th-232	8.60E-01	9.0E-04	6.7E-02	1.1E-07	3.5E-07	1.6E-01	2.8E+00	1.9E-09	1.5E-06
Surf. (<0.5 ft)	CWC	U-234	4.56E+00	4.2E-04	0.0E+00	4.2E-10	0.0E+00	7.8E-02	0.0E+00	1.1E-08	0.0E+00
Surf. (<0.5 ft)	CWC	U-235	2.02E-01	8.9E-04	0.0E+00	2.6E-09	0.0E+00	3.7E-02	0.0E+00	1.2E-08	0.0E+00
Surf. (<0.5 ft)	CWC	U-238	4.51E+00	3.9E-03	0.0E+00	1.4E-08	0.0E+00	2.1E-01	0.0E+00	7.8E-08	0.0E+00
Surf. (<0.5 ft)	CWC	TOTAL		1.3E-01	6.9E-02	5.1E-07	3.6E-07	8.6E+00	2.9E+00	2.8E-06	1.6E-06
All Depths	CWC	Ac-227	1.73E+00	2.8E-02	0.0E+00	5.8E-08	0.0E+00	2.3E+00	0.0E+00	4.0E-07	0.0E+00
All Depths	CWC	Pa-231	2.09E+00	5.9E-03	0.0E+00	1.4E-08	0.0E+00	1.1E+00	0.0E+00	2.7E-08	0.0E+00
All Depths	CWC	Pb-210	4.22E+00	3.5E-03	0.0E+00	3.5E-09	0.0E+00	1.2E+00	0.0E+00	1.7E-07	0.0E+00
All Depths	CWC	Ra-226	7.10E-01	4.5E-02	0.0E+00	2.2E-07	0.0E+00	1.7E+00	0.0E+00	1.0E-06	0.0E+00
All Depths	CWC	Th-228	7.90E-01	4.5E-02	0.0E+00	7.4E-08	0.0E+00	1.7E+00	0.0E+00	1.1E-06	0.0E+00
All Depths	CWC	Th-230	1.31E+00	2.8E-04	2.4E-03	9.6E-10	1.1E-08	4.8E-02	1.4E-01	3.0E-09	5.2E-08
All Depths	CWC	Th-232	8.60E-01	9.0E-04	6.7E-02	1.1E-07	3.5E-07	1.6E-01	2.8E+00	1.9E-09	1.5E-06
All Depths	CWC	U-234	4.56E+00	4.2E-04	0.0E+00	4.2E-10	0.0E+00	7.8E-02	0.0E+00	1.1E-08	0.0E+00
All Depths	CWC	U-235	2.02E-01	8.9E-04	0.0E+00	2.6E-09	0.0E+00	3.7E-02	0.0E+00	1.2E-08	0.0E+00
All Depths	CWC	U-238	4.51E+00	3.9E-03	0.0E+00	1.4E-08	0.0E+00	2.1E-01	0.0E+00	7.8E-08	0.0E+00
All Depths	CWC	TOTAL		1.3E-01	6.9E-02	5.1E-07	3.6E-07	8.6E+00	2.9E+00	2.8E-06	1.6E-06
All Depths	Futura	Ac-227	5.04E+01	8.1E-01	0.0E+00	1.7E-06	0.0E+00	6.7E+01	0.0E+00	1.2E-05	0.0E+00
All Depths	Futura	Pa-231	5.96E+01	1.7E-01	0.0E+00	3.9E-07	0.0E+00	3.1E+01	0.0E+00	7.7E-07	0.0E+00
All Depths	Futura	Pb-210	1.10E+02	9.2E-02	0.0E+00	9.2E-08	0.0E+00	3.2E+01	0.0E+00	4.4E-06	0.0E+00
All Depths	Futura	Ra-226	4.50E+01	2.8E+00	0.0E+00	1.4E-05	0.0E+00	1.1E+02	0.0E+00	6.5E-05	0.0E+00
All Depths	Futura	Th-228	1.15E+00	6.5E-02	0.0E+00	1.1E-07	0.0E+00	2.5E+00	0.0E+00	1.5E-06	0.0E+00
All Depths	Futura	Th-230	1.00E+02	2.1E-02	1.8E-01	7.4E-08	8.7E-07	3.7E+00	1.0E+01	2.3E-07	4.0E-06
All Depths	Futura	Th-232	1.22E+00	1.3E-03	9.5E-02	1.6E-07	4.9E-07	2.2E-01	3.9E+00	2.6E-09	2.1E-06
All Depths	Futura	U-234	5.31E+01	4.9E-03	0.0E+00	4.9E-09	0.0E+00	9.1E-01	0.0E+00	1.3E-07	0.0E+00
All Depths	Futura	U-235	2.43E+00	1.1E-02	0.0E+00	3.1E-08	0.0E+00	4.4E-01	0.0E+00	1.5E-07	0.0E+00
All Depths	Futura	U-238	5.30E+01	4.5E-02	0.0E+00	1.7E-07	0.0E+00	2.4E+00	0.0E+00	9.2E-07	0.0E+00
All Depths	Futura	TOTAL		4.0E+00	2.8E-01	1.7E-05	1.4E-06	2.5E+02	1.4E+01	8.5E-05	6.1E-06
All Depths	HISS	Ac-227	1.47E+00	2.4E-02	0.0E+00	5.0E-08	0.0E+00	2.0E+00	0.0E+00	3.4E-07	0.0E+00
All Depths	HISS	Pa-231	1.48E+00	4.2E-03	0.0E+00	9.7E-09	0.0E+00	7.7E-01	0.0E+00	1.9E-08	0.0E+00
All Depths	HISS	Pb-210	2.30E+01	1.9E-02	0.0E+00	1.9E-08	0.0E+00	6.7E+00	0.0E+00	9.3E-07	0.0E+00
All Depths	HISS	Ra-226	8.55E+00	5.4E-01	0.0E+00	2.7E-06	0.0E+00	2.1E+01	0.0E+00	1.2E-05	0.0E+00
All Depths	HISS	Ra-228	9.00E-03	3.0E-04	0.0E+00	2.1E-09	0.0E+00	1.2E-02	0.0E+00	6.5E-09	0.0E+00
All Depths	HISS	Th-230	5.02E+01	1.1E-02	9.2E-02	3.7E-08	4.4E-07	1.8E+00	5.2E+00	1.1E-07	2.0E-06
All Depths	HISS	Th-232	6.80E-01	7.1E-04	5.3E-02	9.1E-08	2.7E-07	1.2E-01	2.2E+00	1.5E-09	1.2E-06
All Depths	HISS	U-234	1.60E+01	1.5E-03	0.0E+00	1.5E-09	0.0E+00	2.7E-01	0.0E+00	3.8E-08	0.0E+00
All Depths	HISS	U-235	1.53E+00	6.8E-03	0.0E+00	1.9E-08	0.0E+00	2.8E-01	0.0E+00	9.4E-08	0.0E+00
All Depths	HISS	U-238	1.59E+01	1.4E-02	0.0E+00	5.0E-08	0.0E+00	7.3E-01	0.0E+00	2.8E-07	0.0E+00
All Depths	HISS	TOTAL		6.2E-01	1.4E-01	3.0E-06	7.1E-07	3.4E+01	7.4E+00	1.4E-05	3.2E-06
Sub. (>0.5 ft)	IA-1	Ac-227	5.76E-01	9.3E-03	0.0E+00	1.9E-08	0.0E+00	7.6E-01	0.0E+00	1.3E-07	0.0E+00
Sub. (>0.5 ft)	IA-1	Pa-231	1.13E+00	3.2E-03	0.0E+00	7.4E-09	0.0E+00	5.9E-01	0.0E+00	1.5E-08	0.0E+00
Sub. (>0.5 ft)	IA-1	Pb-210	3.60E+02	3.0E-01	0.0E+00	3.0E-07	0.0E+00	1.1E+02	0.0E+00	1.4E-05	0.0E+00
Sub. (>0.5 ft)	IA-1	Ra-226	2.11E+02	1.3E+01	0.0E+00	6.6E-05	0.0E+00	5.2E+02	0.0E+00	3.1E-04	0.0E+00
Sub. (>0.5 ft)	IA-1	Th-228	2.40E-01	1.4E-02	0.0E+00	2.3E-08	0.0E+00	5.3E-01	0.0E+00	3.2E-07	0.0E+00
Sub. (>0.5 ft)	IA-1	Th-230	2.60E+01	5.6E-03	4.7E-02	1.9E-08	2.3E-07	9.5E-01	2.7E+00	5.9E-08	1.0E-06
Sub. (>0.5 ft)	IA-1	Th-232	5.37E+00	5.6E-03	4.2E-01	7.2E-07	2.2E-06	9.7E-01	1.7E+01	1.2E-08	9.4E-06
Sub. (>0.5 ft)	IA-1	U-234	1.09E+02	1.0E-02	0.0E+00	1.0E-08	0.0E+00	1.9E+00	0.0E+00	2.6E-07	0.0E+00
Sub. (>0.5 ft)	IA-1	U-235	9.32E-02	4.1E-04	0.0E+00	1.2E-09	0.0E+00	1.7E-02	0.0E+00	5.8E-09	0.0E+00
Sub. (>0.5 ft)	IA-1	U-238	1.09E+02	9.3E-02	0.0E+00	3.4E-07	0.0E+00	5.0E+00	0.0E+00	1.9E-06	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 53 of 60)

			Exposure Point Conc.	RECREATIONAL/TRESPASSER				CONSTRUCTION			
Data Group	**Property**	**Isotope**	**(pCi/g)**	**Dose Year=0.0**	**Dose Year=1000**	**Risk Year=0.0**	**Risk Year=1000**	**Dose Year=0.0**	**Dose Year=1000**	**Risk Year=0.0**	**Risk Year=1000**
Sub. (>0.5 ft)	IA-1	TOTAL		1.4E+01	4.7E-01	6.8E-05	2.4E-06	6.3E+02	2.0E+01	3.2E-04	1.0E-05
Surf. (<5 ft)	IA-1	Ac-227	5.38E+02	8.7E+00	0.0E+00	1.8E-05	0.0E+00	7.1E+02	0.0E+00	1.2E-04	0.0E+00
Surf. (<5 ft)	IA-1	Pa-231	5.85E+02	1.6E+00	0.0E+00	3.8E-06	0.0E+00	3.0E+02	0.0E+00	7.6E-06	0.0E+00
Surf. (<5 ft)	IA-1	Pb-210	9.95E+02	8.3E-01	0.0E+00	8.3E-07	0.0E+00	2.9E+02	0.0E+00	4.0E-05	0.0E+00
Surf. (<5 ft)	IA-1	Ra-226	5.84E+02	3.7E+01	0.0E+00	1.8E-04	0.0E+00	1.4E+03	0.0E+00	8.5E-04	0.0E+00
Surf. (<5 ft)	IA-1	Ra-228	3.36E+00	1.1E-01	0.0E+00	7.8E-07	0.0E+00	4.5E+00	0.0E+00	2.4E-06	0.0E+00
Surf. (<5 ft)	IA-1	Th-228	1.20E+01	6.8E-01	0.0E+00	1.1E-06	0.0E+00	2.7E+01	0.0E+00	1.6E-05	0.0E+00
Surf. (<5 ft)	IA-1	Th-230	9.26E+01	2.0E-02	1.7E-01	6.8E-08	8.1E-07	3.4E+00	9.6E+00	2.1E-07	3.7E-06
Surf. (<5 ft)	IA-1	Th-232	1.44E+01	1.5E-02	1.1E+00	1.9E-06	5.8E-06	2.6E+00	4.6E+01	3.1E-08	2.5E-05
Surf. (<5 ft)	IA-1	U-234	2.86E+02	2.7E-02	0.0E+00	2.6E-08	0.0E+00	4.9E+00	0.0E+00	6.8E-07	0.0E+00
Surf. (<5 ft)	IA-1	U-235	1.31E+01	5.8E-02	0.0E+00	1.7E-07	0.0E+00	2.4E+00	0.0E+00	8.1E-07	0.0E+00
Surf. (<5 ft)	IA-1	U-238	2.86E+02	2.4E-01	0.0E+00	9.0E-07	0.0E+00	1.3E+01	0.0E+00	4.9E-06	0.0E+00
Surf. (<5 ft)	IA-1	TOTAL		4.9E+01	1.3E+00	2.1E-04	6.6E-06	2.8E+03	5.6E+01	1.0E-03	2.9E-05
Sub. (>0.5 ft)	IA-10	Ac-227	3.80E+00	6.1E-02	0.0E+00	1.3E-07	0.0E+00	5.0E+00	0.0E+00	8.8E-07	0.0E+00
Sub. (>0.5 ft)	IA-10	Pa-231	4.16E+00	1.2E-02	0.0E+00	2.7E-08	0.0E+00	2.2E+00	0.0E+00	5.4E-08	0.0E+00
Sub. (>0.5 ft)	IA-10	Pb-210	7.41E+00	6.2E-03	0.0E+00	6.2E-09	0.0E+00	2.2E+00	0.0E+00	3.0E-07	0.0E+00
Sub. (>0.5 ft)	IA-10	Ra-226	3.31E+00	2.1E-01	0.0E+00	1.0E-06	0.0E+00	8.1E+00	0.0E+00	4.8E-06	0.0E+00
Sub. (>0.5 ft)	IA-10	Th-228	5.54E-01	3.1E-02	0.0E+00	5.2E-08	0.0E+00	1.2E+00	0.0E+00	7.4E-07	0.0E+00
Sub. (>0.5 ft)	IA-10	Th-230	6.17E+00	1.3E-03	1.1E-02	4.5E-09	5.4E-08	2.3E-01	6.4E-01	1.4E-08	2.5E-07
Sub. (>0.5 ft)	IA-10	Th-232	9.30E-01	9.7E-04	7.2E-02	1.2E-07	3.8E-07	1.7E-01	3.0E+00	2.0E-09	1.6E-06
Sub. (>0.5 ft)	IA-10	U-234	9.77E+00	9.1E-04	0.0E+00	9.0E-10	0.0E+00	1.7E-01	0.0E+00	2.3E-08	0.0E+00
Sub. (>0.5 ft)	IA-10	U-235	4.41E-01	1.9E-03	0.0E+00	5.6E-09	0.0E+00	8.0E-02	0.0E+00	2.7E-08	0.0E+00
Sub. (>0.5 ft)	IA-10	U-238	9.72E+00	8.3E-03	0.0E+00	3.0E-08	0.0E+00	4.4E-01	0.0E+00	1.7E-07	0.0E+00
Sub. (>0.5 ft)	IA-10	TOTAL		3.3E-01	8.4E-02	1.4E-06	4.3E-07	2.0E+01	3.6E+00	7.0E-06	1.9E-06
Surf. (<0.5 ft)	IA-10	Ac-227	8.00E-03	1.3E-04	0.0E+00	2.7E-10	0.0E+00	1.1E-02	0.0E+00	1.9E-09	0.0E+00
Surf. (<0.5 ft)	IA-10	Pa-231	1.10E-01	3.1E-04	0.0E+00	7.2E-10	0.0E+00	5.7E-02	0.0E+00	1.4E-09	0.0E+00
Surf. (<0.5 ft)	IA-10	Pb-210	2.19E+00	1.8E-03	0.0E+00	1.8E-09	0.0E+00	6.4E-01	0.0E+00	8.8E-08	0.0E+00
Surf. (<0.5 ft)	IA-10	Ra-226	2.40E-01	1.5E-02	0.0E+00	7.5E-08	0.0E+00	5.9E-01	0.0E+00	3.5E-07	0.0E+00
Surf. (<0.5 ft)	IA-10	Th-228	1.05E+00	6.0E-02	0.0E+00	9.9E-08	0.0E+00	2.3E+00	0.0E+00	1.4E-06	0.0E+00
Surf. (<0.5 ft)	IA-10	Th-230	2.78E+00	5.9E-04	5.1E-03	2.0E-09	2.4E-08	1.0E-01	2.9E-01	6.3E-09	1.1E-07
Surf. (<0.5 ft)	IA-10	Th-232	4.10E-01	4.3E-04	3.2E-02	5.5E-08	1.7E-07	7.4E-02	1.3E+00	8.8E-10	7.2E-07
Surf. (<0.5 ft)	IA-10	U-234	4.32E+00	4.0E-04	0.0E+00	4.0E-10	0.0E+00	7.4E-02	0.0E+00	1.0E-08	0.0E+00
Surf. (<0.5 ft)	IA-10	U-235	1.18E-01	5.2E-04	0.0E+00	1.5E-09	0.0E+00	2.2E-02	0.0E+00	7.3E-09	0.0E+00
Surf. (<0.5 ft)	IA-10	U-238	4.27E+00	3.6E-03	0.0E+00	1.3E-08	0.0E+00	1.9E-01	0.0E+00	7.4E-08	0.0E+00
Surf. (<0.5 ft)	IA-10	TOTAL		8.2E-02	3.7E-02	2.5E-07	1.9E-07	4.1E+00	1.6E+00	1.9E-06	8.3E-07
Surf. (<5 ft)	IA-11	Th-230	2.40E-01	5.1E-05	4.4E-04	1.8E-10	2.1E-09	8.8E-03	2.5E-02	5.5E-10	9.6E-09
Surf. (<5 ft)	IA-11	TOTAL		5.1E-05	4.4E-04	1.8E-10	2.1E-09	8.8E-03	2.5E-02	5.5E-10	9.6E-09
Sub. (>0.5 ft)	IA-12	Ac-227	2.02E+00	3.3E-02	0.0E+00	6.8E-08	0.0E+00	2.7E+00	0.0E+00	4.7E-07	0.0E+00
Sub. (>0.5 ft)	IA-12	Pa-231	2.12E+00	6.0E-03	0.0E+00	1.4E-08	0.0E+00	1.1E+00	0.0E+00	2.7E-08	0.0E+00
Sub. (>0.5 ft)	IA-12	Pb-210	4.35E+00	3.6E-03	0.0E+00	3.6E-09	0.0E+00	1.3E+00	0.0E+00	1.7E-07	0.0E+00
Sub. (>0.5 ft)	IA-12	Ra-226	1.51E+00	9.5E-02	0.0E+00	4.7E-07	0.0E+00	3.7E+00	0.0E+00	2.2E-06	0.0E+00
Sub. (>0.5 ft)	IA-12	Ra-228	2.33E-01	7.9E-03	0.0E+00	5.4E-08	0.0E+00	3.1E-01	0.0E+00	1.7E-07	0.0E+00
Sub. (>0.5 ft)	IA-12	Th-228	5.40E-01	3.1E-02	0.0E+00	5.1E-08	0.0E+00	1.2E+00	0.0E+00	7.2E-07	0.0E+00
Sub. (>0.5 ft)	IA-12	Th-230	7.32E+01	1.6E-02	1.3E-01	5.4E-08	6.4E-07	2.7E+00	7.6E+00	1.7E-07	2.9E-06
Sub. (>0.5 ft)	IA-12	Th-232	9.00E-01	9.4E-04	7.0E-02	1.2E-07	3.6E-07	1.6E-01	2.9E+00	1.9E-09	1.6E-06
Sub. (>0.5 ft)	IA-12	U-234	8.34E+00	7.7E-04	0.0E+00	7.6E-10	0.0E+00	1.4E-01	0.0E+00	2.0E-08	0.0E+00
Sub. (>0.5 ft)	IA-12	U-235	1.69E+00	7.5E-03	0.0E+00	2.1E-08	0.0E+00	3.1E-01	0.0E+00	1.0E-07	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 54 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	RECREATIONAL/TRESPASSER Dose Year=1000	RECREATIONAL/TRESPASSER Risk Year=0.0	RECREATIONAL/TRESPASSER Risk Year=1000	CONSTRUCTION Dose Year=0.0	CONSTRUCTION Dose Year=1000	CONSTRUCTION Risk Year=0.0	CONSTRUCTION Risk Year=1000
Sub. (>0.5 ft)	IA-12	U-238	8.29E+00	7.1E-03	0.0E+00	2.6E-08	0.0E+00	3.8E-01	0.0E+00	1.4E-07	0.0E+00
Sub. (>0.5 ft)	IA-12	TOTAL		2.1E-01	2.0E-01	8.9E-07	1.0E-06	1.4E+01	1.0E+01	4.2E-06	4.5E-06
Surf. (<0.5 ft)	IA-12	Ac-227	3.67E+00	5.9E-02	0.0E+00	1.2E-07	0.0E+00	4.9E+00	0.0E+00	8.5E-07	0.0E+00
Surf. (<0.5 ft)	IA-12	Pa-231	4.02E+00	1.1E-02	0.0E+00	2.6E-08	0.0E+00	2.1E+00	0.0E+00	5.2E-08	0.0E+00
Surf. (<0.5 ft)	IA-12	Pb-210	7.17E+00	6.0E-03	0.0E+00	6.0E-09	0.0E+00	2.1E+00	0.0E+00	2.9E-07	0.0E+00
Surf. (<0.5 ft)	IA-12	Ra-226	3.17E+00	2.0E-01	0.0E+00	9.9E-07	0.0E+00	7.8E+00	0.0E+00	4.6E-06	0.0E+00
Surf. (<0.5 ft)	IA-12	Th-228	2.74E-01	1.6E-02	0.0E+00	2.6E-08	0.0E+00	6.1E-01	0.0E+00	3.6E-07	0.0E+00
Surf. (<0.5 ft)	IA-12	Th-230	3.17E+02	6.8E-02	5.8E-01	2.3E-07	2.8E-06	1.2E+01	3.3E+01	7.2E-07	1.3E-05
Surf. (<0.5 ft)	IA-12	Th-232	6.00E-01	6.3E-04	4.7E-02	8.0E-08	2.4E-07	1.1E-01	1.9E+00	1.3E-09	1.0E-06
Surf. (<0.5 ft)	IA-12	U-234	1.12E+01	1.0E-03	0.0E+00	1.0E-09	0.0E+00	1.9E-01	0.0E+00	2.7E-08	0.0E+00
Surf. (<0.5 ft)	IA-12	U-235	5.06E-01	2.2E-03	0.0E+00	6.4E-09	0.0E+00	9.2E-02	0.0E+00	3.1E-08	0.0E+00
Surf. (<0.5 ft)	IA-12	U-238	1.11E+01	9.5E-03	0.0E+00	3.5E-08	0.0E+00	5.1E-01	0.0E+00	1.9E-07	0.0E+00
Surf. (<0.5 ft)	IA-12	TOTAL		3.7E-01	6.2E-01	1.5E-06	3.0E-06	3.0E+01	3.5E+01	7.1E-06	1.4E-05
Sub. (>0.5 ft)	IA-13	Ac-227	1.65E+00	2.7E-02	0.0E+00	5.6E-08	0.0E+00	2.2E+00	0.0E+00	3.8E-07	0.0E+00
Sub. (>0.5 ft)	IA-13	Pa-231	1.82E+00	5.1E-03	0.0E+00	1.2E-08	0.0E+00	9.5E-01	0.0E+00	2.4E-08	0.0E+00
Sub. (>0.5 ft)	IA-13	Pb-210	3.43E+00	2.9E-03	0.0E+00	2.9E-09	0.0E+00	1.0E+00	0.0E+00	1.4E-07	0.0E+00
Sub. (>0.5 ft)	IA-13	Ra-226	9.70E-01	6.1E-02	0.0E+00	3.0E-07	0.0E+00	2.4E+00	0.0E+00	1.4E-06	0.0E+00
Sub. (>0.5 ft)	IA-13	Th-228	6.05E-01	3.4E-02	0.0E+00	5.7E-08	0.0E+00	1.3E+00	0.0E+00	8.1E-07	0.0E+00
Sub. (>0.5 ft)	IA-13	Th-230	1.58E+00	3.4E-04	2.9E-03	1.2E-09	1.4E-08	5.8E-02	1.6E-01	3.6E-09	6.3E-08
Sub. (>0.5 ft)	IA-13	Th-232	9.90E-01	1.0E-03	7.7E-02	1.3E-07	4.0E-07	1.8E-01	3.2E+00	2.1E-09	1.7E-06
Sub. (>0.5 ft)	IA-13	U-234	9.67E+00	9.0E-04	0.0E+00	8.9E-10	0.0E+00	1.7E-01	0.0E+00	2.3E-08	0.0E+00
Sub. (>0.5 ft)	IA-13	U-235	4.37E-01	1.9E-03	0.0E+00	5.5E-09	0.0E+00	8.0E-02	0.0E+00	2.7E-08	0.0E+00
Sub. (>0.5 ft)	IA-13	U-238	9.62E+00	8.2E-03	0.0E+00	3.0E-08	0.0E+00	4.4E-01	0.0E+00	1.7E-07	0.0E+00
Sub. (>0.5 ft)	IA-13	TOTAL		1.4E-01	8.0E-02	6.0E-07	4.1E-07	8.8E+00	3.3E+00	3.0E-06	1.8E-06
Surf. (<0.5 ft)	IA-13	Ac-227	1.73E-01	2.8E-03	0.0E+00	5.8E-09	0.0E+00	2.3E-01	0.0E+00	4.0E-08	0.0E+00
Surf. (<0.5 ft)	IA-13	Pa-231	3.19E-01	9.0E-04	0.0E+00	2.1E-09	0.0E+00	1.7E-01	0.0E+00	4.1E-09	0.0E+00
Surf. (<0.5 ft)	IA-13	Pb-210	2.70E+00	2.3E-03	0.0E+00	2.2E-09	0.0E+00	7.9E-01	0.0E+00	1.1E-07	0.0E+00
Surf. (<0.5 ft)	IA-13	Ra-226	5.40E-01	3.4E-02	0.0E+00	1.7E-07	0.0E+00	1.3E+00	0.0E+00	7.8E-07	0.0E+00
Surf. (<0.5 ft)	IA-13	Th-228	2.00E-02	1.1E-03	0.0E+00	1.9E-09	0.0E+00	4.4E-02	0.0E+00	2.7E-08	0.0E+00
Surf. (<0.5 ft)	IA-13	Th-230	1.37E+01	2.9E-03	2.5E-02	1.0E-08	1.2E-07	5.0E-01	1.4E+00	3.1E-08	5.5E-07
Surf. (<0.5 ft)	IA-13	Th-232	4.30E-01	4.5E-04	3.3E-02	5.7E-08	1.7E-07	7.8E-02	1.4E+00	9.3E-10	7.5E-07
Surf. (<0.5 ft)	IA-13	U-234	2.90E+00	2.7E-04	0.0E+00	2.7E-10	0.0E+00	5.0E-02	0.0E+00	6.9E-09	0.0E+00
Surf. (<0.5 ft)	IA-13	U-235	1.33E-01	5.9E-04	0.0E+00	1.7E-09	0.0E+00	2.4E-02	0.0E+00	8.2E-09	0.0E+00
Surf. (<0.5 ft)	IA-13	U-238	2.85E+00	2.4E-03	0.0E+00	8.9E-09	0.0E+00	1.3E-01	0.0E+00	4.9E-08	0.0E+00
Surf. (<0.5 ft)	IA-13	TOTAL		4.8E-02	5.8E-02	2.6E-07	2.9E-07	3.3E+00	2.8E+00	1.1E-06	1.3E-06
Sub. (>0.5 ft)	IA-2	Ac-227	6.93E+00	1.1E-01	0.0E+00	2.3E-07	0.0E+00	9.2E+00	0.0E+00	1.6E-06	0.0E+00
Sub. (>0.5 ft)	IA-2	Pa-231	9.09E+00	2.6E-02	0.0E+00	6.0E-08	0.0E+00	4.7E+00	0.0E+00	1.2E-07	0.0E+00
Sub. (>0.5 ft)	IA-2	Pb-210	4.83E+01	4.0E-02	0.0E+00	4.0E-08	0.0E+00	1.4E+01	0.0E+00	1.9E-06	0.0E+00
Sub. (>0.5 ft)	IA-2	Ra-226	2.74E+01	1.7E+00	0.0E+00	8.6E-06	0.0E+00	6.7E+01	0.0E+00	4.0E-05	0.0E+00
Sub. (>0.5 ft)	IA-2	Ra-228	1.63E-01	5.5E-03	0.0E+00	3.8E-08	0.0E+00	2.2E-01	0.0E+00	1.2E-07	0.0E+00
Sub. (>0.5 ft)	IA-2	Th-228	4.00E-01	2.3E-02	0.0E+00	3.8E-08	0.0E+00	8.9E-01	0.0E+00	5.3E-07	0.0E+00
Sub. (>0.5 ft)	IA-2	Th-230	4.54E+02	9.7E-02	8.3E-01	3.3E-07	4.0E-06	1.7E+01	4.7E+01	1.0E-06	1.8E-05
Sub. (>0.5 ft)	IA-2	Th-232	1.24E+00	1.3E-03	9.6E-02	1.7E-07	5.0E-07	2.2E-01	4.0E+00	2.7E-09	2.2E-06
Sub. (>0.5 ft)	IA-2	U-234	4.88E+01	4.5E-03	0.0E+00	4.5E-09	0.0E+00	8.4E-01	0.0E+00	1.2E-07	0.0E+00
Sub. (>0.5 ft)	IA-2	U-235	2.22E+00	9.8E-03	0.0E+00	2.8E-08	0.0E+00	4.0E-01	0.0E+00	1.4E-07	0.0E+00
Sub. (>0.5 ft)	IA-2	U-238	4.87E+01	4.2E-02	0.0E+00	1.5E-07	0.0E+00	2.2E+00	0.0E+00	8.4E-07	0.0E+00
Sub. (>0.5 ft)	IA-2	TOTAL		2.1E+00	9.2E-01	9.7E-06	4.5E-06	1.2E+02	5.1E+01	4.6E-05	2.0E-05

Attachment 12. Radiological Doses and Risks for each Property (page 55 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	CONSTRUCTION Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<5 ft)	IA-2	Ac-227	3.07E+01	4.9E-01	0.0E+00	1.0E-06	0.0E+00	4.1E+01	0.0E+00	7.1E-06	0.0E+00
Surf. (<5 ft)	IA-2	Pa-231	4.12E+01	1.2E-01	0.0E+00	2.7E-07	0.0E+00	2.1E+01	0.0E+00	5.3E-07	0.0E+00
Surf. (<5 ft)	IA-2	Pb-210	1.16E+02	9.7E-02	0.0E+00	9.6E-08	0.0E+00	3.4E+01	0.0E+00	4.7E-06	0.0E+00
Surf. (<5 ft)	IA-2	Ra-226	6.72E+01	4.2E+00	0.0E+00	2.1E-05	0.0E+00	1.6E+02	0.0E+00	9.7E-05	0.0E+00
Surf. (<5 ft)	IA-2	Ra-228	7.63E-01	2.6E-02	0.0E+00	1.8E-07	0.0E+00	1.0E+00	0.0E+00	5.5E-07	0.0E+00
Surf. (<5 ft)	IA-2	Th-228	7.40E-01	4.2E-02	0.0E+00	7.0E-08	0.0E+00	1.6E+00	0.0E+00	9.8E-07	0.0E+00
Surf. (<5 ft)	IA-2	Th-230	1.38E+03	2.9E-01	2.5E+00	1.0E-06	1.2E-05	5.0E+01	1.4E+02	3.1E-06	5.5E-05
Surf. (<5 ft)	IA-2	Th-232	2.04E+00	2.1E-03	1.6E-01	2.7E-07	8.2E-07	3.7E-01	6.5E+00	4.4E-09	3.6E-06
Surf. (<5 ft)	IA-2	U-234	9.70E+01	9.0E-03	0.0E+00	8.9E-09	0.0E+00	1.7E+00	0.0E+00	2.3E-07	0.0E+00
Surf. (<5 ft)	IA-2	U-235	9.62E+00	4.2E-02	0.0E+00	1.2E-07	0.0E+00	1.8E+00	0.0E+00	5.9E-07	0.0E+00
Surf. (<5 ft)	IA-2	U-238	9.69E+01	8.3E-02	0.0E+00	3.0E-07	0.0E+00	4.4E+00	0.0E+00	1.7E-06	0.0E+00
Surf. (<5 ft)	IA-2	TOTAL		5.4E+00	2.7E+00	2.4E-05	1.3E-05	3.2E+02	1.5E+02	1.2E-04	5.9E-05
Sub. (>0.5 ft)	IA-3	Ac-227	6.77E+00	1.1E-01	0.0E+00	2.3E-07	0.0E+00	9.0E+00	0.0E+00	1.6E-06	0.0E+00
Sub. (>0.5 ft)	IA-3	Pa-231	4.06E+00	1.1E-02	0.0E+00	2.7E-08	0.0E+00	2.1E+00	0.0E+00	5.3E-08	0.0E+00
Sub. (>0.5 ft)	IA-3	Pb-210	1.97E+02	1.6E-01	0.0E+00	1.6E-07	0.0E+00	5.8E+01	0.0E+00	7.9E-06	0.0E+00
Sub. (>0.5 ft)	IA-3	Ra-226	1.15E+02	7.2E+00	0.0E+00	3.6E-05	0.0E+00	2.8E+02	0.0E+00	1.7E-04	0.0E+00
Sub. (>0.5 ft)	IA-3	Ra-228	3.30E-02	1.1E-03	0.0E+00	7.6E-09	0.0E+00	4.4E-02	0.0E+00	2.4E-08	0.0E+00
Sub. (>0.5 ft)	IA-3	Th-228	6.00E-02	3.4E-03	0.0E+00	5.6E-09	0.0E+00	1.3E-01	0.0E+00	8.0E-08	0.0E+00
Sub. (>0.5 ft)	IA-3	Th-230	3.45E+02	7.4E-02	6.3E-01	2.5E-07	3.0E-06	1.3E+01	3.6E+01	7.9E-07	1.4E-05
Sub. (>0.5 ft)	IA-3	Th-232	1.63E+00	1.7E-03	1.3E-01	2.2E-07	6.6E-07	3.0E-01	5.2E+00	3.5E-09	2.8E-06
Sub. (>0.5 ft)	IA-3	U-234	7.10E+01	6.6E-03	0.0E+00	6.5E-09	0.0E+00	1.2E+00	0.0E+00	1.7E-07	0.0E+00
Sub. (>0.5 ft)	IA-3	U-235	1.64E+00	7.2E-03	0.0E+00	2.1E-08	0.0E+00	3.0E-01	0.0E+00	1.0E-07	0.0E+00
Sub. (>0.5 ft)	IA-3	U-238	7.09E+01	6.1E-02	0.0E+00	2.2E-07	0.0E+00	3.2E+00	0.0E+00	1.2E-06	0.0E+00
Sub. (>0.5 ft)	IA-3	TOTAL		7.6E+00	7.6E-01	3.7E-05	3.7E-06	3.7E+02	4.1E+01	1.8E-04	1.7E-05
Surf. (<5 ft)	IA-3	Ac-227	1.05E+01	1.7E-01	0.0E+00	3.5E-07	0.0E+00	1.4E+01	0.0E+00	2.4E-06	0.0E+00
Surf. (<5 ft)	IA-3	Pa-231	7.67E+00	2.2E-02	0.0E+00	5.0E-08	0.0E+00	4.0E+00	0.0E+00	9.9E-08	0.0E+00
Surf. (<5 ft)	IA-3	Pb-210	2.70E+01	2.3E-02	0.0E+00	2.2E-08	0.0E+00	7.9E+00	0.0E+00	1.1E-06	0.0E+00
Surf. (<5 ft)	IA-3	Ra-226	1.49E+01	9.3E-01	0.0E+00	4.7E-06	0.0E+00	3.6E+01	0.0E+00	2.2E-05	0.0E+00
Surf. (<5 ft)	IA-3	Ra-228	1.23E-01	4.1E-03	0.0E+00	2.8E-08	0.0E+00	1.7E-01	0.0E+00	8.9E-08	0.0E+00
Surf. (<5 ft)	IA-3	Th-228	5.00E-02	2.8E-03	0.0E+00	4.7E-09	0.0E+00	1.1E-01	0.0E+00	6.7E-08	0.0E+00
Surf. (<5 ft)	IA-3	Th-230	4.80E+02	1.0E-01	8.8E-01	3.5E-07	4.2E-06	1.8E+01	5.0E+01	1.1E-06	1.9E-05
Surf. (<5 ft)	IA-3	Th-232	1.16E+00	1.2E-03	9.0E-02	1.5E-07	4.7E-07	2.1E-01	3.7E+00	2.5E-09	2.0E-06
Surf. (<5 ft)	IA-3	U-234	3.03E+01	2.8E-03	0.0E+00	2.8E-09	0.0E+00	5.2E-01	0.0E+00	7.2E-08	0.0E+00
Surf. (<5 ft)	IA-3	U-235	2.55E+00	1.1E-02	0.0E+00	3.2E-08	0.0E+00	4.6E-01	0.0E+00	1.6E-07	0.0E+00
Surf. (<5 ft)	IA-3	U-238	3.02E+01	2.6E-02	0.0E+00	9.5E-08	0.0E+00	1.4E+00	0.0E+00	5.2E-07	0.0E+00
Surf. (<5 ft)	IA-3	TOTAL		1.3E+00	9.7E-01	5.8E-06	4.7E-06	8.3E+01	5.4E+01	2.7E-05	2.1E-05
Sub. (>0.5 ft)	IA-4	Ac-227	1.26E+00	2.0E-02	0.0E+00	4.3E-08	0.0E+00	1.7E+00	0.0E+00	2.9E-07	0.0E+00
Sub. (>0.5 ft)	IA-4	Pa-231	4.33E-01	1.2E-03	0.0E+00	2.8E-09	0.0E+00	2.3E-01	0.0E+00	5.6E-09	0.0E+00
Sub. (>0.5 ft)	IA-4	Pb-210	2.01E+02	1.7E-01	0.0E+00	1.7E-07	0.0E+00	5.9E+01	0.0E+00	8.1E-06	0.0E+00
Sub. (>0.5 ft)	IA-4	Ra-226	1.17E+02	7.3E+00	0.0E+00	3.7E-05	0.0E+00	2.9E+02	0.0E+00	1.7E-04	0.0E+00
Sub. (>0.5 ft)	IA-4	Th-228	1.80E-01	1.0E-02	0.0E+00	1.7E-08	0.0E+00	4.0E-01	0.0E+00	2.4E-07	0.0E+00
Sub. (>0.5 ft)	IA-4	Th-230	1.80E+02	3.9E-02	3.3E-01	1.3E-07	1.6E-06	6.6E+00	1.9E+01	4.1E-07	7.2E-06
Sub. (>0.5 ft)	IA-4	Th-232	2.58E+00	2.7E-03	2.0E-01	3.4E-07	1.0E-06	4.7E-01	8.3E+00	5.6E-09	4.5E-06
Sub. (>0.5 ft)	IA-4	U-234	8.50E+01	7.9E-03	0.0E+00	7.8E-09	0.0E+00	1.5E+00	0.0E+00	2.0E-07	0.0E+00
Sub. (>0.5 ft)	IA-4	U-235	5.85E+00	2.6E-02	0.0E+00	7.4E-08	0.0E+00	1.1E+00	0.0E+00	3.6E-07	0.0E+00
Sub. (>0.5 ft)	IA-4	U-238	8.49E+01	7.3E-02	0.0E+00	2.7E-07	0.0E+00	3.9E+00	0.0E+00	1.5E-06	0.0E+00
Sub. (>0.5 ft)	IA-4	TOTAL		7.7E+00	5.3E-01	3.8E-05	2.6E-06	3.6E+02	2.7E+01	1.8E-04	1.2E-05
Surf. (<5 ft)	IA-4	Ac-227	4.55E+00	7.3E-02	0.0E+00	1.5E-07	0.0E+00	6.0E+00	0.0E+00	1.1E-06	0.0E+00

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	CONSTRUCTION Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<5 ft)	IA-4	Pa-231	3.10E+00	8.7E-03	0.0E+00	2.0E-08	0.0E+00	1.6E+00	0.0E+00	4.0E-08	0.0E+00
Surf. (<5 ft)	IA-4	Pb-210	4.54E+02	3.8E-01	0.0E+00	3.8E-07	0.0E+00	1.3E+02	0.0E+00	1.8E-05	0.0E+00
Surf. (<5 ft)	IA-4	Ra-226	2.66E+02	1.7E+01	0.0E+00	8.3E-05	0.0E+00	6.5E+02	0.0E+00	3.9E-04	0.0E+00
Surf. (<5 ft)	IA-4	Ra-228	1.53E-01	5.2E-03	0.0E+00	3.5E-08	0.0E+00	2.1E-01	0.0E+00	1.1E-07	0.0E+00
Surf. (<5 ft)	IA-4	Th-228	6.80E-01	3.9E-02	0.0E+00	6.4E-08	0.0E+00	1.5E+00	0.0E+00	9.1E-07	0.0E+00
Surf. (<5 ft)	IA-4	Th-230	2.44E+03	5.2E-01	4.4E+00	1.8E-06	2.1E-05	8.9E+01	2.5E+02	5.5E-06	9.7E-05
Surf. (<5 ft)	IA-4	Th-232	2.89E+00	3.0E-03	2.2E-01	3.9E-07	1.2E-06	5.2E-01	9.3E+00	6.2E-09	5.0E-06
Surf. (<5 ft)	IA-4	U-234	7.13E+01	6.6E-03	0.0E+00	6.5E-09	0.0E+00	1.2E+00	0.0E+00	1.7E-07	0.0E+00
Surf. (<5 ft)	IA-4	U-235	3.00E+00	1.3E-02	0.0E+00	3.8E-08	0.0E+00	5.5E-01	0.0E+00	1.9E-07	0.0E+00
Surf. (<5 ft)	IA-4	U-238	7.12E+01	6.1E-02	0.0E+00	2.2E-07	0.0E+00	3.2E+00	0.0E+00	1.2E-06	0.0E+00
Surf. (<5 ft)	IA-4	TOTAL		1.8E+01	4.7E+00	8.7E-05	2.2E-05	8.9E+02	2.6E+02	4.1E-04	1.0E-04
Sub. (>0.5 ft)	IA-5	Ac-227	7.10E+00	1.1E-01	0.0E+00	2.4E-07	0.0E+00	9.4E+00	0.0E+00	1.6E-06	0.0E+00
Sub. (>0.5 ft)	IA-5	Pa-231	8.29E+00	2.3E-02	0.0E+00	5.4E-08	0.0E+00	4.3E+00	0.0E+00	1.1E-07	0.0E+00
Sub. (>0.5 ft)	IA-5	Pb-210	3.28E+01	2.7E-02	0.0E+00	2.7E-08	0.0E+00	9.6E+00	0.0E+00	1.3E-06	0.0E+00
Sub. (>0.5 ft)	IA-5	Ra-226	1.83E+01	1.1E+00	0.0E+00	5.7E-06	0.0E+00	4.5E+01	0.0E+00	2.6E-05	0.0E+00
Sub. (>0.5 ft)	IA-5	Ra-228	6.00E-03	2.0E-04	0.0E+00	1.4E-09	0.0E+00	8.1E-03	0.0E+00	4.3E-09	0.0E+00
Sub. (>0.5 ft)	IA-5	Th-228	1.00E-01	5.7E-03	0.0E+00	9.4E-09	0.0E+00	2.2E-01	0.0E+00	1.3E-07	0.0E+00
Sub. (>0.5 ft)	IA-5	Th-230	2.94E+02	6.3E-02	5.4E-01	2.2E-07	2.6E-06	1.1E+01	3.1E+01	6.7E-07	1.2E-05
Sub. (>0.5 ft)	IA-5	Th-232	1.22E+00	1.3E-03	9.5E-02	1.6E-07	4.9E-07	2.2E-01	3.9E+00	2.6E-09	2.1E-06
Sub. (>0.5 ft)	IA-5	U-234	3.25E+01	3.0E-03	0.0E+00	3.0E-09	0.0E+00	5.6E-01	0.0E+00	7.7E-08	0.0E+00
Sub. (>0.5 ft)	IA-5	U-235	1.12E+00	4.9E-03	0.0E+00	1.4E-08	0.0E+00	2.0E-01	0.0E+00	6.9E-08	0.0E+00
Sub. (>0.5 ft)	IA-5	U-238	3.24E+01	2.8E-02	0.0E+00	1.0E-07	0.0E+00	1.5E+00	0.0E+00	5.6E-07	0.0E+00
Sub. (>0.5 ft)	IA-5	TOTAL		1.4E+00	6.3E-01	6.6E-06	3.1E-06	8.2E+01	3.4E+01	3.1E-05	1.4E-05
Surf. (<5 ft)	IA-5	Ac-227	2.18E+01	3.5E-01	0.0E+00	7.4E-07	0.0E+00	2.9E+01	0.0E+00	5.1E-06	0.0E+00
Surf. (<5 ft)	IA-5	Pa-231	2.57E+01	7.2E-02	0.0E+00	1.7E-07	0.0E+00	1.3E+01	0.0E+00	3.3E-07	0.0E+00
Surf. (<5 ft)	IA-5	Pb-210	5.00E+01	4.2E-02	0.0E+00	4.2E-08	0.0E+00	1.5E+01	0.0E+00	2.0E-06	0.0E+00
Surf. (<5 ft)	IA-5	Ra-226	2.84E+01	1.8E+00	0.0E+00	8.9E-06	0.0E+00	7.0E+01	0.0E+00	4.1E-05	0.0E+00
Surf. (<5 ft)	IA-5	Ra-228	2.23E-01	7.5E-03	0.0E+00	5.2E-08	0.0E+00	3.0E-01	0.0E+00	1.6E-07	0.0E+00
Surf. (<5 ft)	IA-5	Th-228	2.60E-01	1.5E-02	0.0E+00	2.4E-08	0.0E+00	5.8E-01	0.0E+00	3.5E-07	0.0E+00
Surf. (<5 ft)	IA-5	Th-230	6.60E+02	1.4E-01	1.2E+00	4.9E-07	5.8E-06	2.4E+01	6.8E+01	1.5E-06	2.6E-05
Surf. (<5 ft)	IA-5	Th-232	1.52E+00	1.6E-03	1.2E-01	2.0E-07	6.1E-07	2.8E-01	4.9E+00	3.3E-09	2.7E-06
Surf. (<5 ft)	IA-5	U-234	5.05E+01	4.7E-03	0.0E+00	4.6E-09	0.0E+00	8.7E-01	0.0E+00	1.2E-07	0.0E+00
Surf. (<5 ft)	IA-5	U-235	3.39E+00	1.5E-02	0.0E+00	4.3E-08	0.0E+00	6.2E-01	0.0E+00	2.1E-07	0.0E+00
Surf. (<5 ft)	IA-5	U-238	5.04E+01	4.3E-02	0.0E+00	1.6E-07	0.0E+00	2.3E+00	0.0E+00	8.7E-07	0.0E+00
Surf. (<5 ft)	IA-5	TOTAL		2.5E+00	1.3E+00	1.1E-05	6.4E-06	1.6E+02	7.3E+01	5.2E-05	2.9E-05
Sub. (>0.5 ft)	IA-6	Ac-227	1.11E+01	1.8E-01	0.0E+00	3.7E-07	0.0E+00	1.5E+01	0.0E+00	2.6E-06	0.0E+00
Sub. (>0.5 ft)	IA-6	Pa-231	1.16E+01	3.3E-02	0.0E+00	7.6E-08	0.0E+00	6.1E+00	0.0E+00	1.5E-07	0.0E+00
Sub. (>0.5 ft)	IA-6	Pb-210	9.81E+00	8.2E-03	0.0E+00	8.2E-09	0.0E+00	2.9E+00	0.0E+00	3.9E-07	0.0E+00
Sub. (>0.5 ft)	IA-6	Ra-226	4.72E+00	3.0E-01	0.0E+00	1.5E-06	0.0E+00	1.2E+01	0.0E+00	6.8E-06	0.0E+00
Sub. (>0.5 ft)	IA-6	Ra-228	2.63E-01	8.9E-03	0.0E+00	6.1E-08	0.0E+00	3.5E-01	0.0E+00	1.9E-07	0.0E+00
Sub. (>0.5 ft)	IA-6	Th-228	4.30E-01	2.4E-02	0.0E+00	4.0E-08	0.0E+00	9.5E-01	0.0E+00	5.7E-07	0.0E+00
Sub. (>0.5 ft)	IA-6	Th-230	2.85E+02	6.1E-02	5.2E-01	2.1E-07	2.5E-06	1.0E+01	3.0E+01	6.5E-07	1.1E-05
Sub. (>0.5 ft)	IA-6	Th-232	2.05E+00	2.1E-03	1.6E-01	2.7E-07	8.3E-07	3.7E-01	6.6E+00	4.4E-09	3.6E-06
Sub. (>0.5 ft)	IA-6	U-234	3.09E+01	2.9E-03	0.0E+00	2.8E-09	0.0E+00	5.3E-01	0.0E+00	7.3E-08	0.0E+00
Sub. (>0.5 ft)	IA-6	U-235	2.73E+00	1.2E-02	0.0E+00	3.5E-08	0.0E+00	5.0E-01	0.0E+00	1.7E-07	0.0E+00
Sub. (>0.5 ft)	IA-6	U-238	3.08E+01	2.6E-02	0.0E+00	9.7E-08	0.0E+00	1.4E+00	0.0E+00	5.3E-07	0.0E+00
Sub. (>0.5 ft)	IA-6	TOTAL		6.5E-01	6.8E-01	2.7E-06	3.3E-06	5.0E+01	3.6E+01	1.2E-05	1.5E-05
Surf. (<5 ft)	IA-6	Ac-227	1.77E+01	2.8E-01	0.0E+00	6.0E-07	0.0E+00	2.3E+01	0.0E+00	4.1E-06	0.0E+00

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	CONSTRUCTION Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<5 ft)	IA-6	Pa-231	1.86E+01	5.2E-02	0.0E+00	1.2E-07	0.0E+00	9.7E+00	0.0E+00	2.4E-07	0.0E+00
Surf. (<5 ft)	IA-6	Pb-210	1.64E+01	1.4E-02	0.0E+00	1.4E-08	0.0E+00	4.8E+00	0.0E+00	6.6E-07	0.0E+00
Surf. (<5 ft)	IA-6	Ra-226	8.57E+00	5.4E-01	0.0E+00	2.7E-06	0.0E+00	2.1E+01	0.0E+00	1.2E-05	0.0E+00
Surf. (<5 ft)	IA-6	Ra-228	3.93E-01	1.3E-02	0.0E+00	9.1E-08	0.0E+00	5.3E-01	0.0E+00	2.8E-07	0.0E+00
Surf. (<5 ft)	IA-6	Th-228	1.90E-01	1.1E-02	0.0E+00	1.8E-08	0.0E+00	4.2E-01	0.0E+00	2.5E-07	0.0E+00
Surf. (<5 ft)	IA-6	Th-230	4.62E+02	9.9E-02	8.4E-01	3.4E-07	4.0E-06	1.7E+01	4.8E+01	1.1E-06	1.8E-05
Surf. (<5 ft)	IA-6	Th-232	2.34E+00	2.4E-03	1.8E-01	3.1E-07	9.5E-07	4.2E-01	7.5E+00	5.0E-09	4.1E-06
Surf. (<5 ft)	IA-6	U-234	3.09E+01	2.9E-03	0.0E+00	2.8E-09	0.0E+00	5.3E-01	0.0E+00	7.3E-08	0.0E+00
Surf. (<5 ft)	IA-6	U-235	4.27E+00	1.9E-02	0.0E+00	5.4E-08	0.0E+00	7.8E-01	0.0E+00	2.6E-07	0.0E+00
Surf. (<5 ft)	IA-6	U-238	3.08E+01	2.6E-02	0.0E+00	9.7E-08	0.0E+00	1.4E+00	0.0E+00	5.3E-07	0.0E+00
Surf. (<5 ft)	IA-6	TOTAL		1.1E+00	1.0E+00	4.3E-06	5.0E-06	8.0E+01	5.5E+01	2.0E-05	2.3E-05
Sub. (>0.5 ft)	IA-7	Ac-227	1.16E-01	1.9E-03	0.0E+00	3.9E-09	0.0E+00	1.5E-01	0.0E+00	2.7E-08	0.0E+00
Sub. (>0.5 ft)	IA-7	Pa-231	6.33E-01	1.8E-03	0.0E+00	4.2E-09	0.0E+00	3.3E-01	0.0E+00	8.2E-09	0.0E+00
Sub. (>0.5 ft)	IA-7	Pb-210	4.45E+00	3.7E-03	0.0E+00	3.7E-09	0.0E+00	1.3E+00	0.0E+00	1.8E-07	0.0E+00
Sub. (>0.5 ft)	IA-7	Ra-226	1.57E+00	9.8E-02	0.0E+00	4.9E-07	0.0E+00	3.9E+00	0.0E+00	2.3E-06	0.0E+00
Sub. (>0.5 ft)	IA-7	Th-228	1.30E-01	7.4E-03	0.0E+00	1.2E-08	0.0E+00	2.9E-01	0.0E+00	1.7E-07	0.0E+00
Sub. (>0.5 ft)	IA-7	Th-230	1.11E+02	2.4E-02	2.0E-01	8.2E-08	9.7E-07	4.1E+00	1.2E+01	2.5E-07	4.4E-06
Sub. (>0.5 ft)	IA-7	Th-232	6.40E-01	6.7E-04	5.0E-02	8.5E-08	2.6E-07	1.2E-01	2.0E+00	1.4E-09	1.1E-06
Sub. (>0.5 ft)	IA-7	U-234	8.46E+00	7.8E-04	0.0E+00	7.8E-10	0.0E+00	1.5E-01	0.0E+00	2.0E-08	0.0E+00
Sub. (>0.5 ft)	IA-7	U-235	7.52E-02	3.3E-04	0.0E+00	9.6E-10	0.0E+00	1.4E-02	0.0E+00	4.6E-09	0.0E+00
Sub. (>0.5 ft)	IA-7	U-238	8.41E+00	7.2E-03	0.0E+00	2.6E-08	0.0E+00	3.8E-01	0.0E+00	1.5E-07	0.0E+00
Sub. (>0.5 ft)	IA-7	TOTAL		1.5E-01	2.5E-01	7.1E-07	1.2E-06	1.1E+01	1.4E+01	3.1E-06	5.6E-06
Surf. (<5 ft)	IA-7	Ac-227	1.27E+02	2.0E+00	0.0E+00	4.3E-06	0.0E+00	1.7E+02	0.0E+00	2.9E-05	0.0E+00
Surf. (<5 ft)	IA-7	Pa-231	1.26E+02	3.5E-01	0.0E+00	8.3E-07	0.0E+00	6.6E+01	0.0E+00	1.6E-06	0.0E+00
Surf. (<5 ft)	IA-7	Pb-210	1.40E+02	1.2E-01	0.0E+00	1.2E-07	0.0E+00	4.1E+01	0.0E+00	5.6E-06	0.0E+00
Surf. (<5 ft)	IA-7	Ra-226	8.15E+01	5.1E+00	0.0E+00	2.6E-05	0.0E+00	2.0E+02	0.0E+00	1.2E-04	0.0E+00
Surf. (<5 ft)	IA-7	Ra-228	1.48E+00	5.0E-02	0.0E+00	3.4E-07	0.0E+00	2.0E+00	0.0E+00	1.1E-06	0.0E+00
Surf. (<5 ft)	IA-7	Th-228	1.53E+00	8.7E-02	0.0E+00	1.4E-07	0.0E+00	3.4E+00	0.0E+00	2.0E-06	0.0E+00
Surf. (<5 ft)	IA-7	Th-230	2.01E+03	4.3E-01	3.7E+00	1.5E-06	1.7E-05	7.3E+01	2.1E+02	4.6E-06	8.0E-05
Surf. (<5 ft)	IA-7	Th-232	1.50E+00	1.6E-03	1.2E-01	2.0E-07	6.1E-07	2.7E-01	4.8E+00	3.2E-09	2.6E-06
Surf. (<5 ft)	IA-7	U-234	2.76E+01	2.6E-03	0.0E+00	2.5E-09	0.0E+00	4.7E-01	0.0E+00	6.6E-08	0.0E+00
Surf. (<5 ft)	IA-7	U-235	1.02E+01	4.5E-02	0.0E+00	1.3E-07	0.0E+00	1.9E+00	0.0E+00	6.3E-07	0.0E+00
Surf. (<5 ft)	IA-7	U-238	2.75E+01	2.4E-02	0.0E+00	8.6E-08	0.0E+00	1.3E+00	0.0E+00	4.8E-07	0.0E+00
Surf. (<5 ft)	IA-7	TOTAL		8.3E+00	3.8E+00	3.3E-05	1.8E-05	5.6E+02	2.1E+02	1.6E-04	8.3E-05
Sub. (>0.5 ft)	IA-8	Ac-227	3.88E-01	6.2E-03	0.0E+00	1.3E-08	0.0E+00	5.1E-01	0.0E+00	9.0E-08	0.0E+00
Sub. (>0.5 ft)	IA-8	Pa-231	6.03E-01	1.7E-03	0.0E+00	4.0E-09	0.0E+00	3.1E-01	0.0E+00	7.8E-09	0.0E+00
Sub. (>0.5 ft)	IA-8	Pb-210	7.02E+00	5.9E-03	0.0E+00	5.8E-09	0.0E+00	2.1E+00	0.0E+00	2.8E-07	0.0E+00
Sub. (>0.5 ft)	IA-8	Ra-226	3.08E+00	1.9E-01	0.0E+00	9.7E-07	0.0E+00	7.6E+00	0.0E+00	4.5E-06	0.0E+00
Sub. (>0.5 ft)	IA-8	Th-228	2.00E-01	1.1E-02	0.0E+00	1.9E-08	0.0E+00	4.4E-01	0.0E+00	2.7E-07	0.0E+00
Sub. (>0.5 ft)	IA-8	Th-230	1.73E+02	3.7E-02	3.2E-01	1.3E-07	1.5E-06	6.3E+00	1.8E+01	3.9E-07	6.9E-06
Sub. (>0.5 ft)	IA-8	Th-232	1.26E+00	1.3E-03	9.8E-02	1.7E-07	5.1E-07	2.3E-01	4.0E+00	2.7E-09	2.2E-06
Sub. (>0.5 ft)	IA-8	U-234	1.25E+01	1.2E-03	0.0E+00	1.1E-09	0.0E+00	2.1E-01	0.0E+00	3.0E-08	0.0E+00
Sub. (>0.5 ft)	IA-8	U-235	1.46E-01	6.5E-04	0.0E+00	1.9E-09	0.0E+00	2.7E-02	0.0E+00	9.0E-09	0.0E+00
Sub. (>0.5 ft)	IA-8	U-238	1.24E+01	1.1E-02	0.0E+00	3.9E-08	0.0E+00	5.7E-01	0.0E+00	2.1E-07	0.0E+00
Sub. (>0.5 ft)	IA-8	TOTAL		2.7E-01	4.1E-01	1.3E-06	2.0E-06	1.8E+01	2.2E+01	5.8E-06	9.1E-06
Surf. (<0.5 ft)	IA-8	Ac-227	8.21E+01	1.3E+00	0.0E+00	2.8E-06	0.0E+00	1.1E+02	0.0E+00	1.9E-05	0.0E+00
Surf. (<0.5 ft)	IA-8	Pa-231	8.63E+01	2.4E-01	0.0E+00	5.7E-07	0.0E+00	4.5E+01	0.0E+00	1.1E-06	0.0E+00
Surf. (<0.5 ft)	IA-8	Pb-210	5.90E+01	4.9E-02	0.0E+00	4.9E-08	0.0E+00	1.7E+01	0.0E+00	2.4E-06	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 58 of 60)

			Exposure Point	RECREATIONAL/TRESPASSER				CONSTRUCTION			
Data Group	**Property**	**Isotope**	**Conc. (pCi/g)**	**Dose Year=0.0**	**Dose Year=1000**	**Risk Year=0.0**	**Risk Year=1000**	**Dose Year=0.0**	**Dose Year=1000**	**Risk Year=0.0**	**Risk Year=1000**
Surf. (<0.5 ft)	IA-8	Ra-226	3.37E+01	2.1E+00	0.0E+00	1.1E-05	0.0E+00	8.3E+01	0.0E+00	4.9E-05	0.0E+00
Surf. (<0.5 ft)	IA-8	Ra-228	6.63E-01	2.2E-02	0.0E+00	1.5E-07	0.0E+00	8.9E-01	0.0E+00	4.8E-07	0.0E+00
Surf. (<0.5 ft)	IA-8	Th-228	6.40E-01	3.6E-02	0.0E+00	6.0E-08	0.0E+00	1.4E+00	0.0E+00	8.5E-07	0.0E+00
Surf. (<0.5 ft)	IA-8	Th-230	1.75E+03	3.7E-01	3.2E+00	1.3E-06	1.5E-05	6.4E+01	1.8E+02	4.0E-06	7.0E-05
Surf. (<0.5 ft)	IA-8	Th-232	9.20E-01	9.6E-04	7.2E-02	1.2E-07	3.7E-07	1.7E-01	2.9E+00	2.0E-09	1.6E-06
Surf. (<0.5 ft)	IA-8	U-234	2.48E+01	2.3E-03	0.0E+00	2.3E-09	0.0E+00	4.3E-01	0.0E+00	5.9E-08	0.0E+00
Surf. (<0.5 ft)	IA-8	U-235	2.01E+01	8.9E-02	0.0E+00	2.6E-07	0.0E+00	3.7E+00	0.0E+00	1.2E-06	0.0E+00
Surf. (<0.5 ft)	IA-8	U-238	2.47E+01	2.1E-02	0.0E+00	7.7E-08	0.0E+00	1.1E+00	0.0E+00	4.3E-07	0.0E+00
Surf. (<0.5 ft)	IA-8	TOTAL		4.3E+00	3.3E+00	1.6E-05	1.6E-05	3.3E+02	1.8E+02	7.8E-05	7.1E-05
Sub. (>0.5 ft)	IA-9	Ac-227	5.09E+00	8.2E-02	0.0E+00	1.7E-07	0.0E+00	6.8E+00	0.0E+00	1.2E-06	0.0E+00
Sub. (>0.5 ft)	IA-9	Pa-231	5.86E+00	1.6E-02	0.0E+00	3.8E-08	0.0E+00	3.1E+00	0.0E+00	7.6E-08	0.0E+00
Sub. (>0.5 ft)	IA-9	Pb-210	5.58E+00	4.7E-03	0.0E+00	4.6E-09	0.0E+00	1.6E+00	0.0E+00	2.2E-07	0.0E+00
Sub. (>0.5 ft)	IA-9	Ra-226	2.23E+00	1.4E-01	0.0E+00	7.0E-07	0.0E+00	5.5E+00	0.0E+00	3.2E-06	0.0E+00
Sub. (>0.5 ft)	IA-9	Ra-228	2.30E-02	7.8E-04	0.0E+00	5.3E-09	0.0E+00	3.1E-02	0.0E+00	1.7E-08	0.0E+00
Sub. (>0.5 ft)	IA-9	Th-228	3.80E-01	2.2E-02	0.0E+00	3.6E-08	0.0E+00	8.4E-01	0.0E+00	5.1E-07	0.0E+00
Sub. (>0.5 ft)	IA-9	Th-230	1.03E+02	2.2E-02	1.9E-01	7.6E-08	9.0E-07	3.8E+00	1.1E+01	2.4E-07	4.1E-06
Sub. (>0.5 ft)	IA-9	Th-232	5.90E-01	6.1E-04	4.6E-02	7.9E-08	2.4E-07	1.1E-01	1.9E+00	1.3E-09	1.0E-06
Sub. (>0.5 ft)	IA-9	U-234	5.51E+00	5.1E-04	0.0E+00	5.1E-10	0.0E+00	9.5E-02	0.0E+00	1.3E-08	0.0E+00
Sub. (>0.5 ft)	IA-9	U-235	8.19E-01	3.6E-03	0.0E+00	1.0E-08	0.0E+00	1.5E-01	0.0E+00	5.1E-08	0.0E+00
Sub. (>0.5 ft)	IA-9	U-238	5.46E+00	4.7E-03	0.0E+00	1.7E-08	0.0E+00	2.5E-01	0.0E+00	9.4E-08	0.0E+00
Sub. (>0.5 ft)	IA-9	TOTAL		3.0E-01	2.3E-01	1.1E-06	1.1E-06	2.2E+01	1.3E+01	5.6E-06	5.2E-06
Surf. (<0.5 ft)	IA-9	Ac-227	2.63E+00	4.2E-02	0.0E+00	8.9E-08	0.0E+00	3.5E+00	0.0E+00	6.1E-07	0.0E+00
Surf. (<0.5 ft)	IA-9	Pa-231	3.50E+00	9.8E-03	0.0E+00	2.3E-08	0.0E+00	1.8E+00	0.0E+00	4.5E-08	0.0E+00
Surf. (<0.5 ft)	IA-9	Pb-210	2.87E+00	2.4E-03	0.0E+00	2.4E-09	0.0E+00	8.4E-01	0.0E+00	1.2E-07	0.0E+00
Surf. (<0.5 ft)	IA-9	Ra-226	6.40E-01	4.0E-02	0.0E+00	2.0E-07	0.0E+00	1.6E+00	0.0E+00	9.3E-07	0.0E+00
Surf. (<0.5 ft)	IA-9	Th-228	1.50E-01	8.5E-03	0.0E+00	1.4E-08	0.0E+00	3.3E-01	0.0E+00	2.0E-07	0.0E+00
Surf. (<0.5 ft)	IA-9	Th-230	3.26E+01	7.0E-03	5.9E-02	2.4E-08	2.8E-07	1.2E+00	3.4E+00	7.4E-08	1.3E-06
Surf. (<0.5 ft)	IA-9	Th-232	5.40E-01	5.6E-04	4.2E-02	7.2E-08	2.2E-07	9.8E-02	1.7E+00	1.2E-09	9.4E-07
Surf. (<0.5 ft)	IA-9	U-234	4.88E+00	4.5E-04	0.0E+00	4.5E-10	0.0E+00	8.4E-02	0.0E+00	1.2E-08	0.0E+00
Surf. (<0.5 ft)	IA-9	U-235	4.87E-01	2.2E-03	0.0E+00	6.2E-09	0.0E+00	8.9E-02	0.0E+00	3.0E-08	0.0E+00
Surf. (<0.5 ft)	IA-9	U-238	4.83E+00	4.1E-03	0.0E+00	1.5E-08	0.0E+00	2.2E-01	0.0E+00	8.3E-08	0.0E+00
Surf. (<0.5 ft)	IA-9	TOTAL		1.2E-01	1.0E-01	4.5E-07	5.0E-07	9.7E+00	5.1E+00	2.1E-06	2.2E-06
Sub. (>0.5 ft)	Norfork Southern	Pb-210	2.35E-01	2.0E-04	0.0E+00	2.0E-10	0.0E+00	6.9E-02	0.0E+00	9.4E-09	0.0E+00
Sub. (>0.5 ft)	Norfork Southern	Ra-226	2.01E+00	1.3E-01	0.0E+00	6.3E-07	0.0E+00	4.9E+00	0.0E+00	2.9E-06	0.0E+00
Sub. (>0.5 ft)	Norfork Southern	Th-230	1.51E+01	3.2E-03	2.8E-02	1.1E-08	1.3E-07	5.5E-01	1.6E+00	3.4E-08	6.0E-07
Sub. (>0.5 ft)	Norfork Southern	Th-232	8.50E-01	8.9E-04	6.6E-02	1.1E-07	3.4E-07	1.5E-01	2.7E+00	1.8E-09	1.5E-06
Sub. (>0.5 ft)	Norfork Southern	U-238	1.01E+01	8.6E-03	0.0E+00	3.2E-08	0.0E+00	4.6E-01	0.0E+00	1.7E-07	0.0E+00
Sub. (>0.5 ft)	Norfork Southern	TOTAL		1.4E-01	9.4E-02	7.9E-07	4.8E-07	6.2E+00	4.3E+00	3.1E-06	2.1E-06
Surf. (<0.5 ft)	Norfork Southern	Ac-227	4.20E-03	6.8E-05	0.0E+00	1.4E-10	0.0E+00	5.6E-03	0.0E+00	9.7E-10	0.0E+00
Surf. (<0.5 ft)	Norfork Southern	Pa-231	4.48E-02	1.3E-04	0.0E+00	2.9E-10	0.0E+00	2.3E-02	0.0E+00	5.8E-10	0.0E+00
Surf. (<0.5 ft)	Norfork Southern	Pb-210	4.28E-01	3.6E-04	0.0E+00	3.6E-10	0.0E+00	1.3E-01	0.0E+00	1.7E-08	0.0E+00
Surf. (<0.5 ft)	Norfork Southern	Ra-226	1.98E+00	1.2E-01	0.0E+00	6.2E-07	0.0E+00	4.9E+00	0.0E+00	2.9E-06	0.0E+00
Surf. (<0.5 ft)	Norfork Southern	Th-230	2.89E+01	6.2E-03	5.3E-02	2.1E-08	2.5E-07	1.1E+00	3.0E+00	6.6E-08	1.2E-06
Surf. (<0.5 ft)	Norfork Southern	Th-232	7.50E-01	7.8E-04	5.8E-02	1.0E-07	3.0E-07	1.4E-01	2.4E+00	1.6E-09	1.3E-06
Surf. (<0.5 ft)	Norfork Southern	U-238	1.01E+01	8.6E-03	0.0E+00	3.2E-08	0.0E+00	4.6E-01	0.0E+00	1.7E-07	0.0E+00
Surf. (<0.5 ft)	Norfork Southern	TOTAL		1.4E-01	1.1E-01	7.8E-07	5.6E-07	6.7E+00	5.4E+00	3.1E-06	2.5E-06
All Depths	Norfork Southern	Pb-210	2.44E-01	2.0E-04	0.0E+00	2.0E-10	0.0E+00	7.1E-02	0.0E+00	9.8E-09	0.0E+00

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	CONSTRUCTION Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
All Depths	Norfork Southern	Ra-226	1.83E+00	1.1E-01	0.0E+00	5.7E-07	0.0E+00	4.5E+00	0.0E+00	2.7E-06	0.0E+00
All Depths	Norfork Southern	Th-230	1.57E+01	3.4E-03	2.9E-02	1.2E-08	1.4E-07	5.7E-01	1.6E+00	3.6E-08	6.3E-07
All Depths	Norfork Southern	Th-232	7.60E-01	7.9E-04	5.9E-02	1.0E-07	3.1E-07	1.4E-01	2.4E+00	1.6E-09	1.3E-06
All Depths	Norfork Southern	U-238	9.72E+00	8.3E-03	0.0E+00	3.0E-08	0.0E+00	4.4E-01	0.0E+00	1.7E-07	0.0E+00
All Depths	Norfork Southern	TOTAL		1.3E-01	8.8E-02	7.2E-07	4.4E-07	5.7E+00	4.1E+00	2.9E-06	2.0E-06
Sub. (>0.5 ft)	ROAD ROW	Pb-210	1.88E-01	1.6E-04	0.0E+00	1.6E-10	0.0E+00	5.5E-02	0.0E+00	7.5E-09	0.0E+00
Sub. (>0.5 ft)	ROAD ROW	Ra-226	1.02E+00	6.4E-02	0.0E+00	3.2E-07	0.0E+00	2.5E+00	0.0E+00	1.5E-06	0.0E+00
Sub. (>0.5 ft)	ROAD ROW	Th-230	1.17E+01	2.5E-03	2.1E-02	8.6E-09	1.0E-07	4.3E-01	1.2E+00	2.7E-08	4.7E-07
Sub. (>0.5 ft)	ROAD ROW	Th-232	1.17E+00	1.2E-03	9.1E-02	1.6E-07	4.7E-07	2.1E-01	3.7E+00	2.5E-09	2.0E-06
Sub. (>0.5 ft)	ROAD ROW	U-238	1.04E+01	8.9E-03	0.0E+00	3.3E-08	0.0E+00	4.7E-01	0.0E+00	1.8E-07	0.0E+00
Sub. (>0.5 ft)	ROAD ROW	TOTAL		7.7E-02	1.1E-01	5.2E-07	5.8E-07	3.7E+00	5.0E+00	1.7E-06	2.5E-06
Surf. (<0.5 ft)	ROAD ROW	Ac-227	8.10E-02	1.3E-03	0.0E+00	2.7E-09	0.0E+00	1.1E-01	0.0E+00	1.9E-08	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	Pa-231	5.42E-01	1.5E-03	0.0E+00	3.6E-09	0.0E+00	2.8E-01	0.0E+00	7.0E-09	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	Pb-210	3.72E+00	3.1E-03	0.0E+00	3.1E-09	0.0E+00	1.1E+00	0.0E+00	1.5E-07	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	Ra-226	5.04E+00	3.2E-01	0.0E+00	1.6E-06	0.0E+00	1.2E+01	0.0E+00	7.3E-06	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	Ra-228	4.30E-02	1.4E-03	0.0E+00	1.0E-08	0.0E+00	5.8E-02	0.0E+00	3.1E-08	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	Th-228	3.30E-01	1.9E-02	0.0E+00	3.1E-08	0.0E+00	7.3E-01	0.0E+00	4.4E-07	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	Th-230	2.64E+02	5.7E-02	4.8E-01	1.9E-07	2.3E-06	9.6E+00	2.7E+01	6.0E-07	1.1E-05
Surf. (<0.5 ft)	ROAD ROW	Th-232	1.03E+00	1.1E-03	8.0E-02	1.4E-07	4.2E-07	1.9E-01	3.3E+00	2.2E-09	1.8E-06
Surf. (<0.5 ft)	ROAD ROW	U-234	2.06E+00	1.9E-04	0.0E+00	1.9E-10	0.0E+00	3.5E-02	0.0E+00	4.9E-09	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	U-235	1.78E-01	7.9E-04	0.0E+00	2.3E-09	0.0E+00	3.2E-02	0.0E+00	1.1E-08	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	U-238	1.06E+01	9.1E-03	0.0E+00	3.3E-08	0.0E+00	4.8E-01	0.0E+00	1.8E-07	0.0E+00
Surf. (<0.5 ft)	ROAD ROW	TOTAL		4.1E-01	5.6E-01	2.0E-06	2.7E-06	2.5E+01	3.1E+01	8.8E-06	1.2E-05
All Depths	ROAD ROW	Ac-227	8.10E-02	1.3E-03	0.0E+00	2.7E-09	0.0E+00	1.1E-01	0.0E+00	1.9E-08	0.0E+00
All Depths	ROAD ROW	Pa-231	5.42E-01	1.5E-03	0.0E+00	3.6E-09	0.0E+00	2.8E-01	0.0E+00	7.0E-09	0.0E+00
All Depths	ROAD ROW	Pb-210	6.99E-01	5.8E-04	0.0E+00	5.8E-10	0.0E+00	2.0E-01	0.0E+00	2.8E-08	0.0E+00
All Depths	ROAD ROW	Ra-226	1.84E+00	1.2E-01	0.0E+00	5.8E-07	0.0E+00	4.5E+00	0.0E+00	2.7E-06	0.0E+00
All Depths	ROAD ROW	Ra-228	4.30E-02	1.4E-03	0.0E+00	1.0E-08	0.0E+00	5.8E-02	0.0E+00	3.1E-08	0.0E+00
All Depths	ROAD ROW	Th-228	3.30E-01	1.9E-02	0.0E+00	3.1E-08	0.0E+00	7.3E-01	0.0E+00	4.4E-07	0.0E+00
All Depths	ROAD ROW	Th-230	4.82E+01	1.0E-02	8.8E-02	3.5E-08	4.2E-07	1.8E+00	5.0E+00	1.1E-07	1.9E-06
All Depths	ROAD ROW	Th-232	1.11E+00	1.2E-03	8.6E-02	1.5E-07	4.5E-07	2.0E-01	3.6E+00	2.4E-09	1.9E-06
All Depths	ROAD ROW	U-235	1.78E-01	7.9E-04	0.0E+00	2.3E-09	0.0E+00	3.2E-02	0.0E+00	1.1E-08	0.0E+00
All Depths	ROAD ROW	U-238	1.03E+01	8.8E-03	0.0E+00	3.2E-08	0.0E+00	4.7E-01	0.0E+00	1.8E-07	0.0E+00
All Depths	ROAD ROW	TOTAL		1.6E-01	1.7E-01	8.4E-07	8.7E-07	8.4E+00	8.6E+00	3.5E-06	3.9E-06
Sub. (>0.5 ft)	SLAPS	Ac-227	4.18E+00	6.7E-02	0.0E+00	1.4E-07	0.0E+00	5.5E+00	0.0E+00	9.7E-07	0.0E+00
Sub. (>0.5 ft)	SLAPS	Pa-231	4.57E+00	1.3E-02	0.0E+00	3.0E-08	0.0E+00	2.4E+00	0.0E+00	5.9E-08	0.0E+00
Sub. (>0.5 ft)	SLAPS	Pb-210	7.57E+01	6.3E-02	0.0E+00	6.3E-08	0.0E+00	2.2E+01	0.0E+00	3.0E-06	0.0E+00
Sub. (>0.5 ft)	SLAPS	Ra-226	4.35E+01	2.7E+00	0.0E+00	1.4E-05	0.0E+00	1.1E+02	0.0E+00	6.3E-05	0.0E+00
Sub. (>0.5 ft)	SLAPS	Ra-228	8.00E-03	2.7E-04	0.0E+00	1.9E-09	0.0E+00	1.1E-02	0.0E+00	5.8E-09	0.0E+00
Sub. (>0.5 ft)	SLAPS	Th-228	1.20E-01	6.8E-03	0.0E+00	1.1E-08	0.0E+00	2.7E-01	0.0E+00	1.6E-07	0.0E+00
Sub. (>0.5 ft)	SLAPS	Th-230	2.19E+02	4.7E-02	4.0E-01	1.6E-07	1.9E-06	8.0E+00	2.3E+01	5.0E-07	8.8E-06
Sub. (>0.5 ft)	SLAPS	Th-232	1.39E+00	1.4E-03	1.1E-01	1.9E-07	5.6E-07	2.5E-01	4.5E+00	3.0E-09	2.4E-06
Sub. (>0.5 ft)	SLAPS	U-234	4.12E+01	3.8E-03	0.0E+00	3.8E-09	0.0E+00	7.1E-01	0.0E+00	9.8E-08	0.0E+00
Sub. (>0.5 ft)	SLAPS	U-235	1.41E+00	6.2E-03	0.0E+00	1.8E-08	0.0E+00	2.6E-01	0.0E+00	8.7E-08	0.0E+00
Sub. (>0.5 ft)	SLAPS	U-238	4.11E+01	3.5E-02	0.0E+00	1.3E-07	0.0E+00	1.9E+00	0.0E+00	7.1E-07	0.0E+00
Sub. (>0.5 ft)	SLAPS	TOTAL		3.0E+00	5.1E-01	1.4E-05	2.5E-06	1.5E+02	2.7E+01	6.9E-05	1.1E-05
Surf. (<5 ft)	SLAPS	Ac-227	3.24E+01	5.2E-01	0.0E+00	1.1E-06	0.0E+00	4.3E+01	0.0E+00	7.5E-06	0.0E+00

Attachment 12. Radiological Doses and Risks for each Property (page 60 of 60)

Data Group	Property	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	CONSTRUCTION Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
Surf. (<5 ft)	SLAPS	Pa-231	3.39E+01	9.6E-02	0.0E+00	2.2E-07	0.0E+00	1.8E+01	0.0E+00	4.4E-07	0.0E+00
Surf. (<5 ft)	SLAPS	Pb-210	1.00E+02	8.3E-02	0.0E+00	8.3E-08	0.0E+00	2.9E+01	0.0E+00	4.0E-06	0.0E+00
Surf. (<5 ft)	SLAPS	Ra-226	5.78E+01	3.6E+00	0.0E+00	1.8E-05	0.0E+00	1.4E+02	0.0E+00	8.4E-05	0.0E+00
Surf. (<5 ft)	SLAPS	Ra-228	3.73E-01	1.3E-02	0.0E+00	8.6E-08	0.0E+00	5.0E-01	0.0E+00	2.7E-07	0.0E+00
Surf. (<5 ft)	SLAPS	Th-228	4.10E-01	2.3E-02	0.0E+00	3.9E-08	0.0E+00	9.1E-01	0.0E+00	5.5E-07	0.0E+00
Surf. (<5 ft)	SLAPS	Th-230	8.21E+02	1.8E-01	1.5E+00	6.0E-07	7.2E-06	3.0E+01	8.5E+01	1.9E-06	3.3E-05
Surf. (<5 ft)	SLAPS	Th-232	1.87E+00	1.9E-03	1.5E-01	2.5E-07	7.6E-07	3.4E-01	6.0E+00	4.0E-09	3.3E-06
Surf. (<5 ft)	SLAPS	U-234	4.85E+01	4.5E-03	0.0E+00	4.4E-09	0.0E+00	8.3E-01	0.0E+00	1.2E-07	0.0E+00
Surf. (<5 ft)	SLAPS	U-235	4.16E+00	1.8E-02	0.0E+00	5.3E-08	0.0E+00	7.6E-01	0.0E+00	2.6E-07	0.0E+00
Surf. (<5 ft)	SLAPS	U-238	4.84E+01	4.1E-02	0.0E+00	1.5E-07	0.0E+00	2.2E+00	0.0E+00	8.4E-07	0.0E+00
Surf. (<5 ft)	SLAPS	TOTAL		4.6E+00	1.6E+00	2.1E-05	7.9E-06	2.7E+02	9.1E+01	1.0E-04	3.6E-05
All Depths	Stone Container	Ac-227	2.78E+00	4.5E-02	0.0E+00	9.4E-08	0.0E+00	3.7E+00	0.0E+00	6.5E-07	0.0E+00
All Depths	Stone Container	Pa-231	3.34E+00	9.4E-03	0.0E+00	2.2E-08	0.0E+00	1.7E+00	0.0E+00	4.3E-08	0.0E+00
All Depths	Stone Container	Pb-210	6.53E+00	5.4E-03	0.0E+00	5.4E-09	0.0E+00	1.9E+00	0.0E+00	2.6E-07	0.0E+00
All Depths	Stone Container	Ra-226	1.67E+00	1.0E-01	0.0E+00	5.2E-07	0.0E+00	4.1E+00	0.0E+00	2.4E-06	0.0E+00
All Depths	Stone Container	Ra-228	8.30E-02	2.8E-03	0.0E+00	1.9E-08	0.0E+00	1.1E-01	0.0E+00	6.0E-08	0.0E+00
All Depths	Stone Container	Th-230	1.17E+02	2.5E-02	2.1E-01	8.6E-08	1.0E-06	4.3E+00	1.2E+01	2.7E-07	4.7E-06
All Depths	Stone Container	Th-232	8.40E-01	8.8E-04	6.5E-02	1.1E-07	3.4E-07	1.5E-01	2.7E+00	1.8E-09	1.5E-06
All Depths	Stone Container	U-234	9.17E+00	8.5E-04	0.0E+00	8.4E-10	0.0E+00	1.6E-01	0.0E+00	2.2E-08	0.0E+00
All Depths	Stone Container	U-235	4.14E-01	1.8E-03	0.0E+00	5.3E-09	0.0E+00	7.5E-02	0.0E+00	2.6E-08	0.0E+00
All Depths	Stone Container	U-238	9.12E+00	7.8E-03	0.0E+00	2.9E-08	0.0E+00	4.2E-01	0.0E+00	1.6E-07	0.0E+00
All Depths	Stone Container	TOTAL		2.0E-01	2.8E-01	9.0E-07	1.4E-06	1.7E+01	1.5E+01	3.9E-06	6.1E-06
Sub. (>0.5 ft)	Wabash/VP-2(C)	Pb-210	9.24E-02	7.7E-05	0.0E+00	7.7E-11	0.0E+00	2.7E-02	0.0E+00	3.7E-09	0.0E+00
Sub. (>0.5 ft)	Wabash/VP-2(C)	Ra-226	1.80E-01	1.1E-02	0.0E+00	5.6E-08	0.0E+00	4.4E-01	0.0E+00	2.6E-07	0.0E+00
Sub. (>0.5 ft)	Wabash/VP-2(C)	Th-230	4.94E+00	1.1E-03	9.0E-03	3.6E-09	4.3E-08	1.8E-01	5.1E-01	1.1E-08	2.0E-07
Sub. (>0.5 ft)	Wabash/VP-2(C)	Th-232	8.50E-01	8.9E-04	6.6E-02	1.1E-07	3.4E-07	1.5E-01	2.7E+00	1.8E-09	1.5E-06
Sub. (>0.5 ft)	Wabash/VP-2(C)	U-238	6.72E+00	5.7E-03	0.0E+00	2.1E-08	0.0E+00	3.1E-01	0.0E+00	1.2E-07	0.0E+00
Sub. (>0.5 ft)	Wabash/VP-2(C)	TOTAL		1.9E-02	7.5E-02	1.9E-07	3.9E-07	1.1E+00	3.2E+00	3.9E-07	1.7E-06
Surf. (<0.5 ft)	Wabash/VP-2(C)	Pb-210	9.35E-02	7.8E-05	0.0E+00	7.8E-11	0.0E+00	2.7E-02	0.0E+00	3.8E-09	0.0E+00
Surf. (<0.5 ft)	Wabash/VP-2(C)	Ra-226	1.13E+00	7.1E-02	0.0E+00	3.5E-07	0.0E+00	2.8E+00	0.0E+00	1.6E-06	0.0E+00
Surf. (<0.5 ft)	Wabash/VP-2(C)	Th-230	5.02E+00	1.1E-03	9.1E-03	3.7E-09	4.4E-08	1.8E-01	5.2E-01	1.1E-08	2.0E-07
Surf. (<0.5 ft)	Wabash/VP-2(C)	Th-232	1.37E+00	1.4E-03	1.1E-01	1.8E-07	5.5E-07	2.5E-01	4.4E+00	3.0E-09	2.4E-06
Surf. (<0.5 ft)	Wabash/VP-2(C)	U-238	1.12E+01	9.6E-03	0.0E+00	3.5E-08	0.0E+00	5.1E-01	0.0E+00	1.9E-07	0.0E+00
Surf. (<0.5 ft)	Wabash/VP-2(C)	TOTAL		8.3E-02	1.2E-01	5.8E-07	6.0E-07	3.7E+00	4.9E+00	1.8E-06	2.6E-06
All Depths	Wabash/VP-2(C)	Pb-210	8.65E-02	7.2E-05	0.0E+00	7.2E-11	0.0E+00	2.5E-02	0.0E+00	3.5E-09	0.0E+00
All Depths	Wabash/VP-2(C)	Ra-226	8.80E-01	5.5E-02	0.0E+00	2.8E-07	0.0E+00	2.2E+00	0.0E+00	1.3E-06	0.0E+00
All Depths	Wabash/VP-2(C)	Th-230	4.52E+00	9.7E-04	8.2E-03	3.3E-09	3.9E-08	1.6E-01	4.7E-01	1.0E-08	1.8E-07
All Depths	Wabash/VP-2(C)	Th-232	1.08E+00	1.1E-03	8.4E-02	1.4E-07	4.4E-07	2.0E-01	3.5E+00	2.3E-09	1.9E-06
All Depths	Wabash/VP-2(C)	U-238	9.72E+00	8.3E-03	0.0E+00	3.0E-08	0.0E+00	4.4E-01	0.0E+00	1.7E-07	0.0E+00
All Depths	Wabash/VP-2(C)	TOTAL		6.6E-02	9.2E-02	4.5E-07	4.8E-07	3.0E+00	3.9E+00	1.5E-06	2.1E-06

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 1 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Construction Worker													
Soil - All Depths	09K220205/VP-54	Manganese	10/10	4.69E+03	4.8E-01	4.0E-02	2.5E-02	5.4E-01					
Soil - All Depths	09K220205/VP-54	Inorganics Pathway Total			4.8E-01	4.0E-02	2.5E-02	5.4E-01					
Soil - All Depths	09K220205/VP-54	Pathway Total - Chemicals			4.8E-01	4.0E-02	2.5E-02	5.4E-01					
Soil - All Depths	Futura	Arsenic	1/1	3.20E+02	5.0E+00	4.1E-02		5.1E+00	3.2E-05	2.6E-07	5.3E-09	3.2E-05	H
Soil - All Depths	Futura	Barium	1/1	3.48E+03	2.3E-01	1.1E-02	1.9E-04	2.4E-01					H
Soil - All Depths	Futura	Cadmium	4/14	3.73E+00	1.8E-02	5.8E-02		7.6E-02			2.6E-11	2.6E-11	
Soil - All Depths	Futura	Molybdenum	5/14	2.01E+02	1.9E-01	1.7E-03		1.9E-01					H
Soil - All Depths	Futura	Nickel	1/1	1.73E+04	4.1E+00	5.0E-02		4.1E+00					H
Soil - All Depths	Futura	Selenium	1/14	2.15E+02	2.0E-01	1.5E-03		2.0E-01					H
Soil - All Depths	Futura	Vanadium	1/1	2.18E+03	1.5E+00	4.9E-01		1.9E+00					H
Soil - All Depths	Futura	Inorganics Pathway Total			1.1E+01	6.5E-01	1.9E-04	1.2E+01	3.2E-05	2.6E-07	5.3E-09	3.2E-05	H
Soil - All Depths	Futura	Pathway Total - Chemicals			1.1E+01	6.5E-01	1.9E-04	1.2E+01	3.2E-05	2.6E-07	5.3E-09	3.2E-05	H
Soil - All Depths	HISS	Antimony	1/13	5.70E+01	6.7E-01	1.1E-01		7.8E-01					H
Soil - All Depths	HISS	Arsenic	2/2	1.01E+03	1.6E+01	1.3E-01		1.6E+01	1.0E-04	8.2E-07	1.7E-08	1.0E-04	R,H
Soil - All Depths	HISS	Barium	2/2	4.36E+03	2.9E-01	1.4E-02	2.4E-04	3.1E-01					H
Soil - All Depths	HISS	Boron	1/1	1.01E+03	5.3E-02	1.9E-04	1.4E-05	5.3E-02					
Soil - All Depths	HISS	Cadmium	5/13	6.44E+00	3.0E-02	1.0E-01		1.3E-01			4.5E-11	4.5E-11	H
Soil - All Depths	HISS	Molybdenum	4/13	2.48E+02	2.3E-01	2.0E-03		2.3E-01					H
Soil - All Depths	HISS	Nickel	1/1	1.78E+03	4.2E-01	5.1E-03		4.2E-01					H
Soil - All Depths	HISS	Nitrate	1/1	1.03E+03	3.0E-03	2.0E-05		3.0E-03					
Soil - All Depths	HISS	Selenium	2/13	2.29E+02	2.2E-01	1.6E-03		2.2E-01					H
Soil - All Depths	HISS	Thallium	2/13	2.17E+02	1.3E+00	2.1E-02		1.3E+00					H
Soil - All Depths	HISS	Vanadium	1/1	7.12E+02	4.8E-01	1.6E-01		6.4E-01					H
Soil - All Depths	HISS	Inorganics Pathway Total			1.9E+01	5.4E-01	2.5E-04	2.0E+01	1.0E-04	8.2E-07	1.7E-08	1.0E-04	R,H
Soil - All Depths	HISS	Pathway Total - Chemicals			1.9E+01	5.4E-01	2.5E-04	2.0E+01	1.0E-04	8.2E-07	1.7E-08	1.0E-04	R,H
Surface Soil (<5 ft)	IA-1	PCB-1254	1/2	2.60E-01	2.4E-02	5.4E-03		3.0E-02	3.5E-08	7.7E-09	5.7E-13	4.3E-08	
Surface Soil (<5 ft)	IA-1	Organics Pathway Total			2.4E-02	5.4E-03		3.0E-02	3.5E-08	7.7E-09	5.7E-13	4.3E-08	
Surface Soil (<5 ft)	IA-1	Pathway Total - Chemicals			2.4E-02	5.4E-03		3.0E-02	3.5E-08	7.7E-09	5.7E-13	4.3E-08	
Surface Soil (<0.5 ft)	IA-10	Benz(a)anthracene	4/4	6.96E-01					3.4E-08	3.7E-09	2.4E-13	3.8E-08	
Surface Soil (<0.5 ft)	IA-10	Benzo(a)pyrene	4/4	7.34E-01					3.6E-07	3.9E-08	2.5E-12	4.0E-07	
Surface Soil (<0.5 ft)	IA-10	Benzo(b)fluoranthene	4/4	6.47E-01					3.2E-08	3.4E-09	2.2E-13	3.5E-08	
Surface Soil (<0.5 ft)	IA-10	Indeno(1,2,3-cd)pyrene	4/4	7.77E-01					3.8E-08	4.1E-09	2.7E-13	4.2E-08	
Surface Soil (<0.5 ft)	IA-10	Organics Pathway Total							4.6E-07	5.0E-08	3.2E-12	5.1E-07	
Surface Soil (<0.5 ft)	IA-10	Pathway Total - Chemicals							4.6E-07	5.0E-08	3.2E-12	5.1E-07	
Surface Soil (<0.5 ft)	IA-13	Arsenic	6/6	1.99E+01	3.1E-01	2.5E-03		3.1E-01	2.0E-06	1.6E-08	3.3E-10	2.0E-06	
Surface Soil (<0.5 ft)	IA-13	Thallium	1/6	1.05E+00	6.2E-03	1.0E-04		6.3E-03					
Surface Soil (<0.5 ft)	IA-13	Uranium	1/6	9.31E+00	1.5E-02	5.7E-05		1.5E-02					
Surface Soil (<0.5 ft)	IA-13	Inorganics Pathway Total			3.3E-01	2.7E-03		3.3E-01	2.0E-06	1.6E-08	3.3E-10	2.0E-06	
Surface Soil (<0.5 ft)	IA-13	Pathway Total - Chemicals			3.3E-01	2.7E-03		3.3E-01	2.0E-06	1.6E-08	3.3E-10	2.0E-06	
Surface Soil (<5 ft)	IA-2	Arsenic	2/2	2.37E+02	3.7E+00	3.0E-02		3.7E+00	2.4E-05	1.9E-07	3.9E-09	2.4E-05	H
Surface Soil (<5 ft)	IA-2	Cadmium	4/12	2.31E+00	1.1E-02	3.6E-02		4.7E-02			1.6E-11	1.6E-11	
Surface Soil (<5 ft)	IA-2	Molybdenum	3/12	5.76E+01	5.4E-02	4.7E-04		5.5E-02					

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 2 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Surface Soil (<5 ft)	IA-2	Vanadium	2/2	8.62E+02	5.8E-01	1.9E-01		7.7E-01					H
Surface Soil (<5 ft)	IA-2	Inorganics Pathway Total			4.4E+00	2.6E-01		4.6E+00	2.4E-05	1.9E-07	4.0E-09	2.4E-05	H
Surface Soil (<5 ft)	IA-2	Pathway Total - Chemicals			4.4E+00	2.6E-01		4.6E+00	2.4E-05	1.9E-07	4.0E-09	2.4E-05	H
Surface Soil (<5 ft)	IA-3	Antimony	2/7	2.49E+01	2.9E-01	4.9E-02		3.4E-01					H
Surface Soil (<5 ft)	IA-3	Cadmium	2/7	2.14E+01	1.0E-01	3.3E-01		4.3E-01			1.5E-10	1.5E-10	H
Surface Soil (<5 ft)	IA-3	Chromium	4/4	2.72E+03	6.4E-01	1.1E-01	7.4E-03	7.5E-01			1.2E-07	1.2E-07	H
Surface Soil (<5 ft)	IA-3	Molybdenum	3/7	2.83E+01	2.7E-02	2.3E-04		2.7E-02					
Surface Soil (<5 ft)	IA-3	Thallium	2/7	1.40E+00	8.2E-03	1.4E-04		8.4E-03					
Surface Soil (<5 ft)	IA-3	Uranium	2/3	1.29E+02	2.0E-01	7.9E-04		2.0E-01					H
Surface Soil (<5 ft)	IA-3	Vanadium	3/3	5.72E+01	3.8E-02	1.3E-02		5.1E-02					
Surface Soil (<5 ft)	IA-3	Zinc	4/4	3.64E+03	5.7E-02	9.5E-04		5.8E-02					
Surface Soil (<5 ft)	IA-3	Inorganics Pathway Total			1.4E+00	5.0E-01	7.4E-03	1.9E+00			1.2E-07	1.2E-07	H
Surface Soil (<5 ft)	IA-3	1,2-Dichloroethene	1/3	3.00E-03	1.6E-06	6.5E-08		1.6E-06					
Surface Soil (<5 ft)	IA-3	Dimethylbenzene	1/3	1.00E-02	1.3E-07	4.8E-09		1.4E-07					
Surface Soil (<5 ft)	IA-3	MCPP	1/3	1.10E+01	5.2E-03	3.4E-04		5.5E-03					
Surface Soil (<5 ft)	IA-3	Organics Pathway Total			5.2E-03	3.4E-04		5.5E-03					
Surface Soil (<5 ft)	IA-3	Pathway Total - Chemicals			1.4E+00	5.0E-01	7.4E-03	1.9E+00			1.2E-07	1.2E-07	H
Surface Soil (<5 ft)	IA-4	Arsenic	3/3	5.08E+01	8.0E-01	6.4E-03		8.0E-01	5.1E-06	4.1E-08	8.4E-10	5.2E-06	H
Surface Soil (<5 ft)	IA-4	Barium	4/4	3.27E+03	2.2E-01	1.0E-02	1.8E-04	2.3E-01					H
Surface Soil (<5 ft)	IA-4	Cadmium	1/7	2.14E+00	1.0E-02	3.3E-02		4.3E-02			1.5E-11	1.5E-11	
Surface Soil (<5 ft)	IA-4	Molybdenum	3/7	3.86E+01	3.6E-02	3.2E-04		3.7E-02					
Surface Soil (<5 ft)	IA-4	Nickel	3/3	2.01E+03	4.7E-01	5.8E-03		4.8E-01					H
Surface Soil (<5 ft)	IA-4	Thallium	2/7	3.30E+00	1.9E-02	3.2E-04		2.0E-02					
Surface Soil (<5 ft)	IA-4	Uranium	1/2	7.36E+01	1.2E-01	4.5E-04		1.2E-01					H
Surface Soil (<5 ft)	IA-4	Inorganics Pathway Total			1.7E+00	5.7E-02	1.8E-04	1.7E+00	5.1E-06	4.1E-08	8.6E-10	5.2E-06	H
Surface Soil (<5 ft)	IA-4	Pathway Total - Chemicals			1.7E+00	5.7E-02	1.8E-04	1.7E+00	5.1E-06	4.1E-08	8.6E-10	5.2E-06	H
Surface Soil (<5 ft)	IA-5	Arsenic	7/7	1.60E+01	2.5E-01	2.0E-03		2.5E-01	1.6E-06	1.3E-08	2.7E-10	1.6E-06	
Surface Soil (<5 ft)	IA-5	Barium	8/8	1.77E+03	1.2E-01	5.6E-03	9.6E-05	1.2E-01					
Surface Soil (<5 ft)	IA-5	Cadmium	3/18	1.03E+00	4.8E-03	1.6E-02		2.1E-02			7.2E-12	7.2E-12	
Surface Soil (<5 ft)	IA-5	Chromium	7/7	2.59E+01	6.1E-03	1.0E-03	7.0E-05	7.2E-03			1.2E-09	1.2E-09	
Surface Soil (<5 ft)	IA-5	Thallium	4/18	2.00E+00	1.2E-02	2.0E-04		1.2E-02					
Surface Soil (<5 ft)	IA-5	Uranium	3/7	2.51E+01	3.9E-02	1.5E-04		3.9E-02					
Surface Soil (<5 ft)	IA-5	Vanadium	7/7	6.58E+01	4.4E-02	1.5E-02		5.9E-02					
Surface Soil (<5 ft)	IA-5	Inorganics Pathway Total			4.8E-01	4.0E-02	1.7E-04	5.2E-01	1.6E-06	1.3E-08	1.4E-09	1.6E-06	
Surface Soil (<5 ft)	IA-5	MCPP	1/5	2.20E+01	1.0E-02	6.9E-04		1.1E-02					
Surface Soil (<5 ft)	IA-5	Organics Pathway Total			1.0E-02	6.9E-04		1.1E-02					
Surface Soil (<5 ft)	IA-5	Pathway Total - Chemicals			4.9E-01	4.0E-02	1.7E-04	5.3E-01	1.6E-06	1.3E-08	1.4E-09	1.6E-06	
Surface Soil (<5 ft)	IA-7	Barium	4/4	1.36E+04	9.1E-01	4.3E-02	7.4E-04	9.6E-01					H
Surface Soil (<5 ft)	IA-7	Molybdenum	2/4	2.55E+02	2.4E-01	2.1E-03		2.4E-01					H
Surface Soil (<5 ft)	IA-7	Nickel	4/4	7.38E+03	1.7E+00	2.1E-02		1.8E+00					H
Surface Soil (<5 ft)	IA-7	Selenium	2/4	1.73E+02	1.6E-01	1.2E-03		1.6E-01					H
Surface Soil (<5 ft)	IA-7	Vanadium	3/3	6.30E+02	4.2E-01	1.4E-01		5.6E-01					H
Surface Soil (<5 ft)	IA-7	Inorganics Pathway Total			3.5E+00	2.1E-01	7.4E-04	3.7E+00					H
Surface Soil (<5 ft)	IA-7	Pathway Total - Chemicals			3.5E+00	2.1E-01	7.4E-04	3.7E+00					H
Surface Soil (<0.5 ft)	IA-8	Chromium	1/1	4.26E+01	1.0E-02	1.7E-03	1.2E-04	1.2E-02			1.9E-09	1.9E-09	

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 3 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Surface Soil (<0.5 ft)	IA-8	Inorganics Pathway Total			1.0E-02	1.7E-03	1.2E-04	1.2E-02			1.9E-09	1.9E-09	
Surface Soil (<0.5 ft)	IA-8	Benz(a)anthracene	1/1	1.40E+00					6.9E-08	7.4E-09	4.8E-13	7.6E-08	
Surface Soil (<0.5 ft)	IA-8	Benzo(a)pyrene	1/1	1.60E+00					7.8E-07	8.4E-08	5.5E-12	8.7E-07	
Surface Soil (<0.5 ft)	IA-8	Benzo(b)fluoranthene	1/1	2.10E+00					1.0E-07	1.1E-08	7.2E-13	1.1E-07	
Surface Soil (<0.5 ft)	IA-8	Dibenz(a,h)anthracene	1/1	2.80E-01					1.4E-07	1.5E-08	9.6E-13	1.5E-07	
Surface Soil (<0.5 ft)	IA-8	Indeno(1,2,3-cd)pyrene	1/1	8.80E-01					4.3E-08	4.6E-09	3.0E-13	4.8E-08	
Surface Soil (<0.5 ft)	IA-8	MCPA	1/1	2.50E+01	2.3E-01	1.6E-02		2.5E-01					
Surface Soil (<0.5 ft)	IA-8	Organics Pathway Total			2.3E-01	1.6E-02		2.5E-01	1.1E-06	1.2E-07	7.9E-12	1.3E-06	
Surface Soil (<0.5 ft)	IA-8	Pathway Total - Chemicals			2.4E-01	1.7E-02	1.2E-04	2.6E-01	1.1E-06	1.2E-07	1.9E-09	1.3E-06	
Surface Soil (<0.5 ft)	IA-9	Arsenic	8/8	2.14E+01	3.4E-01	2.7E-03		3.4E-01	2.2E-06	1.7E-08	3.6E-10	2.2E-06	
Surface Soil (<0.5 ft)	IA-9	Barium	8/8	5.32E+02	3.6E-02	1.7E-03	2.9E-05	3.7E-02					
Surface Soil (<0.5 ft)	IA-9	Nickel	8/8	1.08E+03	2.5E-01	3.1E-03		2.6E-01					
Surface Soil (<0.5 ft)	IA-9	Uranium	2/8	5.28E+01	8.3E-02	3.2E-04		8.3E-02					
Surface Soil (<0.5 ft)	IA-9	Vanadium	8/8	1.85E+02	1.2E-01	4.1E-02		1.7E-01					
Surface Soil (<0.5 ft)	IA-9	Inorganics Pathway Total			8.3E-01	4.9E-02	2.9E-05	8.8E-01	2.2E-06	1.7E-08	3.6E-10	2.2E-06	
Surface Soil (<0.5 ft)	IA-9	Benzo(a)pyrene	8/8	5.90E-01					2.9E-07	3.1E-08	2.0E-12	3.2E-07	
Surface Soil (<0.5 ft)	IA-9	Dimethylbenzene	2/8	7.06E-03	9.3E-08	3.4E-09		9.6E-08					
Surface Soil (<0.5 ft)	IA-9	Organics Pathway Total			9.3E-08	3.4E-09		9.6E-08	2.9E-07	3.1E-08	2.0E-12	3.2E-07	
Surface Soil (<0.5 ft)	IA-9	Pathway Total - Chemicals			8.3E-01	4.9E-02	2.9E-05	8.8E-01	2.4E-06	4.8E-08	3.6E-10	2.5E-06	
Soil - All Depths	ROAD ROW	Arsenic	1/1	2.32E+01	3.6E-01	2.9E-03		3.7E-01	2.3E-06	1.9E-08	3.9E-10	2.4E-06	H
Soil - All Depths	ROAD ROW	Manganese	1/1	6.32E+03	6.5E-01	5.4E-02	3.4E-02	7.3E-01					H
Soil - All Depths	ROAD ROW	Thallium	1/1	7.20E+00	4.2E-02	7.0E-04		4.3E-02					
Soil - All Depths	ROAD ROW	Vanadium	1/1	6.53E+01	4.4E-02	1.5E-02		5.8E-02					
Soil - All Depths	ROAD ROW	Inorganics Pathway Total			1.1E+00	7.2E-02	3.4E-02	1.2E+00	2.3E-06	1.9E-08	3.9E-10	2.4E-06	H
Soil - All Depths	ROAD ROW	MCPP	1/1	1.20E+02	5.6E-02	3.7E-03		6.0E-02					
Soil - All Depths	ROAD ROW	Organics Pathway Total			5.6E-02	3.7E-03		6.0E-02					
Soil - All Depths	ROAD ROW	Pathway Total - Chemicals			1.2E+00	7.6E-02	3.4E-02	1.3E+00	2.3E-06	1.9E-08	3.9E-10	2.4E-06	H
Surface Soil (<5 ft)	SLAPS	Arsenic	17/17	6.69E+01	1.0E+00	8.5E-03		1.1E+00	6.7E-06	5.5E-08	1.1E-09	6.8E-06	H
Surface Soil (<5 ft)	SLAPS	Barium	19/19	3.68E+03	2.5E-01	1.2E-02	2.0E-04	2.6E-01					H
Surface Soil (<5 ft)	SLAPS	Cadmium	12/52	3.45E+00	1.6E-02	5.4E-02		7.0E-02			2.4E-11	2.4E-11	
Surface Soil (<5 ft)	SLAPS	Chromium	15/15	6.14E+02	1.4E-01	2.4E-02	1.7E-03	1.7E-01			2.8E-08	2.8E-08	H
Surface Soil (<5 ft)	SLAPS	Molybdenum	19/52	3.58E+01	3.4E-02	2.9E-04		3.4E-02					
Surface Soil (<5 ft)	SLAPS	Nickel	17/17	1.74E+03	4.1E-01	5.0E-03		4.1E-01					H
Surface Soil (<5 ft)	SLAPS	Selenium	10/52	1.99E+01	1.9E-02	1.4E-04		1.9E-02					
Surface Soil (<5 ft)	SLAPS	Thallium	8/52	3.30E+00	1.9E-02	3.2E-04		2.0E-02					
Surface Soil (<5 ft)	SLAPS	Uranium	6/14	4.19E+01	6.6E-02	2.6E-04		6.6E-02					
Surface Soil (<5 ft)	SLAPS	Vanadium	17/17	2.88E+02	1.9E-01	6.4E-02		2.6E-01					H
Surface Soil (<5 ft)	SLAPS	Zinc	15/15	8.44E+02	1.3E-02	2.2E-04		1.3E-02					
Surface Soil (<5 ft)	SLAPS	Inorganics Pathway Total			2.2E+00	1.7E-01	1.9E-03	2.4E+00	6.7E-06	5.5E-08	2.9E-08	6.8E-06	H
Surface Soil (<5 ft)	SLAPS	1,2-Dichloroethene	1/11	3.00E-03	1.6E-06	6.5E-08		1.6E-06					
Surface Soil (<5 ft)	SLAPS	Dimethylbenzene	1/11	4.72E-03	6.2E-08	2.2E-09		6.4E-08					
Surface Soil (<5 ft)	SLAPS	MCPP	2/11	1.28E+01	6.0E-03	4.0E-04		6.4E-03					
Surface Soil (<5 ft)	SLAPS	PCB-1254	1/11	8.96E-02	8.4E-03	1.9E-03		1.0E-02	1.2E-08	2.7E-09	2.0E-13	1.5E-08	
Surface Soil (<5 ft)	SLAPS	Organics Pathway Total			1.4E-02	2.3E-03		1.7E-02	1.2E-08	2.7E-09	2.0E-13	1.5E-08	
Surface Soil (<5 ft)	SLAPS	Pathway Total - Chemicals			2.2E+00	1.7E-01	1.9E-03	2.4E+00	6.7E-06	5.7E-08	2.9E-08	6.8E-06	H

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 4 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Industrial Worker													
Soil - All Depths	09K220205/VP-54	Manganese	10/10	4.69E+03	5.0E-02	1.4E-02	1.1E-02	7.5E-02					
Soil - All Depths	09K220205/VP-54	Inorganics Pathway Total			5.0E-02	1.4E-02	1.1E-02	7.5E-02					
Soil - All Depths	09K220205/VP-54	Pathway Total - Chemicals			5.0E-02	1.4E-02	1.1E-02	7.5E-02					
Soil - All Depths	Futura	Arsenic	1/1	3.20E+02	5.2E-01	1.5E-02		5.4E-01	8.4E-05	2.3E-06	5.6E-08	8.6E-05	H
Soil - All Depths	Futura	Barium	1/1	3.48E+03	2.4E-02	4.0E-03	8.0E-04	2.9E-02					
Soil - All Depths	Futura	Cadmium	4/14	3.73E+00	1.8E-03	2.1E-02		2.3E-02			2.8E-10	2.8E-10	
Soil - All Depths	Futura	Molybdenum	5/14	2.01E+02	2.0E-02	5.9E-04		2.0E-02					
Soil - All Depths	Futura	Nickel	1/1	1.73E+04	4.2E-01	1.8E-02		4.4E-01					H
Soil - All Depths	Futura	Selenium	1/14	2.15E+02	2.1E-02	5.5E-04		2.2E-02					
Soil - All Depths	Futura	Vanadium	1/1	2.18E+03	1.5E-01	1.7E-01		3.3E-01					H
Soil - All Depths	Futura	Inorganics Pathway Total			1.2E+00	2.3E-01	8.0E-04	1.4E+00	8.4E-05	2.3E-06	5.7E-08	8.6E-05	H
Soil - All Depths	Futura	Pathway Total - Chemicals			1.2E+00	2.3E-01	8.0E-04	1.4E+00	8.4E-05	2.3E-06	5.7E-08	8.6E-05	H
Soil - All Depths	HISS	Antimony	1/13	5.70E+01	7.0E-02	4.0E-02		1.1E-01					H
Soil - All Depths	HISS	Arsenic	2/2	1.01E+03	1.6E+00	4.6E-02		1.7E+00	2.6E-04	7.4E-06	1.8E-07	2.7E-04	R,H
Soil - All Depths	HISS	Barium	2/2	4.36E+03	3.0E-02	5.0E-03	1.0E-03	3.6E-02					
Soil - All Depths	HISS	Boron	1/1	1.01E+03	5.5E-03	7.0E-05	5.8E-06	5.6E-03					
Soil - All Depths	HISS	Cadmium	5/13	6.44E+00	3.2E-03	3.6E-02		3.9E-02			4.8E-10	4.8E-10	
Soil - All Depths	HISS	Molybdenum	4/13	2.48E+02	2.4E-02	7.3E-04		2.5E-02					
Soil - All Depths	HISS	Nickel	1/1	1.78E+03	4.4E-02	1.8E-03		4.5E-02					
Soil - All Depths	HISS	Nitrate	1/1	1.03E+03	3.1E-04	7.2E-06		3.2E-04					
Soil - All Depths	HISS	Selenium	2/13	2.29E+02	2.2E-02	5.8E-04		2.3E-02					
Soil - All Depths	HISS	Thallium	2/13	2.17E+02	1.3E+00	7.6E-02		1.4E+00					H
Soil - All Depths	HISS	Vanadium	1/1	7.12E+02	5.0E-02	5.7E-02		1.1E-01					H
Soil - All Depths	HISS	Inorganics Pathway Total			3.2E+00	2.6E-01	1.0E-03	3.5E+00	2.6E-04	7.4E-06	1.8E-07	2.7E-04	R,H
Soil - All Depths	HISS	Pathway Total - Chemicals			3.2E+00	2.6E-01	1.0E-03	3.5E+00	2.6E-04	7.4E-06	1.8E-07	2.7E-04	R,H
Surface Soil (<5 ft)	IA-1	PCB-1254	1/2	2.60E-01	6.4E-03	4.8E-03		1.1E-02	9.1E-08	6.9E-08	6.1E-12	1.6E-07	
Surface Soil (<5 ft)	IA-1	Organics Pathway Total			6.4E-03	4.8E-03		1.1E-02	9.1E-08	6.9E-08	6.1E-12	1.6E-07	
Surface Soil (<5 ft)	IA-1	Pathway Total - Chemicals			6.4E-03	4.8E-03		1.1E-02	9.1E-08	6.9E-08	6.1E-12	1.6E-07	
Surface Soil (<0.5 ft)	IA-10	Benz(a)anthracene	4/4	6.96E-01					8.9E-08	3.3E-08	2.5E-12	1.2E-07	
Surface Soil (<0.5 ft)	IA-10	Benzo(a)pyrene	4/4	7.34E-01					9.4E-07	3.4E-07	2.7E-11	1.3E-06	
Surface Soil (<0.5 ft)	IA-10	Benzo(b)fluoranthene	4/4	6.47E-01					8.3E-08	3.0E-08	2.4E-12	1.1E-07	
Surface Soil (<0.5 ft)	IA-10	Indeno(1,2,3-cd)pyrene	4/4	7.77E-01					9.9E-08	3.6E-08	2.8E-12	1.4E-07	
Surface Soil (<0.5 ft)	IA-10	Organics Pathway Total							1.2E-06	4.4E-07	3.4E-11	1.7E-06	
Surface Soil (<0.5 ft)	IA-10	Pathway Total - Chemicals							1.2E-06	4.4E-07	3.4E-11	1.7E-06	
Surface Soil (<0.5 ft)	IA-13	Arsenic	6/6	1.99E+01	3.2E-02	9.0E-04		3.3E-02	5.2E-06	1.5E-07	3.5E-09	5.4E-06	
Surface Soil (<0.5 ft)	IA-13	Thallium	1/6	1.05E+00	6.4E-03	3.7E-04		6.8E-03					
Surface Soil (<0.5 ft)	IA-13	Uranium	1/6	9.31E+00	1.5E-03	2.0E-05		1.5E-03					
Surface Soil (<0.5 ft)	IA-13	Inorganics Pathway Total			4.0E-02	1.3E-03		4.2E-02	5.2E-06	1.5E-07	3.5E-09	5.4E-06	
Surface Soil (<0.5 ft)	IA-13	Pathway Total - Chemicals			4.0E-02	1.3E-03		4.2E-02	5.2E-06	1.5E-07	3.5E-09	5.4E-06	
Surface Soil (<5 ft)	IA-2	Arsenic	2/2	2.37E+02	3.9E-01	1.1E-02		4.0E-01	6.2E-05	1.7E-06	4.2E-08	6.4E-05	
Surface Soil (<5 ft)	IA-2	Cadmium	4/12	2.31E+00	1.1E-03	1.3E-02		1.4E-02			1.7E-10	1.7E-10	
Surface Soil (<5 ft)	IA-2	Molybdenum	3/12	5.76E+01	5.6E-03	1.7E-04		5.8E-03					

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 5 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Surface Soil (<5 ft)	IA-2	Vanadium	2/2	8.62E+02	6.0E-02	6.9E-02		1.3E-01					
Surface Soil (<5 ft)	IA-2	Inorganics Pathway Total			4.5E-01	9.2E-02		5.5E-01	6.2E-05	1.7E-06	4.2E-08	6.4E-05	
Surface Soil (<5 ft)	IA-2	Pathway Total - Chemicals			4.5E-01	9.2E-02		5.5E-01	6.2E-05	1.7E-06	4.2E-08	6.4E-05	
Surface Soil (<5 ft)	IA-3	Antimony	2/7	2.49E+01	3.0E-02	1.7E-02		4.8E-02					
Surface Soil (<5 ft)	IA-3	Cadmium	2/7	2.14E+01	1.0E-02	1.2E-01		1.3E-01			1.6E-09	1.6E-09	
Surface Soil (<5 ft)	IA-3	Chromium	4/4	2.72E+03	4.4E-01	2.5E-01	3.1E-03	7.0E-01			1.3E-06	1.3E-06	
Surface Soil (<5 ft)	IA-3	Molybdenum	3/7	2.83E+01	2.8E-03	8.3E-05		2.9E-03					
Surface Soil (<5 ft)	IA-3	Thallium	2/7	1.40E+00	8.6E-03	4.9E-04		9.0E-03					
Surface Soil (<5 ft)	IA-3	Uranium	2/3	1.29E+02	2.1E-02	2.8E-04		2.1E-02					
Surface Soil (<5 ft)	IA-3	Vanadium	3/3	5.72E+01	4.0E-03	4.6E-03		8.6E-03					
Surface Soil (<5 ft)	IA-3	Zinc	4/4	3.64E+03	5.9E-03	3.4E-04		6.3E-03					
Surface Soil (<5 ft)	IA-3	Inorganics Pathway Total			5.3E-01	4.0E-01	3.1E-03	9.3E-01			1.3E-06	1.3E-06	
Surface Soil (<5 ft)	IA-3	1,2-Dichloroethene	1/3	3.00E-03	1.6E-07	2.3E-08		1.9E-07					
Surface Soil (<5 ft)	IA-3	Dimethylbenzene	1/3	1.00E-02	2.4E-09	3.0E-10		2.7E-09					
Surface Soil (<5 ft)	IA-3	MCPP	1/3	1.10E+01	5.4E-03	1.2E-03		6.6E-03					
Surface Soil (<5 ft)	IA-3	Organics Pathway Total			5.4E-03	1.2E-03		6.6E-03					
Surface Soil (<5 ft)	IA-3	Pathway Total - Chemicals			5.3E-01	4.0E-01	3.1E-03	9.3E-01			1.3E-06	1.3E-06	
Surface Soil (<5 ft)	IA-4	Arsenic	3/3	5.08E+01	8.3E-02	2.3E-03		8.5E-02	1.3E-05	3.7E-07	9.0E-09	1.4E-05	
Surface Soil (<5 ft)	IA-4	Barium	4/4	3.27E+03	2.3E-02	3.7E-03	7.5E-04	2.7E-02					
Surface Soil (<5 ft)	IA-4	Cadmium	1/7	2.14E+00	1.0E-03	1.2E-02		1.3E-02			1.6E-10	1.6E-10	
Surface Soil (<5 ft)	IA-4	Molybdenum	3/7	3.86E+01	3.8E-03	1.1E-04		3.9E-03					
Surface Soil (<5 ft)	IA-4	Nickel	3/3	2.01E+03	4.9E-02	2.1E-03		5.1E-02					
Surface Soil (<5 ft)	IA-4	Thallium	2/7	3.30E+00	2.0E-02	1.2E-03		2.1E-02					
Surface Soil (<5 ft)	IA-4	Uranium	1/2	7.36E+01	1.2E-02	1.6E-04		1.2E-02					
Surface Soil (<5 ft)	IA-4	Inorganics Pathway Total			1.9E-01	2.1E-02	7.5E-04	2.1E-01	1.3E-05	3.7E-07	9.1E-09	1.4E-05	
Surface Soil (<5 ft)	IA-4	Pathway Total - Chemicals			1.9E-01	2.1E-02	7.5E-04	2.1E-01	1.3E-05	3.7E-07	9.1E-09	1.4E-05	
Surface Soil (<5 ft)	IA-5	Arsenic	7/7	1.60E+01	2.6E-02	7.3E-04		2.7E-02	4.2E-06	1.2E-07	2.8E-09	4.3E-06	
Surface Soil (<5 ft)	IA-5	Barium	8/8	1.77E+03	1.2E-02	2.0E-03	4.1E-04	1.5E-02					
Surface Soil (<5 ft)	IA-5	Cadmium	3/18	1.03E+00	5.0E-04	5.7E-03		6.2E-03			7.6E-11	7.6E-11	
Surface Soil (<5 ft)	IA-5	Chromium	7/7	2.59E+01	4.2E-03	2.4E-03	3.0E-05	6.7E-03			1.2E-08	1.2E-08	
Surface Soil (<5 ft)	IA-5	Thallium	4/18	2.00E+00	1.2E-02	7.0E-04		1.3E-02					
Surface Soil (<5 ft)	IA-5	Uranium	3/7	2.51E+01	4.1E-03	5.5E-05		4.1E-03					
Surface Soil (<5 ft)	IA-5	Vanadium	7/7	6.58E+01	4.6E-03	5.2E-03		9.8E-03					
Surface Soil (<5 ft)	IA-5	Inorganics Pathway Total			6.4E-02	1.7E-02	4.4E-04	8.1E-02	4.2E-06	1.2E-07	1.5E-08	4.3E-06	
Surface Soil (<5 ft)	IA-5	MCPP	1/5	2.20E+01	1.1E-02	2.5E-03		1.3E-02					
Surface Soil (<5 ft)	IA-5	Organics Pathway Total			1.1E-02	2.5E-03		1.3E-02					
Surface Soil (<5 ft)	IA-5	Pathway Total - Chemicals			7.5E-02	1.9E-02	4.4E-04	9.5E-02	4.2E-06	1.2E-07	1.5E-08	4.3E-06	
Surface Soil (<5 ft)	IA-7	Barium	4/4	1.36E+04	9.5E-02	1.5E-02	3.1E-03	1.1E-01					
Surface Soil (<5 ft)	IA-7	Molybdenum	2/4	2.55E+02	2.5E-02	7.5E-04		2.6E-02					
Surface Soil (<5 ft)	IA-7	Nickel	4/4	7.38E+03	1.8E-01	7.6E-03		1.9E-01					
Surface Soil (<5 ft)	IA-7	Selenium	2/4	1.73E+02	1.7E-02	4.4E-04		1.7E-02					
Surface Soil (<5 ft)	IA-7	Vanadium	3/3	6.30E+02	4.4E-02	5.0E-02		9.4E-02					
Surface Soil (<5 ft)	IA-7	Inorganics Pathway Total			3.6E-01	7.4E-02	3.1E-03	4.4E-01					
Surface Soil (<5 ft)	IA-7	Pathway Total - Chemicals			3.6E-01	7.4E-02	3.1E-03	4.4E-01					
Surface Soil (<0.5 ft)	IA-8	Chromium	1/1	4.26E+01	6.9E-03	4.0E-03	4.9E-05	1.1E-02			2.0E-08	2.0E-08	

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 6 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Surface Soil (<0.5 ft)	IA-8	Inorganics Pathway Total			6.9E-03	4.0E-03	4.9E-05	1.1E-02			2.0E-08	2.0E-08	
Surface Soil (<0.5 ft)	IA-8	Benz(a)anthracene	1/1	1.40E+00					1.8E-07	6.6E-08	5.1E-12	2.4E-07	
Surface Soil (<0.5 ft)	IA-8	Benzo(a)pyrene	1/1	1.60E+00					2.0E-06	7.5E-07	5.8E-11	2.8E-06	
Surface Soil (<0.5 ft)	IA-8	Benzo(b)fluoranthene	1/1	2.10E+00					2.7E-07	9.9E-08	7.6E-12	3.7E-07	
Surface Soil (<0.5 ft)	IA-8	Dibenz(a,h)anthracene	1/1	2.80E-01					3.6E-07	1.3E-07	1.0E-11	4.9E-07	
Surface Soil (<0.5 ft)	IA-8	Indeno(1,2,3-cd)pyrene	1/1	8.80E-01					1.1E-07	4.1E-08	3.2E-12	1.5E-07	
Surface Soil (<0.5 ft)	IA-8	MCPA	1/1	2.50E+01	2.4E-02	5.6E-03		3.0E-02					
Surface Soil (<0.5 ft)	IA-8	Organics Pathway Total			2.4E-02	5.6E-03		3.0E-02	3.0E-06	1.1E-06	8.4E-11	4.0E-06	
Surface Soil (<0.5 ft)	IA-8	Pathway Total - Chemicals			3.1E-02	9.5E-03	4.9E-05	4.1E-02	3.0E-06	1.1E-06	2.1E-08	4.1E-06	
Surface Soil (<0.5 ft)	IA-9	Arsenic	8/8	2.14E+01	3.5E-02	9.7E-04		3.6E-02	5.6E-06	1.6E-07	3.8E-09	5.8E-06	
Surface Soil (<0.5 ft)	IA-9	Barium	8/8	5.32E+02	3.7E-03	6.1E-04	1.2E-04	4.4E-03					
Surface Soil (<0.5 ft)	IA-9	Nickel	8/8	1.08E+03	2.6E-02	1.1E-03		2.8E-02					
Surface Soil (<0.5 ft)	IA-9	Uranium	2/8	5.28E+01	8.6E-03	1.2E-04		8.7E-03					
Surface Soil (<0.5 ft)	IA-9	Vanadium	8/8	1.85E+02	1.3E-02	1.5E-02		2.8E-02					
Surface Soil (<0.5 ft)	IA-9	Inorganics Pathway Total			8.7E-02	1.8E-02	1.2E-04	1.0E-01	5.6E-06	1.6E-07	3.8E-09	5.8E-06	
Surface Soil (<0.5 ft)	IA-9	Benzo(a)pyrene	8/8	5.90E-01					7.5E-07	2.8E-07	2.1E-11	1.0E-06	
Surface Soil (<0.5 ft)	IA-9	Dimethylbenzene	2/8	7.06E-03	1.7E-09	2.1E-10		1.9E-09					
Surface Soil (<0.5 ft)	IA-9	Organics Pathway Total			1.7E-09	2.1E-10		1.9E-09	7.5E-07	2.8E-07	2.1E-11	1.0E-06	
Surface Soil (<0.5 ft)	IA-9	Pathway Total - Chemicals			8.7E-02	1.8E-02	1.2E-04	1.0E-01	6.4E-06	4.3E-07	3.8E-09	6.8E-06	
Soil - All Depths	ROAD ROW	Arsenic	1/1	2.32E+01	3.8E-02	1.1E-03		3.9E-02	6.1E-06	1.7E-07	4.1E-09	6.3E-06	
Soil - All Depths	ROAD ROW	Manganese	1/1	6.32E+03	6.7E-02	1.9E-02	1.5E-02	1.0E-01					
Soil - All Depths	ROAD ROW	Thallium	1/1	7.20E+00	4.4E-02	2.5E-03		4.7E-02					
Soil - All Depths	ROAD ROW	Vanadium	1/1	6.53E+01	4.6E-03	5.2E-03		9.8E-03					
Soil - All Depths	ROAD ROW	Inorganics Pathway Total			1.5E-01	2.8E-02	1.5E-02	2.0E-01	6.1E-06	1.7E-07	4.1E-09	6.3E-06	
Soil - All Depths	ROAD ROW	MCPP	1/1	1.20E+02	5.9E-02	1.3E-02		7.2E-02					
Soil - All Depths	ROAD ROW	Organics Pathway Total			5.9E-02	1.3E-02		7.2E-02					
Soil - All Depths	ROAD ROW	Pathway Total - Chemicals			2.1E-01	4.1E-02	1.5E-02	2.7E-01	6.1E-06	1.7E-07	4.1E-09	6.3E-06	
Surface Soil (<5 ft)	SLAPS	Arsenic	17/17	6.69E+01	1.1E-01	3.0E-03		1.1E-01	1.8E-05	4.9E-07	1.2E-08	1.8E-05	
Surface Soil (<5 ft)	SLAPS	Barium	19/19	3.68E+03	2.6E-02	4.2E-03	8.5E-04	3.1E-02					
Surface Soil (<5 ft)	SLAPS	Cadmium	12/52	3.45E+00	1.7E-03	1.9E-02		2.1E-02			2.5E-10	2.5E-10	
Surface Soil (<5 ft)	SLAPS	Chromium	15/15	6.14E+02	1.0E-01	5.7E-02	7.1E-04	1.6E-01			3.0E-07	3.0E-07	
Surface Soil (<5 ft)	SLAPS	Molybdenum	19/52	3.58E+01	3.5E-03	1.1E-04		3.6E-03					
Surface Soil (<5 ft)	SLAPS	Nickel	17/17	1.74E+03	4.3E-02	1.8E-03		4.4E-02					
Surface Soil (<5 ft)	SLAPS	Selenium	10/52	1.99E+01	1.9E-03	5.0E-05		2.0E-03					
Surface Soil (<5 ft)	SLAPS	Thallium	8/52	3.30E+00	2.0E-02	1.2E-03		2.1E-02					
Surface Soil (<5 ft)	SLAPS	Uranium	6/14	4.19E+01	6.8E-03	9.2E-05		6.9E-03					
Surface Soil (<5 ft)	SLAPS	Vanadium	17/17	2.88E+02	2.0E-02	2.3E-02		4.3E-02					
Surface Soil (<5 ft)	SLAPS	Zinc	15/15	8.44E+02	1.4E-03	7.8E-05		1.5E-03					
Surface Soil (<5 ft)	SLAPS	Inorganics Pathway Total			3.3E-01	1.1E-01	1.6E-03	4.4E-01	1.8E-05	4.9E-07	3.1E-07	1.8E-05	
Surface Soil (<5 ft)	SLAPS	1,2-Dichloroethene	1/11	3.00E-03	1.6E-07	2.3E-08		1.9E-07					
Surface Soil (<5 ft)	SLAPS	Dimethylbenzene	1/11	4.72E-03	1.2E-09	1.4E-10		1.3E-09					
Surface Soil (<5 ft)	SLAPS	MCPP	2/11	1.28E+01	6.3E-03	1.4E-03		7.7E-03					
Surface Soil (<5 ft)	SLAPS	PCB-1254	1/11	8.96E-02	2.2E-03	1.7E-03		3.9E-03	3.1E-08	2.4E-08	2.1E-12	5.5E-08	
Surface Soil (<5 ft)	SLAPS	Organics Pathway Total			8.5E-03	3.1E-03		1.2E-02	3.1E-08	2.4E-08	2.1E-12	5.5E-08	
Surface Soil (<5 ft)	SLAPS	Pathway Total - Chemicals			3.4E-01	1.1E-01	1.6E-03	4.6E-01	1.8E-05	5.1E-07	3.1E-07	1.8E-05	

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 7 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Maintenance Worker													
Soil - All Depths	09K220205/VP-54	Manganese	10/10	4.69E+03	5.0E-02	5.2E-04	2.6E-03	5.3E-02					
Soil - All Depths	09K220205/VP-54	Inorganics Pathway Total			5.0E-02	5.2E-04	2.6E-03	5.3E-02					
Soil - All Depths	09K220205/VP-54	Pathway Total - Chemicals			5.0E-02	5.2E-04	2.6E-03	5.3E-02					
Soil - All Depths	Futura	Arsenic	1/1	3.20E+02	5.2E-01	5.3E-04		5.2E-01	2.2E-05	2.2E-08	3.7E-09	2.2E-05	H
Soil - All Depths	Futura	Barium	1/1	3.48E+03	2.4E-02	1.4E-04	2.0E-05	2.4E-02					
Soil - All Depths	Futura	Cadmium	4/14	3.73E+00	1.8E-03	7.6E-04		2.6E-03			1.8E-11	1.8E-11	
Soil - All Depths	Futura	Molybdenum	5/14	2.01E+02	2.0E-02	2.1E-05		2.0E-02					
Soil - All Depths	Futura	Nickel	1/1	1.73E+04	4.2E-01	6.5E-04		4.2E-01					H
Soil - All Depths	Futura	Selenium	1/14	2.15E+02	2.1E-02	2.0E-05		2.1E-02					
Soil - All Depths	Futura	Vanadium	1/1	2.18E+03	1.5E-01	6.3E-03		1.6E-01					H
Soil - All Depths	Futura	Inorganics Pathway Total			1.2E+00	8.4E-03	2.0E-05	1.2E+00	2.2E-05	2.2E-08	3.7E-09	2.2E-05	H
Soil - All Depths	Futura	Pathway Total - Chemicals			1.2E+00	8.4E-03	2.0E-05	1.2E+00	2.2E-05	2.2E-08	3.7E-09	2.2E-05	H
Soil - All Depths	HISS	Antimony	1/13	5.70E+01	7.0E-02	1.4E-03		7.1E-02					
Soil - All Depths	HISS	Arsenic	2/2	1.01E+03	1.6E+00	1.7E-03		1.6E+00	7.0E-05	7.1E-08	1.2E-08	7.0E-05	H
Soil - All Depths	HISS	Barium	2/2	4.36E+03	3.0E-02	1.8E-04	2.5E-05	3.1E-02					
Soil - All Depths	HISS	Boron	1/1	1.01E+03	5.5E-03	2.5E-06	1.4E-06	5.5E-03					
Soil - All Depths	HISS	Cadmium	5/13	6.44E+00	3.1E-03	1.3E-03		4.5E-03			3.1E-11	3.1E-11	
Soil - All Depths	HISS	Molybdenum	4/13	2.48E+02	2.4E-02	2.6E-05		2.4E-02					
Soil - All Depths	HISS	Nickel	1/1	1.78E+03	4.3E-02	6.7E-05		4.4E-02					
Soil - All Depths	HISS	Nitrate	1/1	1.03E+03	3.1E-04	2.6E-07		3.1E-04					
Soil - All Depths	HISS	Selenium	2/13	2.29E+02	2.2E-02	2.1E-05		2.2E-02					
Soil - All Depths	HISS	Thallium	2/13	2.17E+02	1.3E-01	2.8E-04		1.3E-01					H
Soil - All Depths	HISS	Vanadium	1/1	7.12E+02	5.0E-02	2.1E-03		5.2E-02					
Soil - All Depths	HISS	Inorganics Pathway Total			2.0E+00	7.1E-03	2.6E-05	2.0E+00	7.0E-05	7.1E-08	1.2E-08	7.0E-05	H
Soil - All Depths	HISS	Pathway Total - Chemicals			2.0E+00	7.1E-03	2.6E-05	2.0E+00	7.0E-05	7.1E-08	1.2E-08	7.0E-05	H
Surface Soil (<5 ft)	IA-1	PCB-1254	1/2	2.60E-01	2.5E-03	7.0E-05		2.6E-03	2.4E-08	6.6E-10	3.9E-13	2.5E-08	
Surface Soil (<5 ft)	IA-1	Organics Pathway Total			2.5E-03	7.0E-05		2.6E-03	2.4E-08	6.6E-10	3.9E-13	2.5E-08	
Surface Soil (<5 ft)	IA-1	Pathway Total - Chemicals			2.5E-03	7.0E-05		2.6E-03	2.4E-08	6.6E-10	3.9E-13	2.5E-08	
Surface Soil (<0.5 ft)	IA-10	Benz(a)anthracene	4/4	6.96E-01					2.3E-08	3.1E-10	1.6E-13	2.4E-08	
Surface Soil (<0.5 ft)	IA-10	Benzo(a)pyrene	4/4	7.34E-01					2.5E-07	3.3E-09	1.7E-12	2.5E-07	
Surface Soil (<0.5 ft)	IA-10	Benzo(b)fluoranthene	4/4	6.47E-01					2.2E-08	2.9E-10	1.5E-13	2.2E-08	
Surface Soil (<0.5 ft)	IA-10	Indeno(1,2,3-cd)pyrene	4/4	7.77E-01					2.6E-08	3.5E-10	1.8E-13	2.6E-08	
Surface Soil (<0.5 ft)	IA-10	Organics Pathway Total							3.2E-07	4.3E-09	2.2E-12	3.2E-07	
Surface Soil (<0.5 ft)	IA-10	Pathway Total - Chemicals							3.2E-07	4.3E-09	2.2E-12	3.2E-07	
Surface Soil (<0.5 ft)	IA-13	Arsenic	6/6	1.99E+01	3.2E-02	3.3E-05		3.2E-02	1.4E-06	1.4E-09	2.3E-10	1.4E-06	
Surface Soil (<0.5 ft)	IA-13	Thallium	1/6	1.05E+00	6.4E-04	1.3E-06		6.4E-04					
Surface Soil (<0.5 ft)	IA-13	Uranium	1/6	9.31E+00	1.5E-03	7.4E-07		1.5E-03					
Surface Soil (<0.5 ft)	IA-13	Inorganics Pathway Total			3.5E-02	3.5E-05		3.5E-02	1.4E-06	1.4E-09	2.3E-10	1.4E-06	
Surface Soil (<0.5 ft)	IA-13	Pathway Total - Chemicals			3.5E-02	3.5E-05		3.5E-02	1.4E-06	1.4E-09	2.3E-10	1.4E-06	
Surface Soil (<5 ft)	IA-2	Arsenic	2/2	2.37E+02	3.9E-01	3.9E-04		3.9E-01	1.6E-05	1.7E-08	2.7E-09	1.6E-05	
Surface Soil (<5 ft)	IA-2	Cadmium	4/12	2.31E+00	1.1E-03	4.7E-04		1.6E-03			1.1E-11	1.1E-11	
Surface Soil (<5 ft)	IA-2	Molybdenum	3/12	5.76E+01	5.6E-03	6.2E-06		5.6E-03					

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 8 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Surface Soil (<5 ft)	IA-2	Vanadium	2/2	8.62E+02	6.0E-02	2.5E-03		6.3E-02					
Surface Soil (<5 ft)	IA-2	Inorganics Pathway Total			4.5E-01	3.4E-03		4.6E-01	1.6E-05	1.7E-08	2.7E-09	1.6E-05	
Surface Soil (<5 ft)	IA-2	Pathway Total - Chemicals			4.5E-01	3.4E-03		4.6E-01	1.6E-05	1.7E-08	2.7E-09	1.6E-05	
Surface Soil (<5 ft)	IA-3	Antimony	2/7	2.49E+01	3.0E-02	6.3E-04		3.1E-02					
Surface Soil (<5 ft)	IA-3	Cadmium	2/7	2.14E+01	1.0E-02	4.3E-03		1.5E-02			1.0E-10	1.0E-10	
Surface Soil (<5 ft)	IA-3	Chromium	4/4	2.72E+03	6.6E-02	1.4E-03	7.7E-04	6.9E-02			8.5E-08	8.5E-08	
Surface Soil (<5 ft)	IA-3	Molybdenum	3/7	2.83E+01	2.8E-03	3.0E-06		2.8E-03					
Surface Soil (<5 ft)	IA-3	Thallium	2/7	1.40E+00	8.5E-04	1.8E-06		8.6E-04					
Surface Soil (<5 ft)	IA-3	Uranium	2/3	1.29E+02	2.1E-02	1.0E-05		2.1E-02					
Surface Soil (<5 ft)	IA-3	Vanadium	3/3	5.72E+01	4.0E-03	1.7E-04		4.2E-03					
Surface Soil (<5 ft)	IA-3	Zinc	4/4	3.64E+03	5.9E-03	1.2E-05		5.9E-03					
Surface Soil (<5 ft)	IA-3	Inorganics Pathway Total			1.4E-01	6.6E-03	7.7E-04	1.5E-01			8.5E-08	8.5E-08	
Surface Soil (<5 ft)	IA-3	1,2-Dichloroethene	1/3	3.00E-03	1.6E-07	8.5E-10		1.6E-07					
Surface Soil (<5 ft)	IA-3	Dimethylbenzene	1/3	1.00E-02	1.4E-08	6.2E-11		1.4E-08					
Surface Soil (<5 ft)	IA-3	MCPP	1/3	1.10E+01	5.4E-04	4.5E-06		5.4E-04					
Surface Soil (<5 ft)	IA-3	Organics Pathway Total			5.4E-04	4.5E-06		5.4E-04					
Surface Soil (<5 ft)	IA-3	Pathway Total - Chemicals			1.4E-01	6.6E-03	7.7E-04	1.5E-01			8.5E-08	8.5E-08	
Surface Soil (<5 ft)	IA-4	Arsenic	3/3	5.08E+01	8.3E-02	8.4E-05		8.3E-02	3.5E-06	3.6E-09	5.8E-10	3.5E-06	
Surface Soil (<5 ft)	IA-4	Barium	4/4	3.27E+03	2.3E-02	1.4E-04	1.8E-05	2.3E-02					
Surface Soil (<5 ft)	IA-4	Cadmium	1/7	2.14E+00	1.0E-03	4.3E-04		1.5E-03			1.0E-11	1.0E-11	
Surface Soil (<5 ft)	IA-4	Molybdenum	3/7	3.86E+01	3.8E-03	4.1E-06		3.8E-03					
Surface Soil (<5 ft)	IA-4	Nickel	3/3	2.01E+03	4.9E-02	7.6E-05		4.9E-02					
Surface Soil (<5 ft)	IA-4	Thallium	2/7	3.30E+00	2.0E-03	4.2E-06		2.0E-03					
Surface Soil (<5 ft)	IA-4	Uranium	1/2	7.36E+01	1.2E-02	5.9E-06		1.2E-02					
Surface Soil (<5 ft)	IA-4	Inorganics Pathway Total			1.7E-01	7.4E-04	1.8E-05	1.7E-01	3.5E-06	3.6E-09	5.9E-10	3.5E-06	
Surface Soil (<5 ft)	IA-4	Pathway Total - Chemicals			1.7E-01	7.4E-04	1.8E-05	1.7E-01	3.5E-06	3.6E-09	5.9E-10	3.5E-06	
Surface Soil (<5 ft)	IA-5	Arsenic	7/7	1.60E+01	2.6E-02	2.6E-05		2.6E-02	1.1E-06	1.1E-09	1.8E-10	1.1E-06	
Surface Soil (<5 ft)	IA-5	Barium	8/8	1.77E+03	1.2E-02	7.3E-05	1.0E-05	1.2E-02					
Surface Soil (<5 ft)	IA-5	Cadmium	3/18	1.03E+00	5.0E-04	2.1E-04		7.1E-04			4.9E-12	4.9E-12	
Surface Soil (<5 ft)	IA-5	Chromium	7/7	2.59E+01	6.3E-04	1.3E-05	7.3E-06	6.5E-04			8.1E-10	8.1E-10	
Surface Soil (<5 ft)	IA-5	Thallium	4/18	2.00E+00	1.2E-03	2.5E-06		1.2E-03					
Surface Soil (<5 ft)	IA-5	Uranium	3/7	2.51E+01	4.1E-03	2.0E-06		4.1E-03					
Surface Soil (<5 ft)	IA-5	Vanadium	7/7	6.58E+01	4.6E-03	1.9E-04		4.8E-03					
Surface Soil (<5 ft)	IA-5	Inorganics Pathway Total			4.9E-02	5.2E-04	1.7E-05	5.0E-02	1.1E-06	1.1E-09	9.9E-10	1.1E-06	
Surface Soil (<5 ft)	IA-5	MCPP	1/5	2.20E+01	1.1E-03	8.9E-06		1.1E-03					
Surface Soil (<5 ft)	IA-5	Organics Pathway Total			1.1E-03	8.9E-06		1.1E-03					
Surface Soil (<5 ft)	IA-5	Pathway Total - Chemicals			5.1E-02	5.3E-04	1.7E-05	5.1E-02	1.1E-06	1.1E-09	9.9E-10	1.1E-06	
Surface Soil (<5 ft)	IA-7	Barium	4/4	1.36E+04	9.5E-02	5.6E-04	7.7E-05	9.6E-02					
Surface Soil (<5 ft)	IA-7	Molybdenum	2/4	2.55E+02	2.5E-02	2.7E-05		2.5E-02					
Surface Soil (<5 ft)	IA-7	Nickel	4/4	7.38E+03	1.8E-01	2.8E-04		1.8E-01					
Surface Soil (<5 ft)	IA-7	Selenium	2/4	1.73E+02	1.7E-02	1.6E-05		1.7E-02					
Surface Soil (<5 ft)	IA-7	Vanadium	3/3	6.30E+02	4.4E-02	1.8E-03		4.6E-02					
Surface Soil (<5 ft)	IA-7	Inorganics Pathway Total			3.6E-01	2.7E-03	7.7E-05	3.6E-01					
Surface Soil (<5 ft)	IA-7	Pathway Total - Chemicals			3.6E-01	2.7E-03	7.7E-05	3.6E-01					
Surface Soil (<0.5 ft)	IA-8	Chromium	1/1	4.26E+01	1.0E-03	2.2E-05	1.2E-05	1.1E-03			1.3E-09	1.3E-09	

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 9 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Surface Soil (<0.5 ft)	IA-8	Inorganics Pathway Total			1.0E-03	2.2E-05	1.2E-05	1.1E-03			1.3E-09	1.3E-09	
Surface Soil (<0.5 ft)	IA-8	Benz(a)anthracene	1/1	1.40E+00					4.7E-08	6.3E-10	3.3E-13	4.8E-08	
Surface Soil (<0.5 ft)	IA-8	Benzo(a)pyrene	1/1	1.60E+00					5.4E-07	7.2E-09	3.8E-12	5.5E-07	
Surface Soil (<0.5 ft)	IA-8	Benzo(b)fluoranthene	1/1	2.10E+00					7.1E-08	9.5E-10	4.9E-13	7.2E-08	
Surface Soil (<0.5 ft)	IA-8	Dibenz(a,h)anthracene	1/1	2.80E-01					9.4E-08	1.3E-09	6.6E-13	9.5E-08	
Surface Soil (<0.5 ft)	IA-8	Indeno(1,2,3-cd)pyrene	1/1	8.80E-01					3.0E-08	4.0E-10	2.1E-13	3.0E-08	
Surface Soil (<0.5 ft)	IA-8	MCPA	1/1	2.50E+01	2.4E-02	2.0E-04		2.5E-02					
Surface Soil (<0.5 ft)	IA-8	Organics Pathway Total			2.4E-02	2.0E-04		2.5E-02	7.8E-07	1.0E-08	5.4E-12	7.9E-07	
Surface Soil (<0.5 ft)	IA-8	Pathway Total - Chemicals			2.5E-02	2.2E-04	1.2E-05	2.6E-02	7.8E-07	1.0E-08	1.3E-09	7.9E-07	
Surface Soil (<0.5 ft)	IA-9	Arsenic	8/8	2.14E+01	3.5E-02	3.5E-05		3.5E-02	1.5E-06	1.5E-09	2.4E-10	1.5E-06	
Surface Soil (<0.5 ft)	IA-9	Barium	8/8	5.32E+02	3.7E-03	2.2E-05	3.0E-06	3.7E-03					
Surface Soil (<0.5 ft)	IA-9	Nickel	8/8	1.08E+03	2.6E-02	4.1E-05		2.6E-02					
Surface Soil (<0.5 ft)	IA-9	Uranium	2/8	5.28E+01	8.6E-03	4.2E-06		8.6E-03					
Surface Soil (<0.5 ft)	IA-9	Vanadium	8/8	1.85E+02	1.3E-02	5.4E-04		1.3E-02					
Surface Soil (<0.5 ft)	IA-9	Inorganics Pathway Total			8.6E-02	6.4E-04	3.0E-06	8.7E-02	1.5E-06	1.5E-09	2.4E-10	1.5E-06	
Surface Soil (<0.5 ft)	IA-9	Benzo(a)pyrene	8/8	5.90E-01					2.0E-07	2.7E-09	1.4E-12	2.0E-07	
Surface Soil (<0.5 ft)	IA-9	Dimethylbenzene	2/8	7.06E-03	9.7E-09	4.4E-11		9.7E-09					
Surface Soil (<0.5 ft)	IA-9	Organics Pathway Total			9.7E-09	4.4E-11		9.7E-09	2.0E-07	2.7E-09	1.4E-12	2.0E-07	
Surface Soil (<0.5 ft)	IA-9	Pathway Total - Chemicals			8.6E-02	6.4E-04	3.0E-06	8.7E-02	1.7E-06	4.2E-09	2.5E-10	1.7E-06	
Soil - All Depths	ROAD ROW	Arsenic	1/1	2.32E+01	3.8E-02	3.8E-05		3.8E-02	1.6E-06	1.6E-09	2.6E-10	1.6E-06	
Soil - All Depths	ROAD ROW	Manganese	1/1	6.32E+03	6.7E-02	7.0E-04	3.6E-03	7.1E-02					
Soil - All Depths	ROAD ROW	Thallium	1/1	7.20E+00	4.4E-03	9.1E-06		4.4E-03					
Soil - All Depths	ROAD ROW	Vanadium	1/1	6.53E+01	4.6E-03	1.9E-04		4.7E-03					
Soil - All Depths	ROAD ROW	Inorganics Pathway Total			1.1E-01	9.3E-04	3.6E-03	1.2E-01	1.6E-06	1.6E-09	2.6E-10	1.6E-06	
Soil - All Depths	ROAD ROW	MCPP	1/1	1.20E+02	5.9E-03	4.9E-05		5.9E-03					
Soil - All Depths	ROAD ROW	Organics Pathway Total			5.9E-03	4.9E-05		5.9E-03					
Soil - All Depths	ROAD ROW	Pathway Total - Chemicals			1.2E-01	9.8E-04	3.6E-03	1.2E-01	1.6E-06	1.6E-09	2.6E-10	1.6E-06	
Surface Soil (<5 ft)	SLAPS	Arsenic	17/17	6.69E+01	1.1E-01	1.1E-04		1.1E-01	4.6E-06	4.7E-09	7.6E-10	4.6E-06	
Surface Soil (<5 ft)	SLAPS	Barium	19/19	3.68E+03	2.6E-02	1.5E-04	2.1E-05	2.6E-02					
Surface Soil (<5 ft)	SLAPS	Cadmium	12/52	3.45E+00	1.7E-03	7.0E-04		2.4E-03			1.6E-11	1.6E-11	
Surface Soil (<5 ft)	SLAPS	Chromium	15/15	6.14E+02	1.5E-02	3.1E-04	1.7E-04	1.5E-02			1.9E-08	1.9E-08	
Surface Soil (<5 ft)	SLAPS	Molybdenum	19/52	3.58E+01	3.5E-03	3.8E-06		3.5E-03					
Surface Soil (<5 ft)	SLAPS	Nickel	17/17	1.74E+03	4.2E-02	6.5E-05		4.3E-02					
Surface Soil (<5 ft)	SLAPS	Selenium	10/52	1.99E+01	1.9E-03	1.8E-06		1.9E-03					
Surface Soil (<5 ft)	SLAPS	Thallium	8/52	3.30E+00	2.0E-03	4.2E-06		2.0E-03					
Surface Soil (<5 ft)	SLAPS	Uranium	6/14	4.19E+01	6.8E-03	3.3E-06		6.8E-03					
Surface Soil (<5 ft)	SLAPS	Vanadium	17/17	2.88E+02	2.0E-02	8.4E-04		2.1E-02					
Surface Soil (<5 ft)	SLAPS	Zinc	15/15	8.44E+02	1.4E-03	2.9E-06		1.4E-03					
Surface Soil (<5 ft)	SLAPS	Inorganics Pathway Total			2.3E-01	2.2E-03	1.9E-04	2.3E-01	4.6E-06	4.7E-09	2.0E-08	4.6E-06	
Surface Soil (<5 ft)	SLAPS	1,2-Dichloroethene	1/11	3.00E-03	1.6E-07	8.5E-10		1.6E-07					
Surface Soil (<5 ft)	SLAPS	Dimethylbenzene	1/11	4.72E-03	6.5E-09	2.9E-11		6.5E-09					
Surface Soil (<5 ft)	SLAPS	MCPP	2/11	1.28E+01	6.3E-04	5.2E-06		6.3E-04					
Surface Soil (<5 ft)	SLAPS	PCB-1254	1/11	8.96E-02	8.8E-04	2.4E-05		9.0E-04	8.3E-09	2.3E-10	1.4E-13	8.5E-09	
Surface Soil (<5 ft)	SLAPS	Organics Pathway Total			1.5E-03	2.9E-05		1.5E-03	8.3E-09	2.3E-10	1.4E-13	8.5E-09	
Surface Soil (<5 ft)	SLAPS	Pathway Total - Chemicals			2.3E-01	2.2E-03	1.9E-04	2.3E-01	4.6E-06	4.9E-09	2.0E-08	4.7E-06	

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 10 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Recreational/Trespasser													
Soil - All Depths	09K220205/VP-54	Manganese	10/10	4.69E+03	7.3E-03	3.7E-03	3.7E-04	1.1E-02					
Soil - All Depths	09K220205/VP-54	Inorganics Pathway Total			7.3E-03	3.7E-03	3.7E-04	1.1E-02					
Soil - All Depths	09K220205/VP-54	Pathway Total - Chemicals			7.3E-03	3.7E-03	3.7E-04	1.1E-02					
Soil - All Depths	Futura	Arsenic	1/1	3.20E+02	7.6E-02	3.8E-03		8.0E-02	4.4E-06	2.2E-07	6.9E-10	4.6E-06	
Soil - All Depths	Futura	Barium	1/1	3.48E+03	3.5E-03	1.0E-03	2.7E-05	4.6E-03					
Soil - All Depths	Futura	Cadmium	4/14	3.73E+00	2.7E-04	5.4E-03		5.7E-03			3.4E-12	3.4E-12	
Soil - All Depths	Futura	Molybdenum	5/14	2.01E+02	2.9E-03	1.5E-04		3.0E-03					
Soil - All Depths	Futura	Nickel	1/1	1.73E+04	6.2E-02	4.7E-03		6.6E-02					
Soil - All Depths	Futura	Selenium	1/14	2.15E+02	3.1E-03	1.4E-04		3.2E-03					
Soil - All Depths	Futura	Vanadium	1/1	2.18E+03	2.2E-02	4.5E-02		6.7E-02					
Soil - All Depths	Futura	Inorganics Pathway Total			1.7E-01	6.0E-02	2.7E-05	2.3E-01	4.4E-06	2.2E-07	6.9E-10	4.6E-06	
Soil - All Depths	Futura	Pathway Total - Chemicals			1.7E-01	6.0E-02	2.7E-05	2.3E-01	4.4E-06	2.2E-07	6.9E-10	4.6E-06	
Soil - All Depths	HISS	Antimony	1/13	5.70E+01	1.0E-02	1.0E-02		2.1E-02					
Soil - All Depths	HISS	Arsenic	2/2	1.01E+03	2.4E-01	1.2E-02		2.5E-01	1.4E-05	6.9E-07	2.2E-09	1.5E-05	
Soil - All Depths	HISS	Barium	2/2	4.36E+03	4.4E-03	1.3E-03	3.4E-05	5.8E-03					
Soil - All Depths	HISS	Boron	1/1	1.01E+03	8.0E-04	1.8E-05	2.0E-07	8.2E-04					
Soil - All Depths	HISS	Cadmium	5/13	6.44E+00	4.6E-04	9.4E-03		9.8E-03			5.8E-12	5.8E-12	
Soil - All Depths	HISS	Molybdenum	4/13	2.48E+02	3.5E-03	1.9E-04		3.7E-03					
Soil - All Depths	HISS	Nickel	1/1	1.78E+03	6.3E-03	4.8E-04		6.8E-03					
Soil - All Depths	HISS	Nitrate	1/1	1.03E+03	4.6E-05	1.9E-06		4.8E-05					
Soil - All Depths	HISS	Selenium	2/13	2.29E+02	3.3E-03	1.5E-04		3.4E-03					
Soil - All Depths	HISS	Thallium	2/13	2.17E+02	1.9E-01	2.0E-02		2.1E-01					
Soil - All Depths	HISS	Vanadium	1/1	7.12E+02	7.2E-03	1.5E-02		2.2E-02					
Soil - All Depths	HISS	Inorganics Pathway Total			4.7E-01	6.8E-02	3.4E-05	5.4E-01	1.4E-05	6.9E-07	2.2E-09	1.5E-05	
Soil - All Depths	HISS	Pathway Total - Chemicals			4.7E-01	6.8E-02	3.4E-05	5.4E-01	1.4E-05	6.9E-07	2.2E-09	1.5E-05	
Surface Soil (<5 ft)	IA-1	PCB-1254	1/2	2.60E-01	9.3E-04	1.3E-03		2.2E-03	4.8E-09	6.5E-09	7.4E-14	1.1E-08	
Surface Soil (<5 ft)	IA-1	Organics Pathway Total			9.3E-04	1.3E-03		2.2E-03	4.8E-09	6.5E-09	7.4E-14	1.1E-08	
Surface Soil (<5 ft)	IA-1	Pathway Total - Chemicals			9.3E-04	1.3E-03		2.2E-03	4.8E-09	6.5E-09	7.4E-14	1.1E-08	
Surface Soil (<0.5 ft)	IA-10	Benz(a)anthracene	4/4	6.96E-01					4.7E-09	3.1E-09	3.1E-14	7.7E-09	
Surface Soil (<0.5 ft)	IA-10	Benzo(a)pyrene	4/4	7.34E-01					4.9E-08	3.2E-08	3.3E-13	8.1E-08	
Surface Soil (<0.5 ft)	IA-10	Benzo(b)fluoranthene	4/4	6.47E-01					4.3E-09	2.8E-09	2.9E-14	7.2E-09	
Surface Soil (<0.5 ft)	IA-10	Indeno(1,2,3-cd)pyrene	4/4	7.77E-01					5.2E-09	3.4E-09	3.4E-14	8.6E-09	
Surface Soil (<0.5 ft)	IA-10	Organics Pathway Total							6.3E-08	4.2E-08	4.2E-13	1.0E-07	
Surface Soil (<0.5 ft)	IA-10	Pathway Total - Chemicals							6.3E-08	4.2E-08	4.2E-13	1.0E-07	
Surface Soil (<0.5 ft)	IA-13	Arsenic	6/6	1.99E+01	4.7E-03	2.4E-04		5.0E-03	2.7E-07	1.4E-08	4.3E-11	2.9E-07	
Surface Soil (<0.5 ft)	IA-13	Thallium	1/6	1.05E+00	9.3E-04	9.5E-05		1.0E-03					
Surface Soil (<0.5 ft)	IA-13	Uranium	1/6	9.31E+00	2.2E-04	5.3E-06		2.3E-04					
Surface Soil (<0.5 ft)	IA-13	Inorganics Pathway Total			5.9E-03	3.4E-04		6.2E-03	2.7E-07	1.4E-08	4.3E-11	2.9E-07	
Surface Soil (<0.5 ft)	IA-13	Pathway Total - Chemicals			5.9E-03	3.4E-04		6.2E-03	2.7E-07	1.4E-08	4.3E-11	2.9E-07	
Surface Soil (<5 ft)	IA-2	Arsenic	2/2	2.37E+02	5.6E-02	2.8E-03		5.9E-02	3.3E-06	1.6E-07	5.1E-10	3.4E-06	
Surface Soil (<5 ft)	IA-2	Cadmium	4/12	2.31E+00	1.6E-04	3.4E-03		3.5E-03			2.1E-12	2.1E-12	
Surface Soil (<5 ft)	IA-2	Molybdenum	3/12	5.76E+01	8.2E-04	4.4E-05		8.6E-04					

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 11 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Surface Soil (<5 ft)	IA-2	Vanadium	2/2	8.62E+02	8.8E-03	1.8E-02		2.7E-02					
Surface Soil (<5 ft)	IA-2	Inorganics Pathway Total			6.6E-02	2.4E-02		9.0E-02	3.3E-06	1.6E-07	5.1E-10	3.4E-06	
Surface Soil (<5 ft)	IA-2	Pathway Total - Chemicals			6.6E-02	2.4E-02		9.0E-02	3.3E-06	1.6E-07	5.1E-10	3.4E-06	
Surface Soil (<5 ft)	IA-3	Antimony	2/7	2.49E+01	4.4E-03	4.5E-03		9.0E-03					
Surface Soil (<5 ft)	IA-3	Cadmium	2/7	2.14E+01	1.5E-03	3.1E-02		3.3E-02			1.9E-11	1.9E-11	
Surface Soil (<5 ft)	IA-3	Chromium	4/4	2.72E+03	6.5E-02	6.6E-02	1.1E-04	1.3E-01			1.6E-08	1.6E-08	
Surface Soil (<5 ft)	IA-3	Molybdenum	3/7	2.83E+01	4.0E-04	2.2E-05		4.2E-04					
Surface Soil (<5 ft)	IA-3	Thallium	2/7	1.40E+00	1.2E-03	1.3E-04		1.4E-03					
Surface Soil (<5 ft)	IA-3	Uranium	2/3	1.29E+02	3.1E-03	7.4E-05		3.1E-03					
Surface Soil (<5 ft)	IA-3	Vanadium	3/3	5.72E+01	5.8E-04	1.2E-03		1.8E-03					
Surface Soil (<5 ft)	IA-3	Zinc	4/4	3.64E+03	8.6E-04	8.8E-05		9.5E-04					
Surface Soil (<5 ft)	IA-3	Inorganics Pathway Total			7.7E-02	1.0E-01	1.1E-04	1.8E-01			1.6E-08	1.6E-08	
Surface Soil (<5 ft)	IA-3	1,2-Dichloroethene	1/3	3.00E-03	2.4E-08	6.1E-09		3.0E-08					
Surface Soil (<5 ft)	IA-3	Dimethylbenzene	1/3	1.00E-02	3.6E-10	7.9E-11		4.4E-10					
Surface Soil (<5 ft)	IA-3	MCPP	1/3	1.10E+01	7.8E-04	3.2E-04		1.1E-03					
Surface Soil (<5 ft)	IA-3	Organics Pathway Total			7.8E-04	3.2E-04		1.1E-03					
Surface Soil (<5 ft)	IA-3	Pathway Total - Chemicals			7.7E-02	1.0E-01	1.1E-04	1.8E-01			1.6E-08	1.6E-08	
Surface Soil (<5 ft)	IA-4	Arsenic	3/3	5.08E+01	1.2E-02	6.0E-04		1.3E-02	7.0E-07	3.5E-08	1.1E-10	7.3E-07	
Surface Soil (<5 ft)	IA-4	Barium	4/4	3.27E+03	3.3E-03	9.7E-04	2.5E-05	4.3E-03					
Surface Soil (<5 ft)	IA-4	Cadmium	1/7	2.14E+00	1.5E-04	3.1E-03		3.3E-03			1.9E-12	1.9E-12	
Surface Soil (<5 ft)	IA-4	Molybdenum	3/7	3.86E+01	5.5E-04	3.0E-05		5.8E-04					
Surface Soil (<5 ft)	IA-4	Nickel	3/3	2.01E+03	7.2E-03	5.4E-04		7.7E-03					
Surface Soil (<5 ft)	IA-4	Thallium	2/7	3.30E+00	2.9E-03	3.0E-04		3.2E-03					
Surface Soil (<5 ft)	IA-4	Uranium	1/2	7.36E+01	1.7E-03	4.2E-05		1.8E-03					
Surface Soil (<5 ft)	IA-4	Inorganics Pathway Total			2.8E-02	5.6E-03	2.5E-05	3.4E-02	7.0E-07	3.5E-08	1.1E-10	7.3E-07	
Surface Soil (<5 ft)	IA-4	Pathway Total - Chemicals			2.8E-02	5.6E-03	2.5E-05	3.4E-02	7.0E-07	3.5E-08	1.1E-10	7.3E-07	
Surface Soil (<5 ft)	IA-5	Arsenic	7/7	1.60E+01	3.8E-03	1.9E-04		4.0E-03	2.2E-07	1.1E-08	3.4E-11	2.3E-07	
Surface Soil (<5 ft)	IA-5	Barium	8/8	1.77E+03	1.8E-03	5.2E-04	1.4E-05	2.3E-03					
Surface Soil (<5 ft)	IA-5	Cadmium	3/18	1.03E+00	7.3E-05	1.5E-03		1.6E-03			9.3E-13	9.3E-13	
Surface Soil (<5 ft)	IA-5	Chromium	7/7	2.59E+01	6.1E-04	6.3E-04	1.0E-06	1.2E-03			1.5E-10	1.5E-10	
Surface Soil (<5 ft)	IA-5	Thallium	4/18	2.00E+00	1.8E-03	1.8E-04		2.0E-03					
Surface Soil (<5 ft)	IA-5	Uranium	3/7	2.51E+01	6.0E-04	1.4E-05		6.1E-04					
Surface Soil (<5 ft)	IA-5	Vanadium	7/7	6.58E+01	6.7E-04	1.4E-03		2.0E-03					
Surface Soil (<5 ft)	IA-5	Inorganics Pathway Total			9.3E-03	4.4E-03	1.5E-05	1.4E-02	2.2E-07	1.1E-08	1.9E-10	2.3E-07	
Surface Soil (<5 ft)	IA-5	MCPP	1/5	2.20E+01	1.6E-03	6.4E-04		2.2E-03					
Surface Soil (<5 ft)	IA-5	Organics Pathway Total			1.6E-03	6.4E-04		2.2E-03					
Surface Soil (<5 ft)	IA-5	Pathway Total - Chemicals			1.1E-02	5.0E-03	1.5E-05	1.6E-02	2.2E-07	1.1E-08	1.9E-10	2.3E-07	
Surface Soil (<5 ft)	IA-7	Barium	4/4	1.36E+04	1.4E-02	4.0E-03	1.1E-04	1.8E-02					
Surface Soil (<5 ft)	IA-7	Molybdenum	2/4	2.55E+02	3.6E-03	2.0E-04		3.8E-03					
Surface Soil (<5 ft)	IA-7	Nickel	4/4	7.38E+03	2.6E-02	2.0E-03		2.8E-02					
Surface Soil (<5 ft)	IA-7	Selenium	2/4	1.73E+02	2.5E-03	1.1E-04		2.6E-03					
Surface Soil (<5 ft)	IA-7	Vanadium	3/3	6.30E+02	6.4E-03	1.3E-02		1.9E-02					
Surface Soil (<5 ft)	IA-7	Inorganics Pathway Total			5.3E-02	1.9E-02	1.1E-04	7.2E-02					
Surface Soil (<5 ft)	IA-7	Pathway Total - Chemicals			5.3E-02	1.9E-02	1.1E-04	7.2E-02					
Surface Soil (<0.5 ft)	IA-8	Chromium	1/1	4.26E+01	1.0E-03	1.0E-03	1.7E-06	2.0E-03			2.5E-10	2.5E-10	

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 12 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Surface Soil (<0.5 ft)	IA-8	Inorganics Pathway Total			1.0E-03	1.0E-03	1.7E-06	2.0E-03			2.5E-10	2.5E-10	
Surface Soil (<0.5 ft)	IA-8	Benz(a)anthracene	1/1	1.40E+00					9.4E-09	6.2E-09	6.2E-14	1.6E-08	
Surface Soil (<0.5 ft)	IA-8	Benzo(a)pyrene	1/1	1.60E+00					1.1E-07	7.0E-08	7.1E-13	1.8E-07	
Surface Soil (<0.5 ft)	IA-8	Benzo(b)fluoranthene	1/1	2.10E+00					1.4E-08	9.2E-09	9.3E-14	2.3E-08	
Surface Soil (<0.5 ft)	IA-8	Dibenz(a,h)anthracene	1/1	2.80E-01					1.9E-08	1.2E-08	1.2E-13	3.1E-08	
Surface Soil (<0.5 ft)	IA-8	Indeno(1,2,3-cd)pyrene	1/1	8.80E-01					5.9E-09	3.9E-09	3.9E-14	9.8E-09	
Surface Soil (<0.5 ft)	IA-8	MCPA	1/1	2.50E+01	3.6E-03	1.5E-03		5.0E-03					
Surface Soil (<0.5 ft)	IA-8	Organics Pathway Total			3.6E-03	1.5E-03		5.0E-03	1.5E-07	1.0E-07	1.0E-12	2.6E-07	
Surface Soil (<0.5 ft)	IA-8	Pathway Total - Chemicals			4.6E-03	2.5E-03	1.7E-06	7.1E-03	1.5E-07	1.0E-07	2.5E-10	2.6E-07	
Surface Soil (<0.5 ft)	IA-9	Arsenic	8/8	2.14E+01	5.1E-03	2.5E-04		5.3E-03	2.9E-07	1.5E-08	4.6E-11	3.1E-07	
Surface Soil (<0.5 ft)	IA-9	Barium	8/8	5.32E+02	5.4E-04	1.6E-04	4.1E-06	7.0E-04					
Surface Soil (<0.5 ft)	IA-9	Nickel	8/8	1.08E+03	3.8E-03	2.9E-04		4.1E-03					
Surface Soil (<0.5 ft)	IA-9	Uranium	2/8	5.28E+01	1.3E-03	3.0E-05		1.3E-03					
Surface Soil (<0.5 ft)	IA-9	Vanadium	8/8	1.85E+02	1.9E-03	3.8E-03		5.7E-03					
Surface Soil (<0.5 ft)	IA-9	Inorganics Pathway Total			1.3E-02	4.6E-03	4.1E-06	1.7E-02	2.9E-07	1.5E-08	4.6E-11	3.1E-07	
Surface Soil (<0.5 ft)	IA-9	Benzo(a)pyrene	8/8	5.90E-01					3.9E-08	2.6E-08	2.6E-13	6.5E-08	
Surface Soil (<0.5 ft)	IA-9	Dimethylbenzene	2/8	7.06E-03	2.5E-10	5.6E-11		3.1E-10					
Surface Soil (<0.5 ft)	IA-9	Organics Pathway Total			2.5E-10	5.6E-11		3.1E-10	3.9E-08	2.6E-08	2.6E-13	6.5E-08	
Surface Soil (<0.5 ft)	IA-9	Pathway Total - Chemicals			1.3E-02	4.6E-03	4.1E-06	1.7E-02	3.3E-07	4.1E-08	4.6E-11	3.7E-07	
Soil - All Depths	ROAD ROW	Arsenic	1/1	2.32E+01	5.5E-03	2.7E-04		5.8E-03	3.2E-07	1.6E-08	5.0E-11	3.3E-07	
Soil - All Depths	ROAD ROW	Manganese	1/1	6.32E+03	9.8E-03	5.0E-03	4.9E-04	1.5E-02					
Soil - All Depths	ROAD ROW	Thallium	1/1	7.20E+00	6.4E-03	6.5E-04		7.1E-03					
Soil - All Depths	ROAD ROW	Vanadium	1/1	6.53E+01	6.6E-04	1.4E-03		2.0E-03					
Soil - All Depths	ROAD ROW	Inorganics Pathway Total			2.2E-02	7.3E-03	4.9E-04	3.0E-02	3.2E-07	1.6E-08	5.0E-11	3.3E-07	
Soil - All Depths	ROAD ROW	MCPP	1/1	1.20E+02	8.5E-03	3.5E-03		1.2E-02					
Soil - All Depths	ROAD ROW	Organics Pathway Total			8.5E-03	3.5E-03		1.2E-02					
Soil - All Depths	ROAD ROW	Pathway Total - Chemicals			3.1E-02	1.1E-02	4.9E-04	4.2E-02	3.2E-07	1.6E-08	5.0E-11	3.3E-07	
Surface Soil (<5 ft)	SLAPS	Arsenic	17/17	6.69E+01	1.6E-02	7.9E-04		1.7E-02	9.2E-07	4.6E-08	1.4E-10	9.6E-07	
Surface Soil (<5 ft)	SLAPS	Barium	19/19	3.68E+03	3.7E-03	1.1E-03	2.9E-05	4.9E-03					
Surface Soil (<5 ft)	SLAPS	Cadmium	12/52	3.45E+00	2.5E-04	5.0E-03		5.3E-03			3.1E-12	3.1E-12	
Surface Soil (<5 ft)	SLAPS	Chromium	15/15	6.14E+02	1.5E-02	1.5E-02	2.4E-05	2.9E-02			3.6E-09	3.6E-09	
Surface Soil (<5 ft)	SLAPS	Molybdenum	19/52	3.58E+01	5.1E-04	2.7E-05		5.4E-04					
Surface Soil (<5 ft)	SLAPS	Nickel	17/17	1.74E+03	6.2E-03	4.7E-04		6.7E-03					
Surface Soil (<5 ft)	SLAPS	Selenium	10/52	1.99E+01	2.8E-04	1.3E-05		3.0E-04					
Surface Soil (<5 ft)	SLAPS	Thallium	8/52	3.30E+00	2.9E-03	3.0E-04		3.2E-03					
Surface Soil (<5 ft)	SLAPS	Uranium	6/14	4.19E+01	9.9E-04	2.4E-05		1.0E-03					
Surface Soil (<5 ft)	SLAPS	Vanadium	17/17	2.88E+02	2.9E-03	6.0E-03		8.9E-03					
Surface Soil (<5 ft)	SLAPS	Zinc	15/15	8.44E+02	2.0E-04	2.0E-05		2.2E-04					
Surface Soil (<5 ft)	SLAPS	Inorganics Pathway Total			4.9E-02	2.9E-02	5.3E-05	7.7E-02	9.2E-07	4.6E-08	3.7E-09	9.7E-07	
Surface Soil (<5 ft)	SLAPS	1,2-Dichloroethene	1/11	3.00E-03	2.4E-08	6.1E-09		3.0E-08					
Surface Soil (<5 ft)	SLAPS	Dimethylbenzene	1/11	4.72E-03	1.7E-10	3.7E-11		2.1E-10					
Surface Soil (<5 ft)	SLAPS	MCPP	2/11	1.28E+01	9.1E-04	3.7E-04		1.3E-03					
Surface Soil (<5 ft)	SLAPS	PCB-1254	1/11	8.96E-02	3.2E-04	4.3E-04		7.5E-04	1.6E-09	2.2E-09	2.6E-14	3.9E-09	
Surface Soil (<5 ft)	SLAPS	Organics Pathway Total			1.2E-03	8.1E-04		2.0E-03	1.6E-09	2.2E-09	2.6E-14	3.9E-09	
Surface Soil (<5 ft)	SLAPS	Pathway Total - Chemicals			5.0E-02	2.9E-02	5.3E-05	7.9E-02	9.2E-07	4.8E-08	3.7E-09	9.7E-07	

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 13 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Residential													
Soil - All Depths	09K220205/VP-54	Manganese	10/10	4.69E+03	1.9E-01	1.6E-02	3.5E-02	2.4E-01					
Soil - All Depths	09K220205/VP-54	Inorganics Pathway Total			1.9E-01	1.6E-02	3.5E-02	2.4E-01					
Soil - All Depths	09K220205/VP-54	Pathway Total - Chemicals			1.9E-01	1.6E-02	3.5E-02	2.4E-01					
Soil - All Depths	Futura	Arsenic	1/1	3.20E+02	2.0E+00	1.6E-02		2.0E+00	3.8E-04	3.1E-06	2.2E-07	3.9E-04	R,H
Soil - All Depths	Futura	Barium	1/1	3.48E+03	9.3E-02	4.4E-03	2.6E-03	1.0E-01					
Soil - All Depths	Futura	Cadmium	4/14	3.73E+00	6.9E-03	2.3E-02		3.0E-02			1.1E-09	1.1E-09	
Soil - All Depths	Futura	Molybdenum	5/14	2.01E+02	7.5E-02	6.6E-04		7.6E-02					
Soil - All Depths	Futura	Nickel	1/1	1.73E+04	1.6E+00	2.0E-02		1.6E+00					H
Soil - All Depths	Futura	Selenium	1/14	2.15E+02	8.0E-02	6.1E-04		8.1E-02					
Soil - All Depths	Futura	Vanadium	1/1	2.18E+03	5.8E-01	1.9E-01		7.7E-01					H
Soil - All Depths	Futura	Inorganics Pathway Total			4.4E+00	2.6E-01	2.6E-03	4.7E+00	3.8E-04	3.1E-06	2.2E-07	3.9E-04	R,H
Soil - All Depths	Futura	Pathway Total - Chemicals			4.4E+00	2.6E-01	2.6E-03	4.7E+00	3.8E-04	3.1E-06	2.2E-07	3.9E-04	R,H
Soil - All Depths	HISS	Antimony	1/13	5.70E+01	2.7E-01	4.5E-02		3.1E-01					H
Soil - All Depths	HISS	Arsenic	2/2	1.01E+03	6.3E+00	5.1E-02		6.3E+00	1.2E-03	9.9E-06	6.9E-07	1.2E-03	R,H
Soil - All Depths	HISS	Barium	2/2	4.36E+03	1.2E-01	5.6E-03	3.2E-03	1.2E-01					H
Soil - All Depths	HISS	Boron	1/1	1.01E+03	2.1E-02	7.8E-05	1.9E-05	2.1E-02					
Soil - All Depths	HISS	Cadmium	5/13	6.44E+00	1.2E-02	4.0E-02		5.2E-02			1.8E-09	1.8E-09	
Soil - All Depths	HISS	Molybdenum	4/13	2.48E+02	9.2E-02	8.2E-04		9.3E-02					
Soil - All Depths	HISS	Nickel	1/1	1.78E+03	1.7E-01	2.1E-03		1.7E-01					H
Soil - All Depths	HISS	Nitrate	1/1	1.03E+03	1.2E-03	8.0E-06		1.2E-03					
Soil - All Depths	HISS	Selenium	2/13	2.29E+02	8.5E-02	6.5E-04		8.6E-02					
Soil - All Depths	HISS	Thallium	2/13	2.17E+02	5.1E+00	8.5E-02		5.1E+00					H
Soil - All Depths	HISS	Vanadium	1/1	7.12E+02	1.9E-01	6.4E-02		2.5E-01					H
Soil - All Depths	HISS	Inorganics Pathway Total			1.2E+01	2.9E-01	3.2E-03	1.3E+01	1.2E-03	9.9E-06	6.9E-07	1.2E-03	R,H
Soil - All Depths	HISS	Pathway Total - Chemicals			1.2E+01	2.9E-01	3.2E-03	1.3E+01	1.2E-03	9.9E-06	6.9E-07	1.2E-03	R,H
Surface Soil (<5 ft)	IA-1	PCB-1254	1/2	2.60E-01	2.4E-02	5.4E-03		3.0E-02	4.2E-07	9.3E-08	2.4E-11	5.1E-07	
Surface Soil (<5 ft)	IA-1	Organics Pathway Total			2.4E-02	5.4E-03		3.0E-02	4.2E-07	9.3E-08	2.4E-11	5.1E-07	
Surface Soil (<5 ft)	IA-1	Pathway Total - Chemicals			2.4E-02	5.4E-03		3.0E-02	4.2E-07	9.3E-08	2.4E-11	5.1E-07	
Surface Soil (<0.5 ft)	IA-10	Benz(a)anthracene	4/4	6.96E-01					4.1E-07	4.4E-08	9.8E-12	4.5E-07	
Surface Soil (<0.5 ft)	IA-10	Benzo(a)pyrene	4/4	7.34E-01					4.3E-06	4.6E-07	1.0E-10	4.7E-06	
Surface Soil (<0.5 ft)	IA-10	Benzo(b)fluoranthene	4/4	6.47E-01					3.8E-07	4.1E-08	9.1E-12	4.2E-07	
Surface Soil (<0.5 ft)	IA-10	Indeno(1,2,3-cd)pyrene	4/4	7.77E-01					4.5E-07	4.9E-08	1.1E-11	5.0E-07	
Surface Soil (<0.5 ft)	IA-10	Organics Pathway Total							5.5E-06	6.0E-07	1.3E-10	6.1E-06	
Surface Soil (<0.5 ft)	IA-10	Pathway Total - Chemicals							5.5E-06	6.0E-07	1.3E-10	6.1E-06	
Surface Soil (<0.5 ft)	IA-13	Arsenic	6/6	1.99E+01	1.2E-01	1.0E-03		1.2E-01	2.4E-05	1.9E-07	1.4E-08	2.4E-05	
Surface Soil (<0.5 ft)	IA-13	Thallium	1/6	1.05E+00	2.4E-02	4.1E-04		2.5E-02					
Surface Soil (<0.5 ft)	IA-13	Uranium	1/6	9.31E+00	5.8E-03	2.3E-05		5.8E-03					
Surface Soil (<0.5 ft)	IA-13	Inorganics Pathway Total			1.5E-01	1.4E-03		1.6E-01	2.4E-05	1.9E-07	1.4E-08	2.4E-05	
Surface Soil (<0.5 ft)	IA-13	Pathway Total - Chemicals			1.5E-01	1.4E-03		1.6E-01	2.4E-05	1.9E-07	1.4E-08	2.4E-05	
Surface Soil (<5 ft)	IA-2	Arsenic	2/2	2.37E+02	1.5E+00	1.2E-02		1.5E+00	2.8E-04	2.3E-06	1.6E-07	2.9E-04	R,H
Surface Soil (<5 ft)	IA-2	Cadmium	4/12	2.31E+00	4.3E-03	1.4E-02		1.9E-02			6.6E-10	6.6E-10	
Surface Soil (<5 ft)	IA-2	Molybdenum	3/12	5.76E+01	2.1E-02	1.9E-04		2.2E-02					

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 14 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Surface Soil (<5 ft)	IA-2	Vanadium	2/2	8.62E+02	2.3E-01	7.7E-02		3.1E-01					H
Surface Soil (<5 ft)	IA-2	Inorganics Pathway Total			1.7E+00	1.0E-01		1.8E+00	2.8E-04	2.3E-06	1.6E-07	2.9E-04	R,H
Surface Soil (<5 ft)	IA-2	Pathway Total - Chemicals			1.7E+00	1.0E-01		1.8E+00	2.8E-04	2.3E-06	1.6E-07	2.9E-04	R,H
Surface Soil (<5 ft)	IA-3	Antimony	2/7	2.49E+01	1.2E-01	1.9E-02		1.4E-01					H
Surface Soil (<5 ft)	IA-3	Cadmium	2/7	2.14E+01	4.0E-02	1.3E-01		1.7E-01			6.1E-09	6.1E-09	H
Surface Soil (<5 ft)	IA-3	Chromium	4/4	2.72E+03	1.7E+00	2.8E-01	1.0E-02	2.0E+00			5.1E-06	5.1E-06	H
Surface Soil (<5 ft)	IA-3	Molybdenum	3/7	2.83E+01	1.1E-02	9.3E-05		1.1E-02					
Surface Soil (<5 ft)	IA-3	Thallium	2/7	1.40E+00	3.3E-02	5.5E-04		3.3E-02					
Surface Soil (<5 ft)	IA-3	Uranium	2/3	1.29E+02	8.0E-02	3.2E-04		8.0E-02					
Surface Soil (<5 ft)	IA-3	Vanadium	3/3	5.72E+01	1.5E-02	5.1E-03		2.0E-02					
Surface Soil (<5 ft)	IA-3	Zinc	4/4	3.64E+03	2.3E-02	3.8E-04		2.3E-02					
Surface Soil (<5 ft)	IA-3	Inorganics Pathway Total			2.0E+00	4.4E-01	1.0E-02	2.5E+00			5.1E-06	5.1E-06	H
Surface Soil (<5 ft)	IA-3	1,2-Dichloroethene	1/3	3.00E-03	6.2E-07	2.6E-08		6.5E-07					
Surface Soil (<5 ft)	IA-3	Dimethylbenzene	1/3	1.00E-02	9.3E-09	3.4E-10		9.7E-09					
Surface Soil (<5 ft)	IA-3	MCPP	1/3	1.10E+01	2.0E-02	1.4E-03		2.2E-02					
Surface Soil (<5 ft)	IA-3	Organics Pathway Total			2.0E-02	1.4E-03		2.2E-02					
Surface Soil (<5 ft)	IA-3	Pathway Total - Chemicals			2.0E+00	4.4E-01	1.0E-02	2.5E+00			5.1E-06	5.1E-06	H
Surface Soil (<5 ft)	IA-4	Arsenic	3/3	5.08E+01	3.2E-01	2.6E-03		3.2E-01	6.1E-05	5.0E-07	3.5E-08	6.1E-05	
Surface Soil (<5 ft)	IA-4	Barium	4/4	3.27E+03	8.7E-02	4.2E-03	2.4E-03	9.4E-02					
Surface Soil (<5 ft)	IA-4	Cadmium	1/7	2.14E+00	4.0E-03	1.3E-02		1.7E-02			6.1E-10	6.1E-10	
Surface Soil (<5 ft)	IA-4	Molybdenum	3/7	3.86E+01	1.4E-02	1.3E-04		1.5E-02					
Surface Soil (<5 ft)	IA-4	Nickel	3/3	2.01E+03	1.9E-01	2.3E-03		1.9E-01					
Surface Soil (<5 ft)	IA-4	Thallium	2/7	3.30E+00	7.7E-02	1.3E-03		7.8E-02					
Surface Soil (<5 ft)	IA-4	Uranium	1/2	7.36E+01	4.6E-02	1.8E-04		4.6E-02					
Surface Soil (<5 ft)	IA-4	Inorganics Pathway Total			7.3E-01	2.4E-02	2.4E-03	7.6E-01	6.1E-05	5.0E-07	3.5E-08	6.1E-05	
Surface Soil (<5 ft)	IA-4	Pathway Total - Chemicals			7.3E-01	2.4E-02	2.4E-03	7.6E-01	6.1E-05	5.0E-07	3.5E-08	6.1E-05	
Surface Soil (<5 ft)	IA-5	Arsenic	7/7	1.60E+01	9.9E-02	8.1E-04		1.0E-01	1.9E-05	1.6E-07	1.1E-08	1.9E-05	
Surface Soil (<5 ft)	IA-5	Barium	8/8	1.77E+03	4.7E-02	2.3E-03	1.3E-03	5.1E-02					
Surface Soil (<5 ft)	IA-5	Cadmium	3/18	1.03E+00	1.9E-03	6.4E-03		8.4E-03			2.9E-10	2.9E-10	
Surface Soil (<5 ft)	IA-5	Chromium	7/7	2.59E+01	1.6E-02	2.7E-03	9.6E-05	1.9E-02			4.8E-08	4.8E-08	
Surface Soil (<5 ft)	IA-5	Thallium	4/18	2.00E+00	4.7E-02	7.8E-04		4.7E-02					
Surface Soil (<5 ft)	IA-5	Uranium	3/7	2.51E+01	1.6E-02	6.1E-05		1.6E-02					
Surface Soil (<5 ft)	IA-5	Vanadium	7/7	6.58E+01	1.8E-02	5.9E-03		2.3E-02					
Surface Soil (<5 ft)	IA-5	Inorganics Pathway Total			2.4E-01	1.9E-02	1.4E-03	2.6E-01	1.9E-05	1.6E-07	5.9E-08	1.9E-05	
Surface Soil (<5 ft)	IA-5	MCPP	1/5	2.20E+01	4.1E-02	2.7E-03		4.4E-02					
Surface Soil (<5 ft)	IA-5	Organics Pathway Total			4.1E-02	2.7E-03		4.4E-02					
Surface Soil (<5 ft)	IA-5	Pathway Total - Chemicals			2.9E-01	2.2E-02	1.4E-03	3.1E-01	1.9E-05	1.6E-07	5.9E-08	1.9E-05	
Surface Soil (<5 ft)	IA-7	Barium	4/4	1.36E+04	3.6E-01	1.7E-02	1.0E-02	3.9E-01					H
Surface Soil (<5 ft)	IA-7	Molybdenum	2/4	2.55E+02	9.5E-02	8.4E-04		9.6E-02					
Surface Soil (<5 ft)	IA-7	Nickel	4/4	7.38E+03	6.9E-01	8.5E-03		7.0E-01					H
Surface Soil (<5 ft)	IA-7	Selenium	2/4	1.73E+02	6.4E-02	4.9E-04		6.5E-02					
Surface Soil (<5 ft)	IA-7	Vanadium	3/3	6.30E+02	1.7E-01	5.6E-02		2.2E-01					H
Surface Soil (<5 ft)	IA-7	Inorganics Pathway Total			1.4E+00	8.3E-02	1.0E-02	1.5E+00					H
Surface Soil (<5 ft)	IA-7	Pathway Total - Chemicals			1.4E+00	8.3E-02	1.0E-02	1.5E+00					H
Surface Soil (<0.5 ft)	IA-8	Chromium	1/1	4.26E+01	2.6E-02	4.4E-03	1.6E-04	3.1E-02			7.9E-08	7.9E-08	

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 15 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Surface Soil (<0.5 ft)	IA-8	Inorganics Pathway Total			2.6E-02	4.4E-03	1.6E-04	3.1E-02			7.9E-08	7.9E-08	
Surface Soil (<0.5 ft)	IA-8	Benz(a)anthracene	1/1	1.40E+00					8.2E-07	8.8E-08	2.0E-11	9.0E-07	
Surface Soil (<0.5 ft)	IA-8	Benzo(a)pyrene	1/1	1.60E+00					9.3E-06	1.0E-06	2.2E-10	1.0E-05	
Surface Soil (<0.5 ft)	IA-8	Benzo(b)fluoranthene	1/1	2.10E+00					1.2E-06	1.3E-07	2.9E-11	1.4E-06	
Surface Soil (<0.5 ft)	IA-8	Dibenz(a,h)anthracene	1/1	2.80E-01					1.6E-06	1.8E-07	3.9E-11	1.8E-06	
Surface Soil (<0.5 ft)	IA-8	Indeno(1,2,3-cd)pyrene	1/1	8.80E-01					5.1E-07	5.5E-08	1.2E-11	5.7E-07	
Surface Soil (<0.5 ft)	IA-8	MCPA	1/1	2.50E+01	9.3E-02	6.2E-03		9.9E-02					
Surface Soil (<0.5 ft)	IA-8	Organics Pathway Total			9.3E-02	6.2E-03		9.9E-02	1.4E-05	1.5E-06	3.3E-10	1.5E-05	
Surface Soil (<0.5 ft)	IA-8	Pathway Total - Chemicals			1.2E-01	1.1E-02	1.6E-04	1.3E-01	1.4E-05	1.5E-06	7.9E-08	1.5E-05	
Surface Soil (<0.5 ft)	IA-9	Arsenic	8/8	2.14E+01	1.3E-01	1.1E-03		1.3E-01	2.6E-05	2.1E-07	1.5E-08	2.6E-05	
Surface Soil (<0.5 ft)	IA-9	Barium	8/8	5.32E+02	1.4E-02	6.8E-04	3.9E-04	1.5E-02					
Surface Soil (<0.5 ft)	IA-9	Nickel	8/8	1.08E+03	1.0E-01	1.2E-03		1.0E-01					
Surface Soil (<0.5 ft)	IA-9	Uranium	2/8	5.28E+01	3.3E-02	1.3E-04		3.3E-02					
Surface Soil (<0.5 ft)	IA-9	Vanadium	8/8	1.85E+02	4.9E-02	1.7E-02		6.6E-02					
Surface Soil (<0.5 ft)	IA-9	Inorganics Pathway Total			3.3E-01	2.0E-02	3.9E-04	3.5E-01	2.6E-05	2.1E-07	1.5E-08	2.6E-05	
Surface Soil (<0.5 ft)	IA-9	Benzo(a)pyrene	8/8	5.90E-01					3.4E-06	3.7E-07	8.3E-11	3.8E-06	
Surface Soil (<0.5 ft)	IA-9	Dimethylbenzene	2/8	7.06E-03	6.6E-09	2.4E-10		6.8E-09					
Surface Soil (<0.5 ft)	IA-9	Organics Pathway Total			6.6E-09	2.4E-10		6.8E-09	3.4E-06	3.7E-07	8.3E-11	3.8E-06	
Surface Soil (<0.5 ft)	IA-9	Pathway Total - Chemicals			3.3E-01	2.0E-02	3.9E-04	3.5E-01	2.9E-05	5.8E-07	1.5E-08	3.0E-05	
Soil - All Depths	ROAD ROW	Arsenic	1/1	2.32E+01	1.4E-01	1.2E-03		1.5E-01	2.8E-05	2.3E-07	1.6E-08	2.8E-05	
Soil - All Depths	ROAD ROW	Manganese	1/1	6.32E+03	2.6E-01	2.1E-02	4.7E-02	3.2E-01					
Soil - All Depths	ROAD ROW	Thallium	1/1	7.20E+00	1.7E-01	2.8E-03		1.7E-01					
Soil - All Depths	ROAD ROW	Vanadium	1/1	6.53E+01	1.7E-02	5.8E-03		2.3E-02					
Soil - All Depths	ROAD ROW	Inorganics Pathway Total			5.9E-01	3.1E-02	4.7E-02	6.6E-01	2.8E-05	2.3E-07	1.6E-08	2.8E-05	
Soil - All Depths	ROAD ROW	MCPP	1/1	1.20E+02	2.2E-01	1.5E-02		2.4E-01					
Soil - All Depths	ROAD ROW	Organics Pathway Total			2.2E-01	1.5E-02		2.4E-01					
Soil - All Depths	ROAD ROW	Pathway Total - Chemicals			8.1E-01	4.6E-02	4.7E-02	9.0E-01	2.8E-05	2.3E-07	1.6E-08	2.8E-05	
Surface Soil (<5 ft)	SLAPS	Arsenic	17/17	6.69E+01	4.2E-01	3.4E-03		4.2E-01	8.0E-05	6.6E-07	4.6E-08	8.1E-05	H
Surface Soil (<5 ft)	SLAPS	Barium	19/19	3.68E+03	9.8E-02	4.7E-03	2.7E-03	1.1E-01					H
Surface Soil (<5 ft)	SLAPS	Cadmium	12/52	3.45E+00	6.4E-03	2.2E-02		2.8E-02			9.8E-10	9.8E-10	
Surface Soil (<5 ft)	SLAPS	Chromium	15/15	6.14E+02	3.8E-01	6.4E-02	2.3E-03	4.5E-01			1.1E-06	1.1E-06	H
Surface Soil (<5 ft)	SLAPS	Molybdenum	19/52	3.58E+01	1.3E-02	1.2E-04		1.3E-02					
Surface Soil (<5 ft)	SLAPS	Nickel	17/17	1.74E+03	1.6E-01	2.0E-03		1.6E-01					H
Surface Soil (<5 ft)	SLAPS	Selenium	10/52	1.99E+01	7.4E-03	5.7E-05		7.5E-03					
Surface Soil (<5 ft)	SLAPS	Thallium	8/52	3.30E+00	7.7E-02	1.3E-03		7.8E-02					
Surface Soil (<5 ft)	SLAPS	Uranium	6/14	4.19E+01	2.6E-02	1.0E-04		2.6E-02					
Surface Soil (<5 ft)	SLAPS	Vanadium	17/17	2.88E+02	7.7E-02	2.6E-02		1.0E-01					H
Surface Soil (<5 ft)	SLAPS	Zinc	15/15	8.44E+02	5.2E-03	8.8E-05		5.3E-03					
Surface Soil (<5 ft)	SLAPS	Inorganics Pathway Total			1.3E+00	1.2E-01	5.0E-03	1.4E+00	8.0E-05	6.6E-07	1.2E-06	8.2E-05	H
Surface Soil (<5 ft)	SLAPS	1,2-Dichloroethene	1/11	3.00E-03	6.2E-07	2.6E-08		6.5E-07					
Surface Soil (<5 ft)	SLAPS	Dimethylbenzene	1/11	4.72E-03	4.4E-09	1.6E-10		4.6E-09					
Surface Soil (<5 ft)	SLAPS	MCPP	2/11	1.28E+01	2.4E-02	1.6E-03		2.5E-02					
Surface Soil (<5 ft)	SLAPS	PCB-1254	1/11	8.96E-02	8.3E-03	1.9E-03		1.0E-02	1.4E-07	3.2E-08	8.1E-12	1.8E-07	
Surface Soil (<5 ft)	SLAPS	Organics Pathway Total			3.2E-02	3.5E-03		3.6E-02	1.4E-07	3.2E-08	8.1E-12	1.8E-07	
Surface Soil (<5 ft)	SLAPS	Pathway Total - Chemicals			1.3E+00	1.3E-01	5.0E-03	1.4E+00	8.0E-05	6.9E-07	1.2E-06	8.2E-05	H

HQ = Hazard Quotient

Attachment 13. Surface Soil Risks and Hazards for Chemicals by Property (page 16 of 16)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]

HI = Hazard Index
COPC = Contaminant of Potential Concern

[a] COPC codes:
H = COPC based on hazard result
R = COPC based on risk result

Attachment 14. Subsurface Soil Risks and Hazards for Chemicals by Property (page 1 of 2)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Construction Worker													
Subsurface Soil (>0.5 ft)	09K220205/VP-54	Manganese	10/10	4.69E+03	4.8E-01	4.0E-02	2.5E-02	5.4E-01					
Subsurface Soil (>0.5 ft)	09K220205/VP-54	Inorganics Pathway Total			4.8E-01	4.0E-02	2.5E-02	5.4E-01					
Subsurface Soil (>0.5 ft)	09K220205/VP-54	Pathway Total - Chemicals			4.8E-01	4.0E-02	2.5E-02	5.4E-01					
Subsurface Soil (>0.5 ft)	IA-10	Antimony	1/14	4.27E+01	5.0E-01	8.3E-02		5.8E-01					H
Subsurface Soil (>0.5 ft)	IA-10	Arsenic	5/5	4.21E+02	6.6E+00	5.3E-02		6.6E+00	4.2E-05	3.4E-07	7.0E-09	4.3E-05	H
Subsurface Soil (>0.5 ft)	IA-10	Thallium	2/14	1.50E+02	8.8E-01	1.5E-02		9.0E-01					H
Subsurface Soil (>0.5 ft)	IA-10	Inorganics Pathway Total			8.0E+00	1.5E-01		8.1E+00	4.2E-05	3.4E-07	7.0E-09	4.3E-05	H
Subsurface Soil (>0.5 ft)	IA-10	Pathway Total - Chemicals			8.0E+00	1.5E-01		8.1E+00	4.2E-05	3.4E-07	7.0E-09	4.3E-05	H
Subsurface Soil (>0.5 ft)	IA-2	Arsenic	7/7	1.45E+02	2.3E+00	1.8E-02		2.3E+00	1.5E-05	1.2E-07	2.4E-09	1.5E-05	H
Subsurface Soil (>0.5 ft)	IA-2	Uranium	2/5	1.01E+02	1.6E-01	6.2E-04		1.6E-01					H
Subsurface Soil (>0.5 ft)	IA-2	Inorganics Pathway Total			2.4E+00	1.9E-02		2.4E+00	1.5E-05	1.2E-07	2.4E-09	1.5E-05	H
Subsurface Soil (>0.5 ft)	IA-2	1,2-Dichloroethene	1/5	1.49E-02	7.8E-06	3.2E-07		8.1E-06					
Subsurface Soil (>0.5 ft)	IA-2	Organics Pathway Total			7.8E-06	3.2E-07		8.1E-06					
Subsurface Soil (>0.5 ft)	IA-2	Pathway Total - Chemicals			2.4E+00	1.9E-02		2.4E+00	1.5E-05	1.2E-07	2.4E-09	1.5E-05	H
Subsurface Soil (>0.5 ft)	IA-3	Chromium	8/8	1.19E+03	2.8E-01	4.6E-02	3.2E-03	3.3E-01			5.4E-08	5.4E-08	
Subsurface Soil (>0.5 ft)	IA-3	Uranium	2/7	5.95E+01	9.3E-02	3.6E-04		9.4E-02					
Subsurface Soil (>0.5 ft)	IA-3	Inorganics Pathway Total			3.7E-01	4.7E-02	3.2E-03	4.2E-01			5.4E-08	5.4E-08	
Subsurface Soil (>0.5 ft)	IA-3	1,2-Dichloroethene	1/7	3.00E-03	1.6E-06	6.5E-08		1.6E-06					
Subsurface Soil (>0.5 ft)	IA-3	Dimethylbenzene	2/7	6.45E-03	8.5E-08	3.1E-09		8.8E-08					
Subsurface Soil (>0.5 ft)	IA-3	Organics Pathway Total			1.7E-06	6.8E-08		1.7E-06					
Subsurface Soil (>0.5 ft)	IA-3	Pathway Total - Chemicals			3.7E-01	4.7E-02	3.2E-03	4.2E-01			5.4E-08	5.4E-08	
Subsurface Soil (>0.5 ft)	IA-4	Arsenic	13/13	1.62E+01	2.5E-01	2.1E-03		2.6E-01	1.6E-06	1.3E-08	2.7E-10	1.6E-06	
Subsurface Soil (>0.5 ft)	IA-4	Uranium	2/12	2.42E+01	3.8E-02	1.5E-04		3.8E-02					
Subsurface Soil (>0.5 ft)	IA-4	Inorganics Pathway Total			2.9E-01	2.2E-03		2.9E-01	1.6E-06	1.3E-08	2.7E-10	1.6E-06	
Subsurface Soil (>0.5 ft)	IA-4	Pathway Total - Chemicals			2.9E-01	2.2E-03		2.9E-01	1.6E-06	1.3E-08	2.7E-10	1.6E-06	
Subsurface Soil (>0.5 ft)	IA-5	Arsenic	26/26	1.08E+01	1.7E-01	1.4E-03		1.7E-01	1.1E-06	8.8E-09	1.8E-10	1.1E-06	
Subsurface Soil (>0.5 ft)	IA-5	Uranium	4/26	1.28E+01	2.0E-02	7.8E-05		2.0E-02					
Subsurface Soil (>0.5 ft)	IA-5	Inorganics Pathway Total			1.9E-01	1.4E-03		1.9E-01	1.1E-06	8.8E-09	1.8E-10	1.1E-06	
Subsurface Soil (>0.5 ft)	IA-5	Pathway Total - Chemicals			1.9E-01	1.4E-03		1.9E-01	1.1E-06	8.8E-09	1.8E-10	1.1E-06	
Subsurface Soil (>0.5 ft)	IA-7	Nickel	12/12	2.28E+03	5.4E-01	6.6E-03		5.4E-01					
Subsurface Soil (>0.5 ft)	IA-7	Inorganics Pathway Total			5.4E-01	6.6E-03		5.4E-01					
Subsurface Soil (>0.5 ft)	IA-7	Pathway Total - Chemicals			5.4E-01	6.6E-03		5.4E-01					
Subsurface Soil (>0.5 ft)	IA-9	Arsenic	41/41	1.37E+01	2.1E-01	1.7E-03		2.2E-01	1.4E-06	1.1E-08	2.3E-10	1.4E-06	
Subsurface Soil (>0.5 ft)	IA-9	Thallium	7/61	1.06E+01	6.2E-02	1.0E-03		6.3E-02					
Subsurface Soil (>0.5 ft)	IA-9	Uranium	3/40	1.63E+01	2.6E-02	1.0E-04		2.6E-02					
Subsurface Soil (>0.5 ft)	IA-9	Inorganics Pathway Total			3.0E-01	2.9E-03		3.1E-01	1.4E-06	1.1E-08	2.3E-10	1.4E-06	
Subsurface Soil (>0.5 ft)	IA-9	Dieldrin	4/40	1.25E-01	1.2E-02	7.8E-04		1.3E-02	1.3E-07	8.9E-09	2.2E-12	1.4E-07	
Subsurface Soil (>0.5 ft)	IA-9	Organics Pathway Total			1.2E-02	7.8E-04		1.3E-02	1.3E-07	8.9E-09	2.2E-12	1.4E-07	
Subsurface Soil (>0.5 ft)	IA-9	Pathway Total - Chemicals			3.1E-01	3.7E-03		3.2E-01	1.5E-06	2.0E-08	2.3E-10	1.5E-06	
Subsurface Soil (>0.5 ft)	ROAD ROW	Arsenic	1/1	2.32E+01	3.6E-01	2.9E-03		3.7E-01	2.3E-06	1.9E-08	3.9E-10	2.4E-06	H

Attachment 14. Subsurface Soil Risks and Hazards for Chemicals by Property (page 2 of 2)

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Subsurface Soil (>0.5 ft)	ROAD ROW	Manganese	1/1	6.32E+03	6.5E-01	5.4E-02	3.4E-02	7.3E-01					H
Subsurface Soil (>0.5 ft)	ROAD ROW	Inorganics Pathway Total			1.0E+00	5.7E-02	3.4E-02	1.1E+00	2.3E-06	1.9E-08	3.9E-10	2.4E-06	H
Subsurface Soil (>0.5 ft)	ROAD ROW	MCPP	1/1	1.20E+02	5.6E-02	3.7E-03		6.0E-02					
Subsurface Soil (>0.5 ft)	ROAD ROW	Organics Pathway Total			5.6E-02	3.7E-03		6.0E-02					
Subsurface Soil (>0.5 ft)	ROAD ROW	Pathway Total - Chemicals			1.1E+00	6.0E-02	3.4E-02	1.2E+00	2.3E-06	1.9E-08	3.9E-10	2.4E-06	H
Subsurface Soil (>0.5 ft)	SLAPS	Arsenic	64/64	2.26E+01	3.5E-01	2.9E-03		3.6E-01	2.3E-06	1.8E-08	3.8E-10	2.3E-06	
Subsurface Soil (>0.5 ft)	SLAPS	Chromium	62/62	1.56E+02	3.7E-02	6.1E-03	4.2E-04	4.3E-02			7.1E-09	7.1E-09	
Subsurface Soil (>0.5 ft)	SLAPS	Nickel	65/65	4.91E+02	1.2E-01	1.4E-03		1.2E-01					
Subsurface Soil (>0.5 ft)	SLAPS	Uranium	10/61	2.03E+01	3.2E-02	1.2E-04		3.2E-02					
Subsurface Soil (>0.5 ft)	SLAPS	Inorganics Pathway Total			5.4E-01	1.1E-02	4.2E-04	5.5E-01	2.3E-06	1.8E-08	7.4E-09	2.3E-06	
Subsurface Soil (>0.5 ft)	SLAPS	1,2-Dichloroethene	2/38	4.33E-03	2.3E-06	9.4E-08		2.4E-06					
Subsurface Soil (>0.5 ft)	SLAPS	Dimethylbenzene	2/38	3.59E-03	4.7E-08	1.7E-09		4.9E-08					
Subsurface Soil (>0.5 ft)	SLAPS	Organics Pathway Total			2.3E-06	9.6E-08		2.4E-06					
Subsurface Soil (>0.5 ft)	SLAPS	Pathway Total - Chemicals			5.4E-01	1.1E-02	4.2E-04	5.5E-01	2.3E-06	1.8E-08	7.4E-09	2.3E-06	

HQ = Hazard Quotient
HI = Hazard Index
COPC = Contaminant of Potential Concern

[a] COPC codes:
H = COPC based on hazard result
R = COPC based on risk result

Attachment 15. Ground-Water Risks and Hazards for Non-radionuclides by Aggregates (page 1 of 3)

Analyte	Freq. Det.	Expos. Point Conc. (mg/L)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Industrial Worker											
HISS/DEEP											
Ammonia	3/3	1.25E+01									
Barium	3/3	8.62E-01	1E-01			1E-01					H
Manganese	3/3	8.48E-01	2E-01			2E-01					H
Thallium	1/3	2.80E-03	3E-01			3E-01					H
Uranium	1/3	7.86E-05	3E-04			3E-04					
Inorganics Pathway Total			6E-01			6E-01					H
MCPP	1/1	4.70E-01	5E+00			5E+00					H
Organics Pathway Total			5E+00			5E+00					H
Pathway Total - Chemicals			5E+00			5E+00					H
HISS/SHALLOW											
Ammonia	3/43	6.51E-01									
Arsenic	4/43	1.36E-02	4E-01			4E-01	7E-05			7E-05	H
Barium	43/43	2.60E-01	4E-02			4E-02					
Cadmium	4/43	2.27E-03	4E-02			4E-02					
Fluoride	19/41	4.71E-01	8E-02			8E-02					
Manganese	26/39	3.98E+00	8E-01			8E-01					H
Molybdenum	21/43	7.85E-03	2E-02			2E-02					
Nitrate	40/45	3.67E+02	2E+00			2E+00					H
Nitrite	3/24	4.64E-01	5E-02			5E-02					
Selenium	30/43	1.46E-01	3E-01			3E-01					H
Strontium	42/42	1.16E+00	2E-02			2E-02					
Uranium	19/45	7.39E-02	2E-01			2E-01					H
Vanadium	7/43	1.49E-02	2E-02			2E-02					
Inorganics Pathway Total			4E+00			4E+00	7E-05			7E-05	H
Chloroform	9/41	6.52E-03	6E-03			6E-03	1E-07			1E-07	
Chloromethane	4/41	5.00E-03					2E-07			2E-07	
Dimethylbenzene	3/41	5.09E-03	2E-05			2E-05					
Trichloroethene	7/41	1.38E-01	2E-01			2E-01	5E-06			5E-06	H
Organics Pathway Total			2E-01			2E-01	6E-06			6E-06	H
Pathway Total - Chemicals			5E+00			5E+00	8E-05			8E-05	H
SLAPS/DEEP											
Ammonia	43/49	4.04E+00									
Arsenic	38/48	6.76E-02	2E+00			2E+00	4E-04			4E-04	R,H
Barium	48/48	4.14E-01	6E-02			6E-02					

Analyte	Freq. Det.	Expos. Point Conc. (mg/L)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Boron	37/48	2.43E-01	3E-02			3E-02					
Chromium	21/48	4.62E-03	2E-02			2E-02					
Fluoride	22/46	4.35E-01	7E-02			7E-02					
Manganese	48/48	1.12E+00	2E-01			2E-01					H
Molybdenum	23/48	6.95E-03	1E-02			1E-02					
Nitrate	12/49	2.71E+00	2E-02			2E-02					
Thallium	3/47	2.11E-03	3E-01			3E-01					H
Uranium	15/49	1.05E-02	3E-02			3E-02					
Inorganics Pathway Total			3E+00			3E+00	4E-04			4E-04	R,H
Bis(2-ethylhexyl)phthalate	2/37	4.45E-03	2E-03			2E-03	2E-07			2E-07	
Organics Pathway Total			2E-03			2E-03	2E-07			2E-07	
Pathway Total - Chemicals			3E+00			3E+00	4E-04			4E-04	R,H
SLAPS/SHALLOW											
Ammonia	27/97	1.49E+00									
Arsenic	13/92	4.27E-03	1E-01			1E-01	2E-05			2E-05	H
Barium	92/92	2.80E-01	4E-02			4E-02					
Boron	58/92	1.28E-01	1E-02			1E-02					
Cadmium	15/92	1.10E-03	2E-02			2E-02					
Chromium	31/92	1.30E-02	4E-02			4E-02					
Fluoride	25/82	4.82E-01	8E-02			8E-02					
Manganese	76/87	9.60E-01	2E-01			2E-01					H
Molybdenum	27/92	7.20E-03	1E-02			1E-02					
Nickel	41/92	5.49E-02	3E-02			3E-02					
Nitrate	84/97	1.39E+02	9E-01			9E-01					H
Nitrite	6/64	5.39E-01	5E-02			5E-02					
Selenium	53/92	4.24E-01	8E-01			8E-01					H
Uranium	38/98	5.26E-01	2E+00			2E+00					H
Vanadium	28/92	7.92E-03	1E-02			1E-02					
Inorganics Pathway Total			4E+00			4E+00	2E-05			2E-05	H
1,2-Dichloroethene	16/85	6.74E-03	7E-03			7E-03					
Bis(2-ethylhexyl)phthalate	7/83	5.57E-03	3E-03			3E-03	3E-07			3E-07	
Trichloroethene	24/85	7.29E-02	1E-01			1E-01	3E-06			3E-06	H
Organics Pathway Total			1E-01			1E-01	3E-06			3E-06	H
Pathway Total - Chemicals			4E+00			4E+00	3E-05			3E-05	H

Resident

HISS/DEEP											
Ammonia	3/3	1.25E+01									

Attachment 15. Ground-Water Risks and Hazards for Non-radionuclides by Aggregates (page 3 of 3)

Analyte	Freq. Det.	Expos. Point Conc. (mg/L)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Barium	3/3	8.62E-01	4E-01	1E-02		4E-01					H
Manganese	3/3	8.48E-01	6E-01	3E-02		6E-01					H
Thallium	1/3	2.80E-03	1E+00	1E-02		1E+00					H
Uranium	1/3	7.86E-05	8E-04	2E-06		8E-04					
Inorganics Pathway Total			2E+00	6E-02		2E+00					H
MCPP	1/1	4.70E-01	1E+01	5E-01		2E+01					H
Organics Pathway Total			1E+01	5E-01		2E+01					H
Pathway Total - Chemicals			2E+01	5E-01		2E+01					H
<u>SLAPS/DEEP</u>											
Ammonia	43/49	4.04E+00									
Arsenic	38/48	6.76E-02	7E+00	4E-02		7E+00	1E-03	8E-06		1E-03	R,H
Barium	48/48	4.14E-01	2E-01	6E-03		2E-01					H
Boron	37/48	2.43E-01	9E-02	2E-04		9E-02					
Chromium	21/48	4.62E-03	5E-02	6E-03		5E-02					
Fluoride	22/46	4.35E-01	2E-01	6E-04		2E-01					H
Manganese	48/48	1.12E+00	8E-01	5E-02		8E-01					H
Molybdenum	23/48	6.95E-03	4E-02	3E-04		4E-02					
Nitrate	12/49	2.71E+00	5E-02	3E-04		5E-02					
Thallium	3/47	2.11E-03	8E-01	1E-02		8E-01					H
Uranium	15/49	1.05E-02	1E-01	3E-04		1E-01					H
Inorganics Pathway Total			9E+00	1E-01		1E+01	1E-03	8E-06		1E-03	R,H
Bis(2-ethylhexyl)phthalate	2/37	4.45E-03	7E-03	2E-03		9E-03	8E-07	2E-07		1E-06	R
Organics Pathway Total			7E-03	2E-03		9E-03	8E-07	2E-07		1E-06	R
Pathway Total - Chemicals			9E+00	1E-01		1E+01	1E-03	8E-06		1E-03	R,H

HQ = Hazard Quotient
HI = Hazard Index
COPC = Contaminant of Potential Concern

[a] COPC codes:
H = COPC based on hazard result
R = COPC based on risk result

Attachment 16. Surface Water Risks and Hazards for Chemicals by Aggregates (page 1 of 2)

Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/L)	Dermal HQ	Inhal. HQ	Total HI	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Recreational/Trespasser										
Reach A	Arsenic	4/6	4.94E-03	1.4E-04		1.4E-04	7.9E-09		7.9E-09	
Reach A	Fluoride	7/9	1.12E+00							
Reach A	Molybdenum	7/7	5.00E-02	8.9E-05		8.9E-05				
Reach A	Nitrate	10/10	6.05E+01	2.6E-04		2.6E-04				
Reach A	Nitrite	9/9	7.07E-01	4.8E-05		4.8E-05				
Reach A	Selenium	6/6	5.65E-01	8.7E-04		8.7E-04				
Reach A	Uranium	31/32	4.66E-02	6.2E-05		6.2E-05				
Reach A	Inorganics Pathway Total			1.5E-03		1.5E-03	7.9E-09		7.9E-09	
Reach A	Bis(2-ethylhexyl)phthalate	1/6	6.25E-03	1.3E-04		1.3E-04	4.6E-09		4.6E-09	
Reach A	Dimethylbenzene	1/6	1.00E-03	1.8E-07		1.8E-07				
Reach A	Methylene chloride	4/6	5.10E-03	1.4E-06	8.4E-07	2.2E-06	7.9E-11	1.5E-10	2.3E-10	
Reach A	Tetrachloroethene	4/6	2.76E-03	3.5E-04	2.3E-06	3.5E-04	2.3E-08	1.0E-10	2.3E-08	
Reach A	Trichloroethene	4/6	7.70E-03	4.6E-04		4.6E-04	3.9E-09	8.4E-10	4.8E-09	
Reach A	Organics Pathway Total			9.4E-04	3.1E-06	9.4E-04	3.2E-08	1.1E-09	3.3E-08	
Reach A	Pathway Total - Chemicals			2.4E-03	3.1E-06	2.4E-03	4.0E-08	1.1E-09	4.1E-08	
Reach B	Molybdenum	2/3	2.80E-02	5.0E-05		5.0E-05				
Reach B	Uranium	24/26	1.55E-02	2.1E-05		2.1E-05				
Reach B	Inorganics Pathway Total			7.1E-05		7.1E-05				
Reach B	Acetone	2/3	1.79E-01	4.2E-06		4.2E-06				
Reach B	Organics Pathway Total			4.2E-06		4.2E-06				
Reach B	Pathway Total - Chemicals			7.5E-05		7.5E-05				
Resident/Child										
Reach A	Arsenic	4/6	4.94E-03	7.1E-04		7.1E-04	4.1E-08		4.1E-08	
Reach A	Fluoride	7/9	1.12E+00							
Reach A	Molybdenum	7/7	5.00E-02	4.6E-04		4.6E-04				
Reach A	Nitrate	10/10	6.05E+01	1.3E-03		1.3E-03				
Reach A	Nitrite	9/9	7.07E-01	2.5E-04		2.5E-04				
Reach A	Selenium	6/6	5.65E-01	4.5E-03		4.5E-03				
Reach A	Uranium	31/32	4.66E-02	3.2E-04		3.2E-04				
Reach A	Inorganics Pathway Total			7.6E-03		7.6E-03	4.1E-08		4.1E-08	
Reach A	Bis(2-ethylhexyl)phthalate	1/6	6.25E-03	6.7E-04		6.7E-04	2.4E-08		2.4E-08	
Reach A	Dimethylbenzene	1/6	1.00E-03	9.1E-07		9.1E-07				
Reach A	Methylene chloride	4/6	5.10E-03	7.1E-06	4.4E-06	1.1E-05	4.1E-10	7.9E-10	1.2E-09	
Reach A	Tetrachloroethene	4/6	2.76E-03	1.8E-03	1.2E-05	1.8E-03	1.2E-07	5.2E-10	1.2E-07	
Reach A	Trichloroethene	4/6	7.70E-03	2.4E-03		2.4E-03	2.0E-08	4.3E-09	2.5E-08	
Reach A	Organics Pathway Total			4.9E-03	1.6E-05	4.9E-03	1.7E-07	5.7E-09	1.7E-07	
Reach A	Pathway Total - Chemicals			1.2E-02	1.6E-05	1.3E-02	2.1E-07	5.7E-09	2.1E-07	
Reach B	Molybdenum	2/3	2.80E-02	2.6E-04		2.6E-04				
Reach B	Uranium	24/26	1.55E-02	1.1E-04		1.1E-04				
Reach B	Inorganics Pathway Total			3.7E-04		3.7E-04				
Reach B	Acetone	2/3	1.79E-01	2.2E-05		2.2E-05				
Reach B	Organics Pathway Total			2.2E-05		2.2E-05				
Reach B	Pathway Total - Chemicals			3.9E-04		3.9E-04				

HQ = Hazard Quotient
HI = Hazard Index
COPC = Contaminant of Potential Concern

Attachment 16. Surface Water Risks and Hazards for Chemicals by Aggregates (page 2 of 2)

Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/L)	Dermal HQ	Inhal. HQ	Total HI	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]

[a] No COPCs are identified for surface water exposures.

Attachment 17. Sediment Radiological Doses and Risks for each Data Grouping (page 1 of 1)

Data Aggregate	Isotope	Exposure Point Conc. (pCi/g)	RESIDENTIAL				INDUSTRIAL				CONSTRUCTION			
			Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
HS Group 1	Ra-226	7.50E-01	2.7	0.0	4E-05	0E+00	0.9	0.0	1E-05	0E+00	1.8	0.0	1E-06	0E+00
HS Group 1	Th-230	6.65E+01	1.8	8.2	3E-05	1E-04	0.4	2.3	6E-06	3E-05	2.4	6.9	2E-07	3E-06
HS Group 1	Th-232	2.31E+00	0.3	10.6	1E-04	2E-04	0.1	3.3	3E-05	5E-05	0.4	7.4	5E-09	4E-06
HS Group 1	TOTAL		4.8	18.8	2E-04	3E-04	1.3	5.6	5E-05	8E-05	4.7	14.3	1E-06	7E-06
HS Group 2	Ra-226	2.55E+00	9.3	0.0	1E-04	0E+00	2.9	0.0	4E-05	0E+00	6.3	0.0	4E-06	0E+00
HS Group 2	Th-230	4.02E+01	1.1	5.0	2E-05	7E-05	0.2	1.4	4E-06	2E-05	1.5	4.2	9E-08	2E-06
HS Group 2	Th-232	8.86E-01	0.1	4.1	5E-05	7E-05	0.0	1.3	1E-05	2E-05	0.2	2.8	2E-09	2E-06
HS Group 2	TOTAL		10.5	9.1	2E-04	1E-04	3.2	2.7	5E-05	4E-05	7.9	7.0	4E-06	3E-06
Reach A	Ac-227	9.60E-02	0.1	0.0	3E-07	0E+00	0.0	0.0	1E-07	0E+00	0.1	0.0	2E-08	0E+00
Reach A	Pa-231	4.30E-02	0.0	0.0	9E-08	0E+00	0.0	0.0	2E-08	0E+00	0.0	0.0	6E-10	0E+00
Reach A	Ra-228	1.16E-01	0.2	0.0	2E-06	0E+00	0.1	0.0	8E-07	0E+00	0.2	0.0	8E-08	0E+00
Reach A	Th-228	2.12E-01	0.7	0.0	1E-06	0E+00	0.2	0.0	4E-07	0E+00	0.5	0.0	3E-07	0E+00
Reach A	Th-230	1.69E+01	0.5	2.1	7E-06	3E-05	0.1	0.6	2E-06	8E-06	0.6	1.8	4E-08	7E-07
Reach A	Th-232	1.60E-02	0.0	0.1	9E-07	1E-06	0.0	0.0	2E-07	3E-07	0.0	0.1	3E-11	3E-08
Reach A	U-235	6.90E-02	0.0	0.0	1E-07	0E+00	0.0	0.0	4E-08	0E+00	0.0	0.0	4E-09	0E+00
Reach A	TOTAL		1.6	2.2	1E-05	3E-05	0.4	0.6	3E-06	8E-06	1.4	1.8	4E-07	7E-07
Reach B	Ac-227	2.00E-01	0.3	0.0	7E-07	0E+00	0.1	0.0	2E-07	0E+00	0.3	0.0	5E-08	0E+00
Reach B	Pa-231	1.15E-01	0.1	0.0	2E-07	0E+00	0.0	0.0	6E-08	0E+00	0.1	0.0	1E-09	0E+00
Reach B	Ra-228	1.00E-01	0.2	0.0	2E-06	0E+00	0.1	0.0	7E-07	0E+00	0.1	0.0	7E-08	0E+00
Reach B	Th-228	4.38E-01	1.4	0.0	3E-06	0E+00	0.5	0.0	8E-07	0E+00	1.0	0.0	6E-07	0E+00
Reach B	Th-230	8.88E+00	0.2	1.1	4E-06	2E-05	0.0	0.3	8E-07	4E-06	0.3	0.9	2E-08	4E-07
Reach B	Th-232	5.26E-01	0.1	2.4	3E-05	4E-05	0.0	0.8	7E-06	1E-05	0.1	1.7	1E-09	9E-07
Reach B	U-235	1.51E-01	0.0	0.0	3E-07	0E+00	0.0	0.0	8E-08	0E+00	0.0	0.0	9E-09	0E+00
Reach B	TOTAL		2.3	3.5	4E-05	6E-05	0.7	1.1	1E-05	1E-05	1.9	2.6	7E-07	1E-06
Reach C	Ac-227	2.39E-01	0.3	0.0	8E-07	0E+00	0.1	0.0	2E-07	0E+00	0.3	0.0	6E-08	0E+00
Reach C	Ra-228	5.30E-02	0.1	0.0	1E-06	0E+00	0.0	0.0	3E-07	0E+00	0.1	0.0	4E-08	0E+00
Reach C	Th-228	5.98E-01	2.0	0.0	4E-06	0E+00	0.6	0.0	1E-06	0E+00	1.3	0.0	8E-07	0E+00
Reach C	Th-230	2.90E-01	0.0	0.0	1E-07	5E-07	0.0	0.0	3E-08	1E-07	0.0	0.0	7E-10	1E-08
Reach C	Th-232	6.66E-01	0.1	3.1	4E-05	5E-05	0.0	1.0	9E-06	1E-05	0.1	2.1	1E-09	1E-06
Reach C	U-235	2.57E-02	0.0	0.0	5E-08	0E+00	0.0	0.0	1E-08	0E+00	0.0	0.0	2E-09	0E+00
Reach C	TOTAL		2.5	3.1	4E-05	5E-05	0.8	1.0	1E-05	1E-05	1.8	2.2	9E-07	1E-06

Data Aggregate	Isotope	Exposure Point Conc. (pCi/g)	RECREATIONAL/TRESPASSER				MAINTENANCE				UTILITY[a]			
			Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000	Dose Year=0.0	Dose Year=1000	Risk Year=0.0	Risk Year=1000
HS Group 1	Ra-226	7.50E-01	0.0	0.0	2E-07	0E+00	0.1	0.0	5E-07	0E+00	0.1	0.0	4E-08	0E+00
HS Group 1	Th-230	6.65E+01	0.0	0.1	5E-08	6E-07	0.2	0.6	2E-07	1E-06	0.1	0.3	6E-09	1E-07
HS Group 1	Th-232	2.31E+00	0.0	0.2	3E-07	9E-07	0.0	0.6	5E-07	2E-06	0.0	0.3	2E-10	2E-07
HS Group 1	TOTAL		0.1	0.3	6E-07	2E-06	0.4	1.1	1E-06	3E-06	0.2	0.6	5E-08	3E-07
HS Group 2	Ra-226	2.55E+00	0.2	0.0	8E-07	0E+00	0.5	0.0	2E-06	0E+00	0.3	0.0	1E-07	0E+00
HS Group 2	Th-230	4.02E+01	0.0	0.1	3E-08	4E-07	0.1	0.3	1E-07	8E-07	0.1	0.2	4E-09	6E-08
HS Group 2	Th-232	8.86E-01	0.0	0.1	1E-07	4E-07	0.0	0.2	2E-07	7E-07	0.0	0.1	8E-11	6E-08
HS Group 2	TOTAL		0.2	0.1	9E-07	7E-07	0.6	0.6	2E-06	2E-06	0.3	0.3	2E-07	1E-07
Reach A	Ac-227	9.60E-02	0.0	0.0	3E-09	0E+00	0.0	0.0	9E-09	0E+00	0.0	0.0	9E-10	0E+00
Reach A	Pa-231	4.30E-02	0.0	0.0	3E-10	0E+00	0.0	0.0	7E-10	0E+00	0.0	0.0	2E-11	0E+00
Reach A	Ra-228	1.16E-01	0.0	0.0	3E-08	0E+00	0.0	0.0	6E-08	0E+00	0.0	0.0	3E-09	0E+00
Reach A	Th-228	2.12E-01	0.0	0.0	2E-08	0E+00	0.0	0.0	5E-08	0E+00	0.0	0.0	1E-08	0E+00
Reach A	Th-230	1.69E+01	0.0	0.0	1E-08	1E-07	0.1	0.1	4E-08	3E-07	0.0	0.1	2E-09	3E-08
Reach A	Th-232	1.60E-02	0.0	0.0	2E-09	6E-09	0.0	0.0	3E-09	1E-08	0.0	0.0	1E-12	1E-09
Reach A	U-235	6.90E-02	0.0	0.0	9E-10	0E+00	0.0	0.0	2E-09	0E+00	0.0	0.0	2E-10	0E+00
Reach A	TOTAL		0.0	0.0	7E-08	2E-07	0.1	0.1	2E-07	3E-07	0.1	0.1	2E-08	3E-08
Reach B	Ac-227	2.00E-01	0.0	0.0	7E-09	0E+00	0.0	0.0	2E-08	0E+00	0.0	0.0	2E-09	0E+00
Reach B	Pa-231	1.15E-01	0.0	0.0	8E-10	0E+00	0.0	0.0	2E-09	0E+00	0.0	0.0	6E-11	0E+00
Reach B	Ra-228	1.00E-01	0.0	0.0	2E-08	0E+00	0.0	0.0	5E-08	0E+00	0.0	0.0	3E-09	0E+00
Reach B	Th-228	4.38E-01	0.0	0.0	4E-08	0E+00	0.1	0.0	1E-07	0E+00	0.0	0.0	2E-08	0E+00
Reach B	Th-230	8.88E+00	0.0	0.0	7E-09	8E-08	0.0	0.1	2E-08	2E-07	0.0	0.0	8E-10	1E-08
Reach B	Th-232	5.26E-01	0.0	0.0	7E-08	2E-07	0.0	0.1	1E-07	4E-07	0.0	0.1	5E-11	4E-08
Reach B	U-235	1.51E-01	0.0	0.0	2E-09	0E+00	0.0	0.0	4E-09	0E+00	0.0	0.0	4E-10	0E+00
Reach B	TOTAL		0.0	0.1	2E-07	3E-07	0.2	0.2	3E-07	6E-07	0.1	0.1	3E-08	5E-08
Reach C	Ac-227	2.39E-01	0.0	0.0	8E-09	0E+00	0.0	0.0	2E-08	0E+00	0.0	0.0	2E-09	0E+00
Reach C	Ra-228	5.30E-02	0.0	0.0	1E-08	0E+00	0.0	0.0	3E-08	0E+00	0.0	0.0	2E-09	0E+00
Reach C	Th-228	5.98E-01	0.0	0.0	6E-08	0E+00	0.1	0.0	1E-07	0E+00	0.1	0.0	3E-08	0E+00
Reach C	Th-230	2.90E-01	0.0	0.0	2E-10	3E-09	0.0	0.0	7E-10	6E-09	0.0	0.0	3E-11	5E-10
Reach C	Th-232	6.66E-01	0.0	0.1	9E-08	3E-07	0.0	0.2	1E-07	6E-07	0.0	0.1	6E-11	5E-08
Reach C	U-235	2.57E-02	0.0	0.0	3E-10	0E+00	0.0	0.0	7E-10	0E+00	0.0	0.0	6E-11	0E+00
Reach C	TOTAL		0.0	0.1	2E-07	3E-07	0.1	0.2	3E-07	6E-07	0.1	0.1	4E-08	5E-08

Doses less than 0.1 mrem/yr shown as 0.0.
All risk estimates rounded on one digit
HS calculations performed for two elevated areas (about 100 linear meters along the creek) in Reach A.

[a] Calculated as 4% of corresponding construction worker value based on occupancy.

Attachment 18. Sediment Risks and Hazards for Chemicals by Aggregates (page 1 of 4)

Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Industrial Worker												
Reach A	Selenium	5/8	4.12E+01	4.0E-03	1.0E-04		4.1E-03					
Reach A	Thallium	2/8	1.60E+00	9.8E-03	5.6E-04		1.0E-02					
Reach A	Inorganics Pathway Total			1.4E-02	6.6E-04		1.4E-02					
Reach A	Benz(a)anthracene	11/12	3.36E+00					4.3E-07	1.6E-07	1.2E-11	5.9E-07	
Reach A	Benzo(a)pyrene	11/12	3.01E+00					3.8E-06	1.4E-06	1.1E-10	5.3E-06	
Reach A	Benzo(b)fluoranthene	11/12	5.10E+00					6.5E-07	2.4E-07	1.9E-11	8.9E-07	
Reach A	Dibenz(a,h)anthracene	2/10	9.86E-01					1.3E-06	4.6E-07	3.6E-11	1.7E-06	
Reach A	Indeno(1,2,3-cd)pyrene	9/12	3.00E+00					3.8E-07	1.4E-07	1.1E-11	5.2E-07	
Reach A	Organics Pathway Total							6.6E-06	2.4E-06	1.9E-10	9.0E-06	
Reach A	Pathway Total - Chemicals			1.4E-02	6.6E-04		1.4E-02	6.6E-06	2.4E-06	1.9E-10	9.0E-06	
Reach B	Arsenic	5/6	2.06E+01	3.4E-02	9.3E-04		3.5E-02	5.4E-06	1.5E-07	3.6E-09	5.6E-06	
Reach B	Manganese	6/6	3.71E+03	3.9E-02	1.1E-02	8.5E-03	5.9E-02					
Reach B	Thallium	1/5	2.77E+00	1.7E-02	9.7E-04		1.8E-02					
Reach B	Inorganics Pathway Total			9.0E-02	1.3E-02	8.5E-03	1.1E-01	5.4E-06	1.5E-07	3.6E-09	5.6E-06	
Reach B	Benz(a)anthracene	6/6	4.00E+01					5.1E-06	1.9E-06	1.5E-10	7.0E-06	
Reach B	Benzo(a)pyrene	6/6	3.50E+01					4.5E-05	1.6E-05	1.3E-09	6.1E-05	
Reach B	Benzo(b)fluoranthene	5/6	3.00E+01					3.8E-06	1.4E-06	1.1E-10	5.2E-06	
Reach B	Benzo(k)fluoranthene	5/6	3.40E+01					4.3E-07	1.6E-07	1.2E-11	5.9E-07	
Reach B	Indeno(1,2,3-cd)pyrene	4/6	1.47E+01					1.9E-06	6.9E-07	5.3E-11	2.6E-06	
Reach B	Organics Pathway Total							5.6E-05	2.1E-05	1.6E-09	7.6E-05	
Reach B	Pathway Total - Chemicals			9.0E-02	1.3E-02	8.5E-03	1.1E-01	6.1E-05	2.1E-05	5.2E-09	8.2E-05	
Reach C	Arsenic	6/6	1.59E+01	2.6E-02	7.2E-04		2.7E-02	4.2E-06	1.2E-07	2.8E-09	4.3E-06	
Reach C	Thallium	3/6	4.92E+00	3.0E-02	1.7E-03		3.2E-02					
Reach C	Inorganics Pathway Total			5.6E-02	2.4E-03		5.8E-02	4.2E-06	1.2E-07	2.8E-09	4.3E-06	
Reach C	Pathway Total - Chemicals			5.6E-02	2.4E-03		5.8E-02	4.2E-06	1.2E-07	2.8E-09	4.3E-06	
Maintenance Worker												
Reach A	Selenium	5/8	4.12E+01	4.0E-03	3.8E-06		4.0E-03					
Reach A	Thallium	2/8	1.60E+00	9.8E-04	2.0E-06		9.8E-04					
Reach A	Inorganics Pathway Total			5.0E-03	5.8E-06		5.0E-03					
Reach A	Benz(a)anthracene	11/12	3.36E+00					1.1E-07	1.5E-09	7.9E-13	1.1E-07	
Reach A	Benzo(a)pyrene	11/12	3.01E+00					1.0E-06	1.4E-08	7.1E-12	1.0E-06	

Attachment 18. Sediment Risks and Hazards for Chemicals by Aggregates (page 2 of 4)

Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Reach A	Benzo(b)fluoranthene	11/12	5.10E+00					1.7E-07	2.3E-09	1.2E-12	1.7E-07	
Reach A	Dibenz(a,h)anthracene	2/10	9.86E-01					3.3E-07	4.4E-09	2.3E-12	3.4E-07	
Reach A	Indeno(1,2,3-cd)pyrene	9/12	3.00E+00					1.0E-07	1.4E-09	7.1E-13	1.0E-07	
Reach A	Organics Pathway Total							1.7E-06	2.3E-08	1.2E-11	1.8E-06	
Reach A	Pathway Total - Chemicals			5.0E-03	5.8E-06		5.0E-03	1.7E-06	2.3E-08	1.2E-11	1.8E-06	
Reach B	Arsenic	5/6	2.06E+01	3.4E-02	3.4E-05		3.4E-02	1.4E-06	1.4E-09	2.4E-10	1.4E-06	
Reach B	Manganese	6/6	3.71E+03	3.9E-02	4.1E-04	2.1E-03	4.2E-02					
Reach B	Thallium	1/5	2.77E+00	1.7E-03	3.5E-06		1.7E-03					
Reach B	Inorganics Pathway Total			7.5E-02	4.5E-04	2.1E-03	7.7E-02	1.4E-06	1.4E-09	2.4E-10	1.4E-06	
Reach B	Benz(a)anthracene	6/6	4.00E+01					1.3E-06	1.8E-08	9.4E-12	1.4E-06	
Reach B	Benzo(a)pyrene	6/6	3.50E+01					1.2E-05	1.6E-07	8.2E-11	1.2E-05	
Reach B	Benzo(b)fluoranthene	5/6	3.00E+01					1.0E-06	1.4E-08	7.1E-12	1.0E-06	
Reach B	Benzo(k)fluoranthene	5/6	3.40E+01					1.1E-07	1.5E-09	8.0E-13	1.2E-07	
Reach B	Indeno(1,2,3-cd)pyrene	4/6	1.47E+01					4.9E-07	6.6E-09	3.5E-12	5.0E-07	
Reach B	Organics Pathway Total							1.5E-05	2.0E-07	1.0E-10	1.5E-05	
Reach B	Pathway Total - Chemicals			7.5E-02	4.5E-04	2.1E-03	7.7E-02	1.6E-05	2.0E-07	3.4E-10	1.6E-05	
Reach C	Arsenic	6/6	1.59E+01	2.6E-02	2.6E-05		2.6E-02	1.1E-06	1.1E-09	1.8E-10	1.1E-06	
Reach C	Thallium	3/6	4.92E+00	3.0E-03	6.2E-06		3.0E-03					
Reach C	Inorganics Pathway Total			2.9E-02	3.2E-05		2.9E-02	1.1E-06	1.1E-09	1.8E-10	1.1E-06	
Reach C	Pathway Total - Chemicals			2.9E-02	3.2E-05		2.9E-02	1.1E-06	1.1E-09	1.8E-10	1.1E-06	
Recreational/Trespasser												
Reach A	Selenium	5/8	4.12E+01	5.9E-04	2.7E-05		6.1E-04					
Reach A	Thallium	2/8	1.60E+00	1.4E-03	1.5E-04		1.6E-03					
Reach A	Inorganics Pathway Total			2.0E-03	1.7E-04		2.2E-03					
Reach A	Benz(a)anthracene	11/12	3.36E+00					2.2E-08	1.5E-08	1.5E-13	3.7E-08	
Reach A	Benzo(a)pyrene	11/12	3.01E+00					2.0E-07	1.3E-07	1.3E-12	3.3E-07	
Reach A	Benzo(b)fluoranthene	11/12	5.10E+00					3.4E-08	2.2E-08	2.3E-13	5.7E-08	
Reach A	Dibenz(a,h)anthracene	2/10	9.86E-01					6.6E-08	4.3E-08	4.4E-13	1.1E-07	
Reach A	Indeno(1,2,3-cd)pyrene	9/12	3.00E+00					2.0E-08	1.3E-08	1.3E-13	3.3E-08	
Reach A	Organics Pathway Total							3.4E-07	2.3E-07	2.3E-12	5.7E-07	
Reach A	Pathway Total - Chemicals			2.0E-03	1.7E-04		2.2E-03	3.4E-07	2.3E-07	2.3E-12	5.7E-07	

Attachment 18. Sediment Risks and Hazards for Chemicals by Aggregates (page 3 of 4)

Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Reach B	Arsenic	5/6	2.06E+01	4.9E-03	2.4E-04		5.1E-03	2.8E-07	1.4E-08	4.4E-11	3.0E-07	
Reach B	Manganese	6/6	3.71E+03	5.7E-03	2.9E-03	2.9E-04	9.0E-03					
Reach B	Thallium	1/5	2.77E+00	2.5E-03	2.5E-04		2.7E-03					
Reach B	Inorganics Pathway Total			1.3E-02	3.4E-03	2.9E-04	1.7E-02	2.8E-07	1.4E-08	4.4E-11	3.0E-07	
Reach B	Benz(a)anthracene	6/6	4.00E+01					2.7E-07	1.8E-07	1.8E-12	4.4E-07	
Reach B	Benzo(a)pyrene	6/6	3.50E+01					2.3E-06	1.5E-06	1.6E-11	3.9E-06	
Reach B	Benzo(b)fluoranthene	5/6	3.00E+01					2.0E-07	1.3E-07	1.3E-12	3.3E-07	
Reach B	Benzo(k)fluoranthene	5/6	3.40E+01					2.3E-08	1.5E-08	1.5E-13	3.8E-08	
Reach B	Indeno(1,2,3-cd)pyrene	4/6	1.47E+01					9.8E-08	6.5E-08	6.5E-13	1.6E-07	
Reach B	Organics Pathway Total							2.9E-06	1.9E-06	1.9E-11	4.9E-06	
Reach B	Pathway Total - Chemicals			1.3E-02	3.4E-03	2.9E-04	1.7E-02	3.2E-06	1.9E-06	6.4E-11	5.2E-06	
Reach C	Arsenic	6/6	1.59E+01	3.8E-03	1.9E-04		4.0E-03	2.2E-07	1.1E-08	3.4E-11	2.3E-07	
Reach C	Thallium	3/6	4.92E+00	4.4E-03	4.5E-04		4.8E-03					
Reach C	Inorganics Pathway Total			8.2E-03	6.3E-04		8.8E-03	2.2E-07	1.1E-08	3.4E-11	2.3E-07	
Reach C	Pathway Total - Chemicals			8.2E-03	6.3E-04		8.8E-03	2.2E-07	1.1E-08	3.4E-11	2.3E-07	
Resident												
Reach A	Selenium	5/8	4.12E+01	1.5E-02	1.2E-04		1.5E-02					
Reach A	Thallium	2/8	1.60E+00	3.7E-02	6.2E-04		3.8E-02					
Reach A	Inorganics Pathway Total			5.3E-02	7.4E-04		5.3E-02					
Reach A	Benz(a)anthracene	11/12	3.36E+00					2.0E-06	2.1E-07	4.7E-11	2.2E-06	
Reach A	Benzo(a)pyrene	11/12	3.01E+00					1.8E-05	1.9E-06	4.2E-10	1.9E-05	
Reach A	Benzo(b)fluoranthene	11/12	5.10E+00					3.0E-06	3.2E-07	7.2E-11	3.3E-06	
Reach A	Dibenz(a,h)anthracene	2/10	9.86E-01					5.7E-06	6.2E-07	1.4E-10	6.4E-06	
Reach A	Indeno(1,2,3-cd)pyrene	9/12	3.00E+00					1.7E-06	1.9E-07	4.2E-11	1.9E-06	
Reach A	Organics Pathway Total							3.0E-05	3.2E-06	7.2E-10	3.3E-05	
Reach A	Pathway Total - Chemicals			5.3E-02	7.4E-04		5.3E-02	3.0E-05	3.2E-06	7.2E-10	3.3E-05	
Reach B	Arsenic	5/6	2.06E+01	1.3E-01	1.0E-03		1.3E-01	2.5E-05	2.0E-07	1.4E-08	2.5E-05	R
Reach B	Manganese	6/6	3.71E+03	1.5E-01	1.3E-02	2.7E-02	1.9E-01					
Reach B	Thallium	1/5	2.77E+00	6.5E-02	1.1E-03		6.6E-02					
Reach B	Inorganics Pathway Total			3.4E-01	1.5E-02	2.7E-02	3.8E-01	2.5E-05	2.0E-07	1.4E-08	2.5E-05	R
Reach B	Benz(a)anthracene	6/6	4.00E+01					2.3E-05	2.5E-06	5.6E-10	2.6E-05	R
Reach B	Benzo(a)pyrene	6/6	3.50E+01					2.0E-04	2.2E-05	4.9E-09	2.3E-04	R

Attachment 18. Sediment Risks and Hazards for Chemicals by Aggregates (page 4 of 4)

Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Reach B	Benzo(b)fluoranthene	5/6	3.00E+01					1.7E-05	1.9E-06	4.2E-10	1.9E-05	R
Reach B	Benzo(k)fluoranthene	5/6	3.40E+01					2.0E-06	2.1E-07	4.8E-11	2.2E-06	R
Reach B	Indeno(1,2,3-cd)pyrene	4/6	1.47E+01					8.6E-06	9.3E-07	2.1E-10	9.5E-06	R
Reach B	Organics Pathway Total							2.6E-04	2.8E-05	6.2E-09	2.8E-04	R
Reach B	Pathway Total - Chemicals			3.4E-01	1.5E-02	2.7E-02	3.8E-01	2.8E-04	2.8E-05	2.0E-08	3.1E-04	R
Reach C	Arsenic	6/6	1.59E+01	9.9E-02	8.1E-04		1.0E-01	1.9E-05	1.6E-07	1.1E-08	1.9E-05	
Reach C	Thallium	3/6	4.92E+00	1.1E-01	1.9E-03		1.2E-01					
Reach C	Inorganics Pathway Total			2.1E-01	2.7E-03		2.2E-01	1.9E-05	1.6E-07	1.1E-08	1.9E-05	
Reach C	Pathway Total - Chemicals			2.1E-01	2.7E-03		2.2E-01	1.9E-05	1.6E-07	1.1E-08	1.9E-05	

HQ = Hazard Quotient

HI = Hazard Index

COPC = Contaminant of Potential Concern

[a] COPC codes:

H = COPC based on hazard result

R = COPC based on risk result

Attachment 19. Land Use and Removal Criteria by Property (Page 1 of 3)

Property ID [a]	Current Receptor	Future Receptor	Remediation Status	Alternative 2 Criteria [b]	Alternative 3 Criteria [b]	Alternative 5 Criteria [b]	Alternative 6 Criteria [b]	Removal Required [c]
VP-1	Industrial	Industrial		A	A	A	A	No
VP-1(C)	Industrial	Industrial		A	A	A	A	Yes
VP-1(L)	Industrial	Industrial		A	A	A	A	No
10K530076, north of VP-1(L)	Industrial	Industrial		A	A	A	A	No
10K530087, west of VP-1(L)	Industrial	Industrial		A	A	A	A	Yes
VP-2	Industrial	Industrial		A	A	A	A	No
VP-2(C)	Industrial	Industrial		A	A	A	A	Yes
VP-2(L)	Industrial	Industrial	Removal Action	A	A	A	A	Yes
VP-3	Industrial	Industrial		A	A	A	A	No
VP-3(C)	Industrial	Industrial		A	A	A	A	Yes
VP-3(L)	Industrial	Industrial	Removal Action	A	A	A	A	Yes
10K520165, southeast of VP-3(L)	Industrial	Industrial		A	A	A	A	No
VP-4	Industrial	Industrial		A	A	A	A	No
VP-4(C)	Industrial	Industrial		A	A	A	A	Yes
VP-4(L)	Industrial	Industrial	Removal Action	A	A	A	A	Yes
VP-5	Industrial	Industrial		A	A	A	A	No
VP-5(C)	Industrial	Industrial		A	A	A	A	Yes
VP-5(L)	Industrial	Industrial	Removal Action	A	A	A	A	No
VP-6	Industrial	Industrial		A	A	A	A	No
VP-6(C)	Industrial	Industrial		A	A	A	A	No
VP-6(L)	Industrial	Industrial	Removal Action	A	A	A	A	Yes
VP-7	Industrial	Industrial		A	A	A	A	Yes
VP-7(C)	Industrial	Industrial		A	A	A	A	No
VP-8	Industrial	Industrial		A	A	A	A	No
VP-8(C)	Industrial	Industrial		A	A	A	A	Yes
VP-9	Industrial	Industrial		A	A	A	A	No
VP-9(C)	Industrial	Industrial		A	A	A	A	No
VP-10	Industrial	Industrial		A	A	A	A	No
VP-10(C)	Industrial	Industrial		A	A	A	A	No
VP-11	Industrial	Industrial		A	A	A	A	Yes
VP-12	Industrial	Industrial		A	A	A	A	Yes
VP-13	Industrial	Industrial		A	A	A	A	Yes
VP-14	Industrial	Industrial		A	A	A	A	No
VP-14(A)	Utility	Utility		A	A	A	A	No
VP-15	Industrial	Industrial		A	A	A	A	Yes
VP-16	Industrial	Industrial		A	A	A	A	No
VP-17	Industrial	Industrial		A	A	A	A	No
VP-18	Industrial	Industrial		A	A	A	A	No
VP-19	Residential	Residential	Removal Action	A	A	A	A	No
VP-20	Residential	Residential	Removal Action	A	A	A	A	No
VP-20(A)	Industrial	Industrial		A	A	A	A	No
VP-21	Industrial	Industrial	Removal Action	A	A	A	A	Yes
VP-22	Industrial	Industrial	Removal Action	A	A	A	A	Yes
VP-23	Industrial	Industrial	Removal Action	A	A	A	A	Yes
10K240182, north of VP-23	Industrial	Industrial		A	A	A	A	No
VP-24	Industrial	Industrial	Removal Action	A	A	A	A	No
VP-25	Industrial	Industrial		A	A	A	A	No
VP-26	Industrial	Industrial		A	A	A	A	No
VP-27	Industrial	Industrial		A	A	A	A	No
10K240207, west of VP-27	Industrial	Industrial		A	A	A	A	No

Attachment 19. Land Use and Removal Criteria by Property (Page 3 of 3)

Property ID [a]	Current Receptor	Future Receptor	Remediation Status	Alternative 2 Criteria [b]	Alternative 3 Criteria [b]	Alternative 5 Criteria [b]	Alternative 6 Criteria [b]	Removal Required [c]
IA-5	Construction	Industrial	Partial Removal	B	B	A	A	Yes
IA-6	Construction	Industrial	Removal Action	B	B	A	A	Yes
IA-7	Construction	Industrial	Removal Action	B	A	A	A	Yes
IA-8	Utility	Utility	Partial Removal	A	A	A	A	Yes
IA-9	Construction	Recreational	Partial Removal	A	A	A	A	Yes
IA-10	Recreational	Recreational		A	A	A	A	Yes
IA-11	Industrial	Industrial		A	A	A	A	Yes
IA-12	Industrial	Industrial		A	A	A	A	Yes
IA-13	Industrial	Industrial		A	A	A	A	Yes
Road, bridges and railroads	Utility	Utility		C	C	C	A	Yes
10K620412, north of Latty east	Industrial	Industrial		A	A	A	A	No
11K630221, NE of McDonnell rail siding	Industrial	Industrial		A	A	A	A	No
10K620452, south of Latty East	Industrial	Industrial		A	A	A	A	No
11L520011, airport south of IA-13	Industrial	Industrial		A	A	A	A	No

[a] All properties designated into the FUSRAP site and any additional property for which analytical data are available.

[b] A = Ra/Th/U to 5/14/50 pCi/g above background in surface soils, 15/15/50 pCi/g above background in subsurface soils, and 15/43/150 for sediments below the mean water gradient of Coldwater Creek.

B = Ra/Th/U to 5/14/50 pCi/g above background in surface soils and 25/70/250 pCi/g above background in subsurface soils.

C = Soils under roads, bridges, railroads, and other permanent structures, are inaccessible and will not be remediated as part of this response action.

It is assumed that both radionuclides and non-radionuclides will be remediated to satisfy CERCLA risk requirements.

[c] For properties where removal is required the extent of excavation could vary depending on the criteria applied. No removals are required under Alternative 1 (No Further Action) and Alternative 4 (Institutional Controls).

APPENDIX E

POST REMOVAL ACTION DATA

POST REMEDIAL ACTION DATA

The information presented in Appendix D and Section 2.3.2 of the FS is used to narrow down the total list of chemicals in the site database into a final list of contaminants of potential concern (COPCs). Appendix D uses screening techniques to eliminate chemicals below background, carcinogenic and non-carcinogenic screening levels, etc. to eventually produce a list of risk-related COPCs. The screening does include an evaluation to determine which of the COPCs are related to Manhattan Engineer District or Atomic Energy Commission (MED/EAC) activities. Table E-1 lists those chemicals that are identified as COPCs by the Appendix D assessment. Section 2.3.2 looks at the uranium process to identify major and minor constituents found in the ore or related process materials. The conclusion presented in that section is that the removal of radiological contaminants would likely remove non-radiological COPCs, and that it is conservative to assume that all of the COPCs identified in the Appendix D are MED/AEC-related. The purpose of this appendix is to present non-radiological post-remedial action data collected in the St. Louis North County Site for comparison to the conclusions presented in Appendix D and Section 2.3.2.

Table E-2 shows the initial data screens on post-remedial action data. These screens include screen against background, a screen against Environmental Protection Agency (EPA) Region IX preliminary remediation goals (PRGs), and a screen to eliminate essential nutrient and infrequently detected chemicals. The screening approach is identical to the approach used in Appendix D to identify potential chemicals of concern (PCOCs). Any chemical that passes through these screens is assumed to be a PCOC and is included in a site-specific risk calculation.

Table E-3 shows the results of the site-specific risk calculation for those PCOCs identified in post-remedial action data. If the total risk for a specified receptor (e.g., resident) and medium (e.g., soil) exceeds 10^{-4}, those individual PCOCs with a risk greater than 10^{-6} may be identified as carcinogenic COPCs for the site. If the total hazard for a specified receptor (e.g., resident) and medium (e.g., soil) exceeds 1.0, those individual PCOCs with a hazard greater than 0.1 may be identified as non-carcinogenic COPCs for the site. The approach for calculating COPCs is identical to the approach used in Appendix D.

The data screens used in this appendix are not constrained by the results presented in Appendix D or Section 2.3.2 of the FS. That is, the data screens and risk calculations are not limited to the chemicals listed in Tables E-1 or the major and minor constituents listed in Section 2.3.2. All chemicals in the post-remedial action data set are considered equally. Even with this conservative approach, the results demonstrate that no COPCs are identified (far right column of Table E-3) indicating that either there are no non-radiological COPCs at the site or the non-radiological COPCs were remediated with the radionuclides.

Table E-1. North County Site Contaminants of Potential Concern (COPCs)

Soil		Sediment		Ground Water [a]	Surface Water
SLAPS and Contiguous Areas[b, d]	Radionuclides [c], antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium	Coldwater Creek	Radionuclides [c]	None	None
HISS/Futura and Latty Avenue VPs 2L and 10k530087	Radionuclides [c], antimony, arsenic, barium, cadmium, molybdenum, nickel, selenium, thallium, and vanadium				
Haul Road Properties and Remaining VPs	Radionuclides [c]				
Coldwater Creek (within banks)	Radionuclides [c]				
[a] COPCs identified in HZ-A. However, no COCs identified because HZ-A is not a source of potable drinking water. [b] IA-1 through IA-13 [c] Radionuclides in the uranium, thorium, and actinium series [d] COCs are applicable only for soil within IAs 2 and 10 as there are no identified COCs for other areas.					

Table E-2. PCOC Screens

Data Grouping	Aggregate	Analyte	Freq. Det.	Units	Min. Non-det. Conc.	Max. Non-det. Conc.	Min. Det. Conc.	Max. Det. Conc.	Mean Conc.	Dist. [a]	UCL$_{95}$	Expos. Conc. [b]		Background Criteria	Freq. Det. Above Bkgd.	Region IX Resid. Soil PRG [c]	PCOC	Type PCOC [d]	Justification [e]
Soil - All Depths	VP-56	Aluminum	16/16	mg/kg			7240	15200	9550	L	10600	10600	u	14700	1/16	7.5E+03	Y	Qual.	
Soil - All Depths	VP-56	Arsenic	16/16	mg/kg			6.7	10.1	8.23	L	8.68	8.68	u	18	0/16	3.8E-01	N		Below Background
Soil - All Depths	VP-56	Barium	16/16	mg/kg			129	188	164	N	171	171	u	279	0/16	5.2E+02	N		Below Background
Soil - All Depths	VP-56	Beryllium	6/16	mg/kg	0.305	0.36	0.62	0.79	0.459	D	0.54	0.54	u	0.83	0/16	1.5E+01	N		Below Background
Soil - All Depths	VP-56	Boron	16/16	mg/kg			5.7	10.6	7.13	L	7.74	7.74	u	9.9	1/16	4.9E+02	N		Max. detect < PRG
Soil - All Depths	VP-56	Cadmium	1/16	mg/kg	0.15	0.17	0.3	0.3	0.166	D	0.182	0.182	u	0.62	0/16	3.7E+00	N		Below Background
Soil - All Depths	VP-56	Calcium	16/16	mg/kg			2170	30300	8960	L	14800	14800	u	28900	1/16		N		Essential Nutrient (low conc.)
Soil - All Depths	VP-56	Chromium	16/16	mg/kg			11.2	17.6	13.6	L	14.6	14.6	u	17.3	1/16	3.0E+01	N		Max. detect < PRG
Soil - All Depths	VP-56	Cobalt	16/16	mg/kg			5.9	16.7	8.69	X	9.76	9.76	u	31.7	0/16	3.3E+02	N		Below Background
Soil - All Depths	VP-56	Copper	16/16	mg/kg			11.8	25.2	15.1	L	16.7	16.7	u	19.4	1/16	2.8E+02	N		Max. detect < PRG
Soil - All Depths	VP-56	Iron	16/16	mg/kg			12700	21300	15800	L	17000	17000	u	26600	0/16	2.2E+03	N		Below Background
Soil - All Depths	VP-56	Lead	16/16	mg/kg			12.6	114	34.7	L	54.1	54.1	u	79.7	2/16	4.0E+01	Y	Qual.	
Soil - All Depths	VP-56	Lithium	16/16	mg/kg			4.3	8.8	5.44	X	6	6	u	8.1	1/16	1.5E+02	N		Max. detect < PRG
Soil - All Depths	VP-56	Magnesium	16/16	mg/kg			2030	12600	3680	X	4760	4760	u	18400	0/16		N		Below Background
Soil - All Depths	VP-56	Manganese	16/16	mg/kg			498	1280	724	L	829	829	u	2830	0/16	3.1E+02	N		Below Background
Soil - All Depths	VP-56	Molybdenum	11/16	mg/kg	0.155	0.5	0.46	1.5	0.737	X	0.924	0.924	u	22.7	0/16	3.7E+01	N		Below Background
Soil - All Depths	VP-56	Nickel	16/16	mg/kg			14	25.5	18.5	L	19.9	19.9	u	33.9	0/16	1.5E+02	N		Below Background
Soil - All Depths	VP-56	Potassium	16/16	mg/kg			475	1300	883	L	1020	1020	u	1140	3/16		N		Essential Nutrient (low conc.)
Soil - All Depths	VP-56	Selenium	6/16	mg/kg	0.125	0.43	0.25	0.54	0.257	D	0.313	0.313	u	0.55	0/16	3.7E+01	N		Below Background
Soil - All Depths	VP-56	Sodium	16/16	mg/kg			63.1	1250	341	X	511	511	u	235	5/16		N		Essential Nutrient (low conc.)
Soil - All Depths	VP-56	Strontium	16/16	mg/kg			14.1	40	20	X	23	23	u	26	2/16	4.5E+03	N		Max. detect < PRG
Soil - All Depths	VP-56	Thallium	13/16	mg/kg	0.245	0.395	0.53	1.3	0.754	N	0.89	0.89	u	0	13/16	6.0E-01	Y	Quant.	
Soil - All Depths	VP-56	Titanium	16/16	mg/kg			135	333	200	L	231	231	u	269	3/16		Y	Qual.	
Soil - All Depths	VP-56	Vanadium	16/16	mg/kg			17.8	33.1	22.9	L	24.7	24.7	u	31	1/16	5.2E+01	N		Max. detect < PRG
Soil - All Depths	VP-56	Zinc	16/16	mg/kg			43.5	120	56.2	X	64.4	64.4	u	278	0/16	2.2E+03	N		Below Background
Soil - All Depths	VP-56	beta-BHC	1/16	mg/kg	0.00095	0.0011	0.0023	0.0023	0.00109	D	0.00124	0.00124	u	0	1/16	3.0E-01	N		Max. detect < PRG
Soil - All Depths	VP-56	Anthracene	3/16	mg/kg	0.19	0.21	0.023	0.048	0.167	D	0.196	0.048	m	0.031	2/16	1.4E+03	N		Max. detect < PRG
Soil - All Depths	VP-56	Benz(a)anthracene	8/16	mg/kg	0.19	0.205	0.02	0.24	0.155	X	0.189	0.189	u	0.3	0/16	5.6E-01	N		Below Background
Soil - All Depths	VP-56	Benzo(a)pyrene	5/16	mg/kg	0.19	0.205	0.055	0.28	0.196	D	0.216	0.216	u	0.34	0/16	5.6E-02	N		Below Background
Soil - All Depths	VP-56	Benzo(b)fluoranthene	6/16	mg/kg	0.19	0.205	0.032	0.24	0.179	D	0.204	0.204	u	0.31	0/16	5.6E-01	N		Below Background
Soil - All Depths	VP-56	Benzo(ghi)perylene	5/16	mg/kg	0.19	0.205	0.085	0.43	0.224	D	0.259	0.259	u	0.39	1/16		Y	Qual.	
Soil - All Depths	VP-56	Benzo(k)fluoranthene	6/16	mg/kg	0.19	0.205	0.029	0.24	0.175	D	0.201	0.201	u	0.29	0/16	5.6E+00	N		Below Background
Soil - All Depths	VP-56	Bis(2-ethylhexyl)phthalate	12/16	mg/kg	0.19	0.2	0.021	0.11	0.0922	L	0.148	0.11	m	0.18	0/16	3.2E+01	N		Below Background
Soil - All Depths	VP-56	Carbazole	1/16	mg/kg	0.19	0.215	0.019	0.019	0.188	D	0.208	0.019	m	0	1/16	2.2E+01	N		Max. detect < PRG
Soil - All Depths	VP-56	Chrysene	9/16	mg/kg	0.19	0.205	0.026	0.29	0.16	X	0.199	0.199	u	0.57	0/16	5.6E+01	N		Below Background
Soil - All Depths	VP-56	Di-n-butyl phthalate	6/16	mg/kg	0.19	0.215	0.02	0.029	0.134	D	0.173	0.029	m	0	6/16	5.5E+02	N		Max. detect < PRG
Soil - All Depths	VP-56	Fluoranthene	10/16	mg/kg	0.19	0.205	0.028	0.48	0.184	L	0.36	0.36	u	0.7	0/16	2.0E+02	N		Below Background
Soil - All Depths	VP-56	Indeno(1,2,3-cd)pyrene	6/16	mg/kg	0.19	0.205	0.022	0.39	0.205	D	0.242	0.242	u	0.35	1/16	5.6E-01	N		Max. detect < PRG
Soil - All Depths	VP-56	Phenanthrene	7/16	mg/kg	0.19	0.205	0.02	0.3	0.161	D	0.197	0.197	u	0.28	1/16		Y	Qual.	
Soil - All Depths	VP-56	Pyrene	10/16	mg/kg	0.19	0.205	0.039	0.65	0.215	L	0.401	0.401	u	0.66	0/16	1.5E+02	N		Below Background
Soil - All Depths	VP-56	2-Butanone	1/16	mg/kg	0.0055	0.0065	0.006	0.006	0.00594	D	0.00607	0.006	m	0.023	0/16	6.9E+02	N		Below Background
Soil - All Depths	VP-56	Dimethylbenzene	6/16	mg/kg	0.003	0.003	0.002	0.003	0.00294	D	0.00305	0.003	m	0	6/16		Y	Quant.	
Soil - All Depths	VP-56	Toluene	6/16	mg/kg	0.003	0.003	0.006	0.016	0.006	D	0.00799	0.00799	u	0.11	0/16	5.2E+02	N		Below Background
Soil - All Depths	VP-56	Trichloroethene	1/16	mg/kg	0.003	0.003	0.001	0.001	0.00288	D	0.00309	0.001	m	0	1/16	2.7E+00	N		Max. detect < PRG

[a] Distribution flags:

D = Not determined because fewer than 5 detects or < 50% detects; t-statistic used in calculations of UCL$_{95}$.
L = Lognormal; H-statistic used in calculations of UCL$_{95}$.
N = Normal; t-statistic used in calculations of UCL$_{95}$.
X = Neither normal nor lognormal; t-statistic used in calculations of UCL$_{95}$.
Z = Contains concentrations that are negative and/or zero; t-statistic used in calculations of UCL$_{95}$.

[b] Basis for determining the exposure concentration:

m = maximum detected concentration.
u = 95% upper confidence limit on the mean concentration.

[c] EPA Region IX residential soil PRG, based on a risk level of 10^{-6} or a hazard level of 0.1 (note that Region IX noncarcinogenic PRGs are provided for a hazard level of 1.0; these values have been adjusted to a hazard level of 0.1 for this screening).

[d] Based on the lack of available toxicity information, some PCOCs were evaluated qualitatively;

Qual. = Qualitative
Quant. = Quantitative.

[e] Justification for eliminating the analyte from the PCOC list.

Table E-3. Identification of COPCs

Media Group	Aggregate	Analyte	Freq. Det.	Expos. Point Conc. (mg/kg)	Ingest. HQ	Dermal HQ	Inhal. HQ	Total HI	Ingest. Risk	Dermal Risk	Inhal. Risk	Total Risk	COPC[a]
Construction Worker													
Soil - All Depths	VP-56	Thallium	13/16	8.90E-01	5.2E-03	8.7E-05		5.3E-03					
Soil - All Depths	VP-56	Inorganics Pathway Total			5.2E-03	8.7E-05		5.3E-03					
Soil - All Depths	VP-56	Dimethylbenzene	6/16	3.00E-03	3.9E-08	1.4E-09		4.1E-08					
Soil - All Depths	VP-56	Organics Pathway Total			3.9E-08	1.4E-09		4.1E-08					
Soil - All Depths	VP-56	Pathway Total - Chemicals			5.2E-03	8.7E-05		5.3E-03					
Industrial Worker													
Soil - All Depths	VP-56	Thallium	13/16	8.90E-01	5.4E-03	3.1E-04		5.8E-03					
Soil - All Depths	VP-56	Inorganics Pathway Total			5.4E-03	3.1E-04		5.8E-03					
Soil - All Depths	VP-56	Dimethylbenzene	6/16	3.00E-03	7.3E-10	9.1E-11		8.2E-10					
Soil - All Depths	VP-56	Organics Pathway Total			7.3E-10	9.1E-11		8.2E-10					
Soil - All Depths	VP-56	Pathway Total - Chemicals			5.4E-03	3.1E-04		5.8E-03					
Maintenance Worker													
Soil - All Depths	VP-56	Thallium	13/16	8.90E-01	5.4E-04	1.1E-06		5.4E-04					
Soil - All Depths	VP-56	Inorganics Pathway Total			5.4E-04	1.1E-06		5.4E-04					
Soil - All Depths	VP-56	Dimethylbenzene	6/16	3.00E-03	4.1E-09	1.9E-11		4.1E-09					
Soil - All Depths	VP-56	Organics Pathway Total			4.1E-09	1.9E-11		4.1E-09					
Soil - All Depths	VP-56	Pathway Total - Chemicals			5.4E-04	1.1E-06		5.4E-04					
Recreational/Trespasser													
Soil - All Depths	VP-56	Thallium	13/16	8.90E-01	7.9E-04	8.1E-05		8.7E-04					
Soil - All Depths	VP-56	Inorganics Pathway Total			7.9E-04	8.1E-05		8.7E-04					
Soil - All Depths	VP-56	Dimethylbenzene	6/16	3.00E-03	1.1E-10	2.4E-11		1.3E-10					
Soil - All Depths	VP-56	Organics Pathway Total			1.1E-10	2.4E-11		1.3E-10					
Soil - All Depths	VP-56	Pathway Total - Chemicals			7.9E-04	8.1E-05		8.7E-04					
Residential													
Soil - All Depths	VP-56	Thallium	13/16	8.90E-01	2.1E-02	3.5E-04		2.1E-02					
Soil - All Depths	VP-56	Inorganics Pathway Total			2.1E-02	3.5E-04		2.1E-02					
Soil - All Depths	VP-56	Dimethylbenzene	6/16	3.00E-03	2.8E-09	1.0E-10		2.9E-09					
Soil - All Depths	VP-56	Organics Pathway Total			2.8E-09	1.0E-10		2.9E-09					
Soil - All Depths	VP-56	Pathway Total - Chemicals			2.1E-02	3.5E-04		2.1E-02					

HQ = Hazard Quotient
HI = Hazard Index
COPC = Contaminant of Potential Concern

[a] COPC codes:
H = COPC based on hazard result
R = COPC based on risk result