FINAL

RECORD OF DECISION FOR THE NORTH ST. LOUIS COUNTY SITES

ST. LOUIS, MISSOURI

September 2, 2005

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

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September 2, 2005

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. DAC43-00-D-0515, Task Order 0007

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ACRONYMS, ABBREVIATIONS

AEA	Atomic Energy Act of 1954
AEC	U.S. Atomic Energy Commission
ANL	Argonne National Laboratory
ARAR	applicable or relevant and appropriate requirement
AUF	area use factor
BERA	baseline ecological risk assessment
bgs	below ground surface
BHE	BHE Environmental, Inc.
BNAE	base/neutral and acid extractable
BNI	Bechtel National, Inc.
BRA	baseline risk assessment
CAS	chemical abstract service
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
COPC	contaminant of potential concern
CWA	Clean Water Act
DCGL	Derived Concentration Guideline Level
DOE	U.S. Department of Energy
EDE	effective dose equivalent
EE/CA	engineering evaluation/cost analysis
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
FDEP	Florida Department of Environmental Protection
FFA	Federal Facilities Agreement
FS	Feasibility Study
FS/PP	Feasibility Study/Proposed Plan
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
HEAST	Health Effects Assessment Summary Table
HI	hazard index
HISS	Hazelwood Interim Storage Site
HQ	hazard quotient
HZ	hydrostratigraphic zone
IA	Investigation Area
IC	Institutional Control
ICRP	International Commission on Radiological Protection
IRIS	Integrated Risk Information System

ACRONYMS, ABBREVIATIONS (CONT'D)

LOAEL	Lowest Observed Adverse Effect Level
MARSSIM	Multi-Agency Radiation Site Survey and Investigation Manual
MCL	maximum contaminant level
MCW	Mallinckrodt Chemical Works
MDC	Missouri Department of Conservation
MDNR	Missouri Department of Natural Resources
MED	Manhattan Engineer District
MOE	Ontario Ministry of Environment Effect Levels
MOU	Memorandum of Understanding
MSA	Metropolitan Statistical Area
NCP	National Contingency Plan
NOAA	National Oceanic and Atmospheric Administration
NOAEL	No Observed Adverse Effect Level
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 contaminant of concern
PDI	pre-design investigation
PEL	probable effect level
POTW	publicly owned treatment works
PP	Proposed Plan
PRG	preliminary remediation goal
RAGS	Risk Assessment Guidance for Superfund
RAO	remedial action objective
RAR	relevant and appropriate requirement
RCRA	Resource Conservation and Recovery Act
RD/RA	Remedial Design / Remedial Action
RESRAD	Residual Radioactive
RfC	reference concentration
RfD	reference dose
RG	remediation goal
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	reasonable maximum exposure
ROD	Record of Decision
RR	railroad
s	second
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SERA	Supplemental Ecological Risk Assessment
SHPO	State Historical Preservation Office (Missouri)

ACRONYMS, ABBREVIATIONS (CONT'D)

SLAPS	St. Louis Airport Site
SLDS	St. Louis Downtown Site
SOR	sum of ratios
SQB	Sediment Quality Benchmarks
SQC	Sediment Quality Criteria
SVOC	semi-volatile organic compound
TBC	to be considered
TCLP	toxicity characteristic leaching procedure
TEDE	total effective dose equivalent
TEL	threshold effect level
TOC	total organic carbon
TOX	total organic halogens
TRV	toxicity reference value
UCL	Upper Confidence Limit
UMTRCA	Uranium Mill Tailings Radiation Control Act
USACE	United States Army Corps of Engineers
UUUE	Unlimited Use and Unrestricted Exposure
VAMS	Vernon's Annotated Missouri Statutes
VOC	volatile organic compound
VP	vicinity property
WL	Working level
yr	year

PART 1

DECLARATION

1.0 DECLARATION FOR THE RECORD OF DECISION

1.1 SITE NAME AND LOCATION

The North St. Louis County sites, which include the St. Louis Airport Site (SLAPS)/ Hazelwood Interim Storage Site (HISS)/Futura Coatings Company (CERCLIS Identification Number MOD980633176), the Latty Avenue Vicinity Properties (VPs), and the SLAPS Vicinity Properties (VPs), are located in St. Louis, Missouri.

1.2 STATEMENT OF BASIS AND PURPOSE

This decision document presents the Selected Remedy for the North St. Louis County sites, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on information documented in the Administrative Record for this site.

This Record of Decision is published by the U.S. Army Corps of Engineers (USACE). Under the Formerly Utilized Sites Remedial Action Program (FUSRAP), USACE is authorized by Congress as the lead agency implementing the Selected Remedy. The remedy is jointly selected by the USACE and the United States Environmental Protection Agency (EPA).

The State of Missouri provided the following statement on concurrence with the selected remedy:

> "The Missouri Department of Natural Resources prefers alternative 6 as the selected remedy as it does not require institutional controls (ICs) and long-term monitoring. However, the department recognizes that it is not practical or cost effective to remove all contamination at this time. Therefore, the department supports the USACE's selected remedy, alternative 5, if the federal government can ensure the implementation of IC's and a commitment for fully funding an enforceable and robust long-term stewardship at the FUSRAP sites. The department stands ready to partner with the USACE, the EPA, and the local stakeholders on the development of ICs and a Long Term Stewardship plan. To achieve adequate stewardship, the State must be included as an equal party in an amended Federal Facility Agreement (FFA). Therefore, the department gives concurrence with this remedy under the condition that the FFA will be amended, with the State as a signatory agent, concurrent with or prior to finalization of the stewardship plan."

1.3 ASSESSMENT OF THE SITE

The response action selected in this Record of Decision is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

1.4 DESCRIPTION OF THE SELECTED REMEDY

The Selected Remedy for the Site is Alternative 5 of the Feasibility Study, *Excavation with Institutional Controls for Soils Under Roads, Rail Lines, and Other Permanent Structures.* The

Selected Remedy is the final planned remedy for the North St. Louis County site. Portions of the North St. Louis County site have already been addressed through removal actions conducted pursuant to Engineering Evaluation/Cost Analyses (EE/CAs) and Action Memoranda. The Selected Remedy addresses soil, sediment, surface water, ground water, and structures contaminated as a result of Manhattan Engineer District/Atomic Energy Commission (MED/AEC) uranium ore processing activities. The contaminated shallow ground-water system is not considered to be a potential source of drinking water due to its poor quality and very low yields. The principal contaminants of concern are radionuclides associated with the residues of ore processing. Contaminants from other sources that are co-located with the MED/AEC contaminants will also be addressed concurrently.

The main components of the Selected Remedy include:

- Excavate all accessible contaminated soils to remediation goals (RGs) that support unlimited use and unrestricted exposure (UUUE) and dispose off-site at a permitted facility;
- Impose use restrictions at areas under roads, active rail lines and other permanent structures where the residual condition is not consistent with UUUE;
- Dredge contaminated sediments from Coldwater Creek to RGs that support UUUE;
- Remove contaminated soils from the surfaces of buildings and structures as necessary to achieve RGs that support UUUE, or remove the contaminated structures themselves and dispose off-site at a permitted facility;
- Monitor ground water and surface water during the soil remediation period to ensure water quality is not adversely effected and identify any areas where ground water may be significantly degraded; and,
- Monitor ground water long-term in selected areas where soils contaminated above RGs are left in place or where contaminated ground water has the potential to degrade adjacent ground-water or surface-water systems.

No principal threat wastes, as defined by the NCP [§300.430(a)(1)(iii)(A)] are present at the North St. Louis County sites.

1.5 STATUTORY DETERMINATIONS

The Selected Remedy is protective of human health and the environment, complies with requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. The Selected Remedy uses permanent solutions to the maximum extent practicable.

The Selected Remedy does not satisfy the statutory preference for treatment as a principal element of the remedy because examination of available technologies (soil sorting, soil washing, and phytoremediation) indicated that none were effective in reducing volume, mobility, or toxicity for the type of soils and contaminants present at the North St. Louis County sites.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review of the Selected Remedy, which includes institutional controls to manage these residual contaminants, will be conducted no less often than every five years after initiation of the selected

remedial action or until the concentrations of hazardous substances at the site are at such levels to allow for unlimited use and unrestricted exposure.

1.6 RECORD OF DECISION DATA CERTIFICATION CHECKLIST

The following table is provided to summarize the key remedy selection information contained in this Record of Decision. The table also provides a "roadmap" of where this key information can be found in the Decision Summary Section (Part 2) of this Record of Decision. Additionally, supporting remedy selection information can be found in the Administrative Record for the North St. Louis County sites maintained by the United States Army Corps of Engineers FUSRAP Project Office, 8945 Latty Avenue, in Berkeley, Missouri or at the St. Louis Public Library, Government Information Room, 1302 Olive Street, St. Louis, Missouri 63103.

Record of Decision Data Checklist Item	Decision Summary Page Number
☑ Contaminants of concern (COCs) and their respective concentrations	Table 2-3, Page 2-26
☑ Baseline risk represented by the COCs	Table 2-5, Page 2-31
☑ Remediation goals established for the COCs and the basis for these goals	Section 2.8.2, Page 2-36 and Table 2-10, Page 2-37
☑ How source materials constituting principal threats are addressed	No principal threat wastes currently at the Site; Section 2.11, Page 2-76
☑ Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the Baseline Risk Assessment and Record of Decision	Section 2.6, Page 2-21
☑ Potential land use that will be available at the Site as a result of the Selected Remedy	Section 2.12.4, Page 2-95
☑ Estimated capital, annual operation and maintenance, and the total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected	Table 2-16, Page 2-94
☑ Key factor(s) that led to selecting the remedy	Section 2.13, Page 2-95

1.7 AUTHORIZING SIGNATURES

_____ _____

Robert Crear
Brigadier General, USA
Commander, Mississippi Valley Division
U.S. Army Corps of Engineers

Date

_____ _____

James B. Gulliford
Regional Administrator
U.S. Environmental Protection Agency

Date

PART 2

THE DECISION SUMMARY

2.0 THE DECISION SUMMARY

2.1 SITE NAME, LOCATION AND BRIEF DESCRIPTION

2.1.1 Site Name and Location

The North St. Louis County sites are one of two separate geographical areas collectively referred to as the St. Louis FUSRAP Sites, which are located in metropolitan St. Louis, Missouri. These two areas are comprised of multiple properties and are located in two distinct areas: north St. Louis County and St. Louis City (See Figure 2-1). The designations assigned to these two sites are the North St. Louis County sites and the St. Louis Downtown Site (SLDS), respectively. This decision document presents the Selected Remedy for the cleanup at the North St. Louis County sites. The North St. Louis County sites consist of the St. Louis Airport Site (SLAPS), the SLAPS Vicinity Properties (VPs), and the Latty Avenue Properties. The SLAPS is the property near the St. Louis airport which was originally used to store waste materials from uranium processing activities at SLDS. The SLAPS VPs include Coldwater Creek and properties near the SLAPS and along Coldwater Creek. The Latty Avenue Properties include the Hazelwood Interim Storage Site (HISS), the Futura Coatings Company (Futura), and Latty Avenue VPs. The locations of the properties that comprise the North St. Louis County sites are presented in Figure 2-2 and in Table 2-1. In October 1989, EPA placed three of the North St. Louis County sites properties [SLAPS, HISS, and Futura Coatings Company] on the Superfund National Priorities List (NPL) (*CERCLIS No. MOD980633176)*.

Table 2-1. North St. Louis County Sites

LOCATION NAME	PROPERTIES
SLAPS	**Investigation Areas 1 through 7**
SLAPS VPs	**Investigation Areas 8 through 13** **Haul Roads –Eva Avenue, Frost Avenue, Hazelwood Avenue, McDonnell Boulevard, and Pershall Road** **Haul Road Properties –Vicinity Properties 1-63** **Coldwater Creek** **Coldwater Creek Vicinity Properties 1C through 10C**
Latty Avenue Properties	**Hazelwood Interim Storage Site (HISS)** **Futura Coatings Company (Futura)** **Latty Avenue Vicinity Properties 1L through 6L** **Vicinity Properties 40A and 10K530087**

2.1.2 Site Description

2.1.2.1 SLAPS

The SLAPS is an unincorporated 21.7-acre property in north St. Louis County owned by the City of St. Louis. The 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 as shown in Figure 2-3. There are no permanent sewer lines or overhead utility lines within the security fence of the SLAPS, but utilities are located parallel to McDonnell Boulevard.

2.1.2.2 SLAPS VPs

The SLAPS VPs consist of approximately 78 properties including properties along former haul routes between the SLAPS and the HISS, Coldwater Creek, the open fields (former ballfield area) immediately north of the SLAPS, and other SLAPS contiguous properties. The impacted properties are located along haul routes between the SLAPS and the HISS. These routes include Eva Avenue, Frost Avenue, Hazelwood Avenue, McDonnell Boulevard, and Pershall Road. The SLAPS VPs are primarily 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. Coldwater Creek flows for 500 feet (ft) [153 meters (m)] along the western border of the SLAPS. The creek originates 3.6 miles (mi) [5.8 kilometers (km)] to the south of the SLAPS and continues for 15 mi (24 km) in a northeasterly direction through the City of Hazelwood, the City of Florissant, unincorporated areas of St. Louis County, and along the northern edge of the community of Black Jack, until it discharges into the Missouri River. The creek, except for 1.2 mi (1.9 km) under the Lambert-St. Louis International Airport, is generally accessible to the public. The contiguous properties surrounding the SLAPS were designated as Investigation Areas (IAs) 8 through 13, as shown on Figure 2-3. These properties are located within the City of Hazelwood, the City of Berkeley, and the airfield owned by the City of St. Louis.

2.1.2.3 Latty Avenue Properties

The Latty Avenue Properties are shown in Figure 2-2 and include HISS and Futura Coatings Company, and eight VPs designated as 1(L) through 6(L), 40A, and 10k530087. The majority of the VPs are located along Latty Avenue. The Latty Avenue Properties are 1.2 km (0.75 mi) northeast of the SLAPS. Key features of HISS and Futura Coatings Company, located at 9170 and 9200 Latty Avenue (respectively), are shown on Figure 2-4. These properties cover a 4.5-hectare (ha) (11-acre) tract of land. The HISS and Futura Coatings Company are in the City of Hazelwood. The VPs are located predominately within the City of Berkeley.

2.1.3 Lead and Support Agencies

The Selected Remedy will be implemented under FUSRAP, which is funded directly by Congress. The USACE is the lead agency responsible for implementing the Selected Remedy at the North St. Louis County sites under the legislative authority contained in the 2000 Energy and Water Development Appropriations Act, Public Law 106-60, §611 (HR 2605). This law establishes the authority of the USACE to conduct response actions for releases related to the nation's early atomic energy program as the lead federal agency, subject to the CERCLA and the NCP.

Plans and activities at the North St. Louis County sites are being overseen by EPA Region VII and are being coordinated with appropriate Missouri state agencies, including the Missouri Department of Natural Resources (MDNR).

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.1 Site History

Mallinckrodt Chemical Works processed uranium feed material for the production of uranium metal from 1942 to 1957 under contracts with the MED/AEC. This work was performed at the Mallinckrodt Plant, on property known today as the SLDS. The original feed material used at SLDS was uranium black oxide that was extracted from uranium ore. Because of pre-processing, this black oxide was relatively free of radium and radium daughter products. In 1944, Belgian Congo Shinkolobwe ore containing high percentages of uranium (greater than 30% by weight) were processed. 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 byproduct waste with correspondingly lower activity concentrations (particularly with respect to daughter products).

In 1946, the AEC acquired the 21.7-acre tract of land (now known as the SLAPS) in what was then an undeveloped area of north St. Louis County to store process byproducts and scrap from uranium processing at the Mallinckrodt Plant. The following byproducts and scrap were transported mainly from the SLDS to the 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;
- C-701 U scalping of magnesium fluoride, Japanese precipitates, and Vitro residues from the Vitro Corporation's facility in Canonsburg, PA; and
- Empty drums, contaminated steel and alloy scrap, and building debris.

Uranium processing residues and wastes resulting from the ore-processing activities at SLDS were stored at SLAPS beginning in1946. The general historical storage layout at the SLAPS is shown in Figure 2-5. The pitchblende raffinate cake and Colorado raffinate cake were stored along the southern boundary extending in toward the central portions of SLAPS, labeled AM-7 and AM-10 in Figure 2-5. Concentrated radium (including "K-65" residues) and barium sulfate cake were stored near the center of the site near the north boundary, in the areas designated AJ-4 in Figure 2-5. Uranium tailings were stored along the northwest portion of the SLAPS in the areas labeled as C-701 on Figure 2-5. Scrap metal, empty drums, and other debris were placed in low areas on the western end of the property and covered with dirt to make a level storage area. By 1960, there were approximately 50,000 empty drums and approximately 3,500 tons of miscellaneous contaminated steel and alloy scrap stored onsite at SLAPS. Through time, various meanders in Coldwater Creek were backfilled to support construction, resulting in some commingling of site soils and sediments with wastes brought to SLAPS. The alignment of McDonnell Boulevard has also changed through time.

These residues were removed from the site in subsequent actions of the 1960s. In 1966, all of these residues and wastes were sold to a private company and removed from the site. This

company, Continental Mining & Milling Company (CMM), purchased the SLAPS residues and began moving them under an AEC license to a property at 9200 Latty Avenue for storage (now known as HISS and Futura Coatings Company). The conditions of CMM's license specified that it was only for removal of stockpiled residues from 50 Brown Road (SLAPS) and storage at 9200 Latty Avenue. Storage, handling, and transportation of materials spread the materials along haul routes to Vicinity Properties (SLAPS VPs).

In February 1967, the Commercial Discount Corporation (CDC) of Chicago obtained possession of the residues and shipped much of the material, after drying, to Canon City, Colorado. Cotter Corporation purchased the remaining residues in 1969 and dried and shipped more material to Canon City during 1970. In 1973, Cotter shipped undried AM-10 Colorado raffinate cake to Canon City, Colorado and transported the leached AJ-4 barium sulfate cake, mixed with topsoil, to Westlake Landfill in western St. Louis County.

After removal of most of the residues to HISS, storage sheds on SLAPS were demolished and buried on the property in 1969. One to three feet of clean fill material was spread over SLAPS to achieve acceptable levels of surface radioactivity; however, soil contamination resulted from releases of these residues while they were on-site. In 1973, the U.S. Government and the City of St. Louis agreed to transfer ownership of SLAPS by quitclaim deed from AEC to the St. Louis Airport Authority.

In 1974, AEC [later to become the Department of Energy (DOE) and the U.S. Nuclear Regulatory Commission (NRC)] established the FUSRAP to address sites contaminated as a result of the nation's early atomic weapons development program. SLDS, SLAPS, SLAPS VPs, and the Latty Avenue Properties were placed in FUSRAP. Further, SLAPS, HISS, and the Futura Coatings Company property were added to the EPA's NPL in 1989. A Federal Facility Agreement (FFA) was negotiated between EPA and DOE under CERCLA Section 120. The FFA incorporates the procedural and documentation requirements of CERCLA and establishes the roles of each signatory agency. The Federal Facility Agreement (Docket Number VII-90-F-0005) addresses cleanup of 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 the St. Louis Downtown Site; 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 the St. Louis Downtown Site.

In support of a series of property development projects at the Latty Avenue Properties between 1977 and 1986, the DOE used the HISS for the interim storage of contaminated soils and materials that had been removed from the Futura Coatings Company property and nearby vicinity properties. Approximately 41,000 cubic yards of material were consolidated into interim storage piles at HISS and on adjacent Latty Avenue vicinity property (VP-2L). These piles were subsequently removed under the 1998 HISS EE/CA and Action Memorandum.

Since 1946, the small farms comprising the North St. Louis County sites have been developed into commercial, industrial, residential and even recreational properties. Residues migrated from the SLAPS (via runoff onto adjacent properties and into Coldwater Creek or windblown) or were released or otherwise deposited when material was transported along haul routes, contaminating the soil and sediment at the SLAPS VPs and Latty Avenue Properties. In 1997, Congress transferred responsibility for the execution of FUSRAP from the DOE to the USACE under the Fiscal Year 1998 Energy and Water Appropriations Act. Consistent with the transfer of authority, the USACE is acting as successor agency to the DOE under the FFA for the remedial action phase. Responsibility for implementation of long-term site management following completion of the remedial action remains with DOE. A more complete history of the North St. Louis County sites and description of the uranium production process at the SLDS is provided in Section 2.1 of the Feasibility Study.

2.2.2 Previous Investigations and Response Actions

2.2.2.1 Previous Site Investigations

Numerous site characterization activities have been conducted at the North St. Louis County sites. These characterization activities included radiological surveys, periodic sampling and analysis of environmental media, and investigations conducted under CERCLA and other environmental authorities.

In 1994, DOE issued a Remedial Investigation (RI) Report summarizing the results of previous investigations conducted at the North St. Louis County sites and the SLDS. The RI concluded that contamination related to MED/AEC activities is present in surface and subsurface soil at the North St. Louis County sites. It also identified additional data needs to more fully characterize the nature and extent of contamination at the North St. Louis County sites.

In 1995, DOE issued an RI Addendum report to summarize the results of an additional field investigation conducted to fill the data gaps identified in the RI Report. The activities associated with this investigation included soil sampling at the SLAPS VPs, the HISS, Futura Properties, and adjacent Latty Avenue VPs; sediment sampling in Coldwater Creek; installation and sampling of ground-water monitoring wells at the SLAPS and the HISS; building survey scans at Futura; vegetation sampling along ditches next to the haul roads; and background soil and ground-water sampling. The results of this investigation confirmed the presence of widespread radioactive contamination of surface and subsurface soil at the North St. Louis County sites. It also indicated that elevated levels of radiological contamination were present in ground water at the HISS and SLAPS.

In 1997, USACE conducted baseline ground-water characterization studies for the SLAPS and the HISS. These studies involved the installation of ground-water monitoring wells; measurement of ground-water levels; and radiological and chemical analysis of ground-water samples. In 1998 USACE conducted an investigation of SLAPS consisting of radiological and chemical analysis of soil and ground water. From 1997 to 1998, sampling of the HISS piles was conducted by USACE to characterize the distribution of radiological and chemical contamination in the piles, identify the presence of any mixed waste, and support the evaluation of removal action alternatives.

The Administrative Record contains documents describing the key investigations conducted at the North St. Louis County sites.

2.2.2.2 Previous Response Actions

Several removal actions conducted in accordance with approved EE/CAs are either on-going or have been completed at the North St. Louis County sites. The general locations of the areas where removal actions have been conducted at the North St. Louis County sites are shown in Figure 2-6. Additional details concerning the previous response actions are provided below.

SLAPS

From September to December 1997, an interim removal action was conducted by USACE at SLAPS to address contamination at the west end of the site. Approximately 5,100 cubic yards (yd^3) of contaminated material (in-situ) were removed from the western end of SLAPS under this action.

In accordance with the May 1998 EE/CA, USACE removed approximately 211,830 yd^3 of contaminated soil during the construction of the sedimentation basin, cleanup of the radium pit storage area, the eastern third of the site, McDonnell Blvd drainage ditch, and Phases 2 and 3. These actions were ongoing in 2004.

SLAPS VPs

In accordance with the March 1992 EE/CA, DOE began removal actions at the SLAPS VPs. In 1995, DOE excavated contaminated soils from the frontages of six residential vicinity properties and two industrial properties along Frost and Hazelwood Avenue. This resulted in the removal of approximately 580 yd^3 of contaminated soil from the properties for disposal at a licensed out of state disposal facility.

A removal action was conducted by USACE to support the City of Florissant's replacement of the St. Denis Bridge. Under the DOE 1992 EE/CA, approximately 450 in-situ yd^3 of contaminated soil and sediment from the east and west bank of Coldwater Creek were removed between October and November 1998.

In March 2000, USACE removed approximately 5,000 yd^3 of contaminated soil from VP-38 to allow relocation of USACE support facilities as a consequence of the cleanup of HISS.

Latty Avenue Properties

From October 1998 through 2001 the USACE removed 39,475 yd^3 of contaminated soil contained in the HISS piles. This removal action was conducted in accordance with the March 1998 EE/CA for the site. This removal action also included the installation of a rail spur at the site.

2.3 COMMUNITY PARTICIPATION

The community has been provided with multiple opportunities to be involved with the decision process at the North St. Louis County sites. The St. Louis Sites Remediation Task Force actively investigated the St. Louis Sites from 1994 to 1996 and published a report, which included specific recommendations and hundreds of pages of analysis. The St. Louis Sites Remediation Task Force became the St. Louis Oversight Committee after publishing its report. USACE provides monthly briefings at the St. Louis Oversight Committee meetings, which are open to the public. The USACE maintains a web site with current information about the status of the St. Louis FUSRAP Sites and historical documentation. Newsletters and fact sheets are distributed throughout the community semi-annually. In addition, two training sessions were conducted for the public to help explain the nature of the materials at the North St. Louis County sites and the process of evaluating an effective remediation plan.

The Feasibility Study and Proposed Plan (FS/PP) for the North St. Louis County sites were made available to the public on May 1, 2003. They can be found in the Administrative Record maintained at the U.S. Army Corps of Engineers FUSRAP Project Office, 8945 Latty Avenue, Berkeley, Missouri, or at the St. Louis Public Library, Government Information Room, 1302 Olive Street, St. Louis, Missouri.

The notice of availability for these documents was published in the Federal Register and in the *St. Louis Post-Dispatch* on May 1, 2003. A public comment period was held from May 1 to May 31, 2003. An extension of the public comment period was requested and subsequently granted. As a result, the public comment period ended on July 14, 2003. Responses to the comments received from the public, and local, state and federal agencies are provided in the Responsiveness Summary included as Part 3 to this Record of Decision.

A public meeting was held on May 29, 2003, at the Hazelwood Civic Center – East, located near the North St. Louis County sites, to present the FS/PP to interested members of the community. The meeting included an open-house public workshop allowing one-on-one discussions with agency representatives, an informal presentation, and a transcribed open microphone public hearing which allowed the public to make comments on the record. During the public workshop, the public was given the opportunity to ask questions and receive answers from the USACE staff. During the open microphone segment, members of the public were provided with an opportunity to comment on the FS/PP and the statements were recorded by a court reporter. The transcript of the public hearing and comment period was made available to the public on the USACE's St. Louis District FUSRAP website *www.mvs.usace.army.mil/engr/fusrap/home2.htm* and is included as part of the Administrative Record.

2.4 SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The Selected Remedy is a component of a comprehensive cleanup strategy for the North St. Louis County sites. This comprehensive cleanup strategy addresses releases resulting from MED/AEC-related activities.

During the first phase of this cleanup strategy, portions of the North St. Louis County sites were addressed through removal actions conducted pursuant to EE/CAs and Action Memoranda. The

ongoing removal actions were designed to address contaminated soils through excavation and permanent offsite disposal at a permitted disposal facility. Numerous properties, as described in Section 2.2.2.2, have been cleaned up through removal action.

Concurrent with the implementation of these removal actions, an RI/FS process was initiated for the sites. This ROD completes the RI/FS process. It sets forth the final Selected Remedy for the North St. Louis County sites, and serves as the basis for remedial design and remedial action, culminating in final closeout of the North St. Louis County sites. This ROD addresses contaminated soil, sediment, surface water, ground water, and structures at the North St. Louis County sites. The USACE intends that the selected remedy with respect to contaminated soil will supersede the decisions made under removal authority. Concurrent with the execution of this remedy, the USACE will evaluate the residual condition of those areas, which were cleaned up in accordance with the EE/CA criteria, and verify that the performance objectives of this remedy were met. In the event any removal actions have not met the objectives of this ROD, remedial action will be necessary. This assessment will be performed and documented as part of the RD/RA process.

2.5 SITE CHARACTERISTICS

2.5.1 Physical Site Location

The North St. Louis County sites are located in northern St. Louis County, Missouri within the boundaries of five local municipal jurisdictions. Specific properties include the SLAPS, SLAPS VPs, and the Latty Avenue Properties [Hazelwood Interim Storage Site (HISS), Futura Coatings Company, and Latty Avenue VPs]. There are more than 87 properties with a variety of industrial, commercial, residential and recreational uses included in the North St. Louis County sites. All properties included in the North St. Louis County sites are identified in Figure 2-2. Coldwater Creek, considered a SLAPS VP, flows adjacent to the SLAPS, HISS, and Futura Coatings Company, and receives the runoff from the North St. Louis County sites.

SLAPS is a 21.7-acre property in St. Louis County immediately north of the Lambert-St. Louis International Airport. It is bounded by the Norfolk and Western Railroad and Banshee Road on the south, Coldwater Creek on the west, and McDonnell Boulevard and adjacent recreational fields on the north and east. A heavily industrialized area that includes landowners/tenants such as Lambert-St. Louis International Airport, the Boeing Company, and GKN Aerospace Services surrounds the SLAPS property.

The SLAPS VPs include properties located along the haul routes between SLAPS and HISS, Coldwater Creek, the ballfields immediately north of SLAPS, and other SLAPS contiguous properties. These properties include an industrial/commercial area, recreational properties and residential properties.

The Latty Avenue Properties are approximately 1 mile north of SLAPS in the Berkeley Industrial Court immediately east of Coldwater Creek. The Latty Avenue Properties consist of the Hazelwood Interim Storage Site (HISS), the Futura Coatings Company property, and a group of impacted properties along Latty Avenue and/or adjacent to the 11-acre HISS and Futura

Coatings Company properties. These properties are surrounded by commercial, light industrial and transportation facilities.

The North St. Louis County sites are primarily located within the municipalities of Hazelwood and Berkeley. However, a few properties such as SLAPS and Coldwater Creek, also fall under the jurisdiction of St. Louis City, unincorporated St. Louis County, Florissant, and Black Jack. The cities of Hazelwood and Berkeley have a combined population of approximately 38,000 based on the 2000 census data for St. Louis County. The North St. Louis County sites are situated within the St. Louis Metropolitan Statistical Area, which has a population of approximately 2.6 million. The nearest residential properties to SLAPS are located approximately 0.6 km (0.4 miles) to the northeast on Frost Avenue in the City of Berkeley. The closest residential properties to HISS and Futura Coatings Company are located approximately 0.3 km (0.2 miles) to the southwest along Frost Avenue and 0.5 km (0.3 miles) to the northeast along Hazelwood Avenue. 2000 census data indicates a population of 3,700 people for the census tract containing SLAPS, HISS and most of the VPs.

2.5.2 Topography, Drainage, and Surface Water

The North St. Louis County sites are located on a modest upland area south of the Missouri River floodplain. The upland area surrounds a topographic depression known as the Florissant Basin. Pleistocene soil and recent fill overlay shale and limestone bedrock. Faulting is not evident at the site, and the limestone bedrock appears to be almost flat.

Coldwater Creek is the major drainage mechanism for the SLAPS, SLAPS VPs, and the Latty Avenue Properties. It has been designated as a Metropolitan No-Discharge Stream. Coldwater Creek flows adjacent to the SLAPS and SLAPS VPs, then meanders near the HISS, Futura Coatings Company and other Latty Avenue Properties and continues to flow through northern St. Louis County until it discharges into the Missouri River. The ecological risk assessment partitioned Coldwater Creek into three reaches: the upper reach of Coldwater Creek, located between SLAPS and HISS (Section A); the middle reach between Pershall Road and U.S Highway 67 (Section B), and the lower reach (Section C) which extends from US Highway 67 to the mouth of the creek at the Missouri River. Coldwater Creek floods areas of the North St. Louis County sites including portions of the SLAPS, HISS, Futura Coatings Company, and several VPs. Bank stabilization measures have been undertaken by local municipalities at various locations along Coldwater Creek. In the industrial area located between the airport and Pershall Road, the water quality in Coldwater Creek is generally poor. The portion of Coldwater Creek from its intersection with U.S. Highway 67 downstream to its mouth at the Missouri River is protected for livestock and wildlife watering and aquatic-life usage. This lower portion of Coldwater Creek is classified by the state as a Class “C” waterway. Class “C” waterways may cease flow in dry periods but maintain permanent pools that support aquatic life.

2.5.3 Geology/Soil

The stratigraphic section of interest for the North St. Louis County sites consists of the Pennsylvanian and Mississippian bedrock and the overlying Pleistocene and recent nonlithified surficial material, consisting of loess, clay, sands, and gravel that was deposited by wind, stream and lake processes. This surficial sequence was deposited on Pennsylvanian shale and

Mississippian limestone. The shale is absent in specific areas. The limestone lies at a depth of approximately 100 feet below ground surface at the North St. Louis County sites. The stratigraphic units identified at the North St. Louis County sites are shown in Figure 2-7. Units 1 and 2 include the surficial fill and loess, respectively. Unit 3, which is subdivided into Subunits 3T, 3M, and 3B, consists primarily of clay and silt lakebed deposits. Unit 4 consists of clayey gravel with fine to very-fine sand and sandy gravel. This unit is absent beneath the eastern part of the SLAPS, where the 3T, 3M, and 3B drape, or onlap, onto Pennsylvanian shale bedrock, Unit 5. Below Units 3 and 4 are Units 5 and 6, which consist of Pennsylvanian shale/siltstone and Mississippian Limestone, respectively. The geologic setting at the SLAPS is similar to that at the Latty Avenue Properties, with one exception. The Pennsylvanian shale bedrock unit (Unit 5) present beneath portions of the SLAPS is absent at the Latty Avenue Properties.

2.5.4 Hydrogeology/Ground Water

Chemical and hydrologic characteristics define five hydrostratigraphic (ground-water) zones (HZs) at the North St. Louis County sites. These HZs are identified in the conceptual model of ground-water flow for the SLAPS shown in Figure 2-7. The ground-water zones for the SLAPS are, in order of increasing depth: HZ-A, which consists of Unit 1 fill, Unit 2 loess, and Subunit 3T silty clay; HZ-B, the Subunit 3M clay; HZ-C, consisting of Subunit 3B silty clay and Unit 4 clayey to sandy gravel; HZ-D, the Unit 5 shale/siltstone; and HZ-E, the Unit 6 Mississippian Limestone. All five HZs (HZ-A through HZ-E) occur beneath the SLAPS. HZ-D (shale/siltstone) is not found beneath the Latty Avenue Properties.

HZ-A is not considered a viable source of potable water because of its low yield and poor quality (i.e., turbidity and chemical pollutants from the highly industrialized North County region). HZ-B limits the passage of ground water vertically beneath the North St. Louis County sites properties. Subunit 3M of HZ-B is a clayey aquitard that effectively impedes vertical contaminant migration from the HZ-A ground-water system to the underlying HZ-C and HZ-E. The exchange of waters between HZ-A and HZ-E will take centuries.

Chemical compositions of ground-water samples collected from HZ-A are highly variable and include major anions and cations, radionuclides, metals, and organic compounds. The chemical composition of ground-water samples collected from each of the deeper HZs is remarkably similar among these lower zones but, distinctly different from the composition of the bulk of the ground-water samples collected from HZ-A. Additionally, while soil contaminants of concern (COCs) were detected in HZ-A ground water, no soil COCs were detected in samples from the limestone aquifer (HZ-E) which is a potential drinking water zone. The modeled rate of vertical contaminant movement suggests an arrival time exceeding 1,000 years for the soil COCs to reach HZ-E from HZ-A. This arrival time is based on the assumption that the soil remains contaminated. 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.

This interpretation of limited vertical ground-water movement 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 site-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 Feasibility Study. HZ-E meets 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 ground water in HZ-A at and near the SLAPS and the HISS is of poor quality and low yield and meets the Class III definition. 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 remediated 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. Subclasses are differentiated based primarily on the degree of interconnection of the ground water to adjacent surface water and/or ground water. If an 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. Based on this rationale, HZ-A, B, C, and D were classified as Class IIIA. The soils and shale of units HZ-A through HZ-D have such fine-grained matrix that the recovery rates for sampling are extremely low. Although not equivalent to wells for the purpose of water production, the low recovery rates in the monitoring wells indicate that water wells completed in these units would not be able to sustain pumping rates capable of meeting the needs of individual private residences. There is no known use for ground water of such poor water quality and low yield under any of the current or reasonably anticipated land uses.

2.5.5 Ecology

Studies of aquatic life in Coldwater Creek have shown the stream ecology is severely affected by industrial and other operations in North County unrelated to the MED/AEC-related activities. Pollutants enter the creek in storm water from commercial and industrial facilities, residential areas, and Lambert-St. Louis International Airport. The SLAPS storm-water run-off 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 creek, including the Ford Motor Company, Lambert-St. Louis International Airport, and the Boeing Company. Permitted discharges include storm-water runoff and manufacturing discharges, such as non-contact cooling water.

No threatened or endangered species have been found at the North St. Louis County sites. The pallid sturgeon and the bald eagle are the only federal and state endangered or threatened species that may possibly be found in the North St. Louis County sites area. 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 the site. Potential wetlands have been identified along Coldwater Creek, and portions of the North St. Louis County sites lie within the 100-year floodplain.

2.5.6 Archaeological and Historical Sites

The North St. Louis County sites do not contain any historic buildings or archaeological sites. No known archeological or historical sites are affected by the contamination at the North St. Louis County sites.

2.5.7 Conceptual Site Model

The conceptual site model illustrates the threats posed by the sites by presenting the type and extent of contamination, affected media, location of contamination, and potential routes of exposure. The conceptual site model for the North St. Louis County sites is depicted in Figure 2-8.

2.5.7.1 Known and Potential Sources of Contamination

The original sources of contamination were: 1) the contaminated process wastes and scrap materials which were stored or buried at SLAPS; 2) contaminated process wastes and associated soils that were spilled during the process of transportation by truck; and 3) contaminated wastes and associated soils that were stored or processed for shipment at HISS and the Futura Coatings Company property pending the transfer of such materials for recovery of other constituents. These sources were long ago removed and the current sources of ongoing migration are the contaminated soils and scrap that were left behind.

2.5.7.2 Types of Contaminants

As noted in Section 2.2.1, uranium processing residues and wastes resulting from the ore-processing activities of MED/AEC at the SLDS were stored at SLAPS from 1946 through 1966. The residues consisted of the remaining portion of the metal-bearing ore consisting of finely ground rock and process liquid after some or all of the uranium has been extracted. The uranium mill tailing residues are typically composed of sands, slimes and liquids. Although most of the residues were later transported to other locations for reprocessing or disposal, some residual materials and large quantities of contaminated soils were left behind at SLAPS and Latty Avenue.

As the uranium ore was processed, the daughter products were chemically separated from the respective parent such that tailings residuals contained elevated amounts of the daughter products with relatively small amounts of the uranium parents. Although uranium tailings typically contain about 85% of the initial radioactivity of the ore, the processing at the SLDS chemically extracted the Ra-226 with the more concentrated K-65 residues for return to the owner. This resulted in much lower Ra-226 concentrations in tailings at SLAPS than would otherwise be expected. Residual concentrations of Pa-231 and Ac-227 would be expected to equate to about 4.5 percent of the Th-230 concentration. The total amount of radioactivity of SLAPS tailings varied significantly over time based on the origin and associated activity of the feed material. As a result, the distribution of the radionuclides within the contaminated soils at SLAPS is highly variable.

Environmental transport of site contaminants in surface and ground water depends in large part on their relative solubility. Prior to processing of feed materials, uranium and radium are relatively soluble when compared to thorium, actinium and protactinium. As a result of processing with sulfuric acid, radium is converted into radium sulfate, a very insoluble material. The acid, together with pH control, generates metallic sulfate and oxide, which effectively precipitate the metals from the soluble portion. These insoluble metallic compounds, whether radiological or non-radiological, do not move well in the environment. Contaminated soils at SLAPS generally contain these relatively insoluble forms of radium, thorium, and heavy metals.

Radium, thorium, and uranium are the primary radiological COCs at the site. The non-radiological COCs are antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium. Note that these COCs vary by location as defined in Table 2-2 in Section 2.7. Additional information concerning the nature and extent of contamination at the site is presented in Section 2.5.8.

2.5.7.3 Affected Media

Affected media at the North St. Louis County sites are soils, sediment, shallow ground water (HZ-A), surface water, and soils adhered to the surface of buildings and structures. As discussed above, deeper ground-water zones have not been affected because of the presence of an aquitard; however, in the absence of any response action, the deeper zones (HZ-C and HZ-E) could potentially be impacted over the long term. Air is not significantly impacted under current conditions as long as the contaminated soils remain covered or vegetated; however, this could be an issue over the long-term if these conditions are not maintained. Affected and potentially affected media are shown in the Conceptual Site Model presented in Figure 2-8. COCs for each media are presented in Table 2-2, located in Section 2.7 of this ROD.

2.5.7.4 Routes of Migration

Potential routes of migration at the North St. Louis County sites are shown in the Conceptual Site Model presented in Figure 2-8. These include:

- Storm-water runoff over contaminated soil and transport of suspended material to other surface locations and to surface water (i.e., Coldwater Creek);
- Radon gas emanation from radium-contaminated soil or ground water;
- Wind dispersal of contaminants from structural surfaces and fugitive dust (particulates) from contaminated soil;
- Surface deposition of airborne particulates; and,
- Infiltration/percolation from contaminated soil to ground water.

2.5.7.5 Potential Receptors

Potential human receptors were identified in the Baseline Risk Assessment on the basis of the following factors:

- Locations of contaminated source areas, types of contaminants found at source areas, and potential mechanisms of contaminant release;

- Likely contaminant fate and transport within or between environmental media;
- Estimated exposure point concentrations and the associated probable routes of human exposure; and
- Completeness of each exposure pathway (presence of source, mechanism of contaminant release, environmental transport medium, point of human contact with the source or medium, and route of human exposure at that point).

The Conceptual Site Model for the North St. Louis County sites includes the following potential exposure routes: 1) ingestion, dermal contact, and inhalation of ground-water contaminants; 2) inhalation and dermal contact with surface water; 3) ingestion and dermal contact with surface and subsurface soil and sediment; 4) inhalation of airborne contaminants originating from soil, sediment, and building surfaces; and 5) external gamma exposure originating from soil and sediment contamination. The potential receptors evaluated were 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. Ground water was not considered a complete exposure pathway because there are no contaminants in the potentially usable ground-water unit HZ-E (the Class IIB ground-water unit).

2.5.8 Nature and Extent of Contamination

This section provides a brief summary of the nature and extent of contamination at the North St. Louis County sites. A more complete description can be found in the Remedial Investigation (RI) Report, the RI Addendum, the SLAPS Implementation Report, and the Feasibility Study. The patterns of soil contamination around SLAPS, HISS, and Futura Coatings Company indicate that airborne transport has been a contaminant transport mechanism in the past [e.g., from the SLAPS north to Investigation Area 9 (IA-9), the former ballfield area]. Spillage from trucks was also a major mechanism for contaminant transport to haul road properties in the past when materials were moved from the SLAPS to the HISS and Futura Coatings Company. Runoff from affected areas has led to the contamination of Coldwater Creek sediment. Flood events have moved the contaminated sediment within the floodplain as well as downstream.

The following sections describe the results of soil and ground-water investigations at each of the North St. Louis County sites. For this document, the term “surface” refers to the first 6 in (15 cm) and the term “subsurface” refers to depths below 6 in (15 cm). The entire surface soil and subsurface soil data summary tables are included in Section 2 of the North County Feasibility Study. The extent of radionuclide contamination in soil at the North St. Louis County sites is shown in Figure 2-9.

Contaminated and potentially contaminated structures at the North St. Louis County sites include but are not limited to: buildings and portions of buildings, including roof areas and foundations; footings, retaining walls, and stop logs; piping and ducting; utility poles; bridges and supporting structures; and other similar items located where surficial soil contamination occurs. These structures have become contaminated by contaminated soils becoming trapped, embedded, or adhered onto various structural surfaces. In conjunction with various site investigations including the *Radiological Characterization Report for the Futura Coatings Site*, the *Remedial Investigation Report of the St. Louis Site* and the *Feasibility Study/Environmental Impact*

Statement for the St. Louis Site, structures at the North St. Louis County sites have been investigated to determine whether any detectable radiological activity was present. All potentially contaminated structures have not been investigated to this point.

2.5.8.1 SLAPS

Soil

Contamination at the SLAPS occurs over most of the surface and subsurface soil down to a variable depth whose maximum is 20 feet below ground surface (bgs). Contaminated building rubble was buried on the SLAPS. Geotechnical investigations have identified features on the SLAPS consistent with burials of this type. A limited amount of scrap, rubble and partial drums have been unearthed during the removal actions at SLAPS.

Elevated levels of radionuclides in the uranium, thorium, and actinium decay series, including Ra-226, Th-230, and U-238, have been detected in the SLAPS soil. The remedial investigations found concentrations of Ra-226, Th-230, and U-238 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 in the Radium Test Pits (IA-4) prior to removal.

Non-radiological contaminants, including volatile organic compounds (VOCs) (primarily trichloroethene (TCE) and its breakdown products), are also present at SLAPS. A complete list of substances, radiological and non-radiological, found at SLAPS in the surface and subsurface soils are listed in Tables 2-10 & 2-11 of the Feasibility Study. The non-radiological contaminants associated with the processed ores are co-located with the radiological contaminants. Experience from the removal actions shows that excavations designed to remove the radiological contaminants will effectively remove the co-located non-radiological contaminants. Confirmation sampling results from properties that have undergone removal action were evaluated to verify that this is the case. This screening evaluation is described in Appendix E of the Feasibility Study.

The gross estimated in-situ volume of contaminated soil present at SLAPS is 270,000 cubic yards, based on a preliminary screening level of 5/5/50 pCi/g for surface soils and 5/15/50 pCi/g for subsurface soils for Ra-226, Th-230, and U-238, respectively. This volume estimate represents conditions at SLAPS as of June 30, 2003. The volume necessary for excavation and disposal may be different than this estimate based on the alternative selected. The horizontal and vertical extent of radiological contamination in soil at SLAPS is shown in Figures 2-10 and 2-11.

Ground Water

Ground-water sampling is currently being reported annually. The most recent results of ground-water monitoring were reported in the Annual Environmental Monitoring Data and Analysis Report (EMDAR) for Calendar Year 2004.

Various metals, radionuclides, and organic compounds are present at elevated levels in the shallow ground-water system (HZ-A) at SLAPS. The principal inorganic contaminants in shallow HZ-A ground water at the site include antimony, arsenic, chromium, iron, manganese,

nitrate, selenium, and thallium. The principal radiological contaminants present in the HZ-A ground water are Ra-226, Th-230, U-234, and U-238. In general, the highest concentrations of these radionuclides have been detected in wells located on the western portion of SLAPS near Coldwater Creek.

The organic compounds TCE and 1,2-dichloroethene (1,2-DCE) have also been detected at concentrations above their maximum contaminant levels (MCLs) in shallow wells (HZ-A) at the western edge of SLAPS near the buried meander bend of Coldwater Creek and in the ballfields where there have been no MED/AEC activities. Most of the organic contamination in the vicinity of SLAPS is probably unrelated to MED/AEC wastes and probably originates from other industrial activities common to the area.

The contaminated shallow ground water (HZ-A) is subject to horizontal flow and discharge to Coldwater Creek, though Coldwater Creek has not shown significant impact from HZ-A water. Due to the presence of an aquitard between HZ-A and the deeper ground-water systems (HZ-C, HZ-D, and/or HZ-E), significant mixing between HZ-A and the deeper units is not expected. This is supported by the analytical data. The contamination present in HZ-A ground water is not present in the deeper zones. Also, no measurable water-quality changes have been identified vertically, based upon piezometric, water quality, and tritium data. Elevated concentrations of arsenic, iron, manganese, and total dissolved solids (TDS) have been detected in ground-water samples from the lower ground-water units (HZ-C, HZ-D, and/or HZ-E), but their occurrence is interpreted as being due to natural conditions. These ground-water constituents are commonly detected in the glacial deposits of the area, such as the glacial lake bed deposits represented by the HZ-C unit. Samples from the HZ-C unit, in background wells upgradient of the SLAPS, detected the presence of elevated arsenic, iron, and manganese. In addition, the low vertical hydraulic conductivity of the overlying units has prevented the mixing between HZ-A and HZ-C waters as shown by piezometric, water quality, and tritium data. See Figure 2-7 for the conceptual diagram of ground-water flow at SLAPS.

Structures

The contaminated structures at SLAPS generally consist of temporary utility poles and temporary utility lines.

2.5.8.2 SLAPS VPs

Soil

Contamination at the SLAPS VPs generally occurs in the surface soil. Levels of Ra-226, Th-230, and U-238 were detected above background concentrations on some of the SLAPS 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 (26,000 pCi/g above background) and in the ditches (15,000 pCi/g above background) adjacent to the SLAPS. Many of the SLAPS VPs have undergone removal actions. Of the remaining vicinity properties, the highest Th-230 concentration identified is approximately 20,000 pCi/g on IA-8 (under and along McDonnell Boulevard at the SLAPS). See Figure 2-6.

In general, historical (pre-1997) non-radiological data for the SLAPS VPs are extremely limited. Historical (pre-1997) data show VOC concentrations at the SLAPS 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 detected in one sample at 253 mg/kg above the background soil value of 610 mg/kg. As part of an additional characterization effort, USACE collected samples for full suite analysis on IA-8, IA-9, IA-10, and IA-13. Organics detected in soil samples above background and EPA Region IX preliminary remediation goals (PRGs) included 2-methyl-4-chloro phenoxyacetic acid (MCPA), 2-methylnaphthalene, dieldrin, dimethylbenzene, and various polycyclic aromatic hydrocarbons (PAHs). Various organic compounds from industrial activities and vehicle emissions are present because the site is located in an industrial area. Industrial activities in the area of the airport are potential sources of organic and non-radioactive inorganic contamination (e.g., refueling, deicing and maintenance of aircraft) that are not related to MED/AEC activities.

An intersection sampling effort was undertaken to identify any areas of radiological contamination, in addition to previously identified areas along transportation routes. Samples from 28 intersections on these routes between the HISS and the West Lake Landfill in western St. Louis County (231 samples) were collected and analyzed for Ra-226, Th-230, Th-232, and U-238. None of the samples collected exhibited radionuclide concentrations exceeding the proposed surface and subsurface soil remediation goals identified in this ROD.

The gross estimated in-situ volume of contaminated soil present at SLAPS VPs is 111,000 cubic yards, based on a preliminary screening level of 5/15/50 pCi/g for radium-226, thorium-230, and uranium-238, respectively. The volume necessary for excavation and disposal may be different than this estimate based on the alternative selected.

Ground Water

The SLAPS VP ground water discussion is included in Section 2.5.8.1 on SLAPS, as these data were evaluated collectively.

Surface Water and Sediment

Radionuclide and chemical contamination has been detected in sediment samples in selected reaches of Coldwater Creek located between the SLAPS and the Missouri River. Historical analytical results for sediment samples collected from Coldwater Creek in the reach between the SLAPS and the HISS reveal elevated levels of radionuclides at numerous locations, typically in the top 6 in (15 cm) of sediment. Concentrations of Th-230 in sediment ranged from background to 1,400 pCi/g, with the corresponding concentrations of U-238 and Ra-226 ranging from background to 10.9 pCi/g and 25.1 pCi/g, respectively. Sediment with elevated levels of radionuclides is intermittently located in creek bends where natural settling would occur. Concentration levels are highest near the SLAPS and the HISS, but decrease greatly downstream. Four sediment samples collected from Coldwater Creek revealed four metals (arsenic, manganese, selenium, and thallium) that exceed background levels. Nine polycyclic aromatic hydrocarbons (PAHs) and one VOC were detected in these 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].

Results of surface-water sampling indicate levels of measured radionuclides in surface-water samples from Coldwater Creek were consistent with background levels. However, ten chemicals (aluminum, barium, cobalt, copper, iron, lead, manganese, selenium, vanadium, and zinc) exceeded benchmarks for the protection of aquatic life at the SLAPS/HISS reach.

The gross estimated in-situ volume of contaminated sediment present below the mean water gradient in Coldwater Creek is 500 cubic yards, based on a preliminary screening level of 15/43/150 pCi/g for radium-226, thorium-230, and uranium-238, respectively. The mean water gradient is a hydrologic term that refers to the low average water level and reflects the level of the creek that stays damp throughout most of the year. The volume necessary for excavation and disposal may be different than this estimate based on the alternative selected.

Structures

A wide variety of structures are present on the SLAPS VPs. These structures include, but are not limited to, buildings, footings, bridges, retaining walls, utility lines, and utility poles. Investigations of structures present within the SLAPS VPs indicate that above background concentrations of radionuclides are present on a limited number of these structures including portions of the St. Denis Bridge footings, and concrete and soil adjacent to footings for the McDonnell Boulevard Bridge over Coldwater Creek, indicating that these structures will require investigation.

2.5.8.3 Latty Avenue Properties

Soil

Due to local site characteristics and former/current uses, soil contamination at the Latty Avenue Properties is best understood by examining HISS, Futura Coatings Company, and the Latty Avenue VPs separately. At the HISS property, Th-230 is the primary radionuclide present in soil, with lesser amounts of Ra-226 and U-238 present. Based on the results of the RI, the depth of contamination ranges from the surface to 2 m (6 ft bgs).

With respect to non-radiological contaminants at HISS, metals and organics were found. Sixteen metals were detected in soil samples from the HISS at varying concentrations ranging from below the average background to as high as 11,400 mg/kg of magnesium. 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. Base/neutral and acid extractable (BNAE) analyses of two samples indicated the presence of unidentifiable hydrocarbon compounds. While the analyses failed to fully identify the compounds, it is most probable that chemical analyses have detected the weathered remains of the original substance. The original substance is judged to be unrelated to MED/AEC activities, but will be removed where co-located with MED/AEC wastes. Eleven inorganics (nitrate, antimony, arsenic, barium, boron, cadmium, molybdenum, nickel,

selenium, thallium, and vanadium) were found to exceed background levels and/or EPA Region IX PRGs in HISS soil samples.

Results from sampling performed in the early 1990s found that the HISS soil does not exhibit characteristics of a RCRA-hazardous waste. Soil samples did not exceed regulatory thresholds for ignitability, corrosivity, reactivity, and toxicity by the Extraction Procedure-Toxicity (EP-TOX), the precursor to the Toxicity Characteristic Leaching Procedure (TCLP). No additional samples were collected at the HISS for TCLP analysis because concentrations for non-radionuclide chemicals were found to be low and no EP-TOX regulatory threshold limits were exceeded.

At the Futura Coatings Company property, Ra-226, Th-230, and U-238 concentrations in soil samples exceeded background concentrations. 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 15 ft (5 m) bgs.

With respect to non-radiological contaminants at the Futura Coatings Company property, VOCs and metals were found. Two VOC compounds (toluene and trichlorofluoromethane) were detected at 15 µg/kg and 1.3 µg/kg, respectively. Twelve metals are present in soil samples collected from the Futura Coatings Company property at concentrations ranging from background concentrations to 17,000 mg/kg. Arsenic, barium, cadmium, molybdenum, nickel, selenium, and vanadium were detected in soil above background and EPA Region IX PRGs. Historical (pre-1997) chemical sampling resulted in no soil samples exhibiting the RCRA-hazardous waste characteristics of ignitability, corrosivity, reactivity, and toxicity. Concentrations for non-radionuclide chemicals were found to be low, and EP-TOX results were below regulatory levels.

Documentation in MDNR databases indicates that the following regulated hazardous substances have been used and/or stored on the Futura Coatings Company property in underground storage tanks [chemical abstract service 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).

Radiological characterization of soil on the eight Latty Avenue VPs indicates levels of Ra-226 and Th-230 exceeding background levels. Th-230 is the predominant radionuclide in Latty Avenue VP soil with a maximum concentration of approximately 1,200 pCi/g above background.

Potential areas of radiological contamination along transportation routes, which included Latty Avenue, were identified and sampled. Samples from 28 intersections on these routes between the HISS and the West Lake Landfill in western St. Louis County (231 samples) were collected and analyzed for radionuclides. None of the 231 samples collected exhibited concentrations of radionuclides exceeding the proposed surface and subsurface soil remediation goals identified in this ROD.

The gross estimated in-situ volume of contaminated soil present at the Latty Avenue Properties is 138,000 cubic yards, based on a preliminary screening level of 5/15/50 pCi/g for Ra-226, Th-230,

and U-238, respectively. The volume necessary for excavation and disposal may be different than this estimate based on the alternative selected. The horizontal and vertical extent of radiological contamination at the Latty Avenue Properties is shown in Figures 2-12 and 2-13.

Ground Water

Ground-water sampling is currently being reported annually. The most recent results of ground-water monitoring were reported in the Annual EMDAR for Calendar Year 2004. Ground-water monitoring data from the HISS indicate that inorganic, radionuclide, and organic compounds are present in HZ-A. The principal inorganics identified in HZ-A at HISS are arsenic, iron, manganese, and selenium. In addition, TCE has been identified in HZ-A. Organics were found at HISS in two wells far removed from the former MED/AEC stockpiled material areas and therefore, are not believed to be associated with MED/AEC activities. The HISS organic concentrations are the highest of all FUSRAP wells at the North St. Louis County sites. Total uranium has been detected above its MCL and/or its background concentration in numerous HZ-A monitoring wells. Other radiological contaminants are generally present in HZ-A ground water at very low to non-detect levels, with the exception of some slightly elevated levels of Ra-226 and Th-230 detected in samples from wells located near the southern and western edges of the HISS.

Ground-water samples collected from the two deep wells at the HISS indicate that some metals are present at elevated concentrations in HZ-C. In particular, arsenic, iron, and manganese have been detected at average concentrations that exceeded their MCLs or their background concentrations for HZ-C ground water. The elevated arsenic, iron, and manganese concentrations in HZ-C ground water are likely the result of natural conditions. These ground-water constituents are commonly detected in the glacial deposits of the area, such as the glacial lake bed deposits represented by the HZ-C unit. Samples from the HZ-C unit, in background wells upgradient of the SLAPS, detected the presence of elevated arsenic, iron, and manganese. In addition, the low vertical hydraulic conductivity of the overlying units has prevented the mixing between HZ-A and HZ-C waters as shown by piezometric and water quality data.

Structures

See the discussion provided on structures under Section 2.5.8. A wide variety of structures are present on the Latty Avenue Properties. These structures include, but are not limited to, buildings, footings, retaining walls, utility lines, and utility poles. Investigations of structures present within the Latty Avenue Properties indicate that above background concentrations of radionuclides are present on a limited number of structures. Elevated levels of radiological COCs were detected: 1) on the roof, roof vents, west wall and bay area of the structure at VP-2L; 2) adjacent to and under portions of foundations of the Futura buildings and structures; and 3) on ledges and equipment inside Futura buildings.

2.6 CURRENT AND POTENTIAL FUTURE LAND AND WATER USES

2.6.1 Current and Potential Future Land Use

The current land uses of the 87 properties included in the North St. Louis County sites consist predominately of commercial/industrial and transportation-related uses, with less prevalent land uses, including private residences, vacant lots, a farming area, a community garden and a recreational area also represented. Coldwater Creek, which traverses the area, is occasionally used for recreational purposes.

Adjacent land use varies between SLAPS, SLAPS VPs (including Coldwater Creek), and the Latty Avenue Properties. More than two-thirds of the land within 0.5 mi of SLAPS is used for transportation related purposes. The remaining land is used for commercial and industrial uses. Adjacent to HISS, the primary land use is commercial and industrial, although Hazelwood Avenue provides access to a residential area north of Latty Avenue along Heather Lane. Due to the physical dispersion of the SLAPS VPs, the land uses cover the full spectrum of industrial, commercial, residential and recreational use. Coldwater Creek, in particular, accounts for the diversity of land uses as it flows through a commercial/industrial area, residential sections of Hazelwood and Florissant, Black Jack and adjacent to several recreational parks.

No significant changes in land use are anticipated. The likely potential future land use for most of the North St. Louis County sites is commercial/industrial, based on the prior conversion of undeveloped properties to commercial/industrial use, a review of local development plans, discussions with local land use committees, and existing zoning restrictions within the area. Exceptions to the anticipated commercial/industrial use include existing residential areas, Coldwater Creek (recreational), and transportation corridors, where those uses are anticipated to continue.

2.6.2 Current and Potential Future Water Use

Ground water is not currently used as a water-supply source at the North St. Louis County sites. The limestone aquifer (HZ-E) fits the classification for a potential source of drinking water but it is not currently used. The upper water-bearing unit at the North St. Louis County sites, HZ-A, is not a current or future potential source of drinking water due to its poor quality and very low yields. The soils and shale of units HZ-A through HZ-D have such fine-grained matrix that the recovery rates for sampling are extremely low. Although not equivalent to wells for the purpose of water production, the low recovery rates in the monitoring wells indicate that water wells placed in these units would not be able to sustain pumping rates capable of meeting the needs of individual private residences. A description of the HZ-A ground-water quality is given in Section 2.5.4. There is no known use for water of such poor quality under any of the current land uses. Future ground-water use is not anticipated at the North St. Louis County sites, given the generally poor ground-water quality, very low yield, and the proximity of abundant drinking water supplies from the Mississippi and Missouri Rivers.

Coldwater Creek is not currently used as a drinking water source. Two municipal water intakes (the City of St. Louis Chain of Rocks Plant and the East St. Louis Plant) are present on the Mississippi River downstream of the discharge of the creek to the Missouri River. The present

and reasonably anticipated future use of the creek is recreational and livestock and wildlife watering. Coldwater Creek, except for 1.2 miles under the Lambert-St. Louis International Airport, is generally accessible to the public. The beneficial uses designated for the classified portion of Coldwater Creek (downstream of Highway 67) are industrial, livestock and wildlife watering, protection of warm water aquatic life and human health associated with fish consumption.

2.7 SUMMARY OF SITE RISKS

This section provides 1) a brief summary of the relevant portions of the human health risk assessment, 2) a brief summary of the ecological risk assessment, and 3) the basis for taking action.

2.7.1 Human Health Risks

The baseline risk assessment estimates what risks the site poses if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action.

A Baseline Risk Assessment (BRA) was prepared in 1993 to address the St. Louis Sites, which includes the North St. Louis County sites and SLDS. Because significant additional information (chemical samples, updated cancer slope factors, etc.) became available after the BRA was issued, a supplemental human health risk assessment was developed and included in Appendix D of the North County Feasibility Study. This section of the ROD summarizes the results of the human health risk assessment.

The human health risk assessment addresses both cancer and toxic (non-cancer) risks. The approach used for the supplemental human health risk assessment is based on the EPA guidance in *Risk Assessment Guidance for Superfund Volume I, Human Health Evaluation Manual (Part A)* (RAGS Part A). The human health risk assessment consists of 4 major components:

1. Identification of COCs: Identifies those contaminants which are of significant concern;
2. Exposure Assessment: Identifies actual or potential exposure pathways, the potentially exposed populations, and the extent of possible exposures;
3. Toxicity Assessment: Considers the types and magnitudes of adverse health effects associated with exposure to the COCs; and
4. Risk Characterization (including an uncertainty analysis): Integrates the three other components to summarize the potential and actual risks posed by the COCs at the site.

2.7.1.1 Identification of Contaminants of Concern for the Human Health Risk Assessment

Under this step, the assessment evaluated all possible impacted environmental media and the sampling data for all contaminants present in each medium to identify the COCs that are present at the site. The human health COCs for the various media at the North St. Louis County sites are discussed in the following:

a) **Soil:** The radiological COCs, which all originated from materials stored at SLAPS, are consistent across the properties. The non-radiological COCs in soil vary by depth and location due to differences in the source of the contamination, the mechanisms of distribution, and the mobility characteristics of the individual contaminants. Risks associated with the non-radiological chemicals typically are of lower magnitude than risks associated with the radiological COCs. As a result, non-radiological chemicals were not carried forward as COCs in some portions of the site because they did not exceed the CERCLA thresholds applied in the risk assessment screening. The screening process is more fully described in the Feasibility Study. Specific COCs for soil are presented in Table 2-2.

b) **Soil on Permanent Structures:** COCs for structures were found to be consistent with soil COCs because the primary means of structure contamination was by soil adhering to structure surfaces. At the SLAPS, SLAPS VPs, and the Latty Avenue Properties, the exterior of structures (e.g., the roof, utility poles, etc.) have become contaminated from windborne contaminated soils or from dust along the haul routes. Specific COCs for soil on permanent structures are presented in Table 2-2.

c) **Sediment:** As with soil, radionuclides are identified as COCs in Coldwater Creek sediment. No non-radiological COCs were identified for Coldwater Creek sediment. One metal (arsenic) and five organics also exceeded the CERCLA risk range in Coldwater Creek sediment. Organic and arsenic concentrations increase with distance downstream from SLAPS and HISS. Thus, the elevated concentrations are judged to be the result of the heavy industrial activity in the area and are not MED/AEC-related. For this reason, neither the organics nor arsenic is retained as a COC for sediment. COCs for sediment are the isotopes of radium, thorium, uranium, protactinium, and actinium. Specific COCs for sediment in Coldwater Creek are presented in Table 2-2. Other contaminants will be remediated when co-located with the radiological COCs.

Table 2-2. Contaminants of Concern (COCs) for the North St. Louis County Sites

Media	SLAPS (Includes Investigation Areas IA-1 to IA-7)	Latty Avenue Properties	SLAPS VPs (excluding Coldwater Creek below mean water gradient)	Coldwater Creek (below mean water gradient)
Soil – Surface (≤6")	Radionuclides: Radium-226, -228 Thorium-230, -228, -232 Uranium-234, -235, -238 Lead-210 Protactimium-231 Actinium-227	Radionuclides: Same as SLAPS	Radionuclides: Same as SLAPS	NA
	Non-Radionuclides: Antimony Arsenic Barium Cadmium Chromium Molybdenum Nickel Selenium Thallium Uranium Vanadium	Non-Radionuclides: (applies only to HISS, Futura, VP-2L, and 10k530087)* Antimony Arsenic Barium Cadmium Molybdenum Nickel Selenium Thallium Vanadium	Non-Radionuclides: (applies only to IA-8-13)**(does not apply to VPs located outside IA8-IA13) Same as SLAPS	NA
Soil-Subsurface (>6")	Radionuclides: Same as Surface Soil	Radionuclides: Same as Surface Soil	Radionuclides: Same as Surface Soil	NA
	Non-Radionuclides: Antimony Arsenic Thallium Uranium	Non-Radionuclides: (applies only to HISS, Futura, VP-2L, and 10k530087)* Antimony Arsenic Thallium	Non-Radionuclides: (applies only to IA-8-13)** Same as SLAPS	NA
Soil – On Structures	Radionuclides: Radium-226, -228 Thorium-230, -228, -232 Uranium-234, -235, -238 Lead-210 Protactinium-231 Actinium-227	Radionuclides: Same as SLAPS	Radionuclides; Same as SLAPS	NA
Sediment	NA	NA	NA	Radionuclides: Radium-226, -228 Thorium-230, -228, -232 Uranium-234, -235, -238 Lead-210 Protactinium-231 Actinium-227
Ground Water	None	None	None	NA
Surface Water	NA	NA	NA	None

NA – Not Applicable
* Does not apply to Latty VPs 1(L), 3(L), 4(L), 5(L), and 6(L).
**IA- Investigation Areas (Figure 2-3)

d) Ground Water: No COCs were identified for ground water. Although some contaminants are present in the shallow ground-water unit (HZ-A), this ground water is not considered potentially usable due to its low yield and poor water quality as discussed in Section 2.6.1. In addition, the contaminants are generally confined to the shallow ground water except through slow discharge to Coldwater Creek. Coldwater Creek shows no significant impact from HZ-A water. Therefore, the contaminants detected in HZ-A ground water do not meet the definition of a COC. Ground water in HZ-A was eliminated as a medium of concern for risk-assessment purposes.

Sampling of the deep ground water, HZ-C, HZ-D, and HZ-E, the latter being the protected water resource, indicated that there are no soil COCs present. Prior investigations have demonstrated that the vertical movement of water between HZ-A and either HZ-C or HZ-E either is not occurring or is immeasurably small, and that HZ-E ground water will not be impacted by soil COCs for very long periods of time, if ever. Modeling has indicated that barely measurable quantities of the more mobile contaminants, such as uranium, would not reach the HZ-E for 1,000 years if no remedial action were taken. Ground water in HZ-C and HZ-E was eliminated as a medium of concern for risk-assessment purposes.

e) Surface Water: No COCs were identified for Coldwater Creek, which is the only surface water body impacted by the site. An evaluation of the data against background, risk, and hazard criteria indicates that the contaminants potentially associated with the site are at levels within the acceptable CERCLA risk range of 10^{-4} to 10^{-6}. For that reason, surface water was eliminated as a medium of concern.

Table 2-3 presents the human health COCs for soil and sediment, their minimum and maximum detected concentrations, their frequency of detection at different properties, and their exposure point concentrations. The exposure point concentration is used to quantify potential cancer risks and non-cancer hazards for each COC. The exposure point concentration is the concentration from a given medium or route of exposure that is representative of a chemical contaminant. The type of statistical measure it represents is also identified in Table 2-3. EPA recommends use of 1) the maximum concentration (MAX) detected if there are few samples or 2) the 95th percentile upper confidence limit (UCL 95) of the mean concentration as the exposure point concentration for deterministic risk assessments.

2.7.1.2 Exposure Assessment

The purpose of the exposure assessment is to estimate the nature, extent, and magnitude of potential receptors' exposure to COCs that are present at or migrating from the site, considering both current and potential future land and resource use at the site. Components of the conceptual site model (e.g., identification of potential receptors, exposure pathways, and exposure media) were used in performing the exposure assessment. The conceptual site model for the North St. Louis County sites is depicted in Figure 2-8.

Exposure scenarios are used to assess potential risk. Scenarios are developed by modeling the potential receptor's exposure given a specific concentration of the contaminant (exposure point

Table 2-3: Summary of Contaminants of Concern and Medium-Specific Exposure Point Concentrations

Exposure Point	Contaminant of Concern	Location	Detected Concentration[1]		Frequency of Detection	Exposure Point Concentration[1]	Statistical Measures[3]
			Min	Max			
Surface soil on-site–Direct Contact	**Radionuclide COCs**						
	Radium-226[4]	Futura	0.4	2,300	359/361	46	95% UCL
		HISS	0.5	700	537/544	9.6	95% UCL
		IA-10	0.3	2.8	95/119	1.29	95% UCL
		IA-13	0.54	3.3	110/111	1.59	95% UCL
		IA-8	0.7	436.4	85/86	34.7	95% UCL
		IA-9	0.5	29.27	451/478	1.69	95% UCL
		ROAD ROW	0.4	92	1,730/1,757	2.89	95% UCL
		SLAPS[2]	0.6	2,700	323/456	58.8	95% UCL
	Thorium-230[5]	11K630221	12.13	12.13	1/1	12.1	MAX
		Futura	0.5	2,000	172/173	102	95% UCL
		HISS	0.8	830	215/228	51.9	95% UCL
		IA-10	0.4	29	112/121	4.44	95% UCL
		IA-13	0.42	110	108/109	15.4	95% UCL
		IA-8	2.9	20,280	83/84	1,750	95% UCL
		IA-9	0.51	2,787	510/523	34.3	95% UCL
		ROAD ROW	0.3	5,100	2,740/2,784	49.9	95% UCL
		SLAPS[2]	0	37,780	278/279	823	95% UCL
	Uranium-238[6]	Futura	2.3	2,500	48/361	54.2	95% UCL
		HISS	4	800	62/543	17.1	95% UCL
		IA-8	6	190.4	29/86	25.9	95% UCL
		ROAD ROW	0.3	5,100	47/1754	49.9	95% UCL
		SLAPS[2]	3.04	1,200	104/455	49.6	95% UCL
Surface soil on-site–Direct Contact	**Non-Radionuclide COCs**						
	Arsenic	Futura	320	320	1/1	320	MAX
		HISS	51.3	1,010	2/2	1,010	MAX
		IA-13	5.1	19.9	6/6	19.9	MAX
		IA-9	5.5	41	8/8	21.4	95% UCL
		ROAD ROW	23.2	23.2	1/1	23.2	MAX
		SLAPS[2]	6.1	237	17/17	66.9	95% UCL
	Antimony	HISS	242	242	1/13	57	95% UCL
		IA-3	5.3	53.2	2/7	24.9	95% UCL
	Barium	Futura	3,480	3,480	1/1	3,480	MAX
		HISS	3,010	4,360	2/2	4,360	MAX
		IA-9	29.8	532	8/8	532	MAX
		SLAPS[2]	152	13,600	19/19	3,680	95% UCL
	Cadmium	Futura	1.3	15.5	4/14	3.73	95% UCL
		HISS	1.2	26.6	5/13	6.44	95% UCL
		SLAPS[2]	0.52	50.4	12/52	3.45	95% UCL
	Chromium	IA-8	42.6	42.6	1/1	3.2	MAX
		SLAPS[2]	15.1	3,240	15/15	614	95% UCL
	Molybdenum	Futura	20.9	947	5/14	201	95% UCL
		HISS	19.1	1,100	4/13	248	95% UCL
		SLAPS[2]	1.2	255	19/52	35.8	95% UCL
	Nickel	Futura	17,300	17,300	1/1	17,300	MAX
		HISS	1,780	1,780	1/1	1,780	MAX
		IA-9	2.6	1,080	8/8	1,080	MAX
		SLAPS[2]	19	7,570	17/17	1,740	95% UCL
	Selenium	Futura	1,040	1,040	1/14	215	95% UCL
		HISS	41.1	1,020	2/13	229	95% UCL
		SLAPS[2]	0.38	183	10/52	19.9	95% UCL

Table 2-3: Summary of Contaminants of Concern and Medium-Specific Exposure Point Concentrations (cont'd)

Exposure Point	Contaminant of Concern	Location	Detected Concentration[1]		Frequency of Detection	Exposure Point Concentration[1]	Statistical Measures[3]
			Min	Max			
Surface soil on-site–Direct Contact	**Non-Radionuclide COCs (continued)**						
	Thallium	HISS	51.8	959	2/13	217	95% UCL
		IA-13	1.4	1.4	1/6	1.05	95% UCL
		ROAD ROW	7.2	7.2	1/1	7.2	MAX
		SLAPS[2]	1	3.3	8/52	3.3	MAX
	Uranium	IA-13	10.2	10.2	1/6	9.31	95% UCL
		IA-9	53.6	118	2/8	52.8	95% UCL
		SLAPS[2]	11.1	129	6/14	41.9	95% UCL
	Vanadium	Futura	2,180	2,180	1/1	2,180	MAX
		HISS	712	712	1/1	712	MAX
		IA-9	10.7	185	8/8	185	MAX
		ROAD ROW	65.3	65.3	1/1	65.3	MAX
		SLAPS[2]	27.4	862	17/17	288	95% UCL
Subsurface soil on-site–Direct Contact	**Radionuclide COCs**						
	Radium-226[4]	IA-10	0.6	44	44/58	4.36	95% UCL
		IA-8	0.67	130	282/294	4.13	95% UCL
		IA-9	0.15	230.7	420/427	3.28	95% UCL
		ROAD ROW	0.4	39.9	1,359/1,381	2.07	95% UCL
		SLAPS[2]	0.5	5,620	649/874	44.5	95% UCL
	Thorium-230[5]	IA-10	0.4	46	60/63	7.83	95% UCL
		IA-8	0.9	15,000	303/303	175	95% UCL
		IA-9	0.6	10,140	402/407	105	95% UCL
		ROAD ROW	0.3	1,100	2,328/2,371	13.4	95% UCL
		SLAPS[2]	0	14,680	623/626	221	95% UCL
	Uranium-238[6]	IA-8	3.87	66	24/294	13.6	95% UCL
		SLAPS[2]	3.04	1,769	162/872	42.3	95% UCL
Subsurface soil on-site–Direct Contact	**Non-Radionuclide COCs**						
	Arsenic	IA-10	4.9	668	5/5	421	95% UCL
		IA-9	1.8	98.4	41/41	13.7	95% UCL
		ROAD ROW	23.2	23.2	1/1	23.2	MAX
		SLAPS[2]	2	237	64/64	22.6	95% UCL
	Antimony	IA-10	195	195	1/14	42.7	95% UCL
	Chromium	SLAPS	10.3	3,240	62/62	156	95% UCL
	Nickel	SLAPS	8.7	7,570	65/65	491	95% UCL
	Thallium	IA-10	1.3	726	2/14	150	95% UCL
		IA-9	0.46	148	7/61	10.6	95% UCL
	Uranium	IA-9	36	112	3/40	16.3	95% UCL
		SLAPS[2]	11.1	155	10/61	20.3	95% UCL
Sediment-Coldwater Creek	**Radionuclide COCs**						
	Radium-226[4]	Reach A	0.3	25.1	271/280	1.31	95% UCL
		Reach B	0.15	13.1	183/347	1.09	95% UCL
	Thorium-230[5]	HS Group 1	3.3	128.7	6/9	67.7	95% UCL
		HS Group 2	1.5	84.7	10/12	41.4	95% UCL
		Reach A	0.19	1,398.7	276/282	18.1	95% UCL
		Reach B	0.7	198.7	205/352	10.1	95% UCL
		Reach C	0.7	27.7	51/146	1.51	95% UCL
	Uranium-238[6]	Reach A	0.2	10.9	240/268	0.895	95% UCL
		Reach B	0.79	9.9	24/330	0.525	95% UCL

[1] Units of radionuclide and non-radionuclide concentration are pCi/g and mg/kg, respectively.
[2] SLAPS properties include properties IA-1 to IA-7. [3] 95% UCL = 95% upper confidence limit of the mean concentration
[4]Ac-227, Pa-231 and Pb-210 are assumed to be present with respect to Ra-226.
[5]Thorium-232 is co-located with Th-230 and is present at relatively low concentrations. Remediation of Thorium-230 will effectively remove Thorium-232 from the soils.
[6]Uranium-238 was used as a surrogate for Uranium-234, and Uranium-235 as their natural activity concentration ratio is 1:1: 0.046.

concentration) and specific exposure parameters (e.g., body surface area, duration on site, frequency of exposure, breathing rate, etc.) for each anticipated exposure pathway. The overall risk to each receptor is the sum of the risks associated with each exposure pathway.

As indicated in the conceptual site model, potentially exposed populations/receptors are adults and children living on site (i.e., residents), commercial/industrial workers, construction workers, maintenance workers, recreational users (or trespassers), and utility workers. Exposure pathways consist of: dermal contact (non-radiological only), direct gamma (radiological only), soil/sediment ingestion, and inhalation.

Specific exposure parameters used standard default values recommended by EPA's RAGs Part A guidance document and EPA's 1997 Exposure Factor Handbook to the extent that such parameters were available. Where EPA standard parameters were not available, site-specific parameters were used. (See Feasibility Study Table D-2 for more detailed information).

Reasonable maximum exposure (RME) is the highest exposure that is reasonably expected to occur at a site. RMEs were estimated for individual pathways. Where a population was exposed via more than one pathway, the combination of exposure across pathways represented an RME. Each intake variable in the exposure assessment equation had a range of values, and the combination of all intake variables resulted in an estimate of RME for that pathway, based on quantitative information, professional judgment and site information.

Due to the differences in levels and types of contaminants and land use, the sites were subdivided into the following categories for purpose of identifying RMEs: SLAPS IAs 1-13, HISS, Futura Coatings Company, Coldwater Creek, roads/bridges/active rail lines, and remaining VPs. RMEs for radiological exposures are presented in Table 2-5. The RME receptor for the SLAPS IAs 1-13 and for the HISS and Futura Coatings Company was an industrial worker. The RME receptor for Coldwater Creek and roads/bridges/rail lines was a construction worker. The RME receptor for the remaining VPs was a resident. The exposure assessment results in an estimation of contaminant intake for each receptor. Detailed data can be found in Table D-3 of Appendix D of the Feasibility Study.

2.7.1.3 Toxicity Assessment

The toxicity assessment results in the selection of appropriate toxicity values to use in generating estimates of potential health risks associated with exposure. This is accomplished by reviewing the available information on the toxicity of the COCs and summarizing the factors pertinent to the exposures being assessed.

Primary organs/systems affected by non-carcinogenic chemical COCs are as follows: 1) the cardiovascular system by antimony, arsenic and barium; 2) the respiratory system/lungs by antimony, cadmium, chromium, nickel and vanadium; 3) the central nervous system (CNS) by selenium and thallium; 4) the immune system by nickel; 5) the skeletal system/bones by molybdenum; 6) the kidney by cadmium and uranium; and 7) the skin/hair by arsenic, selenium and thallium. Carcinogenic COCs consist of radionuclides, cadmium, arsenic and chromium.

The major sources for toxicity values such as chemical slope factors and reference doses (RfDs) are Integrated Risk Information System (IRIS) and Health Effects Assessment Summary Table (HEAST). Dermal slope factors and dermal chronic RfDs are not available for a number of chemicals. They have been extrapolated from oral values. In addition, chronic and subchronic inhalation RfDs were converted from inhalation reference concentrations (RfCs). Radiological toxicity assessments used the dose conversion factors for external gamma, inhalation, and ingestion from the Federal Guidance Reports 11 (September 1988) and 12 (September 1993). The human health toxicity data and their sources for both radionuclide and non-radionuclide COCs for the North St. Louis County sites are provided in Table 2-4.

2.7.1.4 Risk Characterization

In the risk characterization, the chemical intakes estimated in the exposure assessment were combined with the appropriate critical toxicity values identified in the toxicity assessment. The results were the estimated cancer risks and non-carcinogenic health hazards posed by the exposures.

RESRAD Version 5.82 was used to perform the radiological dose and risk assessment for the North St. Louis County sites soil and sediment. RESRAD is a computer code developed at Argonne National Laboratory for the DOE to determine site-specific radiation guidelines and dose to a hypothetical on-site receptor at sites that are contaminated with residual radioactive materials. This model uses dose conversion factors (DCFs) for external gamma, inhalation and ingestion to estimate dose, and slope factors to convert soil concentration to risk.

Table 2-5 presents the excess lifetime cancer and chronic risks for different properties of the North St. Louis County sites. The table presents the total risk and considers all COCs across all pathways. As shown in this table, the risks due to radiological COCs at IAs 1-13, HISS, Futura Coatings Company, roads/bridges/rail lines, and the VPs, for the RME scenario exceed the CERCLA risk range of 10^{-6} to 10^{-4}. The maximum cancer risks due to non-radiological COCs at IAs 1-13 and at HISS and Futura Coatings Company for the RME scenario exceed the CERCLA risk range. In addition, the chronic risks at IAs 1-13, HISS and Futura Coatings Company, and under portions of roads, bridges, and active rail lines would exceed a hazard index of 1.0 if the current use were to change. The results of the carcinogenic and chronic risk levels indicate that remedial action is required.

Sources of uncertainty in risk estimates for the North St. Louis County sites include: 1) the quality of historic (pre-October 1997) sampling data; 2) the use of environmental fate and transport models; 3) the use of default exposure factors; and 4) the available toxicity information.

Historic sampling data used in the risk assessment included results from several characterization efforts and included different analysis methods and reporting requirements. In addition, changes in the coordinate system subsequent to historical sampling efforts have introduced uncertainty into the location of the samples. Additional sampling conducted as a part of removal actions occasionally failed to duplicate the presence of contamination as indicated in historical data. Thus the use of the historical sampling data may increase uncertainty.

Table 2-4. Human Health Toxicity Data Summary for the North St. Louis County Sites

Chemicals of Potential Concern	Reference Doses (mg/kg-day)						Cancer Slope Factors					
	Chronic Oral RfD[a]	Subchr. Oral RfD[b]	Chronic Dermal RfD[+]	Subchr. Dermal RfD[+]	Chronic Inhalation RfD[++]	Subchr. Inhalation RfD[++]	Oral Slope Factor	Dermal Slope Factor[+]	Inhalation Slope Factor[+++]	External Slope Factor[c]	EPA Class[d]	ICRP Lung Class[d]
Chemicals							**Cancer Slope Factors (mg/kg-day)$^{-1}$**					
Antimony	4.00E-04	4.00E-04	8.00E-06	8.00E-06							NA	
Arsenic	3.00E-04	3.00E-04	1.23E-04	1.23E-04			1.50E+00[a]	3.66E+00	1.51E+01		A	
Barium	7.00E-02	7.00E-02	4.90E-03	4.90E-03	1.43E-04	1.43E-03					D	
Cadmium (Diet) [e]	1.00E-03		1.00E-05						6.30E+00		B1	
Cadmium (Water) [e]	5.00E-04		5.00E-06						6.30E+00		B1	
Chromium VI (chromic acid mists) [f]	3.00E-03	2.00E-02	6.00E-05	4.00E-04	2.29E-06				4.10E+01		A	
Chromium VI (particulates) [f]	3.00E-03	2.00E-02	6.00E-05	4.00E-04	2.86E-05				4.10E+01		A	
Molybdenum	5.00E-03	5.00E-03	1.90E-03	1.90E-03							NA	
Nickel	2.00E-02	2.00E-02	5.40E-03	5.40E-03							NA	
Selenium	5.00E-03	5.00E-03	2.20E-03	2.20E-03							D	
Thallium [g]	8.00E-05	8.00E-04	1.60E-05	1.60E-04							D	
Uranium [h]	3.00E-03		2.55E-03								NA	
Vanadium	7.00E-03[b]	7.00E-03	7.00E-05	7.00E-05							NA	
Radionuclides[i, j]							**Cancer Slope Factors (risk/pCi)**					
Actinium-227+D [p]							6.26E-10		7.87E-08	9.30E-07	A	Y
Lead-210+D [p]							1.01E-09		3.86E-09	1.45E-10	A	D
Protactinium-231							1.49E-10		2.42E-08	2.71E-08	A	Y
Radium-226+D [p]							2.96E-10		2.75E-09	6.74E-06	A	W
Radium-228+D [p]							2.48E-10		9.94E-10	3.28E-06	A	W
Thorium-228+D [p]							2.31E-10		9.68E-08	6.20E-06	A	Y
Thorium-230							3.75E-11		1.72E-08	4.40E-11	A	Y
Thorium-232							3.28E-11		1.93E-08	1.97E-11	A	Y
Uranium-234							4.44E-11		1.40E-08	2.14E-11	A	Y
Uranium-235+D [p]							4.70E-11		1.30E-08	2.65E-07	A	Y
Uranium-238+D [p]							6.20E-11		1.24E-08	6.57E-08	A	Y

[+] Dermal chronic RfD, Dermal subchronic RfD and Dermal slope factors are derived values based on method provided in the Risk Assessment Guidance for Superfund Volume 1, Human Health Evaluation Manual, Part A (RAGs Part A).
[++] Inhalation RfC (mg/m^3) are converted to RfD (mg/kg-day) by multiplying a conversion factor of 20 m^3/day per 70 kg by the RfC.
[+++] Inhalation slope factor for chemicals was calculated from inhalation unit risk as described in Supplemental Guidance from RAGS.
[a] Source of toxicity values is IRIS (1999) except for vanadium (chronic oral RfD);
[b] Source of toxicity values is HEAST (1995)
[c] Units for external exposure cancer slope factor (radionuclides only) are (risk/year per pCi/g soil).
[d] EPA Class: (A) Human carcinogen; (B1) Probable human carcinogen; (D) Not classifiable as to human carcinogenicity. ICRP Lung Classification categories: (Y) years; (W) weeks; (D) days.
[e] Cadmium (diet) toxicity values were used for soil and sediment; Cadmium (water) toxicity values were used for ground water and surface water.
[f] Chromium VI (particulates) toxicity values were used for soil and sediment; Chromium VI (chromic acid mist) toxicity values were used for ground water and surface water.
[g] Thallium was evaluated using the toxicity of Thallium Sulfate.
[h] Uranium (as a non-radionuclide) was evaluated using the toxicity of Uranium (Soluble Salts).
[i] Radionuclide toxicity values were derived from HEAST (1997).
[J] Please note that FGR 13 has updated slope factor values, which have been incorporated into HEAST 2001 and which will be used in the Final Status Surveys.
+D [p] Slope factors include contributions from short-lived daughter products.
NA Not available
This table originated from the May 2003 *Feasibility Study for the St. Louis North County Site*

Table 2-5. Summary of Human Health Baseline Risk For The North St. Louis County Sites

Radiological Exposures						
Properties [a]	RME Receptor	Minimum Dose (mrem/yr)	Maximum Dose (mrem/yr)	Minimum Risk [b]	Maximum Risk [b]	Exceeds Risk Levels
IAs 1-13[c]	Industrial	0.0	946	2E-08	9E-03	Yes
IAs 1-13[c]	Resident[d]	0.0	3407	1E-07	4E-02	Yes
HISS & Futura Coatings Company	Industrial	2.7	79	4E-05	8E-04	Yes
Coldwater Creek[e]	Construction	2.9	8.6	2E-06	3E-06	No
Roads/Bridges/Rail lines	Construction	0.01	1128	9E-10	6E-04	Yes
VPs	Resident	51	60	7E-04	9E-04	Yes
Non-radiological Exposures [f]						
Properties [a]	RME Receptor	Minimum HI [g]	Maximum HI[g]	Minimum Risk	Maximum Risk	Exceeds Risk Levels
IAs 1-13	Industrial	< 0.1	0.9	2E-07	6E-05	No
IAs 1-13	Resident[d]	< 0.1	2.3	5E-07	3E-04	Yes
HISS & Futura Coatings Company	Industrial	<0.1	3.1	9E-05	3E-04	Yes
Coldwater Creek	Construction	-	-	-	-	No
Roads/Bridges/Rail lines [h]	Construction	<0.1	0.4	2E-06	2E-06	No
VPs [h]	Resident	-	-	-	-	No

[a] VP = Remaining vicinity properties [Latty Avenue VPs: VP 1(L) through 6(L), VP-40A, and 10K530087; and SLAPS VPs: VPs 1 through 63, VPs 1(C) through 10(C)]
[b] Minimum and maximum values listed for VP with worst-case source term
[c] IA = investigation area (includes SLAPS)
[d] Although the future receptor for IAs 1-13 is not "Resident", the values are included in the table for informational purposes.
[e] Coldwater Creek's risk reflects exposure if sediment remains in Creek. For exposures resulting from sediment excavation and placement on adjacent banks, exposure scenarios would be similar to VPs.
[f] Cancer risks for all non-radionuclides, including those that are non-MED/AEC-related
[g] HI = hazard index; calculated for non-radiological COCs only for each target organ
[h] No available non-radiological data except where property also falls under an IA

The use of environmental fate and transport models introduces uncertainty to the risk estimates. The risk calculations use default exposure factors designed to produce conservative dose and risk estimates. Also, it was conservatively assumed that the contaminants are uniformly distributed across the site and all modeled receptors are equally exposed. This approach produces conservative dose and risk estimates. For many properties, the contamination actually affects only small areas and may only reasonably expose a small subset of individuals (e.g., utility workers).

There are a variety of sources of uncertainty associated with estimating cancer risks using toxicological data obtained from human and animal studies. These studies extrapolate health effects at low doses from experiments/observations of health effects of high doses, and/or extrapolate health effects on humans from experiments/observations of health effects on animals.

This approach resolves uncertainties by using conservative values and assumptions for relating high doses to low doses and animal studies to humans, which may result in an overestimate of risk. The use of conservative default parameters for geologic conditions, (e.g., hydraulic conductivities and retardation factors), tends to result in an overestimation of the potential impacts to ground water and surface water.

In general, CERCLA risk assessments are designed to conservatively estimate exposure point concentrations, toxicity of the various COCs and relevant exposure parameter values.

2.7.2 Ecological Risks

The baseline ecological risk assessment (BERA) conducted in 1993 presented two conclusions about ecological risk. First, the BERA concluded on the basis of a qualitative environmental assessment that "only a few contaminants [arsenic, thallium, and PAHs] are at concentrations of potential concern to biota." Second, the BERA concluded that "the potential ecological impacts are not a major concern requiring extensive further field analysis because the habitats and biota occurring at the site are not unique or unusual; not necessary for continued propagation of key species; and not highly valued economically, recreationally, or aesthetically."

A supplemental screening-level ecological risk assessment (SERA) was conducted for soil, surface water, and sediment at the North St. Louis County sites as part of the Feasibility Study. The assessment for the North St. Louis County sites follows the *Ecological Risk Assessment for Superfund, Process for Designing and Conducting Ecological Risk Assessments*. The SERA was performed using the data for surface soil from IA 9 and 10 adjacent to the SLAPS and using the sediment and surface water data from that portion of Coldwater Creek from the airport to the Missouri River. The remaining properties constituting the North St. Louis County sites do not provide undisturbed, natural, or vegetated habitat for ecological receptors, so data for these areas were not evaluated. The results of the SERA indicated low risks relative to the uncertainty in the risk estimates; a low probability of significant ecological effects on local populations; and, the lack of unique, rare, and critical habitat at the North St. Louis County sites.

2.7.2.1 Identification of Ecological Contaminants of Concern

Potential ecological contaminants were identified during the SERA process and were further re-evaluated to determine the ecological COCs for the North St. Louis County sites during the ecological risk assessment. The re-evaluation considered the ecological significance of the potential adverse effect on the persistence of local species populations exposed at the North St. Louis County sites and evaluated the rarity, diversity, and importance of habitats at the North St. Louis County sites. The results of this re-evaluation are shown in Tables 2-6 and 2-7.

Table 2-6. Results of Ecological Risk Assessment for Surface Soil

Potential Contaminant	Site RME Concentration (mg/kg)	HQs		
		Short-tailed Shrew	American Robin	Red-tailed Hawk
IA–9				
Aluminum	1.21E+04	6.18E+01	1.02E+00	5.81E-04
Cobalt	3.05E+02	8.33E+00	4.12E-01	No HQ
Lead	2.40E+02	3.92E-01	5.69E+00	5.62E-04
Molybdenum	2.57E+01	5.05E+00	2.44E-01	1.70E-03
Nickel	1.08E+03	1.22E+00	1.24E+00	2.52E-03
Selenium	7.81E+00	5.12E+00	2.25E+00	1.16E-02
Vanadium	1.03E+02	3.51E+00	6.67E-02	6.29E-05
IA –10 (None)				

Table 2-7. Results of Ecological Risk Assessment for Surface Water

Potential Contaminant	Upstream Reference (mg/L)	RME Conc. (mg/L)	HQ		
			Mallard Duck	Raccoon	Kingfisher
SLAPS/HISS Reach					
Aluminum	2.62E+02	7.05E+03	1.23E-03	4.04E+00	3.30E-02
Arsenic	2.60E+00	7.30E+00	6.81E-05	1.75E+00	5.02E-02
Molybdenum	ND	1.23E+01	3.77E-05	2.56E+00	4.96E-02
Middle Reach					
Molybdenum	ND	9.10E+00	2.79E-05	1.89E+00	3.67E-02
Lower Reach					
Arsenic	2.60E+00	2.90E+01	2.71E-04	6.93E+00	2.00E-01

Upstream Reference Station 1 is located immediately downstream of St. Louis Airport upstream of SLAPS.
Middle Reach includes Coldwater Creek Stations 7 and 8
Lower Reach includes Coldwater Creek stations 3B and 4B
ND = nondetect

2.7.2.2 Exposure Assessment

At the North St. Louis County sites, terrestrial and aquatic habitats are present, although they are limited in extent and substantially affected by their urban surroundings. The ecological receptors along with their exposure pathways that were identified in the SERA are provided in Table 2–8. The exposure parameters used for the above-identified ecological receptors during the SERA process are shown in Table 2-9.

The Environmental Risk Assessment (ERA) processes (Steps 1 to 3) conducted for the Ballfield areas (IA-9 and IA-10) and portions of Coldwater Creek concluded that no further evaluation is required for ecological receptors present at the North St. Louis County sites. The remaining evaluation steps of the EPA ERA process were not recommended for IA-9 and IA-10 because of low risk relative to uncertainty in risk estimates, low probability of significant ecological effects on local populations, and the lack of unique, rare, and critical habitat at the North St. Louis County sites.

Table 2-8. Site-Specific Ecological Receptors for the North St. Louis County Sites

Study Areas	Receptor Categories	Individual Species	Exposure Pathways
IA-9 & IA-10	Plants	None Evaluated	
	Soil-Dwelling Invertebrates		
	Insectivorous Birds and Mammals	Robins Short-tailed Shrews	Ingestion of Plant matter, soil-dwelling invertebrates, & soil.
	Top Predators	Not Evaluated	
Coldwater Creek	Aquatic Biota	None Evaluated	
	Sediment-dwelling Biota		
	Herbivorous Birds	Mallard Duck	Ingestion of aquatic plants and water
	Piscivorous Birds	Kingfisher	Ingestion of water and aquatic animals (e.g., fish)
	Mammals	Raccoon	

Table 2-9. Exposure Parameters for Different Ecological Receptors at the North St. Louis County Sites

Parameter	Unit	Short-Tailed Shrew	American Robin	Red-Tailed Hawk	Mallard Duck	Raccoon	Belted Kingfisher
Body Weight (BW)	kg	0.015	0.077	1.219	1.1	6.25	0.158
Home Range	ha	0.4	0.81	697	580	156	0.39
Temporal Use Factor		1	1	1	1	1	1
Food Ingestion Rate	kg/ kgBW/d	0.6	1.56	0.1	0.06	0.286	0.5
Plant Fraction		0.13	0.6	0	0.25	0	0
Animal Fraction		0.87	0.4	1	0.75	1	1
Soil Fraction		0.13	0.04	0	0.02	0	0
Water Ingestion Rate	L/ kgBW/d	0.223	0.14	0.057	0.057	0.08	0.108

The SLAPS/HISS Reach (from SLAPS to Pershall Road) and Middle Reach of Coldwater Creek (from Pershall Road to U.S. Highway 67) do not represent unique, rare, and critical habitat for ecological receptors. The lack of unique, rare, and critical habitat in the two upper reaches means excavation of sediment for purposes of reducing human health risk, if executed properly, would not have a severe adverse effect on ecological resources and may reduce the residual risk to ecological receptors from contamination. The Lower Reach of Coldwater Creek between US Highway 67 and the Missouri River does represent a relatively unique habitat for ecological communities in the area. However, ecological potential contaminants of concern (PCOCs) in sediment and surface water in the lower reach of Coldwater Creek were judged not to represent a significant risk and are not associated with releases from the North St. Louis County sites. A decision to excavate sediment from locations in the Lower Reach of Coldwater Creek for reasons of human health risk should be weighed against the probability of adverse effects of excavation on habitats of ecological receptors. The adverse effects of excavation, including population reductions, habitat disruption, and sedimentation, would likely be temporary.

In summary, no ecological COCs were identified for the North St. Louis County sites. The results of the SERA indicated low risks relative to the uncertainty in the risk estimates; a low

probability of significant ecological effects on local populations; and, the lack of unique, rare, and critical habitat at the North St. Louis County sites.

2.7.3 Basis for Action

The response action selected in this Record of Decision is necessary to protect human health or welfare from actual or threatened releases of hazardous substances into the environment at the site.

2.8 REMEDIAL ACTION OBJECTIVES

2.8.1 Remedial Action Objectives

The NCP sets forth a requirement to "establish remedial action objectives specifying contaminants and media of concern, potential exposure pathways, and remediation goals" [40 CFR 300.430 (e)(2)(i)]. The media-specific remedial action objectives (RAOs) serve as a basis for developing and assessing remedial action alternatives. The RAOs describe what the remedial alternatives need to accomplish in order to be protective of human health and the environment. Protective levels are those levels that do not increase an individual's lifetime cancer risk by more than 1 in 10,000, which is the upper bound of the CERCLA risk range. Specific remediation goals (RGs) are developed consistent with protective ARARs. If ARARs are not available or are not sufficiently protective due to multiple contaminants or multiple pathways, then RGs are based on site-specific risk-based cleanup levels. This section provides a description of the general RAOs followed by a description of the specific RGs that will be used to implement some of these objectives.

The following RAOs are identified for the North St. Louis County sites:

1. Prevent exposure to contaminated soils at concentrations which exceed chemical-specific ARARs or which result in an excess lifetime cancer risk greater than the acceptable risk range (greater than one in ten thousand) or which result in a Hazard Index (HI) greater than 1. The potential exposure pathways are direct contact, ingestion, inhalation of dust, and external gamma.
2. Prevent exposure to contaminated structural surfaces at concentrations which result in an excess lifetime cancer risk greater than the acceptable risk range. Buildings and structures are contaminated primarily as a result of contaminated soils adhering to or becoming embedded in surfaces. The potential exposure pathways are external gamma, ingestion, and inhalation.
3. Prevent exposure to contaminated sediments in Coldwater Creek at concentrations which result in an excess lifetime cancer risk greater than the acceptable risk range. The potential exposure pathways are direct contact, ingestion, and external gamma.
4. Remove the potential for ongoing migration of soil contaminants to the shallow ground-water system (HZ-A) and Coldwater Creek. Accomplishing this objective would also preclude the potential for future impacts to the deep ground-water systems (HZ-C, HZ-D, and the usable ground-water resource HZ-E).

The acceptable risk range and HI are explained in Section 2.8.2.

As explained in Section 2.6, reasonably anticipated land use for the impacted properties is consistent with current land use, i.e., predominantly commercial/industrial and transportation uses. Typically, the objective would be to make the site protective for reasonably anticipated land use. In this case, as is explained in Section 2.8.2, the USACE is using ARARs to address much of the soil contamination which affects the decision on the appropriate land use objective for the North St. Louis County sites.

The RAOs were originally identified in the Feasibility Study. They have been restated to improve understanding of the objectives with respect to the affected media. The RAO of "eliminate or minimize volume, toxicity, or mobility of contaminated soil and sediment" as identified in the Feasibility Study, does not meet the guidance for development of an RAO, was therefore inappropriate, and has been eliminated from this ROD.

2.8.2 Derivation of Remediation Goals

The USACE has developed remediation goals (RGs) for soils, structures, and sediments at the North St. Louis County sites. For some contaminants, there are protective chemical-specific ARARs which are used as RGs. For other contaminants, site-specific risk calculations have been used to derive protective RGs. 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 uses the 10^{-6} level as the point of departure for establishing preliminary RGs. Final RGs may be revised upward within the risk range based on a variety of site or remedy specific factors such as the reliability of the data, quantification or detection limits, background considerations, or other considerations consistent with the remedy selection criteria defined in the NCP. For non-cancer hazards, the hazard quotients for all chemicals affecting the same organ are summed such that a hazard index (HI) value of 1.0 or less indicates that no health effects (non-cancer) are expected to occur. Where they apply to the same contaminant, the more restrictive of either the carcinogenic or non-carcinogenic hazards is used to establish the RG. The RGs developed for the North St. Louis County sites are listed in Table 2-10 and discussed individually in the following paragraphs.

2.8.2.1 Soil RGs for Radiological COCs

For the North St. Louis County sites, Ra-226, Th-230 or U-238 are the principal radiological components of the various process residues and serve as effective surrogates for all other radionuclides that are present, including daughters, e.g., Pa-231 and Ac-227. That is because the radiological contaminants are co-located and cleanups designed to remove the most prevalent contaminants will effectively remove all contaminants.

The standards for residual Ra-226 in soil set forth in 40 CFR 192, Subpart B, are relevant and appropriate requirements (RAR) for the North St. Louis County sites. These requirements implement the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA). EPA's guidance documents for cleanup of CERCLA sites using 40 CFR 192 as ARAR set forth EPA's expectation that, in order to meet the unlimited use and unrestricted exposure standard, remediation of subsurface soil contamination will, in practice, achieve the surface cleanup

Table 2-10. Remediation Goals (RGs) for the North St. Louis County Sites

DESCRIPTION	COC*	UNITS	RG**	BASIS OF RG
Surface Soil (≤ 6")	Antimony	mg/kg	15	Risk/Hazard
	Arsenic	mg/kg	36	Risk/Hazard
	Barium	mg/kg	2,800	Risk/Hazard
	Cadmium	mg/kg	12	Risk/Hazard
	Chromium	mg/kg	350	Risk/Hazard
	Molybdenum	mg/kg	1,000	Risk/Hazard
	Nickel	mg/kg	1,500	Risk/Hazard
	Selenium	mg/kg	300	Risk/Hazard
	Thallium	mg/kg	25	Risk/Hazard
	Uranium	mg/kg	150	Risk/Hazard
	Vanadium	mg/kg	112	Risk/Hazard
	Radium-226[1]	pCi/g	5	ARAR
	Thorium-230[2]	pCi/g	14	ARAR
	Uranium-238[3]	pCi/g	50	ARAR
Subsurface Soil (> 6")	Antimony	mg/kg	25	Risk/Hazard
	Arsenic	mg/kg	40	Risk/Hazard
	Thallium	mg/kg	30	Risk/Hazard
	Uranium	mg/kg	150	Risk/Hazard
	Radium-226[1]	pCi/g	15	ARAR
	Thorium-230[2]	pCi/g	15	ARAR
	Uranium-238[3]	pCi/g	50	ARAR
Sediment	Radium-226[1]	pCi/g	15	ARAR
	Thorium-230[2]	pCi/g	43	ARAR
	Uranium-238[3]	pCi/g	150	ARAR
Supplemental Standards for Soils Remaining On-site	Radium-226[1]	pCi/g	25	ARAR
	Thorium-230[2]	pCi/g	70	ARAR
	Uranium-238[3]	pCi/g	250	ARAR
Permanent Structures (e.g., Buildings)	Actinium-227	dpm/100 cm^2	400	ARAR
	Protactinium-231	dpm/100 cm^2	1,400	ARAR
	Radium-226	dpm/100 cm^2	15,000	ARAR
	Radium-228	dpm/100 cm^2	7,700	ARAR
	Thorium-228	dpm/100 cm^2	4,400	ARAR
	Thorium-230	dpm/100 cm^2	6,900	ARAR
	Thorium-232	dpm/100 cm^2	1,300	ARAR
	Uranium-234	dpm/100 cm^2	17,000	ARAR
	Uranium-235	dpm/100 cm^2	16,000	ARAR
	Uranium-238	dpm/100 cm^2	19,000	ARAR
Inaccessible Areas	External gamma[4]	uR/hr	20	ARAR

[1]Ac-227, Pa-231 and Pb-210 are assumed to be present with respect to Ra-226.
[2]Thorium-232 is co-located with Th-230 and is present at relatively low concentrations. Remediation of Thorium-230 will effectively remove Thorium-232 from the soils.
[3]Uranium-238 was used as a surrogate for Uranium-234, and Uranium-235 as their natural activity concentration ratio is 1:1: 0.046.
[4]In addition, the annual average (or equivalent) radon decay product concentration (including background) will not exceed 0.02 WL and the radon decay product concentration (including background) shall not exceed 0.03 WL.
* COCs vary by area, see Table 2-2.
** Defined RGs are for unlimited use and unrestricted exposure with the exception of supplemental standards to be applied if Alternative 2 or Alternative 3 is selected as the final remedy.

criterion of 5 pCi/g above background for Ra-226. EPA approval of this ROD is contingent upon satisfying EPA's expectations for cleanup of CERCLA sites; therefore USACE has adopted site-specific surface and subsurface soil cleanup levels for the North St. Louis County sites that will generally result in an average residual Ra-226 concentration of 5 pCi/g or less.

The surface and subsurface soil standards in 40 CFR 192, Subpart B, for radium-226 are 5 and 15 pCi/g, respectively, as an areal average concentration above background in the top 6 inch (15 cm) layer and in subsequent 6 inch (15 cm) layers, respectively. These standards are considered RAR for radium at the North St. Louis County sites because the circumstance is similar to the UMTRCA Title I sites in terms of contaminants present and their distribution at the sites, in that contaminants consist of uranium mill tailings and the distribution is such that there is relatively little subsurface contamination between 5 and 30 pCi/g. Under these circumstances, use of the subsurface standard is expected to achieve an average subsurface cleanup that meets or exceeds the surface standard in practice. This conclusion is supported by results of the removal action excavations performed to date at the North St. Louis County sites. The removal actions apply these standards and post-cleanup confirmation analysis indicates that residual concentrations of radium average less than 5 pCi/g and commonly are in the range of background.

The site-specific U-238 RG is derived based on the approach described in 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, Subpart B. The U-238 RG 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. The RG for U-238 is calculated to be 81 pCi/g when used as a surrogate for total uranium. The U-238 RG is revised downward to 50 pCi/g to account for Pa-231 and Ac-227 concentrations that are present above their expected natural abundance

The soil concentration of Th-230 required to produce the benchmark dose equating to 5 pCi/g of Ra-226 ranges from 380 to 1100 pCi/g for the various scenarios. By contrast, the soil concentration that would result in in-growth of 5 pCi/g of Ra-226 over a period of 1000 years equates to 14 pCi/g. As such, a soil concentration of 14 pCi/g is retained as the RG for Th-230 in surface soils. Although a subsurface soil concentration of 43 pCi/g would result in the in-growth of 15 pCi/g of Ra-226, EPA's guidance documents for 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. EPA approval of this ROD is contingent upon satisfying EPA's expectations for cleanup of CERCLA sites; therefore USACE has adopted site-specific surface and subsurface soil cleanup levels for the North St. Louis County sites that will result in a residual Ra-226 concentration of 5 pCi/g. Constraining the concentration of Th-230 to the stated RGs in surface soil to 14 pCi/g and subsurface soil 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. The surface soil RG for Th-230 is limited based on the in-growth of Ra-226 over 1000 years. The subsurface soil RG for Th-230 is essentially identical to the surface soil RG and achieves the same residual site conditions. The 15 pCi/g subsurface soil RG for Th-230 was derived as ARAR in the EE/CAs for the St. Louis FUSRAP Sites. Residual concentrations of Ra-226 are generally not substantially different from background. Relatively low concentrations of Ra-226 exist within the North St. Louis County sites. As such, the residual concentration of Ra-226 will generally be primarily that concentration that is generated by its in-growth from Th-230.

The above described approach for setting the RG for Th-230 in surface soil is different than the approach EPA uses to set site-specific RGs pursuant to the NCP. However, the RG is also considered protective using EPA methods. The site-specific risk calculation for exposure to Th-230 at 14 pCi/g under the standard suburban residential scenario results in a risk of 5.8 X 10^{-6}, which corresponds to the lower end of the CERCLA risk range. The standard suburban residential scenario follows the recommendations in EPA guidance (RAGS, Exposure Factors Handbook) and provides risk estimates for reasonable maximum exposure (RME) to a resident receptor. For purposes of this site and this ROD, the standard suburban residential scenario is considered representative of unlimited use and unrestricted exposure (UUUE), the CERCLA guidance threshold for determining whether ICs are appropriate. Therefore, the surface soil RG for Th-230 is consistent with UUUE and consistent with the land use objectives of the RAR-based RGs above. The RG of 15 pCi/g Th-230 in the subsurface is also considered a protective ARAR consistent with EPA guidance for cleanup of CERCLA sites using 40 CFR 192 as ARAR. That is, the distribution of Th-230 in the subsurface is such that there is relatively little contamination between 5 and 30 pCi/g, and under these circumstances, use of the subsurface standard is appropriate. In this circumstance, use of the RG of 15 pCi/g Th-230 in the subsurface is consistent with UUUE as the land use objective.

The RGs for Ra-226, Th-230, and U-238 are 5, 14 and 50 pCi/g, respectively, above background in surface [top 6 in (15 cm)] soil and 15, 15, 50 pCi/g, respectively, above background in any subsequent 6 inch (15 cm) layer of soil. The remedial actions shall be conducted so as to provide reasonable assurance that residual concentrations in soil averaged over any area of 100 square meters (m^2) shall not exceed background level by more than the RG.

2.8.2.2 RGs for Radiological Contamination on Structures (Derived Concentration Guideline Levels)

Certain structures are contaminated with radionuclides as a result of being in proximity to the former radiological operations or being located on or near contaminated soils. Contamination of structures occurred as a result of soil, raffinates, residues, etc. adhering to the surfaces of the structure. RGs for contaminated structures were developed using Derived Concentration Guideline Levels (DCGLs) found in ARARs [10 CFR 40, Appendix A, Criterion 6(6) and 40 CFR 192, Sections 192.12, 192.20 and 192.21]. Specifically, 40 CFR 192 and 10 CFR 40 establish a limit of 5 and 15 pCi/g above background in each 328.1 ft^2 (100 m^2) area as the limit for Ra-226 in surface and subsurface soil, respectively. Title 10, CFR, Part 40, Appendix A, Criterion 6(6) provides that "Byproduct material containing concentrations of radionuclides other than radium in soil, and surface activity on remaining structures, must not result in a total effective dose equivalent (TEDE) exceeding the dose from cleanup of radium contaminated soil to the above standard (benchmark dose), and must be at levels which are as low as is reasonably achievable." A benchmark dose is the dose that is found to be equivalent to 40 CFR 192 cleanup standards for Ra-226 of 5 pCi/g surface and 15 pCi/g subsurface, using modeling.

The DCGLs for structures within the North St. Louis County sites were based on the dose for the residential scenario in Appendix D, Table D-11 of the Feasibility Study. Although the benchmark dose based on 5 pCi/g of Ra-226 is calculated to be 19 mrem/yr, EPA's guidance documents for the cleanup of CERCLA sites using 40 CFR 192 and 10 CFR 40, Appendix A, Criterion 6(6) as ARAR set forth EPA's determination that 15 mrem/yr effective dose equivalent is the minimally acceptable dose limit under CERCLA. (See OSWER 9200.4-35P, "Remediation

Goals for Radioactively Contaminated CERCLA Sites Using the Benchmark Dose Cleanup Criteria in 10 CFR Part 40, Appendix A, I, Criterion 6(6)"). EPA approval of this ROD is contingent upon satisfying EPA's expectation for cleanup sites; therefore, USACE has limited the dose to 15 mrem/yr on a site specific basis for the development of DCGLs for the North St. Louis County sites. An evaluation was performed to determine the likely limiting scenario for North St. Louis County structures. Four receptors were considered during this evaluation: an industrial worker, a renovation worker, a building resident, and a post-demolition on-site resident. Although the building resident scenario was considered, it was not limiting in that potentially contaminated commercial buildings would require extensive renovation for conversion into residential properties such that any existing contamination would be removed concurrent with such renovation. Consequently, in this case, the Building Occupancy – Industrial Scenario represents the reasonable maximum exposure and is the basis for establishing DCGLs. RESRAD-Build Version 3.1 was used to calculate DCGL concentrations for long-term and full-time employees (industrial worker) by using parameter values primarily from EPA and Nuclear Regulatory Commission (NRC) guidance.

Remediation goals (i.e., DCGLs) derived in "Derivation of Site-Specific DCGLs for the North County Structures" are as follows, in units of disintegrations per minute per 100 square centimeters of surface area: Ac-227 – 400; Pa-231 – 1,400; Ra-226 – 15,000; Ra-228 – 7,700; Th-228 – 4,400; Th-230 – 6,900; Th-232 – 1,300; U-234 – 17,000; U-235 – 16,000; and U-238 – 19,000. Surrogate gross alpha and gross beta surface DCGLs will be developed for each structure based on the activity fraction of each radionuclide present in the soils where the structure is located. Compliance with these surrogate DCGLs will be demonstrated and will ensure that the isotopic RGs are achieved.

These RGs comply with ARARs and achieve protectiveness to levels within the CERCLA risk range under reasonable maximum exposure.

2.8.2.3 Soil RGs for Non-radiological COCs

Chemical-specific ARARs are not available for the non-radiological contaminants present in site soil. The soil RGs for non-radiological COCs were developed based on site-specific risk assessments and hazard evaluations.

Remediation goals were derived based on site-specific exposure assumptions and with the objective of meeting the acceptable CERCLA risk range as provided in the NCP (See Feasibility Study, 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 10,000 (10^{-4}) and one in 1,000,000 (10^{-6}). The EPA (Region IX) establishes PRGs for all carcinogenic chemicals at the 10^{-6} level, which is also known as the point of departure. Final RGs may be revised upward within the acceptable risk range based on factors such as uncertainty, technical limitations on detection, or other considerations consistent with the remedy selection criteria defined in the NCP. However, final RGs remain within the acceptable risk range. Aggregate risks from final RGs 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.

At the North St. Louis County sites, 11 non-radionuclides were identified as COCs for soil – antimony, arsenic, barium, cadmium, chromium, molybdenum, nickel, selenium, thallium, uranium, and vanadium. Among them, arsenic, cadmium, and chromium have carcinogenic effects. However, the non-carcinogenic effect provides the most conservative RGs for those non-radionuclides. Hence, the RGs for all non-radionuclides were developed for the most sensitive receptors to ensure that the cumulative effect of the chemical levels of the COCs produces a HI<1.0 for each target organ/system affected. Risks for all carcinogenic COCs, to include both those that are radioactive and those that are non-radioactive were also summed to assure overall risks remain within the acceptable range.

The effects of the 11 metals on the primary target organs/systems were evaluated and a matrix was developed to show the results. Then HIs were calculated for six receptors: residential, industrial, construction worker, maintenance worker, recreational/trespasser, and utility worker. The construction worker was identified as the most sensitive receptor, except for the few cases where the residential receptor was the most sensitive or restrictive scenario. The non-radionuclide RGs were developed by ensuring that the target organ/system-specific HIs were less than 1.0 for the constraining scenario (i.e., construction worker and residential receptor).

The non-radiological RGs for surface soils are antimony (15 mg/kg), arsenic (36 mg/kg), barium (2,800 mg/kg), cadmium (12 mg/kg), chromium (350 mg/kg), molybdenum (1,000 mg/kg), nickel (1,500 mg/kg), selenium (300 mg/kg), thallium (25 mg/kg), uranium (150 mg/kg), and vanadium (112 mg/kg). The non-radiological RGs for subsurface soils are antimony (25 mg/kg), arsenic (40 mg/kg), thallium (30 mg/kg), and uranium (150 mg/kg). The non-radiological COCs vary in soils by site. Refer to Table 2-2 of this ROD for a complete listing of non-radiological COCs by area.

It should be noted that, to date, non-radiological contaminants of concern have been co-located with radiological contaminants such that attainment of the RGs for radiological COCs for remedial activities at SLDS and removal actions at North St. Louis County properties, has resulted in residual site conditions that are protective of human health and the environment for all site contaminants (radiological and non-radiological). Verification surveys have shown that excavations designed to remove the radiological contaminants will effectively remove the co-located non-radiological contaminants. Confirmation sampling results from properties that have undergone removal action were evaluated to verify that this is the case.

These RGs achieve residual risk levels within the CERCLA risk range under reasonable maximum exposure and result in a HI<1.0.

2.8.2.4 Sediment RGs for Radiological COCs

For all material above the Coldwater Creek's mean water gradient, soil RGs will apply. [The mean water gradient is a hydrologic term that refers to the low average water level and reflects the level of the creek that stays damp throughout most of the year.] Sediment RGs apply to material below the mean water gradient. The risks associated with the presence of radiological contamination in sediments were fully evaluated in the Feasibility Study for a variety of scenarios (Appendix D). This assessment demonstrates that the potential risk from exposure to contaminated sediments in Coldwater Creek is within the acceptable risk range. However, relocation of the sediments from the creek to an adjacent property could result in soil

contaminant levels that exceed the RGs for UUUE described above. Contamination below the mean water gradient is present in relatively small volumes, which are typically located in intermittent areas such as creek bends where natural deposition occurs. Sediment RGs were developed to meet the soil RGs for UUUE even if sediments from the creek were relocated to an adjacent property. The sediment RGs recognize that the contaminated sediments would be subject to mixing with non-contaminated sediments and soils upon being dredged and relocated. As such, a conservative mixing factor of three times was applied to the surface soil RGs. This reasonably assures that, in the event sediments are placed on surface areas adjacent to the creek, contaminant levels in soil will not exceed the surface soil RGs suitable for unlimited use and unrestricted exposure. The remediation goals derived for sediments are 15 pCi/g of Ra-226, 43 pCi/g of Th-230 and 150 pCi/g of U-238 as an areal average of 100 square meters. The estimated volume of sediment below the mean water gradient with concentrations of COCs that exceed 15/43/150 pCi/g for Ra-226, Th-230, and U-238, respectively, is 500 cubic yards. These remediation goals assure that Coldwater Creek and the surrounding area will remain protective under all future anticipated land use conditions (i.e., recreational/trespasser, maintenance, construction, and utility uses) and minimize adverse environmental impact associated with sediment excavation in Coldwater Creek.

2.8.2.5 Sediment RGs for Non-Radiological COCs

There are no non-radiological COCs identified for sediment.

2.8.2.6 Supplemental Standard Soil RGs for Radiological COCs

Supplemental standard soil RGs apply for alternatives in which subsurface soil materials are contained or stored on-site (Alternatives 2 and 3). 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 configuration (e.g., protective cap) and appropriate institutional controls. The supplemental standards for subsurface materials at storage areas are to be used in conjunction with institutional controls. Institutional controls would be imposed to restrict land use to commercial/industrial use. The circumstances where these supplemental standards would apply are only where soil would be placed beneath an engineered cap, and do not apply to other inaccessible soils (e.g., soil under roads, bridges, active rail lines, and other permanent structures). Assuming implementation of land use restrictions, and design of a cap to meet the CERCLA risk range, supplemental standards of 25/70/250 pCi/g above background for Ra-226/Th-230/U-238 would be appropriate for subsurface soils. These supplemental standards protect the most likely current and future receptors (e.g., construction and utility workers). The risk to potential receptors will be limited to the CERCLA target risk range (10^{-4} to 10^{-6}) with institutional controls in place. Information demonstrating that remediation to these RGs is achievable and would result in acceptable risk levels is presented in Appendix D of the FS.

2.8.2.7 RGs for Radiological COCs in Inaccessible Areas

To control the hazard from external radiation exposure to Ra-226 in buildings, EPA established a standard in 40 CFR 192.12 that states that "the level of gamma radiation shall not exceed background by more than 20 microroentgens per hour." Based on this standard, a radiation

level of 20 microroentgens per hour is a reasonable upper bound such that this level of exposure as measured one meter above the ground (to equate to whole body exposure) would assure protectiveness of inaccessible soils. Confirmation of achievement of this standard can be confirmed by radiation surveys or residual contamination concentration data for Ra-226. This represents an acceptable supplemental standard in accordance with 40 CFR 192, Subpart C.

40 CFR 192.12 (b) states that "In any occupied or habitable building, the objective of the remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 working levels (WL). In any case, the radon product concentration (including background) shall not exceed 0.03 WL." This standard is relevant and appropriate for buildings (e.g., Futura Coatings Company) present within the North St. Louis County sites.

2.9 DESCRIPTION OF ALTERNATIVES

Six remedial alternatives were developed in the Feasibility Study. The following section provides a brief description of each of the remedial alternatives.

2.9.1 Alternative 1, No Further Action

Alternative 1 provides a baseline to compare with the other remedial alternatives and is required by the NCP and CERCLA guidance. This alternative assumes that no additional response actions would be implemented at the North St. Louis County sites. Five-year reviews would be conducted pursuant to CERCLA.

On-going Removal Actions: The removal action at SLAPS would be completed under the EE/CA and not be considered part of this alternative.

Excavation: No soil or sediment would be excavated under Alternative 1.

Institutional Controls: No institutional controls would be imposed under Alternative 1.

Monitoring: Alternative 1 does not include monitoring.

Expected Outcome: Current conditions at the site would not change.

Protectiveness: Because no actions are taken to eliminate, reduce, or control the risks posed by the site, Alternative 1 is not protective of human health.

Costs: The capital costs are estimated at $149 thousand (project management) and the present worth O&M costs (five-year reviews) are estimated to be $494.0 thousand (includes both periodic and annual O&M). The estimated total 30-year cost of this alternative is $1.5 million, which includes escalation and contingency costs. The present worth cost of this alternative is $677 thousand at a 7% discount rate.

Anticipated Implementation Timeframe: This alternative could be implemented immediately.

Five Year Reviews: Because contaminants would remain at the site above levels that allow for unlimited use and unrestricted exposure (ref. 40 CFR 300.430(f)(4)(ii)), a five-year review is required for this alternative.

ARARs: The key ARARs for Alternative 1 and compliance with those ARARs are listed below:

40 CFR Part 192, Subpart B, Section 192.12(a)
Alternative 1 does not comply with the requirement that Ra-226 concentrations in soil shall not exceed 5 pCi/g above background in the top 15 cm and 15 pCi/g above background in lower 15 cm layers averaged over $100m^2$ areas.

40 CFR Part 192, Subpart B, Section 192.12(b)
Alternative 1 does not comply with the regulatory objective that the annual average (or equivalent) radon decay product concentration (including background) does not exceed 0.02 WL and the requirement, in any case, that the radon decay product concentration (including background) shall not exceed 0.03 WL. Alternative 1 also does not comply with the requirement that gamma radiation shall not exceed the background level by more than 20 microroentgens per hour.

40 CFR Part 192, Subpart C, Section 192.20
Alternative 1 does not comply with the regulatory guidance of Subpart C.

40 CFR Part 192, Subpart C, Section 192.21 and 192.22
Alternative 1 does not utilize supplemental standards.

10 CFR 40, Appendix A, Criterion 6(6)
Alternative 1 does not comply with the requirement that byproduct material containing concentrations of radionuclides other than radium in soil, and surface activity on remaining structures, must not result in a total effective dose exceeding the dose equivalent from cleanup of radium contaminated soil to the above standard and must be as low a reasonably achievable. Alternative 1 also does not comply with the requirement that if more than one residual radionuclide is present in the same 100-square-meter area, the sum of the ratios of the concentration for each radionuclide present to the concentration limit will not exceed "1" (unity).

40 CFR Part 122, Subpart C, Sections 122.41(d,e) and 122.44(a,d,e,i)
Alternative 1 does not comply with regulatory requirements implementing the Clean Water Act establishing limits for the discharge of pollutants into waters of the state.

2.9.2 Alternative 2, Partial Excavation and Capping at SLAPS, HISS and Futura Coatings Company

Major Components of Alternative 2
• Cleanup the various VPs near SLAPs and Latty Avenue sites to meet the soil RGs for UUUE, except for the inaccessible soils under roads, active rail lines and other permanent structures. Dispose of soils off-site at a permitted facility.
• Cleanup the main sites at SLAPS, HISS and Futura Coatings Company to meet the supplemental standards, and ship soils off-site to a permitted disposal facility. Soils meeting the supplemental standards but exceeding the RGs for UUUE would remain on SLAPS, HISS and Futura Coatings

Company and would be covered with a multi-layer cap.
• Apply institutional controls at SLAPS, HISS, Futura Coatings Company, Coldwater Creek, and for areas under roads, active rail lines and other permanent structures where soil RGs for UUUE are exceeded.
• Operate and maintain multi-layer cap and institutional controls.
• Long-term monitoring.

On-going Removal Actions: Ongoing removal actions at SLAPS would cease at the earliest reasonable breakpoint (e.g., clearance of a survey unit). Removal actions completed under EE/CAs and Action Memoranda would be reviewed to ensure that the site meets the requirements of this ROD. Where such reviews indicate prior removal actions do not meet the requirements of this ROD, remedial action would be conducted. Where such reviews indicate prior removal actions meet the requirements of this ROD, compliance would be documented in the appropriate closeout reports. The transition strategy will be described in the remedial design/remedial action (RD/RA) work plan which describes how this ROD will be implemented and is submitted for regulatory review.

Remedial Design: Pre-design investigation (PDI) sampling for COCs would be conducted as necessary to obtain technical information and data to support the remedial design, minimize effects on property owners, and better manage construction schedules. Following issuance of this ROD, a remedial design/remedial action (RD/RA) work plan describing how the remedy will be implemented will be submitted for regulatory review.

Capping: A multi-layer cover (cap) would be constructed at SLAPS and at HISS and Futura Coatings Company to provide a barrier to limit exposures. The cap reduces infiltration, radon emanation, gamma emissions and contaminant migration from erosion. SLAPS and the HISS and Futura Coatings Company properties 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 Coatings Company, and areas under roads, bridges, active rail lines, and other permanent structures. Soils under roads, bridges, active rail lines and other permanent structures are inaccessible and would not be excavated as part of this response action. At SLAPS, HISS and Futura Coatings Company, soils exceeding the supplemental radiological standards for subsurface soils would be excavated and shipped off-site to a permitted disposal facility. Those soils achieving the supplemental standards for subsurface soil as identified in Section 2.8.2.6, would be placed on-site beneath a multilayer cover at SLAPS and at the HISS and Futura Coatings Company properties. The supplemental standards would be used in conjunction with institutional controls to allow compatible commercial/industrial use of SLAPS, HISS and Futura Coatings Company. Under Alternative 2, an estimated 150,000 cubic yards of soil would be removed. USACE construction activities during the remedial action would comply with the Federal Aviation Administration (FAA) restrictions of air space around the airport. These restrictions include limits on the height of structures and equipment.

Remediation of radiological contaminants is expected to address co-located chemical contaminants sufficient to meet RGs. This is based on the results of post-remedial action sampling conducted on previously remediated North St. Louis County properties.

At SLAPS, HISS and Futura Coatings Company, the RGs for soil are: 25 pCi/g of Ra-226 above background, 70 pCi/g of Th-230 above background, and 250 pCi/g of U-238 above background. At SLAPS VPs, Coldwater Creek (soil above the mean water gradient), and Latty Avenue Properties (except under roads, bridges, active rail lines and other permanent structures), the RGs for soil in the surface 6-inch layer are: 5 pCi/g of Ra-226 above background, 14 pCi/g of Th-230 above background, and 50 pCi/g of U-238 above background. The RGs for subsurface accessible soil (soil deeper than 6 inches) are: 15 pCi/g of Ra-226 above background, 15 pCi/g of Th-230 above background, and 50 pCi/g of U-238 above background. The non-radiological RGs are listed in Table 2-10.

Dredging: Dredging of contaminated sediments from Coldwater Creek is not part of Alternative 2 because the creek is protective in its current use. However, activities at Coldwater Creek would need to be monitored and managed such that sediments removed as part of separate projects, such as the planned flood control project, would be properly analyzed and disposed of as appropriate, consistent with the Coldwater Creek sediment RGs.

Structures: Structures would be decontaminated or disposed of consistent with the RGs for contaminated structures in Section 2.8.2.2.

Backfill: Site soil could be used as backfill if it meets the RGs for surface soil with prior notification to MDNR.

Remedial Action Control Measures: Water encountered during remedial actions would be characterized, treated (if necessary), and released to the publicly-owned treatment works (POTW), or to Coldwater Creek or its tributaries, as allowed. The treatment would address chemicals and radionuclides consistent with applicable federal (NPDES) and state regulations or requirements of the POTW. Excavation water would meet levels established by discharge permits or permit-equivalent requirements prior to being released off-site. Supporting technologies would be implemented 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 material would be added and the excavated areas graded to ensure appropriate surface water drainage. Erosion and sediment controls would be implemented.

Transportation and Waste Management: 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.

Institutional Controls: Land use restrictions would not be necessary at the SLAPS VPs or Latty Avenue VPs because the accessible contaminated soil would be cleaned up to RGs for UUUE. Land use restrictions would be necessary at SLAPS, HISS, and Futura Coatings Company both to protect the caps and to prevent exposure to contaminated soils. Use restrictions would be necessary at Coldwater Creek to prevent activities that might relocate contaminated sediments to the land. Use restrictions would be necessary to control or manage

uses at roads, active rail lines, and other permanent structures where inaccessible soils exceeding UUUE levels are located. SLAPS, HISS, and Futura Coatings Company would need to be limited to commercial/industrial use. Digging would need to be prohibited or managed. Specific IC mechanisms designed to implement the use restrictions will be evaluated and identified as part of the remedial design and remedial action planning process. The evaluation will examine various IC options including proprietary controls, governmental controls, and informational devices. Where available, multiple mechanisms will be used to provide "layering" for additional durability and effectiveness.

Monitoring: Monitoring of ground water (Unit 2 of HZ-A and Unit 4 of HZ-C) and surface water during the response action at SLAPS and HISS, and the Futura Coatings Company would be conducted to ensure that the response action does not impact ground water or surface water. In addition**,** long-term monitoring of surface water and ground water (HZ-A and Unit 4 of HZ-C) would be required at SLAPS, HISS, the Futura Coatings Company and McDonnell Boulevard as part of this alternative to assure protectiveness of this action and to verify that ground-water and surface-water conditions do not degrade. The capping at HISS and SLAPS would require HZ-C (Unit 4) ground water to be monitored for the long term. Ground-water monitoring would continue until determined to be no longer required as part of the five-year review process. Long-term surface-water monitoring would only occur if degraded ground-water conditions were to develop.

Excavation perimeter air monitoring would be conducted during excavation activities. Monitoring would consist of both real-time (continuous readout) and time-integrated sampling. Real-time monitoring would be conducted for lower exposure limit, oxygen level, particulates, and organic compounds. Time-integrated sampling consists of mid-volume and low-volume samplers for total alpha and total beta measurements. Radon monitoring would be conducted in any "occupied or habitable building" existing on soils exceeding RGs for Ra-226 (e.g. Futura buildings).

Protectiveness: Alternative 2 is protective of human health and the environment. It achieves protectiveness through engineering means by either removing material for remote disposal or by consolidating material under a cap that would be maintained long term. However, the alternative also relies heavily on ICs to prevent uses that would be inconsistent with capped soils. Because the USACE does not control the properties and the properties are potentially subject to a variety commercial/industrial uses, monitoring and maintaining ICs would require some vigilance.

Costs: The capital costs are estimated at $167.6 million (real estate, project management, and construction costs) and the present worth O&M costs (monitoring, final status reporting, and five-year reviews) are estimated to be $16.1 million (includes both periodic and annual O&M). The estimated total 30-year cost of this alternative is $205 million, which includes escalation and contingency costs. The present worth cost for this alternative is $149.8 million at a 7% discount rate.

Anticipated Implementation Timeframe: The amount of time required to implement this alternative depends on the availability of funding, the magnitude of excavation and the timing to obtain necessary real estate interests to make the SLAPS, HISS, and Futura Coatings Company areas available for storage. For purposes of comparison, historical program funding levels, an excavation quantity of approximately 185,500 cubic yards, and the immediate availability of

SLAPS, HISS, and Futura Coatings Company were assumed. The estimated implementation timeframe for Alternative 2 (excluding long-term monitoring) is 4 to 5 years.

Long-term Reliability of Alternative: The long-term reliability of Alternative 2 depends upon the ability to maintain the multi-layer cap and institutional controls on SLAPS, HISS, Futura Coatings Company, and inaccessible areas. SLAPS, HISS, and Futura Coatings Company are located in public areas where control may be difficult. The ability to monitor and support activities affecting Coldwater Creek sediments is likely to be severely limited.

Five Year Reviews: Because contaminants would remain at the site above levels that allow for unlimited use and unrestricted exposure [40 CFR 300.430(f)(4)(ii)], a five-year review is required for this alternative.

ARARs: The ARARs for Alternative 2 and compliance with those ARARs are listed below:

40 CFR Part 192, Subpart A, Section 192.02(a) is relevant and appropriate
Alternative 2 will comply with the requirement of a cover design that will be effective for up to 1,000 years, to the extent reasonably achievable, and in any case, for at least 200 years.

40 CFR Part 192, Subpart A, Section 192.02(b) is relevant and appropriate
Alternative 2 will comply with the requirement to "provide reasonable assurance that the release of Ra-222 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 Ra-222 in the air at or above any location outside the disposal site by more than 0.5 picocuries per liter (pCi/L).

40 CFR Part 192, Subpart B, Section 192.12(a), (b) is relevant and appropriate to accessible soils
Alternative 2 will comply with the requirements that Ra-226 concentrations shall not exceed 5 pCi/g above background in top 15 cm and 15 pCi/g above background in lower 15 cm layers averaged over 100 m^2 areas at SLAPS VPs and Latty Avenue VPs. These requirements are not relevant and appropriate to soils under the capped areas or the inaccessible soils.

40 CFR Part 192, Subpart C, Section 192.20(a)(1,3), (b)(1,2,3) is relevant and appropriate
Alternative 2 will comply with the regulatory guidance of Subpart C as cited.

10 CFR 40, Appendix A, Criterion 6(6) is relevant and appropriate to accessible soils
Alternative 2 will comply with the requirements of Criterion 6(6), which requires that byproduct material containing concentrations of radionuclides other than radium in soil, and surface activity on remaining structures, must not result in a total effective dose equivalent (TEDE) exceeding the dose from cleanup of radium contaminated soil to the above standard (benchmark dose), and must be at levels which are as low as is reasonably achievable. If more than one residual radionuclide is present in the same 100-square-meter area, the sum of the ratios of the concentration for each radionuclide present to the concentration limit will not exceed "1" (unity). This provides a basis for the derivation of RGs for radionuclides other than Ra-226.

40 CFR Part 122, Subpart C, Sections 122.41(d,e) and 122.44(a,d,e,i) is relevant and appropriate to on-site discharges

Alternative 2 will comply with 40 CFR Part 122, Subpart C, which establishes limits for discharge of pollutants into waters of the state. Any water discharged from a point source into waters of the state must meet any limits that would have been established in the NPDES permit. The substantive requirements in the NPDES permit equivalent for SLAPS, dated 10/2/1998 are relevant and appropriate for the North St. Louis County sites. The effluent limits (daily maximum and monthly average concentrations) addressing site COCs for the North St. Louis County sites are: 100 µg/L total recoverable arsenic; 94 µg/L total recoverable cadmium; and 280µg/L total recoverable chromium.

40 CFR Part 192, Subpart C, Section 192.21(a-f,h), Section 192.22(a-c) is relevant and appropriate

Alternative 2 will comply with supplemental standards as specified in 40 CFR 192.22(a-c) where the circumstances set forth in 40 CFR 192.21 exist. The development of supplemental standards is appropriate for soil contained or stored onsite and for inaccessible soil managed in place with institutional controls.

40 CFR Part 61, Subpart I, Section 61.102(a) is relevant and appropriate

Alternative 2 will comply with the requirement that emissions of radionuclides to the ambient air shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr during cleanup activities.

10 CSR 23-4.030 through 10 CSR 23.04.080

Alternative 2 will comply with substantive requirements related to the construction, operation, maintenance and plugging of monitoring wells.

2.9.3 Alternative 3, Partial Excavation and Treatment at SLAPS

Major Components of Alternative 3
• Cleanup all sites except for SLAPS (and the inaccessible soils under roads, bridges, active rail lines and other permanent structures) to meet the RGs for UUUE, and consolidate contaminated soils at SLAPS for treatment.
• Cleanup the soils at SLAPS to meet the supplemental standards and consolidate excavated soils for treatment.
• Dredge sediments from Coldwater Creek to sediment RGs for UUUE and transfer to SLAPS for treatment. Conduct limited phytoremediation for two seasons.
• Treat soils consolidated at SLAPS using sorting or soil washing techniques to concentrate the more contaminated fraction. Soils below supplemental standards would be used as backfill and covered with a clean soil cap. Soils exceeding supplemental standards would be shipped off-site to a permitted disposal facility.
• Apply institutional controls at SLAPS and areas under roads, active rail lines and other permanent structures where soil RGs for UUUE are exceeded.
• Operate and maintain soil cap and institutional controls.
• Long-term monitoring.

On-going Removal Actions: Ongoing removal actions at SLAPS would cease at the earliest reasonable breakpoint (e.g., clearance of a survey unit). Removal actions completed under EE/CAs and Action Memoranda would be reviewed to ensure that the site meets the

requirements of this ROD. Where such reviews indicate prior removal actions do not meet the requirements of this ROD, remedial action would be conducted. Where such reviews indicate prior removal actions meet the requirements of this ROD, compliance would be documented in the appropriate closeout reports. The transition strategy will be described in the remedial design/remedial action (RD/RA) work plan which describes how this ROD will be implemented and is submitted for regulatory review.

Remedial Design: Pre-design investigation (PDI) sampling for COCs would be conducted as necessary to obtain technical information and data to support the remedial design, minimize effects on property owners, and better manage construction schedules. Following issuance of this ROD, a remedial design/remedial action (RD/RA) work plan describing how the remedy will be implemented will be submitted for regulatory review.

On-site Treatment: At the North St. Louis County sites, the primary radiological COCs are radium, thorium, and uranium. Of these, only uranium is soluble and therefore capable of being extracted by soil washing, which preferentially extracts soluble contaminants to reduce the volume of soil requiring off-site disposal. Thus, the soil washing treatment option would only be applied to soils contaminated solely with uranium. The volume of such soils is small. Soil sorting would be limited to non-clayey soils containing sufficient detectable levels of radium. The volume of such soils is also small. 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. Although effective only in limited circumstances, the option for phytoremediation was included in Alternative 3 in an effort to maximize the use of treatment in this alternative.

Excavated soils and sediments would be consolidated at SLAPS for treatment (soil sorting and enhanced soil washing). Treated soils that meet the ARAR-based criteria for subsurface soil supplemental criteria would be used as backfill at SLAPS, and would be covered with clean soils. Any soils not meeting the supplemental soil standards would be shipped off-site to a permitted disposal facility. The overall objective would be to reduce the volume of contaminated soils by separating the "clean" fraction from the contaminated fraction. The treatment would also be designed to optimize the concentration of site contaminants in the soil fraction for offsite disposal thereby maximizing the amount of contamination taken off-site and minimizing the volume that would be shipped for disposal.

Excavation: All excavations will be designed to meet the soil RGs for UUUE except at SLAPS where the excavations will meet supplemental standards designed to allow for on-site containment. Land use at SLAPS would be restricted to certain commercial/industrial uses compatible with containment. Inaccessible soils under roads, bridges, active rail lines, and other permanent structures would remain in place.

Under Alternative 3, an estimated total of 190,000 cubic yards of soil would be excavated. An estimated volume of 143,000 cubic yards could be placed at SLAPS leaving and estimated 47,000 cubic yards to be disposed of off-site at a permitted disposal facility. USACE construction activities during the remedial action would comply with the FAA restrictions of air space around the airport. These restrictions include limits on the height of structures and equipment.

At SLAPS, the RGs for soil are: 25 pCi/g of Ra-226 above background, 70 pCi/g of Th-230 above background, and 250 pCi/g of U-238 above background based on commercial/industrial land use. At HISS, Futura Coatings Property, SLAPS VPs, Coldwater Creek (soil above the mean water gradient), and Latty Avenue Properties (except under roads, bridges, active rail lines and other permanent structures), the RGs for UUUE for soil in the surface 6-inch layer are: 5 pCi/g of Ra-226 above background, 14 pCi/g of Th-230 above background, and 50 pCi/g of U-238 above background. The RGs for UUUE for subsurface accessible soil (soil deeper than 6 inches) are: 15 pCi/g of Ra-226 above background, 15 pCi/g of Th-230 above background, and 50 pCi/g of U-238 above background. The non-radiological RGs are listed in Table 2-10.

Dredging: The action will be designed to dredge contaminated sediments from Coldwater Creek that exceed the sediment RG for UUUE. Dredged sediments would be consolidated at SLAPS for treatment.

Structures: Structures would be decontaminated or disposed of consistent with the RGs for contaminated structures in Section 2.8.2.2.

Backfill: Site soil could be used as backfill at the SLAPS VPs and Latty Avenue Properties if it meets the RGs for UUUE for surface soil with prior notification to MDNR. Soil below the supplemental soil standards would be used as backfill at SLAPS.

Remedial Action Control Measures: Water encountered during remedial actions would be characterized, treated (if necessary), and released to the POTW, or to Coldwater Creek or its tributaries, as allowed. The treatment would address chemicals and radionuclides consistent with applicable federal (NPDES) and state regulations or requirements of the POTW. Excavation water would meet levels established by discharge permits or permit-equivalent requirements prior to being released off-site. Supporting technologies would be implemented 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 material would be added and the excavated areas graded to ensure appropriate surface water drainage. Erosion and sediment controls would be implemented.

Transportation and Waste Management: Alternative 3 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.

Institutional Controls: Land use restrictions would be necessary at SLAPS, both to protect the cap and to prevent exposure to contaminated soils. Use restrictions would be necessary to control uses at roads, active rail lines, and other permanent structures where inaccessible soils exceeding UUUE levels are located. All other properties, including Coldwater Creek, would be cleaned up to RGs for UUUE. Land use at SLAPS would be restricted to commercial/industrial uses. Digging would need to be prohibited or managed. Transportation/utility uses would be maintained for roads, bridges, and railroad beds. Specific IC mechanisms designed to implement the use restrictions will be evaluated and identified as part of the remedial design and remedial

action planning process. The evaluation will examine various IC options including proprietary controls, governmental controls, and informational devices. Where available, multiple mechanisms will be used to provide "layering" for additional durability and effectiveness.

Monitoring: Monitoring of ground water (Unit 2 of HZ-A and Unit 4 of HZ-C), surface water and sediment during the response action at SLAPS, HISS, Futura Coatings Company, and Coldwater Creek would be conducted to ensure that the response action does not impact ground water or surface water. In addition**,** long-term monitoring of surface water and ground water (HZ-A and Unit 4 of HZ-C) would be required at SLAPS, the Futura Coatings Company, and McDonnell Boulevard as part of this alternative to assure protectiveness of this action and to verify that ground-water and surface-water conditions do not degrade. The remaining soils below the supplemental standard are treated on SLAPS, but may exceed RGs for unlimited use and unrestricted exposure; therefore, long-term monitoring of HZ-C (Unit 4) ground water at SLAPS would be conducted. Ground-water monitoring would continue until determined to be no longer required as part of the five-year review process. Long-term surface-water monitoring would only occur if degraded ground-water conditions were to develop.

Excavation perimeter air monitoring would be conducted during excavation activities. Monitoring would consist of both real-time (continuous readout) and time-integrated sampling. Real-time monitoring would be conducted for lower exposure limit, oxygen level, particulates, and organic compounds. Time-integrated sampling consists of mid-volume and low-volume samplers for total alpha and total beta measurements. Radon monitoring would be conducted in any "occupied or habitable building" existing on soils exceeding RGs for Ra-226 (e.g. Futura buildings).

Protectiveness: Alternative 3 is protective of human health and the environment. It achieves protectiveness by (1) reducing the volume of contaminated materials through treatment; (2) shipping the more highly contaminated materials offsite for disposal; and (3) covering the contaminated soils that remain onsite with clean soil. Land use restrictions would be necessary to maintain protectiveness at SLAPS and for limited areas under roads, active rail lines and other permanent structures where contamination levels exceed UUUE.

Costs: The capital costs are estimated at $258.9 million (real estate, project management, and construction costs) and the present worth O&M costs (monitoring, final status reporting, and five-year reviews) are estimated to be $13 million (includes both periodic and annual O&M). The estimated total 30-year cost of this alternative is $284 million, which includes escalation and contingency costs. The present worth cost of this alternative is $228 million at a 7% discount rate.

Anticipated Implementation Timeframe: The amount of time required to implement this alternative depends on the availability of funding, the magnitude of excavation, and the timing to obtain necessary real estate interests to make the SLAPS areas available for storage. For purposes of comparison, historical program funding levels, an excavation quantity of approximately 229,000 cubic yards, and the immediate availability of SLAPS were assumed. The estimated implementation timeframe (excluding long-term monitoring) for Alternative 3 is 5 to 7 years.

Long-term Reliability of Alternative: The long-term reliability of Alternative 3 depends upon the ability to maintain the soil cap and institutional controls on SLAPS, at the Futura buildings and at roads, bridges, active rail lines and other permanent structures. SLAPS is located in a public area where control may be difficult.

Five Year Reviews: Because contaminants would remain at the site above levels that allow for unlimited use and unrestricted exposure (40 CFR 300.430(f)(4)(ii)), a five-year review is required for this alternative.

ARARs: The key ARARs for Alternative 3 and compliance with those ARARs are listed below:

40 CFR Part 192, Subpart A, Section 192.02(a) is relevant and appropriate
Alternative 3 will comply with the requirement of a cover design that will be effective for up to 1,000 years, to the extent reasonably achievable, and in any case, for at least 200 years.

40 CFR Part 192, Subpart A, Section 192.02(b) is relevant and appropriate
Alternative 3 will comply with the requirement to "provide reasonable assurance that the release of Ra-222 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 Ra-222 in the air at or above any location outside the disposal site by more than 0.5 picocuries per liter (pCi/L).

40 CFR Part 192, Subpart B, Section 192.12(a), (b) is relevant and appropriate to accessible soils
Alternative 3 will comply with the requirements that Ra-226 concentrations shall not exceed 5 pCi/g above background in top 15 cm and 15 pCi/g above background in lower 15 cm layers averaged over 100 m^2 areas at SLAPS VPs, Coldwater Creek (above mean water gradient), and Latty Avenue VPs.

40 CFR Part 192, Subpart C, Section 192.20(a)(1,3), (b)(1,2,3) is relevant and appropriate
Alternative 3 will comply with the regulatory guidance of Subpart C as cited.

10 CFR 40, Appendix A, Criterion 6(6) is relevant and appropriate to accessible soils
Alternative 3 will comply with the requirements of Criterion 6(6), which requires that byproduct material containing concentrations of radionuclides other than radium in soil, and surface activity on remaining structures, must not result in a total effective dose equivalent (TEDE) exceeding the dose from cleanup of radium contaminated soil to the above standard (benchmark dose), and must be at levels which are as low as is reasonably achievable. If more than one residual radionuclide is present in the same 100-square-meter area, the sum of the ratios of the concentration for each radionuclide present to the concentration limit will not exceed "1" (unity). This provides a basis for the derivation of RGs for radionuclides other than Ra-226.

40 CFR Part 122, Subpart C, Sections 122.41(d,e) and 122.44(a,d,e,i) is relevant appropriate to on-site discharges
Alternative 3 will comply with 40 CFR Part 122, Subpart C, which establishes limits for discharge of pollutants into waters of the state. Any water discharged from a point source into waters of the state must meet any limits that would have been established in the NPDES permit. The substantive requirements in the NPDES permit equivalent for SLAPS, dated 10/2/1998 are relevant and appropriate for the entire North St. Louis County site. The effluent limits (daily

maximum and monthly average concentrations) addressing site COCs for the North St. Louis County sites are: 100 µg/L total recoverable arsenic; 94 µg/L total recoverable cadmium; and 280µg/L total recoverable chromium.

40 CFR Part 192, Subpart C, Section 192.21(a-f,h), Section 192.22(a-c) is relevant and appropriate

Alternative 3 will comply with supplemental standards as specified in 40 CFR 192.22(a-c) where the circumstances set forth in 40 CFR 192.21 exist. The development of supplemental standards is appropriate for soil contained or stored onsite and for inaccessible soil managed in place with institutional controls.

40 CFR Part 61, Subpart I, Section 61.102(a) is relevant and appropriate

Alternative 3 will comply with the requirement that emissions of radionuclides to the ambient air shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr during cleanup activities.

10 CSR 23-4.030 through 10 CSR 23.04.080

Alternative 3 will comply with substantive requirements related to the construction, operation, maintenance and plugging of monitoring wells.

2.9.4 Alternative 4, Institutional Controls (No Further Excavation)

Major Components of Alternative 4
• No excavation beyond the scope of the ongoing removal actions.
• Apply Institutional Controls at areas where contamination levels exceed the RGs for UUUE. These areas would include portions of SLAPS, SLAPS VPs, Latty Avenue Properties, Coldwater Creek, and areas under roads, active rail lines and other permanent structures
• Operate and maintain institutional controls.
• Perform long-term monitoring.

On-going Removal Actions: Removal action at SLAPS would be completed under the EE/CA and Action Memorandum. The transition strategy will be described in the remedial design/remedial action (RD/RA) work plan which describes how this ROD will be implemented and is submitted for regulatory review.

Excavation: No soil or sediment would be excavated under Alternative 4.

Institutional Controls: Use restrictions would be necessary to limit land use in areas where contamination levels exceed the RGs for UUUE. These areas include portions of SLAPS, HISS, Futura Coatings Company, roads, active rail lines, and other permanent structures, Coldwater Creek, and the VPs (approximately 87 properties are affected). Use restrictions would be necessary to maintain land uses consistent with current commercial, industrial and transportation uses and to prevent development for uses such as residential, schools, or day care. In some areas construction and digging activities would need to be prohibited or managed. Specific IC mechanisms designed to implement the use restrictions will be evaluated and identified as part of the remedial design and remedial action planning process. The evaluation will examine various IC options including proprietary controls, governmental controls, and informational devices. Where available, multiple mechanisms will be used to provide "layering" for additional durability and effectiveness.

Monitoring: Long-term monitoring of ground and surface water would be required at SLAPS, HISS, Futura Coatings Company, and McDonnell Boulevard as part of this alternative to assure protectiveness of this action and to verify that ground-water and surface-water conditions did not degrade. Ground-water monitoring would continue 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 due to the presence of soils exceeding RGs. Long-term surface-water monitoring would only occur if degraded ground-water conditions were to develop.

Radon monitoring would be conducted in any "occupied or habitable building" existing on soils exceeding RGs for Ra-226 (e.g., Futura buildings). Radon mitigation technologies are retained as ancillary technologies and could be used if deemed necessary during radon monitoring.

Protectiveness: Alternative 4 protects human health through land use management. Uses that result in unacceptable exposures would need to be prohibited. The number of properties and variety of potential uses that would need to be managed is large. The protectiveness of this remedy would rely heavily on the effectiveness of the ICs and the monitoring and maintenance program.

Costs: The capital costs are estimated at $85 million (project management and institutional controls) and the present worth O&M costs (monitoring, final status reporting and five-year reviews) are estimated to be $21.6 million (includes both periodic and annual monitoring). The estimated total 30-year cost of this alternative is $129 million, which includes escalation and contingency costs. The present worth of this alternative is $93.4 million at a 7% discount rate.

Anticipated Implementation Timeframe: The amount of time required to implement this alternative depends on the availability of funding and the ability to implement institutional controls on approximately 87 properties. For purposes of comparison, historical program funding levels, the cooperation of landowners, and support from local government entities were assumed. The estimated implementation timeframe (excluding long-term monitoring) for Alternative 4 is 2 to 3 years.

Long-term Reliability of Alternative: The use restrictions would need to be maintained indefinitely. The long-term reliability of Alternative 4 depends upon the effectiveness and durability of the IC mechanisms used and on the effectiveness of the monitoring and maintenance procedures that would be implemented as part of the long-term stewardship program. The long-term reliability of this alternative is difficult to assure given the number of properties, potential uses, and third parties that would need to be involved.

Due to the large number and variety of property owners, potential administrative problems are anticipated with enforcement, access and monitoring, and voluntary compliance with regulatory controls. Further, private (i.e., non-governmental) property owners are often less than willing participants in subordinating their fee title interests for residual site contamination. Although the implementation of institutional controls at SLAPS, SLAPS VPs, and Latty Avenue Properties is technically feasible, it would involve complex administrative requirements. Maintaining controls at such a large number of properties would be difficult.

Five Year Reviews: Because contaminants would remain at the site above levels that allow for unlimited use and unrestricted exposure [40 CFR 300.430(f)(4)(ii)], a five-year review is required for this alternative.

ARARs: The key ARARs for Alternative 4 and compliance with those ARARs are listed below:

40 CFR Part 192, Subpart A, Section 192.02(b) is relevant and appropriate
Alternative 4 does not comply with the requirement to "provide reasonable assurance that the release of Ra-222 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 Ra-222 in the air at or above any location outside the disposal site by more than 0.5 picocuries per liter (pCi/L).

40 CFR Part 192, Subpart B, Section 192.12(a), (b) is relevant and appropriate to accessible soils
Alternative 4 does not comply with the requirements that Ra-226 concentrations shall not exceed 5 pCi/g above background in top 15 cm and 15 pCi/g above background in lower 15 cm layers averaged over 100 m^2 areas at SLAPS VPs, Coldwater Creek (above mean water gradient), and Latty Avenue VPs. This alternative would also not comply with the additional standards found in 10 CFR 40, Appendix A, Criterion 6(6)

40 CFR Part 192, Subpart C, Section 192.20(a)(1,3), (b)(1,2,3) is relevant and appropriate
Alternative 4 does not comply with the regulatory guidance of Subpart C as cited.

10 CFR 40, Appendix A, Criterion 6(6) is relevant and appropriate to accessible soils
Alternative 4 does not comply with the requirement that byproduct material containing concentrations of radionuclides other than radium in soil, and surface activity on remaining structures, must not result in a total effective dose exceeding the dose equivalent from cleanup of radium contaminated soil to the above standard and must be as low a reasonably achievable. Alternative 4 also does not comply with the requirement that if more than one residual radionuclide is present in the same 100-square-meter area, the sum of the ratios of the concentration for each radionuclide present to the concentration limit will not exceed "1" (unity).

40 CFR Part 122, Subpart C, Sections 122.41(d,e) and 122.44(a,d,e,i) is relevant and appropriate to on-site discharges
Alternative 4 will comply with 40 CFR Part 122, Subpart C, which establishes limits for discharge of pollutants into waters of the state. Any water discharged from a point source into waters of the state must meet any limits that would have been established in the NPDES permit. The substantive requirements in the NPDES permit equivalent for SLAPS, dated 10/2/1998 are relevant and appropriate for the entire North St. Louis County site. The effluent limits (daily maximum and monthly average concentrations) addressing site COCs for the North St. Louis County sites are: 100 µg/L total recoverable arsenic; 94 µg/L total recoverable cadmium; and 280µg/L total recoverable chromium.

40 CFR Part 192, Subpart C, Section 192.21(a-f,h), Section 192.22(a-c) is relevant and appropriate

Alternative 4 will comply with supplemental standards as specified in 40 CFR 192.22(a-c) where the circumstances set forth in 40 CFR 192.21 exist. The development of supplemental standards is appropriate for inaccessible soil managed in place with institutional controls.

10 CSR 23-4.030 through 10 CSR 23.04.080
Alternative 4 will comply with substantive requirements related to the construction, operation, maintenance and plugging of monitoring wells.

2.9.5 Alternative 5, Excavation with Institutional Controls for Soils Under Roads, Rail lines, and Other Permanent Structures

Major Components of Alternative 5
• Cleanup all accessible areas including SLAPS, SLAPS VPS, Latty Avenue properties and Coldwater Creek, to RGs that support UUUE. Dispose of contaminated soils at a permitted off-site facility.
• Apply institutional controls at inaccessible areas under roads, active rail lines and other permanent structures where soils exceed the RGs for UUUE.
• Operate and maintain institutional controls.
• Long-term monitoring of inaccessible areas.

On-going Removal Actions: USACE would ensure a smooth transition from removal action to remedial action when the ROD is approved. This alternative is expected to be consistent with the objectives of the removal actions. Because operations to be conducted under this alternative are similar to those that have been conducted under the removal actions, the transition is expected to be transparent and would involve, for the most part, administrative rather than technical issues. Upon approval of the ROD (assuming selection of this alternative), USACE would compare the requirements of this alternative with the requirements of existing on-going design and work description documents at SLAPS prepared under EE/CA criteria and the level of cleanup achieved by removal actions completed under EE/CAs and Action Memoranda. If these designs or work description documents do not meet the full requirements of this alternative, then modified documents or document addendums would be coordinated for regulatory review and finalized. Removal actions completed under EE/CAs and Action Memoranda would be reviewed to ensure that residual levels of contamination meet the requirements of this ROD. Where such reviews indicate prior removal actions do not meet the requirements of this ROD, remedial action would be conducted. Where such reviews indicate prior removal actions meet the requirements of this ROD, compliance would be documented in the appropriate closeout reports. The transition strategy will be described in the remedial design/remedial action (RD/RA) work plan which describes how this ROD will be implemented and is submitted for regulatory review.

Remedial Design: Pre-design investigation (PDI) sampling for COCs would be conducted as necessary to obtain technical information and data to support the remedial design, minimize effects on property owners, and better manage construction schedules. Those properties where current or past activities unrelated to uranium processing have resulted in chemical waste being co-located with MED/AEC-related radioactive waste would be evaluated and sampled, as necessary, prior to remediation for the purpose of determining the need for treatment and disposal as hazardous waste.

Excavation: All soils exceeding the RGs for unrestricted land use would be excavated and shipped for off-site disposal, with the exception of soils under roads, bridges, active rail lines, and other permanent structures. Under Alternative 5, a total of 230,000 cubic yards of soil would be removed. USACE construction activities during the remedial action would comply with the FAA restrictions of air space around the airport. These restrictions include limits on the height of structures and equipment.

The RGs for UUUE for surface soil (first 6-inch layer) are: 5 pCi/g of Ra-226 above background, 14 pCi/g of Th-230 above background, and 50 pCi/g of U-238 above background. The RGs for UUUE for subsurface accessible soil (soil deeper than 6 inches) are: 15 pCi/g of Ra-226 above background, 15 pCi/g of Th-230 above background, and 50 pCi/g of U-238 above background. The non-radiological RGs for UUUE are listed in Table 2-10.

Dredging: Coldwater Creek sediments below the mean water gradient that exceed the Coldwater Creek sediment criteria (15/43/150 pCi/g, respectively for Ra-226/Th-230/U-238) for UUUE would be dredged and disposed.

Structures: Structures would be decontaminated or disposed of consistent with the RGs for contaminated structures in Section 2.8.2.2.

Backfill: Site soil could be used as backfill if it meets the RGs for UUUE for surface soil with prior notification to MDNR.

Remedial Action Control Measures: Water encountered during remedial actions would be characterized, treated (if necessary), and released to the POTW, or to Coldwater Creek or its tributaries, as allowed. The treatment would address chemicals and radionuclides consistent with applicable federal (NPDES) and state regulations or requirements of the POTW. Excavation water would meet levels established by discharge permits or permit-equivalent requirements prior to being released off-site. Supporting technologies would be implemented 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 material would be added and the excavated areas graded to ensure appropriate surface water drainage. Erosion and sediment controls would be implemented.

Transportation and Waste Management: Alternative 5 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.

Institutional Controls: Use restrictions would be necessary to limit land use in areas where contamination levels exceed the RGs for UUUE. The areas needing use restrictions are limited to the areas described as "inaccessible" meaning that the areas are located under roads, active rail lines and other permanent structures. Use restrictions for these areas would be necessary to maintain land uses consistent with current uses and to prevent development for uses such as residential, schools, or day care. In some areas construction and digging activities would need to

be prohibited or managed. Specific IC mechanisms designed to implement the use restrictions will be evaluated and identified as part of the remedial design and remedial action planning process. The evaluation will examine various IC options including proprietary controls, governmental controls, and informational devices. Where available, multiple mechanisms will be used to provide "layering" for additional durability and effectiveness.

Monitoring: Monitoring of ground water (Unit 2 of HZ-A and Unit 4 of HZ-C), surface water and sediment during the response action at SLAPS, HISS, Futura Coatings Company, and Coldwater Creek would be conducted to ensure that the response action does not impact ground water or surface water. In addition, long-term monitoring of surface water and ground water (HZ-A only) would be required at the Futura buildings and McDonnell Boulevard as part of this alternative to assure protectiveness of this action and to verify that ground-water and surface-water conditions do not degrade. Excavation and offsite disposal at all properties (except inaccessible areas) removes the need to monitor HZ-C (Unit 4) and HZ-E ground water. Ground-water monitoring would continue until determined to be no longer required as part of the five-year review process. Long-term surface-water monitoring would only occur if degraded ground-water conditions were to develop.

Excavation perimeter air monitoring would be conducted during excavation activities. Monitoring could consist of both real-time (continuous readout) and time-integrated sampling. Real-time monitoring would be conducted for lower exposure limit, oxygen level, particulates, and organic compounds. Time-integrated sampling consists of mid-volume and low-volume samplers for total alpha and total beta measurements. Radon monitoring would be conducted in any "occupied or habitable building" existing on soils exceeding RGs for Ra-226 (e.g. Futura buildings).

Protectiveness: Alternative 5 achieves protectiveness by removing contaminated soils and sediment to RGs that support UUUE and disposing of them at an off-site facility. ICs are necessary to maintain protectiveness over the long term for the inaccessible areas where residual soil contamination exceeds the unrestricted use criteria. The small number of areas under roads, active rail lines or other permanent structures where soils exceed unlimited use and unrestricted exposure RGs are protective under their current configurations (i.e., soils under some sort of protective cover, such as pavement, and with limited accessibility/use). Continued protectiveness of inaccessible areas is achieved under this alternative by maintaining their limited accessibility/use (e.g., transportation corridor) using institutional controls.

Costs: The capital costs are estimated at $210.5 million (real estate, project management, construction and institution controls) and the present worth O&M costs (monitoring, final status reporting and five-year reviews) are estimated to be $7.6 million (includes both periodic and annual monitoring). The estimated total 30-year cost of this alternative is $222 million, which includes escalation and contingency costs. The present worth of this alternative is $176.7 million at a 7% discount rate.

Anticipated Implementation Timeframe: The amount of time required to implement this alternative depends on the availability of funding, the magnitude of excavation, and the ability to implement institutional controls on a small number of properties. For purposes of comparison, historical program funding levels, an excavation quantity of approximately 278,000 cubic yards,

and the cooperation of landowners were assumed. The estimated implementation timeframe (excluding long- term monitoring) for Alternative 5 is 6 to 8 years.

Long-term Reliability of Alternative: The long-term reliability of Alternative 5 depends upon the ability to maintain the institutional controls on the inaccessible areas. This alternative is designed to minimize reliance on institutional controls but stops short of taking actions that would cause significant disruption to active facilities. Also, it is considered unlikely that significant human exposure to contaminated soils at the inaccessible areas will occur as long as the facilities continue to be used for their current functions.

Five Year Reviews: Because contaminants would remain at the site above levels that allow for unlimited use and unrestricted exposure (40 CFR 300.430(f)(4)(ii)), a five-year review is required for this alternative.

This alternative as presented in the St. Louis North County Sites Feasibility Study was modified in response to public comments as explained in Section 2.14 "Documentation of Significant and Other Changes from the Preferred Alternative of the Proposed Plan" and the changes have been incorporated into Section 2.12 "Selected Remedy."

ARARs: The key ARARs for Alternative 5 and compliance with those ARARs are listed below:

<u>40 CFR Part 192, Subpart A, Section 192.02(b) is relevant and appropriate</u>
Alternative 5 will comply with the requirement to "provide reasonable assurance that the release of Ra-222 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 Ra-222 in the air at or above any location by more than 0.5 picocuries per liter (pCi/L).

<u>40 CFR Part 192, Subpart B, Section 192.12(a), (b) is relevant and appropriate to accessible soils</u>
Alternative 5 will comply with the requirements that Ra-226 concentrations shall not exceed 5 pCi/g above background in top 15 cm and 15 pCi/g above background in lower 15 cm layers averaged over 100 m^2 areas.

<u>40 CFR Part 192, Subpart C, Section 192.20(a)(1,3), (b)(1,2,3) is relevant and appropriate</u>
Alternative 5 will comply with the regulatory guidance of Subpart C as cited.

<u>10 CFR 40, Appendix A, Criterion 6(6) is relevant and appropriate</u>
Alternative 5 will comply with the requirements of Criterion 6(6), which requires that byproduct material containing concentrations of radionuclides other than radium in soil, and surface activity on remaining structures, must not result in a total effective dose equivalent (TEDE) exceeding the dose from cleanup of radium contaminated soil to the above standard (benchmark dose), and must be at levels which are as low as is reasonably achievable. If more than one residual radionuclide is present in the same 100-square-meter area, the sum of the ratios of the concentration for each radionuclide present to the concentration limit will not exceed "1" (unity). This provides a basis for the derivation of RGs for radionuclides other than Ra-226.

40 CFR Part 122, Subpart C, Sections 122.41(d,e) and 122.44(a,d,e,i) is relevant and appropriate to on-site discharges

Alternative 5 will comply with 40 CFR Part 122, Subpart C, which establishes limits for discharge of pollutants into waters of the state. Any water discharged from a point source into waters of the state must meet any limits that would have been established in the NPDES permit. The substantive requirements in the NPDES permit equivalent for SLAPS, dated 10/2/1998 are relevant and appropriate for the entire North St. Louis County site. The effluent limits (daily maximum and monthly average concentrations) addressing site COCs for the North St. Louis County sites are: 100 µg/L total recoverable arsenic; 94 µg/L total recoverable cadmium; and 280µg/L total recoverable chromium.

40 CFR Part 192, Subpart C, Section 192.21(a-f,h), Section 192.22(a-c) is relevant and appropriate

Alternative 5 will comply with supplemental standards as specified in 40 CFR 192.22(a-c) where the circumstances set forth in 40 CFR 192.21 exist. The development of supplemental standards is appropriate for inaccessible soil managed in place with institutional controls.

40 CFR Part 61, Subpart I, Section 61.102(a) is relevant and appropriate

Alternative 5 will comply with the requirement that emissions of radionuclides to the ambient air shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr during cleanup activities.

10 CSR 23-4.030 through 10 CSR 23.04.080

Alternative 5 will comply with substantive requirements related to the construction, operation, maintenance and plugging of monitoring wells.

2.9.6 Alternative 6, Excavation at all Properties

Major Components of Alternative 6
• Cleanup all areas (including inaccessible areas located under roads, active rail lines and other permanent structures) to soil RGs that support UUUE. Dispose of contaminated soils at a permitted off-site facility.
• Institutional controls are not required for this alternative after the remedial action is complete.
• No operation or maintenance activities required for this alternative.
• Perform response-action monitoring.

On-going Removal Actions: USACE would ensure a smooth transition from removal action to remedial action when the ROD is approved. Because operations to be conducted under the this alternative are similar to those that have been conducted under the removal actions, the transition is expected to be transparent and would involve, for the most part, administrative rather than technical issues. For this alternative, USACE would compare the requirements of this alternative with the requirements of existing on-going design and work description documents at SLAPS prepared under EE/CA criteria and the level of cleanup achieved by removal actions completed under the EE/CAs and Action Memoranda. If these designs or work description documents do not meet the full requirements of the ROD, then modified documents or document addendums would be coordinated for regulatory review and finalized. Removal actions completed under EE/CAs and Action Memoranda would be reviewed to ensure that residual levels of contamination meet the requirements of this ROD. Where such reviews

indicate prior removal actions do not meet the requirements of this ROD, remedial action would be conducted. Where such reviews indicate prior removal actions meet the requirements of this ROD, compliance would be documented in the appropriate closeout reports. The transition strategy will be described in the remedial design/remedial action (RD/RA) work plan which describes how this ROD will be implemented and is submitted for regulatory review.

Remedial Design: Pre-design investigation (PDI) sampling for COCs would be conducted as necessary to obtain technical information and data to support the remedial design, minimize effects on property owners, and better manage construction schedules. Those properties where current or past activities unrelated to uranium processing have resulted in chemical waste being co-located with MED/AEC-related radioactive waste would be evaluated and sampled, as necessary, prior to remediation for the purpose of determining the need for treatment and disposal as hazardous waste.

Excavation: Under Alternative 6 all contaminated soil and sediment would be remediated, regardless of location or accessibility. All contaminated soils with concentrations exceeding the RGs for UUUE would be removed from all property units and disposed off-site. Unlike other alternatives, all roads, active rail lines, and other permanent structures would be removed as required to allow excavation of soil. This would require extensive coordination with local transportation entities, service disruption of major transportation routes, and would significantly increase risk during excavation to both workers and residents at greatly increased costs to society. Under Alternative 6, an estimated 300,000 cubic yards of soil would be removed. USACE construction activities during the remedial action would comply with the FAA restrictions of air space around the airport. These restrictions include limits on the height of structures and equipment.

The RGs for UUUE for surface soil (first 6-inch layer) are: 5 pCi/g of Ra-226 above background, 14 pCi/g of Th-230 above background, and 50 pCi/g of U-238 above background. The RGs for UUUE for subsurface accessible soil (soil deeper than 6 inches) are: 15 pCi/g of Ra-226 above background, 15 pCi/g of Th-230 above background, and 50 pCi/g of U-238 above background. The non-radiological RGs are listed in Table 2-10.

Dredging: Coldwater Creek sediments below the mean water gradient that exceed the Coldwater Creek sediment criteria (15/43/150 pCi/g, respectively for Ra-226/Th-230/U-238) for UUUE would be dredged and disposed off-site at a permitted facility.

Structures: Decontamination is retained as an ancillary technology and could be used if building contamination is discovered.

Backfill: Site soil could be used as backfill if it meets the RGs for UUUE for surface soil with prior notification to MDNR.

Remedial Action Control Measures: Water encountered during remedial actions would be characterized, treated (if necessary), and released to the POTW, or to Coldwater Creek or its tributaries, as allowed. The treatment would address chemicals and radionuclides consistent with applicable federal (NPDES) and state regulations or requirements of the POTW. Excavation water would meet levels established by discharge permits or permit-equivalent requirements

prior to being released off-site. Supporting technologies would be implemented 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 material would be added and the excavated areas graded to ensure appropriate surface water drainage. Erosion and sediment controls would be implemented.

Transportation and Waste Management: Alternative 6 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.

Institutional Controls: Institutional controls would be required until the areas under roads, active rail lines, and other permanent structures are made available. Institutional controls are not required for this alternative after the remedial action is complete.

Monitoring: Monitoring of ground water (Unit 2 of HZ-A and Unit 4 of HZ-C), surface water and sediment during the response action at SLAPS, HISS, Futura Coatings Company, and Coldwater Creek would be conducted to ensure that the response action does not impact ground water or surface water. No long-term monitoring would be required since all sources of contamination would have been removed.

Excavation perimeter air monitoring would be conducted during excavation activities. Monitoring would consist of both real-time (continuous readout) and time-integrated sampling. Real-time monitoring would be conducted for lower exposure limit, oxygen level, particulates, and organic compounds. Time-integrated sampling consists of mid-volume and low-volume samplers for total alpha and total beta measurements. Radon monitoring would be conducted in any "occupied or habitable building" existing on soils exceeding RGs for Ra-226 (e.g. Futura buildings).

Protectiveness: Alternative 6 eliminates the risks posed by the site by means of excavation and off-site disposal of contaminated soil and sediment exceeding the RGs for UUUE.

Costs: The capital costs are estimated at $273.4 million (real estate, project management, construction) and the present worth O&M costs (final status reporting) are estimated to be $7.5 million. The estimated total 30-year cost of this alternative is $286 million, which includes escalation and contingency costs. The present worth cost of this alternative is $221 million at a 7% discount rate, but does not include costs associated with replacement of roads, bridges, active rail lines and other permanent structures, disruption to property owners and economic impact to businesses. Consequently, the cost for this alternative may be underestimated.

Anticipated Implementation Timeframe: The amount of time required to implement this alternative depends on the availability of funding, the magnitude of excavation and the timing of landowners in making the areas under roads, active rail lines, bridges and other permanent structures available for remediation. For purposes of comparison, historical program funding levels, an excavation quantity of approximately 360,000 cubic yards, and the cooperation of

landowners were assumed. The estimated implementation timeframe for Alternative 6 is 8 to 10 years.

Long-term Reliability of Alternative: The long-term reliability of Alternative 6 is high since the properties are remediated to levels that allow for unlimited use and unrestricted exposure and there is no long-term reliance on ICs.

Five Year Reviews: Hazardous substances would remain in place until all properties have been made available for excavation. Until this point in time, five-year reviews (policy reviews) would be conducted.

ARARs: The key ARARs for Alternative 6 and compliance with those ARARs are listed below:

40 CFR Part 192, Subpart A, Section 192.02(b) is relevant and appropriate
Alternative 6 will comply with the requirement that the release of Ra-222 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 Ra-222 in the air at or above any location by more than 0.5 picocuries per liter (pCi/L).

40 CFR Part 192, Subpart B, Section 192.12(a), (b) is relevant and appropriate
Alternative 6 will comply with the requirements that Ra-226 concentrations shall not exceed 5 pCi/g above background in top 15 cm and 15 pCi/g above background in lower 15 cm layers averaged over 100 m^2 areas.

10 CFR 40, Appendix A, Criterion 6(6) is relevant and appropriate
Alternative 6 will comply with the requirements of Criterion 6(6), which requires that byproduct material containing concentrations of radionuclides other than radium in soil, and surface activity on remaining structures, must not result in a total effective dose equivalent (TEDE) exceeding the dose from cleanup of radium contaminated soil to the above standard (benchmark dose), and must be at levels which are as low as is reasonably achievable. If more than one residual radionuclide is present in the same 100-square-meter area, the sum of the ratios of the concentration for each radionuclide present to the concentration limit will not exceed "1" (unity). This provides basis for the derivation of RGs for radionuclides other than Ra-226.

40 CFR Part 122, Subpart C, Sections 122.41(d,e) and 122.44(a,d,e,i) is relevant and appropriate
Alternative 6 will comply with 40 CFR Part 122, Subpart C, which establishes limits for discharge of pollutants into waters of the state. Any water discharged from a point source into waters of the state must meet any limits that would have been established in the NPDES permit. The substantive requirements in the NPDES permit equivalent for SLAPS, dated 10/2/1998 are relevant and appropriate for the entire North St. Louis County site. The effluent limits (daily maximum and monthly average concentrations) addressing site COCs for the North St. Louis County sites are: 100 µg/L total recoverable arsenic; 94 µg/L total recoverable cadmium; and 280µg/L total recoverable chromium.

40 CFR Part 61, Subpart I, Section 61.102(a) is relevant and appropriate
Alternative 6 will comply with the requirement that emissions of radionuclides to the ambient air shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr during cleanup activities.

10 CSR 23-4.030 through 10 CSR 23.04.080
Alternative 6 will comply with substantive requirements related to the construction, operation, maintenance and plugging of monitoring wells.

2.10 COMPARATIVE ANALYSIS OF THE ALTERNATIVES

This section of the ROD summarizes the comparative analysis of alternatives presented in the detailed analysis section of the Feasibility Study. First, a descriptive summary of each of the nine criteria is presented. Then, an explanation of how each of the alternatives compare to each other relative to each criterion is presented.

2.10.1 Summary of the CERCLA Criteria

The remedial alternatives have undergone detailed comparative analysis using the nine CERCLA criteria discussed in the following paragraphs. The comparative analysis provides a means by which remedial alternatives can be directly compared to one another with respect to common criteria.

Threshold Criteria

Overall protection of human health and the environment and compliance with ARARs are "threshold criteria" that any remedial alternative must meet before being considered for implementation.

- ***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 (ARARs)–*** addresses whether a remedy would meet the site ARARs. Applicable requirements are those cleanup standards, standards of control, and other substantive 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. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be relevant and appropriate.

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

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*** **–** addresses residual risk (i.e., risk remaining after implementation of the alternative) and the ability of an alternative to protect human health and the environment over time once RGs have been met.

- ***Short-Term Effectiveness and Environmental Impacts*** **–** addresses 1) the impacts to the community and site workers during remediation including the amount of time required to achieve RGs and 2) the environmental effects of implementing the remedial action.

- ***Reduction in Toxicity, Mobility, or Volume through Treatment*** **–** addresses 1) the ability of the alternative to reduce the volume, toxicity, or mobility of the waste and 2) the irreversibility of the treatment process and the type and quantity of residuals remaining after treatment.

- ***Implementability*** **–** addresses the technical and administrative feasibility of an alternative, including the availability of materials and services required for remediation. 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 and the degree of difficulty in implementation of land use controls and institutional controls.

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

Modifying Criteria

Finally, the remedial alternatives are evaluated against the two modifying criteria described below on the basis of comments received during the public comment period for the Feasibility Study and Proposed Plan.

- ***State Acceptance*** **–** an evaluation of whether the State agrees with, opposes, or has no comment on the preferred alternative.

- ***Community Acceptance*** **–** addresses the issues and concerns the public has regarding each of the alternatives.

2.10.2 Comparison of the Alternatives Using the CERCLA Criteria

During the Feasibility Study process, the alternatives were evaluated against the two Threshold Criteria and the five Primary Balancing Criteria. The results of this comparative analysis for the six site-wide alternatives are presented in Table 2-11. The evaluation against the two modifying criteria (State and Community Acceptance) was conducted at completion of the public comment period and is summarized in Section 2.10.2.8.

2.10.2.1 Overall Protection of Human Health and the Environment

Each of the alternatives except Alternative 1 will protect human health and the environment by eliminating, reducing, or controlling the risks posed by the site through excavation, treatment, capping, and/or institutional controls.

Alternative 6 is protective because all contaminated soil and sediment is transported to an off-site disposal location, allowing for unlimited use and unrestricted exposure at the site. Alternative 4 achieves protectiveness exclusively through the use of institutional controls to prevent exposure. The other protective alternatives achieve protectiveness through a balance of soil cleanup, soil containment, treatment and institutional control. Alternatives that rely more heavily on engineering controls are considered to provide greater overall protection than those that rely more heavily on institutional control. Alternative 5 achieves greater protectiveness than Alternatives 2 and 3 because offsite disposal is considered a more reliable long-term solution than on-site containment.

2.10.2.2 Compliance with ARARs

Section 121(d) of CERCLA and NCP 300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs", unless such ARARS are waived under CERCLA section 121(d)(4). (See Section 2.10.1 for additional explanation of ARARs.) Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes or provides a basis for invoking a waiver.

Each of the alternatives, except Alternative 1 (No Action) and Alternative 4 (Institutional Control), complies with ARARs. Alternatives involving soil removal (Alternatives 2, 3, 5, and 6) had common ARARs associated with excavation. Alternatives involving on-site consolidation and storage (Alternatives 2 and 3) also had common ARARs associated with determining which soils may remain on-site. The ARARs for each of the remedial alternatives are listed in Section 2.9. Additional laws and regulations proposed by the State as potential ARARs, although not relevant to the development of cleanup standards, may be important to consider during implementation of the remedial action. To the extent they apply, the requirements will be described in the remedial action work plans to ensure compliance by USACE and its contractors during implementation.

2.10.2.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence addresses the expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met.

Each alternative, except the no-action alternative (Alternative 1), provides some degree of long-term protection. The alternatives increase in effectiveness of assuring protection against potential exposure and potential future migration of contamination to ground water/surface water as more contaminated material is removed from the sites and reliance on institutional controls diminishes.

Table 2-11. Summary of Detailed Analysis of Alternatives

Criteria	Alternative 1, No Further Action	Alternative 2, Partial Excavation and Capping at SLAPS, HISS and Futura Coatings Company	Alternative 3, Partial Excavation and Treatment at SLAPS	Alternative 4, Institutional Controls (No Further Excavation)	Alternative 5, Excavation with Institutional Controls Under Roads, Bridges, Active Rail lines, and Other Permanent Structures	Alternative 6, Excavation at all Properties
Overall Protection						
• Human Health	No reduction in risk so it is not protective.	Achieves acceptable risks/hazards by consolidating contaminated materials meeting supplemental criteria on site & covering with a multi-layer cap. Use restrictions prevent or mitigate potential exposures to contaminated sediment in Creek. Institutional controls assure protectiveness and effectiveness of the remedy.	Achieves acceptable risks/hazards by reducing the volume of contaminated soils through treatment. All material not meeting supplemental criteria is shipped off-site for disposal. Soils remaining on-site are capped in place to minimize exposure. Uses institutional controls to assure protectiveness and effectiveness of the remedy.	Achieves acceptable risks/hazards by managing land use in both accessible and inaccessible areas. Relies on institutional controls to assure protectiveness and effectiveness of the remedy. It is the least protective of the protective alternatives.	Achieves acceptable risks/hazards by removing all accessible contaminated soils & sediment to levels supporting UUUE and using institutional controls to control exposures at inaccessible areas.	Achieves acceptable risks/hazards by removing all contaminated soil & sediment to levels that support UUUE. It achieves the highest degree of protection.
• Environment	Does not prevent potential future migration to surface and ground water so it is not protective.	Achieves protection by removing the contaminated material or capping it to prevent runoff & leaching.	Achieves protection by removing the contaminated material or capping it to prevent runoff & leaching.	Does not increase protectiveness because institutional controls do not prevent potential future migration to surface and ground water.	Achieves protectiveness by removing most of the contaminated material. Potential migration & leaching is limited to the inaccessible areas.	Achieves protectiveness by removing the contaminated material. Following cleanup there is no potential for significant migration & leaching.
Compliance With ARARs						
• Chemical-specific	Not compliant for soil	Compliant	Compliant	Not compliant for soil.	Compliant	Compliant
Long-Term Effectiveness and Permanence						
• Magnitude of Remaining Risk	Neither effective over the long-term nor permanent because the contaminant sources have not been addressed. Existing risk remains.	Very effective over the long-term and permanent for the VPs cleaned up to levels supporting UUUE. Long-term effectiveness at the capped areas depends on maintenance. Not a permanent remedy for SLAPS, HISS, Futura Coatings, Coldwater Creek, or the inaccessible areas.	Very effective over the long-term and permanent for areas cleaned up to levels supporting UUUE. Long-term effectiveness at the capped area depends on maintenance. Not a permanent remedy for SLAPS or the inaccessible areas.	Long-term effectiveness depends upon maintaining appropriate and effective institutional controls as long as contaminant levels remain above UUUE. Not a permanent remedy because the sources have not been addressed. Existing risk remains.	Very effective and permanent for all accessible soils. Less effective and not permanent for contaminated soils in inaccessible areas because those contaminants would remain in place. The long-term effectiveness in these areas depends on maintaining appropriate and effective institutional controls as long as contaminants remain above levels supporting UUUE.	Very effective and permanent for all areas.

Table 2-11. Summary of Detailed Analysis of Alternatives (Cont'd)

Criteria	Alternative 1, No Further Action	Alternative 2, Partial Excavation and Capping at SLAPS, HISS and Futura Coatings Company	Alternative 3, Partial Excavation and Treatment at SLAPS	Alternative 4, Institutional Controls (No Further Excavation)	Alternative 5, Excavation with Institutional Controls Under Roads, Bridges, Active Rail lines, and Other Permanent Structures	Alternative 6, Excavation at all Properties
• Adequacy and Reliability of Controls	No controls over remaining contamination. Contaminants would remain on-site above acceptable risk levels.	Multi-layer cap controls contaminated soil. Reliability of cap can be high if maintained. Failure to maintain cap can increase potential for direct contact and future ground water contamination. Appropriate and effective institutional controls must be maintained over the long-term.	Soil cap controls contaminated soil. Reliability of cap can be high if maintained. Failure to maintain cap can increase potential for direct contact and future ground water contamination. Appropriate and effective institutional controls must be maintained over the long-term.	Contaminants would remain on-site above acceptable risk levels. Appropriate and effective institutional controls must be maintained over the long-term which could be difficult for the 80+ properties requiring such controls.	Appropriate and effective institutional controls must be maintained over the long-term, although only properties with inaccessible contamination would require such controls.	No long-term controls required.
• Long-Term Management	5-year reviews and long-term Stewardship Plan required.	5-year reviews; long-term management of caps and environmental monitoring at the SLAPS and at the HISS and Futura Coatings Company properties necessary; controls required to ensure continued use of roads, active rail lines, and other permanent structures as transportation/utility corridors. Long-term Stewardship Plan required.	5-year reviews; environmental monitoring; and long-term management of soil cover and land use restrictions at the SLAPS necessary; controls required to ensure continued use of roads, active rail lines, and other permanent structures as transportation/utility corridors. Long-term Stewardship Plan required.	5-year reviews; environmental monitoring; and maintenance of land use restrictions necessary. Long-term Stewardship Plan required.	5-year reviews; environmental monitoring; controls only required to ensure continued use of roads, active rail lines, and other permanent structures as transportation/utility corridors. Long-term Stewardship Plan required.	5-year review during the remedial action period. No long-term management required; response action environmental monitoring only.
Reduction of Toxicity, Mobility, or Volume Through Treatment						
Toxicity, Mobility, or Volume by Treatment	Primary: None. Secondary: None.	Primary: None. Secondary: treatment of structures and surface water.	Primary: soil sorting and soil washing. Secondary: treatment of structures and surface water.	Primary: None. Secondary: None.	Primary: None. Secondary: treatment of structures and surface water.	Primary: None. Secondary: treatment of structures and surface water.
Short-Term Effectiveness						
• Community Protection	Continued risk to community through no action.	Minor increase in dust generation during excavation & cap installation. Exposure risks controlled through use of standard controls such as dust suppression & use of covered trucks.	Minor increase in dust generation during excavation & cap installation. Exposure risks controlled through use of standard controls such as dust suppression & use of covered trucks.	Continued risk to community. Material remains on-site. Implementation of institutional controls does not create additional short-term risk.	Small additional short-term risk to community during excavation and transportation activities. Protective of exposure risks to contaminated soil with use of standard controls such as dust control and use of covered trucks.	Significant increased short-term risk during excavation of materials under roads, active rail lines, and other permanent structures, which will involve more complex construction techniques and traffic re-routing.

Table 2-11. Summary of Detailed Analysis of Alternatives (Cont'd)

Criteria	Alternative 1, No Further Action	Alternative 2, Partial Excavation and Capping at SLAPS, HISS and Futura Coatings Company	Alternative 3, Partial Excavation and Treatment at SLAPS	Alternative 4, Institutional Controls (No Further Excavation)	Alternative 5, Excavation with Institutional Controls Under Roads, Bridges, Active Rail lines, and Other Permanent Structures	Alternative 6, Excavation at all Properties
• Protection of Workers	No additional occupational risks to workers due to no action taken.	Alternative 2 requires a 4-5 year construction period to achieve RGs. Protection required against dermal contact & inhalation of contaminated dust during excavation & cap construction.	Alternative 3 requires a 5-7 year-construction period to achieve RGs. Protection required against dermal contact & inhalation of contaminated dust during excavation, treatment & cap construction.	No additional short-term occupational risk to workers. Requires 2-3 years to implement.	Alternative 5 requires 6-8 year construction period to achieve RGs. Protection required against dermal contact & inhalation of contaminated dust during excavation.	Alternative 6 requires the longest time to achieve RGs (8-10 years). Short-term occupational risk to workers increased due to removing materials under roads, bridges, active rail lines, and other permanent structures, which will involve more complex construction techniques and traffic re-routing. Protection required against dermal contact & inhalation of contaminated dust during excavation.
• Environmental Impacts	Continued impact from existing conditions	Short-term effects on urban terrestrial and aquatic (Coldwater Creek) ecosystem. Migration of contaminants minimized.	Short-term effects on urban terrestrial and aquatic (Coldwater Creek) ecosystem. Migration of contaminants minimized.	Continued impact from existing conditions.	Short-term effects on urban terrestrial and aquatic (Coldwater Creek) ecosystem. Migration of contaminants minimized.	Short-term effects on urban ecosystem; significant degree of land disturbance. Migration of contaminants minimized.
Implementability						
• Technical Feasibility	No construction or operation. No equipment, materials or technology required.	Feasible. Easy to construct. Excavation & cap materials/technology readily available. May be difficult to extend cap due to lack of available space if volumes increase.	Feasible. Excavation & cap materials/technology readily available. However soil washing may be limited to only a small amount of soils. May be difficult to extend cap due to lack of available space if volumes increase.	Feasible. No construction required. Institutional control mechanisms exist. Changes in volume do not impact alternative feasibility.	Feasible. Easy to construct. Excavation equipment/technology readily available. Can easily handle changes in volume.	Feasible. Requires intensive coordination with local transportation entities. Excavation equipment/technology readily available. Can easily handle changes in volume.

Table 2-11. Summary of Detailed Analysis of Alternatives (Cont'd)

Criteria	Alternative 1, No Further Action	Alternative 2, Partial Excavation and Capping at SLAPS, HISS and Futura Coatings Company	Alternative 3, Partial Excavation and Treatment at SLAPS	Alternative 4, Institutional Controls (No Further Excavation)	Alternative 5, Excavation with Institutional Controls Under Roads, Bridges, Active Rail lines, and Other Permanent Structures	Alternative 6, Excavation at all Properties
• Administrative Feasibility	Not a supportable CERCLA decision because it doesn't meet the threshold criteria.	Approvals/coordination required for on-site storage. Possible objection by state regulators, landowners and public due to contaminated soil remaining in place at the SLAPS, HISS, and Futura Coatings Company.	Approvals/coordination required for consolidation & on-site storage at SLAPS. Possible objection by state regulators to use of treated soil as backfill at the SLAPS and to the storage of contaminated soil at SLAPS.	Likely objection by state regulators, landowners & public due to contaminated soil remaining in place. Ability to obtain institutional controls on privately owned properties may be difficult due to uncooperative landowners. Enforcement due to large number of properties may be complicated. Compliance with ARARs must be waived in accordance with 40 CFR §300.430(f)(1)(ii)(C) before alternative could be selected.	Feasible. Limited objection expected due to location and concentration of remaining contaminants (i.e. inaccessible soils.)	Feasible. No objections expected to extent of remediation. However, significant objections expected relative to extent of land disturbance. Administratively complex for roads, bridges, active rail lines, and other permanent structures. Disruption of public use of infrastructure is potentially great. Cost for replacement of infrastructure is not included.
Cost (Present Worth)						
• Capital Cost	$ 149,000	$ 167.6 million	$ 258.9 million	$ 85 million	$ 210.5 million	$ 273.4 million
• O&M (present worth with 7% discount)	$ 494,000	$ 16.1 million	$ 13.0 million	$ 21.6 million	$ 7.6 million	$ 7.5 million
• Total Cost	$ 1.5 million	$ 205 million	$ 284 million	$ 129 million	$ 222 million	$ 286 million
• Present Worth (7% discount)	$ 677,000	$ 149.8 million	$ 228 million	$ 93.4 million	$ 176.7 million	$ 221 million
State and Community Acceptance						
• State Acceptance	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Acceptable	Acceptable
• Community Acceptance	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Acceptable	Acceptable

Alternative 6 will result in the greatest degree of long-term effectiveness and permanence. Under Alternative 6, all contaminated soil is removed and transported to an off-site disposal location, leaving no unacceptable residual risk. Next in terms of degree of long-term effectiveness and permanence is Alternative 5, which removes the second greatest volume of soils and requires implementation of institutional controls on fewer properties than the remaining alternatives (Alternatives 2, 3, and 4). For the remaining alternatives (Alternatives 2, 3, and 4), the degree of long-term effectiveness and permanence from greater to lesser is Alternative 3, 2, and 4. Alternative 3 results in on-site storage at SLAPS, while Alternative 2 results in on-site storage at SLAPS and at the HISS and Futura Coatings Company properties. In addition, both Alternatives 2 and 3 depend upon the adequacy of maintenance of multi-layer and soil caps, respectively, and more extensive use of institutional controls than Alternative 5. Alternatives 4 and 1 have the highest level of residual risk, due to the continued presence of contaminated materials at the site. Alternative 4 relies exclusively on institutional controls to manage contaminated soils. No further action would be taken under Alternative 1.

Pursuant to §121 of CERCLA as amended by SARA, site remedy reviews will be conducted no less often than every five years after initiation of the remedial action when hazardous substances remain on-site above levels that allow for unlimited use and unrestricted exposure.

2.10.2.4 Reduction in Volume, Toxicity, or Mobility Through Treatment

Reduction of toxicity, mobility or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Alternatives 1, 2, 4, 5, and 6 do not include treatment as a principal component of the remedy. Therefore, these alternatives would not reduce the volume, toxicity, or mobility of contamination at the site.

Alternative 3 would provide a limited reduction both in the volume of contaminated soil and in the mobility of some site contaminants of concern through treatment (soil washing, phytoremediation, and soil sorting). The use of soil washing would be effective in treating the soluble contaminants like uranium. However, the large presence of insoluble metals such as radium sulfate and thorium in soil that is rich in fines, clays and organic matter, as is the case for the North St. Louis County sites, makes soil washing ineffective because the treated soil would continue to be radiologically contaminated. Phytoremediation (using plants to draw soluble contamination from soil) could potentially reduce the concentration of soluble metals (such as uranium) in soils but would be of limited benefit in this case because it is not effective as a means of treating soils containing the relatively insoluble metals that exist within most of the North St. Louis County sites. Soil sorting is of limited value for soils containing radium but is not technically viable as a treatment option for volume reduction of fine (clay) soils contaminated with thorium.

2.10.2.5 Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

Short-term risks would be considerably lower for Alternative 4, which relies exclusively on institutional controls. It does not involve any construction activities so there is minimal adverse impact to workers or to environmental, natural, and cultural resources. Because Alternatives 2, 3, 5, and 6 involve disposal of various volumes of contaminated soil off-site, they have short-term risks associated with traffic accidents along the transportation route to the off-site disposal area. Alternative 2 requires a 4 to 5 year construction period to achieve the RGs. Alternative 3 will take approximately 5 to 7 years to implement. Alternative 5 will require a 6 to 8 year construction period. Assuming the same level of annual funding is available for each alternative, and a linear relationship between excavation/construction time periods and cubic yardage to be removed or handled, Alternative 2 would have the second greatest short-term effectiveness followed by Alternatives 3 and 5. Alternative 6 has the least short-term effectiveness because it requires the longest time to implement (8 to 10 years to attain RGs). Short-term risks to on-site workers would be considerably higher for Alternative 6, which would require excavation from under heavily traveled roads, active rail lines, and bridges. Increased risks associated with potential traffic accidents in these areas would be incurred by site workers and the general public using these transportation routes during the remediation.

Short-term negative effects on the environment are likely to occur with soil excavation (Alternatives 2, 3, 5, 6) and sediment dredging (Alternatives 3, 5, and 6). Excavation and dredging potentially redistribute wastes into uncontaminated areas, adversely impacts animals and plants residing at the excavated locations, and adversely impacts existing features of the environment that provide habitat or food to plants and animals. Alternative 6 entails the highest degree of soil excavation and sediment dredging and therefore has the maximum short-term negative effects. The degree of short-term adverse impacts to the environment increases with the amount of surface area subjected to removal in each of the alternatives. Although the implementation of Alternatives 2, 3, 5, and 6 may temporarily affect wetlands, surface drainage in the floodplain, and create non-point source surface water discharges, each of these effects will be managed, and are not considered to be significant obstacles to the implementation of these remedial alternatives.

2.10.2.6 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are considered.

The administrative feasibility of Alternatives 2, 3, 4, and 5 depends on the type of institutional control necessary for each property and the different governmental entities involved. For each of these alternatives, the use restrictions required for transportation corridors (i.e., roads, bridges, and active rail lines) are expected to be relatively easy to arrange and administer. These inaccessible areas already have use restrictions placed on them by local government entities and would only require the party that administers the land use control to agree to notify the United States in advance if it were to change the control or if there were plans for intrusive work.

Implementation of Alternative 4 is also difficult because it does not comply with ARARs and would require a waiver. Section 121 (d) of CERCLA and the NCP §300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites attain ARARs, unless such ARARs are waived.

Selection of Alternative 4 would require compliance with 40 CFR 192, Subparts A, B, and C be waived in accordance with CERCLA 121(d)(4) and NCP§300.430(f)(1)(ii)(C).

Alternative 5 would likely be the easiest to implement from an administrative perspective because the controls would be required primarily for the transportation corridors. It is anticipated that there would be few areas outside the corridors requiring institutional controls. Those alternatives requiring institutional controls for an increasing number of properties (Alternatives 2, 3, and 4) are more difficult to implement from an administrative perspective. Alternative 4, which requires institutional controls at SLAPS, SLAPS VPs (including Coldwater Creek), and the Latty Avenue Properties would involve approximately 87 properties and consequently would be the most administratively difficult to achieve. Maintaining and enforcing the necessary institutional controls at numerous private properties would be difficult. For private properties requiring institutional controls, deed restrictions may be imposed as necessary, to prohibit or limit construction or other intrusive activities in contaminated soil. While Alternative 6 relies on institutional controls only for a limited period (i.e., during the period of remedial action), the extent of coordination required to make areas under roads, bridges, active rail lines, and other permanent structures available for remediation during the period of remedial action would be complicated. Disruption of public use of infrastructure would require extensive coordination.

Alternatives involving on-site placement of radioactive materials (Alternatives 2 and 3) will likely be the most administratively difficult to achieve. Condemnation may be required to obtain the necessary real estate interests and it would be difficult to obtain the necessary regulatory approvals to place radioactive materials on-site. In addition, on-site remedies (Alternatives 2 and 3) have received strong objection from the state and the community during the public comment period. The state and community have a strong preference for excavation and off-site disposal.

With respect to technical feasibility, Alternative 4 does not include construction activities and does not require consideration of availability of equipment, specialists, or materials. The excavation and disposal aspects of Alternatives 2, 3, 5, and 6 are easily implemented and technically feasible. Materials and services for removal of contamination and environmental monitoring activities are readily available. However, the degree of difficulty in implementing alternatives increases with the amount and accessibility of contaminated soil to be excavated, the amount of coordination for transportation required to dispose of contaminated soil, and the time involved in completing the alternative. Disposal at an existing commercial facility specifically designed for waste similar to that at the North St. Louis County sites, is considered easy to implement. It should be noted that Alternatives 2 and 3, which involve capping, would be slightly more technically challenging than Alternatives 5 and 6, which do not involve capping. Alternatives 2 and 3 could be limited in their ability to handle significant increases in volume. The most technical difficult alternative to implement is Alternative 3, which relies primarily on treatment. Treatment technologies would require specialized expertise and equipment. Soil washing as a means of extracting radioactive materials from soils has not, to date, been determined to be effective in removing significant radionuclides from fine particle soils (e.g. clays). In addition, phytoremediation has been shown to be of very limited use in extracting MED/AEC radiological COCs from soils.

2.10.2.7 Cost

The estimated costs are based on historical costs incurred in previous FUSRAP actions, quotes from suppliers, generic unit costs, vendor information, conventional cost-estimating guides, and other information. The cost estimates were developed in Fiscal Year 2003 dollars, and are believed to be accurate within a range between minus 30 percent and plus 50 percent of actual costs. The actual costs for these actions could be higher than estimated because of unexpected site conditions and the potential for delays in taking action. The cost estimates include a 30-year performance period for ongoing actions, such as monitoring and maintenance. Costs for each alternative, itemization of individual components, and the sensitivity analysis for each alternative may be found in Appendix C of the Feasibility Study. The total 30-year cost, as well as the present worth costs for the alternatives, are provided in Table 2-12. The least expensive alternative is Alternative 1 (No further Action), followed by Alternatives 4, 2, 5, 3, 6 with Alternative 6 being the most expensive. It should be noted that Alternative 6 does not include costs associated with replacement of roads, bridges, active rail lines and other permanent structures, disruption to property owners and economic impact to businesses. Consequently, the cost for this alternative may be underestimated.

Table 2-12. Total 30-Year and Present Worth Costs for the Site-Wide Alternatives

Alternative	30-Year	Present Worth
1. No Further Action	$1.5 million	$0.677 million
2. Partial Excavation and Capping at SLAPS and HISS/Futura	$205 million	$150 million
3. Partial Excavation and Treatment at SLAPS	$284 million	$228 million
4. Institutional Controls (No Further Excavation)	$129 million	$93 million
5. Excavation with Institutional Controls Under Roads, Bridges, Railroads, and Other Permanent Structures	$222 million	$177 million
6. Excavation at all Properties	$286 million	$221 million

2.10.2.8 State and Community Acceptance

The evaluation of State and Community Acceptance was completed after the close of the public comment period on the Proposed Plan. A complete list of the submitted comments and USACE's responses are contained in the Responsiveness Summary (Section 3.0 of this document). Comments received from the State of Missouri on previous documents developed pursuant to the EE/CAs were considered in the formulation of alternatives. Previous comments and the input from the Oversight Committee were considered in the formulation of the alternatives. USACE has taken State and Community recommendations into consideration and reflected them in this ROD.

The public expressed their dislike of Alternatives 1 through 4 during the Feasibility Study and Proposed Plan public comment period. The public generally expressed a preference for Alternative 6 (Excavation at All Properties) as the final selected remedial alternative. USACE believes this preference was due to the public's concern over how inaccessible soil would be managed after completion of active remediation under Alternative 5 - Excavation with Institutional Controls for Soils Under Roads, Rail lines, and Other Permanent Structures). Some soils exceeding unlimited use and unrestricted exposure RGs will remain in a small number of areas under roads, active rail lines, pavement or other permanent structures. These

areas in their current configuration (i.e., soils under some sort of protective cover such as pavement) and with their limited accessibility/use (e.g., transportation corridor) do not pose an unacceptable risk provided the configuration and limited accessibility/use are maintained. Surveys will be performed in inaccessible areas to document the current protectiveness as defined in Section 2.8.2.7. Institutional controls could be used to limit land use and intrusive activities such as drilling and excavation to assure continued protectiveness in their current configuration. These controls will ensure that current protective cover remains and that potential contaminant migration pathways are not created. Language clarifying the stewardship planning process can be found in Section 2.12.2.7, institutional control implementation planning is discussed in Section 2.12.2.6, and the 5-year review process and how these help assure long-term effectiveness are contained in Section 2.13.6. Table 2-13 identifies the inaccessible soil areas at the North St. Louis County sites and Figure 2-14 is a map that outlines the areas having inaccessible soil.

In addition, the State found Alternatives 1 through 4 to be unacceptable. The State concurred with USACE that it is not practical or cost effective to immediately remove contamination at inaccessible areas at this time. However, the State's comments also expressed a preference for Alternative 6 over Alternative 5. USACE believes this preference was based on concern over the manner in which inaccessible soil would be addressed under Alternative 5. As noted above, additional clarifying information concerning inaccessible soil has been included in the ROD in response to these concerns. The State also objected to some of the proposed RGs for radionuclides in soil and expressed reservations concerning several components of Alternative 5, including monitoring, institutional controls, and decontamination of buildings. In response, USACE has provided additional text in the ROD to clarify these aspects of the alternative.

2.10.2.9 Summary of Comparative Analysis

Alternative 5 provides the best balance of trade-offs among the alternatives when evaluated against the balancing criteria. Alternative 5 provides the greatest degree of long-term effectiveness and permanence except for Alternative 6. Alternative 5 outperforms Alternative 6 on all other criteria. It can be done at a reasonable cost, is relatively easy to implement, results in low residual risk, and low short-term risks. Alternative 6, excavation at all properties, is less cost effective and has higher short-term risks from potential accidents than Alternative 5. Alternatives 2 and 3 achieve protectiveness through containment and treatment, respectively, but have slightly higher residual risks and potentially less administrative feasibility than Alternative 5. With the exception of the no-action alternative, Alternative 4 is the least permanent and results in the highest residual risk.

2.11 PRINCIPAL THREAT WASTES

The NCP establishes an expectation that treatment will be used to address the principal threats posed by the site wherever practicable. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or environment should exposure occur. No principal threat wastes are present at the North St. Louis County sites. The wastes at the North St. Louis County sites consist mainly of soils contaminated with uranium ore processing

residues. The original uranium ore processing wastes have been removed from the site and no liquid wastes or wastes of highly toxic or highly mobile nature are present.

2.12 SELECTED REMEDY

The selected remedy is Alternative 5 - excavate contaminated soils from all properties to levels that allow for unlimited use and unrestricted exposure (UUUE), except for some limited areas where the soils are not currently accessible because they are located under permanent structures such as active roads, railways, or buildings where excavation is considered impractical under current conditions. Potential risks from contaminants in these inaccessible areas will be managed by imposing appropriate use restrictions through institutional controls. Contaminated sediments will also be removed from Coldwater Creek to levels that allow for UUUE. Contaminated structures will be removed or cleaned up to levels that allow for UUUE. Residual contamination in the shallow ground water does not present an exposure concern or threaten potentially usable ground-water systems. See Section 2.14 for an explanation of clarifications resulting from the public review.

2.12.1 Rationale for the Selected Remedy

Based on information currently available, the USACE concludes the selected remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing criteria. The objective of the remedy is to achieve a cleanup of soils, sediments, and structures that is consistent with UUUE except for those limited areas where contaminated soils are not easily accessible and are protective in their current configuration. Although reasonably anticipated land use for most affected properties is commercial/industrial/transportation, the end use objective of UUUE is considered appropriate in this case. The large number of affected properties and ownerships would make the implementation and maintenance of use restrictions very difficult and Alternative 5 is designed to reduce the need for long-term use restrictions to the fullest practical extent. Alternative 5 also has general support from the state and affected community. The selected remedy satisfies the statutory requirements of CERCLA 121:

- be protective of human health and the environment through removal of contaminated soil and sediment and use of institutional controls to prevent exposure to humans or the environment;
- comply with ARARs;
- be cost-effective; and,
- utilize permanent solutions to the extent practicable.

2.12.2 Description of the Selected Remedy

Major Components of Alternative 5
• Excavate all accessible contaminated soils to remediation goals (RGs) that support unlimited use and unrestricted exposure (UUUE) and dispose off-site at a permitted facility.
• Impose use restrictions at inaccessible areas under roads, active rail lines and other permanent structures where the residual condition is not consistent with UUUE.
• Dredge contaminated sediments from Coldwater Creek to RGs that support UUUE.

• Remove contaminated soils from the surfaces of buildings and structures as necessary to achieve RGs that support UUUE, or remove the contaminated structures themselves and dispose off-site at a permitted facility.
• Monitor ground water and surface water during the soil remediation period to ensure water quality is unimpacted and identify any areas where ground water may be significantly degraded.
• Monitor ground water long term in selected areas where soils contaminated above RGs are left in place or where contaminated ground water has the potential to degrade adjacent ground-water or surface-water systems.

The details of the selected remedy are further explained in the following subsections of 2.12.2.

2.12.2.1 Excavation

All soils exceeding the RGs for UUUE will be excavated and shipped for off-site disposal, with the exception of inaccessible soils under roads, active rail lines, and other permanent structures. Sediments in Coldwater Creek will also be removed to RGs that support UUUE and disposed of off-site. The sediment RGs will apply to material located below the mean water gradient and soil RGs will be applied to material located above the mean water gradient.

Soils under roads, active rail lines, and other permanent structures that exceed RGs for UUUE, but are protective in their current configuration subject to application of radiological RGs for soil in inaccessible areas (See Section 2.8.2.7), will be managed in place through implementation of use restrictions. The location and volume of inaccessible soils are presented in Table 2-13.

The RGs that support UUUE are described in detail below and summarized in Table 2-14. See Section 2.8.2 for an explanation of the basis for these RGs.

Soil in the surface 6-inch layer will be removed if the radionuclide concentrations averaged over any area of 100 m^2 exceed:

- 5 pCi/g of Ra-226 above background, or
- 14 pCi/g of Th-230 above background, or
- 50 pCi/g of U-238 above background.

Subsurface soil (soil deeper than 6 inches) will be removed where the subsurface radionuclide concentrations averaged over any area of 100 m^2 and averaged over a 6-inch thick layer of soil exceed:

- 15 pCi/g of Ra-226 above background, or
- 15 pCi/g of Th-230 above background, or
- 50 pCi/g of U-238 above background.

Sediment below the mean water gradient will be removed if radionuclide concentrations averaged over any area of 100 m^2 exceed:

- 15 pCi/g of Ra-226 above background, or

- 43 pCi/g of Th-230 above background, or
- 150 pCi/g of U-238 above background.

Table 2-13. Location and Estimated Volume of Inaccessible Soil

Property ID	Category	Estimated Volume (cubic yards)
INACCESSIBLE SOIL UNDER BUILDINGS		
Futura Coatings Company	Under Three Futura buildings	16,381
INACCESSIBLE SOIL UNDER ROADS		
Latty Avenue	Under Latty Avenue	950
Byassee Road	Under SLAPS VP Roads	7
Eva Road	Under SLAPS VP Roads	267
Frost Avenue	Under SLAPS VP Roads	622
Hazelwood Avenue	Under SLAPS VP Roads	1,902
McDonnell Boulevard	Under SLAPS VP Roads	24,376
Banshee Road	Under SLAPS VP Roads	1,260
Pershall Road	Under SLAPS VP Roads	3,958
I-270 Road ROW	Under SLAPS VP Roads	25
INACCESSIBLE SOIL UNDER RAIL LINES		
VP-40A - RR	Latty RR	2,523
IA-12	Under SLAPS VP RR	14,839
Norfolk Southern - RR	Under SLAPS VP RR	2,014
VP-02(C) - RR	Under SLAPS VP RR	4
VP-04(C) - RR	Under SLAPS VP RR	15
Total Volume (cubic yards)		69,144

Table 2-14. Remediation Goals (RGs) for the North St. Louis County Sites

MEDIA	SLAPS (Includes IA-1 to IA-7)		Latty Avenue Properties		SLAPS VPs (excluding CWC below mean water gradient)		Coldwater Creek (below mean water gradient)	
	COC	RG	COC	RG	COC	RG	COC	RG
Surface Soil (≤ 6")	NON-RADIOLOGICAL (mg/kg)							
	Antimony	15	Antimony*	15	Antimony**	15	NA	
	Arsenic	36	Arsenic*	36	Arsenic**	36		
	Barium	2,800	Barium*	2,800	Barium**	2,800		
	Cadmium	12	Cadmium*	12	Cadmium**	12		
	Chromium	350	Molybdenum*	1,000	Chromium**	350		
	Molybdenum	1,000	Nickel*	1,500	Molybdenum**	1,000		
	Nickel	1,500	Selenium*	300	Nickel**	1,500		
	Selenium	300	Thallium*	25	Selenium**	300		
	Thallium	25	Vanadium*	112	Thallium**	25		
	Uranium	150			Uranium**	150		
	Vanadium	112			Vanadium**	112		
	RADIOLOGICAL (pCi/g)							
	Radium-226[1]	5	Radium-226[1]	5	Radium-226[1]	5	NA	
	Thorium-230[2]	14	Thorium-230[2]	14	Thorium-230[2]	14		
	Uranium-238[3]	50	Uranium-238[3]	50	Uranium-238[3]	50		
Subsurface Soil (> 6")	NON-RADIOLOGICAL (mg/kg)							
	Antimony	25	Antimony*	25	Antimony**	25	NA	
	Arsenic	40	Arsenic*	40	Arsenic**	40		
	Thallium	30	Thallium*	30	Thallium**	30		
	Uranium	150			Uranium**	150		
	RADIOLOGICAL (pCi/g)							
	Radium-226[1]	15	Radium-226[1]	15	Radium-226[1]	15	NA	
	Thorium-230[2]	15	Thorium-230[2]	15	Thorium-230[2]	15		
	Uranium-238[3]	50	Uranium-238[3]	50	Uranium-238[3]	50		
Soil on Structures (e.g., Buildings)	RADIOLOGICAL (dpm/100 cm^2)							
	Actinium-227	400	Actinium-227	400	Actinium-227	400	NA	
	Protactinium-231	1,400	Protactinium-231	1,400	Protactinium-231	1,400		
	Radium-226	15,000	Radium-226	15,000	Radium-226	15,000		
	Radium-228	7,700	Radium-228	7,700	Radium-228	7,700		
	Thorium-230	6,900	Thorium-230	6,900	Thorium-230	6,900		
	Thorium-232	1,300	Thorium-232	1,300	Thorium-232	1,300		
	Uranium-234	17,000	Uranium-234	17,000	Uranium-234	17,000		
	Uranium-235	16,000	Uranium-235	16,000	Uranium-235	16,000		
	Uranium-238	19,000	Uranium-238	19,000	Uranium-238	19,000		
Sediment	RADIOLOGICAL (pCi/g)							
	NA		NA		NA		Radium-226[1]	15
							Thorium-230[2]	43
							Uranium-238[3]	150
Ground Water	None		None		None		NA	
Surface Water	NA		NA		NA		None	

* Applies only to HISS, Futura, VP-2L, and 10k530087, does not apply to Latty VPs 1(L), 3(L), 4(L), 5(L), and 6(L).
**Applies only to Investigation Areas (IA) – 8 through 13 (Figure 2-3)
[1] Lead-210 is assumed to be present in equilibrium with Radium-226.
[2]Thorium-232 is co-located with Th-230 and is present at relatively low concentrations. Remediation of Thorium-230 will effectively remove Thorium-232 from the soils.
[3]Uranium-238 was used as a surrogate for Uranium-234, Uranium-235, Protactinium-231, and Actinium-227.
NA – Not Applicable

The Sum of Ratios (SOR) approach will be used when more than one radionuclide is present. It is shown below:

$$SOR_{surface} = \frac{^{226}Ra_N}{5\,pCi/g} + \frac{^{230}Th_N}{14\,pCi/g} + \frac{^{238}U_N}{50\,pCi/g} \le 1$$

$$SOR_{subsurface} = \frac{^{226}Ra_N}{15\,pCi/g} + \frac{^{230}Th_N}{15\,pCi/g} + \frac{^{238}U_N}{50\,pCi/g} \le 1$$

$$SOR_{sediment} = \frac{^{226}Ra_N}{15\,pCi/g} + \frac{^{230}Th_N}{43\,pCi/g} + \frac{^{238}U_N}{150\,pCi/g} \le 1$$

The "N" stands for the net (above background) value. Mean soil background for North St. Louis County sites have been determined to be:

	Surface Soil	Subsurface Soil
Radium-226	0.95 pCi/g	1.15 pCi/g
Thorium-230	1.49 pCi/g	1.83 pCi/g
Uranium-238	1.08 pCi/g	1.27 pCi/g

Remediation of subsurface soil to the RGs will, in practice, achieve the surface cleanup criterion of 5 pCi/g for Ra-226. Results from the ongoing removal actions at the North St. Louis County Sites demonstrate that application of the 15 pCi/g subsurface criteria results in a cleanup below 5 pCi/g. The results also demonstrate that cleanup using the 15 pCi/g Th-230 criterion in subsurface soil reduces Ra-226 and Th-232 concentrations to levels comparable to background. Therefore, residual concentrations will not produce risks significantly above background.

At SLAPS, HISS, Futura Coatings Company, Latty Avenue VP-2L, Latty Avenue VP 10k530087, and IAs 8 through 13, non-radiological COCs and RGs for surface soils for are antimony (15 mg/kg), arsenic (36 mg/kg), barium (2,800 mg/kg), cadmium (12 mg/kg), chromium (350 mg/kg), molybdenum (1,000 mg/kg), nickel (1,500 mg/kg), selenium (300 mg/kg), thallium (25 mg/kg), uranium (150 mg/kg), and vanadium (112 mg/kg). The non-radiological COCs and RGs for subsurface soils at these same locations are antimony (25 mg/kg), arsenic (40 mg/kg), thallium (30 mg/kg), and uranium (150 mg/kg). There are no non-radiological COCs for the remaining Latty Avenue VPs or SLAPS VPs.

It should be noted that, to date, the non-radiological contaminants of concern have been co-located with the radiological contaminants such that attainment of the RGs for radiological COCs has resulted in residual site conditions that are protective of human health and the environment for all site contaminants (radiological and non-radiological COCs). Results from the ongoing removal actions at the North St. Louis County sites have demonstrated that excavations designed to remove the principal radiological COCs will effectively remove all other COCs to levels consistent with UUUE.

Soil will be excavated using conventional techniques. Supporting technologies will be used to prevent the spread of contamination. These include revegetation, dust mitigation, storage pile covers, sedimentation basins, and dewatering. Field screening surveys will be implemented, as appropriate, to ensure removal of COC concentrations above RGs while reducing over excavation of clean soil. Grading will be performed to provide acceptable surface water drainage. Conventional material handling techniques will be implemented. Contaminated material exceeding RGs will be shipped to properly permitted off-site disposal facilities. USACE construction activities during the remedial action will comply with the FAA restrictions of air space around the airport. These restrictions include limits on the height of structures and equipment.

Areas of the North St. Louis County sites that were cleaned up under the removal action criteria will be evaluated as part of the remedial design (RD) process used to implement this ROD. The evaluation will be designed to confirm that cleanup activities undertaken prior to the effective date of this ROD achieve the ROD RGs. Any previously cleaned up areas that do not meet the ROD RGs will be further cleaned up consistent with this remedy.

Final status surveys will be conducted to ensure that excavation of radiological COCs meet the RGs. To verify that excavation of radiological COCs also achieves the RGs for non-radiological COCs, chemical verification sampling will also be conducted as part of the final status survey.

Where final status surveys were performed prior to methods in the MARSSIM effective date of January 1, 1998, additional final status surveys consistent with MARSSIM will be conducted for radiological COCs to ensure that properties achieve the ROD RGs. If the evaluation shows that the ROD remediation goals were not met, those areas where the RGs are not met will be further addressed consistent with this remedy. A post-remedial action risk assessment will be performed upon completion of remedial activities to ensure that the final condition is consistent with the objectives of this remedy.

As necessary, pre-remedial design investigation sampling for COCs will be conducted to obtain technical information to support the remedial design, minimize effects on property owners, and better manage construction schedules. Those properties where current or past activities unrelated to uranium processing have resulted in chemical waste being co-located with MED/AEC-related radioactive waste will be evaluated and sampled, as necessary, prior to remediation for the purpose of determining the need for treatment and disposal.

2.12.2.2 Dredging

Coldwater Creek sediment below the mean water gradient containing COC concentrations that exceed sediment RGs will be dredged or excavated and shipped off-site for disposal at a permitted disposal facility. Floodplain soil and sediment above the mean water gradient of Coldwater Creek will be treated the same as soil (i.e., surface and subsurface soil RGs apply). Sediment will be dredged or excavated using conventional equipment based on the level of the water. Best management practices will be used while excavating Coldwater Creek sediment to ensure that no more than *de minimus* discharge is returned to Coldwater Creek and long-term stream integrity is maintained. The State Water Protection Program will be notified and briefed

of the proposed work in advance and the public will be encouraged to participate in a USACE briefing of the proposed work at the appropriate monthly St. Louis Oversight Committee Meeting.

2.12.2.3 Transportation and Waste Management

The Selected Remedy includes truck, rail, and intermodal transport, and disposal at permitted facilities. Currently there are no such permitted facilities within the State of Missouri, as a result of prohibitions contained within Missouri solid waste regulations specifically related to MED/AEC materials (10 CSR 80-3.010(1)(C) and 10 CSR 80-3.010(3)). On-site movement of soils and contaminated material will be accomplished using conventional construction equipment. Local transportation will be performed using sealed or covered trucks. Long-distance shipment will be primarily by rail to off-site permitted disposal facilities. Absorbers and other conditioning will be used, as necessary, to comply with the transportation and disposal requirements. Rubble and similar materials would be sized as necessary for disposal.

2.12.2.4 Backfill

Clean backfill from approved sources will be added and the site will be graded to provide for surface water and flood control. Site soil could be used as backfill if it meets the RGs for surface soil with prior notification to MDNR.

2.12.2.5 Removal of Contaminated Soil from Structures

Investigation of structures present within the North St. Louis County sites indicates that above background concentrations of radionuclides are present on portions of a limited number of structures. Elevated levels of COCs were detected: 1) on the roof, roof vents, west wall and bay area of the structure at VP-2L; 2) under portions of the St. Denis Bridge; 3) adjacent to and under portions of foundations of Futura Coatings Company buildings and structures; 4) adjacent to footings for the McDonnell Boulevard bridge over Coldwater Creek; and 5) on ledges and equipment etc. inside Futura Coatings Company buildings. Impacted structures will be investigated and decontaminated to DCGLs as identified in Section 2.8.2.2.

Decontamination technologies that may be used to address contaminated soils on surfaces include, but are not limited to, vacuuming, washing/scrubbing, surface abrasion/scabbling, pressurized air or water cleaning, and removal of contaminated areas/portions from structures.

Impacted structures within the North St. Louis County sites will be fully investigated using procedures that are compatible with the MARSSIM as necessary to document attainment of DCGLs as specified in the ROD in accordance with the final version of the "Derived Concentration Guideline Levels (DCGLs) for North County Structures."

Pursuant to MARSSIM, surveys of impacted structures will be performed to provide a basis for their classification as Class 1, 2 or 3. Decontamination and final status surveys will subsequently be performed to assure that structures achieve the stated DCGLs. Portions of structures (e.g., ventilation intakes, storm water downspouts, brackets, etc.) that cannot be economically

decontaminated may be removed and/or replaced. Contaminated portions of such structures would be disposed of as radioactive waste at a properly permitted disposal site. This approach assures that residual concentrations of radiological COCs on structures achieve levels that allow for unlimited use and unrestricted exposures.

2.12.2.6 Institutional Controls

Institutional controls (ICs) are non-engineered instruments such as administrative and legal controls which limit land and resource use to reduce the potential for human exposure and/or to maintain the effectiveness of the remedy. The specific ICs needed to implement the use restrictions identified in this ROD will be identified, implemented, and maintained pursuant to the remedial design and remedial action process. A remedial design/remedial action planning document (RD/RA Work Plan) will be developed and submitted by the USACE to describe how this ROD will be implemented. The RD/RA Work Plan will address the full scope of the site management activities necessary to assure that the North St. Louis County Sites remain protective over the long term. In addition to addressing such things as maintaining current use of the properties, the RD/RA Work Plan will be used to assure that the use restrictions identified in this ROD are properly imposed and maintained. Therefore, the RD/RA Work Plan will provide for IC evaluation, and an IC design and implementation plan. Consistent with EPA guidance on selecting ICs, various IC mechanisms will be evaluated, including governmental controls, proprietary controls, enforcement tools, and informational devices. When appropriate, redundant mechanisms will be employed to increase effectiveness. The objective is to incorporate the full range of specific ICs and the manner in which they will be maintained, inspected, and enforced into an IC design and implementation plan.

The selected remedy calls for excavation of contaminated soils to standards that allow for unlimited use and unrestricted exposure except in some limited cases where the contaminated soil is located under permanent structures, such as roads, active rail lines, and buildings. These areas do not present an unacceptable risk under current and reasonably anticipated land use because the contaminated soils are not easily accessible; however, use restrictions will be necessary to maintain protectiveness over the long term. The purpose of this section is to identify the specific use restrictions necessary for all site areas where contamination will remain above RGs allowing for unlimited use and unrestricted exposure (UUUE), the threshold in CERCLA guidance for determining whether ICs are appropriate.

The restricted areas generally fall into three categories: 1) roads; 2) rail lines; and, 3) other permanent structures. The specific restricted areas and the estimated volume of contaminated soil exceeding RGs for UUUE are identified in Table 2-13. Figures 2-14, 2-15, and 2-16 show the locations of these areas. It is planned that the remedial design (RD) process will include further field and analytical work to refine the descriptions of the specific locations requiring use restriction.

<u>Roads:</u>

Use restrictions will be implemented at those areas where soil contaminants will remain under the pavement, on the shoulders of active roads, or under bridges at levels exceeding the RGs for

UUUE. The restricted locations are on portions of McDonnell Boulevard, including the area under the footings for the McDonnell Boulevard Bridge over Coldwater Creek, Latty Avenue, Pershall Road, Byassee Road, Eva Road, Hazelwood Avenue, and Frost Avenue. These areas are shown in Figures 2-14 through 2-18. The volumes in Table 2-13 were estimated using a 3-dimensional modeling software and input of over 15,000 sample locations. The estimates are considered conservative and may overestimate the actual volume of such soil.

The current and reasonably anticipated land use for the roadways is transportation. Based on discussions with the Missouri Department of Transportation, the St. Louis County Highway Department, and the local land use planning offices, there are no anticipated land use changes, nor are there any plans to replace or remove roads. Under this land use, the opportunity for exposure to the contaminated soils is limited. For most of these inaccessible locations, current risks are within the CERCLA acceptable risk range using a conservative road construction/utility worker exposure scenario, which is considered to represent reasonable maximum exposure under current use. However, road construction and utility work could have undesired effects, e.g., migration or relocation of contaminants, and these activities should be restricted or managed at all of the inaccessible locations. Therefore, use restrictions will be necessary to prohibit land uses that are inconsistent with current land use, maintain the physical integrity of the roadway, and/or manage roadway construction activities to maintain the effectiveness of the remedy.

The use restrictions listed below will apply to the roadways and serve as the performance objectives for institutional controls. The use restrictions will be maintained until the remaining hazardous substances are at levels allowing for UUUE.

- Prohibit the development and use of the properties for residential housing, elementary and secondary schools, child care facilities and playgrounds;
- Maintain the physical integrity of the pavement, shoulder, and roadway so that the road bed is not subject to erosion or undercutting that might result in the relocation or dispersion of the soil;
- Prevent construction or maintenance activities such as drilling, boring, trenching, digging, or earth moving in the roadway that could expose, relocate or disburse the soils; or, manage these activities such that the contaminated soils are dispositioned in a manner that is consistent with the objectives of this ROD;
- Ensure continued protectiveness in the event conditions are changed, e.g., roadway relocation or abandonment; and,
- Maintain the integrity of any current or future remedy or monitoring system.

Commonly used devices which might be able to achieve these restrictions include: interagency/intergovernmental agreements with the departments that mange these roadways to restrict the usage, provide access and describe notice requirements; proprietary controls that could limit use, such as easements; informational devices that could serve to notify utility or other workers of the use restrictions will also be used. A more thorough evaluation of possible

institutional control mechanisms, including an analysis of feasibility, implementability and long-term effectiveness, will be conducted as provided in the RD/RA Work Plan.

Rail Lines:

Use restrictions will be implemented at those areas where soil contaminants will remain on the rail beds of active rail lines or spurs at levels exceeding the RGs for UUUE. The restricted areas are portions of the rail lines at the SLAPS Investigation Area (IA)-12, Vicinity Property VP-40A, the Norfolk Southern Rail Line, and active rail spurs on private property found to be contaminated. The areas are shown in Figures 2-14 through 2-18 and volumes are listed in Table 2-13.

The current and reasonably anticipated land use for the active rail lines is transportation. Based on discussions with the railroads and the local land use planning offices, there are no anticipated land use changes, nor are there any plans to replace, remove, or abandon rail lines. Under this land use, the opportunity for exposure to the contaminated soils is limited. For most of these inaccessible locations, current risks are within the CERCLA acceptable risk range using a conservative construction/utility worker exposure scenario, which is considered to represent reasonable maximum exposure under current use. However, construction and utility work could have undesired effects, e.g., migration or relocation of contaminants, and these activities should be restricted or managed at all of the inaccessible locations. Therefore, use restrictions will be necessary to prohibit land uses that are inconsistent with current land use, maintain the physical integrity of the rail bed, and/or manage construction activities to maintain the effectiveness of the remedy.

The use restrictions listed below will apply to the rail lines and serve as the performance objectives for institutional controls. The use restrictions will be maintained until the remaining hazardous substances are at levels allowing for UUUE.

- Prohibit the development and use of the properties for residential housing, elementary and secondary schools, child care facilities and playgrounds;
- Maintain the physical integrity of the rail line, rail bed, and railway so that the soil is not subject to erosion or undercutting that might result in the relocation or dispersion of the soil;
- Prevent construction or maintenance activities such as drilling, boring, trenching, digging, or earth moving on the railway that could expose or disburse the soils; or, manage these activities such that the contaminated soils are dispositioned in a manner that is consistent with the objectives of this ROD;
- Ensure continued protectiveness in the event conditions are changed, e.g., railway relocation or abandonment; and,
- Maintain the integrity of any current or future remedy or monitoring system.

Commonly used devices which might be available to achieve these use restrictions include proprietary controls, such as restrictive covenants and easements, to restrict the usage, provide access and describe notice requirements, and informational devices that could serve to notify

utility or other workers of the use restrictions. A more thorough evaluation of possible institutional control mechanisms, including an analysis of feasibility, implementability and long-term effectiveness, will be conducted as provided in the RD/RA Work Plan.

Other Permanent Structures:

Institutional controls will be required where soil contaminants remain under/on permanent structures such as the Futura Coatings Company buildings. These buildings were built on soil with contamination levels exceeding the RGs for UUUE. Approximately 16,000 cubic yards of inaccessible soil are currently beneath the buildings. The areas are shown on Figures 2-14 through 2-18 and the estimated volumes are included in Table 2-13.

The current and reasonably anticipated land use for the building is commercial/industrial. The risks associated with continued commercial use of Futura Coatings Company buildings are within the CERCLA acceptable risk range. Review of local development plans, existing zoning restrictions and discussions with local land use committees indicate that there are no anticipated land use changes. Use restrictions are necessary to maintain the land use as commercial/industrial and to provide notification in the event of redevelopment.

ICs will be used to implement the land use restrictions. Governmental controls (e.g. zoning restrictions), proprietary controls (e.g., easements and covenants), and information devices (e.g., deed notices) will be evaluated for their effectiveness and durability and applied accordingly.

The use restrictions listed below will apply where soil contaminants remain under/on permanent structures (e.g., the Futura Coatings Company buildings) and serve as the performance objectives for institutional controls. The use restrictions will be maintained until the remaining hazardous substances are at levels allowing for UUUE.

- Prohibit the development and use of the properties for residential housing, elementary and secondary schools, child care facilities and playgrounds;
- Prevent construction or maintenance activities such as drilling, boring, trenching, digging, or earth moving on the property that could expose or disburse the soils; or, manage these activities such that the contaminated soils are dispositioned in a manner that is consistent with the objectives of this ROD;
- Ensure continued protectiveness in the event conditions are changed, e.g., redevelopment; and,
- Maintain the integrity of any current or future remedy or monitoring system.

General IC Provisions:

Use restrictions and land use controls will be maintained until the concentrations of hazardous substances in the soil are at such levels to allow for unrestricted use and unlimited exposure.

The USACE is responsible for implementing, maintaining, reporting on, and enforcing the institutional controls until two years after site closeout in accordance with EPA guidance on

close out procedures for national priority list sites. At that time, these responsibilities will be transferred to the DOE as agreed under the Memorandum of Understanding between the USACE and DOE, dated March 17, 1999. The USACE is responsible for preparing and submitting the Remedial Action Report for EPA review and approval following completion of the remedial action.

Although the USACE and DOE may transfer procedural responsibilities to another party by contract, agreement, or other means, the USACE and DOE shall retain ultimate responsibility for the integrity of the remedy.

Within 15 months of ROD signature, the USACE shall prepare and submit an IC design and implementation plan to EPA for review and approval as part of the Remedial Design and Remedial Action planning process. The IC design and implementation plan shall be a primary document under the FFA or a component of a primary document. The IC design and implementation plan shall identify the specific IC mechanisms necessary to implement the use restrictions described in this ROD and describe the monitoring, maintenance and inspection procedures for each of the ICs.

2.12.2.7 Ground Water

Residual contamination in the shallow ground water at the North St. Louis County sites does not present an exposure concern or threaten the potentially usable ground-water system. Improper drilling or well construction could potentially spread contamination to deeper zones or create pathways for vertical migration. The USACE will ensure that its monitoring wells are properly constructed to preclude such occurrence.

Since there is ready access to the public water supply, it is unlikely any person or business would try to install a water supply well. Missouri regulates the construction of wells pursuant to 10 CSR Chapter 3 Well Construction Code. 10 CSR 3.010(1)(A)4 states that "A well shall be constructed so as to maintain existing natural protection against pollution of water-bearing formations and to exclude all known sources of contamination from the well including sources of contamination from adjacent property." 10 CSR 3.030(2) provides "Minimum Protective Depths of Well Casing. All wells shall be watertight to such depths as may be necessary to exclude contaminants. A well shall be constructed so as to seal off formations that are likely to pose a threat to the aquifer or human health." 10 CSR 3.090(1)(A) states "All persons engaged in drilling domestic wells in Area 1, a limestone or dolomite area, shall set no less than eighty feet (80') of casing, extending not less than thirty feet (30') into bedrock. Example: if sixty feet (60') of residual (weathered rock) material is encountered in drilling before bedrock, then ninety feet (90') of casing must be set." These regulations and regulations for monitoring wells (10 CSR Chapter 4), combine to have the effect of preventing the construction of both water supply and monitoring wells that would allow the vertical spread of contaminated ground water.

2.12.2.8 Monitoring

The final remedy for ground water and surface water is monitoring. Monitoring activities for the Selected Remedy consist of monitoring during the response action and long-term monitoring

at areas where soil contamination remains above RGs for UUUE. Total uranium is the most mobile and soluble of the radiological COCs. The Drinking Water Standard for Total Uranium of 30 µg/L may be used as a monitoring guide for surface water and ground water. Below the monitoring guide, there should be little risk, since the surface water of Coldwater creek and ground water of Units 1 and 2 are not drinking water sources. This concentration is safe for the public because the same concentration is acceptable for drinking water from the tap.

Response-action monitoring will be conducted to assess the improvement of water quality due to source removals. Removal of the source material will prevent the leaching of COCs from soil and sediment to ground water and surface water. In the event that the ground-water monitoring portion of the remedial action indicates the presence of COCs at significantly increased concentrations and total uranium significantly above 30 µg/L, an evaluation of potential response actions would be conducted and an appropriate response would be implemented. Significantly increased concentrations are defined as doubling of an individual COC concentration above the upper confidence level of the mean (based on the historical concentration before remedial activity) for a period of twelve months.

Monitoring of ground water (Unit 2 of HZ-A and Unit 4 of HZ-C), surface water and sediment during the response action at SLAPS, HISS, Futura Coatings Company, and Coldwater Creek will be conducted to ensure that the response action does not impact ground water or surface water. Response-action monitoring of shallow (HZ-A) and deep (HZ-C) wells may continue for a period of up to two years beyond an area's remedial action completion that achieves unrestricted use and unlimited exposure.

Response-action monitoring of HZ-A ground water will be used during the term of remedial action to assess the effects of the remedial action on HZ-A ground-water quality, and potential transport of COCs through HZ-A ground water to Coldwater Creek. Results of response-action monitoring will be used to ensure remedy protectiveness and determine whether long-term monitoring will be required. Low impact to the ground and surface waters is assured when the primary mobile COC for ground water, Total Uranium, has fallen below the mean (temporal) total-uranium concentration of 30 µg/L. While deemed unlikely, continued monitoring for Unit 2 of HZ-A may be required long term if significantly degraded ground-water conditions are found. A significantly degraded ground-water condition requires all of the following: 1) that soil COC concentrations have statistically increased (relative to the wells historic data and accounting for uncertainty) for more than a 12 month period; 2) that the degraded well is close enough to impact Coldwater Creek; and 3) that a significant degrading of Coldwater Creek surface water is anticipated. Monitoring of Coldwater Creek surface water to the present indicates that insignificant COC releases have been occurring. The USACE will review ground-water monitoring results of areas of elevated ground-water organics, which are not COCs, before each area's remedial action. The organics' monitoring is to assure RA worker safety and to prepare for possible treatment of excavation water for TCE or its by-products above disposal limits. Organics' monitoring will not be conducted after remedial action is complete.

Response-action ground-water monitoring of HZ-C, Unit 4, is proposed to document the protection of the limestone aquifer during the response action. Analyses and prior studies

indicate that mixing of the shallow contaminated ground water of HZ-A with ground water of HZ-C has not occurred. Impacts to HZ-C are not anticipated.

Response-action surface-water and sediment monitoring of Coldwater Creek will be conducted until the creek has been remediated to document that remedial actions are having a positive effect on the creek, and to provide additional data to assess whether Coldwater Creek is being measurably affected by COC migration from HZ-A. Surface water has experienced very low impacts from soil COCs.

Long-term monitoring is required to address areas where contaminants remain at levels above the RGs at the Futura Coatings Company and along McDonnell Boulevard. Long-term monitoring includes ground-water and surface-water monitoring and monitoring of radon levels in structures located on inaccessible contaminated soils, such as the Futura buildings.

For the Selected Remedy, long-term monitoring of ground water (HZ-A only) will be performed at Futura buildings and McDonnell Boulevard to assure protectiveness of this action where residual contamination remains and to verify that ground-water and surface-water conditions do not degrade. Excavation and offsite disposal at all properties (except inaccessible areas) removes the need to monitor HZ-C (Unit 4) and HZ-E ground water. Ground-water monitoring would continue until determined to be no longer required as part of the five-year review process. Long-term monitoring may be discontinued when the contamination has low impact (i.e., the mean (temporal) total-uranium concentration is below 30 μg/L). Monitoring that has not met the assurance level of low impact will be continued subject to five-year reviews. Long-term surface-water monitoring of Coldwater Creek would only be required to appraise potential impacts from significantly degraded ground-water conditions. The decision to continue or cease monitoring of HZ-A ground water will be based upon COC concentrations in HZ-A ground water, the well's position at the site, and the anticipated rate of COC delivery to Coldwater Creek.

Excavation perimeter air monitoring will be conducted during excavation activities. Monitoring will consist of both real-time (continuous readout) and time-integrated sampling. Real-time monitoring is conducted for lower exposure limit, oxygen level, particulates, and organic compounds. Time-integrated sampling consists of mid-volume and low-volume samplers for total alpha and total beta measurements. Radon monitoring is conducted to determine whether radon releases are occurring.

Long-term monitoring of radon may be required due to Ra-226 under permanent structures remaining at levels above the RGs. Radium-226 exceeding the concentrations specified in 40 CFR 192.12 has been measured under the southern-most building on the Futura Coatings Company property. As only one sample has been collected under the foundation of the northern building, the potential exists for similar concentrations to exist under this structure. Radon monitoring will be conducted in these two structures to assess whether radon concentrations comply with the relevant and appropriate standards in 40 CFR 192.12(b). These standards state that "in any occupied or habitable building, the objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay

product concentration (including background) not to exceed 0.02 working levels (WL)." Radon emanations will be protectively addressed consistent with this standard.

The radiation standard of 20 microroentgens (μR) per hour, stated in 40 CFR 192.12 for occupied or habitable buildings, corresponds to a concentration of Ra-226 from a six-inch layer of soil of 120 and 150 pCi/g under a four-inch layer of asphalt and concrete, respectively. The concentrations of Ra-226 under a six-inch layer of asphalt and concrete equate to 280 and 400 pCi/g, respectively. Corresponding soil concentrations can be determined for other scenarios on a case-by-case basis based on the amount of shielding provided by the associated cover materials. Protectiveness of inaccessible soils will be assessed by comparison of gamma radiation levels with the 20 μR per hour standard or by calculation of the soil concentration corresponding to the Ra-226 gamma radiation standard when the residual soil concentration data are available.

2.12.2.9 Long-Term Stewardship Plan

The USACE, EPA, MDNR, local landowners, municipalities, utilities, the St. Louis Oversight Committee and DOE will work together to develop a long-term stewardship plan. The plan will identify the full scope of site activities and responsibilities necessary to assure that the remedy remains protective of human health and the environment over the long term. The long-term stewardship plan will address 1) site monitoring, maintenance, and reporting; 2) the implementation and maintenance of institutional controls; 3) information and records management; and 4) enforcement. Due to shared responsibility, the plan will be implemented under the terms of a Memorandum of Understanding between USACE and DOE.

2.12.2.10 Five-Year Reviews

Hazardous substances will remain on-site under portions of roads, active rail lines, and other permanent structures above levels that allow for unlimited use and unrestricted exposure. Therefore, a statutory review will be conducted within five years after initiation of the remedial action and at least once every five years thereafter to ensure that the remedy is, or will be, protective of human health and the environment. The five-year review process will continue until MED/AEC-related hazardous substances, pollutants, or contaminants no longer remain on the North St. Louis County sites above levels that allow for unlimited use and unrestricted exposure. If the five-year review indicates that the remedy is no longer protective, due to loss or failure of institutional controls, the facts will be evaluated and appropriate response measures will be taken.

2.12.2.11 Treatment

The Selected Remedy uses treatment technologies to the extent possible given the nature of the contaminants (radiological contaminants in soil/sediment, in soil dust on structures and in ground water that enters excavation areas.) Treatment of soil and sediment was found to be impracticable for the radiological contaminants that are the principal contaminants of concern at the North St. Louis County sites. However, some treatment methods will be utilized as a secondary element of the Selected Remedy. Removal of soil radiological contamination from

structure surfaces would use treatment technologies. Physical methods (vacuuming, scrubbing, scraping, sanding, scabbling, etc.) and chemical methods (solvents, complexing agents, acids, etc.) would be used to remove surface soils. Such methods would reduce the volume of material to be handled for off-site disposal. In addition, feasible methods to treat water to reduce toxicity due to radiological contaminants also exist. Because the remediation of ground water is not required for this remedial action, only ground water that comes into contact with contaminated material in excavation areas will be addressed. Ground water that comes into contact with excavation areas will be removed and, if required, treated to meet discharge criteria or the pre-treatment standards of the receiving POTW prior to release thereby reducing the toxicity of the water discharged from the site.

Water encountered during excavation activities will be managed in accordance with water management plans developed as part of the remedial action design and work plans. Water that meets the NPDES criteria specified in Table 2-17 may be discharged into Coldwater Creek. Water that exceeds the NPDES criteria specified in Table 2-17 will either be discharged through a publicly owned treatment works (POTW) or treated as appropriate.

2.12.3 Estimated Remedy Cost

The total cost for the Selected Remedy was evaluated based on the best available information and over a 30-year costing period. The total cost for the Selected Remedy is $274.3 million. Costs for performing removal actions under the EE/CA and Action Memoranda, as well as other previous costs incurred, are not included in the cost estimate nor are costs included for monitoring and five-year reviews beyond the 30-year costing period. The capital, annual, and total present worth costs for the duration of the evaluation period (30 years) and the discount rate (7 %) are provided in Table 2-15 and Table 2-16.

It should be noted that the information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Table 2-15 provides the cost estimate for the Selected Remedy and takes into account new information that was not available at the time the cost estimates were prepared for the Feasibility Study. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the Administrative Record, an Explanation of Significant Differences (ESD), or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

Table 2-15. Costs for the Selected Remedy

Account No.	ITEM	QUANTITY	UNIT	UNIT PRICE	ESTIMATED AMOUNT
01XXX	REAL ESTATE ANALYSIS/DOCUMENTS				
G	Rights of Entry/Temporary Permit/ICs	1	LS		507,000
32XXX	PROJ. MANG. & PRE-REMEDIAL ACTION				
10	Project Management	1	LS		4,728,000
20	Investigation (PRP)	1	LS		1,576,000
30	Remedial Design	1	LS		17,337,000
40	Remedial Action Contracting	1	LS		1,576,000
331XX	HTRW REMEDIAL ACTION (CONSTRUCT)				
01	Mobilize and Preparatory Work	1	LS		409,000
02	Monitoring, Sampling, Test & Analysis	1	LS		12,878,000
03	Site Work	1	LS		6,469,000
05	Surface Water Collect & Control	1	LS		3,358,000
08	Solids Collect and Containment	1	LS		4,713,000
19	Transportation and Disposal (Commercial)	1	LS		129,174,000
20	Site Restoration	1	LS		211,000
21	Demobilization	1	LS		396,000
332XX	ENGINEERING DURING CONTRUCTION				
01	Engineering During Construction	1	LS		1,576,000
333XX	CONSTRUCTION MANAGEMENT				
01	Construction Management	1	LS		9,456,000
34XXX	POST-REMEDIAL ACTION				
20	Operation, Maintenance, & Monitoring	1	LS		10,339,000
	Includes enforcement of Institutional Controls				
			SUBTOTAL:		$204,703,000
			CONTINGENCIES:		$36,426,000
			ESCALATION:		$33,130,000
			TOTAL COST		**$274,259,000**

Table 2-16. Present Worth Analysis for the Selected Remedy

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	52,207		52,207	0.935	39,346
2	52,207		52,207	0.873	36,772
3	52,207		52,207	0.816	34,366
4	52,207		52,207	0.763	32,118
5	52,207		52,207	0.713	30,017
6		529	529	0.666	3,728
7		529	529	0.623	3,484
8		529	529	0.582	27
9		529	529	0.544	25
10		529	529	0.508	29
11		529	529	0.475	22
12		529	529	0.444	21
13		529	529	0.415	20
14		529	529	0.388	18
15		529	529	0.362	21
16		529	529	0.339	16
17		529	529	0.317	15
18		529	529	0.296	14
19		529	529	0.277	13
20		529	529	0.258	15
21		529	529	0.242	11
22		529	529	0.226	11
23		529	529	0.211	10
24		529	529	0.197	9
25		529	529	0.184	11
26		529	529	0.172	8
27		529	529	0.161	8
28		529	529	0.150	7
29		529	529	0.141	7
30		529	529	0.131	7
Total	**261,035**	**13,225**	**274,260**		**218,454**

* 7.0% Discount rate is in accordance with NCP (55 FR 8722)
Total cost only includes costs incurred for 30-year project duration

2.12.4 Expected Outcome of the Selected Remedy

There are two site scenarios resulting from the Selected Remedy: 1) unlimited use and unrestricted exposure in those areas where contaminated soils and sediment are removed and 2) restricted use of those areas where contamination is not accessible and will remain in place.

Unlimited use and unrestricted exposure areas would include accessible areas at SLAPS, SLAPS VPs, and the Latty Avenue Properties where remediation achieves surface soil, subsurface soil and sediment RGs as identified in Section 2.8.2 of this document. For these areas, there would be no limitations on future land use. As these areas would no longer be contaminated, an increase in property values is possible.

Inaccessible restricted-use areas would include areas under roads, active rail lines, bridges and other permanent structures where soil contaminated above surface and subsurface soil RGs would remain. Anticipated areas meeting this condition are identified in Table 2-13 and Figure 2-14. To assure continued protection of human health and the environment over baseline conditions, institutional controls to limit direct access to contamination and to restrict land use would be implemented. Future land use would be limited to current uses (i.e., commercial/industrial and transportation/utility corridors). Institutional controls would also limit intrusive activities in these areas.

2.13 STATUTORY DETERMINATIONS

Under CERCLA §121(b) and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements, are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the Selected Remedy meets these statutory requirements.

2.13.1 Protection of Human Health and the Environment

The Selected Remedy will protect human health and the environment through the removal of accessible soil and Coldwater Creek sediment contaminated with COCs above site RGs followed by disposal in a properly permitted disposal facility. In addition, for areas where soils contaminated with COCs above site RGs are not accessible due to the presence of buildings, roads, bridges, active rail lines, pavement or other permanent structures, the Selected Remedy requires implementation of institutional controls that limit land use and intrusive activities such as drilling and excavation to assure continued protectiveness in their current configuration.

Soil and sediment removal will reduce or eliminate the potential risks due to exposure to external gamma radiation; inhalation or ingestion of contaminated soil or sediment; dermal contact with contaminated soil and sediment; radon gas emissions; and wind dispersal of fugitive dust. Removal of soil from structure surfaces will reduce or eliminate the potential risks due to

exposure to gamma radiation, inhalation or ingestion of contaminated soil dust and dermal contact with contaminated soil dust.

Removal of the source material will prevent the leaching of COCs from soil and sediment to ground water and surface water. This will reduce potential risks due to dermal contact, inhalation or ingestion of surface water and ground water.

Implementation of institutional controls will also control risk. Where soils above RGs are inaccessible, institutional controls to prevent intrusive activities, such as restrictions on drilling and excavation, will be implemented. These controls will ensure that the current structure which precludes accessibility to the contaminants remains in place and that potential contaminant migration pathways are not created. Maintenance of existing structures will control the threat of exposure to COCs above RGs via external gamma radiation, inhalation or ingestion of contaminated soil, and direct dermal contact with contaminated soil. Restrictions, particularly on drilling, will prevent the downward migration of contaminants to ground water. This will reduce potential risks due to dermal contact, inhalation and ingestion of ground water. Radon monitoring and mitigation will be conducted as necessary in appropriate buildings at Futura Coatings Company to assure that radon concentrations comply with relevant and appropriate standards.

The removal of soils and sediment to RGs (from accessible areas) and application of institutional controls (at inaccessible areas) will achieve a total residual site risk that is within the CERCLA risk range (10^{-6} - 10^{-4}) and a Hazard Index of less than 1.0. Those areas where soils and sediment are removed to achieve the RGs specified in this ROD will meet the unlimited use and unrestricted exposure requirements.

In general, the long-term protectiveness is high and commensurately reliable. However, at roads, bridges, active rail lines, and other permanent structures, long-term protectiveness requires that institutional controls be maintained to prevent exposure.

The remedy does not pose unacceptable short-term risks. Because the remedy involves excavation and disposal of various volumes of contaminated soil off-site, it has short-term risks to the community associated with construction and transportation activities, but the risks are small and can be controlled.

Achievement of RGs will be fully documented using final status surveys that are compatible with MARSSIM. MARSSIM will be used to develop final status survey plans for the North St. Louis County sites that will, in turn, be used to demonstrate compliance with radiological criteria. 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. A post-remedial action risk assessment will be performed upon completion of excavation to describe the level of residual risk from COCs following completion of remedial activities.

2.13.2 Compliance with Applicable or Relevant and Appropriate Requirements

The Selected Remedy is fully complaint with the ARARs. Under the Selected Remedy, accessible soil and sediment will be remediated to the RGs. The RGs were developed pursuant

to ARARs and are relevant and appropriate to all accessible soils. The RGs are fully protective of human health and the environment, and achieve residual conditions consistent with UUUE. Institutional controls will be used to maintain risks within the CERCLA risk range at inaccessible areas where COCs remain at levels above unlimited use and unrestricted exposure criteria.

40 CFR 192.21(c) is ARAR for the inaccessible soils component of the Selected Remedy. This ARAR provides for the development and application of supplemental standards when "the estimated costs of remedial action to satisfy §192.12(a) at a "vicinity" site ... is unreasonably high relative to the long-term benefits, and the residual radioactive materials do not pose a clear present or future hazard." The use of supplemental standards and institutional controls is considered appropriate for inaccessible soils under roads, active rail lines, and other permanent structures that are fully protective in their current configuration.

Table 2-17. ARARs for the North St. Louis County Sites Selected Remedy

ARAR	Citation	Specific Requirements	Applicability or Relevance and Appropriateness to North St. Louis County Sites Selected Remedy
40 CFR Part 192 Subpart A: Uranium Mill Tailings Radiation Control Act (UMTRCA), Standards for Control of Residual Radioactive Materials from Inactive Uranium Processing Sites	*40 CFR 192.02 (a)*	The standards in 192.02 (a) requires that control of residual radioactive materials will "be effective for up to 1000 years, to the extent reasonably achievable, and, in any case, for at least 200 years..." The 1000-year time period specified in 192.02(a) is relevant and appropriate for the development of soil RGs.	Relevant and appropriate. The RG for Th-230 accounts for ingrowth of Ra-226 over 1000 years.
40 CFR Part 192 Subpart B: UMTRCA, Standards for Cleanup of Land and Buildings Contaminated with Residual Radioactive Materials from Inactive Uranium Processing Sites	*40 CFR 192.12 (a), (b)*	*192.12 (a)* specifies that Ra-226 concentrations shall not exceed 5 pCi/g above background in top 15 cm and 15 pCi/g above background in lower 15 cm layers averaged over 100 m^2 areas. *192.12 (b)* specifies limitations for gamma radiation and radon level in occupied or habitable buildings.	The standards for residual Ra-226 are relevant and appropriate for all accessible soils. The gamma and radon limitations are relevant and appropriate to occupied buildings, i.e., Futura Coatings Company buildings.
40 CFR Part 192 Subpart C: UMTRCA, Implementation	*40 CFR 192.20 (a) (1,3); (b) (1, 2, 3); 192.21 (a-f, h); 192.22 (a-c)*	Subpart C allows the use of supplemental standards for establishing alternate limits in lieu of the standards of Subparts A or B if it is determined that circumstances set forth in 40 CFR 192.21 exist. Supplemental standards for subsurface soil used with institutional controls are appropriate under the circumstance set forth in 40 CFR 192.21 (c) which allows the use of supplemental standards if "the estimated cost of remedial action to satisfy § 192.12(a) is unreasonably high relative to the long-term benefits, and the residual radioactive materials do not pose a clear present or future hazard."	Supplemental standards are relevant and appropriate to the inaccessible soils and current concentrations constitute appropriate alternate limits.

Table 2-17. ARARs for the North St. Louis County Sites Selected Remedy (Cont'd)

ARAR	Citation	Specific Requirements	Applicability or Relevance and Appropriateness to North St. Louis County Sites Selected Remedy
10 CFR 40 Appendix A Criterion 6(6) Criteria for Disposal of Wastes from Processing Source Material	*10 CFR 40 Appendix A Criterion 6(6)*	Criterion 6(6) requires that byproduct material containing concentrations of radionuclides other than radium in soil, and surface activity on remaining structures, must not result in a total effective dose equivalent (TEDE) exceeding the dose from cleanup of radium contaminated soil to the above standard (benchmark dose), and must be at levels which are as low as is 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). Provides basis for the derivation of RGs for radionuclides other than Ra-226.	These are relevant and appropriate to structures and accessible soils. This approach was used to derive soil RGs for radionuclides other than Ra-226 and DCLGs for structures.
40 CFR Part 122, Clean Water Act – National Pollutant Discharge Elimination System (NPDES)	*40 CFR 122 Subpart C: δ122.41(d, e) δ122.44(a, d, e, i)*	Establishes limits for discharge of pollutants into waters of the state. Any water discharged from a point source into waters of the state must meet any limits that would have been established in the NPDES permit. The substantive requirements in the NPDES permit equivalent for SLAPS, dated 10/2/1998, are ARAR for the North St. Louis County sites. The effluent limits (daily maximum and monthly average concentrations) addressing site COCs for the North St. Louis County sites are: 100 μg/L total recoverable arsenic 94 μg/L total recoverable cadmium 280 μg/L total recoverable chromium.	Relevant and appropriate to onsite discharges. Will comply with substantive requirements.
40 CFR Part 61, Subpart I: National Emission Standards for Radionuclide Emissions from Federal Facilities Other Than Nuclear Regulatory Commission Licensees and Not Covered by Subpart H	40 CFR 61.102(a)	Emissions of radionuclides to the ambient air shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr.	Relevant and appropriate during cleanup activities. The requirement is not ARAR for airborne emissions from residual contamination after cleanup.
10 CSR Division 23, Chapter 4: Monitoring Well Construction Code	10 CSR 23-4.030 through 10 CSR 23.04.080	Identifies substantive requirements related to the construction, operation, maintenance, and plugging of monitoring wells.	Applicable. Will comply with substantive requirements.

2.13.3 Cost Effectiveness

In the lead agency's judgment, the Selected Remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (NCP Section 300.430 (f)(1)(ii)(D). This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of this Selected Remedy was determined to be proportional to its costs and hence this alternative represents a reasonable value for the money to be spent.

The estimated total cost of the Selected Remedy is $274,259,000.

Although more expensive than Alternatives 1 ($1.5M) and 2 ($205M) the Selected Remedy achieves significantly greater long-term effectiveness and permanence than Alternative 2, which includes consolidation and capping of soils at SLAPS and does not remove source material. The USACE believes that the Selected Remedy's additional cost for excavation and off-site disposal provides a significant increase in protection of human health and the environment and in overall effectiveness of the remedy.

The USACE does not believe that the additional costs of Alternatives 3 and 6 are warranted. The additional costs due to soil washing and sorting as part of Alternative 3 ($284) do not achieve a reduction in the toxicity of radiological contaminants in soil and sediment or reliably reduce volume or mobility of radiological contaminants in soil and sediment for the specific conditions (e.g. clay soils) found at the North St. Louis County sites. The costs of the additional excavation under roads, bridges, active rail lines, and structures called for under Alternative 6 ($286M) are not justified by a commensurate reduction in risk. The shielding provided by existing roads, bridges, active rail lines, and permanent structures at Futura Coatings Company effectively reduces risk while the nature of the ownership of these few specific properties represents a fairly confident level of successful maintenance of institutional controls. On the other hand, the costs and short-term risks associated with excavating these areas are high. The Selected Remedy's implementation of institutional controls for these areas will provide an overall level of protection comparable to Alternative 6 at a significantly lower cost.

2.13.4 Utilization of Permanent Solutions And Alternative Treatment Technologies to the Maximum Extent Possible

USACE has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the site. Of those alternatives that are protective of human health and the environment and comply with ARARs, USACE has determined that the Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference

for treatment as a principal element to the maximum extent possible and considering State and community acceptance. The Selected Remedy satisfies the CERCLA Section 121 (b) statutory preference for using permanent solutions to the extent practicable.

The Selected Remedy uses treatment technologies to the extent possible given the nature of the contaminants (radiological contaminants in soil/sediment, in soil dust on structures and in ground water that enters excavation areas.) Treatment of soil and sediment was found to be impracticable for the radiological contaminants that are the principal contaminants of concern at the North St. Louis County sites.

The Selected Remedy has slightly less short-term risk than Alternative 3, which involves soil washing and sorting. Implementation of such technologies would require additional handling of materials and would increase the potential for exposure of on-site workers, while not achieving a commensurate reliable reduction in toxicity, mobility or volume. The Selected Remedy does not present short-term risks different from the other treatment alternatives.

There are no special implementability issues associated with the Selected Remedy. It is technically and administratively feasible.

2.13.5 Preference for Treatment as a Principal Element

The remedy does not satisfy the statutory preference for treatment as a principal element of the remedy (NCP §300.430(f)(5)(ii)(F)). The potential to achieve lower cleanup goals and higher long-term effectiveness and permanence at a significantly lower cost supports the selection of Alternative 5 over the treatment alternative (Alternative 3). Phytoremediation, soil washing, and soil sorting were evaluated and found to be ineffective at this time for the types of wastes present at the North St. Louis County sites. Soil washing as a means of extracting radioactive materials from soils has not, to date, been effective in removing significant radionuclides from fine particle soils (e.g. clays). In addition, phytoremediation has been of very limited use in extracting MED/AEC radiological COCs from soils.

2.13.6 Five-Year Review Requirements

NCP §300.430(f)(4)(ii) states that if the Selected Remedy "results in hazardous substances, pollutants, or contaminations remaining on-site above levels that allow for unlimited use and unrestricted exposure" a five-year review is required. The five-year review assesses the protectiveness of the Selected Remedy. USACE will be responsible for five-year reviews at the North St. Louis County sites until transfer to DOE.

2.14 DOCUMENTATION OF SIGNIFICANT AND OTHER CHANGES FROM THE PREFERRED ALTERNATIVE OF THE PROPOSED PLAN

The Proposed Plan was released for public comment in May 2003. It identified Alternative 5 – excavation with institutional controls under roads, bridges, rail lines, and other permanent structures – as the preferred alternative for remediation of properties in the North St. Louis County sites that have been impacted by contaminants resulting from uranium manufacturing

and processing activities conducted during the early years of the nations' atomic energy program. USACE has reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

Additional information has been provided in the ROD to clarify how permanent structures left in-place will be remediated. These refinements have no significant effect on the remedy. Radon monitoring and mitigation will be conducted as necessary in appropriate buildings to assure that radon concentrations comply with relevant and appropriate standards [40 CFR 192.12(b)]. This is a minor change from the preferred remedy stated in the Proposed Plan and described in the Feasibility Study, which only retained radon monitoring as a component of the remedy. The change was implemented to address the potential for radon decay product concentration (including background) exceeding 0.03 working levels or the annual average (or equivalent) for radon decay product concentration (including background) exceeding 0.02 working levels. In addition, the ROD clarifies and identifies the remediation goals (i.e. DCGLs) developed in accordance with relevant and appropriate standards [10 CFR 40, Appendix A, Criterion 6(6) and 40 CFR 192, Sections 192.12, 192.20, and 192.21] and describes the type of decontamination technologies that may be used to remove radiological contamination from impacted structures. This information supplements the information provided in the Feasibility Study, which retained decontamination technologies as an ancillary technology if building decontamination was discovered during the cleanup process. The ROD includes additional details related to the remediation of structures that will be left in-place in response to public comments seeking additional information.

Additional information has also been provided in the ROD describing the remedy for inaccessible soils. This information has no significant effect on the remedy. Inaccessible soils are those soils under roads, bridges, active rail lines, buildings and permanent structures that exceed remediation goals but are protective in their current configuration. Inaccessible soils will not be excavated under the ROD, but will be managed in-place with institutional controls. Additional information describing the location and expected volume of inaccessible soils has been included in the ROD. In addition, the ROD identifies the supplemental standard developed in accordance with relevant and appropriate standards [40 CFR 192.12(b) and 192.21(c)], which will be used to confirm that inaccessible soils are protective in their current configuration. The ROD includes additional details related to inaccessible soils in response to public comments seeking additional information.

The ROD also includes a cost estimate for the Selected Remedy in Section 2.12.3. Cost estimates were prepared in November 2002 and April 2003 for each alternative and were included in the Feasibility Study at Appendix C. For the purposes of evaluating the alternatives and selecting the final remedy, the costs documented in the Feasibility Study were considered. Each of the cost estimates documented in the Feasibility Study was based on similar assumptions and facts. Section 2.12.3 provides the cost estimate for the Selected Remedy and takes into account new information that was not available at the time the cost estimates were prepared for the Feasibility Study. The new information has no significant effect on the selection of the remedy and does not result in a significant change in costs from the preferred remedy stated in the Proposed Plan and described in the Feasibility Study. The cost estimate for the Selected Remedy more accurately

reflects costs associated with construction, transportation, and disposal due to increased costs and fees. The cost estimate also more accurately documents costs associated with implementing and enforcing institutional controls. The cost estimate for the Selected Remedy was provided in Section 2.12.3 for the purpose of preparing a more complete and accurate record of the selection of the final remedy.

FIGURES

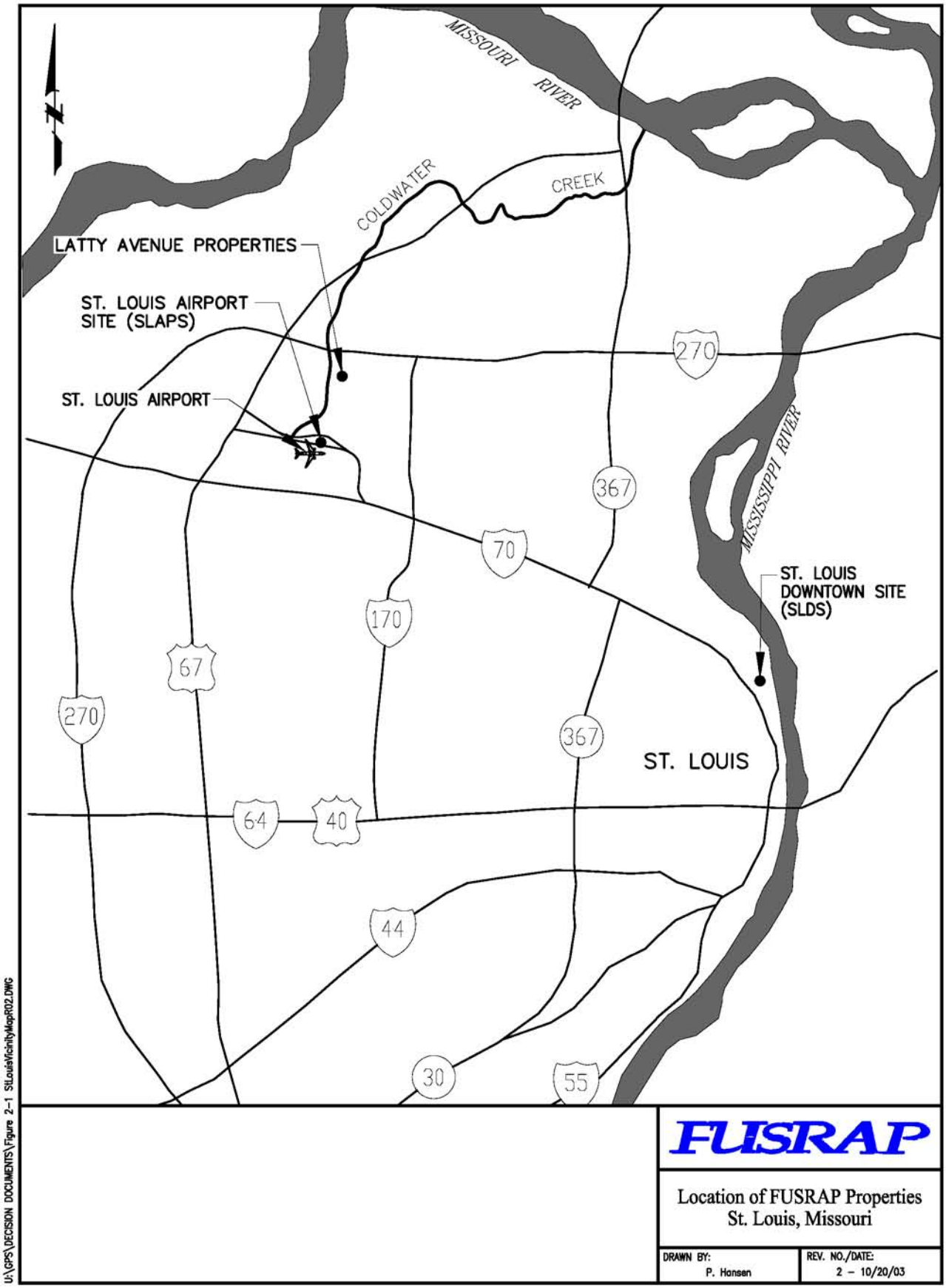

Figure 2-1. Location of Key FUSRAP Properties in the St. Louis, Missouri Area

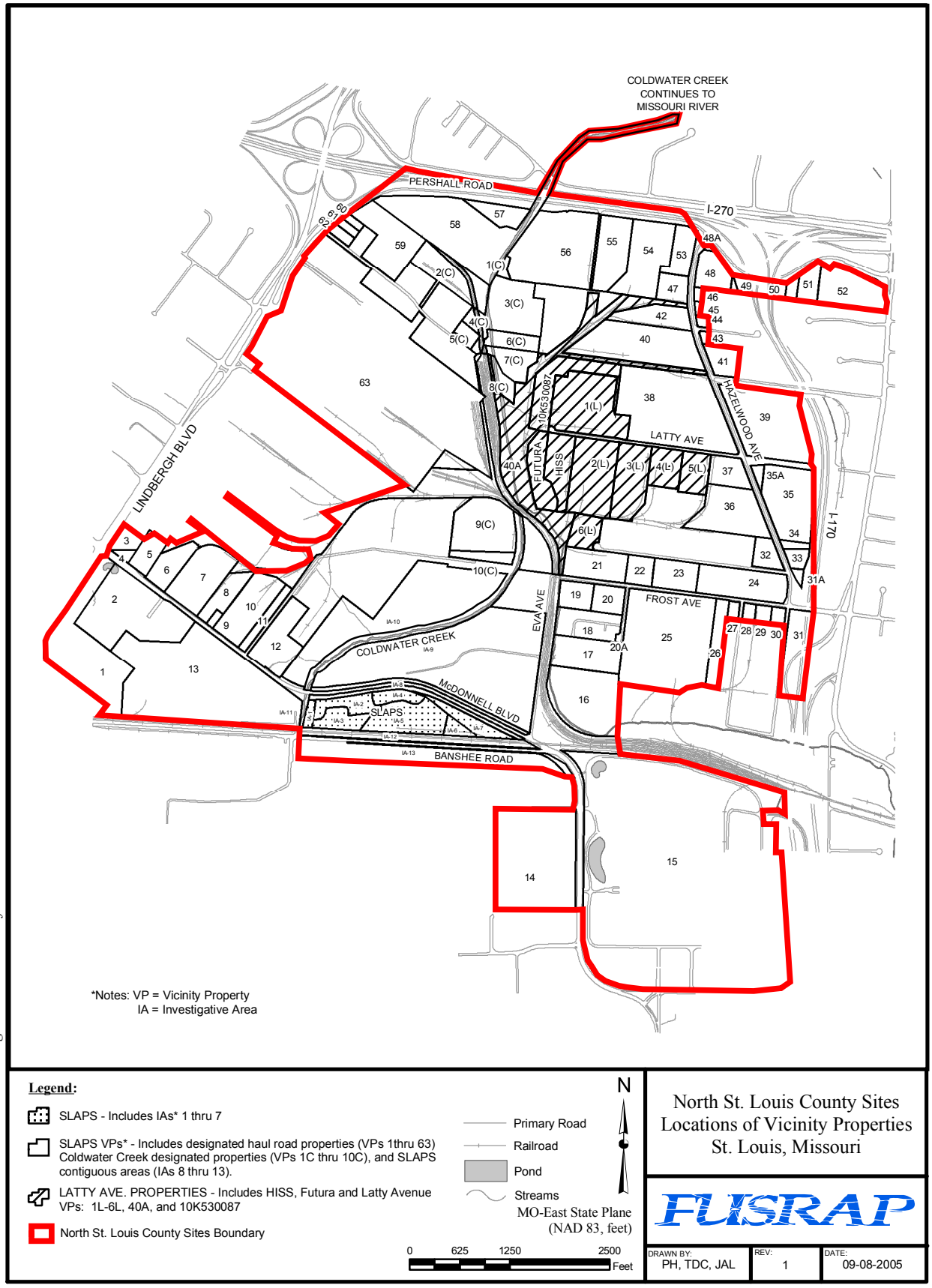

Figure 2-2. Locations of Vicinity Properties

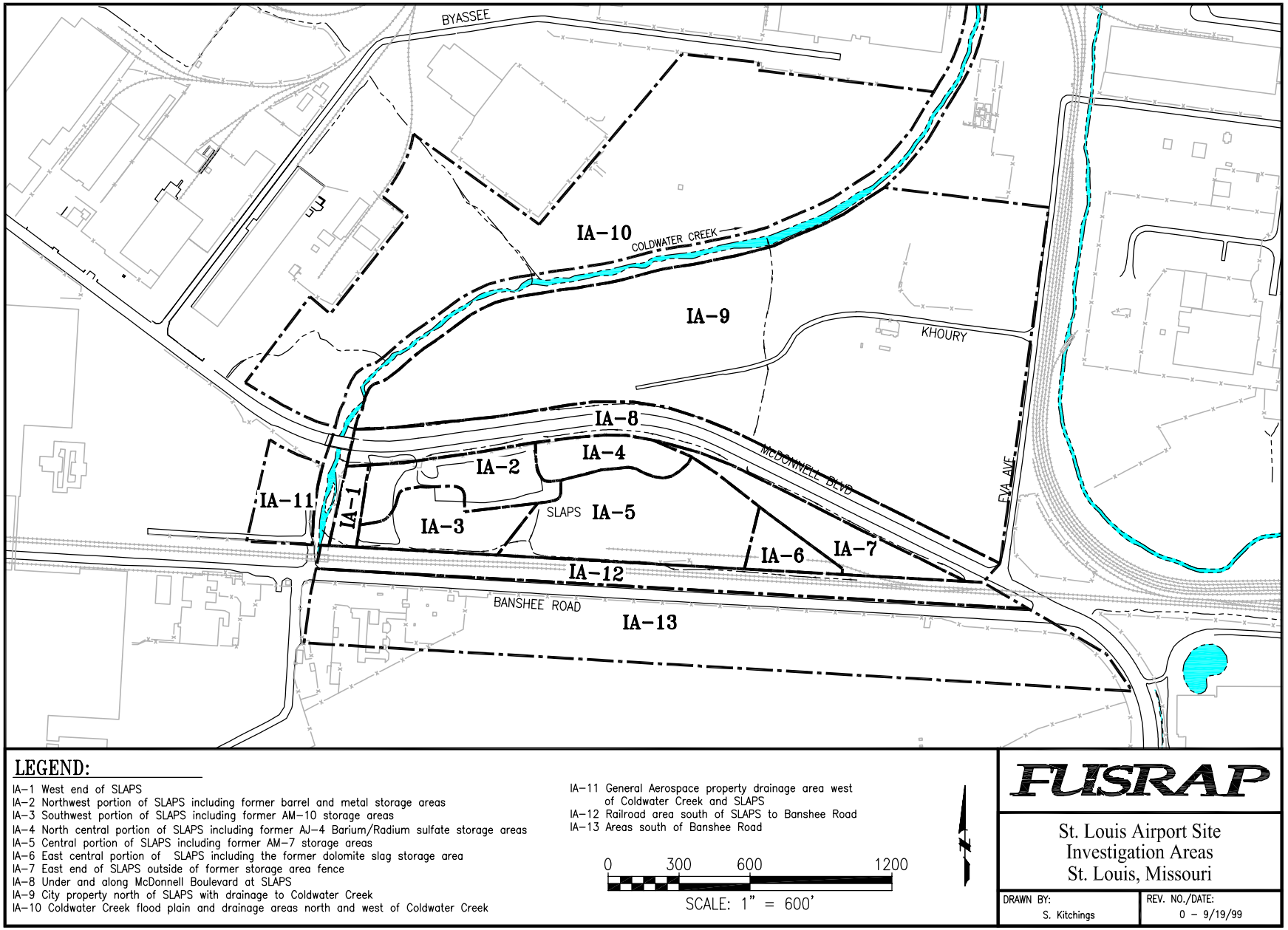

Figure 2-3. Investigation Areas for SLAPS and Contiguous Properties

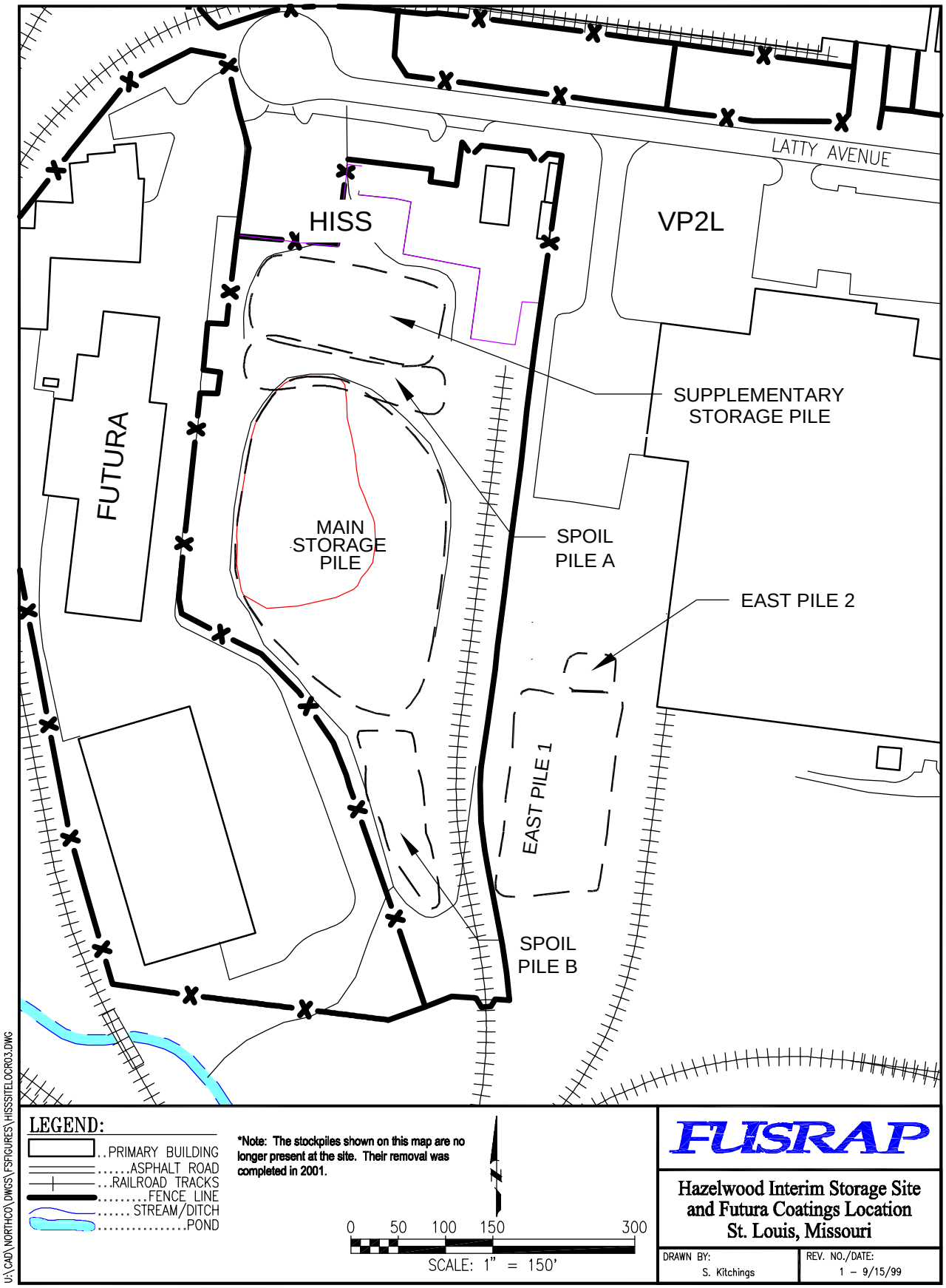

Figure 2-4. Location of Hazelwood Interim Storage Site (HISS) and Futura Coatings Property

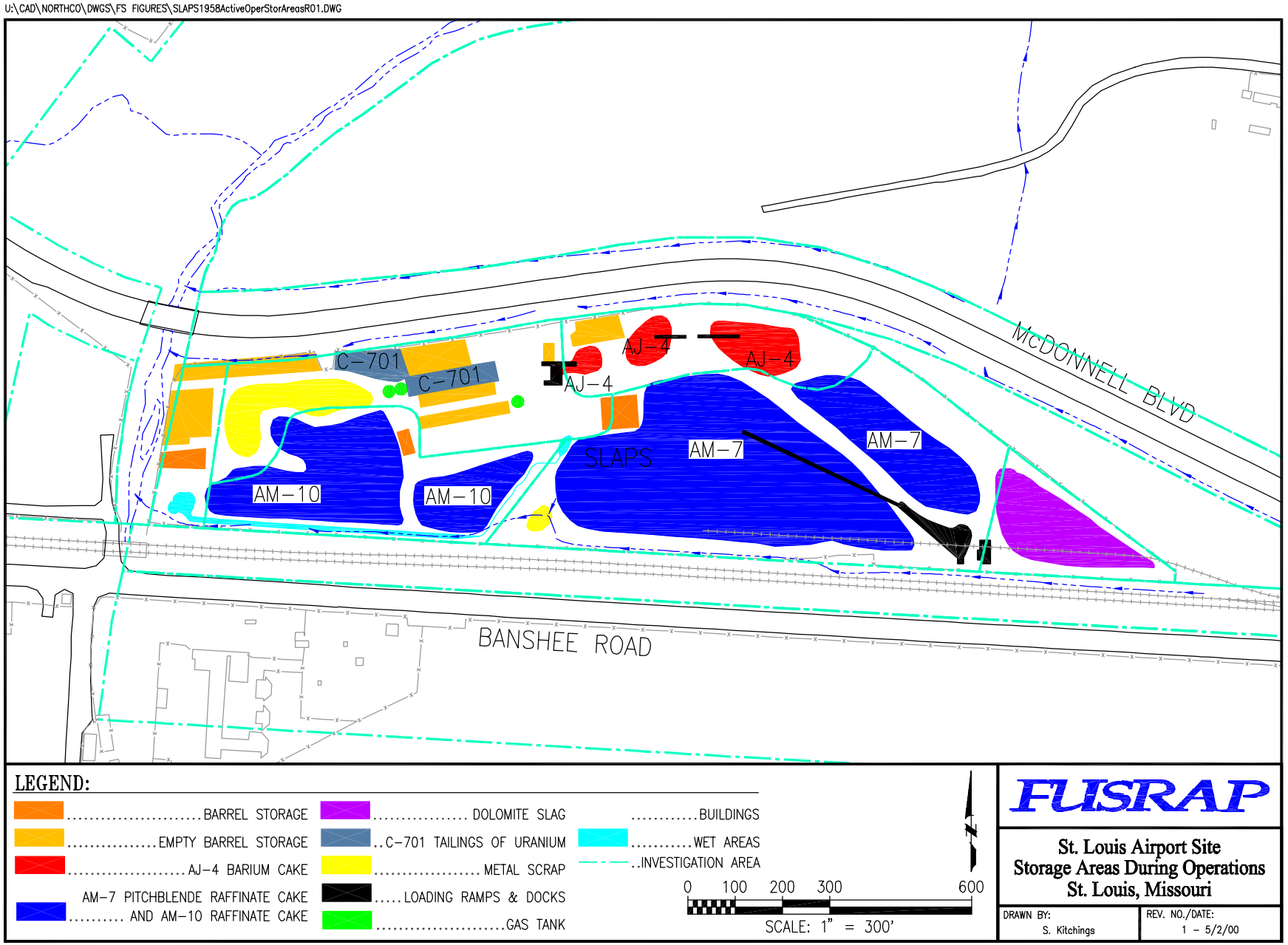

Figure 2-5. Schematic of Storage Areas During Active Operations at SLAPS - Circa 1958

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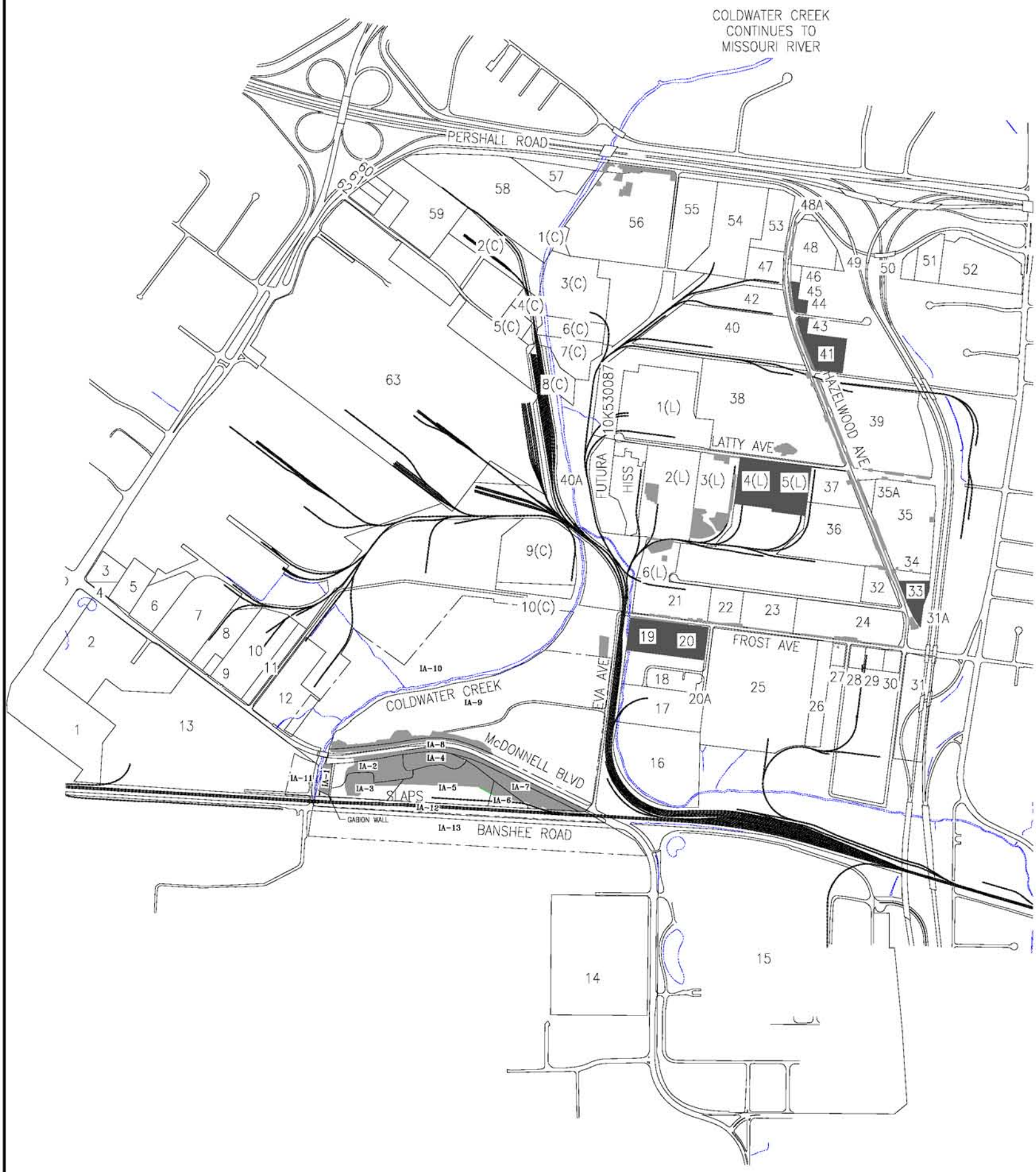

Figure 2-6. Location of Prior Response Actions within the North St. Louis County Sites

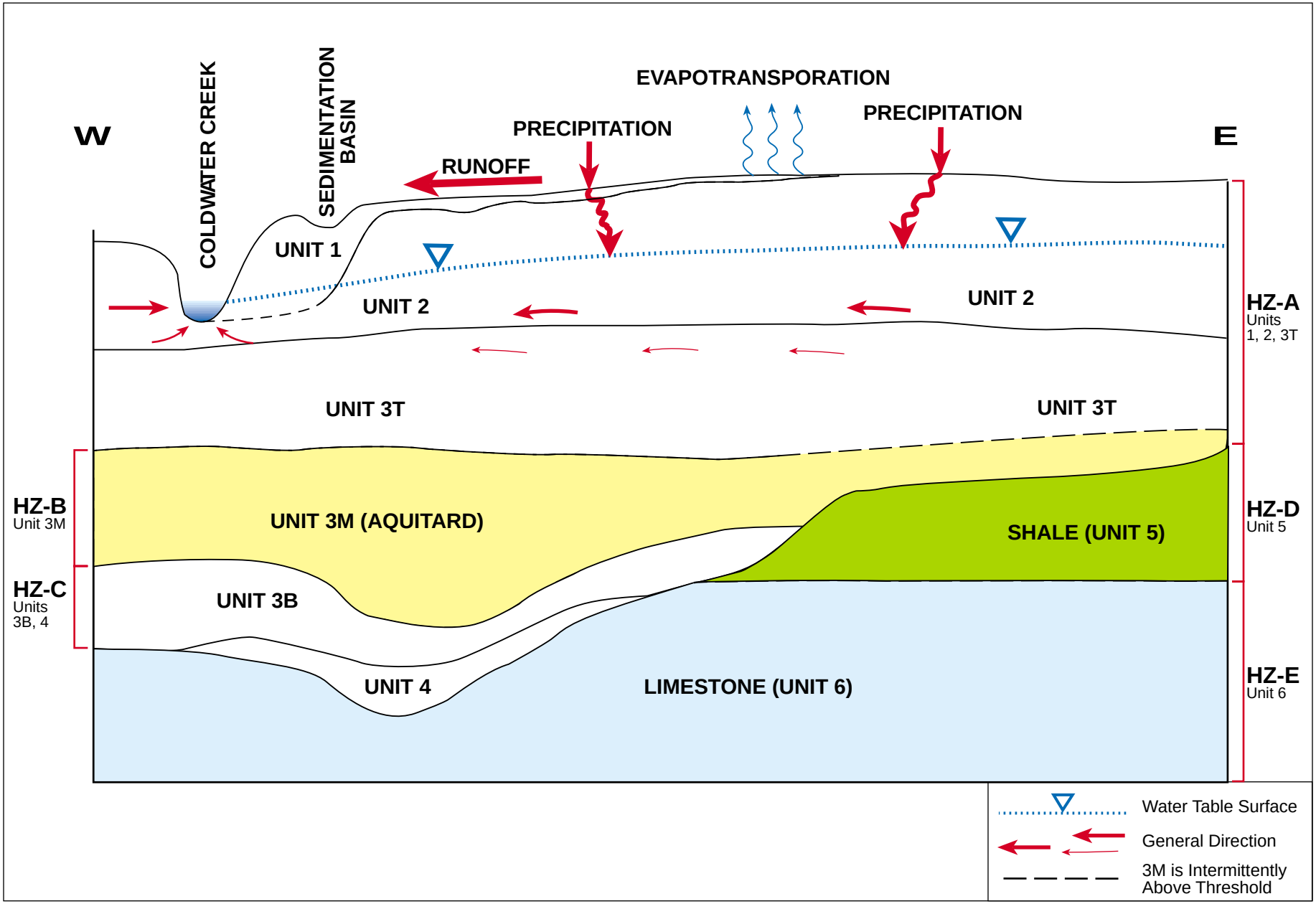

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Figure 2-7. Conceptual Model of Ground-Water Flow at SLAPS Showing Stratigraphic Units and Hydrostratigraphic Zones (HZs).

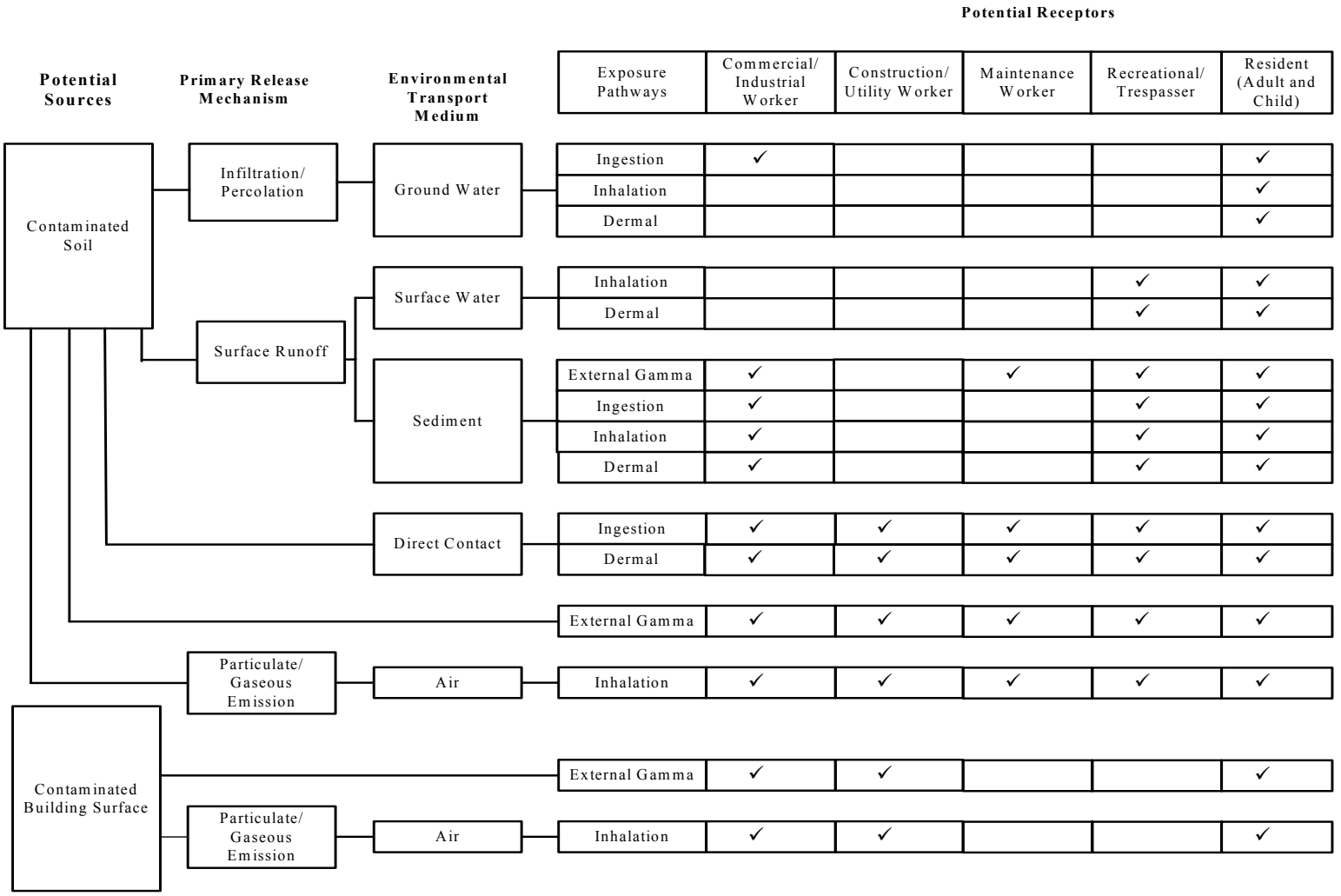

Figure 2-8 Conceptual Site Model

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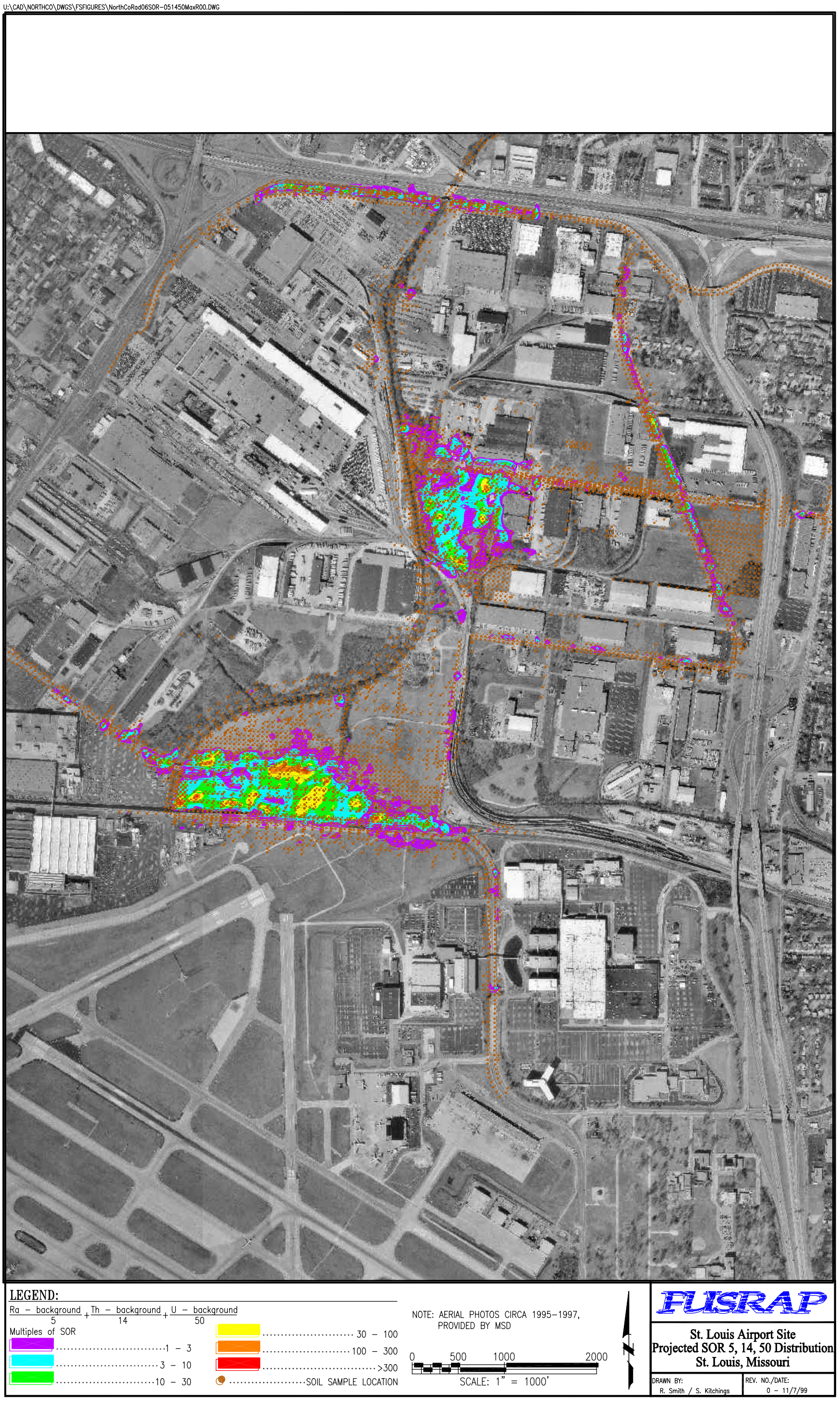

Figure 2-9. Exent of Radiological Contamination in Surface and Subsurface Soil at the North St. Louis County Sites

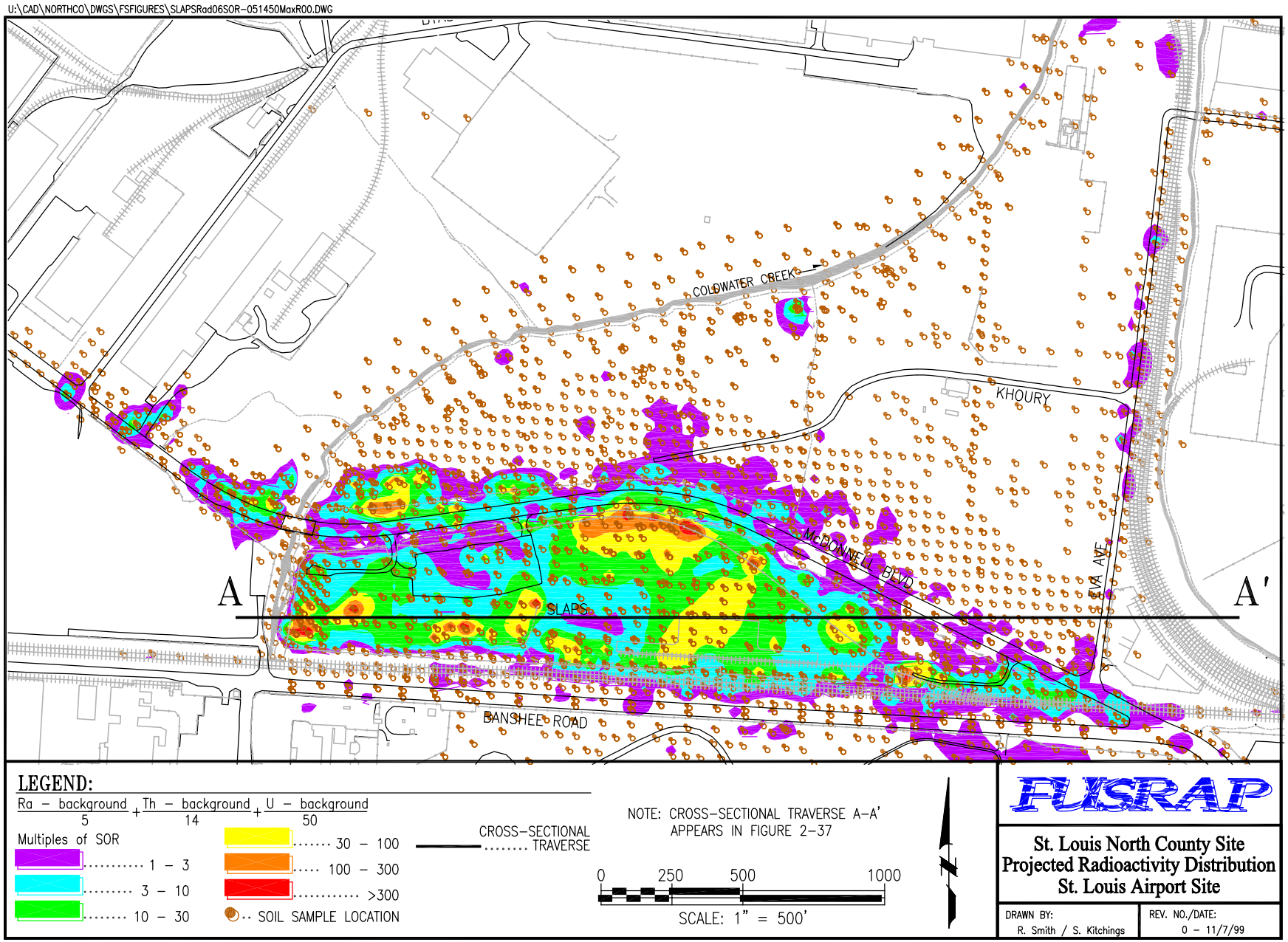

Figure 2-10. Extent of Radiological Contamination at SLAPS

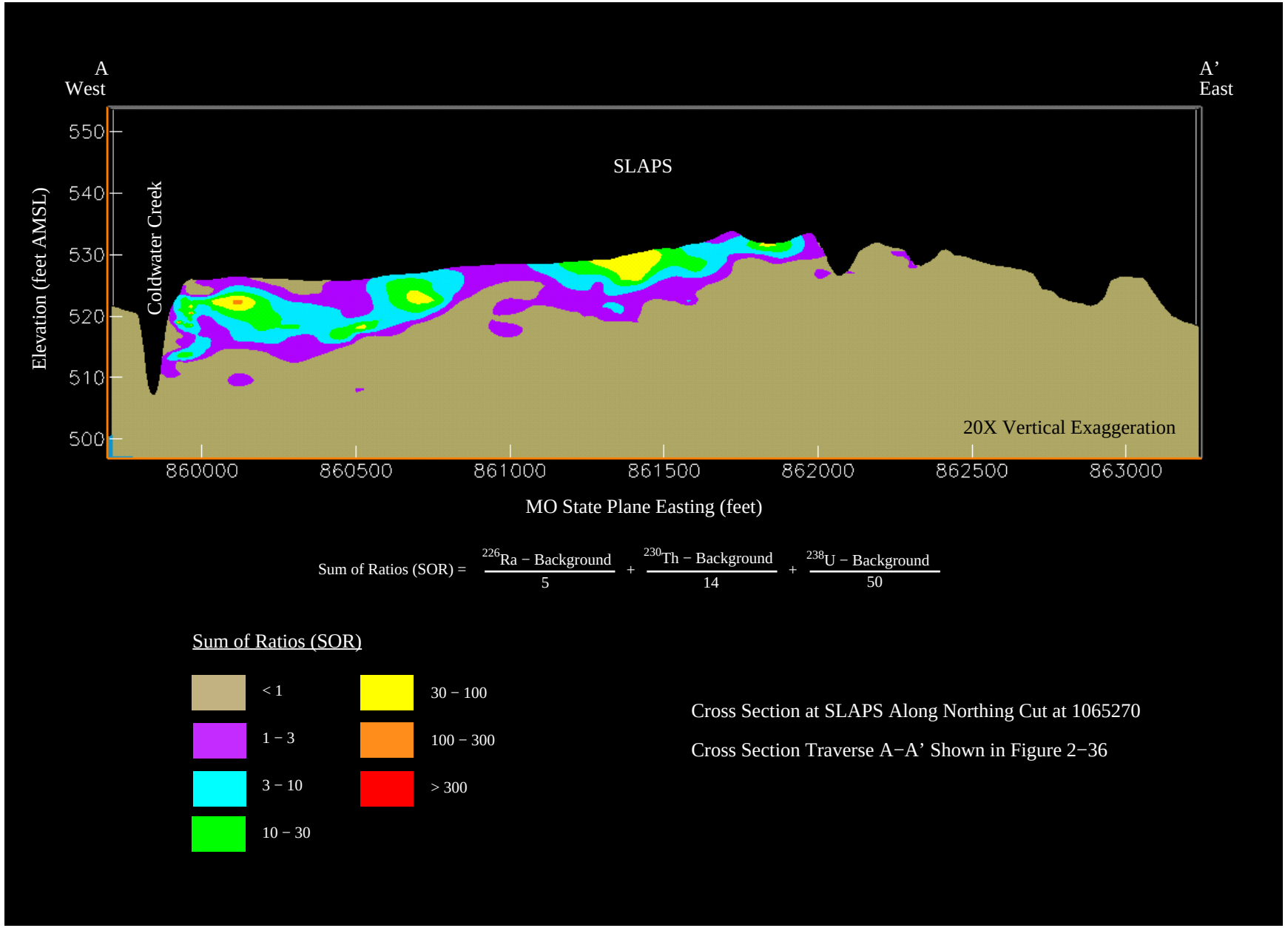

Figure 2−11. Cross Section at SLAPS of Projected Radioactivity Exceeding 5 pCi/g of Radium−226, 14 pCi/g of Thorium−230, and 50 pCi/g of Uranium−238

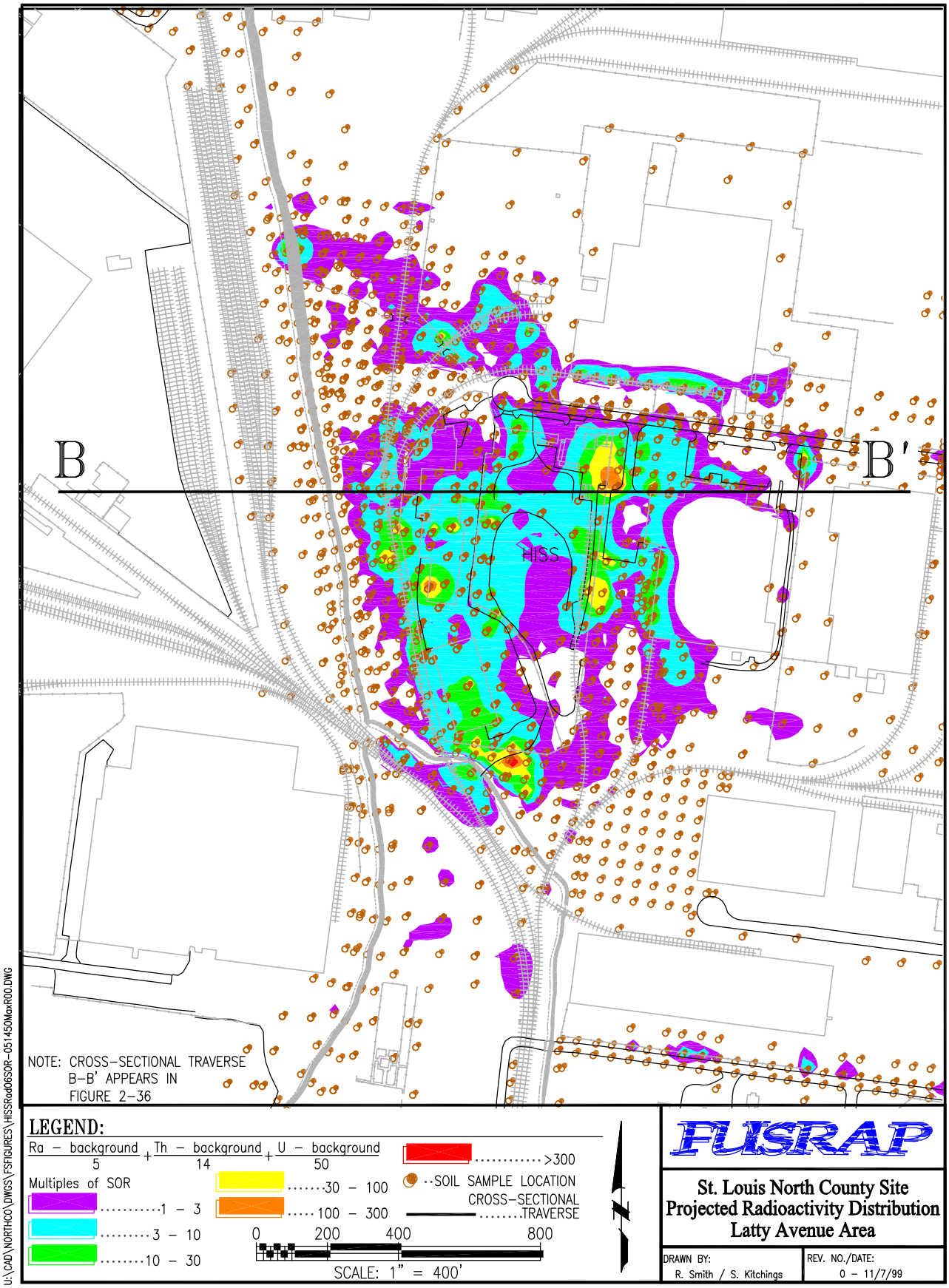

Figure 2-12. Extent of Radiological Contamination at HISS/Futura

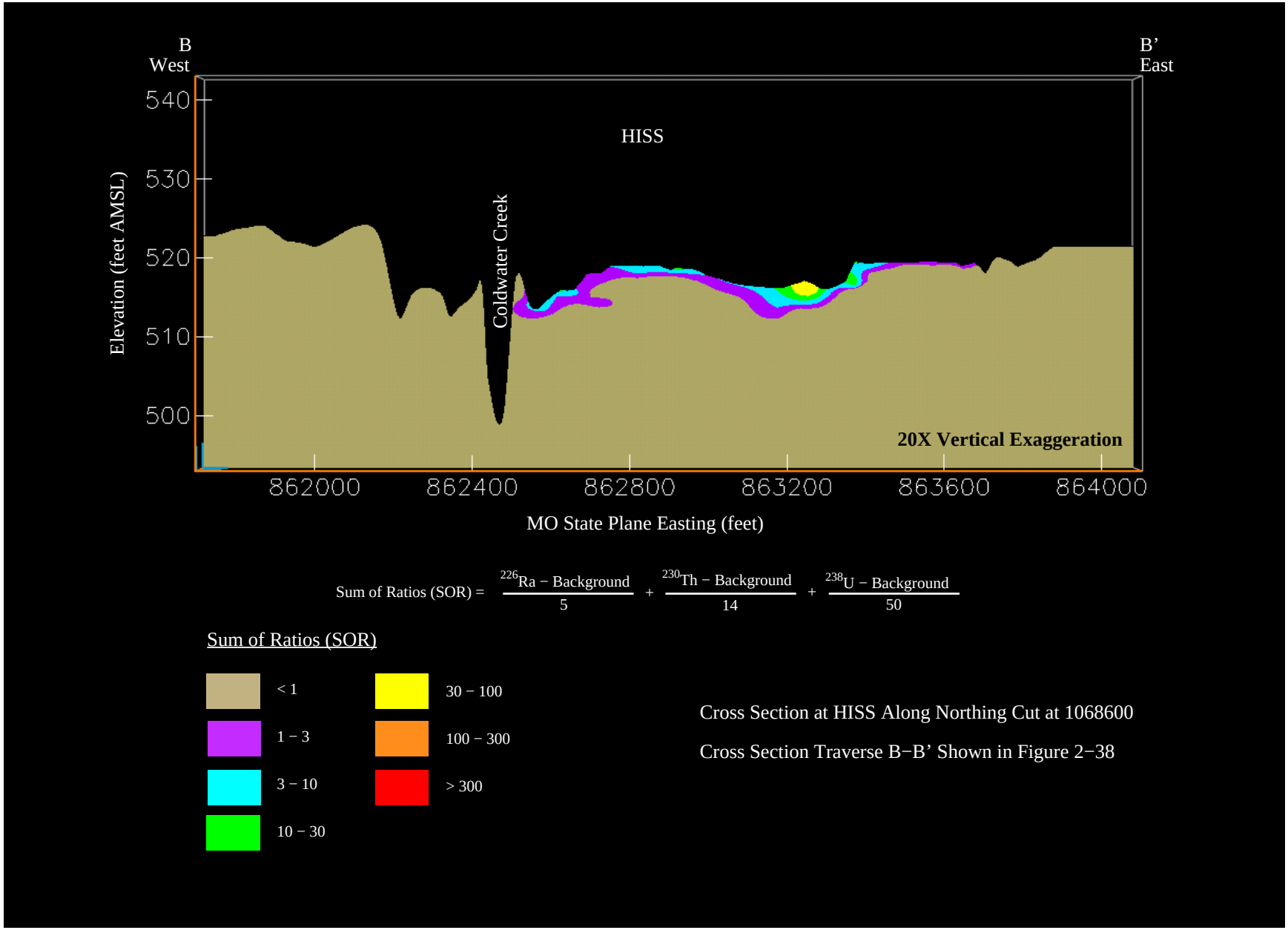

Figure 2−13. Cross Section at HISS of Projected Radioactivity Exceeding 5 pCi/g of Radium−226, 14 pCi/g of Thorium−230, and 50 pCi/g of Uranium−238

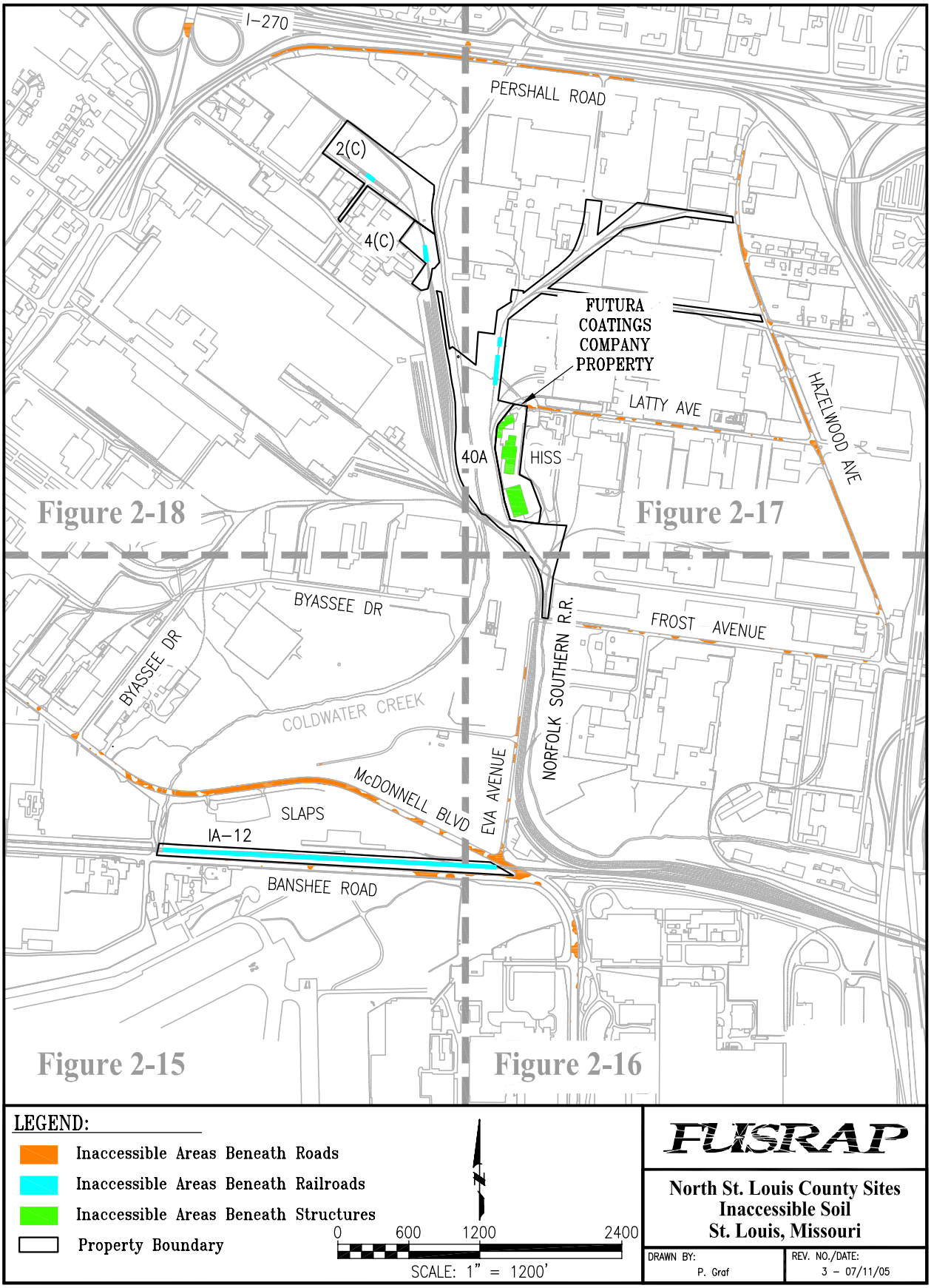

Figure 2-14. Inaccessible Areas with Potentially Impacted Soil above RG's at the North St. Louis County Sites - Overall

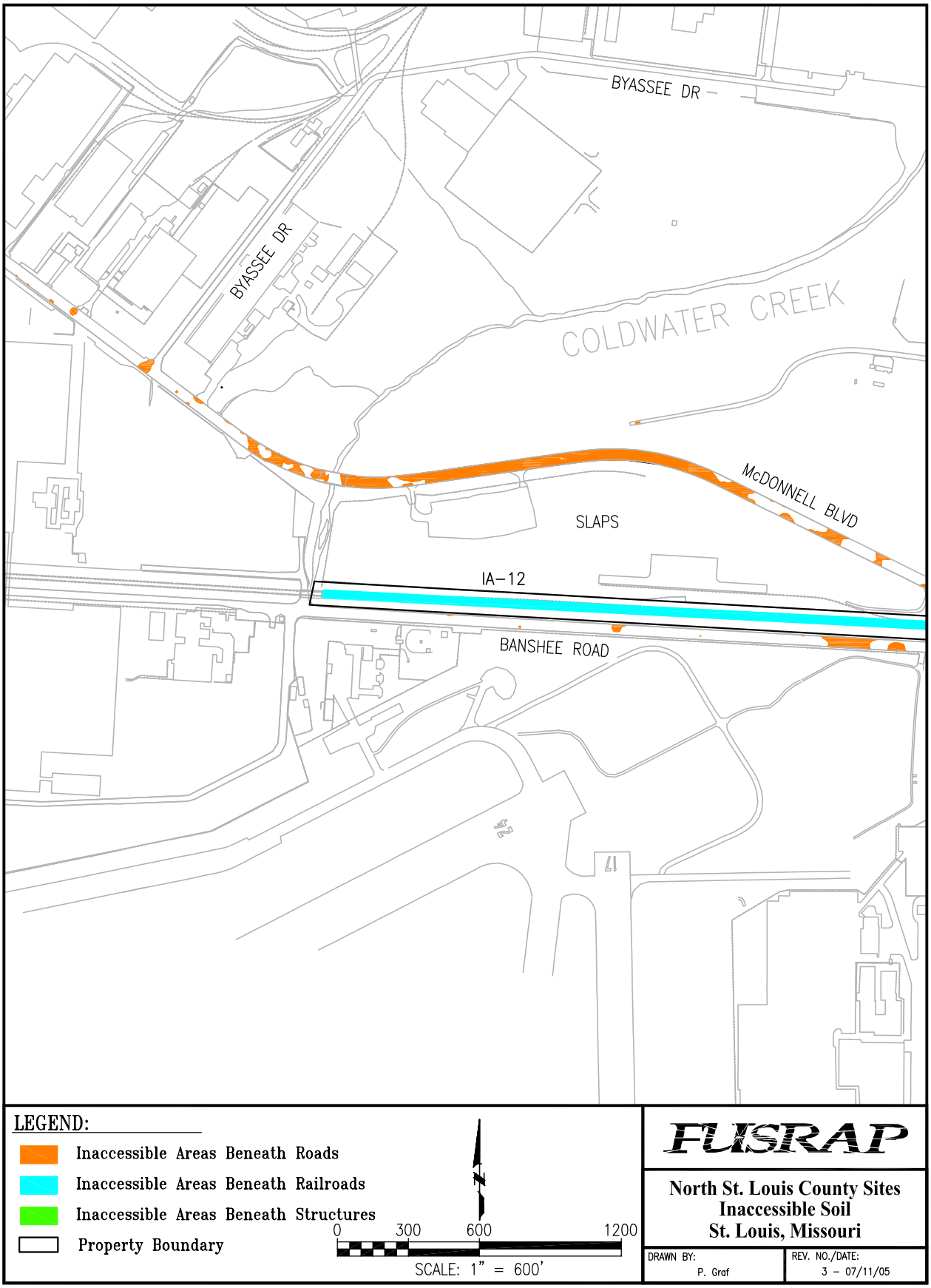

Figure 2-15. Inaccessible Areas with Potentially Impacted Soil above RG's at the North St. Louis County Sites - Southwest Area

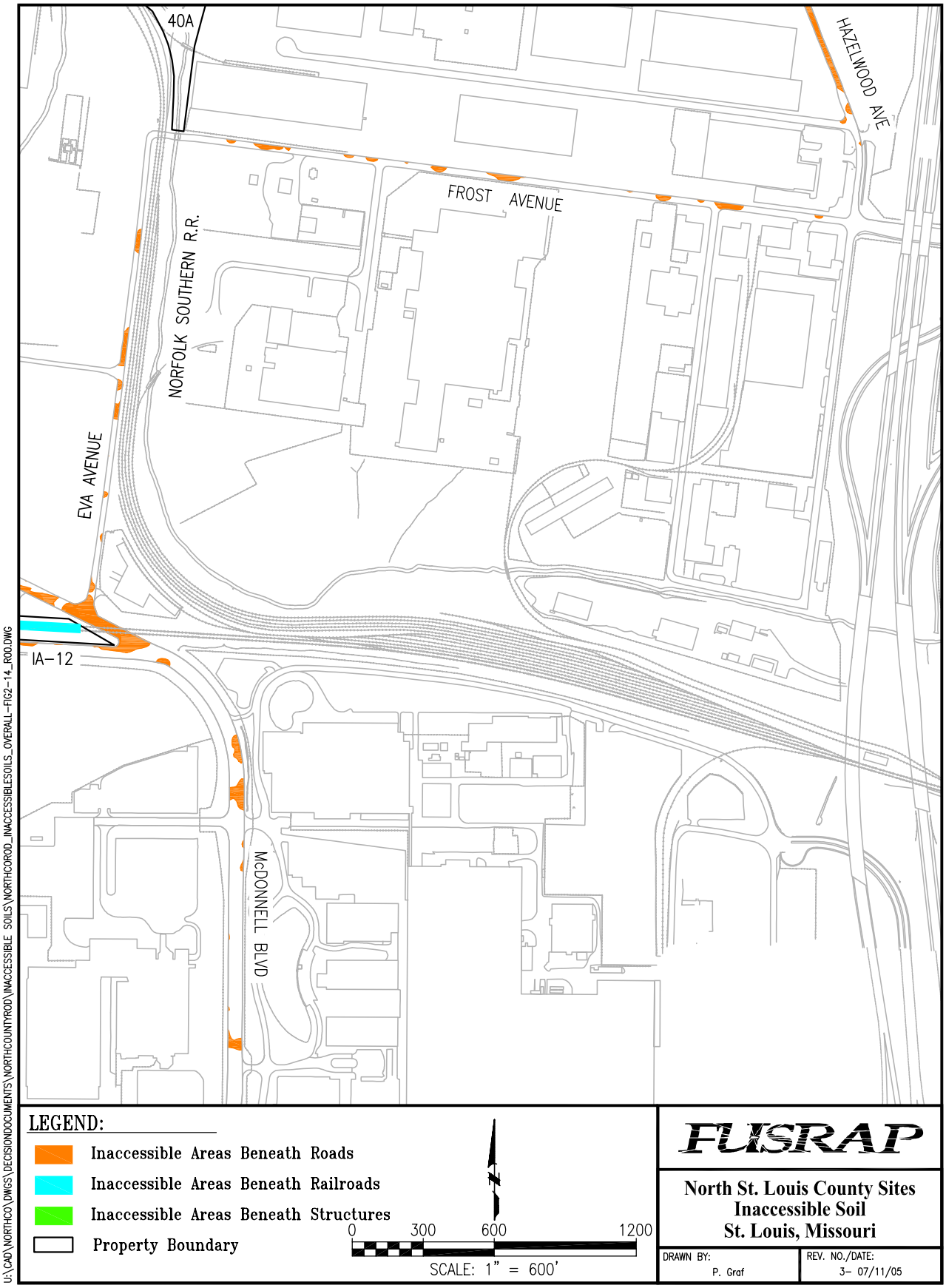

Figure 2-16 Inaccessible Areas with Potentially Impacted Soil above RG's at the North St. Louis County Sites - Southeast Area

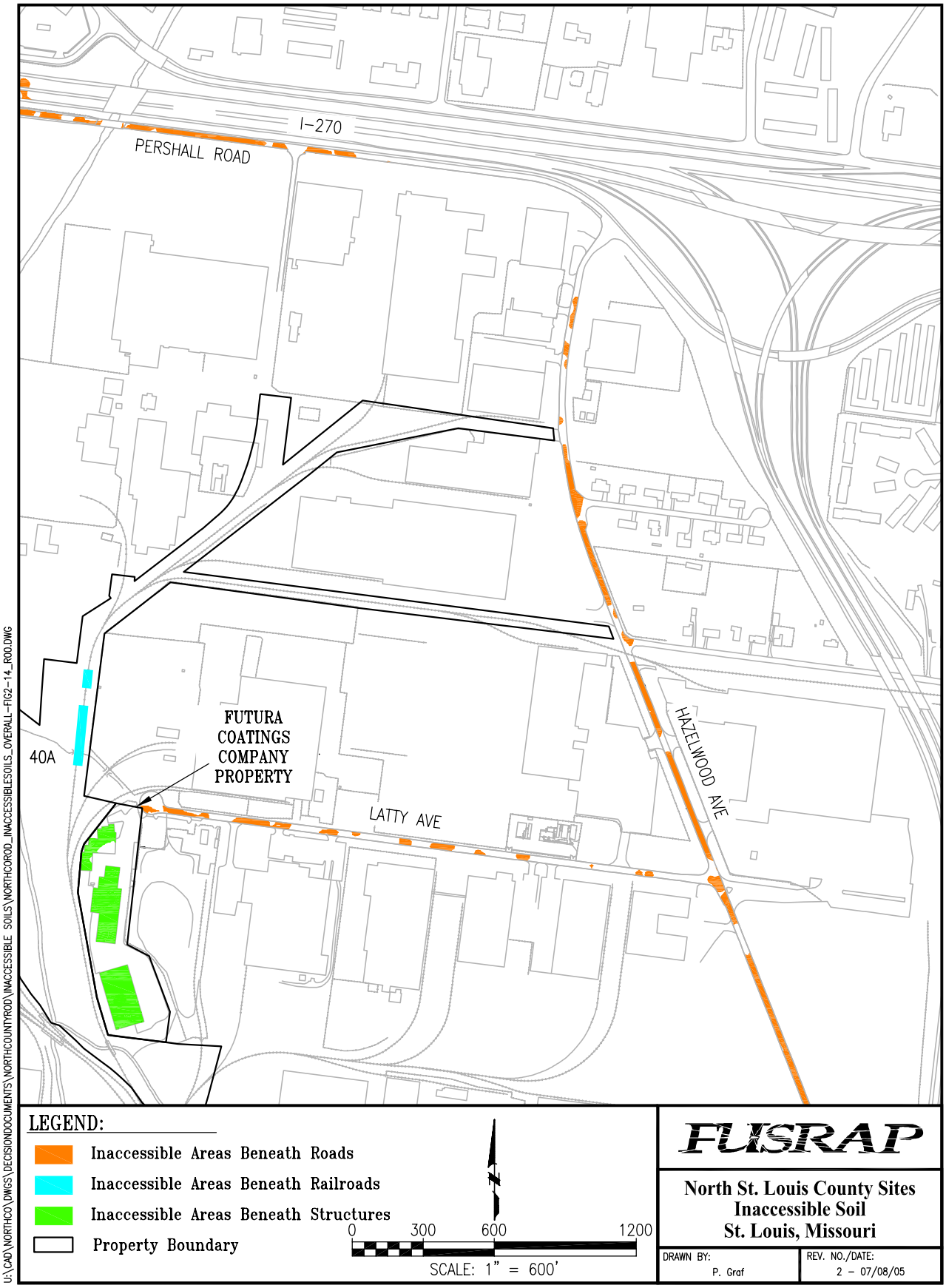

Figure 2-17. Inaccessible Areas with Potentially Impacted Soil above RG's at the North St. Louis County Sites - Northeast Area

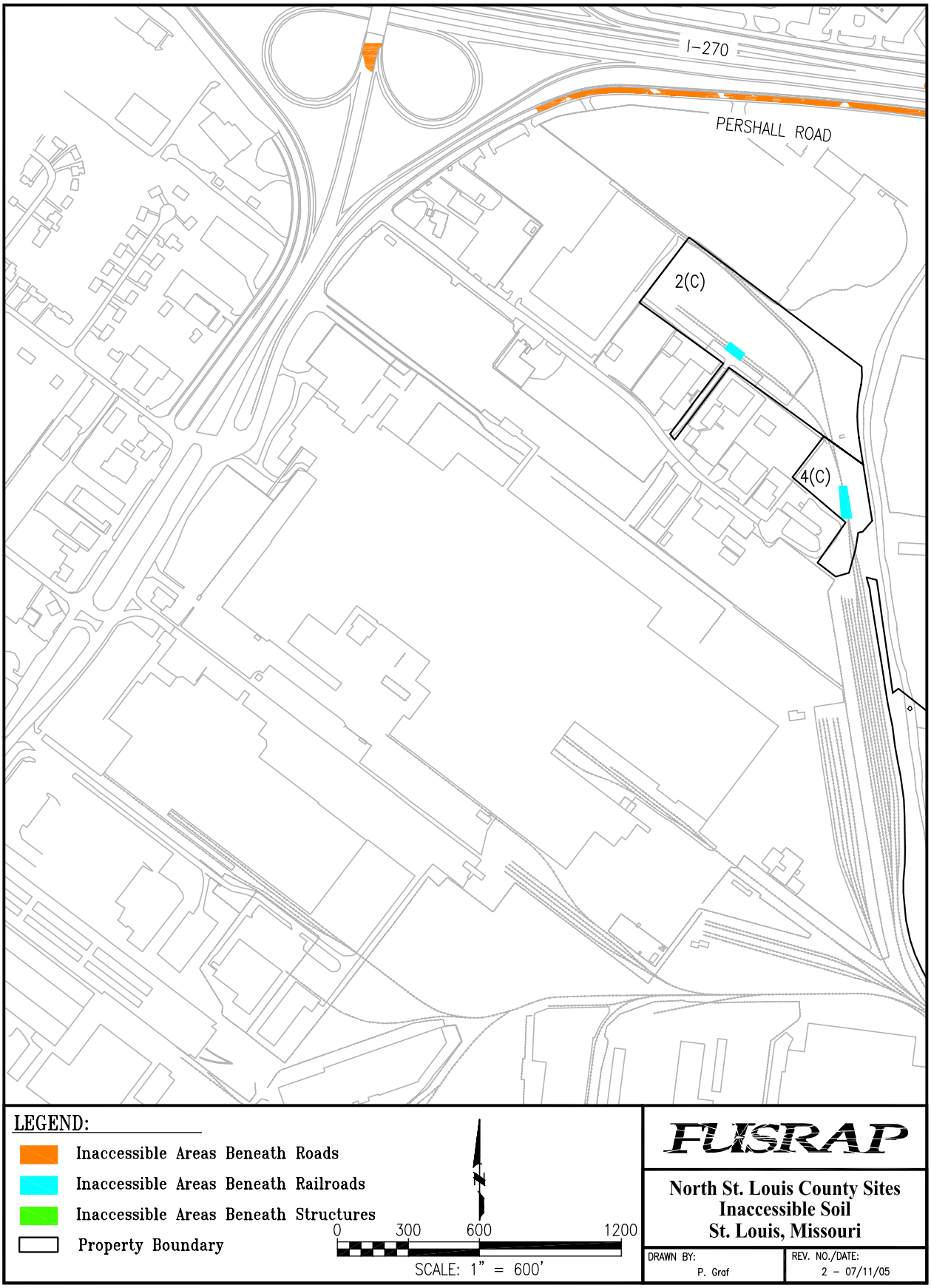

Figure 2-18. Inaccessible Areas with Potentially Impacted Soil above RG's at the North St. Louis County Sites - Northwest Area

PART 3

RESPONSIVENESS SUMMARY

3.0 RESPONSIVENESS SUMMARY

A Proposed Plan (PP) was released on May 1, 2003 describing the USACE's preferred alternative for remediation of the North St. Louis County sites. On that day, USACE made the Proposed Plan and other documents comprising the Administrative Record for this ROD available at the U.S. Army Corps of Engineers FUSRAP Project Office, 8945 Latty Avenue, Berkeley, Missouri, or at the St. Louis Public Library, Government Information Room, 1302 Olive Street, St. Louis, Missouri. An extension of the public comment period was requested and subsequently granted. As a result, the public comment period ended on July 14, 2003.

The comments received have been reviewed and considered by USACE in the decision-making process and are addressed in this Responsiveness Summary. The comments below include both the oral comments presented at the Public Meeting and written comments received during the public review period. The oral comments have not been stated verbatim but instead have been paraphrased to focus on the significant issues expressed by the comment.

Pursuant to Section 113(k)(2)(B)(iv) of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. §9613(k)(2)(B)(iv), this section of the ROD responds to "each of the significant comments, criticisms and new data submitted in written or oral presentation" to USACE regarding the Proposed Plan.

GENERAL COMMENTS

During the comment response period, three issues were raised repeatedly in comments to the Proposed Plan. These three issues focused on the preference for Alternative 6, the need to remediate Westlake Landfill, and concerns regarding the extent of remediation that will be conducted for Coldwater Creek. The following table contains the responses to these comments.

Additional comment and response tables follow the General Comment Table.

General Comments			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	In written comments received during the public review period and in comments made at the public meeting held May 29, 2003, many individuals expressed a preference for Alternative #6 Excavation of all Properties for the North County Site.	As stated in the FS/PP, both Alternative 5 (Excavation with Institutional Controls Under Roads, Bridges, Railroads, and Other Permanent Structures) and Alternative 6 (Excavation at all Properties) are fully protective of human health and the environment. They differ chiefly in how they address the impacted soil under roads, bridges, active rail lines, and other permanent structures (defined as inaccessible soil). Inaccessible soils will not be excavated under Alternative 5. The remedy for inaccessible soils consists of implementation of institutional controls. Selection of this remedy for inaccessible soils considers the future anticipated land use of inaccessible areas and fully considers each of the nine factors in the NCP with particular emphasis on protectiveness, implementability, short-term effectiveness, long-term effectiveness and permanence, cost, and state and community acceptance. The nature of institutional controls will be defined in the long-term stewardship plan. The FS/PP described generally the procedures that would be followed in the development of this plan. Alternative 6 proposes to remediate all impacted soil, including those areas that are under active roads, active bridges, active railroads, and permanent structures but does not provide funding to obtain accessibility to, or for the restoration of, these areas. No institutional controls would be required after the remedial action is complete. Following full consideration of public comment with regard to safety and disruption to businesses, individuals, local municipalities, as well as accounting for significant increases in cost not directly attributable to CERCLA response, Alternative 6 was determined to be less desirable than Alternative 5. For this reason, Alternative 5 was selected by USACE as the preferred remedy.
2	General	A number of comments were received expressing concern over the West Lake Landfill and requested that the site be addressed by USACE.	Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. The West Lake Landfill was listed on the NPL on August 30, 1990. USEPA Region VII is the lead agency for the landfill.

General Comments			
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3	General	Comments were received stating that Coldwater Creek has not been adequately addressed in the Proposed Plan. Several commenters expressed a preference for using the RGs for soil to address the sediment beneath the mean water gradient. Other commenters expressed concerns regarding children playing in the creek and the potential for creek sediments to be redeposited due to flooding.	USACE recognizes the concern of the commenter about the potential hazard posed by the radioactive materials in Coldwater Creek. Although USACE has extensively investigated Coldwater Creek, additional investigations will be conducted prior to remediation to identify each area within Coldwater Creek where remediation is required to achieve remediation goals (RGs) that protect future users of the creek, especially children. The soil above the mean water gradient will be remediated to the same RGs as surface and subsurface soil. The sediment below the mean water gradient would be remediated to sediment RGs, removal of the sediment to these RGs will be fully protective of human health and the environment. The selected alternative (Alternative 5) requires the removal of sediment and soil that would present an unacceptable risk to current and future residents (including children) and workers. The RGs for sediment take into account the possible redeposition of contaminated sediments during flooding. The remediation is anticipated to have a positive effect on surface water quality in the creek.

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GENERAL 1		By initiating public comment on the Proposed Plan without providing EPA the opportunity to review a draft Final FS and draft final Proposed Plan the ACE violated the consultation requirements terms of the FFA. EPA considers this to be significant violation and is considering taking some other action in response to these violations.	Comment noted.
GENERAL 2		We are concerned that the information presented in the FS/PP is rather vague on some aspects of the preferred remedial strategy especially as it relates to the long-term implementation. We are not certain sufficient information is presented to support development of a ROD with clear performance objectives and commitments. For example: a) The PP is inconsistent on whether a decision regarding inaccessible soils is proposed as part of this decision process or is being deferred to future decision documents. The preferred alternative says that inaccessible soils are not addressed by this remedial action, but in some instances the PP says inaccessible soils will be remediated to the proposed cleanup criteria when they become accessible. The scope of the decision must be made clear. If a decision or decisions regarding inaccessible soils are deferred, then this is not the final response action for the North County site and the corresponding response strategy needs to be spelled out. If this is intended to be the final decision process, then more definition of the long-term response strategy is needed	USACE believes that there is sufficient information presented to develop the ROD. The ROD addresses contaminated soil, sediment, surface water, ground water, and structures at the North St. Louis County sites. All soils exceeding RGs for surface or subsurface soils will be excavated and shipped for off-site disposal, with the exception of soils under roads, bridges, active rail lines, buildings or other permanent structures, which are referred to as inaccessible soils. Inaccessible soils will not be excavated under the Record of Decision. The remedy for inaccessible soils consists of implementation of institutional controls. Selection of this remedy for inaccessible soils considers the future anticipated land use of inaccessible areas and fully considers each of the nine factors in the NCP with particular emphasis on protectiveness, implementability, short-term effectiveness, long-term effectiveness and permanence, cost, and state and community acceptance. Verification that institutional controls remain protective as a remedy will be assured through the CERCLA five-year review process. Based on current information, none of the inaccessible areas present an unacceptable risk in their current configuration that would require immediate excavation. To clarify further, the ROD includes additional details related to inaccessible soils, including figures and a table describing the location and expected volume of inaccessible soils. In addition, the ROD identifies the RGs developed in accordance with relevant and appropriate standards [40 CFR 192.12(b) and 192.21(c)], which will be used to confirm that inaccessible soils are protective in their current configuration. The scope of the ROD has been clarified in Sections 2.4 and 2.12 of the ROD.
GENERAL 2b		b) Depending on what the ACE intends, there may or may not be clear distinction between Alternatives 5 and 6. If the intent under Alternative 5 is to remediate inaccessible soils to the proposed cleanup criteria at some	Clarification between Alternatives 5 and 6 is as follows: Alternative 5 includes the removal of accessible soil in areas that exceed RGs. Inaccessible soils are those soils under roads, bridges, active rail lines,

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2b (con't)		point in the future when circumstances make them accessible, then the only distinction between Alternative 5 and Alternative 6 is in the implementation strategy. The technologies, the methods, and the end results are essentially the same. If this is the case, the cost of Alternative 5 should be adjusted to include the cost of future remediation. It is not clear that these two alternatives actually qualify as separate alternatives under the CERCLA remedy selection process. On the other hand, if the intent under Alternative 5 is to make no decision with respect to the inaccessible soils beyond management in place, then these two alternatives do have some important distinctions. However, the FS/PP seems to try to do both.	buildings and permanent structures that exceed remediation goals but are protective in their current configuration. Inaccessible soils will not be excavated under the Record of Decision. The remedy for inaccessible soils consists of implementation of institutional controls. Selection of this remedy for inaccessible soils considers the future anticipated land use of inaccessible areas and fully considers each of the nine factors in the NCP with particular emphasis on protectiveness, implementability, short-term effectiveness, long-term effectiveness and permanence, cost, and state and community acceptance. Verification that institutional controls remain protective as a remedy will be assured through the CERCLA five-year review process. Inaccessible soils are depicted on Figures 2-14 through 2-18, with the associated volumes being listed in Table 2-13. Based on current information, none of the inaccessible areas present an unacceptable risk in their current configuration that would require immediate excavation. Alternative 6 includes the removal of both accessible and inaccessible soil in areas that exceed RGs. No institutional controls would be placed on these properties after remedial action is complete, as it assumes that all inaccessible areas would be made available to the government by the owning entity, at their cost, during the period of remediation. During the period of remediation, the government would excavate, transport and dispose of this soil. The cost estimate in the FS/PP assumes that 69,000 cyds of material would be addressed. This assumes that 100% of the inaccessible contamination would be addressed during a 30-year period. Alternative 6 as presented in the FS/PP does not include the costs associated with demolition of roads, railroads, bridges, and permanent structures, nor the disruption/ replacement costs associated with those roads, railroads, bridges, and permanent structures. Alternative 6 assumes that the local municipality or landowner makes the soil available as a result of road improvement, building demolition or other activity. If alternative 6 were to include such costs, the total cost for Alternative 6 would be substantially greater. The cost includes only those for USACE to pick up and dispose of the soil.

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GENERAL 2c		c) The preferred alternative needs to be clear on the criteria for what constitutes an inaccessible versus an accessible condition. This is especially true if a decision regarding inaccessible soils is deferred. It needs to be clear what soils may be remediated under this decision and what soils must be subject to future decision-making. Optimally, the criteria would be flexible enough so that soils that become unexpectedly available over the near-term are not precluded from being remediated under this decision process.	"Inaccessible soil" is defined as soils under roads, bridges, active rail lines, and other permanent structures that exceed RGs but are protective in their current configuration. Inaccessible soils will not be excavated under the Record of Decision. The remedy for inaccessible soils consists of implementation of institutional controls. If the protective cover (road, bridge, active rail line or other permanent structure) is removed, USACE as the lead agency will consult with EPA and the State of Missouri and either publish an explanation of non-significant differences, significant differences or an amendment to the ROD as appropriate in accordance with the NCP. Inaccessible soils are depicted on Figures 2-14 through 2-18, with the associated volumes being listed in Table 2-13.
GENERAL 2d		d) The division of responsibilities between the ACE and DOE is not described. The MOU between the ACE and the DOE should be described and interpreted to fit site-specific circumstances. Presumably, the general plan is that the ACE is responsible for implementing this response action and the DOE is responsible for the long-term stewardship activities such as monitoring and enforcement of institutional controls. However, expectations regarding specific activities are not described. For example, is the ACE proposing to implement future decision processes and response actions associated with inaccessible soils, or is DOE expected to accept that task? Which agency is expected to implement institutional controls? Could this responsibility fall to either agency depending on the timing? Is it intended that the long-term stewardship plan will used as a mechanism to negotiate and define these responsibilities.	The following information is provided with regard to the Memorandum of Understanding (MOU) between USACE and DOE. Active remediation under the ROD is the responsibility of USACE. Upon transfer to DOE (2 years after completion of the remedial action), DOE is responsible for surveillance, operation and maintenance, which includes institutional controls that have been imposed. With regard to inaccessible soil, USACE will impose institutional controls, as appropriate, and enforcement of such institutional controls will be the responsibility of DOE as a part of their long-term stewardship obligations under the MOU.

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GENERAL 2e		e) The inaccessible soils are generally not well described. Discussion in the FS on the nature and extent of contamination does not address inaccessible soils. What are the volumes, locations, and concentration levels of these soils? Subtracting volume estimates for Alternatives 5 and 6 would suggest an impacted volume of 70,000 cubic yards. Is that a reasonable estimate? What kind of data is available and how adequate is it? What assumptions are used? Figure 6 in the PP suggests that all soils under every road and rail line in the area are contaminated. Is that a reasonable characterization?	The map of inaccessible areas (Figure 6 in the PP) provides an overview of those areas that are believed to be inaccessible. The volume of inaccessible soil, using 3-D modeling and data from pertinent sample locations, was estimated to be 69,000 cubic yards. This volume estimate is conservative based on available data. To better define the areas impacted in Figure 6, information as to the location of soil above RGs has been added to figures in the ROD (Figures 2-14 through 2-18). A table has also been added (Table 2-13) to identify specific areas of potentially contaminated inaccessible areas and to include volumes of inaccessible soil. Additional studies and final status surveys will be used to refine and document residual inaccessible soil that exceeds RGs and requires institutional controls.
GENERAL 2f		f) The documents provide no specific information, beyond Figure 6 of the PP, on the particular structures impacted by the inaccessible soils. Such information would be useful in developing a strategic distinction between inaccessible soils based on the kind of structure they are located under. The indicated approach to soils located under relatively permanent structure like building or interstate highway may be different than the approach to soils located under an inactive rail spur in an area that might be redeveloped. Especially if the ACE's intent is to make a decision regarding inaccessible soils as a part of this process, some effort should be made to categorize situations based on the character of the structure, including ownership, anticipated life span, opportunity to remediate, disruptive impact, potential for exposure, etc.	A table has also been added (Table 2-13) to the ROD to identify specific areas and to include volumes of the inaccessible soil. Additional studies and final status surveys will be used to document residual inaccessible soil that exceeds RGs and requires institutional controls.

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GENERAL 3		The ACE selects remedial goals for Th-230 based on an estimate of the ingrowth of Ra-226 to not exceed soil standards in 40 CFR 192 which are being used as an ARAR. This interpretation of 40 CFR 192 is inconsistent with EPA's. OSWER 9200.4-25 *Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA sites* (February 12, 1998) states "It should be noted that to meet a permanent clean-up objective for radium-226 and radium-228 of 5 pCi/g, there needs to be a reasonable assurance that the preceding radionuclides in the series will not be left behind at levels that will permit the combined radium activity to build-up to levels exceeding 5 pCi/g after completion of the response action. At a minimum, this would generally mean that thorium-230 (the parent of radium-226) and thorium-232 (the parent of radium-228) should be cleaned up to the same concentrations as their radium progeny. Therefore, **whenever the 5 pCi/g and/or 15 pCi/g standards are used as relevant and appropriate requirements (or TBC's) at CERCLA sites with some combination of thorium-230 and thorium-232, these soil standards should apply to the combined level of contamination of thorium-230 and thorium-232**." [emphasis added]	USACE believes the proposed RGs are fully protective. The remediation will result in no unacceptable exposure and will fully comply with ARARs. Section 2.8.2 of the ROD has been revised in coordination with EPA.

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		OSWER 9200.4-35P *Remediation Goals for Radioactively Contaminated CERCLA Sites Using the Benchmark Dose Cleanup Criteria in 10 CFR Part 40 Appendix A, I, Criterion 6(6)* (April 11, 2000) states "The Criterion 6(6) rule should not affect the ARAR status of requirements under the EPA's UMTRCA rule (40 CFR Part 192). In particular, the guidance in OSWER Directive 9200.4-25 "Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA sites", still applies. **This means that when the 5 pCi/g and/or 15 pCi/g standards are used as RARs or TBCs, these soil standards should continue to apply to** the combined levels for radium-226 and radium-228, as well as the **combined levels of thorium-230 and thorium-232**." [emphasis added] If 40 CFR Part 192 soil standards are not ARARs for thorium at this site (e.g., because the profile of contamination means use of the subsurface finding tool would result in thorium levels exceed 5 pCi/g), then a risk based remedial goal for thorium may be suitable. The decision document should specify the risk estimate for such a remedial goal.	The risk estimate for the remediation goal is stated in Table 8 of the FS. This table demonstrates that the RGs are fully protective.
GENERAL 4		The FS/PP contains no supporting information on the remediation of buildings, or other structures that will be left in place. EPA is aware that the ACE has submitted documents containing survey procedures for some of these activities; however, the standards or criteria that will be used need to be supported as part of the CERCLA decision process. It should be noted that dose assessments are not part of the CERCLA decision-making process unless required for ARAR compliance.	Structures were discussed in Section 3.3.2, Section 3.4.3, and Section 4.2 of the Feasibility Study. The standards or criteria pertaining to structures and buildings have been provided in the ROD in Sections 2.8.2 and 2.12. Additional information can be found in the document entitled *Derivation of Site-Specific Derived Concentration Guideline Levels (DCGLs) for North County Structures.* Specific information regarding the DCGL document was presented at the April 9th St. Louis Oversight Committee meeting and made available to the public via the St. Louis FUSRAP web site. A description of this document was also included in the FUSRAP newsletter, which was distributed to all interested stakeholders, including the property owners. A notice regarding this document's availability was published in the St. Louis Post Dispatch. A letter was also sent that explained the document and public review period.

Comments received USEPA			
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GENERAL 5		In a variety of instances the FS/PP frequently concludes that certain contaminants are not FUSRAP related and therefore don't have to be considered further. In making these cases, the ACE doesn't seem to account for the expectation that co-located contaminants not originating from the ore processing activities be remediated. Further, the FS/PP generally leaves the impression that the ACE has identified many potential contamination problems or health concerns that are not being addressed under this process due to the limitations of FUSRAP authority. We don't believe this is a wholly accurate impression; however, the ACE should clearly describe any potential contamination problems or health concerns that it has identified, but does not intend to address.	The following statement has been included in Section 2.12 of the ROD to clarify: "*All accessible MED/AEC wastes will be remediated to the FUSRAP COC RGs. Co-located non-MED/AEC wastes will be remediated concurrently."* The USACE is limited to addressing MED/AEC contamination. To date the USACE has not identified or discovered any contamination problems or health concerns it does not intend to address. If incidental to investigation of AEC work, the USACE encounters non-MED/AEC waste, the USACE will notify the USEPA.
GENERAL 6		The decision process should provide some greater description of the scope, function, and expectations of the stewardship plan.	The following text is provided in the description of the Selected Remedy in the ROD (Section 2.12.2.9) to provide additional information about the long-term stewardship program: "*The USACE, EPA, MDNR, local landowners, municipalities, utilities, the St. Louis Oversight Committee and DOE will work together to develop a long-term stewardship plan. The primary function of the plan is to ensure protection of human health and the environment. The long-term stewardship plan will supplement the five-year review process by identifying the responsibilities for 1) site monitoring, maintenance, and reporting; 2) institutional controls; 3) information and records management; and 4) environmental monitoring. The plan will ultimately be implemented under the terms of a Memorandum of Understanding between USACE and DOE*."
GENERAL 7		The U.S. Department of Energy (DOE) is a key player in the long-term management of this site. This decision process defines site conditions that DOE will inherit and defines activities that DOE will be expected to perform. Therefore, DOE must provide its concurrence with the remedy before EPA will be in a position to concur.	Under the current MOU between USACE and DOE, USACE is fully authorized to develop long-term stewardship management provisions for the North St. Louis County sites. DOE was provided with a copy of the FS/PP and will be provided with a copy of the ROD. Further, they have been and will continue to be invited to participate in development of the long-term stewardship plan.

Comments received USEPA			
Comment No.	**pp/§/¶**	**Comment**	**Response**
Proposed Plan 1	Pg. 3, col. 1	The 2 bullets appear to reflect accurately the scope of the cleanup agreed to in the FFA, but the sentence after them seems to inappropriately limit the scope of the cleanup activities.	The sentence *"Those contaminants not resulting from FUSRAP-related activities are outside the scope of this PP*" was intended to indicate that not all contamination present in the North St. Louis County area will be addressed by this document (i.e., other parties would be responsible for responding to any releases of contaminants not related to the processing or manufacturing of uranium at the SLDS and not co-located with ROD COCs.) This statement has been deleted from the ROD. Text in the ROD reflects the text in the FFA.
Proposed Plan 2	Pg. 3, col. 2, 1st full¶	By mentioning the informal comments provided by EPA, the ACE seems to imply that informal comment was all the process provided and that, having made these informal comments, EPA concurred with the ACE's proposal. Neither is true. The FFA provides for a formal review, comment and approval/disapproval procedure by EPA which the Corps chose not follow. EPA wasn't given the opportunity to participate in this formal review process or provide concurrence on the Corps proposal.	It is USACE's position that both the intent and the letter of the consultation provisions of the FFA have been met. An informal coordination meeting to discuss the original draft FS was held on November 17, 1999. In response to USEPA comments from that meeting, USACE revised the FS and drafted the preliminary FS/PP, a copy of which was provided to USEPA for comment on September 13, 2000, nearly three years ago. USEPA provided comments in response during October 2000. Meetings were subsequently held with USEPA representatives on November 28, 2000 and March 19, 2001. Revised regulatory review copies of the FS/PP were again circulated to USEPA for comment during August 2001. This document remained unaltered pending resolution of internal USACE concerns until early 2003. USEPA was fully apprised of the basis of those internal USACE concerns and the outcome of the subsequent resolution discussions. USEPA was provided an informal draft of the FS/PP in April 2003, and a formal review copy on May 1, 2003. USACE has in the past, and will continue to, consult and coordinate fully with the USEPA in the spirit of partners in this process.
Proposed Plan 3	Pg. 4, col. 1, end of 1st full ¶, last sentence	This sentence also seems to imply that the appropriate regulatory agency review was completed before the FS was released to the public, which is not true. Like with the PP, EPA was not given the formal review and approval/disapproval of the FS that was to be provided under the FFA	It is USACE's position that both the intent and the letter of the consultation provisions of the FFA have been met. See response to USEPA comment PP#2 for additional explanation.

Comments received USEPA			
Comment No.	**pp/§/¶**	**Comment**	**Response**
Proposed Plan 4	Pg. 5, bottom of col. 1	We don't think this accurately represents the status of ongoing removal actions once a ROD is final. Rather than considering the removal actions to be "complete," which implies no further cleanup is necessary, which generally isn't the case, it would seem to be more accurate to say the removal actions within the scope of the ROD are terminated when the ROD is signed. These actions would be incorporated into the remedial action and completed as part of the remedial action. Any ongoing removal actions that are beyond the scope of the cleanup decision made in the ROD should continue uninterrupted.	The statement "*Removal actions started under the EE/CAs are complete at the time the ROD is approved*" has been revised in the ROD as follows: "*USACE would ensure a smooth transition from removal action to remedial action when the ROD is approved. Because operations to be conducted under this alternative are similar to those that have been conducted under the removal actions, the transition is expected to be transparent and would involve, for the most part, administrative rather than technical issues. USACE would compare the requirements of the ROD with the requirements of existing on-going design and work description documents at SLAPS prepared under EE/CA criteria and the level of cleanup achieved by removal actions completed under the EE/CAs and Action Memoranda. If these designs or work description documents do not meet the full requirements of the ROD, then modified documents or document addendums would be coordinated for regulatory review and finalized. Removal actions completed under EE/CAs and Action Memoranda would be reviewed to ensure that residual levels of contamination meet the requirements of this ROD. Where such reviews indicate prior removal actions do not meet the requirements of this ROD, remedial action would be conducted. Where such reviews indicate prior removal actions meet the requirements of this ROD, compliance would be documented in the appropriate closeout reports."*
Proposed Plan 5	Nature and Extent of Contamination, pg. 9	We found no information in the FS on contaminant levels in surface water (Coldwater Creek) and we found no information to support the conclusion regarding risk levels.	Information concerning the contaminant levels in surface water can be found in Appendix D, Attachment 9 of the Feasibility Study. Information concerning risk levels for Coldwater Creek (sediment & surface water) can be found in Appendix D, page D-28 and Attachments 16 and 17. This data supports the conclusion regarding risk levels.
Proposed Plan 6	Pg. 9, col. 2, 1st partial ¶	The FS doesn't provide much substantiation in the way of data summaries to support the conclusion that non-rad FUSRAP contaminants are largely co-located with rad contaminants. Also, it isn't clear whether the non-FUSRAP chemical contaminants discussed in the last 3 sentences of this ¶ are either co-located with FUSRAP wastes or pose an identified problem that the ACE isn't planning on addressing. Co-located non-FUSRAP wastes are supposed to be addressed under the terms of the FFA.	Table D-10 and Appendix E in the FS provide support for the conclusion that radiological and non-radiological COCs are co-located. The referenced text in the PP concerns VOCs that are co-located with MED/AEC-related COCs at SLAPS and so would be addressed by this remedial action. Concur that co-located non-MED/AEC contaminants will be addressed under the terms of the FFA.

Comments received USEPA			
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Proposed Plan 7	Pg. 9, col. 2, bottom partial ¶	It's also not clear here whether the VOCs claimed not to be FUSRAP wastes are co-located with FUSRAP wastes or present an identified problem the ACE doesn't plan to address. In the last sentence of this ¶, on the top of pg. 10, it's not clear what the ACE means when it says the remedial design investigations must consider the presence of these contaminants.	The VOCs mentioned here are co-located with MED/AEC wastes and will be addressed by this remedial action. The VOCs that are co-located with the MED/AEC wastes have vastly different physical and chemical traits which need to be considered when developing the remedial design. This not only includes the removal and disposal of the waste, but also health and safety aspects for the remedial workers.
Proposed Plan 8	Ground water pg. 10	Here and elsewhere in the FS/PP, we find statements to the effect that the presence of contaminants in the shallow groundwater does not require action because a complete pathway to receptors does not exist. Such statements are not consistent with the NCP which sets out the expectation that all potentially usable groundwater be restored to its beneficial use. This expectation is not conditioned on there being a complete pathway to receptors. A judgment that action is not required is dependant on making the case that the groundwater is not potentially usable.	The following text has been included in Section 2.7.1.1 of the ROD: "*Although some contaminants are present in the shallow ground-water unit (HZ-A), this ground water is not considered potentially usable due to its low yield and poor water quality as discussed in Section 2.6.1. In addition, the contaminants are generally confined to the shallow ground water except through slow discharge to Coldwater Creek. Coldwater Creek shows no significant impact from HZ-A water. Therefore, the contaminants detected in HZ-A ground water do not meet the definition of a COC. Ground water in HZ-A was eliminated as a medium of concern for risk-assessment purposes."*
Proposed Plan 9	Scope and Role, pg. 10	This section should have explained how this operable unit fits into the overall remedial strategy for the St. Louis FUSRAP site.	The North St. Louis County sites are one of two separate areal designations collectively referred to as the St. Louis FUSRAP Sites, which are located in St. Louis, Missouri. These two areas are comprised of multiple properties and are located in two distinct areas: north St. Louis County and St. Louis City (See Figure 2-1 of the ROD). The designations assigned to these two sites are the North St. Louis County sites and the St. Louis Downtown Site (SLDS). This decision document presents the Selected Remedy for the cleanup at the North St. Louis County sites.

Comments received USEPA			
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Proposed Plan 10	Pg. 10, col. 2, 1st full ¶	The description of what wastes are not addressed by the FS and PP doesn't distinguish between co-located non-FUSRAP wastes, which should be addressed under the FFA, and non-co-located non-FUSRAP, which might not have to be addressed under the FFA.	The following text has been included in Section 2.2.1 of the ROD to clarify what wastes will be addressed: *"The Federal Facility Agreement (Docket Number VII-90-F-0005), addresses the cleanup of 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 the St. Louis Downtown Site; 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 the St. Louis Downtown Site*."
Proposed Plan 11	Scope and Role, pg. 10 - 11, last sentence	This says that in cases where removal actions were previously conducted, the data will be evaluated to ensure that ROD criteria are met and that they require no further action. What will be done if the evaluation shows that the ROD criteria were not met?	If the evaluation shows that the ROD criteria were not met, those areas where the criteria are not met will be remediated pursuant to the ROD. The following text has been included in Section 2.12.2.1 of the ROD: *"Where final status surveys were performed prior to the MARSSIM (effective date of January 1, 1998), final status surveys consistent with MARSSIM will be conducted for radiological COCs to ensure that properties achieve the ROD RGs. If the evaluation shows that the ROD remediation goals were not met, those areas where the RGs are not met will be further addressed consistent with the remedy."*

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Comment No.	**pp/§/¶**	**Comment**	**Response**
Proposed Plan 12	Pg. 13, col. 1, 1st full ¶	It's not clear what the ACE means when it says it will continue to monitor the groundwater for TCE where appropriate if TCE is co-located with FUSRAP COCs requiring remediation, especially in light of the statements in the preceding ¶ that there are no COCs identified in HZ-A.	The sentence was intended to indicate that monitoring for TCE in HZ-A ground water will be performed during the response action in remediation areas where TCE is present. The purpose of the response-action monitoring is to assure worker safety and address disposal requirements. The following text has been included in Section 2.12.2.8 of the ROD: *"The USACE will review ground-water monitoring results for areas of elevated ground-water organics, which are not COCs, before each area's remedial action. The organics' monitoring is to assure RA worker safety and to prepare for possible treatment of excavation water for TCE or its by-products above disposal limits. Organics' monitoring will not be conducted after remedial action is complete."*
Proposed Plan 13	Pg. 13, col. 1, bottom ¶	The ACE's explanation for not addressing arsenic doesn't take into consideration whether the arsenic is co-located with FUSRAP wastes in the sediment.	An analysis of sediment data for thorium-230 and arsenic indicates that there is no correlation between the two analytes. The following statement has been added to the ROD in Section 2.12.2.1: "*It should be noted that to date, non-radiological contaminants of concern have been co-located with radiological contaminants such that attainment of the RGs for radiological COCs has resulted in residual site conditions that are protective of human health and the environment for all site contaminants (radiological and non-radiological)."*
Proposed Plan 14	Pg. 14, col. 1, bottom partial ¶	The second sentence appears to define "relevant and appropriate," not "applicable or relevant and appropriate."	The following statement is included in Section 2.10.1 of the ROD to provide the definition of "applicable": *"Applicable requirements are those cleanup standards, standards of control, and other substantive 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. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable."*

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Proposed Plan 15	Pages 17-18.	The proposed plan does not specify what is the benchmark and compliance dose of the selected remedial goals. OSWER 9200.4-35P *Remediation Goals for Radioactively Contaminated CERCLA Sites Using the Benchmark Dose Cleanup Criteria in 10 CFR Part 40 Appendix A, I, Criterion 6(6)* (April 11, 2000) pages 5-8 describes how both a "benchmark" and "compliance" dose should be established site-specifically when complying with Criterion 6(6) rule as an ARAR. It is important that the "compliance" dose should be less than 15 mrem/yr and the risk assessment for concentrations corresponding to the compliance dose should fall within the 10-6 to 10-4 risk range. Otherwise, the Criterion 6(6) rule should not be used to establish cleanup levels.	Experience at the St. Louis FUSRAP sites has indicated that implementation of the subsurface remediation criterion for Ra-226 results in actual average residual concentrations of Ra-226 significantly less than 5 pCi/g. These Ra-226 concentrations, in combination with Th-230 and U-238 RGs of 15 and 50 pCi/g achieve doses that are significantly less than 15 mrem/yr, in practice. This is based on post-remediation data from a number of different areas and properties within the North St. Louis County sites and St. Louis Downtown Site. Risk assessments performed to date have determined that the RGs would achieve protectiveness to levels within the CERCLA risk range and below a HI of 1.0.
Proposed Plan 16	Page 18, first column, first paragraph	The ACE states that doses to the general public would not exceed 100 mrem/yr if institutional controls fail. While EPA is not opposed to the concept of establishing a fail safe level in the event institutional controls are lost, it should be noted that dose assessments are not part of CERCLA decision-making unless required for ARAR compliance. December 17, 1999 memo to EPA Regions from Stephen D. Luftig, Director Office of Emergency and Remedial Response and Stephen D. Page Director Office of Radiation and Indoor Air entitled *Distribution of OSWER Radiation Risk Assessment Q & A's Final Guidance* see page , which states "This Risk Q&A clarifies that, in general, **dose assessments should only be conducted under CERCLA where necessary to demonstrate ARAR compliance. Further, dose recommendations (e.g., guidance such as DOE Orders and NRC Regulatory Guides) should generally not be used as to-be-considered material (TBCs)**." [emphasis added] If the ACE is analyzing the site for compliance with some 100 mrem/yr recommendation/requirement outside of its CERCLA decision-making authority, the Corps should state its rationale (e.g., compliance with an internal DOD guidance under the Atomic Energy Act) or remove this language from CERCLA decision documents.	Title 10 Code of Federal Regulations Part 20, Subpart E, limits the residual radiation dose following remediation to 100 mrem/year in areas to be subjected to restricted release with institutional controls. This guidance was considered in establishing supplemental standards for Alternatives 2 and 3. This was intended only as a fail-safe level and was not retained in the Selected Remedy. Alternatives 2 and 3 were not selected in the ROD.

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Proposed Plan 17	Pg. 19, col. 2	The rationales presented for elimination of the on-site disposal cell and vitrification/biological techniques/incineration don't appear to follow CERCLA remedy selection criteria.	The CERCLA criteria (effectiveness, implementability, and cost) were used to evaluate the feasibility of an on-site disposal cell. The results are provided in Table 3-5 and in Section 3.7.4.1 of the Feasibility Study. In addition, public input was considered. The public has objected in the past to on-site disposal cells as an alternative. Vitrification was evaluated against the CERCLA criteria in Section 3.7.6.4. 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. The waste at the North St. Louis County sites is large quantity - low level, and is not suitable for treatment by vitrification. Therefore, vitrification was eliminated from further consideration. Incineration was screened out consistent with the CERCLA remedy selection process, as shown in Tables 3-5 and 3-6. 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 soil. Therefore, incineration was eliminated from further consideration. Bioremediation is not generally applicable for the treatment of inorganic contaminants, such as the metals and radionuclides at the St. Louis Site. However, bioremediation is currently being utilized as treatment for selenium contaminated water and may be carried forward in future remedial actions as a secondary treatment.
Proposed Plan 18	Summary of Feasibility Study Alternatives, beginning on pg. 19	The costs for each alternative should be presented in a form that includes capital costs, annual costs, and total present worth costs. The duration of the evaluation period and the discount rate should also be indicated.	This information can be found in the Feasibility Study for the St. Louis North County Site, Volume II, Appendix C. The ROD presents the selected alternative in a form that includes capital costs, an O&M present worth cost, and total present worth costs as well as the duration of the evaluation period (30 years) and the at a discount rate of 7% for a 30 year period. O&M present worth costs were presented to allow comparison between alternatives which had differing periodic (and annual) O&M costs.

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Proposed Plan 19	Summary of Feasibility Study Alternatives, pg. 20	The discussion on land use, supported by the information in Table 9 is not clear. By "future land use" does the ACE mean reasonably anticipated future land use, which is the standard for identifying reasonable maximum exposure. The analysis tends to equate land use assumption with risk assessment exposure analysis. The FS/PP does not make clear how an industrial standard for reasonable maximum exposure can be consistent with the remedial objective of unrestricted use. On Table 9, how does the term "removal action" indicate the removal status?	Text in the ROD has been clarified to reemphasize that although the reasonably anticipated future land use of most portions of the North St. Louis County sites is commercial/industrial, the RGs are based on ARARs for Ra-226 that were derived for unrestricted site use upon completion of response actions. Cleanup standards for other radionuclides were derived from the radium cleanup standard such that use of the stated RGs, in combination with the unity rule/Sum of Ratios (SOR) methodology results in residual site conditions such that the site is suitable for release with unlimited use and unrestricted exposure. With respect to Table 9, the term "Removal Action" was intended to designate properties that would be completely excavated and restored at the time of the ROD was issued and would require no further responses.
Proposed Plan 20	Pg. 20, col. 2, 3rd full ¶	As commented previously, when the ACE says the ongoing removal actions will be complete, it seems they really mean they will be terminated when the ROD is signed. This seems to say that on-going removal actions otherwise consistent with the selected remedy would be stopped when the ROD is signed and put on hold until the remedial action work plan and remedial design, etc., have been completed.	Paragraphs explaining the transition from removal to remedial action have been added to the description of each alternative. See also response to USEPA Comment – Proposed Plan #4.
Proposed Plan 21	Pg. 20, col 2, bottom partial ¶	This discussion doesn't appear to describe precisely the requirement of the FFA to cleanup all FUSRAP wastes (radiological and non-radiological) as well as any non-FUSRAP wastes commingled with FUSRAP wastes in accordance with CERCLA remedy selection criteria.	The following statement has been included in Section 1.4 of the ROD to clarify: "*Contaminants from other sources that are co-located with MED/AEC contaminants will also be addressed concurrently."* The USACE is limited to addressing MED/AEC contamination. To date the USACE has not identified or discovered any contamination problems or health concerns it does not intend to address. If incidental to investigation of AEC work, the USACE encounters non-MED/AEC waste, the USACE will notify the USEPA.
Proposed Plan 22	Pg. 21, col. 1	Depending upon the alternative selected, institutional controls could be a significant feature of a protective remedy. The PP is somewhat vague as to whether the ACE will be responsible for the long-term stewardship plan or whether this will be part of DOE's followup work. Which agency will be responsible for this should be clarified.	Under the MOU, implementation of the Long-term Stewardship Plan is a USACE responsibility until two years after completion of the remedial activities. At that time, responsibility for continued implementation transfers to DOE.

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Proposed Plan 23	Pg. 21, col. 2, 2nd full ¶	Since the purpose of the RI is to determine the extent of contamination, it should be clarified what is meant by undertaking pre-remedial design investigation to define the extent of contamination.	The following text has been added to the description of alternatives in Section 2.9.2 of the ROD: "*Pre-design investigation (PDI) sampling for COCs would be conducted as necessary to obtain technical information and data to support the remedial design, minimize effects on property owners, and better manage construction schedules."*
Proposed Plan 24	Pg. 21, col. 2, 2nd full ¶	Have any properties with co-located RCRA wastes been identified or is this intended to be hypothetical?	To date, no soils exhibiting the RCRA-hazardous waste characteristics of ignitability, corrosivity, reactivity and toxicity have been found at the North St. Louis County sites. Properties (such as Futura) where current or past activities unrelated to uranium processing have resulted in chemical waste being co-located with MED/AEC related radioactive waste, will be evaluated and sampled, as necessary prior to remediation for the purpose of determining the need for treatment and disposal.
Proposed Plan 25	Pg. 21, col. 2, 3rd full ¶	Explain what is meant by the protective nature of existing geologic deposits and why they would not be changed by any of the alternatives.	The "protective nature of existing geologic deposits" refers to the highly impermeable clay aquitard (Unit 3M) and other clayey soils of Unit 3 that separates the upper ground-water system from the underlying ground-water zones. The clay provides a barrier to vertical contaminant migration. None of the alternatives would penetrate this clay layer. The following text is included in Section 2.5.4 of the ROD to clarify: "*HZ-B limits the passage of ground water vertically beneath the North St. Louis County sites properties. Subunit 3M of HZ-B is a clayey aquitard that effectively impedes vertical contaminant migration from the HZ-A ground-water system to the underlying HZ-C and HZ-E. The exchange of waters between HZ-A and HZ-E will take centuries."*
Proposed Plan 26	Pg. 21, col. 2, 4th partial ¶	Reference the relevant and appropriate federal and state regulations.	Relevant and appropriate regulations are listed for each alternative of the ROD. Where water treatment is required for an alternative, the following sentence has been added to the Remedial Action Control Measures paragraphs (Section 2.9.3). "*The treatment would address chemicals and radionuclides consistent with applicable federal (NPDES) and state regulations or requirements of the POTW."*
Proposed Plan 27	Pg. 22, col. 1	The multi-layer cap would provide a barrier in addition to what?	Noted. The use of the word "additional" was inappropriate in this context and does not appear in the ROD.

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Proposed Plan 28	Pg. 22, col. 2	It's not clear what the ACE means when it says "when and as the inaccessible soils become available" and what the implications are for this in terms of if and when the so-called inaccessible soils will be cleaned up. This is the first we've heard of new decision documents being planned. The remedial decision will need to thorough on defining this approach. Also, the discussion seems to apply cost as a factor in selecting cleanup criteria in a manner not consistent with CERCLA criteria.	The sentence was an attempt to clarify that if inaccessible areas became available after execution of the ROD, under this alternative, addressing those soils would require new documents. Those soils were not being addressed by Alternative 2.
Proposed Plan 29	Pg. 22, col. 2	The ACE should explain its choice of preferred remedies in light of the statement that supplemental standards are appropriate at SLAPS and HISS because excavation to unrestricted criteria would result in excessive remedial action costs relative to the long-term benefits.	USACE explains its selection of the preferred remedy in Sections 2.10 and 2.13 of the ROD, in accordance with the NCP. This analysis is expanded in Section 5 of the Feasibility Study.
Proposed Plan 30	Pg. 23, col. 1	The discussion doesn't give a very accurate picture of the potential difficulties in trying to effectuate enforceable controls over the number and types properties falling into the category of inaccessible soils.	This comment refers to Alternative 2. Section 2.9.2 of the ROD addresses the issue of reliability of institutional controls in the "Long-Term Reliability of Alternative" paragraph for Alternative 2. The following text has been provided in Section 2.10.2.6 (Implementability) of the ROD to describe potential difficulties in implementing institutional controls: *"The administrative feasibility of Alternatives 2, 3, 4, and 5 depends on the type of institutional control necessary for each property and the different governmental entities involved. For each of these alternatives, the use restrictions required for transportation corridors (i.e., roads, bridges, and active rail lines) are expected to be relatively easy to arrange and administer. These inaccessible areas already have use restrictions placed on them by local government entities and would only require the party that administers the land use control to agree to notify the United States in advance if it were to change the control or if there were plans for intrusive work.* *Alternative 5 would likely be the easiest to implement from an administrative perspective because the controls would be required primarily for these transportation corridors. It is anticipated that there would be few areas outside the corridors requiring institutional controls. Those alternatives requiring institutional controls for an increasing number of properties (Alternatives 2, 3, and 4) are more difficult to implement from an administrative perspective. Alternative 4, which requires institutional controls*

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			at SLAPS, SLAPS VPs (including Coldwater Creek), and the Latty Avenue Properties would involve approximately 87 properties and consequently would be the most administratively difficult to achieve. Maintaining and enforcing the necessary institutional controls at numerous private properties would be difficult. For private properties requiring institutional controls, deed restrictions may be imposed as necessary, to prohibit or limit construction or other intrusive activities in contaminated soil. While Alternative 6 relies on institutional controls only for a limited period (i.e., during the period of remedial action), the extent of coordination required to make areas under roads, bridges, active rail lines, and other permanent structures available for remediation during the period of remedial action would be complicated. Disruption of public use of infrastructure would require extensive coordination." If soil tentatively identified as "inaccessible soil" in the ROD remains inaccessible throughout USACE's active remediation efforts, institutional controls will be imposed on the real property and future remediation will be performed when the soil is accessible. Performance will be the responsibility of the Department of Energy in accordance with the MOU as part of the long term stewardship and operation/maintenance activities of the institutional controls.
Proposed Plan 31	Pg. 23, col. 2	It's not clear what the ACE means when it says "additional soils may be identified as inaccessible during implementation."	This comment refers to Alternative 3. The sentence was a poor attempt to address the possible discovery of additional inaccessible areas. While characterization efforts are sufficient, they are not 100% accurate. The description of excavation was changed in the ROD.

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Proposed Plan 32	Pg. 23, col. 2	Reference the supporting information establishing that these treatment processes are effective at achieving the indicated goals. Based on the treatability work, how effective is soil sorting and washing expected to be at achieving the supplemental standards? What is the basis for including phytoremediation of Coldwater flood plain? Is this really considered implementable and effective? If so, we found no rationale eliminating this as an option going forward.	This language was clarified in the ROD in Section 2.9.3 as part of the On-Site Treatment paragraph as follows: *"At the North St. Louis County sites, the primary radiological COCs are radium, thorium, and uranium. Of these, only uranium is soluble and therefore capable of being extracted by soil washing, which preferentially extracts soluble contaminants to reduce the volume of soil requiring off-site disposal. Thus, the soil washing treatment option would only be applied to soils contaminated solely with uranium. The volume of such soils is small. Soil sorting would be limited to non-clayey soils containing sufficient detectable levels of radium. The volume of such soils is also small. 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. Although effective only in limited circumstances, the option for phytoremediation was included in Alternative 3 in an effort to maximize the use of treatment in this alternative.* *Excavated soils and sediments would be consolidated at SLAPS for treatment (soil sorting and enhanced soil washing). Treated soils that meet the ARAR-based criteria for subsurface soil supplemental criteria would be used as backfill at SLAPS, and would be covered with clean soils. Any soils not meeting the supplemental soil standards would be shipped off-site to a permitted disposal facility. The overall objective would be to reduce the volume of contaminated soils by separating the "clean" fraction from the contaminated fraction. The treatment would also be designed to optimize the concentration of site contaminants in the soil fraction for offsite disposal thereby maximizing the amount of contamination taken off-site and minimizing the volume that would be shipped for disposal."*

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Proposed Plan 33	Pg. 25, col. 2, Alternative 5, excavation	What kind of new decision documents (removal or remedial) will be developed when and as inaccessible soils become available? Is there a point in time beyond which the DOE becomes responsible for these decision documents? This seems to set up the expectation that a decision document will be developed each time that some subset of inaccessible soils is made available. Is this a reasonable plan given the number and types of activities anticipated?	Alternative 5, as presented in the Proposed Plan, did not propose excavation of inaccessible areas. Such areas would receive management via institutional controls. If such areas were to become available, some sort of documentation would be required to address them.

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Proposed Plan 34	Pg. 26, col. 1, 1st partial ¶	A primary objective of the institutional controls is described as use restriction designed to limit activities that could disturb soil. This objective may not be entirely consistent with an inaccessible soils plan where the objective is to identify and remove these soils.	This comment refers to Alternative 5. There is no "inaccessible soils plan". Specific institutional controls for a given property will be incorporated into the site remedial design and detailed communications plan. Specific institutional controls will be incorporated into the long-term stewardship plan, as appropriate. Inaccessible soils under Alternative 5 would be addressed through use of institutional controls. The following text has been included in Section 2.12.2.6 regarding the objectives of institutional controls: "*The use restrictions listed below will apply to the roadways and serve as the performance objectives for institutional controls. The use restrictions will be maintained until the remaining hazardous substances are at levels allowing for UUUE.* • *Prohibit the development and use of the properties for residential housing, elementary and secondary schools, child care facilities and playgrounds;* • *Maintain the physical integrity of the pavement, shoulder, and roadway so that the road bed is not subject to erosion or undercutting that might result in the relocation or dispersion of the soil;* • *Prevent construction or maintenance activities such as drilling, boring, trenching, digging, or earth moving in the roadway that could expose, relocate or disburse the soils; or, manage these activities such that the contaminated soils are dispositioned in a manner that is consistent with the objectives of this ROD;* • *Ensure continued protectiveness in the event conditions are changed, e.g., roadway relocation or abandonment; and,* • *Maintain the integrity of any current or future remedy or monitoring system.*"

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Proposed Plan 35	Pg. 28, col. 1	The purpose of the no action alternative is to provide a baseline for comparison. Screening it out prior to the evaluation and comparison of alternatives is not consistent with this purpose.	The statement "Because it does not meet the threshold criteria, no further evaluation is required" is not accurate and was not included in the ROD. A detailed analysis of Alternative 1 was included in the FS and the no action alternative is discussed in Section 2.9 of the ROD.
Proposed Plan 36	Pg. 32, Preferred Alternative, 1st ¶	Residential use does not necessarily equate to unrestricted use.	The ROD replaces residential use with the phrase "unlimited use and unrestricted exposure."

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Proposed Plan 37	Pg. 32, Preferred Alternative, col. 2, 2nd ¶	We had trouble finding the exposure evaluation or risk basis for Coldwater Creek sediment criteria.	This information can be found in the Feasibility Study for the St. Louis North County Site, Volume II, Appendix D. The text in the ROD has been clarified to provide the risk basis for Coldwater Creek. The following text has been added as Section 2.8.2.4. ***2.8.2.4 Sediment RGs for Radiological COCs*** *"For all material above the Coldwater Creek's mean water gradient, soil RGs will apply. [The mean water gradient is a hydrologic term that refers to the low average water level and reflects the level of the creek that stays damp throughout most of the year.] Sediment RGs apply to material below the mean water gradient. The risks associated with the presence of radiological contamination in sediments were fully evaluated in the Feasibility Study for a variety of scenarios (Appendix D). This assessment demonstrates that the potential risk from exposure to contaminated sediments in Coldwater Creek is within the acceptable risk range. However, relocation of the sediments from the creek to an adjacent property could result in soil contaminant levels that exceed the RGs for UUUE described above. Contamination below the mean water gradient is present in relatively small volumes, which are typically located in intermittent areas such as creek bends where natural deposition occurs. Sediment RGs were developed to meet the soil RGs for UUUE even if sediments from the creek were relocated to an adjacent property. The sediment RGs recognize that the contaminated sediments would be subject to mixing with non-contaminated sediments and soils upon being dredged and relocated. As such, a conservative mixing factor of three times was applied to the surface soil RGs. This reasonably assures that, in the event sediments are placed on surface areas adjacent to the creek, contaminant levels in soil will not exceed the surface soil RGs suitable for unlimited use and unrestricted exposure. The remediation goals derived for sediments are 15 pCi/g of Ra-226, 43 pCi/g of Th-230 and 150 pCi/g of U-238 as an areal average of 100 square meters. The estimated volume of sediment below the mean water gradient with concentrations of COCs that exceed 15/43/150 pCi/g for Ra-226, Th-230, and U-238, respectively, is 500 cubic yards. These remediation goals assure that Coldwater Creek and the surrounding area will remain protective under all future anticipated land use conditions (i.e., recreational/trespasser, maintenance, construction, and utility uses) and minimize adverse environmental impact associated with sediment excavation in Coldwater Creek."*

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Proposed Plan 38	Pg. 32, Preferred Alternative, col. 2, 3rd ¶	Further explain the plan to release roads based on final status surveys. Will a focused data collection effort be undertaken or will this be addressed on an ad hoc basis? Another objective will be to better define the locations and concentration, and to identify known versus presumed conditions.	Remedial Investigation, along with data from additional studies (such as the *North St. Louis County Sites Haul Road Analysis*), will be used to identify data gaps and gather technical information and data necessary to close out the site. RI data is used to delineate the inaccessible soil beneath roads and to determine where further investigation is warranted. In addition, one Final Status Survey Plan will be developed and coordinated with the regulators to address the inaccessible soil beneath roads. No additional environmental documentation (RODs, EE/CAs, etc.) is envisioned to address the "inaccessible soil". Language referencing future environmental documentation does not appear in the description of the final Selected Remedy in the ROD.
Proposed Plan 39	Pg. 32, Preferred Alternative, col. 2, 4th ¶	This says that limited dredging may be used for Coldwater Creek. What other method is being considered for sediment removal?	Dredging is the primary method being considered for sediment removal at Coldwater Creek, but if little or no water is present in the creek, conventional excavation methods could also be used. Section 2.12.2.2 of the ROD includes the following text: "*Sediment will be dredged or excavated using conventional equipment based on the level of the water. Best management practices will be used while excavating Coldwater Creek sediment to ensure that no more than de minimus discharge is returned to Coldwater Creek and long-term stream integrity is maintained."*
Proposed Plan 40	Pg. 33, Preferred Alternative, col. 1, 3rd ¶	The applicable standards for surface water treatment need to be identified.	The sentence will be revised in the ROD to state, "*Water encountered during excavation activities will be managed in accordance with water management plans developed as part of the remedial action design and work plans. Water that meets the NPDES criteria specified in Table 2-17 may be discharged into Coldwater Creek. Water that exceeds the NPDES criteria specified in Table 2-17 will either be discharged through a publicly owned treatment works (POTW) or treated as appropriate." The numerical standards are listed in Table 2-17 (ARARs) of the ROD.*

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Proposed Plan 41	Pg. 33, Preferred Alternative, col. 1, 2nd ¶	Under CERCLA, cost is not an overriding consideration in determining whether or not to apply treatment.	Technical limitations of treatment alternatives, rather than cost, preclude treatment as a principal component of the remedy. The following explanation appears in Section 2.10.2.4 of the ROD. "*Alternative 3 would provide a limited reduction both in the volume of contaminated soil and in the mobility of some site contaminants of concern through treatment (soil washing, phytoremediation, and soil sorting). The use of soil washing would be effective in treating the soluble contaminants like uranium. However, the large presence of insoluble metals such as radium sulfate and thorium in soil that is rich in fines, clays and organic matter, as is the case for the North St. Louis County sites, makes soil washing ineffective because the treated soil would continue to be radiologically contaminated. Phytoremediation (using plants to draw soluble contamination from soil) could potentially reduce the concentration of soluble metals (such as uranium) in soils but would be of limited benefit in this case because it is not effective as a means of treating soils containing the relatively insoluble metals that exist within most of the North St. Louis County sites. Soil sorting is of limited value for soils containing radium but is not technically viable as a treatment option for volume reduction of fine (clay) soils contaminated with thorium."*
Proposed Plan 42	Pg. 33, Preferred Alternative	No mention is made of the standards or criteria being applied to buildings or structures left in place.	This comment refers to the Preferred Alternative. The standards or criteria pertaining to structures and buildings left-in-place have been provided in the ROD in Sections 2.8.2.2 and 2.12.2.5. *The criteria are also shown in Table 2-14 of the ROD.* Additional information can be found in the document entitled *Derivation of Site-Specific Derived Concentration Guideline Levels (DCGLs) for North County Structures.*
Proposed Plan 43	Pg. 34, Preferred Alternative	The full scope and purpose of the stewardship plan, and expectations for how it will be developed in conjunction with the DOE should be explained.	Additional information has been added to the discussion of institutional controls (Section 2.12.2.6) and the Long-term Stewardship Plan (Section 2.12.2.9). Under the MOU, implementation of the Long-term Stewardship Plan is a USACE responsibility from its approval until two years after completion of the remedial activities. At that time, responsibilities will be transferred to DOE.

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Comment No.	**pp/§/¶**	**Comment**	**Response**
Proposed Plan 44	Pg. 34, Preferred Alternative	Where is there an explanation of what is meant by "short-term monitoring"? What is the anticipated end point? What criteria would be applied to determining whether long-term monitoring is required to assess potential contaminant migration from contaminated soils beneath roads, railroads, and other permanent structures? What is the basis for the judgement that this might be necessary? The text says this type of monitoring could be performed. Is this the subject of one of the future decision documents?	"Short-term monitoring" was used to refer to monitoring occurring during the response action. This term has been deleted from the ROD. The following text has been included in the ROD (Section 2.12.2.8) to clarify: *"The final remedy for ground water and surface water is monitoring. Monitoring activities for the Selected Remedy consist of monitoring during the response action and long-term monitoring at areas where soil contamination remains above RGs for UUUE.* *Response-action monitoring will be conducted to assess the improvement of water quality due to source removals. Removal of the source material will prevent the leaching of COCs from soil and sediment to ground water and surface water. In the event that the ground-water monitoring portion of the remedial action indicates the presence of COCs at significantly increased concentrations and total uranium significantly above 30 µg/L, an evaluation of potential response actions would be conducted and an appropriate response would be implemented. Significantly increased concentrations are defined as doubling of an individual COC concentration above it's the upper confidence level of the mean (based on the historical concentration before remedial activity) for a period of twelve months.* *Monitoring of ground water (Unit 2 of HZ-A and Unit 4 of HZ-C), surface water and sediment during the response action at SLAPS, HISS, Futura Coatings Company, and Coldwater Creek will be conducted to ensure that the response action does not impact ground water or surface water. Response-action monitoring of shallow (HZ-A) and deep (HZ-C) wells may continue for a period of up to two years beyond an area's remedial action completion that achieves unrestricted use and unlimited exposure.* *Response-action monitoring of HZ-A ground water will be used during the term of remedial action to assess the effects of the remedial action on HZ-A ground-water quality, and potential transport of COCs through HZ-A ground water to Coldwater Creek. Results of response-action monitoring will be used to ensure remedy protectiveness and determine whether long-term monitoring will be required. Low impact to the ground and surface waters is assured when the primary mobile COC for ground water, Total Uranium, has fallen below the mean (temporal) total-uranium concentration of 30 µg/L. While*

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			deemed unlikely, continued monitoring for Unit 2 of HZ-A may be required long term if significantly degraded ground-water conditions have been determined. A significantly degraded ground-water condition requires all of the following: 1) that soil COC concentrations have statistically increased (relative to the wells historic data and accounting for uncertainty) for more than a 12 month period; 2) that the degraded well is close enough to impact Coldwater Creek; and 3) that a significant degrading of Coldwater Creek surface water is anticipated. Monitoring of Coldwater Creek surface water to the present indicates that insignificant COC releases have been occurring. The USACE will review ground-water monitoring results of areas of elevated ground-water organics, which are not COCs, before each area's remedial action. The organics' monitoring is to assure RA worker safety and to prepare for possible treatment of excavation water for TCE or its by-products above disposal limits. Organics' monitoring will not be conducted after remedial action is complete. *Response-action ground-water monitoring of HZ-C, Unit 4, is proposed to document the protection of the limestone aquifer during the response action. Analyses and prior studies indicate that mixing of the shallow contaminated ground water of HZ-A with ground water of HZ-C has not occurred. Impacts to HZ-C are not anticipated.* *Response-action surface-water and sediment monitoring of Coldwater Creek will be conducted until the creek has been remediated to document that remedial actions are having a positive effect on the creek, and to provide additional data to assess whether Coldwater Creek is being measurably affected by COC migration from HZ-A. Surface water has experienced very low impacts from soil COCs.* *Long-term monitoring is required to address areas where contaminants remain at levels above the RGs at the Futura Coatings Company and along McDonnell Boulevard. Long-term monitoring includes ground-water and surface-water monitoring and monitoring of radon levels in structures located on inaccessible contaminated soils, such as the Futura buildings.* *For the Selected Remedy, long-term monitoring of ground water (HZ-A only) will be performed at Futura buildings and McDonnell Boulevard to assure protectiveness of this action where residual contamination remains and to*

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			verify that ground-water and surface-water conditions do not degrade. Excavation and offsite disposal at all properties (except inaccessible areas) removes the need to monitor HZ-C (Unit 4) and HZ-E ground water. Ground-water monitoring would continue until determined to be no longer required as part of the five-year review process. Long-term monitoring may be discontinued when the contamination has low impact (i.e., the mean (temporal) total-uranium concentration is below 30 µg/L). Monitoring that has not met the assurance level of low impact will be continued subject to five-year reviews. Long-term surface-water monitoring of Coldwater Creek would only be required to appraise potential impacts from significantly degraded ground-water conditions. The decision to continue or cease monitoring of HZ-A ground water will be based upon COC concentrations in HZ-A ground water, the well's position at the site, and the anticipated rate of COC delivery to Coldwater Creek. *Excavation perimeter air monitoring will be conducted during excavation activities. Monitoring will consist of both real-time (continuous readout) and time-integrated sampling. Real-time monitoring is conducted for lower exposure limit, oxygen level, particulates, and organic compounds. Time-integrated sampling consists of mid-volume and low-volume samplers for total alpha and total beta measurements. Radon monitoring is conducted to determine whether radon releases are occurring.* *Long-term monitoring of radon may be required due to Ra-226 under permanent structures remaining at levels above the RGs. Radium-226 exceeding the concentrations specified in 40 CFR 192.12 has been measured under the southern-most building on the Futura Coatings Company property. As only one sample has been collected under the foundation of the northern building, the potential exists for similar concentrations to exist under this structure. Radon monitoring will be conducted in these two structures to assess whether radon concentrations comply with the relevant and appropriate standards in 40 CFR 192.12(b). These standards state that "in any occupied or habitable building, the objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 working levels (WL)." Radon emanations will be protectively addressed consistent with this standard.*

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			The radiation standard of 20 microroentgens (µR) per hour, stated in 40 CFR 192.12 for occupied or habitable buildings, corresponds to a concentration of Ra-226 from a six-inch layer of soil of 120 and 150 pCi/g under a four-inch layer of asphalt and concrete, respectively. The concentrations of Ra-226 under a six-inch layer of asphalt and concrete equate to 280 and 400 pCi/g, respectively. Corresponding soil concentrations can be determined for other scenarios on a case-by-case basis based on the amount of shielding provided by the associated cover materials. Protectiveness of inaccessible soils will be assessed by comparison of gamma radiation levels with the 20 µR per hour standard or by calculation of the soil concentration corresponding to the Ra-226 gamma radiation standard when the residual soil concentration data are available."

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GENERAL 1	**Alternative Selection**	We desire a remedy that removes ALL contamination and eliminates the need for long-term care and institutional controls. However, we recognize it is not practical or cost effective to immediately remove contamination at inaccessible areas at this time. Alternative 6 with proper revisions comes closest to the desired goal. When the contamination under the roads, buildings and rail lines is accessible, we expect the federal government to remove the waste and adequately dispose of it. In the interim, those areas must be adequately managed to keep track of the waste and minimize any negative impacts to the public, the environment and the local economy.	Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria.
GENERAL 2	**Alternative Selection**	We acknowledge that a substantial economic burden might be imposed upon the local industry, landowners, and municipalities during the removal of this contamination. Any costs to relocate businesses, utilities, and reroute transportation should be part of the remedial action costs and not the responsibility of the municipalities, landowners, renters, or utility companies. These potential costs should be evaluated at this time.	USACE does not see a benefit of evaluating these potential costs at this time. Including such costs in Alternative 6 would only increase its costs, thereby making it less desirable. Alternative 6 has already been eliminated for a variety of reasons. USACE does not anticipate relocation of businesses or rerouting of traffic during the implementation of the Selected Remedy. Utility relocation will be addressed on a property-by-property basis.
GENERAL 3	**Alternative Selection**	Consideration of any alternative that leaves contamination behind must also provide a plan for long-term care with necessary funding secured. A trust or foundation dedicated to long-term monitoring and maintenance for this project is but one option that should be considered. Please describe how sufficient funds will be available to address the remaining cleanup efforts necessary, in addition to the monitoring and maintenance required. At this point, we can not concur with an option that does not provide a secure funding source for long-term care.	A Memorandum of Understanding (MOU) between USACE and DOE has been executed. Active remediation under the ROD is the responsibility of USACE. Under the MOU, implementation of the Long-term Stewardship Plan is a USACE responsibility for 2 years after completion of remedial activities. At that time, responsibility for continued implementation transfers to the DOE. The 2-year timeframe for transfer will allow DOE sufficient time to incorporate associated costs into its agency budget as part of the Federal Government's budget process. With regard to inaccessible soil, USACE will impose institutional controls, as appropriate, and enforcement of such institutional controls will be a part of long-term stewardship obligations under the MOU.

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GENERAL 4	**Alternative Selection**	Radon must be considered; and monitoring, which includes action levels and corrective measures identified, must be provided when leaving contamination underneath buildings for any length of time. Due to the known health effects of Radon, efforts to mitigate the impacts resulting from waste or residual contamination must be incorporated in this decision and consider input from the public and regulatory agencies.	As stated in the ROD, radon monitoring will be conducted as necessary in appropriate buildings to assure that radon concentrations comply with standards. These standards state that "in any occupied or habitable building, the objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 working levels (WL). In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL..."
GENERAL 5	**Stewardship Plan**	The Department of Energy (DOE) is visibly absent from development of this plan. As recipient of the sites management upon completion of the cleanup. Please clarify if DOE has the responsibility for the residual contamination, inaccessible areas and the resulting responsibilities under the Stewardship role? DOE's input and concurrence to assure long term stewardship must be provided. What steps will the U.S. Army Corps of Engineers (USACE) take to secure DOE participation and what are the results to date?	A Memorandum of Understanding (MOU) between USACE and DOE has been executed. Active remediation under the ROD is the responsibility of USACE. Under the MOU, implementation of the Long-term Stewardship Plan is a USACE responsibility for 2 years after completion of remedial activities. At that time, responsibility for continued implementation transfers to the DOE. The 2-year timeframe for transfer will allow DOE sufficient time to incorporate associated costs into its agency budget as part of the Federal Government's budget process. With regard to inaccessible soil, USACE will impose institutional controls, as appropriate, and enforcement of such institutional controls will be a part of long-term stewardship obligations under the MOU. USACE is currently working with the DOE Office of Legacy Management to develop this plan. To date, DOE has participated in review of the North County FS/PP, conducted numerous site visits, participated in the public meeting, and provided the outline for the long-term stewardship plan. DOE will be provided with a copy of the ROD.

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GENERAL 6	**Stewardship Plan**	Institutional Controls have not been sufficiently evaluated in accordance with the recent EPA guidance in the feasibility study. Please clarify how the evaluation and use of these controls were conducted in accordance with the guidance and provide the necessary assessment. IC's should undergo the same rigorous development in comparison to the 9 criteria (Protective of Human health and the environment, meet ARARs, Long term effectiveness, permanence or reliability, etc) as any other component of the remedial alternatives. Use of guidance issued by the U.S. Environmental Protection Agency (EPA) is required to adequately develop ICs and long-term operation and maintenance (Stewardship) in the feasibility study.	The FS alternatives were evaluated in accordance with EPA and DOD policy and guidance. The FS includes a discussion of the various types of institutional controls that would be used for each alternative (Section 3.6.3, Table 5-1) and an evaluation of these controls with respect to the CERCLA criteria (Section 5.2).
GENERAL 7	**Stewardship Plan**	An acceptable Long Term Stewardship Plan must be developed prior to issuance of a ROD, that demonstrates stewardship is feasible for the alternative selected. We believe the plan must provide enough of the working details to demonstrate that long-term care and controls will not hinder economic development and become a burden of the local governments and landowners. In addition to record keeping and institutional controls, necessary services must be accounted for such as: technical support, contamination removal, storage, transportation, community updates, plus utility and construction worker education.	A demonstration of stewardship feasibility does not require complete development of a Long-term Stewardship Plan. The Long-term Stewardship Plan for the North St. Louis County sites is currently being developed and coordinated by representatives of the USACE, U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA), Missouri Department of Natural Resources (MDNR), local municipalities, utility companies, and the Oversight Committee. The Long-Term Stewardship Plan will define the responsibilities for site monitoring, maintenance, and reporting; institutional controls; information and records management; and, environmental monitoring.
GENERAL 8	**Post Remediation Risk Assessment**	The soil removal criteria is not an unrestricted use goal, despite that being stated in the Proposed Plan. The criteria does not meet CERCLA risk requirements. Some minimal land controls and care will be required unless post cleanup assessments show concentrations of COC's are low enough to meet CERCLA risk requirements for unrestricted future use, i.e. a suburban farmer/resident with a garden).	The RGs were developed pursuant to ARARs and are appropriate for release of property for unlimited use and unrestricted exposure. Residual site risk assessments will confirm protectiveness of response actions. Based on experience at SLDS and North St. Louis County sites, it is expected that achievement of the RGs will be fully protective and fall within the CERCLA risk range.
GENERAL 9	**Post Remediation Risk Assessment**	The NC ROD should use verbiage similar to the SLDS ROD that describes the use of post-remedial risk assessments to determine the needs for long-term care. Page 69 and 70 of the SLDS ROD states: - *"A post-remedial action assessment will be performed to describe the level of risk remaining from MED/AEC contaminants following completion of remedial activities."* - *"Final determinations as to whether institutional controls and use restrictions are necessary will be based on calculations of post remedial action* ***risk derived*** *from actual residual conditions. Five year reviews will*	The ROD includes provisions for residual site risk assessments to evaluate the overall protectiveness.

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		be conducted per the NCP for residual conditions that are unsuitable for unrestricted use." *- "Institutional controls may include land use restrictions for those areas having residual concentrations on contaminants unsuitable for unrestricted use. This determination will be made based on* ***risk analysis*** *of the actual post-remedial action conditions."* *- "For residual conditions requiring use restrictions after the period of active remediation, coordination with property owners and local land use planning authorities will be necessary to implement deed restrictions or other mechanisms to maintain industrial/commercial land use."* *-* ***"Protactinium-231 (Pr-213) and actinium-227 (Ac-227)*** *will be included in the analyses for the post-remedial action residual site risk; . . ."*	
GENERAL 10	**Contaminated Buildings**	Buildings near the Hazelwood Interim Storage Site (HISS), and identified on the various maps, have not been sufficiently characterized for radiological or hazardous waste. Please prepare a proposal to characterize these facilities and the associated means, including specific criteria, to decontaminate or remove these buildings. This information should be provided to the public and regulators for review with subsequent comments or approval incorporated into the NC ROD.	USACE has adequately characterized the buildings near the Hazelwood Interim Storage Site (HISS) for purposes of selecting a protective remedy. The standards or criteria pertaining to structures and buildings have been provided in the ROD in Section 2.12 and 2.8.2.2. Additional information can be found in the document entitled *Derivation of Site-Specific Derived Concentration Guideline Levels (DCGLs) for North County Structures*. Specific information regarding the DCGL document was presented at the April 9th St. Louis Oversight Committee meeting and made available to the public via the St. Louis FUSRAP web site. A description of this document was also included in the FUSRAP newsletter, which was distributed to all interested stakeholders, including the property owners. A notice regarding this document's availability was published in the St. Louis Post Dispatch. A letter was also sent that explained the document and public review period.

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GENERAL 11	**Contaminated Buildings**	Information regarding both radiological and chemical contamination of buildings surrounding HISS should also be made available to the workers in these facilities. The department provided a report in September 2001, which presented concerns regarding these buildings surrounding HISS. These concluding statements were made during the time residues were being processed and stored there. Although no responses have been provided to date, they should be and the associated costs included. - The interior of the FUTURA buildings, including any floor drains and impacted sewers, should be characterized due to their affiliation with operations conducted by the Commercial Discount Corp. - The interior of the buildings located on VP-02(L) should be characterized because contamination has already been found on top of the building and the ventilation was very susceptible to pulling in dust from the HISS site. - The presence of FUSRAP contamination on or in buildings located at VP-02(L), VP-03(L), VP-01(L), VP-09(C), VP-04(L), VP-05(L), and VP-39 should be defined. An extensive survey and sampling event for each property may not be required. Instead, the extent of investigation on each property should be dependent on the potential for impact as determined by preliminary findings from key locations or property immediately upwind from each other (with the wind originating from a direction corresponding to HISS).	Impacted properties at the North St. Louis County sites will be investigated with MARSSIM. At the conclusion of sampling, USACE will communicate this information to the regulatory agencies and the property owners. Site closeout will require EPA concurrence & signature. The USACE is not aware of any affiliation between Futura and Commercial Discount Corporation.
GENERAL 13 (Note: There is no general comment #12)	**Coldwater Creek**	Coldwater Creek, whether above or below the mean water level, needs to achieve the same protective standards as the other impacted sites. If it is determined that this cannot be economically achieved, then rigorous monitoring and procedural safeguards are needed in the long-term stewardship plan. Coldwater Creek has not been adequately characterized to identify and monitor both the radiological and or hazardous materials throughout its length that are attributable to USACE as well as Manhattan Engineering District/Atomic Energy Commission (MED/AEC) or DOE. As a dynamic system, these materials continue to migrate and pose threats to unknowing landowners or individuals downstream.	USACE has adequately characterized Coldwater Creek for purposes of selecting a protective remedy. Coldwater Creek will be investigated further, prior to remediation, to identify data and technical information needed to support the remedial design. The soil above the mean water gradient will be remediated to the RGs for surface and subsurface soil. Although the sediment below the mean water gradient would be remediated to different RGs, removal of the sediment to these RGs will be fully protective. The RGs for sediment take into account the possible redeposition of contaminated sediments during flooding. Remedial designs will consider the future potential transport of FUSRAP COCs through flooding. Minimizing and mitigating the effects of flooding during the remedial actions will be included in the design package.

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GENERAL 14	**Ground Water Contamination**	**Groundwater Contamination** Since the plan proposes to leave contamination in the (upper) groundwater units, monitoring for as long as a threat exists (perpetuity) is required to ensure no adverse impacts occur to Coldwater Creek or the drinking water (lower) units. Action levels, contingency plans, and a monitoring network are required as a component of Long-Term Stewardship in order to assure current and future generations that the remediation is protective. Please identify the details of how and where these components will be noted in the ROD.	Both response-action and long-term monitoring are included as part of the Selected Remedy. Response-action monitoring will be conducted to assure that remedial action does not degrade the present ground-water conditions. In addition, long-term monitoring of ground water (HZ-A only) would be required at the Futura buildings, and McDonnell Boulevard to assure protectiveness of the Selected Remedy and to verify that ground-water conditions do not degrade. Ground-water monitoring would continue until determined to be no longer required as part of the five-year review process. Section 2.12.2.8 of the ROD provides additional details concerning the ground-water monitoring. No specific action levels will be provided. Additional monitoring or other actions would be tied to changes in contaminant trends, i.e., statistically significant increases in the site soil COC concentrations. The ground-water monitoring would continue and the results would be used to determine if there is a need for any additional actions. The five-year review process will evaluate the effectiveness of all components of the remedy, including monitoring. Any determination to cease monitoring will be documented in the five-year reviews and will be completed by USACE or DOE for the site in consultation with the EPA and MDNR. Monitoring is not envisioned to be required in perpetuity.

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GENERAL 15	**Ground Water Contamination**	Hydrologic Zone (HZ)-A groundwater, although not currently used as a water supply, has been impacted by site contaminants. Though no contaminants of potential concern (COPC) have been found in the lower HZs, shallow groundwater is considered "waters of the state" and groundwater must be considered a media of concern with appropriate monitoring to assure the remediation remains protective.	Shallow ground water will be monitored during the remedial action and for a period of two years beyond the remedial action completion that achieves unrestricted use and unlimited exposure. The media of concern specified in the RAOs are limited to primary media in which contamination poses unacceptable risks to human health and ecological receptors. Shallow ground water is addressed as a potential migration pathway in the 4th RAO. The following text is in Section 2.8.1 of the ROD: *"Remove the potential for ongoing migration of soil contaminants to the shallow ground-water system (HZ-A) and Coldwater Creek. Accomplishing this objective would also preclude the potential for future impacts to the deep ground-water systems (HZ-C, HZ-D, and the usable ground-water resource HZ-E)."* An industrial exposure scenario including dermal exposure to contaminants was evaluated. Current shallow ground-water contaminant concentrations were found to be protective of human health and the environment for the posed scenario.
GENERAL 16	**Ground Water Contamination**	The current PP addresses the issue of groundwater in areas where contaminated soils are inaccessible and will remain in place after site closure under institutional controls. It is suggested in the PP that groundwater monitoring *could* (emphasis added) be performed. The state must insist that groundwater monitoring be performed in those areas where inaccessible contaminated soil will be left in place for an indefinite period of time.	Long-term monitoring of ground water (HZ-A only) will be performed at Futura Coatings Company and McDonnell Boulevard to assure protectiveness of this action where residual contamination remains and to verify that ground-water and surface-water conditions do not degrade. Ground-water monitoring would continue until determined to be no longer required as part of the five-year review process. Long-term monitoring may be discontinued when the contamination has low impact (i.e., the mean (temporal) total-uranium concentration is below 30 µg/L). Monitoring that has not met the assurance level of low impact will be continued subject to five-year reviews. Long-term surface water monitoring of Coldwater Creek would only be required to appraise potential impacts from significantly degraded ground-water conditions. The decision to continue or cease monitoring of HZ-A ground water will be based upon COC concentrations in HZ-A ground water, the well's position at the site, and the anticipated rate of COC delivery to Coldwater Creek.

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GENERAL 17	**ARARs**	All ARARs must be recognized and included in the final ROD. Currently the plan only states that these items will be met but not necessarily be included in the ROD. Some of the needed ARARs include the Safe Drinking Water Act, Missouri's monitoring well construction Code, Missouri's Solid Waste Management Laws and Regulations, Missouri General Protection of Groundwater Quality and Resources, Missouri Radiation Regulations-Protection Against Ionizing Radiation, Disposal of Radioactive Wastes, Hazardous Material Transportation Regulations (49 CFR Part 171 & 172, Clean Air Act (40 CFR Part 61 Subpart I dealing with limits on radionuclide emissions to the air), and RCRA Generator and characterization requirements. The state's letter of September 17, 1998, contains a complete list of ARARs and reasons for their use.	USACE has identified the ARARs for the North St. Louis County sites consistent with the requirements of CERCLA §121(d), 42 USC §9621(d), which identifies the requirements that must be followed to determine the degree of cleanup a CERCLA remedial action must achieve. The ARARs selected for the North St. Louis County sites establish the degree of cleanup for the remedial action consistent with this statutory requirement. To the extent other laws not related to the cleanup standard establish legal requirements related to the remedial action, the requirements will be described in workplans to ensure compliance by USACE and its contractors.
GENERAL 18	**Thorium Cleanup**	The cleanup criteria proposed for thorium is not consistent with the EPA standards and directives (ref. 9200.4-25) in the Uranium Mill Tailings Radiation Control Act (i.e. 5/15 for radium and thorium), nor does it meet the St. Louis Site Remediation Task Force recommendation. The stated goal for the NC sites is unrestricted future use so the reasoning for leaving residual thorium contamination at a higher level is unclear. The more waste removed leaves fewer sites where use restrictions or controls must remain.	The RGs were developed pursuant to ARARs, and are fully protective of human health and the environment, and achieve residual conditions consistent with guidance. The 15 pCi/g subsurface Ra-226 standard, together with corresponding concentrations of Th-230 and U-238, are applied to soils below the mean water gradient. This standard is fully protective for all scenarios. The cleanup criteria for thorium-230 are based on the most restrictive of benchmark dose, risk from thorium-230 and ingrowth of radium-226 at the 5 pCi/g level defined in 40 CFR 192 and related EPA guidance. The approach is based on recent federal guidance that was not available at the time of the St. Louis Remediation Task Force. The criteria is protective of human health and the environment irrespective of land use and complies with ARARs.

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GENERAL 19	**Ecological Impacts**	The preliminary screening for ecological risk is not adequate to evaluate impacts to Coldwater Creek, nor is it sufficient to assess natural resource injury. A thorough ecological risk assessment is required. In addition, an evaluation of the means the USACE proposes to minimize ecological impacts resulting from cleanup efforts in the drainage channel have not been identified.	The screening-level ecological risk assessment conducted for the North St. Louis County sites followed EPA guidance for the ecological risk assessment process. As such, it is adequate for evaluating impacts to Coldwater Creek. The decision that additional assessment was not required was based on the low probability of significant ecological effect on local populations and the lack of unique, rare and critical habitat at the North St. Louis County sites. It was also based on the low risk relative to uncertainty in risk estimates, i.e., the risk values are so low that the uncertainties inherent in the risk assessment assumptions (including uncertainties in the conceptual model, natural variation and parameter errors) may exceed the calculated risk. USACE has evaluated short-term effectiveness to include potential ecological impacts during remediation. USACE proposes to minimize ecological impacts to Coldwater Creek through the use of hydraulic dredging or other construction equipment that would be capable of removing contaminated cohesive sediments with minimal disturbance.
GENERAL 20	**FFA**	The department requests that the federal agencies amend the Federal Facility Agreement to include the state as an equal party. Although the EPA and the USACE have acknowledged the department's involvement and participation, CERCLA (§ 120) clearly supports having the states provide a formal role in these cleanup agreements, and the department desires to exercise that option.	The USACE appreciates the continued support of the MDNR in accordance with the Cooperative Agreement. While CERCLA 120 outlines the provisions for state participation and delisting of sites from the NPL, CERCLA §120 does not require the state to be a signatory party in the FFA. The protectiveness of the cleanup will be addressed as part of the 5-year review process, in accordance with CERCLA. USACE looks forward to continuing its working relationship with MDNR.

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GENERAL 21	**Public Input**	The formal public meeting held May 29, 2003, did not provide an opportunity for discussion. Citizens were only able to voice their concerns. The USACE should provide an additional forum prior to finalizing the ROD to let them know if their concerns were addressed or have an opportunity to discuss agreed to resolutions. While the requirement for a public meeting was met, the public's best interests may not have been served without an opportunity to exchange in constructive dialog to discuss their concerns, questions and reasoning. A request is made for a similar opportunity to occur prior to transition of any portion of the site to the DOE for long term stewardship.	The public was afforded a full opportunity to comment, and all comments received have been considered by the decision-maker in selecting a final remedy. As stated in the public notices mailed to the site mailing list, the formal public meeting held on May 29, 2003 consisted of two parts: 1) an informal public workshop, wherein each participating member of the public was provided and opportunity to meet individually with a USACE representative to discuss their specific concerns and 2) a public hearing where all interested parties were able to formally voice their opinions/concerns, which were captured in the transcripts of the public meeting. USACE representatives remained available following the public hearing to extend the opportunity for additional individual dialog. The USACE is accordingly in full compliance with CERCLA requirements for public participation. In addition, the USACE will provide a further opportunity for public participation prior to transition of the North St. Louis County sites from USACE to DOE.
GENERAL 22	**West Lake Landfill**	At the recent public meeting, the public again reminded us that legacy waste from the NC site is improperly stored at the West Lake Landfill. The federal government has administratively separated remediation of West Lake Landfill and the NC sites. Actions proposed for the NC sites should also consider addressing cleanup of the federal waste at the West Lake Landfill site.	Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. The West Lake Landfill was listed on the NPL on August 30, 1990. USEPA Region VII is the lead agency for the landfill.
Proposed Plan 1	Page 4	In the site history portion of this document, there is no mention of the extensive effort and contribution made by the St. Louis Task Force. It would be appropriate to make note of this and include the recommendations of that group for the NC sites.	The Contributions of the St. Louis Task Force are discussed in the ROD in Section 2.3, Community Participation, which covers the public involvement in the CERCLA process.

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Proposed Plan 2	Page 9	Page 9, last paragraph discusses the general contamination characteristics as being radiological. The department also concludes that there may be Resource Conservation and Recovery Act (RCRA) materials present, which originated from the chemical processing of the radioactive ores as well as from the vehicle maintenance activities that occurred during the time the site was used as an active storage facility for the downtown site cleanup activity. There is in fact volatile organic compounds (VOC) found in the monitoring wells. While the USACE assertion that the VOCs are more attributable to other industry in the vicinity, there is no convincing data confirming that there is no RCRA material remaining. Therefore, add RCRA regulations to the Applicable or Relevant and Appropriate Requirement section of the proposed plan and ROD.	USACE has identified the ARARs for the North St. Louis County sites consistent with the requirements of CERCLA §121(d), 42 USC §9621(d), which identifies the requirements that must be followed to determine the degree of cleanup a CERCLA remedial action must achieve. The ARARs selected for the North St. Louis County sites establish the degree of cleanup for the remedial action consistent with this statutory requirement. To the extent other laws not related to the cleanup standard establish legal requirements related to the remedial action, the requirements will be described in workplans to ensure compliance by USACE and its contractors.
Proposed Plan 3	Page 10	Page 10, last sentence of the paragraph bolded heading of **Ground Water**: Since there was no ecological assessment performed on Coldwater Creek, there is insufficient evidence that discharge of (contaminated) groundwater to the creek is not causing an impact. Please revise or remove this statement.	The screening-level ecological risk assessment conducted for the North St. Louis County sites followed EPA guidance for the ecological risk assessment process. As such, it is adequate for evaluating impacts to Coldwater Creek. The decision that additional assessment was not required was based on the low probability of significant ecological effect on local populations and the lack of unique, rare and critical habitat at the North St. Louis County sites. It was also based on the low risk relative to uncertainty in risk estimates, i.e., the risk values are so low that the uncertainties inherent in the risk assessment assumptions (including uncertainties in the conceptual model, natural variation and parameter errors) may exceed the calculated risk. USACE has evaluated short-term effectiveness to include potential ecological impacts during remediation.
Proposed Plan 4	Page 11	Page 11, last paragraph on the left side which discusses ecological risk: The ecological screening is not sufficient to aid in the determination of Natural Resource Injury Assessments as required of Federal Agencies and for the state of Missouri as the trustee. While the brief presentation here in the proposed plan may be adequate to proceed with the development of the ROD, a more complete characterization of the areas impacted and a more thorough risk assessment are necessary.	The screening-level ecological risk assessment conducted for the North St. Louis County sites followed EPA guidance for the ecological risk assessment process. As such, it is adequate for evaluating impacts to Coldwater Creek. As a designated trustee, the State of Missouri is responsible for conducting any necessary additional assessments.

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Comment No.	**pp/§/¶**	**Comment**	**Response**
Proposed Plan 5	Page 13	Paragraph entitled **Sediments**, the logic for discounting metals and organics from the Contaminants of Concern (COC) has no scientific basis. The speculation that elevated concentrations are the likely result of area industry does not rule out St. Louis Airport Site (SLAPS) and HISS/Futura as contributors. Please retain arsenic and the five organics as COCs for sediments.	There is a sound scientific basis for screening out metals and organics as sediment COCs based upon site-relatedness. Although organics were detected at concentrations that exceed the acceptable CERCLA risk range in Coldwater Creek sediment, these organics are present at levels within the acceptable CERCLA risk range in soil at the SLAPS and the HISS/Futura (See Appendix D, Attachment 13). Similarly, none of the five organics were identified above the accepted CERCLA risk range in Reach A of the creek. This strongly suggests that the SLAPS and the HISS/Futura are not the source of these organics. Therefore, these COPCs were eliminated as COCs for Coldwater Creek sediment. Arsenic, the one metal that was detected above the accepted CERCLA risk range in Coldwater Creek sediment, was detected at levels below background concentrations in Reach A, adjacent to the SLAPS and the HISS. Sediment samples collected during last three years showed that the maximum concentrations of arsenic occurred at monitoring stations C002, C005, and C007. C002 is the historical upstream environmental monitoring station, which was not impacted by MED/AEC activities. Monitoring station C005, located downstream of surface drainage from the HISS and certain VPs, is used to detect contaminant contributions from the HISS and those VPs. Monitoring station C007, located approximately 3,700 feet downstream of the HISS, is the furthest monitoring station from the SLAPS and the HISS. Areas around these monitoring stations are predominantly industrial. The contaminant distribution indicates that the arsenic is due to the heavy industrial activity in the area and is not associated with historical site activities.
Proposed Plan 6	Page 13	Top right-hand side, paragraph entitled **Ecological Risk**, referencing comment #5 above: Because there has not be a thorough characterization of Coldwater Creek, especially north of I-270, the use of the screening process is not appropriate or sufficient to conclude there is not or has not been an ecological impact. Please revise or clarify that additional assessments may be required to evaluate Natural Resource Injury Assessment.	There was adequate characterization of Coldwater Creek. The screening-level ecological risk assessment conducted for the North St. Louis County sites followed EPA guidance for the ecological risk assessment process. As such, it is adequate for evaluating impacts to Coldwater Creek. As a designated trustee, the State of Missouri is responsible for conducting any necessary additional assessments.

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Comment No.	**pp/§/¶**	**Comment**	**Response**
Proposed Plan 7	Page 14	Applicable or Relevant and Appropriate Requirements and page 15 Derivation of Remediation Goals and Cleanup Levels: The development of the Thorium criteria using 10 CFR 40, Appendix A, Criterion 6(6) should use 5 pCi/g for radium for surface and subsurface as the baseline. Is this how the Thorium criteria was developed?	The RGs proposed for Th-230 are derived in accordance with Criterion 6(6) from the UMTRCA surface soil standard of 5 pCi/g of Ra-226. The 14 pCi/g surface soil standard is the level that results in the in-growth of 5 pCi/g of Ra-226 over a period of 1,000 years. Constraining the concentration of Th-230 in subsurface soil to 15 pCi/g has been shown to achieve the surface RG of 5 pCi/g for Ra-226 at the SLDS and the North St. Louis County sites.
Proposed Plan 8	Page 14	Applicable or Relevant and Appropriate Requirements (ARARs): This office identified several ARARs that have been used at other sites having similar or identical COCs and site conditions. The department requests that the USACE reconsider evaluation of these identified ARARs (submitted Fall 1998) and include them in the ROD. How can ARARs noted in Table 10-1 and 10-2 of the SLDS not be used at this site? Additionally, many of the NC sites are within the 100-year floodplain; regulations for these areas are ARARs, clearly USACE/Civil Works is familiar with all regulations dealing with areas within a floodplain. Additionally, having encountered asbestos materials at SLAPS and potentially at other vicinity properties (VC), regulations regarding asbestos handling and disposal are ARARs.	USACE has identified the ARARs for the North St. Louis County sites consistent with the requirements of CERCLA §121(d), 42 USC §9621(d), which identifies the requirements that must be followed to determine the degree of cleanup a CERCLA remedial action must achieve. The ARARs selected for the North St. Louis County sites establish the degree of cleanup for the remedial action consistent with this statutory requirement. To the extent other laws not related to the cleanup standard establish legal requirements related to the remedial action, the requirements will be described in workplans to ensure compliance by USACE and its contractors.
Proposed Plan 9	Page 17	Right hand side, second paragraph: The soil removal criteria are described as "consistent with the remediation standards used in Engineering Evaluation/Cost Analysis (EE/CA) by DOE prior to transfer." This is incorrect since the surface criteria for Thorium-230 in soils was modified as was the means of computing the sum-of-the-ratios. In addition, the criteria proposed for contamination of the creek sediments, below the mean water line, is completely different for all the radionuclides.	Although the surface soil RG for Th-230 (14 pCi/g) and the SOR equation are not identical to those used in the EE/CA, they are consistent in that both are fully protective of human health and the environment. The DOE did not propose cleanup standards for sediments below the mean water gradient. The criteria for sediment are similarly fully protective of human health and the environment. Fully protective RGs were developed pursuant to ARARs. Residual site risk assessments will confirm protectiveness of response actions.
Proposed Plan 10	Page 17, right hand side, second paragraph	The soil cleanup criteria is called a "remediation goal" and is said to "meet the threshold criteria" for human health and the environment and compliance with ARARs and will achieve a final status that requires no restrictions on land use. This is incorrect. Please refer to comments under the section titled "Comments on Radiological Soil Removal Criteria" and modify these or avoid making similar statements in the upcoming Record of Decision.	The RGs were developed pursuant to ARARs and are appropriate for release of property for unlimited use and unrestricted exposure. Residual site risk assessments will confirm protectiveness of response actions. Based on experience at SLDS and North St. Louis County sites, it is expected that achievement of the RGs will be fully protective and fall within the CERCLA risk range.

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Comment No.	**pp/§/¶**	**Comment**	**Response**
Proposed Plan 11	Page 21, Transportation and Waste Management	The 4th sentence states "trucking may also be used for long distance shipping." The department has concerns with shipping large quantities of these contaminated materials via our highways due to increased potential for accidents and the spread of contamination. Please clarify when and why this option would be used and provide a cost analysis if this option were taken.	Trucking is not expected as a primary option for transport for excavated materials. This was retained as a potential alternative in the event that use of railways could not be accomplished. It should be noted that near completion of remediation, trucking may be used if all railroad loading facilities have been remediated or removed.
Proposed Plan 12	Page 21, Transportation and Waste Management	Crushing rubble and similar material for disposal is described, and then mention is made that "site soils could be used as backfill if they are not impacted, or if they meet the cleanup criteria for surface soils." Due to mismanagement of rubbleized material which has already occurred at the SLDS site regarding the interpretation of material suitable for fill, please confirm that the term rubble and soil is used as intended here and that crushed concrete and building debris will not be used as backfill. We request the USACE provide us with prior notice of the destination of all materials shipped off-site for disposal (please remember Missouri Solid Waste Regulations prohibit placing MED/AEC impacted materials into any Missouri landfills). We also do not concur with reusing excavated soils as fill unless they are determined, with sufficient opportunity for regulator review of the sampling plan and resultant data, not to be impacted.	USACE does not concur with MDNR's portrayal of "mismanagement of rubbleized material" at SLDS. Soil as defined in 40 CFR 192 will be used as backfill if it meets surface soil RGs and exhibits no hazardous characteristics. USACE will notify MDNR if facilities other than those currently under contract are used for disposal. Site soil could be used for backfill if it meets the RGs for surface soil with prior notification to MDNR.
Proposed Plan 13	Page 21, Transportation and Waste Management	The statement is made that "uranium would be recycled if the costs are similar to the cost of disposal." Please acknowledge that no on-site recycling processes are permitted without prior approval. In addition, please provide prior notification to the department and the EPA regarding the destination of materials shipped, including to recycling facilities.	Uranium recycling, if deemed cost effective, would not take place on-site, but at a recycling facility. USACE will notify MDNR if facilities other than those currently under contract are used for disposal or recycling.
Proposed Plan 14	Page 22-25, Alternatives	The sections titled Excavation and Dredging all describe soils and sediment removal criteria as being remediation goals or criteria for unrestricted release. This is incorrect. Please refer to comments under the section titled "Comments on Radiological Soil Removal Criteria" and modify these statements accordingly. Please note that clarification is needed to ensure the reader is aware that post-remedial action risk assessments will decide long-term care and institutional controls.	The RGs were developed pursuant to ARARs and are appropriate for release of property for unlimited use and unrestricted exposure. Residual site risk assessments will confirm protectiveness of response actions. Based on experience at SLDS and North St. Louis County sites, it is expected that achievement of the RGs will be fully protective and fall within the CERCLA risk range.

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Comment No.	**pp/§/¶**	**Comment**	**Response**
Proposed Plan 15	Page 25, last paragraph	Please revise the paragraph to note the need for post-remedial action risk assessments to decide long term care and institutional controls. The statement "No institutional controls would be required for accessible soils" is the goal. However, without post-remedial action risk assessments that demonstrate the goal was met, the statement is misleading.	The RGs were developed pursuant to ARARs and are appropriate for release of property for unlimited use and unrestricted exposure. Residual site risk assessments will confirm protectiveness of response actions. Based on experience at SLDS and North St. Louis County sites, it is expected that achievement of the RGs will be fully protective and fall within the CERCLA risk range.
Proposed Plan 16	Page 26, second column, 3rd paragraph	This paragraph should read: "Five-year reviews should be conducted of the remedy protectiveness to the groundwater, contamination left in place due to accessibility problems, changes to properties with residual concentrations not meeting the CERCLA risk range, the responsiveness to requests for assistance, and data results with responses to action level triggers for buildings being monitored for radon."	The five-year review will assess the protectiveness of the remedy in accordance with 40 CFR 300.430(f)(4)(ii), "If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action."
Proposed Plan 17	Page 29, second column, first paragraph under *Alt.5, etc*.	Discussions on unrestricted use designations need modification in accordance with comments already made on the use of a post-remedial action risk assessment.	The RGs were developed pursuant to ARARs and are appropriate for release of property for unlimited use and unrestricted exposure. Residual site risk assessments will confirm protectiveness of response actions. Based on experience at SLDS and North St. Louis County sites, it is expected that achievement of the RGs will be fully protective and fall within the CERCLA risk range.
Proposed Plan 18	Page 30, continuation of Alternative 5	A claim is made that Alternative 5 does not conflict with state policies regarding radioactive contaminated material in Missouri. Please revise this comment or acknowledge it does not comply with Missouri Solid Waste Regulations.	The Selected Remedy provides for excavation/dredging of all accessible areas with MED/AEC-contaminated soil or sediment above RGs with offsite disposal at a properly permitted disposal facility. MED/AEC-contaminated soil or sediment excavated or dredged as part of FUSRAP response actions will not be disposed in a Missouri sanitary landfill. Missouri Solid Waste Regulations are not applicable.
Proposed Plan 19	Page 32, 3rd paragraph under title "St. Louis North County Site Preferred Alternative"	When stating remediation goals, the word "or" is used instead of the word "and." Please revise this statement or provide clarification, as it sounds to the reader that the radiological COC and corresponding criteria can be chosen rather than using a sum of all three.	The word "or" is appropriate in this context because if any of the individual ROD criteria is exceeded, remediation would be required. "And" would imply that all criteria must be exceeded to trigger remediation. The following text is included in Section 2.12.2.1 of the ROD: Soil in the surface 6-inch layer will be removed if the radionuclide concentrations averaged over any area of 100 m^2 exceed: • 5 pCi/g of Ra-226 above background, or • 14 pCi/g of Th-230 above background, or • 50 pCi/g of U-238 above background.

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Comment No.	**pp/§/¶**	**Comment**	**Response**
			Subsurface soil (soil deeper than 6 inches) will be removed where the subsurface radionuclide concentrations averaged over any area of 100 m^2 and averaged over a 6-inch thick layer of soil exceed: • 15 pCi/g of Ra-226 above background, or • 15 pCi/g of Th-230 above background, or • 50 pCi/g of U-238 above background. Sediment below the mean water gradient will be removed if radionuclide concentrations averaged over any area of 100 m^2 exceed: • 15 pCi/g of Ra-226 above background, or • 43 pCi/g of Th-230 above background, or • 150 pCi/g of U-238 above background The Sum of Ratios (SOR) approach will be used when more than one radionuclide is present. It is shown below: $$SOR_{surface} = \frac{^{226}Ra_N}{5pCi/g} + \frac{^{230}Th_N}{14pCi/g} + \frac{^{238}U_N}{50pCi/g} \leq 1$$ $$SOR_{subsurface} = \frac{^{226}Ra_N}{15pCi/g} + \frac{^{230}Th_N}{15pCi/g} + \frac{^{238}U_N}{50pCi/g} \leq 1$$ The "N" stands for the net (above background) value.

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Comment No.	**pp/§/¶**	**Comment**	**Response**
Proposed Plan 20	Page 32, paragraph 1 under "St. Louis North County Preferred Alternative"	The statement is made that "Institutional controls are used to ensure protectiveness for alternatives at areas in which the residual concentrations exceed the concentrations in ARARs for residential use . . . ." The soil removal criteria was not risk based and cannot be associated with an end-use scenario. Please revise the paragraph to note the need for post remedial action risk assessments to decide long term care and institutional controls.	"The RGs were developed pursuant to ARARs and are appropriate for release of property for unlimited use and unrestricted exposure. Residual site risk assessments will confirm protectiveness of response actions. Based on experience at SLDS and North St. Louis County sites, it is expected that achievement of the RGs will be fully protective and fall within the CERCLA risk range.
Proposed Plan 21	Page 32, second column, paragraph 3	The paragraph states that "Inaccessible soils . . . are not addressed by this remedial action. The paragraph also states that "New decision documents will identify the response actions to address the inaccessible soils as appropriate." We cannot concur with this proposal unless response actions are pre-defined. Please revise the proposal to remove all contamination or provide a separate stewardship plan that ensures long term care and controls will be available. Comments under the section heading "Long Term Stewardship."	Inaccessible soils will not be excavated under the Record of Decision. The remedy for inaccessible soils consists of implementation of institutional controls. Selection of this remedy for inaccessible soils considers the future anticipated land use of inaccessible areas and fully considers each of the nine factors in the NCP with particular emphasis on protectiveness, implementability, short-term effectiveness, long-term effectiveness and permanence, cost, and state and community acceptance. Verification that institutional controls remain protective as a remedy will be assured through the CERCLA five-year review process. Based on current information, none of the inaccessible areas present an unacceptable risk in their current configuration that would require immediate excavation. A long-term stewardship plan will be developed as part of this remedy. See section 2.12.2.9 of the ROD. Language referencing future environmental documentation does not appear in the description of the final Selected Remedy in the ROD.
Proposed Plan 22	Page 32, 7th paragraph under title "St. Louis North County Site Preferred Alternative"	It is stated "This alternative requires institutional controls to ensure that roads are not excavated without appropriate oversight and safety procedures and constraints." Who will oversee and execute these safety procedures after the project has been completed and the USACE no longer has an on-site presence?	Per the final Memorandum of Understanding Between the U.S. Department of Energy (DOE) and the U.S. Army Corps of Engineers (USACE) regarding Program Management and Funding of the Formerly Utilized Sites Remedial Action Program (FUSRAP) responsibility for long-term stewardship of the St. Louis FUSRAP Sites will transfer from the USACE to the DOE two years after completion of the remedial action at the site.

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Comment No.	**pp/§/¶**	**Comment**	**Response**
Proposed Plan 23	Page 32, St. Louis North County Site Preferred Alternative	This section does not give any reference to which excavated soils or other material can be placed back onto the property of origin. Please clarify this. As pointed out earlier, the department does not concur with re-using excavated soils as fill unless they are determined, with opportunity for review of the data prior to use, to be non-impacted.	USACE will notify MDNR if facilities other than those currently under contract are used for disposal. Site soil could be used for backfill if it meets the RGs for surface soil with prior notification to MDNR.
Proposed Plan 24	Page 32, last paragraph	It is stated, "Size reduction would be used for materials such as concrete debris." Will this material be used as backfill material using criteria in the Consolidated Materials Report?	Backfill will be limited to soil as defined in 40 CFR 192.
Proposed Plan 25	Page 33, first column, paragraph 1	The statement is made, "excavated material would be shipped primarily from the rail spurs . . ." Is the USACE considering using other shipping methods? If, so what are they?	Trucking is not expected as a primary option for transport for excavated materials. This was retained as a potential alternative in the event that railways are unavailable. See also response to MDNR Comment PP #11.
Proposed Plan 26	Page 33, first column, paragraph 2	The statement is made "soils may be shipped off-site to a properly permitted disposal site, including sites where uranium is recovered." None of the current disposal facilities have uranium recovery capabilities. Please remember that both the department and the oversight committee requested notification of disposal facilities being considered for use. Are disposal contracts existing for other places than Envirocare in Utah or Envirosafe in Idaho? Please acknowledge that both the oversight committee and the department will be given notice prior to the USACE's signing of new disposal contracts.	No additional disposal facilities are currently being considered. USACE will notify MDNR and the oversight committee if facilities other than those currently under contract are used for disposal or recycling.
Proposed Plan 27	Page 33, first column, second to last paragraph	The plan states, "no remediation of surface waters or ground water is required or included." and "The source removals will improve water quality." The source (soil) removals should prevent further degradation of the water quality; however, improvement of water quality is questionable. Please acknowledge that groundwater data assessment is ongoing and that conclusions regarding the impact of source removal have yet to be made.	Ground-water monitoring will be conducted during and after the remedial action to support an assessment of the effects of the remedial actions and to ensure that no significant migration of contaminants from ground water to surface water is occurring.

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Comment No.	**pp/§/¶**	**Comment**	**Response**
Proposed Plan 28	Page 34, second column, first paragraph	The statement is made that the five-year review is "conducted for only those areas where COCs remain above unrestricted use criteria." Please note that the following statement is more comprehensive: "Five-year reviews should be conducted of the remedy protectiveness to the groundwater, contamination left in place due to accessibility problems, changes to properties with residual concentrations not meeting the CERCLA risk range, the responsiveness to requests for assistance, and data results with responses to action level triggers for buildings being monitored for radon." Please acknowledge the need for revising the statement, and that you would consider including similar verbiage within the ROD.	The five-year review will assess the protectiveness of the remedy in accordance with 40 CFR 300.430(f)(4)(ii), "If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action."
Proposed Plan 29	Page 34, second column	Groundwater monitoring is described. Please see comments under the section titled "Groundwater Contamination" and consider having a discussion on the USACE expectations for short-term monitoring within an upcoming groundwater technical working group meeting.	The USACE has discussed and will continue to discuss ground-water monitoring needs in Technical Working Group meetings, for as long as USACE is responsible for the North St. Louis County sites. Specifically, the HZ-A monitoring needs and the purpose and scope of installing remedial action evaluation wells (RAEW) was discussed in the June 6, 2001 and May 14, 2003 Technical Working Group meetings. The State has been and may continue to be a participant in these meetings.
Proposed Plan 30	Page 35, first column, continued paragraph from page 34	The USACE lists the benefits of Alternative 5. The disadvantages of Alternative 5 are: a) Properties with contamination concentrations above soil guideline criteria will require long term care and controls which could include the monitoring of buildings for radon.- b) Long-term care and controls on all properties could be required, depending on the results from post remedial risk assessments. c) A plan for long-term care and controls is required, and funding for this must be secured. d) Technical support, material storage, plus contamination removal and waste transportation services will have to be located nearby and able to offer a timely enough response to not inhibit local development.	The advantages and disadvantages of Alternative 5 were evaluated using the nine NCP criteria as discussed in Section 2.10.2.2 and 2.13 of the ROD. This evaluation was fully considered in selection of the final remedy.

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Comment No.	**pp/§/¶**	**Comment**	**Response**
Proposed Plan 31	Page 36, first paragraph on the left, see comment 9	Many of the USACE's responses to the state ARAR list had no basis. Additionally, the ARARs identified by the state are consistent with and used at other sites with the same contaminants and setting. Please include the ARAR's list.	USACE has identified the ARARs for the North St. Louis County sites consistent with the requirements of CERCLA §121(d), 42 USC §9621(d), which identifies the requirements that must be followed to determine the degree of cleanup a CERCLA remedial action must achieve. The ARARs selected for the North St. Louis County sites establish the degree of cleanup for the remedial action consistent with this statutory requirement. To the extent other laws not related to the cleanup standard establish legal requirements related to the remedial action, the requirements will be described in workplans to ensure compliance by USACE and its contractors.
Proposed Plan 32	Figure 6	With the exception of the Futura buildings, the remainder of inaccessible areas involve roads or railroads. Some of the railroad spur tracks depicted on the map are presently not used or have been rendered unusable. Why would spur tracks that are not being used or abandoned be considered inaccessible? If the spur tracks are not being used or have been abandoned, the time to remove the contamination is now, rather than place institutional controls that may or may not be effective and cause unnecessary development restrictions to the property owner.	The map of inaccessible areas (Figure 6 in the PP) provides an overview of those areas that could be designated as inaccessible. The volume of inaccessible soil, using 3-D modeling and data from pertinent sample locations, was estimated to be 69,000 cubic yards. This volume estimate is reasonable based on available data. To better define the areas impacted in Figure 6, information as to the location of soil above RGs has been added to figures in the ROD (Figures 2-14 through 2-18). A table has also been added (Table 2-13) to identify specific areas and to include volumes of the inaccessible soil. Additional studies and final status surveys will be used to refine and more accurately delineate residual inaccessible soil that exceeds RGs and requires institutional controls. It should also be noted that the ROD defines soils under active rail lines as inaccessible.
Proposed Plan 33	Figure 6	In addition, has there been a characterization of these roads and railroads to identify whether or not contamination is present? Figure 6 currently depicts all of the inaccessible areas identified are contaminated and will require an enforceable and strict land use control. Why designate all of the areas if in fact there may not be a need? This causes potential development problems to the property owner and it creates an undue cost for local, state, and federal governments to monitor and maintain vigilance of the areas.	The map of inaccessible areas (Figure 6 in the PP) provides an overview of those areas that could be designated as inaccessible. The volume of inaccessible soil, using 3-D modeling and data from pertinent sample locations, was estimated to be 69,000 cubic yards. This volume estimate is reasonable based on available data. To better define the areas impacted in Figure 6, information as to the location of soil above RGs has been added to figures in the ROD (Figures 2-14 through 2-18). A table has also been added (Table 2-13) to identify specific areas and to include volumes of the inaccessible soil. Additional studies and final status surveys will be used to refine and more accurately delineate residual inaccessible soil that exceeds RGs and requires institutional controls.

Specific Comments on the FS			
FS 1		Much of the verbiage in the PP and FS are similar. Therefore, comments made regarding the PP apply to those applicable sections in the FS. However, we reiterate that the document should: a) clearly show that post-remedial action risk assessments will be conducted and suitable to define land use restrictions if removal criteria is not an unrestricted use guideline, b) propose criteria for the decontamination of structures, c) include a long-term-stewardship plan and the necessary funding.	These issues will be incorporated and addressed as previously noted.
FS 2	Page ES-22, 3rd paragraph	This paragraph discusses non-radiological contaminants of concern (COC) and states that only certain chemicals are defined as non-radiological COCs for surface and only a few of these are defined as COCs for subsurface. Please explain the rationale behind this decision. It is also stated that there are different non-rad COCs for SLAPS and contiguous areas and HISS/Latty. Again, please explain the rationale behind this decision. Additionally, is Coldwater Creek included in contiguous areas of the SLAPS? If not, what are the nonradiological COCs for Coldwater Creek?	The rationale behind this decision is outlined in Appendix D of the Feasibility Study with specific emphasis on pages D-44 through 55 and Table D-19. Coldwater Creek is not included in contiguous areas of SLAPS. Several potential contaminants of concern (PCOCs) were identified in surface-water samples from Coldwater Creek. However, site-specific risk assessment results showed that the risks and hazards present are within the acceptable risk range. Hence, no non-radionuclide COCs were identified for Coldwater Creek.
FS 3	Page ES-31, Under the title "Institutional Controls:"	It is stated, "For alternatives that use institutional controls, a long-term stewardship plan would be developed . . ." Please recognize that a long-term stewardship plan should be developed regardless of the use of institutional controls.	A long-term stewardship plan is being developed.
FS 4	Page ES-31, under the section titled "Transportation and Waste Management:"	It is stated, "Site soils could be used as backfill if they are unimpacted, or if they meet the cleanup criteria for surface soils." The state would like a definition of the term "soils." Would this extend to any concrete debris, rock, or other material? In addition, how would sampling be performed on soils to determine if it meets the criteria? Would soil be separated out in different piles according to radiological activity and then how would sampling be performed on these piles? Further concerns regard the approach of mixing soils to reduce the activity so the soil could be used as backfill. This approach is not acceptable. Finally, consent must be obtained from the owner before using "recycled" soil on the vicinity properties.	Soil as defined in 40 CFR 192 will be used as backfill if it meets surface soil RGs and exhibits no hazardous characteristics.

FS 5	Page ES-36, 1st bullet	It is stated that new decision documents will identify response actions to be used when an inaccessible area becomes accessible. When will this new decision document be developed? It is hoped that this decision document will be developed before the project ends so that there will be a plan in place in the case where inaccessible areas become accessible in the future. If a new "decision document" is developed, that process must be addressed within the Federal Facility Agreement framework.	Inaccessible soils will not be excavated under the Record of Decision. The remedy for inaccessible soils consists of implementation of institutional controls. Verification that institutional controls remain protective as a remedy will be assured through the CERCLA five-year review process. Based on current information, none of the inaccessible areas present an unacceptable risk in their current configuration that would require immediate excavation. No additional environmental documentation (RODs, EE/CAs, etc.) is envisioned to address the "inaccessible soil". Language referencing future environmental documentation does not appear in the description of the final selected remedy in the ROD.
FS 6	Page ES-36, 3rd bullet	It is stated, "Controls could also include zoning restrictions at Futura." Why just Futura? What about other vicinity properties where contamination may exist underneath the buildings?	Previous investigations including the July 1987 "Radiological Characterization Report for the FUTURA Coatings Site", January 1994 "Remedial Investigation Report of the St Louis Site" and April 1994 "Feasibility Study/Environmental Impact Statement for the St. Louis Site" have assessed the existence of contamination in and on structures within the St. Louis sites. Elevated levels of COCs have been determined to be present: 1) on the roof, roof vents, west wall and bay area of the structure at VP-2L; 2) under portions of the St Denis Bridge; 3) adjacent to and under portions of foundations of Futura buildings and structures; 4) adjacent to footings for the McDonnell Boulevard bridge over Coldwater Creek; 5) on ledges and equipment etc. inside FUTURA buildings. Contamination is not suspected under other buildings. However, material under the buildings, if found to exceed RGs during pre-design investigations or other removal activities, would be considered as additional inaccessible areas as discussed in the FS.

FS 7	Page ES-37, 1st paragraph	What long-term monitoring be performed at Coldwater Creek where sediment is left above unrestricted use criteria (below the mean water line), and what kind of institutional controls will be in place?	The criteria for sediment below the mean water gradient are fully protective and no institutional controls will be necessary. Sediment below the mean water line will be remediated to the RGs equating to 15 pCi/g of radium-226. These RGs recognize that sediments are subject to both mixing with non-contaminated sediments and to being spread out if excavated. As such, use of these RGs achieves surface soil criteria and is protective for all future anticipated land uses, including residential. Response-action surface-water and sediment monitoring of Coldwater Creek will be conducted until the creek has been remediated to determine whether remedial actions are having any adverse effects on the creek and, to determine whether long-term monitoring will be required. In addition, post-remedial action risk assessments will be conducted to confirm the areas are protective.
FS 8	Figure ES-3	This map does not depict any contamination under buildings other than at Futura. Were all the buildings in that area constructed before the area was contaminated? If not, then investigations should include those buildings to determine if additional areas are impacted.	Previous investigations including the July 1987 "Radiological Characterization Report for the FUTURA Coatings Site", January 1994 "Remedial Investigation Report of the St Louis Site" and April 1994 "Feasibility Study/Environmental Impact Statement for the St. Louis Site" have assessed the existence of contamination in and on structures within the St. Louis sites. Elevated levels of COCs have been determined to be present: 1) on the roof, roof vents, west wall and bay area of the structure at VP-2L; 2) under portions of the St Denis Bridge; 3) adjacent to and under portions of foundations of Futura buildings and structures; 4) adjacent to footings for the McDonnell Boulevard bridge over Coldwater Creek; 5) on ledges and equipment etc. inside FUTURA buildings. Contamination is not suspected under other buildings. However, material under the buildings, if found to exceed RGs during pre-design investigations or other removal activities, would be considered as additional inaccessible areas as discussed in the FS.
FS 9	Page 2-65, 4th paragraph	This paragraph discusses a process to determine whether or not non-radiological COCs were co-mingled with radiological COCs and subsequently removed when radiological contamination was removed. A similar process must be performed with all of the vicinity properties and documented in a Post-Remedial Action Report (PRAR). Please acknowledge how this will be included in the ROD.	A Post-Remedial Action Report (PRAR) will be prepared for all VPs requiring remediation. A final status survey report will be performed for VPs not requiring remediation. These documents will include information to demonstrate compliance with ROD requirements.

FS 10	Page 2-68, Table 2-12	Why is uranium not listed as a COC for HISS/Futura and Latty Avenue VPs 2L and 10k530087?	Uranium was not present at HISS, Futura, VP2(L) or VP10K530087 above the threshold for metal toxicity (i.e., `above the hazard index) and thus is not a COC based on its non-radioactive properties. U-238 is, however, carried forward as a COC based on its radioactive properties.
FS 11	Page 3-5, 5th paragraph	The department disagrees with the statement made that there are no location or action specific ARARs identified for the NC sites. During removal actions, action specific ARARs included air emission regulations, stormwater discharge regulations, historical preservation regulations, etc. In addition, location-specific ARARs included the height restriction for the SLAPS as well as any flood-plain regulations that exist. Please revise the list of ARARs to include such regulations, many of which we've previously identified on the state ARAR list.	USACE has identified the ARARs for the North St. Louis County sites consistent with the requirements of CERCLA §121(d), 42 USC §9621(d), which identifies the requirements that must be followed to determine the degree of cleanup a CERCLA remedial action must achieve. The ARARs selected for the North St. Louis County sites establish the degree of cleanup for the remedial action consistent with this statutory requirement. To the extent other laws not related to the cleanup standard establish legal requirements related to the remedial action, the requirements will be described in workplans to ensure compliance by USACE and its contractors.
FS 12	Table C-1	HISS/Futura, Alternative 5 states, "Excavate for release without restrictions." This is not a completely accurate statement. The soils under the buildings and the driveway next to the building would still contain residual contamination. Please revise this statement to indicate placement of necessary institutional controls in such areas of the property.	For each row of Table C-1, the information is specific to the property named in the first column. The information excludes inaccessible areas, which are included in the third row of the table. For example, the Futura building is addressed in row three, entitled "Directly under roads, bridges, active rail lines, and other permanent structures", and is not included in row 1 entitled "HISS/Futura". Further revisions to the FS are not planned.
FS 13	Table C-1	Coldwater Creek, Alternative 5 states, "Excavate to Coldwater Creek criteria below the mean water level for release without restriction." Again, this is not an accurate statement. The criteria for below the mean water line were modeled using a recreational scenario. Using a recreational scenario, the criteria meets an acceptable risk, but this does not mean it meets unrestricted use (suburban farmer). Please revise the statement to clarify under what scenario the criteria meets an acceptable risk. Additionally, the public and the department has asked that the cleanup of this area meet the same protective limits as other areas. If this can not be achieved then appropriate IC's and stewardship management plans must be applied.	The criteria for sediment below the mean water gradient of Coldwater Creek were modeled using the recreational scenario and fully considering the placement of sediments on adjacent properties. Protectiveness is demonstrated under a future receptor scenario involving public use of creek sediments in residential areas.
FS 14	Page D-14, 4th paragraph	The background values are slightly different than those used in previous documents. Please explain the changes.	The previous background values for the radionuclides present at the North St. Louis County sites were determined based on the analyses of 23 samples. The samples were collected from 14 sites at Howderschell Park, Aubuchon Park, and adjacent to I-70 south of the airport during 1998 characterization sampling activities. The newer background values were determined using additional sampling results and are based on the analyses of 74 samples.

FS 15	Page D-27	What does eliminated manganese, as a COC have to do with eliminating arsenic as a COC? How are these two chemicals related?	If the total hazard index (HI) for a specified receptor exceeds 1.0, those individual PCOCs with a hazard quotient (HQ) exceeding 0.1 would be identified as a COPC. See Attachment 14. If manganese (HQ = 0.73) and arsenic (HQ = 0.36) are both considered, the total HI exceeds 1.0. However, manganese was not considered to be present due to FUSRAP-related activities, so when manganese was eliminated from selection as a COC, the total HI for the road right-of-way to the construction worker was due only to the presence of arsenic. The hazard quotient for arsenic is equal to 0.37. Since the total HI is less than 1.0, arsenic was eliminated as a COC for the road right-of way based on non-carcinogenic risk. Arsenic was a PCOC based on cancer risk, but was eliminated from selection as a COPC because its risk did not exceed 10^{-6}.
FS 16	Page D-37	EPA guidance (Directive 9200.4-35P) states that dose limits based in NRC Criteria 6(6) (25 mrem/yr.) should not be used for establishing remediation goals under CERCLA. The EPA also determined that dose limits above 15 mrem/yr. are not protective under CERCLA. Please acknowledge that the proposal does NOT meet dose requirements under CERCLA and that USACE intends to use a post-remedial assessment to determine the need for land use restrictions or controls.	Criterion 6(6) does not specify a 25 mrem/yr dose. The RGs were developed pursuant to ARARs and are appropriate for release of property for unlimited use and unrestricted exposure. Residual site risk assessments will confirm protectiveness of response actions. Based on experience at SLDS and the North St. Louis County sites, it is expected that achievement of the RGs will be fully protective and fall within the CERCLA risk range.
FS 17	Page D-49, Table D-15	When stating remediation goals, the word "or" is used instead of the word "and." Please revise this statement, because it implies the radiological COC and corresponding criteria can be chosen rather than using a sum of all three.	The word "or" is appropriate in this context because if any of the individual ROD criteria is exceeded, remediation would be required. "And" would imply that all criteria must be exceeded to trigger remediation. The following text is included in Section 2.12.2.1 of the ROD: Soil in the surface 6-inch layer will be removed if the radionuclide concentrations averaged over any area of 100 m^2 exceed: • 5 pCi/g of Ra-226 above background, or • 14 pCi/g of Th-230 above background, or • 50 pCi/g of U-238 above background. Subsurface soil (soil deeper than 6 inches) will be removed where the subsurface radionuclide concentrations averaged over any area of 100 m^2 and averaged over a 6-inch thick layer of soil exceed: • 15 pCi/g of Ra-226 above background, or • 15 pCi/g of Th-230 above background, or • 50 pCi/g of U-238 above background.

Sediment below the mean water gradient will be removed if radionuclide concentrations averaged over any area of 100 m^2 exceed:

- 15 pCi/g of Ra-226 above background, or
- 43 pCi/g of Th-230 above background, or
- 150 pCi/g of U-238 above background.

The Sum of Ratios (SOR) approach will be used when more than one radionuclide is present. It is shown below:

$$SOR_{surface} = \frac{^{226}Ra_N}{5pCi/g} + \frac{^{230}Th_N}{14pCi/g} + \frac{^{238}U_N}{50pCi/g} \leq 1$$

$$SOR_{subsurface} = \frac{^{226}Ra_N}{15pCi/g} + \frac{^{230}Th_N}{15pCi/g} + \frac{^{238}U_N}{50pCi/g} \leq 1$$

$$SOR_{sediment} = \frac{^{226}Ra_N}{15pCi/g} + \frac{^{230}Th_N}{43pCi/g} + \frac{^{238}U_N}{150pCi/g} \leq 1$$

The "N" stands for the net (above background) value. Soil background for North St. Louis County sites has been determined to be:

	Surface Soil	Subsurface Soil
Radium-226	0.95 pCi/g	1.15 pCi/g
Thorium-230	1.49 pCi/g	1.83 pCi/g
Uranium-238	1.08 pCi/g	1.27 pCi/g

Comments received 05/19/03, Scott A. Clardy, Administrator Section for Environmental Public Health at DHSS			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	Appendix D of FS	Our concern centers around the default exposure assumption that was used for the weight of a child resident. In Table D-2, the body weight of the residential child (1-6 yrs of age) is listed as 50kg, and in that same Table, the recreational trespasser (a 6-14 yr old child) is also listed as 50kg. On pages D-12 and 13, these assumptions are further explained. According to generally agreed upon risk assessment protocol, children aged 1-6 years old are assigned an average weight of 15kg, not 50kg. This difference caused a three fold lower risk to be calculated for the residential incidental ingestion of surface soil and sediment exposure scenario. Another way to state that is: if 15kg had been used rather than 50kg, the calculations would have indicated that the risk was three times greater, and therefore, soil and sediment might need to be remediated to lower levels than proposed.	The weight for a residential child (1-6 years of age) should be 15 kg rather than 50 kg. The text and tables are an accurate indication of the process used to assess the resident. In regard to the ingestion of soil/sediment, the child was evaluated as an older child (6-14 years of age), but with the more conservative (default) ingestion rate of 200 mg/day. Because the ingestion "rate" is a weighted average between the child and adult parameters, the "rate" used would have increased by a factor of 1.96 rather than 3, as cited in the comment. This increase is for the ingestion pathway only. Results of the risk assessment presented in Appendix D will not differ significantly as a result of this change, based on the conservative ingestion rate used.

Comments received 05/19/03, Scott A. Clardy, Administrator Section for Environmental Public Health at DHSS			
Comment No.	**pp/§/¶**	**Comment**	**Response**
2	Appendix D-28	A separate issue concerns the paragraph discussing risk from exposure to sediments on page D-28. Specifically, an assumption is made that arsenic and five organic chemicals are most likely not due to site activities because of locations of elevated arsenic concentrations found downstream of SLAPS and HISS, but not adjacent to them. We believe that since sediments move downstream over time, this assumption is not valid. These contaminants could have come from the SLAPS and HISS site and been re-deposited from reach A to reach B and C over time.	There is a sound scientific basis for screening out metals and organics as sediment COCs based upon site relatedness. Although organics were detected at concentrations that exceed the acceptable CERCLA risk range in Coldwater Creek sediment, these organics are present at levels within the acceptable CERCLA risk range in soil at the SLAPS and the HISS/Futura (See Appendix D, Attachment 13). Similarly, none of the five organics were identified above the accepted CERCLA risk range in Reach A of the creek. This strongly suggests that the SLAPS and the HISS/Futura are not the source of these organics. Therefore, these COPCs were eliminated as COCs for Coldwater Creek sediment. Arsenic, the one metal detected above the accepted CERCLA risk range in Coldwater Creek sediment, was detected at levels below background concentrations in Reach A, adjacent to the SLAPS and the HISS. Sediment samples collected during last three years showed that the maximum concentrations of arsenic occurred at monitoring stations C002, C005, and C007. C002 is the historical upstream environmental monitoring station, which was not impacted by MED/AEC activities. Monitoring station C005, located downstream of surface drainage from the HISS and certain VPs, is used to detect contaminant contributions from the HISS and those VPs. Monitoring station C007, located approximately 3,700 feet downstream of the HISS, is the furthest monitoring station from the SLAPS and the HISS. Areas around these monitoring stations are predominantly industrial. The contaminant distribution indicates that the arsenic is due to the heavy industrial activity in the area and is not associated with historical site activities.

Comments received GIFREHC			
Comment No.	**pp/§/¶**	**Comment**	**Response**
A		**ROD Does Not Supplant Prior Agreements Between the United States and GIFREHC.** In a certain June 1994 agreement between the GIFREHC and DOE (the "*1994 Work Agreement*"),[3] among other things, DOE agreed (i) that it had reviewed and approved of the SMP as an appropriate guide for the management of the radiologic risk posed by the radiologic contamination at VP2(L) and that the SMP was consistent with DOE guidelines and procedures. The DOE also agreed that it would accept responsibility for the management of the contaminated soils and contaminated building materials generated in connection with carrying out the SMP, and would provide certain services in connection with carrying out the SMP. The USACE ratified both the SMP and the 1994 Work Agreement in that certain Right of Entry Agreement, dated as of Oct. 6, 1998 (the "*1998 Rail Spur Agreement*"). In that agreement, among other things, GIFREHC authorized the Corps in 1998 to construct a temporary rail spur across the southwest corner of VP2(L). In each of these agreements, agencies of the United States made certain commitments to GIFREHC. These agreements each contemplate the issuance of the North County ROD. However, the issuance of the ROD does not alter the United States' contractual obligations to GIFREHC under these agreements, which remain in full force. In preparing and implementing the ROD, the government's covenants under these agreements should be viewed as site-specific ARARs and should be taken into account in all remedial planning.	The prior agreements with GIFREHC speak for themselves. They do not meet CERCLA §121(d) requirements for ARAR.

Comments received GIFREHC			
Comment No.	**pp/§/¶**	**Comment**	**Response**
B		GIFREHC Supports A Removal Alternative To Achieve Unrestricted Use. *GIFREHC strongly supports the proposed Remedial Action Objectives and remediation goals that, when achieved, will "allow for unlimited use and unrestricted exposure.", the remedy for the North County site should go as far as reasonably possible to restore the 87 individual properties impacted by MED/AEC wastes and activities to the status quo ante.*	USACE acknowledges the support. The Selected Remedy (Excavation with Institutional Controls Under Roads, Bridges, Railroads, and Other Permanent Structures) is protective of the current and future worker, the public, and the environment. At the conclusion of remedial activities conducted to address FUSRAP contamination, under the Selected Remedy, "unlimited use and unrestricted exposure" will be obtained for accessible soil. The Selected Remedy implements institutional controls to prevent inadvertent exposures to residual contaminants remaining under active roads, active bridges, active railroads, and permanent structures.
B1		***1. Merge Alternatives 5 and 6.*** Consistent with Alternative 5, GIFREHC supports deferring action on "inaccessible areas" until such time as their respective property owners make them available for remediation and restoration. However, GIFREHC does not support deferring a decision on remedial goals until that time. As in Alternative 6, the ROD should prescribe the same ARAR-based and health risk-based remedial goals for both accessible and inaccessible areas, with the understanding that implementation of the final remedy will be deferred for inaccessible areas until a later date. If changes in ARARs, technologies or uses in the interim suggest a more or less protective approach is warranted, the lead agency can certainly move to amend the ROD at that time to appropriately address those new circumstances. Otherwise, the absence of a commitment by the United States to implement a protective remedy for these areas at the appropriate time will only create ambiguity and uncertainty respecting these areas that may interfere with or delay putting these lands to their highest and best use over time. It has taken the United States nearly 26 years and millions of dollars in studies and analysis to reach the current decision point respecting the accessible areas. The ROD should not bind the United States and the St. Louis community to repeat that process over and over as individual inaccessible areas become available for remediation on an ad hoc basis without strong and compelling justification. We do not believe that case has been made.	Inaccessible soils are those soils under roads, bridges, active rail lines, buildings and permanent structures that exceed remediation goals but are protective in their current configuration. As used herein, inaccessible soils exclude those soils under parking lots. Inaccessible soils will not be excavated under the Record of Decision. The remedy for inaccessible soils consists of implementation of institutional controls. Selection of this remedy for inaccessible soils considers the future anticipated land use of inaccessible areas and fully considers each of the nine factors in the NCP with particular emphasis on protectiveness, implementability, long-term effectiveness and permanence, cost, and state and community acceptance. Verification that institutional controls remain protective as a remedy will be assured through the CERCLA five-year review process. Currently known, inaccessible soils are depicted on Figures 2-14 through 2-18, with the associated volumes being listed in Table 2-13. See also response to USEPA General Comment 2d.

Comments received GIFREHC			
Comment No.	**pp/§/¶**	**Comment**	**Response**
B2		***2. Expand Alternatives 5 and 6 to Include Structures and Improvements.*** The Proposed Plan recites that the FS addresses "structures" in addition to soil, sediment, surface water and groundwater (PP at p. 4); however we have not identified any remedial goals in either the FS or PP with respect to structures. Just as soils and groundwater at the North County Site have been impacted by MED/AEC wastes, so too have structures. GIFREHC has continually been confronted with the challenge of safely and appropriately managing both building maintenance tasks involving contaminated building components, and management of the resulting building maintenance debris (e.g., the VP2(L) roof replacement project). The radiological characterization of structures summarized in the FS appears to be limited to buildings at HISS/Futura (e.g., FS p. 2-60), and no data is provided for VP structures that have been impacted, and the remedial alternatives discussed do not address how unrestricted use clearance will be achieved for these materials. The FS should be revised to provide additional structural characterization information for the VPs, and remedial alternatives to address the proper management and disposal, by the United States, of contaminated structural materials over time to meet the human health protectiveness requirements of CERCLA, and ARARs. As the draft FS and PP recite at several locations, Missouri may interpret its rules to prohibit the land disposal of such materials in Missouri.	RGs for structures are included in the ROD. These RGs for surface contamination will be derived to meet the CERCLA risk range. The standards or criteria pertaining to structures and buildings left-in-place have been provided in the ROD in Section 2.12. Additional information can be found in the document entitled *Derivation of Site-Specific Derived Concentration Guideline Levels (DCGLs) for North County Structures.* Further revisions to the FS are not planned. Physical and chemical decontamination methods, as well as size reduction technologies, were evaluated and retained as ancillary technologies in the FS (for example, see pages 3-30 and 3-46 in the FS). Text has been included the ROD to describe the development of RGs for structures. The Selected Remedy clearly states that decontamination and size reduction technologies are retained if building contamination is discovered during implementation of the remedy or during the final status survey.

Comments received GIFREHC			
Comment No.	**pp/§/¶**	**Comment**	**Response**
C		**Potential "Inaccessible Areas" on VP2(L)** GIFREHC strongly supports the position set forth in the FS and PP that the determination of whether soils are "inaccessible" is determined by decisions by the affected property owners. Given the extreme management burdens that could be imposed on property owners plagued with a hodgepodge of small, temporarily "inaccessible" areas under walkways, current parking lots and small structures (each of which presumably would be subject to institutional controls), landowners may reasonably determine that such areas should be deemed accessible now and remediated and replaced now, even where they serve as functional, temporary caps on contaminated soils, rather than allowing action to be deferred to some indefinite future date, to some indefinite future remedial standard. The FS and ROD should identify any more specific criteria for "inaccessible" areas that will be applicable, and confirm that such areas will be defined finally only after consultation with affected landowners following or in connection with the pre-design investigation. The FS does not indicate how additional "inaccessible" areas will be identified.	Section 2.12 of the ROD provides detailed information describing how inaccessible areas are identified and how these areas will be addressed.
C1		***1. The "Hot Spot" Under the VP2(L) Parking Lot is Not Inaccessible and the FS and ROD Should Indicate That the Area Will Be Remediated to Unrestricted Use Levels*** Although not identified as "inaccessible" in Figure ES-3, this is to confirm that the "hot spot" identified in 1996 – involving Th-230 concentrations greater than 30,000 pCi/g – along the VP2(L)/HISS fence line, and under what is now the southwest corner of the VP2(L) west parking area should be deemed accessible. The current asphalt cover was intended as a temporary control measure pending remediation by the United States pursuant to the ROD. GIFREHC understands that the mere presence of the asphalt cover will not cause these soils to be deemed "inaccessible", and that they will be removed to the same extent as other areas of VP2(L). Like the FS, the ROD should reflect that this "hot spot" is not "inaccessible."	The VP(2L) parking lot is defined as accessible.

Comments received GIFREHC			
Comment No.	**pp/§/¶**	**Comment**	**Response**
C2		***2. The Portion of the HISS Rails Spur On VP2(L) is Not Inaccessible and the FS and ROD Should Indicate That It Will Be Remediated to Unrestricted Use Levels*** Figure ES-3 mistakenly shows the entire length of the HISS rail spur to be "inaccessible." As discussed above, a portion of that spur crosses VP2(L) pursuant to the terms of a limited right of entry in favor of the United States set forth in the 1998 Rail Spur Agreement. That agreement provides that the spur (at least insofar as it is present on VP2(L)) is a temporary structure. In particular, Section 1(c) of the 1998 Rail Spur Agreement provides that the Corps shall remove the portion of that rail spur present on VP2(L) no later than October 2010, and shall remediate the property underneath it. GIFREHC hereby affirms its expectation that the HISS spur will be removed in according with the Government's covenant. Even if this discrete area is the last area to be remediated as part of this action, it should nevertheless be remediated as part of this action, and to levels comparable to other portions of VP2(L). Figure ES-3 of the FS should be revised, and the ROD should reflect that this portion of the HISS rail spur is not "inaccessible."	The rail spur, once no longer needed for the transportation of contaminated soil generated by the remedial action for the North St. Louis County sites, will be remediated pursuant to the Selected Remedy. Figure ES-3 has been revised and incorporated in the ROD.

Comments received GIFREHC			
Comment No.	**pp/§/¶**	**Comment**	**Response**
D		**VP2(L) Should Be Remediated First Among the VPs, and this Determination Should be Reflected in the ROD** There are a great number of individual VPs to be addressed under the preferred alternative; however neither the FS nor the PP addresses when remediation will begin at any of the VPs, or the relative priority with which the individual VPs will be addressed. Doubt about the Corps' willingness to stand by its covenant to address VP2(L) first has been raised by the "St. Louis FUSRAP North County Site Property Characterization Plan,"(Apr. 2000), located in the Administrative Record. This document suggests (perhaps erroneously) that the Corps does not plan to honor its commitments both to (1) complete remediation of VP2(L) by the earlier of 2008 or two years after ROD approval (the document suggests commencement in 2009), and (2) in any event, to remediate VP2(L) prior to other VPs. Considering the extent of existing impacts relative to other VPs, and the Corps' prior covenants, the ROD should reflect that VP2(L) will be remediated on a first priority and expedited basis as among the HISS and the other Latty Avenue VPs. The fact that the neighboring HISS may be used as a transshipment point for other area removals should not impact this decision as all such activities must be sufficiently controlled to prevent any risk of recontaminating any remediated areas of VP2(L).	The ROD is an inappropriate forum for presenting the priority for the remediation of properties. The prior agreements with GIFREHC speak for themselves.

Comments received GIFREHC			
Comment No.	**pp/§/¶**	**Comment**	**Response**
E		Clarify That Latty VPs Are Considered "On-Site" For Purposes Of The NCP In various locations in both the FS and PP, the text suggests that the NPL-listed portions of the North County "Site" are limited to the SLAPS, HISS and Futura Coatings properties. Although the geographic scope of the original HRS scoring may have been limited to these areas, subsequent characterization data summarized in the FS and elsewhere confirms that the HISS VPs (including VP2(L)) are properties where contamination has "come to be located" and, therefore, that they are part of the same "facility." See 54 Fed. Reg. 19526 (May 5, 1989) ("*EPA contemplates that the preliminary description of facility boundaries at the time of scoring will need to be refined and improved as more information is developed*"). See also 40 CFR §300.68. The FS/PP and ROD must confirm that the Latty VPs are part of the CERCLA "facility," for which permit waiver authority may be exercised under CERCLA §121.[6] Similarly, the FS and ROD should confirm that the Latty VPs would be covered by any CERCLA five-year reviews to the extent that any contamination remains on these properties during or after construction. [6.] Note that the USACE has conceded in other contexts that NRC licensing would be applicable to its FUSRAP activities conducted in off-site locations. See e.g., 64 FR 16504, 16505, col. 3 (Apr. 5, 1999)*("[The Corps] acknowledges that NRC license requirements may apply to portions of FUSRAP response actions conducted off-site, beyond the scope of the [CERCLA] permit waiver").*	The permit waiver authority applies to response actions conducted by federal agencies. Section XXVIII of the FFA states that "no Federal, State, or local permit shall be required for those portions of the response actions undertaken pursuant to this Agreement which are conducted entirely onsite." The FFA definition of onsite in Section V includes vicinity properties. Therefore, the permit waiver authority applies the Latty Avenue VPs. Five-year reviews will be conducted at the North St. Louis County sites, including vicinity properties, until such time that it is determined to meet "unlimited use and unrestricted exposure" requirements. See Section 2.12.2.10 of the ROD.

Comments received GIFREHC			
Comment No.	**pp/§/¶**	**Comment**	**Response**
F		Confirm that "Supplemental Standards" Are Proposed only for HISS/Futura and SLAPS; and Only Under Alternatives 2 and 3. Ms. Feldt's report cites concerns with the propriety and justification for potential use of so-called "supplemental standards" in the former primary storage areas at HISS/Futura and SLAPS. We understand, and the FS and ROD should be explicit, that these are proposed only under Alternatives 2 and 3, and that they are not being considered for use in connection with Alternatives 5 or 6, or for use in any event on VP2(L) or any other VP. See PP at pp. 17 – 19. GIFREHC would object strongly to creating nuclear burial cells on its property or otherwise in the North County community. These standards were designed for use in connection with remote, isolated mill tailings sites and, in that regard, are not appropriate for the current setting.	In the Feasibility Study, the supplemental standards were evaluated for Alternatives 2 and 3 only. The ROD has now identified additional supplemental standards developed in accordance with relevant and appropriate standards [40 CFR 192.12(b) and 192.21(c)], which will be used to confirm that inaccessible soils are protective in their current configuration. Alternative 6 does not rely on the use of supplemental standards. The Selected Remedy, as described in Section 2.12 of the ROD, would only apply the new supplemental standards for inaccessible areas.
G		**Final Status Surveys and Other Cleanup Documentation** The PP provides only limited information concerning the surveys that will be conducted to confirm that the cleanup has achieved the remedial action objectives. From an affected property owner's perspective, these surveys raise several issues, which should be resolved in the ROD. First, the benchmark for confirming the adequacy of the remediation is whether the remediation has achieved the remedial action objective of the ROD – unrestricted site use at CERCLA-protective levels. Given that the actual remedial goals are proposed at concentrations that would allow residual concentrations somewhat higher than these levels, based on the expectation developed from similar cleanups that remediation to these higher concentrations will, in fact, result in achieving the lower, CERCLA-protective concentrations, the final status surveys must be designed to confirm that assumption has held true at each of the VPs and other affected areas. Second, the final status surveys must be performed and reported on a individual, property-by-property basis. The legacy of MED/AEC activities has clouded the appropriate and safe uses of the 87 affected North County properties. While GIFREHC supports the United States' efforts proposed in the FS/PP to restore these properties to full beneficial use, the cloud may well remain unless individual property owners are provided with the	The RGs were developed pursuant to ARARs, are fully protective of human health and the environment, and achieve residual conditions consistent with guidance. ARARs by definition must meet the CERCLA protective levels. Final status surveys will be conducted to ensure that excavation of radiological COCs meet the RGs. To verify that excavation of radiological COCs also achieves the RGs for non-radiological COCs, chemical sampling will be conducted as required as part of the final status survey. For those areas at the North St. Louis County sites where final status surveys were performed prior to the MARSSIM effective date of January 1, 1998, final status surveys consistent with MARSSIM will be conducted for radiological COCs to ensure that properties achieve the ROD RGs. If the evaluation shows that the ROD remediation goals were not met, those areas where the RGs are not met will be incorporated into the remedy and the remedy applied. Actual remedial goals are not proposed at concentrations that are elevated with respect to "CERCLA-protective concentrations". Text has been included in the ROD to describe the RGs for structures and the processes necessary to achieve the RGs (Section 2.8.2.2). For those vicinity properties with structures, the final status survey for properties will confirm that the RGs for structures were achieved by the remedial activity. If institutional controls are warranted, they will be identified, documented, and included in the

Comments received GIFREHC			
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		documentation that clearly demonstrates to laymen and radiation health physicists alike that the remediated properties are, in fact, fully ready for reuse. GIFREHC believes such reports should document the results of the work, including site-specific survey data, and affirmatively confirm that each such property is "ready for reuse" without restriction. [7] Third, the final status surveys and post-remedial reports must also address conditions in Vicinity Property buildings. While remedial planning has been based in part on the need to assure healthful and protective working environments in structures on the affected VPs over time, which GIFREHC of course supports, the final status surveys should confirm that those conditions have been achieved (or, in the case of VP2(L), remain) with respect to all potential exposure routes. To the extent those surveys identify contaminated building components that will need to be properly managed in the future, they reports should document those findings, and specify how the United States will manage them. [7.] For example, PP Figure 5 shows an area of VP2(L) as having been remediated – presumably in connection with the East Pile removal effort and related construction of the Corps' contractor equipment storage area. But, although that effort has been completed for some time, GIFREHC has not yet received any documentation establishing the post-removal remedial status of that area establishing that it is fully ready for unrestricted reuse.	Long-term Stewardship plan as well as any subsequent five-year reviews. The Final Post-Remedial Action Reports for a given property will be provided to the appropriated property owners when finalized. Building decontamination of structures above RGs preclude the need for future management of building components.
H		**Institutional Controls and Long -Term Stewardship** Alternative 5 specifically contemplates use of institutional controls to control exposure risks for inaccessible areas. Once VP structures are taken into account, we believe that even Alternative 6 may require some such controls. As described in the PP, the contemplated form of the institutional controls will be designed to provide notice to property owners, enforcement mechanisms, and a manner to contact a government agency for more information. The text of the PP provides that the controls are designed to give the government notice of planned activities in areas of residual contamination, "so that the government may conduct the necessary remedial action work prior to or in conjunction with the performance of" such activities. PP at p. 33. GIFREHC strongly supports the government's commitment to take full responsibility for these areas. This commitment should be reflected in the instruments of the institutional control, and in the	Section 2.9.6 of the ROD includes the following text regarding the use of institutional controls for Alternative 6: *"Institutional controls would be required until the areas under roads, active rail lines, and other permanent structures are made available. Institutional controls are not required for this alternative after the remedial action is complete."*

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		long term stewardship plan. The long term stewardship plan must include transparent procedures for property owners with residual contamination (in soils or structures) to obtain the government's timely and effective efforts to remove and dispose of residual contamination as the need arises. GIFREHC's own experience provides an excellent case study of the ongoing need property owners may have for such services, and the extreme hardship imposed on property owners when the government is unable or unwilling to shoulder its responsibility for such conditions. While the government may not be reasonably expected to be able to respond to all decontamination needs at a moment's notice, a transparent procedure, coupled with a commitment by the government to undertake the work to the standards of the ROD, will allow affected property owners to plan appropriately, and to provide appropriate notice to the responsible government agency, and to coordinate with that agency. Absent transparent, workable and timely response procedures, the long term effectiveness of the remedy may be jeopardized by frustrated property owners without the resources to undertake, as GIFREHC has in the past, appropriate protective radiological management steps. The stewardship plan thus functions as an institutional control itself. Because this control is central to the continued long-term protectiveness and implementability of the remedy, these minimum elements of the long term stewardship plan should be reflected and detailed in the ROD, even if the details are completed subsequently. The ROD should also carry the commitment to develop the long-term stewardship plan through a public notice and comment process, which includes elements to assure the government's continued accountability.	USACE acknowledges these concerns regarding long-term stewardship and implementation of institutional controls. Section 2.12.2.6 of the ROD contains clarifying details.

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I		**Implementation** Procedures for further remedial design investigations and soil removals are addressed only surficially in the FS and PP. While this may be appropriate in the more typical case of a NPL site comprising a single property, the North County site is somewhat unique in the number of individual properties and property owners affected over a large commercial and residential area. Normal commercial operations at affected properties may be significantly and adversely impacted and interrupted in the short term when the actual soil removals begin. To document the short term implementability and effectiveness of the remedy, the decision documents should detail how such work will be coordinated and planned with individual property owners, including means of compensating them for temporary disruptions or business dislocations. The PP similarly touches only lightly on the control measures that will be implemented over the course of the North County excavations and transshipments to assure that contaminated soils are not re-released to the environment (as they were when brought to the HISS), and to assure that persons present in VP workplaces are protected from unexpected or unwarranted exposures. This is of particular concern at VP2(L), which is located immediately adjacent to the HISS. The USACE has successfully used such procedures in the past (e.g., during the East Pile removals), and we assume they are anticipated for the contemplated excavations. Given the importance of this issue, the ROD should include a description of and commitment to the monitoring – including air monitoring, action levels, and response plans – that will be undertaken during the course of construction (which we understand will be spread over several years), and a commitment to timely share and interpret the data generated by such monitoring with potentially affected landowners or occupants.	Property-specific monitoring and response plans will be coordinated with property owners to make reasonable attempts to limit disruption and business dislocation. Additional information regarding design investigations and remedial actions are identified in Section 2.12. The remedial design documents for the property will provide additional information concerning these issues. USACE will attempt to coordinate the design documents with the landowners. Additional information concerning monitoring, including an assurance of low impact for ground water, has been added to the ROD (section 2.12). Additional laws and regulations such as those addressing worker safety may establish legal instruments related to the remedial actions. Such requirements will be described in remedial action work plans.

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J		**Extent of Radiological Characterization** Ms. Feldt's report identifies data from several historical characterization efforts by DOE and others respecting VP2(L) that are not acknowledged in the text of the FS or PP, or perhaps in the analysis of risks and options. Additional data may also be available from characterization work undertaken by the USACE in connection with the construction of the HISS rail spur across VP2(L), design studies for the construction of the USACE's contractor equipment storage area on VP2(L), and following removal of the East Piles. GIFREHC has never received documentation of this work. This additional data, and any implications for the sufficiency of the current data set and site findings, should be taken into account as necessary in further remedial design characterization, removal procedure design, worker and workplace monitoring and health protections, and setting remedial priorities among VPs and the primary storage properties.	Prior to any remedial activities taking place at a property, a pre-design investigation will be conducted as necessary to support the remedial design, minimize effects on property owners, and better manage construction schedules. All proper data will be considered in the remedial design process, including, worker and workplace monitoring and health protections.
K		**Conclusion** GIFREHC strongly supports the proposed Remedial Action Objectives and remediation goals that, when achieved, will "allow for unlimited use and unrestricted exposure." The ROD should reflect the commitment today to achieve that standard for all North County properties, and include requirements for appropriate short term protective measures, post-remedial documentation, and long term stewardship to assure that the North County community and affected property owners obtain the full benefit intended benefit of the proposed action.	USACE acknowledges your support.

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1		**The Level And Extent Of Contamination Are Not Adequately Reported in the FS/PP For The VP2L Property** The highest level of thoriuim-230 (Th-230) given in the FS text for the HISS/Futura and Latty Avenue Vicinity Properties is 830 pCi/g. We presume that 830 pCi/g was the contaminant level used to characterize the current and future risk at VP2L and incorporated into the analysis of implementability, effectiveness and the proposed schedule for remediating VP2L and other North County properties. Based upon review of certain documents in the Administrative Record and data that previously has been provided to the Department of Energy (DOE) and the COE by GIFREHC, it appears that the extent and level of contamination at VP2L property has not been adequately restated and considered in the FS. The 5,700-pCi/g level for the VP2L is identified only in Appendix D, Attachment 5 of the FS report and is not carried forward in the FS text and analysis. It is not clear whether the 5,700-pCi/g or the 830-pCi/g Th-230 level was used in the risk and alternatives analysis documented in the FS. This inadequate characterization in the FS/PP poses several potentially significant issues. First, the potential current and future risks calculated for the Latty VPs and HISS may be understated in the FS/PP. Table D-4b of the FS gives the potential current and future risks for the VPs (highest value), assuming industrial use, as 2x10-4. The potential current and future risks should be reevaluated using all the available data. Second, the source or fate and transport mechanism for the higher levels of Th-230 found at VP2L may not be adequately characterized in the FS. For example, there is insufficient documentation or discussion given in the FS regarding the potential impact of soil contamination from the ground water regime (specifically HZ-A), and the potential for recontamination of remediated areas by subsequent shallow groundwater flow. Given the 81,000 pCi/g level of Th-230 identified in the subsurface soils in discrete areas (at approximately a 6 foot depth), the source of contamination should	The VP2(L) was adequately characterized for purposes of selecting a protective remedy. The remedy will be carried out on this and all North St. Louis County sites and is protective of human health and the environment. USACE considered all available appropriate data in the characterization of the property in accordance with CERCLA. 830 pCi/g was the appropriate contaminant level used to characterize the current and future risk at HISS as defined in the Risk Assessment Guidance for Superfund. This value is presented in the Feasibility Study on page ES-8, Table 2-10, and in Appendix D, Attachment 6 page 4 of 14. The VP2(L) was adequately characterized for purposes of selecting a protective remedy. The remedy will be carried out on this and all North St. Louis County sites and is protective of human health and the environment. The maximum Th-230 concentration at VP-2L was 5,700 pCi/g. Pursuant to EPA Risk Assessment Guidance for Superfund (RAGS), the exposure point concentration, not the maximum value, is used in the risk assessment. The exposure point concentration is a very conservative statistical value that takes into account sampling uncertainty and statistical variability. This concentration was 117 pCi/g for VP2L. The 830 pCi/g Th-230 value was the maximum concentration at HISS. The use of this approach appropriately assesses risk to the sensitive individual consistent with EPA guidance. Review of the risk assessments in the Feasibility Study indicates that they have been properly reflected and were not understated. Both the magnitude of contaminants and fate and transport of contaminants were adequately characterized for purposes of selecting a protective remedy.

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		be assessed further for the VP2L property. Third, the necessary monitoring and worker safety control measures during and following the proposed remediation are not adequately described in the FS/PP for the VP2L property. The FS must identify specific measures that will be necessary to control radiation exposure of the industrial work force at VP2L during the remediation. Fourth, the proposed schedule for a 2007 start of remediation of the VP2L property (see April 2003, St. Louis FUSRAP North County Site Property Characterization, Table 3, Administrative Record ID 137) does not appear to factor in the levels of contamination found at the VP2L property. Although site exposures, in fact, presently appear to be well controlled at safe levels at VP2L through voluntary efforts and consistent implementation of the Site Management Plan for 9150 Latty Avenue (developed by GIFREHC in consultation with the DOE), the potential risk levels should be reevaluated in light of all the relevant data, and the VP2L remediation start date should be adjusted accordingly. Finally, the incomplete characterization baseline data reported for VP2L certainly raises the question whether the characterization data reported in the FS (and presumably relied upon for risk and cost calculations, and other purposes) has been sufficient with respect to the other VPs and at the immediately adjacent HISS. Section 300.430(a)(ii)(C) of the NCP states that, "[s]ite-specific data needs, the evaluation of alternatives and the documentation of the selected remedy should reflect the scope and complexity of the site problems being addressed." In addition, NCP §300.430(d)(1) requires that the site be adequately fully characterized, "for the purposes of developing and evaluating effective remedial alternatives." These requirements of the NCP do not appear to have been met for the VP2L property as characterized in the FS/PP.	Additional laws and regulations such as those addressing worker safety may establish legal requirements related to the remedial action. Such requirements will be described in remedial action work plans. The ROD is not the appropriate forum for presenting the priority or schedule for the remediation of properties. The remediation schedule will be set through consultation with the appropriate agencies and the property owners. As stated previously, the potential risk levels have been evaluated in accordance with CERCLA. Contamination within the North St. Louis County sites was adequately and properly characterized for purposes of developing and evaluating effective remedial alternatives and is in full compliance with the NCP.
2		**The FS/PP Does not Adequately Address Management and Remediation of Currently Inaccessible Areas.**	Inaccessible soils are those soils under roads, bridges, active rail lines, buildings and permanent structures that exceed remediation goals but are protective in their current configuration. Inaccessible soils will not be excavated under the Record of

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		Under the preferred remedy, remediation of "inaccessible soils" would be indefinitely deferred and the areas would be made subject to institutional controls. To meet the remediation goals and the ARARs identified for the St. Louis North County site, the clean-up levels for inaccessible areas must be consistent with the cleanup levels identified for the current accessible soils. Particularly given the 200 to 1000 year time frame relevant to this action, the FS (and the ROD) should commit to achieving the same level of protectiveness for soils throughout the North County site (regardless of whether they are currently "inaccessible") or identify sufficient supplemental standards consistent with 40 CFR 192, Subpart C. This is necessary to achieve and demonstrate long-term protection to human health and the environment and to adequately assess the long-term effectiveness of the remedy in accordance with the NCP, 40 CFR § 300.430. The anticipated criteria for "inaccessibility" determinations also should have been set forth in the draft FS so that the public could better understand and comment on the extent of the North County soils for which remediation will be deferred, and consider whether Alternative 6 is in fact the preferred approach. Similarly, the FS refers only generically to the kinds of institutional controls that the COE would seek to impose on currently "inaccessible" areas. Property owners and the public need to understand the details of the anticipated controls to assess their potential practical impact on continued property use until the final remediation is complete. While this impact may be minimal, it could be substantial. The anticipated details of these measures should be identified in the FS. Without this information, it is difficult to provide meaningful comment on the overall protectiveness and practicability of Alternative 5 and, again, whether Alternative 6 may be the preferred approach.	Decision. The remedy for inaccessible soils consists of implementation of institutional controls. Selection of this remedy for inaccessible soils considers the future anticipated land use of inaccessible areas and fully considers each of the nine factors in the NCP with particular emphasis on protectiveness, implementability, short-term effectiveness, long-term effectiveness and permanence, cost, and state and community acceptance. Verification that institutional controls remain protective as a remedy will be assured through the CERCLA five-year review process. Inaccessible soils are depicted on Figures 2-14 through 2-18, with the associated volumes being listed in Table 2-13. Based on current information, none of the inaccessible areas present an unacceptable risk in their current configuration that would require immediate excavation. A long-term stewardship plan will be developed as part of this remedy and under the provisions of the MOU with DOE. The ROD identifies the final remedy for inaccessible soils.
3		**The Discussion In The FS/PP of the Remedial Approach for "Deep" Soil Contamination Is Not Adequate.** The potential existence of deep soil contamination (i.e., greater than 8 feet)	The selected remedy presented in the ROD does not include the use of supplemental standards for deep soil but proposes RGs for subsurface soil to depth that are within the acceptable CERCLA risk range, and comply with ARARs. In the Feasibility Study, the supplemental standards were evaluated for

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		at the North County Site – and the potential use of less stringent remedial standards for such soils – is not raised until Chapter 4 of the FS. It appears that this reference is inserted only as a placeholder, to retain the approach as a future "option." While the lead agency is always free to seek to modify a ROD after a further public process, retaining alternative clean-up standards for deep soil contamination as a discretionary "option" at the North County Site without further public process does not appear permissible on the current record given that the contamination in the deep soil may alter risk estimates and analysis of the implementability and long-term effectiveness of the identified preferred remedy. The less stringent, "supplemental standards" (75/210/750 pCi/g for Ra-226, Th-230 and U-238) proposed as an option for the deep soil are derived from the supplemental standards for subsurface soils under 40 CFR Part 192, Subpart C, and would require the imposition of permanent institutional controls. Whether it is appropriate to rely on such standards at all on the current record is highly doubtful. EPA wrote these standards, and its guidance interpreting the proper use of the supplemental standards specifically provides that the supplemental standards were not expected to be used often. "They were designed [only] for situations in which worker safety would be adversely impacted or clearly greater environmental harm would result from the remedial action necessary" to achieve the more stringent standards normally applied. Directive 9200.4-25, "Use of Soil Clean-up Criteria in 40 CFR 192 as Remediation Goals for CERCLA Sites." The factual case has not been made in the FS that supplemental standards are necessary or appropriate for deep soils at the HISS or HISS Vicinity Properties. It is difficult for the public to assess the impact of, and comment on, the proposed use of supplemental standards as, indeed, the FS does not clearly identify where any such deep soil contamination may exist. In accordance with NCP, 40 CFR §300.430, the FS must adequately describe: (1) the extent of deep soil contamination and; (2) the effect of the deep soil on the baseline risk assessment and on the alternatives evaluation. With the 200 to 1,000-year timeframe identified in 40 CFR 192, Subpart A, it is not reasonable to presume (as the analysis in the FS does) that deep soils would	Alternatives 2 and 3 only. The ROD has now identified additional supplemental standards developed in accordance with relevant and appropriate standards [40 CFR 192.12(b) and 192.21(c)], which will be used to confirm that inaccessible soils are protective in their current configuration. The Selected Remedy would only implement the new supplemental standards (as described in Section 2.8.2 of the ROD) for inaccessible areas. The supplemental standards developed for inaccessible areas are not the same as the supplemental standards identified for Alternatives 2 and 3.

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		never be used or present in the context of a residential setting. The FS states that the only likely current exposure scenario would involve industrial/utility workers and if institutional controls were lost, exposure would be less than 100 mrem/year. This dose rate does not meet the current requirements of CERCLA. See U.S. EPA Directive 9200.4-18, Establishment of Clean-up Levels for CERCLA Sites with Radioactive Contamination (Aug. 22, 1997). Moreover, the FS should also acknowledge that there exists a possibility that these deep soils could be transferred for use in a residential or other uncontrolled setting at some point in the future. If this occurred and the deep soils had been remediated to the less stringent levels of the proposed supplemental standards, as above, the resulting dose rate may well be below 100 mrem/year, but would not be sufficiently protective to meet the requirements of CERCLA. Because the remediation goals specified in the FS are sufficient to allow for unrestricted use in a residential setting, the unrestricted release criteria must be used as the basis for calculating the cleanup levels for any deep soils. If the supplemental standards were derived from the unrestricted release criteria of 5 pCi/g or 15 pCi/g, the deep soil standards would be 15 and 45 pCi/g respectively for Ra-226. Throughout the FS and inherent in the COE's analysis of most of the alternatives, a 100 mrem/year dose rate is assumed to represent a CERCLA "protective" level. While we understand that the DOE has adopted a primary health standard of 100 mrem/year effective dose equivalent to members of the public (based on the ICRP's recommendation to limit long-term average effective dose equivalents to 100 mrem or less) (see DOE Order 5400.5), and that DOE Order 5400.5 standards were to be the basis for remedial actions conducted under the DOE's 1992 EE/CA for the HISS and Vicinity Properties, the U.S. Environmental Protection Agency (EPA) authoritatively stated in 1997 that the 100-mrem/yr criterion is not sufficiently protective to meet the requirements of CERCLA, and that 15 mrem/year or less is the appropriately protective level under the statute and regulations. See EPA Directive 9200.4-18, "Establishment of Clean-up Levels for CERCLA Sites with Radioactive Contamination" (Aug. 22, 1997).	

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		Accordingly, if supplemental standards are applied to any deep soils, those standards must assure a dose rate of 15 mrem/year or less to meet the minimum protectiveness requirements of the NCP, 40 CFR 300.430.	
4		**Commitment To Long-Term Monitoring Is Inadequate In The FS And Inconsistent With The Requirements Of The NCP** To the extent construction of the remedy leaves inaccessible areas, deep soil areas, groundwater (e.g., hydrogeologic zones HZ-A, B and C) (and perhaps site improvements) with COC concentrations above ARARs or remediation goals, long-term monitoring must be a component of the remedy to assure the overall protectiveness and effectiveness of the proposed remedy. Similarly, to the extent the remedy relies on institutional controls, there must be long term monitoring to assure that those controls continue to be honored, and remain effective for their purpose. For example, although the FS recites that the uppermost aquifer is not currently being utilized, radiological contamination does exist in HZ-A. The FS states that remediation of HZ-A is not needed because (1) there are no current receptors (i.e., yield from HZ-A is insufficient as a drinking water source) and; (2) there is no significant hydraulic communication between HZ-A and the lower water bearing zones. The record evidence supporting this second assumption in particular appears to be limited. Only one of the twenty-one wells installed at the HISS/Futura/Latty Avenue Vicinity properties was screened in the lower water-bearing zones. Similarly, there is a concern that shallow groundwater from the HISS may carry contaminants offsite and recontaminate previously remediated areas at neighboring properties, such as VP2L. The apparent response in the FS to this issue, that groundwater moves slowly, may not be valid where the relevant time frame is 200 to 1,000 years. To verify the assumptions made in the FS, to demonstrate the continuing effectiveness of the proposed remediation and control measures, and to ensure that any residual contamination (e.g., from inaccessible areas and deep soils) does not pose or create a threat to human health and the environment, adequate long-term monitoring needs to be identified in the FS and specified in the ROD.	The monitoring commitments made in the ROD are adequate for the Selected Remedy and consistent with the requirements of the NCP. The monitoring currently conducted as part of the Environmental Monitoring Program and defined in the annual Environmental Implementation Reports will continue during the remedial activities. There is sufficient evidence supporting the limited hydraulic connection between HZ-A and HZ-C. The geologic borings indicate the presence of a very low permeability clay unit (subunit 3M) that limits vertical flow between HZ-A and HZ-C. In addition, the interpretation of negligible communication between HZ-A and the lower HZs is supported by anion and cation compositions of ground-water samples, differing piezometric surfaces, and tritium data. This information can be found in Section 2.2.5.2 of the FS and in Section 2.5.4 of the ROD. Further revision of the FS is not planned. Ground-water monitoring to document protectiveness, to identify the effect of remedial actions and to assure water conditions do not degrade is described in Section 2.12.2.8 of the ROD.

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5		**The FS/PP Does Not Adequately Characterize The Residual Risk Or Provide Sufficient Basis For Deviating From The CERCLA "Point Of Departure" Residual Risk Of 10-6** The collective residual cancer risk after the proposed remediation is complete, as calculated in the FS, appears to be approximately a 3x10-4 cancer risk. The Ra-226 clean-up levels of 5 pCi/g (surface soils) and 15 pCi/g (subsurface soils) largely drives [sic] this residual risk estimate. This risk estimate applies to the average for all the properties being addressed in the St. Louis North County Site remediation. (Again, it is unclear whether the impact of inaccessible areas and deep soil contamination are factored into this residual risk estimate.) Based on the information presented in the FS, the estimated potential residual risk at VP2L is not separately stated. Information needs to be provided to assess the residual risk at each Vicinity Property so that specific evaluations (and comment) can be made on the protectiveness of the proposed remedy, as well as the need for institutional controls, worker safety measures and long-term monitoring. In the FS, the COE justifies accepting final risk levels less protective than the NCP's default point of departure for risk (1x10-6) due to practical implementability issues and cost considerations. We do not believe a sufficient record has been established to justify this deviation from default NCP criteria, at least beyond the 2x10-5 residual cancer risk level. With regard to implementability, the FS cites the inability of field instruments to detect radiation levels that correspond to a 10-6 cancer risk. However, laboratory instruments are capable of measuring concentrations as low as 1 pCi/g. Based on data in FS Table D-8, it appears that achieving a 1 pCi/g level would correspond to approximately a 2x10-5 residual cancer risk. A residual risk of 2x10-5 is an order of magnitude more protective than 3x10-4. At sites where non-radiological contaminants are at issue, laboratory analyses are generally the only means to confirm attainment of RGs. The fact that a relatively inexpensive means exists to demonstrate attainment of a less stringent standards does not justify the less stringent standards	A cost analysis is not required to justify the use of an ARAR-based RG. CERCLA presumes that the ARARs are protective. This FS statement is not included in the ROD. The NCP also proves that remediation goals may be revised to a different risk level within the acceptable risk range based on consideration of appropriate factors including uncertainty factors, quantification limits, and technical limitations to remediation. Use of a remedial goal of 14 pCi/g for Th-230 in surface soils would result in a calculated risk of 6 (5.8) x 10-6. This is at the lower end of the CERCLA risk range, is protective for future anticipated land uses, and accounts for in-growth of Ra-226 for up to 1000 years pursuant to 40 CFR 192.02(a). Residual site risk assessment will be performed subsequent to remediation.

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		themselves. The FS and ROD must justify why remedies for radiologic sites are subject to a lower threshold for deviation from NCP risk standards than are applicable at non-radiologic sites. The FS also states that the incremental risk reduction that would be achieved by applying a clean-up level more stringent than the proposed 5/15 pCi/g levels does not warrant the additional cost of a more stringent standard. While this may be true, there is no quantitative cost analysis in the FS to support this conclusion. The FS must provide a quantitative cost analysis to justify deviating from the CERCLA "point of departure" of 10-6, and from 2x10-5 to 3x10-4.	
6		**Use Of 40 CFR 192 As Relevant And Appropriate Requirement May Not Meet CERCLA Standards.** The FS looks to the 40 CFR Part 192, Subpart B standard of 5/15 pCi/g for Ra-226 in surface/subsurface soils to establish Ra-226 remediation goals, and then uses the 5 pCi/g as the benchmark for setting surface soil remediation goals for Th-230 and U-238. According to Table D-11 of the FS, the resulting site-specific dose is estimated at 19 mrem/year for Ra-226, which, as discussed in comment No. 3 (¶¶4-5) above, is less protective than the 15 mrem/year level required by EPA to meet the particular requirements of CERCLA. See EPA Directive 9200.4-18, *Establishment of Clean-up Levels for CERCLA Sites with Radioactive Contamination* (Aug. 22, 1997). The FS must justify this deviation or adjust the remediation goal for Th-230 and U-238 in surface soils. It is not clear from the data presented in the FS whether the proposed 15 pCi/g standard is sufficiently protective overall to meet CERCLA and NCP criteria. EPA clearly states that using the 15 pCi/g practical standard is not warranted in situations where there exist significant quantities of contamination of Ra-226 between 5 and 30 pCi/g in the subsurface. For example, according to FS Attachment 12, Appendix D, the range of Ra-226 found at VP2L was from 0.33 to 89 pCi/g with a mean concentration of 2.29 pCi/g. (As indicated in comment No. 1, above, this represents an incomplete statement of the available soil data for VP2L, and	CERCLA presumes that the ARARs are protective. 40 CFR 192 and 10 CFR 40 were determined to be relevant and appropriate regulations for this site based on the nature and origin of materials present. The RGs for radium, thorium, and uranium established by USACE for the North St. Louis County sites are fully protective of human health and the environment.

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		acknowledging the additional data in the FS may require, among other changes, modifications to FS Attachment 12). Given this distribution, it appears that Th-230 will be the risk limiting factor driving clean-up, not Ra-226, as is supposed by application of 40 CFR Part 192, Subpart B standards. The FS should clarify whether the 15 pCi/g is an appropriate and protective standard, consistent with CERCLA and the NCP, for the subsurface soils at VP2L and other Vicinity Properties. The FS proposes using Ra-226 as surrogate to "measure" levels of Th-230 because the field detection limit for Th-230 is 2120 pCi/g. The technical basis for the adequacy of such an approach is not clear from the FS. The FS should explain how the use of Ra-226 as a surrogate for Th-230 rationally will provide a sufficiently accurate assessment of the final site conditions. The FS also states the use of 40 CFR 192 as an ARAR is consistent with the 1998 St. Louis Downtown Site (SLDS) ROD. This is not completely accurate. The SLDS ROD had a surface soil clean- up level of 5 pCi/g for Th-230. For SLDS, the surface soil clean-up level for Th-230 was consistent with the Ra-226 clean- up level. The SLDS remedy appears consistent with EPA guidance on the use of 40 CFR 192 as an ARAR (EPA Directive 9200.4-25), which states that, "at a minimum, this would generally mean that Thorium-230 and Thorium-232 should be cleaned up to the same concentrations as their radium progeny." The FS should state why a deviation from the Th-230 clean-up standards used for SLDS should be deemed protective under the NCP and compliance with ARARs, or otherwise justified for the North County Site.	Ra-226 is used as a surrogate for Th-230 only when performing radiological surveys using field instruments. Radiological surveys will be augmented by laboratory analysis of soil samples as an integral part of MARSSIM based final status surveys. 10 CFR 40 Appendix A Criterion 6(6) was not in existence at the time of the SLDS ROD and therefore was not available as an ARAR.
7		**Use Of 10 CFR 40 Appendix A, I, Criterion 6(6) To Determine Cleanup Standards For Th-230 And U-238** EPA Directive 9200.4-35P, *Remediation Goals for Radioactively Contaminated CERCLA Sites using the Benchmark Dose Clean-up Criteria in 10 CFR Part 40 Appendix A, I, Criterion 6(6)* (Apr. 2000) states that	USACE has determined 40 CFR 192 and 10 CFR 40 in combination are relevant and appropriate regulations for this site based on the nature and origin of materials present.

Comments received from Integrated Management and Environmental Solutions (IMES)			
Comment No.	**pp/§/¶**	**Comment**	**Response**
		when 5 pCi/g and/or 15 pCi/g standards are used as relevant and appropriate requirements, these soil standards should continue to apply to combined levels of radium-226 and radium-228, as well as the combined levels of Th-230 and Th-232. The proposed surface soil standards for Th-230 at the North County Site do not comply with this interpretation of the regulation, and may not be protective or comply with ARARs. As discussed above, to meet CERCLA protectiveness criteria, the benchmark dose rate should be 15 mrem/year or less when establishing clean- ups using Criterion 6(6). EPA Directive 9200.4-18, *Establishment of Clean-up Levels for CERCLA Sites with Radioactive Contamination* (Aug. 22,1997). The FS should explain why the deviation from EPA's interpretation of its regulations is warranted and how the use of the proposed clean- up levels for Th-230 and U-238 are protective under CERCLA. The FS should also further discuss whether use of Criterion 6(6) is appropriate. It is one element of a comprehensive siting and management program, the other elements of which are not present or accounted for at the North County site. It may not be appropriate to rely on one provision of a comprehensive program where the other circumstances assumed by that program to exist are not present (e.g., that the U.S. would ultimately take title to disposed cells). In addition, the FS should consistently make clear that the clean-up levels proposed under 40 CFR 192 and Criterion 6(6) are levels above background. The FS should discuss what background levels and associated dose and risk rates are for the St. Louis North County Site (currently only identified in Appendix D). In addition, discussion should be added that describes the process used for determining background for the St. Louis North County Site.	Experience at the St. Louis FUSRAP sites has indicated that implementation of the subsurface remediation criterion for Ra-226 results in actual average residual concentrations of Ra-226 significantly less than 5 pCi/g. These Ra-226 concentrations, in combination with Th-230 and U-238 RGs of 15 and 50 pCi/g achieve doses that are below 15 mrem/yr, in practice. This is based on post-remediation data from a number of different areas and properties within the North St. Louis County sites and St. Louis Downtown Site. Risk assessments performed to date have determined that the RGs would achieve protectiveness to levels within the CERCLA risk range and below a HI of 1.0. 10 CFR 40 Criterion 6(6) has been determined to be relevant and appropriate for the North St. Louis County sites (See PP, page 9). The RGs developed in accordance with Criterion 6(6) are unrestricted use criteria and thus are independent of other provisions such as use of disposal cells. The FS, PP, and ROD consistently state that the RGs are above background. Refer to FS Table D-9 and Attachment 1 to Appendix D for soil background values.

Comments received City of St. Louis Airport Authority			
Comment No.	**pp/§/¶**	**Comment**	**Response**
General		The FS adequately addresses source removal options for accessible radiological contamination in soil at SLAPS.	USACE acknowledges your support for the evaluation of source removal options for accessible soil as presented in the FS.
General		Throughout the FS, it is presumed that only radiological and metal contamination resulted from uranium processing at SLDS. According to PRELIMINARY PUBLIC HEALTH ASSESSMENT, ST. LOUIS AIRPORT, HAZELWOOD INTERIM STORAGE/FUTURA COATING COMPANY, ST. LOUIS, ST. LOUIS COUNTY,, MISSOURI, CERCLIS NO. MOD980633176, unstabilized piles of waste consisted of "106,500 tons of Raffinate, 10,200 tons of leached or unleached barium sulfate, 4,000 tons of dolomite and magnesium fluoride, 3.500 tons of scrap metal, 600 tons of U-containing sand and other contaminated materials in 2,400 drums, and 350 tons of miscellaneous wastes". The other contaminated materials in the drums and the miscellaneous wastes are unspecified. At similar uranium processing sites (Oak Ridge, Feral [*sic*], Weldon Spring) non-radiological wastes have included VOCs. The absence of commingling of VOCs and radiological waste on the SLAPS property should not be used to discount the possibility that VOCs detected at SLAPS originated from SLDS uranium processing activities.	An analysis of the physical chemical process for the preparation of uranium metal at SLDS indicated that only radiological and metal contaminants could have occurred. Dolomite linings, barium to precipitate the sulfates and magnesium to reduce the uranium fluoride would be the main substances added during the process. The only organic compound used was diethyl ether which was reclaimed and which displays such high volatility that it would not be found in the environment. This analysis of the process corresponds well with the fact that VOCs are not generally co-located with radiological wastes at SLAPS. VOCs (primarily TCE) have only been found at high levels on SLAPS near the buried meander bend and in some wells on the ballfields, where there have been no MED/AEC activities. The organics found in the ballfield wells are higher than for the SLAPS wells. Also the Weldon Springs TCE drums were disposed of in their Raffinate pit, but were not related to radiological processing. No record of TCE use in the process has been found.
1	Exec. Summary, Authority, para. 3, 1st bullet (also pg. 3 of the PP)	FFA definition includes all wastes associated with Uranium processing conducted at SLDS. Wastes other than metals and radiological constituents are associated with uranium processing. See comment 2.	The FFA definition includes all wastes associated with uranium processing conducted at SLDS. USACE followed CERCLA guidance in addressing COPCs. Those contaminants not resulting from MED/AEC-related activities and not co-located with MED/AEC-related contaminants are outside the scope of this action. A review of known historical documents has indicated that solvents, fuels, or lubricants were not used in the processing at SLDS.

Comments received City of St. Louis Airport Authority			
Comment No.	**pp/§/¶**	**Comment**	**Response**
2	Exec. Summary, Nature and Extent, para. 3 ES-6, para. 2	Regarding no record of VOCs originating from SLDS: U-processing facilities used acids, solvents, fuels, lubricants, and volatile extraction compounds. For example, Oak Ridge Site contaminants include, acetone, 2 butanone, toluene, and xylene; the Feral and Weldon Spring contaminants include acrolein, PAHs, tetrachloroethene, and trichloroethylene. Please note: The City of St. Louis Airport Authority implemented a de-icing solvent collection system in 1999 to address the runoff of glycol de-icing solution to the Coldwater Creek receiving stream. The Airport collects de-icing solution applied to aircraft and diverts the effluent collected to the Bissell Point Waste Water Treatment Facility (MSD) for treatment prior to discharge.	There is no record of VOC-containing wastes being used at SLDS or stored at the SLAPS. A review of known historical documents has indicated that solvents, fuels, or lubricants were not used in the processing at SLDS. Other operations and processes occurred at the referenced facilities and a comparison of those sites to the St. Louis Sites may not be appropriate. USACE understands and has noted the provisions of the City of St. Louis Airport Authority's de-icing solvent collection system.
3	ES-9 through ES-14, Summary of Risk	Risk assessment does not address potential risks from the shallow groundwater. Construction in the SLAPS area (i.e., building foundations, basements, elevator shafts) could complete GW dermal exposure pathway to workers. Further, considering future construction scenarios, the potential completion of the inhalation pathway to workers and occupants in basements/lower levels from the groundwater component is not assessed.	A risk calculation was performed for a construction worker exposed to both shallow and deep ground water at the SLAPS and the HISS (see Attachment 15 of Appendix D in the FS). The results of the risk calculation indicate that both the acute and chronic risks to the construction worker are within the acceptable CERCLA risk range for both inorganic and organic chemicals present at the North St. Louis County sites. The inhalation pathway from ground water was considered during the evaluation of risk to workers and occupants present in basements/lower levels using a worker scenario. However, the chemicals that are present in the ground water do not have values for either Henry's law constant or inhalation reference dose factors, thus limiting the options in respect to risk assessment.

Comments received City of St. Louis Airport Authority			
Comment No.	**pp/§/¶**	**Comment**	**Response**
4	Sect. 2.2.5.2	FS states that refinements were made to the groundwater conceptual model that includes changes in the lateral continuity of Unit 3M (the aquitard) across the site. The RI states that the 3M unit is laterally discontinuous, being absent in the eastern portion of the property. Are there additional lithologic data points (borings) available to support the lateral continuity to the east, inferred lithologic contact between units 3T and 3M (which were not used in the previous version of the model)? Were lithologic data used to generate the previous model discounted? The uranium analytical data from the annual environmental report for the calendar year 2000 indicate two locations were above MCLs (30 ug/l) for uranium in deep groundwater-bearing units. It was reported in the annual report for 2000 that at least one monitoring well location was over 250 ug/l uranium, suggesting there is some degree of communication between the upper and lower hydrostratigraphic units. Will the classification of the upper aquifer be changed to Class II if such communication is discovered at a later date (thereby requiring current and future site owners to address groundwater problems)?	The refinements to the ground-water conceptual model were based primarily on a re-evaluation of the log descriptions for the historical borings and the comparison of these borings to additional post-RI borings completed at the SLAPS. This re-evaluation indicated that a more reasonable interpretation of the lithologic data points is a relatively constant thickness for unit 3M and a generally similar depth to the top of Unit 3M beneath the entire SLAPS area. Units 3T and 3M are very difficult to distinguish in the field, and generally have similar descriptions in the boring logs. USACE acknowledges that stratigraphic interpretations are subjective, but it should be noted that the interpretation does not significantly impact the hydrogeology of the SLAPS. Differences in the two conceptual models would not significantly revise the arrival periods for contaminants reaching the Limestone Aquifer, as Unit 3T, like Unit 3M, is primarily composed of clay and so has a low permeability. Further, little consideration is given to the capacity of clay to bind heavy metals. The two exceedences of the uranium MCL were reported for calendar year (CY) 2000 in Well MW34-98 and Well B53W09D, but were not repeated in CY2001 or CY2002. The reason for the total uranium concentration exceedence detected in MW34-98 in CY2000 is not known. The total uranium concentrations reported for Well B53W09D, which is screened in the shale unit, were only slightly elevated above background, possibly as a result of higher natural uranium concentrations present in the shale. Shallow ground water would not be reclassified as Class II if communication was discovered at a later date as that designation is reserved for ground water that is currently or may be used as a source of drinking water. Due to the low yields (yields < sustainable rate of 150 gpd) and generally poor water quality, the shallow ground water would still fall under the Class III designation.
5	Sect. 2.3, para.3	FS states a records search from industrial facilities near HISS/Futura Coatings reveal existence of RCRA wastes. No records searches for waste sources for the SLAPS area are mentioned which explain that the presence of TCE is unrelated to uranium processing waste. Did wastes from generators other that uranium processing facilities have access to the site?	A records search was conducted for SLAPS. No information has been located that documents RCRA wastes at the SLAPS. Site history and contaminant information has been included in prior reports. TCE is known to have been used upstream of SLAPS on properties bordering Coldwater Creek. A plausible scenario is the transport of TCE in and on surface water to the meander bend location at SLAPS from non-FUSRAP sources.

Comments received City of St. Louis Airport Authority			
Comment No.	**pp/§/¶**	**Comment**	**Response**
6	Sect. 2.3, para. 4	Lack of detecting the commingling of wastes at SLAPS should not be used to exclude VOCs, which have been identified as contaminants at other U-processing sites. Lack of commingling may be due to segregation of the waste (i.e. drums of liquid solvents) prior to burial and/or variability in contaminant mobility after waste container failure. Is there documentation that wastes from SLDS were only solids?	All available information indicates that VOCs were not transferred from SLDS to the SLAPS. Other sites (because of their own environs, contributing processes, and stored wastes) are not germane to the North St. Louis County sites. See also response to City of St. Louis Airport Authority General Comment.
7	Sect. 2, Figs 2-32 and 2-33	Electromagnetic anomalies in area 8 on Fig. 2-32 and in area H on Fig 2-33 were attributed to "conductive material associated with soil stockpile". Were the anomalous responses possibly from buried material in the former dump in this location?	A significant amount of scrap metal and empty drums had been stored at the SLAPS. By 1960, there were approximately 50,000 empty drums and approximately 3,500 tons of contaminated steel and alloy scrap stored on site at the SLAPS [*Airport Committee Report on Disposition of St. Louis Airport Storage Site,* November 5, 1965]. By 1962 the majority of the scrap metals had been sold for their metal salvage values [*Airport Committee Report on Disposition of St. Louis Airport Storage Site,* November 5, 1965]. Terms of the contract for the purchase of the scrap metal 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 [Contract No. AT-(23-2)-47, St. Louis Area Office]. These terms imply that some amount of metal material may have been buried in shallow soil, perhaps as a result of being unloaded and moved over time at the SLAPS. The anomalous responses correlate well with areas where scrap metals had been stored above ground and where this "incidental burial" may have taken place.
8	Sect 2, Figs. 2-42 and 2-43	The figures show uranium and TCE groundwater concentrations two orders of magnitude greater than MCLs at locations within 100-ft of Coldwater Creek. Historic drawings found in other documents depict site use during the 1950's. Drawings/photos from 1955 show drum storage along the western perimeter of the site. TCE was detected in groundwater in the southwestern quarter of the site. Was the site used for disposal of wastes from sites other than uranium processing during the 1950's?	Details of the site history and contaminant information have been included in prior reports. There were no known RCRA wastes stored at the site. A summary of this information is presented in Section 2.2 of the ROD.
9	Sect. 2.5.1	The "1999 Supplemental Human Health Risk Evaluations" do not address risks associated with groundwater exposure. The current property owner should know the risk potentials for future property use. This is needed for evaluation of adequate institutional controls with respect to exposure to contaminated groundwater.	The "1991 Supplemental Human Health Risk Evaluations" do address the potential risks associated with ground water exposure. During the supplemental human health risk evaluation, risk assessments were performed for both current and future maximum exposed receptors from exposures to both shallow and deep ground water, even though it is not an exposure pathway for the North St. Louis County sites. The results of the risk assessments are presented in Attachment 15 of Appendix D of the FS.

Comments received City of St. Louis Airport Authority			
Comment No.	**pp/§/¶**	**Comment**	**Response**
10	Sect 4, Table 4-2	None of the listed Alternatives for SLAPS address groundwater, with the exception of groundwater monitoring during the removal action. In order to protect human health and the interests of property owners, institutional controls for any alternative should include zoning and deed restrictions. As stated in Section 2.2.5.2 of the FS, concentrations of constituents in the uppermost groundwater-bearing unit are highly variable across the site. Restrictions should require analyses of groundwater and saturated soils at the point of invasive activity prior to activities such as construction of building foundations and installation of underground utilities. Analyses should include uranium, VOCs, and metals. RG's for the restriction should be risk-based for construction worker contact and future building resident exposures.	No remedial treatment or restrictions for ground water are warranted. Source-term removal of FUSRAP COCs should make ground water more protective. A risk evaluation was performed for a construction worker exposed to both shallow and deep ground water at SLAPS and HISS. The results of the risk assessment indicated that both the cancer and chronic risks to the construction worker do not exceed the acceptable CERCLA risk range for both inorganic and organic chemicals present at the site. Final status surveys will establish the residual concentrations of radiological and non-radiological COCs. Residual site risk assessments will be performed.
General	Proposed Plan (PP)	The selection of Alternative 5 (Excavation for release without restriction) in Proposed Plan (PP) adequately addresses source removal for accessible radiological contamination in soil at SLAPS.	USACE acknowledges your support for the manner in which radiological contamination in accessible soil is addressed.
General		Alternative 5 has no provisions for environmental concerns and risks related to contaminated groundwater with respect to reasonable expected future use of the SLAPS property.	The Selected Remedy fully addresses all appropriate contaminants and pathways. Soil source term removal will have a protective impact on the present ground-water system. Monitoring will be conducted to assure that remedial action does not degrade the present ground-water conditions. Short-term monitoring of the remaining shallow (HZ-A) and deep (HZ-C) wells will continue for a period of 2 years beyond the remedial action completion that achieves unrestricted use and unlimited exposure. Shallow downgradient wells or deep wells that are found to have statistically significant degradation from FUSRAP soil COCs will continue to be monitored (long-term), subject to five-year reviews. The five-year review process will evaluate the effectiveness of all components of the remedy, including monitoring. Any determination to cease monitoring will be documented in the five-year reviews.
General		The STLAA's comments pertaining to groundwater in the review of the FS are also pertinent to the contents and conclusions of the PP.	Comment noted.

Comments received City of St. Louis Airport Authority			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	Pg. 3, para. 1 of the PP	FFA definition includes all wastes associated with Uranium processing conducted at SLDS. Is it known that wastes other than metals and radiological constituents are not associated with uranium processing?	The FFA definition includes all wastes associated with uranium processing conducted at SLDS. USACE followed CERCLA guidance in addressing COPCs. Those contaminants not resulting from MED/AEC-related activities and not co-located with MED/AEC-related contaminants are outside the scope of this action. A review of known historical documents has indicated that solvents, fuels, or lubricants were not used in the processing at SLDS. See response to St. Louis Airport Authority – Comment #7.
2	Pg 32, para. 1 of PP	The proposed plan for SLAPS in selection of Alternative 5 is "Excavate for release without restrictions". The proposed institutional controls for this alternative include restrictions to prevent exposure to contaminated soils left in place (inaccessible). Concentrations of constituents in the uppermost groundwater are highly variable across the site. In order to protect human health and the interest of the property owners, restrictions for this alternative should include analysis of groundwater at the point of invasive activity prior to activities such as construction of building foundations and installation of underground utilities. Analyses should include uranium, VOCs, and metals. RG's for the restriction should be risk-based for construction worker contact and future building resident exposures. See comment 3.	No remedial treatment or restrictions for ground water are warranted. Source-term removal of FUSRAP COCs should make ground water more protective. A risk evaluation was performed for a construction worker exposed to both shallow and deep ground water at SLAPS and HISS. The results of the risk assessment indicated that both the cancer and chronic risks to the construction worker do not exceed the acceptable CERCLA risk range for both inorganic and organic chemicals present at the site. Final status surveys will establish the residual concentrations of radiological and non-radiological COCs. Residual site risk assessments will be performed.

Comments received 05/28/03, County Executive Buzz Westfall			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	It is, of course, the desire of regional leaders like myself, and many concerned citizens, to continue the clean-up at the 5/15/50 standards. There is, however, the reality of budget cuts that are affecting so many public agencies. I would support, therefore, the USACE Alternative Plan 5 "Excavation with Institutional Controls under Roads, Bridges, Railroads, and Other Permanent Structures" that has been proposed.	USACE acknowledges support for the Selected Remedy.

Comments received T.R. Carr, Mayor, Hazelwood			
Comment No.	**pp/§/¶**	**Comment**	**Response**
General		As the Mayor for the City of Hazelwood, Missouri, I would like to express my firm conviction that all of the contamination related to the MED/AEC be removed from St. Louis County. By implementing a complete cleanup now, any future oversight of the affected areas will be eliminated. In addition, future use of the properties will not need to be regulated by environmental controls. This will help encourage the redevelopment of these areas, which will help the associated communities generate revenues. I understand that these issues can be complex, however no solution other than the complete remediation of the affected sites can fully alleviate potential health risks to children and adult citizens of Hazelwood. A comprehensive cleanup strategy is the only appropriate course of action to protect the public health of our residents and to provide for the possibility of future redevelopment of affected areas.	USACE acknowledges the support for complete cleanup of the North St. Louis County sites. Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Selected Remedy is a comprehensive course of action that is fully protective of human health and the environment.

Comments received Jeanette Eberlin-Rizzello, Council Member, Hazelwood			
Comment No.	**pp/§/¶**	**Comment**	**Response**
General		As City Council member I became, and still am, in close touch with the residents of Hazelwood living in proximity of the site. Please know that there are several "old-timers" still living there, in addition to some younger ones who have moved in. The streets in question, in Hazelwood, are Nyflot Avenue, Carmel Court and Heather Lane. The family whose home is at the intersection of Heather Lane and Hazelwood Avenue has four young children. For their well being and safety, and the businesses and other residents in the area, as a member of the Hazelwood City Council, I urge Congress to place this site on the Record of Decision.	USACE acknowledges the support for complete cleanup of the North St. Louis County sites. Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Selected Remedy is a comprehensive course of action that is fully protective of human health and the environment. .

Comments received 06/11/03, Conrad W. Bowers, Mayor, City of Bridgeton			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	Now, therefore, be it resolved by the mayor and city council of the City of Bridgeton, Missouri, as follows: That the Corps of Engineers be notified that we want their St. Louis cleanup funding continued until the remaining wastes are removed. That it be understood that institutional controls, i.e. deed and zoning restrictions, is not solving the problem but simply abdicating it once again to future generations, while contamination continues to spread.	USACE acknowledges the City of Bridgeton's support for the complete cleanup of the North St. Louis County sites. Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Selected Remedy is a comprehensive course of action that is fully protective of human health and the environment.

Comments received 07/01/03, Steve W. Schulte, Chairman, Earth City Board of Trustees			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	This letter is in response to your April 30th letter requesting public comment on the clean-up of the contamination on what is identified as the North County Site under the FUSRAP program you administer. The Trustees strongly support the cleanup program. However, the Trustees are both shocked and very upset to learn the North County Site DOES NOT include the West Lake Landfill, a Superfund Site. All parties familiar with West Lake know the source of its contamination are the same source as for the North County Site. The answer is the removal of the contamination at the West Lake Landfill within the next couple of years. If the EPA can't or will not do it, then the Corps should request jurisdiction over West Lake and immediately proceed with a 100% clean-up effort. To do nothing is to risk the health and safety of the surrounding community – and this is not acceptable. Please advise what steps can be taken to get the Corps involved in the clean-up of West Lake. Said another way – how did the Corps obtain responsibility for the North County Site?	USACE acknowledges the commenter's support for the complete cleanup of the North St. Louis County sites. Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. The West Lake Landfill was listed on the NPL on August 30, 1990. USEPA Region VII is the lead agency for the landfill. U.S. Army Corps of Engineers obtained responsibility for the North St. Louis County sites under the Formerly Utilized Sites Remedial Action Program (FUSRAP), which was transferred from the Department of Energy to the USACE under the Energy and Water Development Appropriations Act for fiscal year 1998. The West Lake Landfill does not fall under the FUSRAP program and so is beyond the scope of any response action for the North St. Louis County sites.

Comments received 05/30/03, Wm. T. Fitzgerald/ Manager, Environmental Hygiene, Laclede Gas Company			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	Laclede would like to comment on the alternative's presented as control options for the North County FUSRAP site. It is essential that as much residual contamination as possible be removed so that this material will not hinder Laclede's ability to serve its customers and respond to emergencies. In addition to the nuances of Alternative 5, we request that you consider and continue to support the following initiatives: There should be a provision for areas that have been declared "inaccessible", that, in the event they become "accessible", the full support of the Corps and with it, the notification, handling and disposal procedures as are currently offered for the "North County Site" be extended to these additional areas.	USACE agrees that continued health physics support, including the notification, handling and disposal procedures currently in effect, will be provided to Laclede and other affected utility companies when those utilities need to perform excavation/construction activities in inaccessible areas having residual contamination. If the protective cover (road, bridge, active rail line, or other permanent structure) is removed, USACE as the lead agency will consult with EPA and the State of Missouri and either publish an explanation of non-significant differences, significant differences or Amendment to the ROD as appropriate in accordance with the NCP.
2	General	That these areas be included in the establishment of the long-term stewardship program that is to be co-managed by the Department of Energy (DOE) and the Corps of Engineers. That the Utility Support Agreement continue to be honored through the stewardship plan and function as it does now, with the notification process and the technical support (contractor) resulting in a report of the exposures during work activities in the "North County Site."	Inaccessible areas will be addressed in the Long-term Stewardship Plan. The Utility Support Agreement will continue to be honored through the Long-term Stewardship Plan.

Comments received 05/29/03, Elaine M. Brauch, Missouri American Water Company			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	Missouri-American Water Company recommends the final decisional document clearly state that it addresses both accessible and inaccessible areas. Further, the inaccessible areas should be cleaned up in the same manor [sic] as the accessible areas once they become available. Thus, the only difference between these two types of areas would be the placement of institutional controls on inaccessible areas until they become accessible and can be cleaned up by the federal government.	USACE has ensured that the final ROD clearly states how accessible and inaccessible areas will be addressed. Inaccessible soils will not be excavated under the Record of Decision. The remedy for inaccessible soils consists of implementation of institutional controls. Selection of this remedy for inaccessible soils considers the future anticipated land use of inaccessible areas and fully considers each of the nine factors in the NCP with particular emphasis on protectiveness, implementability, short-term effectiveness, long-term effectiveness and permanence, cost, and state and community acceptance. Verification that institutional controls remain protective as a remedy will be assured through the CERCLA five-year review process. Based on current information, none of the inaccessible areas present an unacceptable risk in their current configuration that would require immediate excavation. To clarify further, the ROD includes additional details related to inaccessible soils, including a figure and table describing the location and expected volume of inaccessible soils. In addition, the ROD identifies the supplemental standards developed in accordance with relevant and appropriate standards [40 CFR 192.12(b) and 192.21(c)], which will be used to confirm that inaccessible soils are protective in their current configuration. Final status surveys will be used to define inaccessible soils exceeding RGs.
2		The final decisional document should also address how utilities will recover 100% of costs associated with relocation tasks due to clean up of accessible and inaccessible areas.	Under the Selected Remedy, if the utility is in an accessible area and requires relocation in order for USACE to excavate accessible contaminated soil, USACE will either relocate the utility using our contractor or pay the affected utility to relocate it. If the utility is in an inaccessible area, USACE will not excavate inaccessible soil beneath or around a utility, under this ROD.

May 29, 2003 Public Meeting – Ms. Kathleen Logan-Smith with Health and Environmental Justice, St. Louis			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1		West Lake Landfill is a really big hole considering the amount of waste at that site. I think that remediating all the sites and all the soils that are contaminated is going to be the best plan in the long run.	Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. The West Lake Landfill was listed on the NPL on August 30, 1990. USEPA Region VII is the lead agency for the landfill.
2		I think that a more thorough survey of the creek definitely needs to happen. We had a lot of discussion already about high water events. The thing that's not addressed here, and it's not necessarily a Corps of Engineers area of expertise, is the health risks. What kinds of health surveys, health studies, analysis of data has been done on residents and people who have worked around this site.	Although USACE has extensively investigated Coldwater Creek, additional investigations will be conducted prior to remediation to identify each area within Coldwater Creek where remediation is required to achieve RGs that protect future users of the creek, especially children. The soil above the mean water gradient will be remediated to the same RGs as surface and subsurface soil. Although the sediment below the mean water gradient would be remediated to different RGs, removal of the sediment to these RGs will be fully protective of human health and the environment. Health studies involving the North St. Louis County sites include the Agency for Toxic Substances and Disease Registry's "Preliminary Public Health Assessment, Hazelwood Interim Storage/Futura Coatings Company", St. Louis MO, dated 20 Jan 1994.

May 29, 2003 Public Meeting – Ms. Kathleen Logan-Smith with Health and Environmental Justice, St. Louis			
Comment No.	**pp/§/¶**	**Comment**	**Response**
3		The issue that Jim brought up I thought was important for us to consider is the long-term environmental stewardship office funded long term? Because if it's not it won't happen. And those of us who have ever dealt with anything relating to government know that if it's not funded, it's not going to happen. The thing that's often overlooked when you're assessing risk is cumulative risk. So your risk of exposure to this particle of uranium or this amount of arsenic might be acceptable, but if you're exposed to arsenic and uranium and several other things all at one time, who is doing the math on those numbers?	A Memorandum of Understanding (MOU) between USACE and DOE has been executed. Active remediation under the ROD is the responsibility of USACE. Under the MOU, implementation of the Long-term Stewardship Plan is a USACE responsibility for 2 years after completion of remedial activities. At that time, responsibility for continued implementation transfers to the DOE. The 2-year timeframe for transfer will allow DOE sufficient time to incorporate associated costs into its agency budget as part of the Federal Government's budget process. With regard to inaccessible soil, USACE will impose institutional controls, as appropriate, and enforcement of such institutional controls will be a part of long-term stewardship obligations under the MOU. USACE is currently working with the DOE Office of Legacy Management to develop this plan. To date, DOE has participated in review of the North County FS/PP, conducted numerous site visits, participated in the public meeting, and provided the outline for the long-term stewardship plan. DOE will be provided with a copy of the ROD. The cumulative risk of the contaminants of concern present at the North St. Louis County sites was evaluated and the results are included in the North County Feasibility Study, Appendix D (see Table D-18). The evaluation is described in detail and included cumulative effects of non-carcinogenic chemicals as well as carcinogenic chemicals.
4		I have a question about the term unlimited use and unrestricted exposure. Can sites get that designation without being totally clean, can you get that designation if you've got institutional controls on a site? Because if a site is going to be called unrestricted use, it needs to be completely safe. I am really interested in knowing why the [West Lake] landfill is not included in this plan.	If a site is released for unlimited use and unrestricted exposure, the property owner can use the land for any purpose with no institutional or engineering controls. The site is fully protective of human health and the environment. Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. The West Lake Landfill was listed on the NPL on August 30, 1990. USEPA Region VII is the lead agency for the landfill.

Comments received 06/23/03, Bea Covington, Executive Director/. Edward J. Heisel, Senior Law & Policy Coordinator, Missouri Coalition for the Environment			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	West Lake Landfill	While we realize that the EPA currently has jurisdiction over West Lake Landfill, we believe it would be more efficient, expedient, and economical if the Corps were to be given authority to clean up the two radioactively contaminated areas at West Lake, rather than have the EPA defer the exhumation, transport, and disposal of these hazardous materials, perhaps indefinitely. It seems more reasonable for the Corps to contract for the remediation of all the St. Louis Mallinckrodt wastes at the same time, including those at West Lake.	Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. The West Lake Landfill was listed on the NPL on August 30, 1990. USEPA Region VII is the lead agency for the landfill.
2	Coldwater Creek	We are concerned about the proposal to clean up the creek only above the "mean water gradient." Children will always be attracted to the creek, and periodic flooding will continue to cause the dispersal of the contaminants-at heights above and below the mean water gradient. The creek empties into the Missouri River just upstream from the major St. Louis City drinking water intake.	USACE recognizes the concern of the commenter about the potential hazard posed by the radioactive materials in Coldwater Creek. The soil above the mean water gradient in Coldwater Creek will be remediated to the same RGs as surface and subsurface soil. Although the sediment below the mean water gradient would be remediated to different RGs, removal of the sediment to these RGs will be fully protective of human health and the environment. The remediation is anticipated to have a positive effect on surface water quality in the creek. Although Coldwater Creek empties into the Missouri River, removal of contaminated sediment and dilution with the Missouri River will nullify any discernable affect on the water quality of the river.
3	Coldwater Creek Gabion Wall	We believe the entire gabion wall along the western boundary of the Airport Site should be removed and transported to one of the licensed radioactive waste disposal sites used by the Corps. As long as the contaminated wall remains along the shore of Coldwater Creek, it will continue to contaminate the creek. Conceivably, the Corps could try to wash the radioactive contaminants from between the rocks of the gabion wall (that is, the sludge that have been caught within the chicken wire baskets, starting in 1985 when the wall was installed). But the resulting rinse water would then have to run through a multi-staged water treatment plant before it could be released into the environment. It would be safer for the wall to be removed once the Airport Site remediation has been completed, and for a new gabion wall or other retaining wall to be installed.	USACE intends to address the contamination behind the gabion wall as part of the Selected Remedy. The gabion wall would be removed and disposed of in a cost effective manner in order to remove the contaminated soil. After removal of the contamination and the gabion wall, the creek reach from the railroad trestle at Banshee Road to the bridge at McDonnell Boulevard will be redesigned, eliminating the steep and eroding banks.

Comments received 06/23/03, Bea Covington, Executive Director/. Edward J. Heisel, Senior Law & Policy Coordinator, Missouri Coalition for the Environment			
Comment No.	**pp/§/¶**	**Comment**	**Response**
4	Alternative 6	The description of Alternative 6 sounds appropriate to us, and final: "Alternative 6 emphasizes excavation of all contaminated material, regardless of location or accessibility. All soils exceeding the RG (remediation goal) 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."	USACE acknowledges the support for Alternative 6. Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Selected Remedy is a comprehensive course of action that is fully protective of human health and the environment.
	Conclusion	We appreciate the efforts the Corps of Engineers has taken to try to clean up the historic nuclear weapons wastes that have been dispersed in many areas of St. Louis City and County. We hope you will choose the most inclusive and technologically responsible remedies for the completion of this massive undertaking.	The support for completion of the remediation of the St. Louis FUSRAP Sites is acknowledged. USACE is committed to ensuring that remediation is conducted responsibly and in a manner protective of the local community and the environment.

Comments received 06/26/03, Berny Hintz, Principal, Berny Hintz AIA Architects LC			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	In connection with our review of the North County FS/PP currently out for public comment through July 14, we observed that the characterization of contaminant levels on the 9150 Latty Avenue Property does not appear to account for the >30,000 pCi/g concentrations detected (and temporarily capped in 1996 per instruction of the DOE) in the western heavy vehicle parking area. We are concerned that the evaluation of this property in the FS also does not take into account data generated (1) following removal of the East Piles; (2) during the construction of the HISS Rail Spur; or (3) in connection with the construction of the contractor equipment storage area on the property during the East Pile removal project. The data is needed to assess the impact of, and provide public comment on, the Corps' remedial plans for the 9150 property. In addition, we would like to assure that this data made part of the administrative record to assure that it is taken into account in connection with all future remedial evaluations, decisions and actions respecting the 9150 property. (1) We would have thought this data would have been contained in a post-removal action report for the rail spur construction and east pile removal project carried out under the 1998 EE/CA. However, I understand that no such report has been prepared.	A Post-Remedial Action Report is prepared upon completion of the remedial action. Remedial action at the 9150 property has not been completed. However, when completed, the PRAR will be made available to property owners. USACE considered all available appropriate data in the characterization of the property in accordance with CERCLA.

May 29, 2003 Public Meeting – Ms. Kay Drey			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1		I'm here tonight to urge the Corps of Engineers to seek the funding first to undertake a thorough radiological survey to evaluate the ground water, surface water and lands known or suspected to be contaminated using the best available technology, and then to seek funding to clean up all those sites that exceed the 5/15 picocurie standard where the public currently has access or is expected to have access in the foreseeable future, including the sites from which contamination will continue to migrate onto accessible land and water. And also to seek funding for the exhumation, transport and disposal of the wastes, removing them from our densely populated urban area situated where creeks and rivers flow and overflow, threatening the further dispersal of the contamination.	USACE will continue to utilize the existing budget cycle to obtain funding for the remediation of the North St. Louis County sites.
2		I guess one of my main concerns is West Lake Landfill, which has been mentioned this evening.	Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. The West Lake Landfill was listed on the NPL on August 30, 1990. USEPA Region VII is the lead agency for the landfill.

May 29, 2003 Public Meeting – Ms. Kay Drey			
Comment No.	**pp/§/¶**	**Comment**	**Response**
3		The Coldwater Creek concern is very basic to all of us. I think we all would like the creek cleaned up as well as possible. I think it's even hard to monitor it accurately. But it does flow through populated areas, past schools and churches and homes. And I just think that, as the speaker right before me said, it's going to continue transporting all these wastes.	USACE recognizes the concern of the commenter about the potential hazard posed by the radioactive materials in Coldwater Creek. Although USACE has extensively investigated Coldwater Creek, additional investigations will be conducted prior to remediation to identify each area within Coldwater Creek where remediation is required to achieve RGs that protect future users of the creek, especially children. The soil in Coldwater Creek above the mean water gradient will be remediated to the same RGs as surface and subsurface soil. Although the sediment below the mean water gradient would be remediated to different RGs, removal of the sediment to these RGs will be fully protective of human health and the environment. The selected alternative (Alternative 5) requires removal of all soil and sediment that would present an unacceptable risk to current and future residents (including children) and workers. The RGs for sediment take into account the possible redeposition of contaminated sediment during flooding. The remediation is anticipated to have a positive effect on surface water quality in the creek. The benchmark dose approach defined in Criterion 6(6) was applied using EPA methods and exposure factors in development of the Coldwater Creek sediment remediation goals. The remediation goal derived for sediments is 15 pCi/g of Ra-226, 43 pCi/g of Th-230 and 150 pCi/g of U-238 above background for sediments below 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 additional excavation in Coldwater Creek.
4		I think the gabion wall at the west end of the Airport Site should be removed and not washed off. The gabion wall is chicken wire with rock in it. But they put it onto the land right where it's extremely contaminated, very high levels of radioactivity when they installed the gabion wall	USACE intends to address the contamination behind the gabion wall as part of Selected Remedy. The gabion wall would be removed and disposed of in a cost effective manner in order to remove the contaminated soil. After removal of the contamination and the gabion wall, the creek reach from the railroad trestle at Banshee Road to the bridge at McDonnell Boulevard will be redesigned, eliminating the steep and eroding banks.

May 29, 2003 Public Meeting – Ms. Kay Drey			
Comment No.	**pp/§/¶**	**Comment**	**Response**
5		I think when you're talking about the materials that are as hazardous for as long as ours are, institutional controls are just not acceptable.	USACE concurs that institutional controls would not be an appropriate remedy for all properties at the site and for this reason does not recommend Alternative 4. The selected alternative (Alternative 5) retains institutional controls as only one component of the remedy, appropriate just for those areas that are currently inaccessible.
6		Particularly with regard to Coldwater Creek, water can overflow into people's backyards where they have gardens perhaps with vegetables.	The selected alternative (Alternative 5) requires removal of all soils and sediment that would present an unacceptable risk to current and future residents (including children) and workers. The RGs for sediment take into account the possible redeposition of contaminated sediment during flooding.
7		Because another concern about our St. Louis sites is that we have a lot of alpha emitters, alpha radiation. So a picocurie of alpha-emitting radiation is not insignificant.	USACE agrees that alpha emitting radioactive materials can be hazardous. The Selected Remedy protectively addresses all COCs including alpha-emitting contaminants.
8		I hope they take good care of the workers. I continue to worry about the people who are cleaning up these materials. Let's get on with the cleanup.	All workers involved in the remedial activities or any field operations will be under the guidance and direction of a Site Health and Safety Officer (SHSO) who will ensure that, at a minimum, the health and safety requirements outlined in a Site-Specific Health and Safety Plan (SSHP) are implemented. These plans will be developed in accordance with current Federal regulations, specifically, USACE and Occupational Safety and Health Administration (OSHA) requirements for hazardous waste operations. The workers will also be enrolled in a medical monitoring program which includes a baseline physical prior to beginning work at the Site, an annual physical during the time the worker employed at the Site, and an exit physical at the conclusion of the workers employment at the Site. Additional working requirements include the use of protective clothing as well as hard hats, safety boots, and other means of personal protection. USACE implements the radiation protection requirements of 10 CFR 20.

May 29, 2003 Public Meeting – Dr. Dan McKeel (Washington University School of Medicine)

Comment No.	pp/§/¶	Comment	Response
1		I favor the idea of alternative 6, that is cleaning up as much as possible. And under the roads and bridges, when that dirt becomes accessible, I think we ought to try to clean it up. I also strongly endorse what Jim Werner said, that the groundwater just has to be monitored unless it can be absolutely proven that there's no need to do that, and I think that's basically impossible.	The commenter's support for removal of all radioactive wastes at the St. Louis FUSRAP Sites is acknowledged. Please refer to General Comment 1.
2		On page 18 of the proposed plan is the following statement that has what I believe to be major factual errors. Since the major point of the proposed remedy number 5 and 6, and all of them really, is to protect the public health and environment, I feel that these are very serious scientific and medical errors in the document which must be addressed and the statements must be modified.	Toxicity (slope factor and reference dose) information from IRIS and HEAST was used for the risk assessment for the North St. Louis County Site. Both carcinogenic and non-carcinogenic risks were evaluated for those chemicals that have both slope factor and reference doses. However, remediation goals (RGs) for all COCs were developed based on either carcinogenic or non-carcinogenic effects, whichever gives the most conservative value. For example, risks due to arsenic, cadmium, and chromium were evaluated for both carcinogenic and non-carcinogenic effects. The RGs for arsenic, cadmium, and chromium were developed based on their non-carcinogenic effect, since it contributed the greater risk (HI≥>1). The calculated carcinogenic risks for arsenic (36 mg/Kg), cadmium (12 mg/kg) and chromium (350 mg/kg) for both resident and construction worker are presented in the following table. **Metals** / **Resident** / **Construction Worker** Arsenic / 4.3×10^{-5} / 3.65×10^{-6}. Cadmium / 3.42×10^{-9} / 8.35×10^{-11} Chromium / 6.5×10^{-7} / 1.58×10^{-8} The carcinogenic risks for arsenic, cadmium, and chromium for both residents and construction worker were in the range of 10^{-5} to 10^{-11}. Hence, the remdiation goals (RGs) for all these non-radionuclides are based on their noncarcinogenic effects

May 29, 2003 Public Meeting – Dr. Dan McKeel (Washington University School of Medicine)			
Comment No.	**pp/§/¶**	**Comment**	**Response**
3		What sources were used to classify uranium as not being a radionuclide, and what sources were used to say that the 6 known carcinogens were to be labeled as non-carcinogens.	Uranium: Uranium was evaluated both as a radionuclide (i.e., U-234, U-235, and U-238) and non-radionuclide (soluble salt). HEAST includes the carcinogenic information for radionuclide uranium, whereas IRIS includes the reference dose information for soluble salt uranium. No carcinogenic data is available for uranium metal in IRIS. Hence, uranium metal was not evaluated for carcinogenic risk during the risk assessment process. Chromium: For the risk assessment and in the development of the RGs, all chromium data were evaluated using the toxicity of hexavalent chromium, which has two different types of toxicity values: one for particulates and one for chromic acid mists. The toxicity values from the hexavalent chromium/particulates were used to evaluate chromium in soil/sediment, while the toxicity values from the hexavalent chromium/chromic acid mists were used to evaluate chromium in water. Note that toxicity values are also available for trivalent chromium, but these values are less conservative than those for hexavalent chromium and were not used in the risk assessment or in the development of the RGs for chromium. Thus the approach taken was the more conservative approach (i.e., more conservative than the EPA Region 7 default assumption that 10% of the chromium found in soil is hexavalent). Nickel, Selenium and Other Chemicals. Because no carcinogenic-related toxicity data (slope factor) is available for nickel, selenium, and other chemicals mentioned in the comments, no cancer risk was assessed for those chemicals.
4		What is meant in the document by primary effects that apparently were used to classify these 11 metals as non-carcinogens. And by primary, I think that's important to define what that means since all of the known biologic effects of the 11 compounds may be operating on citizens exposed to them to harm human health and the environment by imposing a cumulative risk.	A primary (or critical) effect is generally the most sensitive effect, i.e., the first effect seen as the dose is increased above the level where no adverse effects are observed. Toxicologists from HSWMR (Tallahassee, FL) evaluated the primary effects associated with each of the 11 metals in the soil at the North St. Louis County sites. Information about primary effects can be found in Table D-17 of Appendix D of the Feasibility Study. As seen on the table, multiple COCs may affect the same primary target organ/system (e.g., antimony, arsenic, and barium all affect the cardiovascular system). Also note that multiple primary target organs/systems may be affected by the same COC (e.g., primary effects for thallium are made to both the Central Nervous System and to the skin/hair). There may be "other" target organs/systems that are affected, but only those listed by the toxicologists as "primary" are included on the table.

July 14, 2003 Written Comments – Dr. Dan McKeel (Washington University School of Medicine)			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1		While I appreciate the opportunity to be heard on the issues that were the focus of the 5/29/03 meeting, I do not understand or agree with the rationale whereby the remediation and regulatory oversight team (USACE, EPA, MDNR) did not allow themselves to respond to questions put to them from the public. This is a different policy than was used at the three recent U.S. Department of Energy (DOE) public workshops on the Long-Term Stewardship August 9, 2002 plan. Those meetings were held at the Weldon Spring Superfund site referable to the Mallinckrodt Uranium Division's uranium production activities during 1942-1966. Yet, both cleanup efforts, SDLS and SLAPS for the downtown site and vicinity properties in St. Louis and North county St. Louis, and Weldon Spring Uranium Feed materials plant/raffinate pits/quarry and vicinity property remediation in St. Charles county (WSSRAP) and the ARMY'S former Weldon Spring Ordnance Works (WSOW), are all governed by CERCLA (Superfund) and related statutes, albeit under different programs (USACE FUSRAP, DOE WSSRAP). Why, then, are different policies adhered to at public hearings? Compared to the DOE program, the North County hearing held 5/29/03 provided less accountability to the public in being one meeting rather than three, and in not allowing governmental agency responses to questions from the public. In addition, the original deadline for submitting public comments was to be May 30, 2003, only one day following the meeting. This short response time was extended to July 14, 2003, partly ameliorating the original inadequate period of time allocated to the public to make final comments on the North County FS/PP.	As no specific format for the public meeting is required under CERCLA, it generally varies somewhat from site to site. Public agencies were free to respond to comments at the meeting. This Responsiveness Summary attempts to summarize or respond to the issues and concerns raised during the public meeting.

July 14, 2003 Written Comments – Dr. Dan McKeel (Washington University School of Medicine)			
Comment No.	**pp/§/¶**	**Comment**	**Response**
2		**Additional concerns raised at the 5/29/03 meeting:** 1) The RARs that support the 6 remedies should be listed in the FS/PP documents. 2) The outline (main objectives) of a Long Term Stewardship plan for both SLDS and SLAPS needs to be included 3) I agree with several comments made that sites such as Latty Avenue and Coldwater Creek need to be fenced off and warning signs posted that warn the public of specific contaminants. To do less, as appears to now be the case, is gross negligence on the part of responsible parties in providing the public their absolute Right to Know. This is a problem at Weldon Spring, Rocky Flats and other DOE nuclear weapons sites that needs to be urgently rectified in a vigorous proactive manner. 4) One objective of the program is to "Minimize adverse effects on area business operations." I believe that this is a low priority goal that should not be given undue weight. The Poplar Street On ramps have been closed by MODOT for emergency repairs, to protect the public safety, even though this action will negatively impact tourism and businesses (late workers) in the short-term. The longer term benefit, safer roads and travel safety thereon, is the prevailing meritorious consideration.	1) USACE has included a full list of the ARARs for all 6 alternatives in the FS. The ARARs are also provided in the ROD. 2) Additional information concerning the Long-Term Stewardship Plan has been included in the ROD. The following statements are included: "The plan will identify the full scope of site activities and responsibilities necessary to assure that the remedy remains protective of human health and the environment over the long term. The long-term stewardship plan will address 1) site monitoring, maintenance, and reporting; 2) the implementation and maintenance of institutional controls; 3) information and records management; and 4) enforcement." 3) The current signage will be reviewed and evaluated. The signage will be adjusted to adequately convey the potential risk of materials at the sites to members of the public. (4) Selection of this remedy fully considers each of the nine factors in the NCP (protectiveness, compliance with ARARs, long-term effectiveness and permanence, reduction in toxicity, mobility or volume through treatment, implementability, short-term effectiveness, cost, and state and community acceptance.) As a CERCLA threshold criteria, overall protection of human health and the environment has been given higher priority than the modifying and balancing criteria (of which "minimizing adverse effects on area businesses" is a component).
3		**New Concerns addressed in the extended comments:** The serious scientific errors made about classification of heavy metals as noncarcinogens in the FS/PP to me raises doubts about the entire scientific validity of the health studies reported in Section 2.5.1 on pages 2-68 - Section on pages 2-82 "Results Of The Supplemental Human Health Risk Evaluations." These pages contain many scientifically and medically challengable "facts." I have attempted to address a few of them, but frankly there is insufficient time and I have run out of energy to do so in more detail. While this may seem to be an overly harsh judgment, it is the reaction I have as an expert pathologist and knowledgable physician to the whole approach used for analysis of risk, the Hazards Index (HI) concept that was heavily relied upon, and the scientific bases for	

July 14, 2003 Written Comments – Dr. Dan McKeel (Washington University School of Medicine)			
Comment No.	**pp/§/¶**	**Comment**	**Response**
		acceptance or rejection of various COCs. The reasons for the latter were not science-based but, rather, appear to be motivated by expediency or to promote cost-containment (to the detriment of protecting the public health and safety). Below are a few specific objections and concerns I have to the analysis in the FS/PP	
		(a) The assumptions underlying HI is the start point is zero, and only site-specific COCs contribute to the HI. Of course this is ludicrous. Many studies have shown that all of us already harbor major burdens of multiple toxic substances including some radionuclides, chemicals, and pesticides. If one's HI is already 0.6, then only 0.4-0.5 hazard units are required for site contaminants to reach and then exceed 1.0, the cutoff point. Of course, people's baseline bodily hazards burden is probably not ever zero. How would one determine an actual baseline HI for an individual or a particular potential COC? This would require chemical or bioassays of human fluids such as blood or urine. True, this is expensive, but it is possible and is being employed increasingly at certain DOE sites (more than 4,500 worker medical exams have been performed on Paducah, KY Gaseous Diffusion Plant workers, for example).	(a) The assumptions concerning HI and the methodology used to perform the risk assessment for the North St. Louis County sites are consistent with EPA's *Risk Assessment Guidance for Superfund*.
		(b) On page 2-75 is a reference to manganese contained in "ores". Question: Which ores? Does this refer to pitchblende, for example, which contains 60% uranium versus about 1% for usual uranium ores. Is there a listing of the composition of uranium ores used at SLDS and transported to SLAPS? This information, defining the exposure sources precisely, should be part of the FS/PP documents	(b) No listing of the composition of all the uranium ores used at SLDS is available. The statement that manganese was contained in the ores is based on information found in *"The Metals", Patty's Industrial Hygiene and Toxicology* (Stokinger, 1981). Based on this reference, manganese is typically present in Belgian Congo pitchblende.
		(c) Also on page 2-75 appears a reference that reads, in part: "…a complete pathway to receptors [aka people] does not exist…potential yield is very low for shallow groundwater…" This basically unsupported reasoning is used over and over in both Army and DOE risk assessments. In order for this reasoning to be accepted as valid by medical scientists in general, you would have to provide field data. Have you performed a tracking	(c) The following text has been included in Section 2.7.1.1 of the ROD: "*Although some contaminants are present in the shallow ground-water unit (HZ-A), this ground water is not considered potentially usable due to its low yield and poor water quality as discussed in Section 2.6.1. In addition, the contaminants are generally confined to the shallow ground water except through slow discharge to Coldwater Creek. Coldwater Creek shows no significant impact from HZ-A water. Therefore, the contaminants detected in HZ-A ground water do not meet the definition of a COC. Ground water in HZ-A was eliminated as a medium of concern for risk-assessment purposes."*

July 14, 2003 Written Comments – Dr. Dan McKeel (Washington University School of Medicine)			
Comment No.	**pp/§/¶**	**Comment**	**Response**
		study that documents actual usage of Coldwater Creek by nearby residents? If so, this study or studies should be cited in the FS/PP. (d) An example of an unproven purely speculative statement on page 2-76 that arsenic in sediment is industry related but not a COC? How do you know that? (e) On page 2-77 there is the statement that "Movement away from 10^{-6} would not be achievable and/or is based on factors such as technical limitations and uncertainties." Three questions arise concerning this too vague statement: (1e) Why (what factors would make this) is this level of remediation not achievable? Please be specific as possible in your answer to this crucial concern. (2e) What are the "technical factors" alluded to, specifically? (3e) What are the "uncertainties" alluded to, specifically? (f) On page 2-81 is the statement that "pesticides…do not represent a human health risk". This sentence is so irresponsible and false that I am flabbergasted to see it in print. This statement reflects badly on FS/PP personnel who wrote these documents. Certain pesticides cause Parkinson's disease (rotenone), neuromuscular paralysis, and many other human disorders that could fill a small book. I am happy to supply a bibliography of these references. (g) (g) I am also concerned that I do not see any reference to the presence of recycled uranium (and its content of plutonium and other obligatory transuranics), even though DOE documents state that 74,000 metric tons of RU were shipped to Mallinckrodt sites. This issue needs to be addressed of whether plutonium is a COC or a potential COC, and if not, what evidence do you have where it went?	(d) Arsenic was detected in sediment samples at levels below background concentrations in Reach A, adjacent to the SLAPS and the HISS. Sediment samples collected during last three years showed that the maximum concentrations of arsenic occurred at monitoring stations C002, C005, and C007. C002 is the historical upstream environmental monitoring station, which was not impacted by MED/AEC activities. Monitoring station C005, located downstream of surface drainage from the HISS and certain VPs, is used to detect contaminant contributions from the HISS and those VPs. Monitoring station C007, located approximately 3,700 feet downstream of the HISS, is the furthest monitoring station from the SLAPS and the HISS. Areas around these monitoring stations are predominantly industrial. The contaminant distribution indicates that the arsenic is due to the heavy industrial activity in the area and is not associated with historical site activities. (e)Technical limitations include the inability of field instruments to detect radiation levels that correspond to a 10^{-6} cancer risk. Sources of uncertainty include: 1) the quality of historic (pre-October 1997) sampling data; 2) the use of environmental fate and transport models; 3) the use of default exposure factors; and 4) the available toxicity information. This information is presented in the ROD. (f) The USACE is aware of the potential health effects of pesticides. As is clarified in the full text of this section, the referenced text concerning pesticides alludes to the levels of pesticides present in various media at the North St. Louis County sites. The evaluation of the pesticide data against background, risk, and hazard criteria indicates that levels present are within the acceptable risk range. Therefore, pesticides do not present an unacceptable health risk at the North St. Louis County sites. (g) The DOE document indicates Mallinckrodt began receiving materials containing recycled uranium in 1962. The report does not specify by name which Mallinckrodt plant it is referring to. It is likely not referring to the SLDS site, as uranium processing activities had been terminated at SLDS prior to this time. USACE has not found any documents indicating SLDS or the North St. Louis County sites received recycled uranium.

Comments received 05/29/03, Janet and Bernard Becker			
Comment No.	**pp/§/¶**	**Comment**	**Response**
	Intro-duction	We are very pleased to see that you are planning more cleanups of the radioactive wastes that have been in North St. Louis County for so long. We urge you to complete the necessary removal of this dreadful material, to the extent that it is technologically possible. The federal government owes Missouri's Department of Natural Resources all the funding necessary to help achieve safe, healthy soil and water conditions in this area and to maintain thorough monitoring oversight for as long as necessary	USACE acknowledges the support for completion of the remediation of the North St. Louis County sites.
1	General	One of the most urgent parts of this cleanup is at the West Lake Landfill, which is in the Missouri River floodplain, and is upstream of the Florissant and Chain of Rocks drinking water treatment plants. As residents of the city of St. Louis, our drinking water is at risk of contamination because it comes from the Missouri River. Cold Water Creek empties into the Missouri River, just upstream of the confluence of the Missouri and Mississippi Rivers.	Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. The West Lake Landfill was listed on the NPL on August 30, 1990. USEPA Region VII is the lead agency for the landfill. The removal of soil and sediment from Coldwater Creek to meet the RGs will have a positive effect on the surface water quality of the stream. There is no detectable increase in the concentration of radionuclides in Coldwater Creek prior to its confluence with the Missouri River.

Comments received 05/28/03, Daniel Berg MD			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	I am writing to encourage a full clean-up of nuclear wastes in St. Louis created by Mallinckrodt. These should not be "stored" in urban areas. I also think Mallinckrodt should pay for this project.	USACE acknowledges the support for full cleanup of the St. Louis FUSRAP Sites and the commenter's opposition to on-site storage. Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Selected Remedy is a comprehensive course of action that is fully protective of human health and the environment. As noted in the Proposed Plan, the radioactively-contaminated soil will be removed for off-site disposal in secure, licensed facilities specifically designed for radioactive materials. These disposal facilities are remote from inhabited areas. USACE is conducting responses pursuant to CERCLA, which provides for cost recovery from responsible parties.

Comments received 05/28/03, Carl Bland			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	I am contacting you with my call for the Corps of Engineers to complete the clean up of radioactive wastes that were created when the US government began processing uranium at Mallinckrodt sixty years ago. These wastes exist in the sediments and shores of Coldwater Creek, at the West Lake Landfill next to Earth City, in Hazelwood along haul roads that were used to truck wastes to Latty Avenue, and on a 22 acre tract near Lambert Airport. The federal government has acknowledged that keeping these wastes buried in an urban flood plane [sic] is clearly not acceptable. These wastes will give off radioactive particles and rays for **4.5 billion years, times ten.** We owe it to future generations to clean up this hazardous mess. I want the clean up continued and completed to the level technologically feasible.	USACE acknowledges the support for completion of the cleanup of the St. Louis FUSRAP Sites. Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. The West Lake Landfill was listed on the NPL on August 30, 1990. USEPA Region VII is the lead agency for the landfill.

Comments received 05/28/03, Joan Botwinick			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	I think it is essential that you continue removal of the radioactive wastes from Coldwater Creek, West Lake Landfill, near the Airport and in Hazelwood. This material is a danger to people and to the groundwater. This extremely radioactive waste should not be allowed anywhere near people or creeks where it can cause extreme health damage to this and future generations.	USACE acknowledges the support for completion of the cleanup of the St. Louis FUSRAP Sites. USACE recognizes the concern of the commenter about the potential hazard posed by the radioactive materials in Coldwater Creek. Although USACE has extensively investigated Coldwater Creek, additional investigations will be conducted prior to remediation to identify each area within Coldwater Creek where remediation is required to achieve RGs that protect future users of the creek, especially children. The soil in Coldwater Creek above the mean water gradient will be remediated to the same RGs as surface and subsurface soil. Although the sediment below the mean water gradient would be remediated to different RGs, removal of the sediment to these RGs will be fully protective of human health and the environment. The selected alternative (Alternative 5) requires that any sediment (regardless of whether it is above or below the mean water gradient) that would present an unacceptable risk to current and future residents (including children) and workers be removed. The RGs for sediment take into account the possible redeposition of contaminated sediment during flooding. The remediation is anticipated to have a positive effect on surface water quality in the creek. Removing sediment to the Coldwater Creek RGs where the risk for the current and future land use is unacceptable, will assure that current and future residents (including children) and workers will be fully protective. USACE recognizes the concern of the commenter about the potential hazard posed by the radioactive materials in Coldwater Creek. Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. The West Lake Landfill was listed on the NPL on August 30, 1990. USEPA Region VII is the lead agency for the landfill.

May 29, 2003 Public Meeting – Mr. Byron Clemens			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1		One of my concerns is voiced by the gentleman from DNR is what happens after the site is cleaned up. I don't think the history of institutional accountability up until this point has been very credible. The site is still in a 100-year floodplain. There's still bubbling springs on the site and near it.	USACE acknowledges the commenter's concern over how the Site will be taken care of after remediation is completed. A Memorandum of Understanding (MOU) between USACE and DOE has been executed. Active remediation under the ROD is the responsibility of USACE. Under the MOU, implementation of the Long-term Stewardship Plan is a USACE responsibility for 2 years after completion of remedial activities. At that time, responsibility for continued implementation transfers to the DOE. The 2-year timeframe for transfer will allow DOE sufficient time to incorporate associated costs into its agency budget as part of the Federal Government's budget process. With regard to inaccessible soil, USACE will impose institutional controls, as appropriate, and enforcement of such institutional controls will be a part of long-term stewardship obligations under the MOU. USACE is not aware of bubbling springs at the North St. Louis County sites.

May 29, 2003 Public Meeting – Mr. Byron Clemens			
Comment No.	**pp/§/¶**	**Comment**	**Response**
2		I think any possibility of future contamination of drinking water and children would say that alternative 6 is the best one to remove all the waste from the site, including the stuff from West Lake Landfill. And I would like to see after the site is cleaned up that it's clear who has the responsibility and ownership, and that it have independent monitoring.	USACE acknowledges the support for Alternative 6. Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Selected Remedy is a comprehensive course of action that is fully protective of human health and the environment. Response-action surface-water and sediment monitoring of Coldwater Creek will be conducted until the creek has been remediated to document that remedial actions are having a positive effect on the creek, and to provide additional data to assess whether Coldwater Creek is being measurably affected by COC migration from HZ-A. Surface water has experienced very low impacts from soil COCs. Restrictions particularly on drilling will prevent the downward migration of contaminants to ground water. This will reduce potential risks due to dermal contact, inhalation and ingestion of ground water. Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. USEPA Region VII is the lead agency for the landfill. See also the response to USEPA General Comment #2d.

May 29, 2003 Public Meeting – Mr. Byron Clemens			
Comment No.	**pp/§/¶**	**Comment**	**Response**
3		I looked at the plan today and page 10 of the Corps's proposed plan says: Coldwater Creek is not significantly impacted. I don't agree with that. I think there's previous studies that show that it is impacted on and I think it needs a lot of remediation. I hope that would be part of the final plan. I know there's still hot spots. I have faith that you guys are going to do a good job of trying to find those spots. But I think some of them could be in those institutional areas we're talking about, roads, bridges, the sediment of the creek. And I really hope before anyone walks away from responsibility that we really thoroughly document the area. Could we possibly look at the same criteria of 5/15 picocuries in the sediment of the creek for the entire length of the creek?	Although USACE has extensively investigated Coldwater Creek, additional investigations will be conducted prior to remediation to identify each area within Coldwater Creek where remediation is required to achieve RGs that protect future users of the creek, especially children. The soil in Coldwater Creek above the mean water gradient will be remediated to the same RGs as surface and subsurface soil. Although the sediment below the mean water gradient would be remediated to different RGs, removal of the sediment to these RGs will be fully protective of human health and the environment. The RGs were developed pursuant to ARARs, and are fully protective of human health and the environment, and achieve residual conditions consistent with guidance. The 15 pCi/g subsurface Ra-226 standard, together with corresponding concentrations of Th-230 and U-238, are applied to soils below the mean water gradient. This standard is fully protective for all scenarios.

May 29, 2003 Public Meeting – Ms. Sandy Delcoure			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1		There's tremendous increasing development along the creek that will add to future flooding along the creek. Dust from radioactive creek sediment deposited along the creek's banks from the rise and fall of the water can become airborne, give off radon gas and be inhaled. This is why it is important that Coldwater Creek be given attention and be cleaned up where it's contaminated. Coldwater Creek is an urban stream with homes, schools, churches, businesses and parks all along its banks. Children play along the creek's banks right up to the edge of the water. It would be very much appreciated if Coldwater Creek were checked and made safe for the community. And from what I've heard, it sounds like you are really doing a good job and trying to do that. Thank you very much.	USACE recognizes the concern of the commenter about the potential hazard posed by the radioactive materials in Coldwater Creek. Although USACE has extensively investigated Coldwater Creek, additional investigations will be conducted prior to remediation to identify each area within Coldwater Creek where remediation is required to achieve RGs that protect future users of the creek, especially children. The soil in Coldwater Creek above the mean water gradient will be remediated to the same RGs as surface and subsurface soil. Although the sediment below the mean water gradient would be remediated to different RGs, removal of the sediment to these RGs will be fully protective of human health and the environment. The 5/15 standard for Ra-226, together with the corresponding concentrations of Th-230 and U-238, apply to site soils including those in the Coldwater Creek banks and floodplain. This standard fully considers and is protective with regard to inhalation of dust. Similarly, use of the subsurface soil radium RG and associated Th-230 and U-238 criteria assures protectiveness of sediment under the mean water gradient. Radon gas is a byproduct of radioactive decay of Radium 226. Given that radium was extracted from feed materials, low concentrations of radium exist within wastes limiting the potential for radon. Use of the radium standard assures protectiveness with respect to radon. The selected alternative (Alternative 5) requires removal of all soil and sediment that would present an unacceptable risk to current and future residents (including children) and workers be removed. The RGs for sediment take into account the possible redeposition of contaminated sediment during flooding. The remediation is anticipated to have a positive effect on surface water quality in the creek. Removing sediment to the Coldwater Creek RGs where the risk for the current and future land use is unacceptable, will assure that current and future residents (including children) and workers will be fully protective. USACE recognizes the concern of the commenter about the potential hazard posed by the radioactive materials in Coldwater Creek.

Comments received 05/06/03, Sandra Delcoure			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	I would like to see #6 Excavation of all Properties carried out for the North County contaminated sites. I would like to thank the Corps and all persons involved in the clean up so far.	USACE acknowledges the support for Alternative 6. Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Selected Remedy is a comprehensive course of action that is fully protective of human health and the environment.

Comments received 05/10/03, Gary Grigsby			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	I see that the Corps is recommending spending $223 million on removing the contaminated soil. I'm strongly in support of that and spending whatever it takes (the $286 million proposal for example) to clean up this area. It is the right and moral thing to do and no time should be wasted in doing so.	USACE acknowledges the support for Alternative 6. Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Selected Remedy is a comprehensive course of action that is fully protective of human health and the environment.

May 29, 2003 Public Meeting - Mr. Walter Hensey			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1		It seems to me there should be some way to keep that land tied to the contaminated waste category so that in future generations it won't be forgotten about.	Land with residual soil contamination above the RGs will be addressed with institutional controls to ensure future generations are informed.
2		I think definitely that Coldwater Creek should be monitored regularly until there's a finding of no longer any contamination. That could go on for centuries possibly. But I think it could be continued until there's no more contamination in the creek. Also I think there should be better designation of that area, posting of signs of the contaminated area.	Coldwater Creek is monitored regularly as part of the Environmental Monitoring Plan will continue during the remedial activities. The Selected Remedy contains provisions for Coldwater Creek to be monitored regularly during remedial activities and until it is determined that the Creek is no longer affected by site contamination. If the monitoring indicates the creek is being adversely affected, monitoring will be continued. The current signage will be reviewed and evaluated. The signage will be adjusted to adequately convey the potential risk of materials at the sites to members of the public.

May 29, 2003 Public Meeting - Mr. Walter Hensey			
Comment No.	**pp/§/¶**	**Comment**	**Response**
3		And I believe that even though you consider 5 to be the preferred option, I would think that you ought to at least cover the area under the roads and put it in your plan some way that it's covered so that it won't be forgotten. And I'm just wondering if you don't clean up the contaminated area under the roads and structures, how are you going to keep that contamination from migrating into the area that you've considered cleaned up. You'll have to go back and clean up the whole area if it does.	Some soils exceeding the RGs will remain in a small number of areas under roads, bridges, active rail lines, and other permanent structures. These areas in their current configurations (i.e., soils under some sort of protective cover such as pavement) and with their limited accessibility/use (e.g., transportation corridor) do not pose an unacceptable risk. These inaccessible areas will not be excavated under this ROD. To ensure that the risks associated with such soils are controlled and managed, institutional controls such as deed restrictions and zoning restrictions would be implemented. Where soils above RGs are inaccessible, institutional controls to prevent intrusive activities, such as restrictions on drilling and excavation, will be implemented. These controls will ensure that the protective cover is not disturbed and that potential contaminant migration pathways are not created. Maintenance of existing protective cover will control the threat of exposure to COCs above RGs via external gamma radiation, inhalation or ingestion of contaminated soil, and direct dermal contact with contaminated soil. Restrictions particularly on drilling will prevent the downward migration of contaminants to ground water. This will reduce potential risks due to dermal contact, inhalation and ingestion of ground water. If the protective cover (road, bridge, active rail line, or other permanent structure) is removed, USACE as the lead agency will consult with EPA and the State of Missouri and either publish an explanation of non-significant differences, significant differences or Amendment to the ROD as appropriate in accordance with the NCP. Specific institutional controls for a given property will be incorporated into the site remedial design and detailed communications plan. Specific institutional controls will be incorporated into the long-term stewardship plan, as appropriate.

Comments received 05/28/03, Patricia Kohn			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	It is imperative that depleted uranium not be ignored by the federal government, especially at a time when all nuclear policies are under review. We in St. Louis have been long subjected to the dangers of nuclear waste, being the first location in the U.S. to have stored it since the middle of the last century and that on an urban flood plain. A start has been made on cleanup but we urge the Corps to finish the job begun by the Department of Energy and remove all the radioactive waste from the sites that have been identified.	Depleted uranium is not present at this site. Wastes resulting from the processing of uranium ore (i.e., natural uranium) are present and are protectively addressed under the Selected Remedy. USACE acknowledges the commenter's support for removal of all radioactive wastes at the St. Louis FUSRAP Sites. Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Selected Remedy is a comprehensive course of action that is fully protective of human health and the environment.

May 29, 2003 Public Meeting – Mr. Rick Lamonica			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1		I do know that much in North County is in a floodplain. Experience from the last 10 years shows that they have had massive flooding, particularly in the spring. I'm not really happy that the standard of cleanup for Coldwater Creek and their term of mean water gradient. I would encourage them to clean up the area along Coldwater Creek and include West Lake Landfill which I understand is also an area that can flood. And remember that water can move this stuff around and shift around the sediments faster than the Corps of Engineers has the ability to clean it up. What we want to do is clean up the area, not make further contamination by just shifting the stuff around.	The Selected Remedy requires removal of all soil and sediment that would present an unacceptable risk to current and future residents (including children) and workers. The RGs for sediment take into account the possible redeposition of contaminated sediment during flooding. The remediation is anticipated to have a positive effect on surface water quality in the creek. Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. The West Lake Landfill was listed on the NPL on August 30, 1990. USEPA Region VII is the lead agency for the landfill.
2		For the minor difference between alternates 5 and 6, considering comments from people that live up here, I would also recommend that they do it to level 6, clean up more of the sites, make sure that they're cleaning up the areas along the banks of these creeks.	USACE acknowledges the commenter's preference for Alternative 6. Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Selected Remedy is a comprehensive course of action that is fully protective of human health and the environment. The differences between the alternatives has been clarified in Section 2.9, evaluated in Section 2.10, and further explained in Section 2.13. The banks of Coldwater Creek above mean water level gradient will be remediated to the surface soil RGs.

Comments received 05/29/03, G. Clare Luane			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	Please be advised that I support the removal of the remainder of the North County radioactive wastes from the following areas: under bridges, roads, and buildings; from the groundwater and from Coldwater Creek sediments and shores: and from West Lake Landfill next to Earth City. I urge that you continue funding the process of clean up until it is completed and the remaining wastes have been removed.	USACE acknowledges the commenter's preference for Alternative 6. Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Selected Remedy is a comprehensive course of action that is fully protective of human health and the environment. The Selected Remedy requires removal of all soil and sediment that would present an unacceptable risk to current and future residents (including children) and workers. The RGs for sediment take into account the possible redeposition of contaminated sediment during flooding. The remediation is anticipated to have a positive effect on surface water quality in the creek. Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. USEPA Region VII is the lead agency for the landfill.
2	General	To rely on "institutional control" like deed and zoning restrictions is not solving the problem. St. Louis has had to bear the burden of this unremediated waste long enough and there should be no further delay in its removal. I expect the USACE to continue this project and oversee it through to its completion, to provide a healthy environment for all residents in this and surrounding areas, promoting the well-being of these communities now and in the future.	USACE concurs that institutional controls would not be an appropriate remedy for all properties at the site and for this reason does not recommend Alternative 4.

Comments received 06/03/03, Chris McClarren			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	I request that you continue to clean-up and finish cleaning up all of the remainders of radioactive wastes in the St. Louis area. Remove it all—under bridges, roads and buildings; from groundwater and Coldwater Creek sediments and shores; and from the West Lake Landfill next to Earth City.	USACE acknowledges the commenter's preference for Alternative 6. Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Selected Remedy is a comprehensive course of action that is fully protective of human health and the environment. It should be noted that no COCs were identified for ground water. Although some contaminants are present in HZ-A ground water, which is the shallower unit, their presence does not require action because the HZ-A ground water is not potentially usable due to its low yield and poor water quality. In addition, the HZ-A ground water does not have a complete pathway to receptors. Therefore, the contaminants detected in HZ-A ground water do not meet the definition of a COC and ground water in HZ-A was eliminated as a medium of concern. Sampling of the deep ground water, HZ-C, HZ-D, and HZ-E, the latter being the protected water resource, indicated that there are no COCs present. Prior analyses and reporting have assured that no mixing of waters between the shallow HZ-A and deep HZ- E (or HZ-C or HZ-D) has occurred. Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. USEPA Region VII is the lead agency for the landfill.

May 29, 2003 Public Meeting – Ms. Price			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1		My comment is that in view of all the construction that's happened along the creek side at the SLAPS area and again at HISS where they removed the piles perhaps the sediment finding analysis would be different today than it was in June of 1999. Certainly different than what it had been in the early 90's. The risks and assessments that have been done to calculate this idea of below the mean water gradient appear from what I can see to be based on numbers of those dates. So I question whether that's the most accurate, and maybe there is a shortcoming in that analysis. So I am asking for a re-evaluation of that or a response on that.	USACE recognizes the concern of the commenter about the potential hazard posed by the radioactive wastes in Coldwater Creek, near the Airport, and in Hazelwood. Contamination within Coldwater Creek is being addressed as part of the Selected Remedy and is presented in detail in the North St. Louis County ROD. Pre-design investigation sampling for COCs will be conducted to obtain technical information to support the remedial design, minimize effects on the property owners, and better manage construction schedules. The creek will be remediated, and upon completion of the remediation, a final status survey will be conducted. This will ensure that the remediation meets the RGs and is fully protective of human health and the environment. Although USACE has extensively investigated Coldwater Creek, additional investigations will be conducted prior to remediation to identify each area within Coldwater Creek where remediation is required to achieve RGs that protect future users of the creek, especially children. The soil in Coldwater Creek above the mean water gradient will be remediated to the same RGs as surface and subsurface soil. Although the sediment below the mean water gradient would be remediated to different RGs, removal of the sediment to these RGs will be fully protective of human health and the environment. The selected alternative (Alternative 5) requires removal of all soil and sediment that would present an unacceptable risk to current and future residents (including children) and workers. The RGs for sediment take into account the possible redeposition of contaminated sediment during flooding. The remediation is anticipated to have a positive effect on surface water quality in the creek.
2		The second point is the application of the mean water gradient to this cleanup where you're going to clean to a certain level above it and a certain different level below it, seems to me to be logical but not practical. And the reason I don't believe it's practical is because I can recall how my son dug rocks and golf balls out of the middle of the creek bed. I don't think there's been enough addressed to give me the assurance that safety has been ensured.	See response to Price Comment #1.

Comments received 06/09/03, Patrick Ryan			
Comment No.	**pp/§/¶**	**Comment**	**Response**
	Intro-duction	One of the things that struck me while visiting the Latty Ave, and SLAPS was that it didn't feel like I was actually surrounded by radioactive waste. It was just a regular plot of land, without any conspicuous indication of the radioactive waste that resides there.	The current signage at the SLAPS and the HISS will be reviewed and evaluated to assure that it adequately conveys the potential risk of materials at the sites to members of the public in accordance with federal law.
1	General	I hope that the Corps of Engineers will take it upon themselves to do what should have been done long ago, and remove all radioactive material from these sites and from North County.	USACE acknowledges the support for removal of all radioactive materials from the North St. Louis County sites.

May 29, 2003 Public Meeting – Ms. Fran Sontag			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1		Since these sites are in highly populated urban areas, and since the way we answer the question will affect our children and grandchildren for hundreds and thousands of centuries, I feel strongly that we should go for the cleanest clean which is possible. And I choose the word possible rather than feasible because I do not think we should take the easy route	USACE acknowledges the commenter's support for the full cleanup of the North St. Louis County sites. Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Selected Remedy is a comprehensive course of action that is fully protective of human health and the environment.
2		A big problem factor is that Coldwater Creek runs through the area. And during and after a flood, sediment is spread over a wide area outside the creek banks. Then after the water subsides, this contaminated soil would naturally tend to erode and get dry and blow about over an even wider area. And then the next flood and drought cycle would spread the dangerous stuff more, and so on and so on, for a long, long time. So I hope you can see my logic of removing as much as humanly possible now while it's relatively close to where we can identify it and deal with it. So I would urge you to dig more deeply all along Coldwater Creek and its bank for quite some distance.	The soil in Coldwater Creek above the mean water gradient will be remediated to the same RGs as surface and subsurface soil. Although the sediment below the mean water gradient would be remediated to different RGs, removal of the sediment to these RGs will be fully protective of human health and the environment. The RGs for sediment take into account the possible redeposition of contaminated sediment during flooding. The remediation is anticipated to have a positive effect on surface water quality in the creek. Removing sediment to the Coldwater Creek RGs where the risk for the current and future land use is unacceptable, will assure that current and future residents (including children) and workers will be fully protective. USACE recognizes the concern of the commenter about the potential hazard posed by the radioactive materials in Coldwater Creek.
3		Remove the gabion wall or whatever that is, that rocks and chicken wire which is there now and replace it with something more permanent which can be monitored for nuclear contamination regularly on and on into the future.	Removal of the gabion wall at SLAPS is included in the Selected Remedy.
4		I would urge you to dig more deeply where the big piles of contaminated soil have already been removed.	Remediation of soils at HISS is included in the Selected Remedy.
5		And one more thing. I visited that site fairly recently and I felt like it was very poorly marked. It's almost indistinguishable from the many industrial sites that are really close by. Perhaps some larger, more colorful and clearer signs would give a better warning to the uninformed visitor that this is a real hazardous waste site.	The current signage at the SLAPS and the HISS will be reviewed and evaluated to assure that it adequately conveys the potential risk of materials at the sites to members of the public, in accordance with Federal Law.

May 29, 2003 Public Meeting – Mr. Leon Steinbach			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1		I disagree with the study that the creek has a low priority as far as resolving and cleaning up radioactive material. I think the creek all the way from the site here at the airport to where it goes into the river should be retested, not only the sediment below the water but the banks. Because when the banks flood for over a period of years, you could have had cumulative radioactive dried dirt, and even incases where basements flooded that could be a possibility of radioactive. I would recommend a concentrated effort on cleaning up the creek, Coldwater Creek area, and the banks and possibly the houses that have been flooded, test it. I agree with your alternative number 5.	USACE acknowledges the concern of the commenter about the potential hazard posed by the radioactive wastes in Coldwater Creek. The soil in Coldwater Creek above the mean water gradient will be remediated to the same RGs as surface and subsurface soil. Although the sediment below the mean water gradient would be remediated to different RGs, removal of the sediment to these RGs will be fully protective of human health and the environment. The RGs for sediment take into account the possible redeposition of contaminated sediment during flooding. The remediation is anticipated to have a positive effect on surface water quality in the creek. Removing sediment to the Coldwater Creek RGs where the risk for the current and future land use is unacceptable, will assure that current and future residents (including children) and workers will be fully protective. USACE recognizes the concern of the commenter about the potential hazard posed by the radioactive materials in Coldwater Creek. USACE acknowledges the commenter's support for Alternative 5

Written Comments, Alf J. Stole, PE			
Comment No.	**pp/§/¶**	**Comment**	**Response**
	Intro-duction	I believe the time is due to get the remaining radioactive wastes removed from all the sites in the North St. Louis County: from the West Lake Landfill in Bridgeton, from the Coldwater Creek sediments and shores and from under bridges, roads, and buildings elsewhere in North County.	Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. The West Lake Landfill was listed on the NPL on August 30, 1990. USEPA Region VII is the lead agency for the landfill. It should be noted that no COCs were identified for ground water. Although some contaminants are present in HZ-A ground water, which is the shallower unit, their presence does not require action because the HZ-A ground water is not potentially usable due to its low yield and poor water quality. In addition, the HZ-A ground water does not have a complete pathway to receptors. Therefore, the contaminants detected in HZ-A ground water do not meet the definition of a COC and ground water in HZ-A was eliminated as a medium of concern. Sampling of the deep ground water, HZ-C, HZ-D, and HZ-E, the latter being the protected water resource, indicated that there are no COCs present. Prior analyses and reporting have assured that no mixing of waters between the shallow HZ-A and deep HZ- E (or HZ-C or HZ-D) has occurred.
1	General	Although, I believe that the West Lake Landfill presently is under the EPA jurisdiction, I would urge the Corps of Engineers to take over the responsibility of the radioactive waste removal from this site; particularly, because West Lake Landfill is located in the Missouri River Floodplain and considering also that these materials have a very long half life.	See response to Stole – Introductory Comment.

May 29, 2003 Public Meeting, Alf J. Stole, PE			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1		It is good to see that the Corps of Engineers has taken an active and leading role in removing the waste from the various sites in the North County. So what I'd like to see is that the Corps of Engineers would take over the responsibility and the lead to move on getting the radioactive material out of our city, out of Westlake Landfill.	USACE acknowledges the commenter's support for the remediation of the North St. Louis County sites. See response to Stole – Introductory Comment.

Comments received 05/29/03, Bob Sutton			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1	General	It is imperative—not only for the residents of North St. Louis County, but for people downstream and everywhere, that the Corps of Engineers complete the remediation project regarding the radioactive waste currently being stored on the floodplain in Hazelwood, MO.	USACE acknowledges the commenter's support for the remediation of the North St. Louis County sites.

May 29, 2003 Public Meeting – Ms. Pamela Todorovich			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1		This danger left behind from the Manhattan Project continues to threaten the health of generations who live and work here, and will forever, unless it is removed from where these people live. It is well past time for the Corps of Engineers to finish their obligation to this community and do a better job and remove all the radioactive waste left from the project of the bomb before it contaminates more areas and exposes more unsuspecting citizens. Alternative 6 might be a good option.	USACE acknowledges the support for Alternative 6. Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria.

May 29, 2003 Public Meeting – Ms Rebecca Wright			
Comment No.	**pp/§/¶**	**Comment**	**Response**
1		Much of the radioactive waste has been removed from the North County site, including contaminated soils and other materials from the various sites, and the radioactive materials have been shipped to facilities in Utah and Idaho. However, now it is important to complete the task. Many areas in the North County site, including West Lake Landfill, still have surface and subsoil contamination and sediments that contain high levels of radium, thorium, uranium, protactinium and actinium. Some of these elements will emit radioactive particles for millions of years and have the potential to be taken up by plants and to poison or mutate human beings and animals now and virtually forever. Perhaps long after institutional controls, origins and presence of the waste will fade from recorded history. That's why all of the remaining contaminated materials should be removed as soon as possible while there are still means and funding and the will to do the job before the contamination spreads and affects present and future generations. I urge the Army Corps of Engineers to press for the most complete and technologically feasible cleanup of these wastes. And this should include excavation and removal of all the contaminated material from all the sites, and include appropriate monitoring of a site before, during and after cleanup, and include cleanup of the inaccessible sites as soon as possible, and to include cleanup of Coldwater Creek, banks and sediment to a 5/15 standard because of floods and the water levels and the potential to spread the contamination.	USACE acknowledges the commenter's support for the remediation of the North St. Louis County sites. Based on the comparative analysis of alternatives, the Selected Remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. Addressing the West Lake Landfill is beyond the scope of the USACE FUSRAP program and, therefore, beyond the scope of any response action for the North St. Louis County sites. USEPA Region VII is the lead agency for the landfill.