AMENDMENT TO THE

RECORD OF DECISION FOR THE

HASTINGS GROUND WATER CONTAMINATION SITE
SECOND STREET SUBSITE
OU 12
HASTINGS, NEBRASKA

PREPARED BY:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VII
KANSAS CITY, KANSAS

SEPTEMBER 2008

DECLARATION FOR THE AMENDMENT TO THE RECORD OF DECISION

SITE NAME AND LOCATION

Hastings Groundwater Contamination Site
Operable Unit 12: Second Street Subsite
Hastings, Nebraska
CERCLIS ID No. NSD980862668

STATEMENT OF BASIS AND PURPOSE FOR AMENDMENT

This decision document presents the amended remedy for Operable Unit 12 (OU 12) of the Second Street Subsite (Subsite), Hastings Groundwater Contamination Site (Site), located in Hastings, Nebraska. The OU 12 remedy was selected in 2006 by the United States Environmental Protection Agency (EPA) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 USC. §§ 9601 *et seq.*(CERCLA), and the National Contingency Plan, 40 CFR Part 300 (NCP). The amended remedy has also been selected in accordance with CERCLA and the NCP. The remedy and amended remedy decisions are based on the Administrative Record for OU 12 of the Subsite.

The state of Nebraska concurs with the amended remedy.

ASSESSMENT OF THE SUBSITE

The response action selected in this Record of Decision (ROD) is necessary to protect the public health and welfare or the environment from actual or threatened releases of hazardous substances, pollutants, and/or contaminants into the environment from OU 12 which may present an imminent and substantial endangerment.

DESCRIPTION OF THE AMENDED REMEDY

The amended remedy is intended to be the final response action for the Subsite and addresses all contamination associated with the principal threats posed by OU 12. Specifically, the selected remedy addresses volatile organic compound (VOC) and semi-volatile organic compound (SVOC) contamination identified in the subsurface soils, fill, and groundwater at the Subsite. The amended remedy, combined with the response actions for OU 20, which address the contaminant plume downgradient of the Subsite, will assist in achieving the long-term objective for the Subsite of restoring the aquifer to its beneficial use as a primary drinking water source.

The major components of the amended remedy selected by EPA for OU 12 are as follows:

- Excavation of soils and source material in the upper vadose zone followed by thermal treatment as required for disposal.

- In situ chemical oxidation of soils and source material in the lower vadose zone, saturated zone, and groundwater, which are inaccessible to excavation.

- Land use restrictions in the form of an environmental covenant consistent with Nebraska Uniform Environmental Covenants Act to limit future use of the property.

STATUTORY DETERMINATIONS

The amended remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. This amended remedy also satisfies the statutory preference for treatment as a principle element of the remedy.

Because this amended 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 will be conducted within five years after initiation of the remedial action to ensure that the remedy is or will be protective of human health and the environment.

AUTHORIZATING SIGNATURE

Cecilia Tapia, Director
Superfund Division

9/12/08
Date

AMENDMENT TO THE

RECORD OF DECISION

DECISION SUMMARY

HASTINGS GROUND WATER
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TABLE OF CONTENTS

PAGE

SECTION I. INTRODUCTION TO THE SITE AND STATEMENT OF PURPOSE

The Second Street Subsite (Subsite) is one of the seven subsites that constitute the Hastings Groundwater Contamination Site (Site). The Site is located primarily in Adams County, Nebraska, and covers the central industrial area of the city of Hastings and adjacent areas outside of the city limits. The Subsite lies on the eastern edge of the downtown Hastings business area and is bounded by the Burlington Northern Santa Fe Railway (BNSF) right-of-way to the south, the former Union Pacific Railroad (UPRR) to the east, Second Street to the north, and Minnesota Avenue to the west. The current owner of the property is the city of Hastings. The United States Environmental Protection Agency (EPA) is the lead agency for the site and the Nebraska Department of Environmental Quality (NDEQ) is the support agency.

As a Superfund project, the Subsite was divided into two operable units (OUs): (1) OU 12 addresses the contaminated soils and source materials at the Subsite, and (2) OU 20 addresses the contaminated groundwater that emanates from the Subsite and has migrated beyond the Subsite boundaries. The location of the Subsite is shown in Figure 1. The focus of this Record of Decision (ROD) Amendment (Amendment) is OU 12.

The original OU 12 ROD was signed on September 21, 2006, and addressed contaminated soil at the Subsite. At this juncture, a fundamental change is being made to the scope of the remedial action to include groundwater remediation. In addition, this Amendment: (1) adds the applicable or relevant and appropriate requirements for groundwater (ARARs), (2) adds groundwater remediation goals, (3) modifies the remediation goals for soils, (4) changes the remedial action goal for soils from a residential standard to an industrial standard, and (5) adds an institutional control to the selected remedy.

The original decision documents and this Amendment present remedial actions selected in accordance with section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, and section 300.435(c)(2)(ii) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This Amendment will become part of the Administrative Record file consistent with section 300.825(a)(2) of the NCP. The Administrative Record contains the information on which selection of the remedial action was based and is available for review at the Hastings Public Library, 517 West 4th Street, Hastings, Nebraska 68901 and the EPA Region 7 office, 901 N. 5th Street, Kansas City, Kansas 66101.

SECTION II. HISTORY, CONTAMINATION, AND SELECTED REMEDY

History

Hastings Site History: Complaints of poor water quality from the municipal water system were first filed in 1944, shortly after the installation of Municipal Well Number 18. City records indicate that Well Number 18 was taken out of service at that time. This well is located along the BNSF right-of way just west of Elm Avenue at a distance of about 2,500 feet from the area later identified as the Second Street Subsite. In 1953, this well was again tested and found to be contaminated; it was not placed back into regular service. In 1983, the city fitted the well with a pump and attempted to place it back in service on an experimental basis. However, residents immediately reported a foul taste and odor in the municipal water supply. In March, April, and May 1983, water samples collected by the Nebraska Department of Health (NDOH) showed the presence of high levels of trichloroethylene (TCE) contamination and relatively lower levels of five other chlorinated solvent chemicals. In addition, the sample collected on May 24, 1983, also contained approximately four micrograms per liter (µg/l) of benzene.

Following the May 1983 sampling, NDOH and NDEQ began investigating wide-spread groundwater contamination in the Hastings area. Eventually, three city-operated water supply wells, (Numbers 3, 10, and 12) were taken out of service and others were placed on standby status. A second public water supply system, run by Community Municipal Services, Inc. (CMS), supplied customers east of the city limits of Hastings. Two of the three CMS system supply wells were also taken out of service due to contamination.

EPA began investigating sources of groundwater contamination in the Hastings area in 1984. Due to the high levels of volatile organic compounds (VOCs) found in three municipal wells, EPA designated the contaminated area as the Hastings Ground Water Contamination Site and proposed it for listing on the NPL; placement on the NPL became final in 1986.

Subsite History: The presence of benzene that NDOH detected during its 1983 sampling of Well Number 18 suggested that contamination originating from an old gas works property may have been a source. Through a search of historical records, EPA found that a coal gas manufacturing plant had occupied 109 West Second Street as early as 1894. The original facility was called the Hastings Gas Works. EPA learned through additional research that the former manufactured gas plant (FMGP) was owned by at least four different companies. The last owner, Central Power Company, ceased operations at the plant in 1931. There are no known successors to any of the former operators of the FMGP.

The FMGP property was acquired by the city in 1942. The city gas department utilized the property for operation of the natural gas delivery system. The old buildings and other structures were eventually demolished. The city constructed a new building on the northern portion of the property in 1948 or 1949. This building was used by the city gas department and later, in 1954, the building became the Hastings Police Station.

Hastings Utilities constructed the Minnesota electrical substation on the southern part of the property in 1969. An animal shelter was constructed on the west side of the property in 1976. Most of the remaining portions of the property were paved and have been used for parking.[1]

In 1988, EPA installed a groundwater monitoring well on the Union Pacific Railroad right-of-way, which adjoins the eastern boundary of the FMGP property. During construction of this well, identified as Monitoring Well-9 (MW-9), a strong petroleum odor was noted. Although MW-9 was intended to define the northern extent of the Colorado Avenue Subsite TCE plume, due to the presence of high levels of benzene, toluene, ethyl benzene and xylene (collectively referred to as BTEX), it became the basis for initiating a remedial investigation of the FMGP property. EPA recognized this separate BTEX plume at the FMGP property as the Subsite. In addition to the BTEX contaminants, sampling of MW-9 in 1988 and 1989 identified the presence of styrene and polynuclear aromatic hydrocarbon (PAH) compounds in the groundwater. The five PAHs found at greatest concentrations were naphthalene, 2-methylnaphthalene, acenaphthylene, fluorene, and phenanthrene. All of these contaminants are commonly associated with FMGP wastes.

Nearby LUST Site Actions: During the early 1990s, Nebraska's Leaking Underground Storage Tank (LUST) program oversaw investigations of a gasoline service station located just to the east of the FMGP property. This LUST Site is referred to as the Foote Oil Site.

The Foote Oil Site investigation confirmed the presence of gasoline contamination in soil and groundwater. Several of the constituents of gasoline, specifically BTEX, are also found in FMGP wastes. Therefore, the plumes have been difficult to distinguish, except that 1,2-dichloroethane (1 ,2- DCA) appears to be associated only with petroleum contamination, not with the FMGP property.

In 1999, under the supervision of the NDEQ LUST Program, an action to address vadose zone contaminants through soil vapor extraction (SVE) was initiated at the Foote Oil Site. That action was suspended in 2008 due to the removal of the petroleum tanks. The Nebraska LUST program, rather than EPA, addresses this contamination because of the CERCLA petroleum exclusion.

Source Control Removal Action: In 1993, EPA installed three monitoring wells and also sampled the Foote Oil LUST site monitoring wells. In January 1997, EPA initiated a removal action near the source area for the Subsite. This removal action consisted of groundwater extraction with carbon treatment and vadose zone contaminant removal by SVE. The vadose zone is the unsaturated portion of the subsurface. This removal action was intended to stabilize Subsite conditions and continues to operate. During construction of the removal action systems, additional investigations of on-site soil and groundwater were performed. The presence of BTEX and PAHs indicated that wastes remaining from the FMGP at the Subsite had contaminated the soil and groundwater.

[1] In June 2001, the Hastings Police Department relocated; the former police station at the Subsite is utilized intermittently for storage and other varied purposes. The property is fenced and normally the main gates are locked when city employees are not working at the property.

Ground Water Removal Action: EPA installed additional monitoring wells at Pine Avenue, California Avenue, Cedar Avenue, and Elm Avenue. During the period of 1997-2000, extensive monitoring of the groundwater downgradient of the source area was performed. Analytical results indicated the presence of benzene and naphthalene approximately 3,000 feet from the FMGP source area. This highlighted the need for additional response action.

In 2001, to supplement the FMGP source area removal action, EPA initiated a downgradient groundwater removal action approximately 700 feet to the east of the FMGP source area. This action uses in-well aeration (IWA) to reduce contamination in the groundwater.

OU 20 ROD: On July 18, 2003, an interim ROD for OU 20 was issued that incorporated the two removal actions and added downgradient in situ biotreatment and groundwater extraction and treatment as the selected remedy.

Institutional Controls(ICs): In November 2000, the city of Hastings, through City Ordinance Number 3754, created the Institutional Control Area (ICA). The controls established by the ICA include requirements for well registration, limited water usage from existing wells, and periodic analysis. The city administers the ICA program and provides results of laboratory testing and related information to property owners. However, the ICA does nothing to limit the migration of the contaminated groundwater or restore this resource to a beneficial use. The entire area currently affected by the Second Street groundwater plume is believed to be located within the ICA.

Contamination

Interpretation of the data from field investigations revealed that there are five primary source areas for this Subsite: Area 1, the Potential Spill Area; Area 2, the Retort Area; Area 3, the Former South Gas Holder; Area 4, Former North Gas Holder; and Area 5, the Eastern Edge of the FMGP. These areas are shown on Figure 2. Recent data has shown groundwater across the Subsite to contain total BTEX and PAH compounds at 19.22 mg/l and 8.035 mg/l, respectively.

Area 1 has contamination which may have resulted from spillage of coal tar or waste materials generated from FMGP operations along the BNSF railroad tracks. The contamination in this area consists primarily of shallow (0 – 20 feet below ground surface [bgs]) contaminated soils. Contaminants are primarily BTEX and PAHs. Total contamination in Area 1 averages 1,342 mg/kg for both BTEX and PAHs combined.

Area 2, near the FMGP production (retort) area, has contaminated soils which were identified from about 20 feet bgs to 140 feet bgs (or about 20 feet below the ground water table). Contaminants are BTEX and PAHs. Contamination levels for BTEX and PAHs combined average 1,042 mg/kg in the vadose zone and 143 mg/kg in the saturated zone.

Area 3 still contains source material (coal tar/oil waste). The former gas holder is approximately 43 feet in diameter, and the soil approximately 10 feet outside the walls of the former gas holder appears to be contaminated. The depth of the base of the former gas holder is approximately 15 feet bgs. Contamination from the former gas holder extends through the vadose zone (from 15 feet bgs to 120 feet bgs) and into the saturated zone (120 – 140 feet bgs). Contaminants are BTEX and PAHs. Contamination levels for BTEX and PAHs combined average 1,037 mg/kg in the holder, 3,645 mg/kg in the vadose zone, and 1,214 mg/kg in the saturated zone.

Area 4 still contains source material. The former gas holder is approximately 50 feet in diameter, and soil approximately 10 feet outside the walls of the former gas holder appears to be contaminated. The depth of the base of the former gas holder is approximately 15 feet bgs. Contamination from the former gas holder extends through the vadose zone (15 – 120 feet bgs) and into the saturated zone (120 – 140 feet bgs). Contaminants are BTEX and PAHs. Soil contamination levels for combined BTEX and PAHs average 411 mg/kg in the holder; 1,347 mg/kg in the vadose zone; and 2,159 mg/kg in the saturated zone.

Area 5, along the eastern edge of the FMGP property, contains contaminated soils to be remediated within the top 20 feet of the saturated zone, extending from approximately 120 – 140 feet bgs. Contaminants are BTEX and PAHs. Total soil contamination levels for source material average 844 mg/kg.

Selected Remedy of the 2006 OU 12 ROD

The selected remedy of the 2006 OU 12 ROD addressed contamination contained in soils in vadose and saturated zone soils at the source area of the Subsite. The components of the remedy are presented below as they were in the ROD:

- Excavation and Treatment – Contaminated soils and source materials from the upper vadose zone which are readily accessible will be excavated from in and near the old gas holders and adjacent to the BNSF (Areas 3, 4, and 1). Excavated material which is suitable for thermal treatment will be thermally treated. Material which is not suitable for thermal treatment (debris) will be disposed. Excavated areas will be backfilled using clean fill material.

- In situ Chemical Oxidation (ISCO) – The contaminated areas of the lower vadose zone and saturated zone throughout the Subsite will be treated employing ISCO. ISCO work will be conducted in phases based on information collected during design and remedy implementation to evaluate progress and assure that only those actions necessary to remove and reduce contamination in the source area are performed.

SECTION III. BASIS FOR THE DOCUMENT

The OU 12 remedy was originally scoped to address BTEX compounds and PAHs in soil. However, EPA recognizes that source material may exist in the groundwater in the form of a dense non-aqueous phase liquid (DNAPL).[2] PAH contamination is often found at former manufactured gas plants as DNAPL in coal tar which can be within the groundwater. Coal tar is a major by-product of the coal gasification process and contains up to 75 percent PAHs by mass. Based on current and historical data which show PAH concentrations in groundwater to be in excess of 1 percent of contaminant solubility in water, EPA broadened the scope of cleanup activities to include the active treatment of groundwater at the Subsite in the remediation of source materials.[3] While treatment of groundwater was implied in the ROD discussion of in situ chemical oxidation (because the chemicals are injected into the soils and the groundwater) and costing of the selected remedy took the groundwater treatment into account, the ROD did not explicitly discuss the groundwater aspect of the selected remedy. This Amendment addresses the active treatment of groundwater at OU 12 that is distinct from the groundwater treatment that addresses OU 20, the Second Street contamination that is downgradient from the Subsite.

Active treatment at the source area is necessary to meet ARARs within the Subsite property line. As set forth in the OU 20 ROD, ARARs for the Subsite will be met only when actions addressed in the OU 20 ROD are combined with a suitable remedy for the Subsite source area (OU 12). In order to reduce downgradient groundwater concentrations, groundwater within the boundaries of the Subsite must be treated in addition to the soils. Therefore, a fundamental change is being made to the scope of the OU 12 ROD in order to achieve overall remedy permanence in accordance with the time frame set forth in Nebraska Title 118 by addressing groundwater.

SECTION IV. DESCRIPTION OF SIGNIFICANT DIFFERENCES

Description of the Selected Amended Remedy

Treatment

The selected amended remedy shall adopt the ex situ and in situ treatments selected in the original ROD and introduce an additional IC. Contaminated soils and source materials from the upper vadose zone which are readily accessible will be excavated from in and near the old gas holders and adjacent to the BNSF right-of-way (Areas 1, 3, and 4) in a Resource Conservation Recovery Act (RCRA) subtitle D landfill. Excavated material which is suitable for thermal treatment will be thermally treated. Material which is not suitable for thermal treatment (debris) or does not require thermal treatment for disposal will be disposed appropriately. Excavated areas will be backfilled using clean fill material. The contaminated areas of the lower vadose zone, upper saturated zone, and groundwater throughout the Subsite will be treated employing

[2] DNAPL is a liquid, such as coal tar, that is heavier than water, does not dissolve or mix easily in water, and forms a separate phase from the water when mixed with water.

[3] The presence of DNAPL is indicated when contaminant concentrations exceed 1 percent of the contaminant solubility in water.

ISCO. ISCO work will be conducted in phases based on information collected during design and remedy implementation to evaluate progress and assure that only those actions necessary to remove and reduce contamination in the source area are performed. Although treatment of groundwater was not explicitly stated in the OU 12 ROD, costing of the original selected remedy incidentally took groundwater treatment into account. Consequently, there is no change in the estimated cost estimate.[4] The Safe Drinking Water Act (SDWA) is included as an additional ARAR as it provides the maximum contaminant levels (MCLs) that are the clean up levels for the contaminants of concern (COC) under Title 118 of the Nebraska Groundwater Quality Standards and Use Classification.

Attainment of remedial action objectives (RAOs) will be measured through the monitoring of contaminant levels in soil and groundwater. As source material has been demonstrated to have migrated 140 feet bgs, monitoring will also ensure that treatment is occurring at the appropriate depths.

Institutional Controls

As discussed in section II of this document, ICs are in place and are being maintained through a city ordinance. The ICs are also a requirement of the Area-Wide Consent Decree for the Hastings Site (Civil Action No. 8:03CV531). The Subsite is located within the ICA that was established under the Area-Wide Consent Decree. The ICA encompasses the area in Hastings bound by 12th Street on the north, Maxon Avenue on the east, J Street on the south, and Crane Avenue on the west. The ICs include monitoring the wells within the ICA, posting warning signs regarding the contamination of the groundwater, and providing alternate water to any resident whose private well is contaminated above health-based levels. In addition, the amended remedy will impose an IC in the form of an environmental covenant through Nebraska's Uniform Environmental Covenants Act to limit future use of the property to commercial use as there are no reasonably anticipated residential uses at the Subsite. EPA and NDEQ will enforce the terms of the covenant.

Summary of Site Risks

The risk information for the soil exposure pathway is presented in the original OU 12 ROD; therefore, this section only pertains to risks associated with groundwater. The summary of site risks for groundwater is based on the baseline risk assessment performed for the downgradient plume of the Subsite (OU 20). For this Amendment, the risk assessment is supplemented by updated toxicological data for naphthalene and 2-methylnaphthalene. The risk assessment for OU 20 was based on MW-9, which is found within the source area of the Subsite, and therefore is applicable to OU 12. MW-9 was utilized to evaluate risks to human health as a consequence of it yielding the highest detections and concentrations of contaminants.

[4] The treated groundwater may be pumped to the OU 20 wells where the water will be discharged through storm sewers to Heartwell Lake.

The baseline risk assessment estimates what risks the Subsite 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. This section of the ROD summarizes the results of the baseline risk assessment for groundwater at this Subsite.

The Nebraska Department of Health (now the Nebraska Health and Human Services System [NHHSS]) prepared a Risk Assessment in June 1994. Based upon information from this Risk Assessment, removal actions were taken at the Subsite to reduce risks associated with potential exposure to contaminants in soil and groundwater. In 2001, NHHSS prepared a Baseline Human Health Risk Assessment, updating the previous risk assessment by evaluating potential human health risks associated with exposure to groundwater utilizing data collected since the 1994 report was published, as well as updated exposure and toxicity information. The 2001 Baseline Human Health Risk Assessment report may be found in the Administrative Record file.

In general, EPA requires or undertakes remedial actions for Superfund sites when the excess carcinogenic (cancer) risk exceeds 1×10^{-4}. A risk of 1×10^{-4} represents an increase of one in ten thousand, or 1/10,000, for a reasonable maximum exposure (RME). This risk represents the lifetime risk of developing cancer as a result of releases from a Superfund site.

Remedial actions may also be conducted at Superfund sites when the hazard index (HI) equals or exceeds one for the RME scenario. The HI is a numeric expression of the noncarcinogenic risk to human health resulting from releases from a Superfund site.

Identification of Contaminants of Concern

Table 1 of this section is a list of the COCs for groundwater for this Subsite and exposure point concentrations that were used for calculations of risk. When evaluating the risk associated with exposure to contaminated groundwater, typically a 95 percent Upper Confidence Limit (UCL) of the arithmetic average concentration of each COC is utilized to determine the exposure point concentration to ensure that the risk is not underestimated. However, at this Subsite, a straight arithmetic average concentration of each COC identified in MW-9 during 1994 through 2000 sampling events was used. This approach was used for several reasons: (1) it is consistent with the approach used in the 1994 risk assessment so a more direct comparison of the results could be made; (2) representative 95 percent UCLs could not be calculated for several of the chemicals due to the limited sample size; and (3) even though MW-9 is one of the most contaminated wells sampled, concentrations of chemicals detected in the last round of sampling that was used for the risk assessment have decreased dramatically. This approach was used to provide a reasonable and protective estimate of potential health risks.

TABLE 1 Arithmetic Average Concentration (mg/l) MW-9 Chemicals of Concern 1994-2000	
Chemical of Concern	**Concentration (mg/l)**
Benzene	3.510
Benzo(a)anthracene	0.071
Benzo(b)fluoranthene	0.074
Benzo(k)fluoranthene	0.019
Benzo(a)pyrene	0.054
Chrysene	0.071
Dibenzo(a,h)anthracene	0.002
Ethylbenzene	0.644
Fluorene	0.535
Indeno(1,2,3-cd)pyrene	0.015
2-Methylnaphthalene	5.063
Naphthalene	14.813
Pyrene	0.206
Styrene	2.546
Toluene	5.483
Xylenes, total	3.662

The COCs may be grouped into general classifications for simplification of discussion. Benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, and pyrene are generally referred to as PAHs. Benzene, ethylbenzene, styrene, toluene, xylenes are generally referred to as VOCs.

This list of COCs is not identical to the COCs that were discussed in the Proposed Plan or OU 20 ROD for the downgradient plume. There were some chemicals listed in the Proposed Plan that were present and site-related but at concentrations below a level of any health concern in the groundwater. These compounds, which included acenaphthene and anthracene, were deleted from the COC list, but will continue to be monitored as part of the remedial action. Fluoranthene, isopropyl benzene, and dibenzofuran were not considered COCs because they were not present in MW-9; however, they will continue to be a part of the groundwater monitoring program because their concentrations in soil exceed preliminary remedial goals (PRGs) for the soil migration to groundwater pathway. 1,2-dichlorethane and 1,1,2-trichloroethane were eliminated as COCs because they were not considered to have originated at the Subsite.

At the time of the baseline risk assessment, 2-methylnaphthalene was eliminated as a COC because there was no toxicity data available for the compound. Since the issuance of the OU 12 ROD, toxicological information has become available. Remediation goals for 2-methylnaphthalene can be calculated for a noncancer endpoint based on oral ingestion. Therefore, cleanup standards have been calculated for 2-methylnaphthalene for both soil and groundwater and the compound has been reinstated to the list of COCs for groundwater. In addition, factors for the provision of a cancer risk estimate are available and have been utilized to derive a more appropriate cleanup level for naphthalene. The factors, which consider the carcinogenicity of naphthalene, are a result of more recent toxicological evaluations.

Exposure Assessment

Exposure scenarios are developed using current exposure pathways given existing land uses and also exposures which might reasonably be predicted based upon expected or logical future land use assumptions. Currently a municipal water supply is available in Hastings and a city ordinance restricts the use of groundwater in the area including the Subsite. Based on well inventories performed for the Hastings Site, it is assumed that no one is currently being exposed to the contaminated groundwater. In the future, exposure to contaminated groundwater could occur through ingestion, inhalation of volatilized contaminants while showering, and dermal exposure while bathing.

Toxicity Assessment

The PAHs, formed during the incomplete combustion of organic substances, persist throughout the environment. The PAHs are generally found in the environment as a mixture of two or more compounds. The PAHs are essential components of coal tar and are commonly found at former manufactured gas plants. In general, PAHs are readily bioavailable following inhalation exposure. Absorption following ingestion or dermal exposure is available and may be subject to saturation. Toxic effects of PAH exposure include bone marrow depression, hepatotoxicity (liver disease), and immunosuppression. The PAHs exhibit local dermal toxicity following dermal exposure. Both developmental and reproductive effects have been observed in animals following exposure to PAHs.

Inhalation, oral, and dermal exposure to PAHs have been associated with carcinogenic effects in animals. The site of tumor is influenced by the route of exposure: dermal exposure induces skin tumors, respiratory tract tumors are observed following inhalation, and forestomach papillomas are observed following oral ingestion. The PAHs are variable with respect to genotoxicity. Benzo(a)pyrene has demonstrated genotoxic potential that requires metabolic activation while a number of other PAHs are negative for genotoxic effects. Of the 16 PAH compounds for which EPA routinely analyzes, seven are considered to be probable human carcinogens, or Group B2 carcinogens. Those compounds are benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, chrysene, indeno(1,2,3-c,d)pyrene, and most recently naphthalene.

Benzene, a contaminant of gasoline and a widely used solvent, is absorbed through the respiratory and gastrointestinal tracts, and skin. Benzene is commonly found at former manufactured gas plants. Benzene is considered to be a human carcinogen. There is clear evidence of carcinogenic activity in rats and mice. In humans, a causal relationship between leukemia and exposure has been established by the observation of increased incidence of leukemia in exposed workers. The most predominant noncarcinogenic systemic effects associated with chronic exposure to benzene is hematotoxicity. This toxicity is manifested as a decrease in white blood cells (leukopenia) in animals. In humans, leukopenia may progress to pancytopenia, a decrease in all cellular elements of the blood. Human benzene toxicity is often described as aplastic or hypoplastic anemia, which is characterized by severe damage to the bone marrow. Direct life-threatening consequences of pancytopenia result from leukopenia and thrombocytopenia which will cause an increased susceptibility to infection or hemorrhagic conditions, respectively. Benzene is classified by EPA as a Group A carcinogen, which is a known human carcinogen.

Ethylbenzene is widely found in the environment as a component of coal tar and petroleum. Ethylbenzene is commonly found at former manufactured gas plants. Ethylbenzene is absorbed following inhalation, ingestion, or direct dermal contact with the liquid. In animals, ethylbenzene exposure is associated with adverse hepatic histology without functional disturbance. Similar histologic and enzymatic changes have been observed in the kidneys. These observations may be representative of adaptive enzyme induction rather than a toxic effect. There is not adequate information on the possibility of carcinogenic effects of ethylbenzene in animals or humans.

Toluene is an industrial solvent. It is commonly found at former manufactured gas plants. Toluene is rapidly absorbed following inhalation; absorption following ingestion or dermal exposure is slower and more limited. The predominant toxic effect following chronic exposure is impairment of the central nervous system. Toluene is also considered a developmental toxicant following exposure of pregnant animals or humans. There is not adequate information on the possibility of carcinogenic effects of toluene in animals or humans.

Xylene is a man-made chemical used as an industrial solvent. Xylene is commonly found at former manufactured gas plants. Xylene is absorbed following ingestion and inhalation and to a much lesser extent following dermal exposure. Adaptive hepatologic changes and adverse renal effects have been observed following chronic xylene exposure. There is not adequate information on the possibility of carcinogenic effects of xylene in animals or humans.

Table 2 of this section lists the toxicity values and potential noncarcinogenic effects of the COCs. Table 3 of this section lists the toxicity values and carcinogenic effects for the COCs.

TABLE 2

Noncarcinogenic Toxicity Information

Chemical	Reference	RfD (mg/kg-day)	RfC (mg/m^3)	Confidence	Site of Action
Benzene	NCEA	3.00E-03	5.95E-03	medium	liver
Benzo(a)anthracene	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA
Benzo(a)pyrene	IRIS	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA
1,2-Dichloroethane	NCEA	3.00E-02	5.00E-03	low	liver,gall bladder
Ethylbenzene	IRIS	1.00E-01	1.00E+00	low	liver,kidney/dev.tox.
Fluorene	IRIS	4.00E-02	NA	low	blood
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA
2-Methylnaphthalene**	IRIS	4.00E-03	NA	low	lung
Naphthalene	IRIS	2.00E-02	3.00E-03	low/med.	body wt./nasal
Pyrene	IRIS	3.00E-02	NA	low	kidney
Styrene	IRIS	2.00E-01	1.00E+00	medium	RBCs, liver/CNS
Toluene	IRIS/HEAST	2.00E-01	4.00E-01	medium	liver,kidney/neurol.
1,1,2-Trichloroethane	IRIS	4.00E-03	NA	medium	Serum chem.
Xylenes, total	IRIS	2.00E+00	7.00E-01	medium	hyper-activity, body wt.

RfD -reference dose

RfC -reference concentration

NA -not applicable or not available

IRIS -Integrated Risk Information System (U.S. EPA 2001)

HEAST -Health Effects Assessment Standards Table (U.S. EPA 2001)

NCEA -National Center for Environmental Assessment (U.S. EPA 2001)

**Based on updated data in IRIS since 2001.

TABLE 3
Carcinogenic Toxicity Information

Chemical	Reference	SF $(mg/kg\text{-}day)^{-1}$	UR $(\mu g/m3)^{-1}$	WOE	Cancer Type
Benzene	IRIS	5.50E-02	7.80E-0-6	A	leukemia
Benzo(a)anthracene	NCEA	7.30E-01	8.86E-05	B2	skin
Benzo(b)fluoranthene	NCEA	7.30E-01	8.86E-05	B2	skin
Benzo(k)fluoranthene	NCEA	7.30E-02	8.86E-06	B2	skin
Benzo(a)pyrene	IRIS/NCEA	7.30E+00	8.86E-04	B2	skin
Chrysene	NCEA	7.30E-03	8.86E-07	B2	skin
Dibenzo(a,h)anthracene	NCEA	7.30E+00	8.86E-04	B2	skin
1,2-Dichloroethane	IRIS	9.10E-02	NA	B2	blood vessels
Ethylbenzene	NA	NA	NA	D	NA
Fluorene	NA	NA	NA	D	NA
Indeno(1,2,3-cd)pyrene	NCEA	7.30E-01	8.86E-05	B2	skin
Naphthalene***	Cal EPA	1.20E-01***	3.4E-05***	C	lung
Pyrene	NA	NA	NA	D	NA
Styrene	NA	NA	NA	D	NA
Toluene	NA	NA	NA	D	NA
1,1,2-Trichloroethane	IRIS	5.70E-02	NA	C	liver
Xylenes, total	NA	NA	NA	D	NA

SF -slope factor
UR -unit risks
NA -not applicable or not available
IRIS -Integrated Risk Information System (U.S. EPA 2001)
NCEA -National Center for Environmental Assessment (U.S. EPA 2001)
Cal EPA -California Environmental Protection Agency
WOE -Weight of Evidence for Carcinogenicity (U.S. EPA 2001)

**For naphthalene for purposes of calculating cleanup goals, inhalation unit risks (IUR) and RfCs were converted to inhalation slope factors and inhalation reference doses based on 2008 toxicological review. The information in this table is based on updated information since 2001.

Risk Characterization

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

$$Risk = CDI \times SF$$

where: risk = a unitless probability (e.g., $2x10^{-5}$) of an individual developing cancer

CDI = chronic daily intake averaged over 70 years (mg/kg-day)

SF = slope factor, expressed as $(mg/kg\text{-}day)^{-1}$.

These risks are probabilities that usually are expressed in scientific notation (e.g., 1 x 10^{-6}). An excess cancer risk of 1 x 10^{-6} indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. EPA's generally acceptable risk range for site-related exposures is 1 x 10^{-4} to 1 x 10^{-6}. The 10^{-6} risk level shall be used as the point of departure for determining remediation goals for alternatives when ARARs are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure.
[40 CFR § 300.430(e)(2)(i)(A)(2)].

In the 2001 Human Health Baseline Risk Assessment, excess cancer risks were calculated for adults and children for the exposure scenario described in this Amendment. The cancer risk are shown in Table 4 (Adult Carcinogenic Risks) and Table 5 (Child Carcinogenic Risks). The excess cancer risks for an adult are 1.1 x 10^{-2}. The excess cancer risks for a child are 7.2 x 10^{-3}. The excess cancer risk for both an adult resident and a child resident are unacceptably high.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., lifetime) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ less than one indicates that a receptor's dose of a single contaminant is less than the RfD and that toxic noncarcinogenic effects from that chemical are unlikely. The HI is generated by adding the HQs for all COCs that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. A HI less than one indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely. A HI greater than one indicates that site-related exposures may present a risk to human health.

The HQ is calculated as follows:

$$\text{Noncancer HQ} = \text{CDI}/\text{RfD}$$

where: CDI = chronic daily intake
RfD = reference dose

CDI and RfD are expressed in the same units and represent the same exposure period.

In the 2001 Human Health Baseline Risk Assessment, noncarcinogenic risks were calculated for adults and children for the exposure scenario described in section 7.1.2. They are shown in Table 6 (Adult Noncarcinogenic Risks) and Table 7 (Child Noncarcinogenic Risks). The HI for an adult is 971. The HI for a child is 1,110. The Hazard Indices for both an adult resident and a child resident are unacceptably high.

These estimates of risk, like all estimates of risk, have some degree of uncertainty associated with them. To ensure the protection of public health, uncertainties inherent in the risk assessment process typically err on the side of conservatism, therefore, the risk presented is most often over-estimated. The selection of MW-9 as a representative well for this Subsite may have resulted in an under- or over-estimation of the Subsite risk. Several chemicals detected in other monitoring wells were not evaluated for their contribution to potential Subsite risk. Also, the use of the arithmetic average concentration rather than the highest detected concentration or the 95 percent upper confidence level concentration may result in an under-estimation of risk for the Subsite.

Uncertainty in the estimates of cancer risk for this Subsite are primarily associated with the fact that benzo(a)pyrene is the only PAH compound which has a slope factor. The slope factors utilized by EPA for the other six carcinogenic PAHs have been assigned based on their relative carcinogenic potency compared to benzo(a)pyrene.

The confidence in the determination of the values of the reference doses used to quantify the noncarcinogenic risk at this Subsite is rated as low to medium. The noncarcinogenic risk estimated for this Subsite may be over- or under-estimated.

Table 4
Carcinogenic Risks – Adult Resident
MW 9 Groundwater Data (1994 – 2000)
Arithmetic Average Concentration (mg/l)

Benzene	Benzo(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluoran thene	Benzo(a)pyrene	Chrysene	Dibenzo(a,h)anthracene
3.510	0.071	0.074	0.019	0.054	0.071	0.002
Ingestion Risk	Ingestion Risk	Ingestion Risk	Ingestion Risk	Ingestion Risk	Ingestion Risk	Ingestion Risk
2.37E-03	6.38E-04	664E-04	1.71E-05	4.85E-03	6.38E-06	1.80E-04
Inhalation Risk	Inhalation Risk	Inhalation Risk	Inhalation Risk	Inhalation Risk	Inhalation Risk	Inhalation Risk
4.43E-09	1.03E-09	1.08E-09	2.76E-ll	7.85E-09	1.03E-11	2.9IE-10
Dermal Risk	Dermal Risk	Dermal Risk	Dermal Risk	Dermal Risk	Dermal Risk	Dermal Risk
NA	1.42E-04	2.17E-04	5.57E-06	1.58E-03	1.42E-06	1.30E-04

1 ,2-Dichloroethane	Elhylbenzene	Fluorene	Indeno(1 ,2,3-cd) pyrene	Naphthalene	Pyrene	Styrene
0.035	0.644	0.535	0.015	14.813	0.206	2.546 i
Ingestion Risk	Ingestion Risk	Ingestion Risk	Ingestion Risk	Ingestion Risk	Ingestion Risk	Ingestion Risk
3.92E-05	NA	NA	1.35E-04	NA	NA	NA
Inhalation Risk	Inhalation Risk	Inhalation Risk	Inhalation Risk	Inhalation Risk	Inhalation Risk	Inhalation Risk
NA	NA	NA	2.18E-IO	NA	NA	NA
Dermal Risk	Dermal Risk	Dermal Risk	Dermal Risk	Dermal Risk	Dermal Risk	Dermal Risk
NA	NA	NA	6.72E-05	NA	NA	NA

Toluene	1,1,2-Trichloroethane	Xylenes
5.483	0.038	3.662
Ingestion Risk	Ingestion Risk	Ingestion Risk
NA	2.66E-05	NA
Inhalation Risk	Inhalation Risk	Inhalation Risk
NA	NA	NA
Dermal Risk	Dermal Risk	Dermal Risk
NA	NA	NA

	Ingestion Risk
TOTAL =	8.93E-03
	Inhalation Risk
TOTAL =	J .49E-08
	Dermal Risk
TOTAL =	2. J 5E-03

Table 5
Carcinogenic Risks – Child Resident
MW 9 Groundwater Data (1994 – 2000)
Arithmetic Average Concentration (mg/l)

Benzene	Benzo(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluoran thene	Benzo(a)pyrene	Chrysene	Dibenzo(a,h)anthracene
3.510	0.071	0.074	0_019	0.054	0.071	0.002
Ingestion Risk 1.54E-03 Inhalation Risk 4.44E-09 Dermal Risk NA	Ingestion Risk 4.14E-04 Inhalation Risk 1.03E-09 Dermal Risk 8.94E-05	Ingestion Risk 4.32E-04 Inhalation Risk 1.08E-09 Dermal Risk 1.37E-04	Ingestion Risk 1.1 IE-OS Inhalation Risk 2.76E-II Dermal Risk 3.52E-06	Ingestion Risk 3.15E-03 Inhalation Risk 7.85E-09 Dermal Risk 9.99E-04	Ingestion Risk 4.14E-06 Inhalation Risk 1.03E-II Dermal Risk 8.94E-07	Ingestion Risk 1.17E-04 Inhalation Risk 2.9IE-1O Dermal Risk 8.22E-05
1 ,2-Dichloroethane	Elhylbenzene	Fluorene	Indeno(1 ,2,3-cd) pyrene	Naphthalene	Pyrene	Styrene
0035	0.644	0.535	0.015	14.813	0.206	2.546
Ingestion Risk 2.54E-05 Inhalation Risk NA Dermal Risk NA	Ingestion Risk NA Inhalation Risk NA Dermal Risk NA	Ingestion Risk NA Inhalation Risk NA Dermal Risk NA	Ingestion Risk 875E-05 Inhalation Risk 2.18E-10 Dermal Risk 4.24E-05	Ingestion Risk NA Inhalation Risk NA Dermal Risk NA	Ingestion Risk NA Inhalation Risk NA Dermal Risk NA	Ingestion Risk NA Inhalation Risk NA Dermal Risk NA

Toluene	1,1,2-Trichloroethane	Xylenes
5.483	O.oJ8	3.662
Ingestion Risk NA Inhalation Risk NA Dermal Risk NA	Ingestion Risk l.73E-05 Inhalation Risk NA Dermal Risk NA	Ingestion Risk NA Inhalation Hisl; NA Dermal Hisk NA

	Ingestion Risk
TOTAL =	5.80E-03
	Inhalation Risk
TOTAL =	1.49E-08
	Dermal Risk
TOTAL =	1.35E-03

Table 6
Noncarcinogenic Risks – Adult Resident
MW 9 Groundwater Data (1994 – 2000)
Arithmetic Average Concentration (mg/l)

Benzene	Benzo(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Chrysene	Dibenzo(a,h)anthracene
3.510	0071	0074	0.019	0.054	0071	0.002
Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ
35.92	NA	NA	NA	NA	NA	NA
Inhalation HQ	Inhalation HQ	Inhalation HQ	Inhalation HQ	Inhalation HQ	Inhalation HQ	Inhalation HQ
96.51	NA	NA	NA	NA	NA	NA
Dermal HQ	Dermal HQ	Dermal HQ	Dermal HQ	Dermal HQ	Dermal HQ	Dermal HQ
NA	NA	NA	NA	NA	NA	NA

1,2-Dichloroethane	Ethylbenzene	fluorene	Indeno (1,2,3-cd)pyrene	Naphthalene	Pyrene	Styrene
0.035	0.644	0.535	0.015	14.813	0.206	2.546
Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ
0.04	0.20	0.41	NA	22.74	0.21	0.39
Inhalation HQ	Inhalation HQ	Inhalation HQ	Inhalation HQ	Inhalation HQ	Inhalation HQ	Inhalation HQ
1.15	0.11	NA	NA	807.80	NA	0.41
Dermal HQ	Dermal HQ	Dermal HQ	Dermal HQ	Derm.1 HQ	Derm.1 HQ	Derm.1 HQ
NA	0.004	NA	NA	0.494	NA	0.007

Toluene	1,1,2-Trichloroethane	Xylenes
5.483	0.038	3.662
Ingestion HQ	Ingestion HQ	Ingestion HQ
0.84	0.29	0.06
Inhalation HQ	Inhalation HQ	Inhalation HQ
2.25	NA	0.86
Dermal HQ	Dermal HQ	Dermal HQ
0.012	NA	0.001

TOTAL =	INGESTION HI
	61.1
TOTAL =	INHALATION HI
	909.1
TOTAL =	DERMAL HI
	0.5

Table 7
Noncarcinogenic Risks – Child Resident
MW 9 Groundwater Data (1994 – 2000)
Arithmetic Average Concentration (mg/l)

Benzene	Benzo(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Chrysene	Dibenzo(a,h)anthracene
3.510	0071	0074	0019	0.054	0071	0.002
Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ
116.88	NA	NA	NA	NA	NA	NA
Inhalation HQ	Inhalation HQ	Inhalation JIQ	Inhalation HQ	Inhalation HQ	Inhalation HQ	Inhalation HQ
96.51	NA	NA	NA	NA	NA	NA
Dermal HQ	Dermal HQ	Dermal HQ	Derm:1i HQ	Dermal HQ	Dermal HQ	Dermal HQ
NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	Ethylbenzene	fluorene	Indeno (1,2,3-cd)pyrene	Naphthalene	Pyrene	Styrene
0035	0.644	0.535	0015	14.813	0.206	2.546
Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ	Ingestion HQ
012	0.64	1.34	NA	73.99	0.69	1.27
Inhalation HQ	Inhalation HQ	Inhalation HQ	Inhalation HQ	Inhalation HQ	Inhalation HQ	Inhalation HQ
1.15	0.11	NA	NA	807.80	NA	OAI
Dermal HQ	Dermal HQ	Dermal HQ	Dermal HQ	Dermal HQ	Dermal HQ	Dermal HQ
NA	0.Ol4	NA	NA	1.561	NA	0.021
Toluene	1,1,2-Trichloroethane	Xylenes				
5,483	0038	3662				
Ingestion HQ	Ingestion IIQ	Ingestion HQ				
2.74	0.95	0.18				
Inhalation HQ	Inhalation HQ	Inhalation HQ				
2.25	NA	0.86				
Dermal HQ	Dermal HQ	Dermal HQ				
0039	NA	0.004				

TOTAL =	INGESTION HI 198.8
TOTAL =	INHALATION HI . 909.1
TOTAL =	DERMALHI 1.6

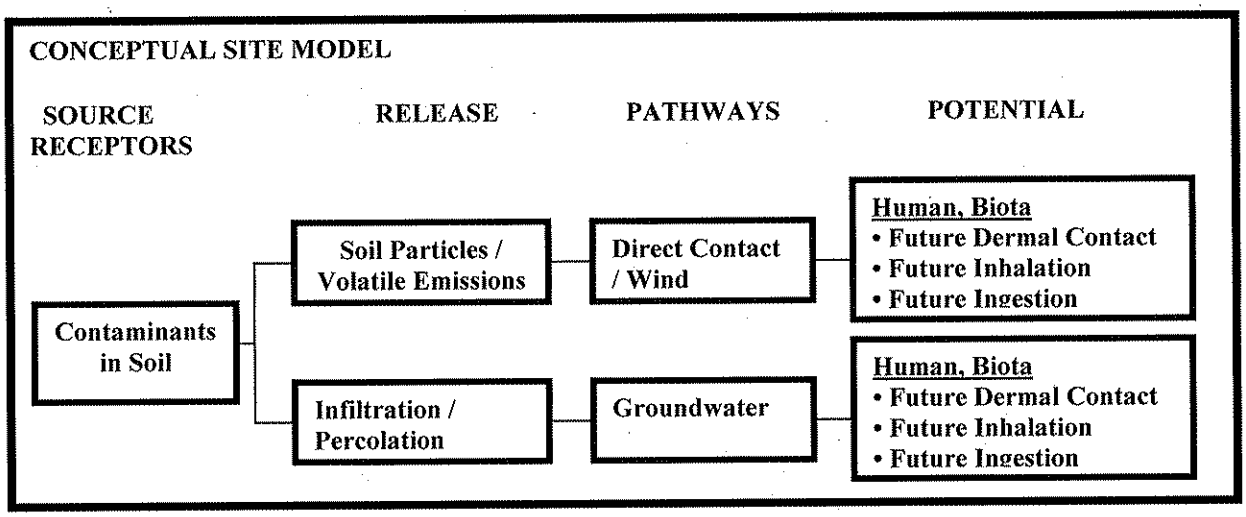
Ecological Risk Assessment

Evaluating potential exposure pathways is one of the primary tasks of the screening-level characterization of OU 12. For an exposure pathway to be complete, a constituent must be able to travel from the source to ecological receptors and be taken up by the receptors via one or more exposure routes.

One of EPA's key questions developed in screening-level problem formulation is "Which habitats present on-site are potentially contaminated or otherwise disturbed?" For OU 12, in order for a habitat to be contaminated or disturbed, allowing wildlife receptors contact with Subsite-related compounds, constituents in sediment must be transported to surface water bodies (streams, rivers, lakes) or drainage ways, or ecological receptors must be in direct contact with the subsurface soil. Surrounding land includes residential, commercial, and industrial property. Based on characterization data, there are no hydraulic connections to Hartwell Lake or other apparent exposure pathways for environmental receptors to contact subsurface soil or wastes. Treated groundwater may be extracted by OU 20 treatment systems and discharged to Heartwell Lake. Because the water will be treated to National Pollutant Discharge Elimination System water quality standards and/or MCLs, aquatic receptors will not be adversely impacted by the discharged water.

Site Conceptual Model

The revised conceptual site model describes the projected contaminant source(s), release mechanism(s), exposure pathway(s), and potential receptors for a site. The sampling program, risk assessment, and response actions are based upon the updated conceptual site model. The revised conceptual site model is presented below.



Remedial Action Objectives

RAOs are specific goals for protecting human health and the environment. RAOs are developed by evaluating ARARs that are protective of human health and the environment and the results of the remedial investigation, including the human health and ecological risk assessments. RAOs describe what the proposed site cleanup is expected to accomplish. As stated in the Interim Action ROD for OU 20, the long-term goals for OU 12 and OU 20 combined are as follows:

- to reduce contaminant levels in the groundwater to levels less than the MCLs or maximum contaminant level goals (MCLGs) if they are greater than zero,... and/or to state cleanup levels derived from Nebraska Title 118 regulations, or to levels where the excess cancer risk is computed as being less than one additional cancer per million persons of population (1×10^{-6}) or where the HI is less than 1, so that the aquifer can be restored to its beneficial use; and

- to prevent further degradation to the aquifer's groundwater.

The goal of this ROD Amendment is to treat source material contamination in the vadose and saturated zones and reduce contamination in the groundwater to established clean-up levels. The contaminated soils in the OU 12 source area are considered to be "principal threat wastes" because the COCs are considered a mobile source material. The subsurface soil contains high concentrations of COCs that can move easily through sandy soils. Although the contaminated groundwater also poses a risk, it is not considered a "principal threat" as defined by EPA guidance; however, it is recognized that source material more than likely exists within the saturated zone as DNAPL. RAOs in the 2006 OU 12 ROD were stated as follows:

- To reduce or prevent the ingestion, inhalation, and direct contact with soils having contaminant concentrations in excess of preliminary remediation goals (PRGs); or which result in an excess cancer risk of greater than 1×10^{-6} or a HI of greater than 1.0, whichever is less. This will allow for unrestricted use, including residential use, of the property.

- To reduce or prevent migration of soil contaminants to provide protection of groundwater, so that the maximum contaminant levels (MCLs) are not exceeded; or result in an excess cancer risk greater than 1×10^{-6} or a HI of greater than 1.0, whichever is less.

The human health RAO for soil exposure has been redefined to allow for a soil exposure cleanup approach more consistent with exposure assessments conducted during the baseline risk assessment. Based on exposure assessments, EPA did not identify a complete exposure pathway for soil under current conditions; however, EPA did conclude that future workers at the Subsite may experience incidental soil ingestion, inhalation, and dermal contact with excavated subsurface contaminants. As a result, the revised RAO will address cleanup to a standard consistent with the future worker exposure scenario. Table 8 shows the amended soil remediation goals in accordance with the revised RAO.

RAOs have also been added to include the groundwater component for the source area and to show the interconnectivity of response actions between OU 20 and OU 12. The relationship between the response actions for both OUs is important as it is the totality of these events that will eventually restore the aquifer to beneficial use and allow ARARs to be met. The objectives for this remedial action are

- To reduce or prevent the incidental ingestion, inhalation, and direct dermal contact of COCs in excess of risk-based standards for industrial settings through the excavation and treatment of shallow soils from the surface to 20 feet.

- To prevent further contaminant migration and degradation of the downgradient plume through the treatment of soils at depths greater than 20 feet and treatment of groundwater so that MCLs or risk-derived standards are not exceeded.

- To restore groundwater to its beneficial use as a potable water source through the excavation and treatment of soil and treatment of groundwater so that MCLs or risk-derived standards are not exceeded.

The soil contact objective will prevent exposure to soils in the top 20 feet with contaminant concentrations which result in an excess cancer risk as referred to in Table 1 or a target organ specific HI of greater than 1.0, whichever is less. Soils below 20 feet will be addressed to reduce or prevent migration of soil contaminants to groundwater so that MCLs are not exceeded or an excess cancer risk as referred to in Table 10 or a HI greater than 1 (whichever is less) does not result. The long term objectives for this Subsite remain as stated in the OU 20 ROD (recited on page 21 of this document).

Remediation Goals

Establishment of Groundwater Remediation Goals

Groundwater is the primary source for drinking water utilized by the city of Hastings both now and in the future. The aquifer is a prolific source of groundwater. Currently, private wells in OU 12 are known not to be used for potable purposes. Use restrictions are in place to prevent residential/potable water wells being installed in the OU 12 area in the future. The groundwater in the vicinity of the Subsite has been designated as a Class GA Groundwater Supply by the state of Nebraska. A Class GA Groundwater Supply is a groundwater supply which is currently being used as a public drinking water supply or is proposed to be used as a public drinking water supply. Contamination detected at the Subsite caused the state to designate the Site as Remedial Action Class 1 (RAC-1), requiring the "most extensive remedial action measures" to clean up the groundwater to drinking water quality suitable for all beneficial uses.

Under the NCP at 40 CFR 300 430(e)(2)(i)(B), federal Safe Drinking Water Act (SDWA) standards which are applicable at the tap are relevant and appropriate to a clean up of groundwater which is a current or potential source of drinking water. The SDWA's MCL is used for any contaminant whose MCLG is zero, otherwise the MCLG is used. The substantive

requirements of Nebraska's Title 118 regulations are also applicable to this remedy including narrative and numerical requirements (which are also called MCLs) and groundwater classifications and clean up standards set forth in or derived from Appendix A of Title 118. Table 2 provides the groundwater clean up levels which have been derived for this cleanup either from numerical federal and/or state MCLs, state Voluntary Cleanup Program (VCP) goals, or using other established remediation goals consistent with Title 118, Appendix A, Step 8.

Correcting Errors in Soil Remediation Goals

While implementing the treatability study, EPA found that cleanup goals stated in the ROD for contaminant migration from soil to groundwater were orders of magnitude lower than detection limits defined by current analytical technologies. As a result, achievement of these goals was immeasurable. Further investigation revealed that the groundwater protection levels in the ROD were adopted from draft numbers proposed in May 2005, by NDEQ for VCP Remediation Goals for Nebraska. Since the publication of the draft numbers, the state of Nebraska has published final remediation goals with achievable values to address soil migration to groundwater. The current standards to address groundwater protection are shown in Table 10.

SECTION V. COMPARATIVE ANALYSIS OF ORIGINAL AND AMENDED REMEDIES

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a preferred remedy. This section of the Amendment profiles the relative performance of the original and amended remedies against the nine criteria, noting how both original and the amended remedy compare to the other options under consideration. The nine evaluation criteria are summarized below.

EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES
Overall Protectiveness of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through ICs, engineering controls, or treatment.
Compliance with ARARs evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the Site, or whether a waiver is justified.
Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
Cost includes estimated capital and annual operation and maintenance (O&M) costs as well as present-worth cost. Present-worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
State/Support Agency Acceptance considers whether the state agrees with EPA's analyses and recommendations as described in the remedial investigation/feasibility study and Proposed Plan.
Community Acceptance considers whether the local community agrees with EPA's analyses and Selected Remedy. Comments received on the Proposed Plan are an important indicator of community acceptance.

Overall Protectiveness and Compliance with ARARs are classified as Threshold Criteria, meaning that alternatives failing to satisfy either of these two criteria will be eliminated from further analysis. The next five criteria on the Evaluation Criteria for Superfund Remedial Alternatives table comprise the Balancing Criteria used to rank alternatives against one another. The last two criteria, State and Community Acceptance, are Modifying Criteria which are given serious consideration and which can affect the decision process.

Overall Protection of Human Health and the Environment

This criterion considers whether a remedy, as a whole, will protect human health and the environment. This includes an assessment of how public health and environmental risks are properly eliminated, reduced, or controlled through treatment, engineering controls, or ICs.

Under the 2006 OU 12 ROD, protection from source-material contaminated soils was provided through the active remediation of the contaminated soils. This Amendment clarifies that the remedy provides for the treatment of groundwater at the source area as well as the soils.

While the existing remedy reduced contaminant loading on the aquifer through the treatment of vadose and saturated zone soils, the amended remedy also reduces the volume of contamination migrating off-site in groundwater, thereby enhancing the effectiveness of treatment systems addressing the downgradient portions of the plume under OU 20. This ROD Amendment also provides greater protection overall by including an IC which will restrict future use at the Subsite and reduce the potential for exposure to lower vadose zone soils.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

This criterion addresses whether or not a remedy complies with all state and federal environmental and public health laws and requirements that apply or are relevant and appropriate to the conditions and remedy at a specific site. If an ARAR can not be met, the analysis of the remedy must provide the grounds for invoking a statutory waiver.

Because contaminated soils and source materials from all five areas were to be treated, the remediation goals [chemical-specific ARARs and to be considereds (TBCs)] identified for OU 12 under the original ROD would be met. This would also be true for action-specific ARARs. No location-specific ARARs were identified. The amended RAOs address the additional ARARs and provide the supporting remediation goals to ensure all RAOs are met including those related to groundwater. Moreover, the amended scope more closely aligns with the long-term objectives of the Subsite (reduction of contaminant levels to levels where the excess cancer risk is computed as being less than one additional cancer per million persons of population (1×10^{-6}) or where the HI is less than 1 so that the aquifer can be restored to its beneficial use and prevention of further degradation of the aquifer's groundwater) through treatment of on-site groundwater.

Long-term Effectiveness and Permanence

This criterion refers to the ability of an alternative to maintain reliable protection of human health and the environment over time once the RAOs and remediation goals have been met.

Both remedies would achieve long-term effectiveness and permanence by source area removal through soil extraction and treatment and groundwater treatment.

Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment

The toxicity, mobility, and volume of the contaminants in the shallow soils and source materials would be reduced by both remedies. The excavation and treatment of the contaminated soils would reduce the toxicity, mobility, and volume of the contaminants in the upper vadose zone. The toxicity and volume of the contaminants in the deep vadose zone and saturated zone would be reduced through ISCO treatment. The amended scope provides further clarification on toxicity, mobility, and volume reductions by explicitly offering the flexibility to optimize in situ groundwater treatment options and limit the volume of contamination migrating into the downgradient plume.

Short-term Effectiveness

This criterion refers to the likelihood of adverse impacts on human health or the environment that may be posed during the construction and implementation of an alternative until remedial action objectives and remediation goals are achieved.

The original and amended remedies would identically offer low to moderate risk to the community or workers. That risk would be minimized by following proper precautions. For on-site remedial action construction workers, the risk would be controlled by proper use of personal protective equipment, equipment decontamination, and enforcing Occupational Safety and Health Administration (OSHA) construction safety standards. The risk to the community would be reduced by limiting access to the areas where construction activities are being conducted. Nearby residents might be exposed to noise during excavation, drilling, or direct-push activities, but noise control would be reduced by limiting access to the areas where construction activities were being conducted and would be limited by the hours of work. Dust control measures would also be instituted during excavation and other on-site construction activities as well as monitoring. Both remedies estimate that up to four months will be needed to complete excavation and restoration activities and that up to 15 years of ISCO treatments may be necessary to achieve remediation goals.

Implementability

This criterion refers to the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the alternative.

Both remedies would be equally difficult to implement. Although the excavation activities would use conventional construction methods, there are several obstacles that would have to be removed and/or relocated prior to excavation including buildings, electrical substation equipment, a natural gas line, SVE piping from the existing treatment system, a diesel tank, and a high voltage line telephone pole. Due to the limited space between the tracks and the depth of excavation, sheet piling might be used for shoring the excavation of Area 1. As a result of the obstacles that must be addressed to perform the excavation activities, a considerable amount of coordination will be needed with the city of Hastings and BNSF Railway Company. In addition,

the amended remedy will require additional coordination with the city to implement the environmental covenant.

Likewise, in situ treatment would also consist of equivalent levels of difficulty to implement due to the depth of the contaminant (up to 140 feet bgs), the frequency of injections (quarterly for up to 15 years to achieve remediation goals), and the number of locations (95) that would be required.

Cost

This criterion includes the capital (up-front) cost of implementing each remedy as well as the cost of operating and maintaining the remedy over the long term.

The costs for the amended remedy are not anticipated to change from the original remedy as incidental groundwater treatment was an expected outcome. The additional IC does not add substantive cost to the remedy. As outlined in the 2006 OU 12 ROD, capital cost has been estimated to be $5,790,300. The yearly annual O&M costs are expected to be $1,738,000. Based on the allocation of these O&M costs over a 15-year duration, the total annual present worth O&M cost is $14,093,000. The present worth cost is estimated at $15,927,300.

State/Support Agency Acceptance

This criterion addresses whether, based on its review of the data derived from the site and the Proposed Plan, the state concurs with, opposes, or has no comment on the remedy change selected for the site.

The state of Nebraska supports the changes imposed by this Amendment.

Community Acceptance

This criterion addresses whether the public concurs with the proposed ROD change. Community acceptance of this Amendment was evaluated based on comments received during the public comment period.

During the public comment period for the Proposed Plan, one comment was received from the local community presenting a different remedy. Section IX presents a Responsiveness Summary, summarizing the comment received in regards to this Amendment. The provisions of the Amendment have not been changed substantially from that presented in the Proposed Plan.

SECTION VI. SUPPORT AGENCY COMMENTS

NDEQ has reviewed this ROD Amendment and supports its conclusions.

SECTION VII. STATUTORY DETERMINATIONS

Under CERCLA §121 and the NCP, the lead Agency must select remedies that are protective of human health and the environment, comply with ARARs, 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.

Protection of Human Health and the Environment

The selected remedy, through use of excavation and treatment and ISCO, will protect human health and the environment. The unacceptable future risks associated with VOCs and Semi-Volatile Organic Compounds (SVOCs) in the subsurface will be reduced to within acceptable levels by excavating and treating contaminated soil from the upper vadose zone and ISCO of the contaminated areas of the lower vadose and saturated zones and groundwater. Short-term risks will be addressed by following proper precautions including use of personal protective equipment, equipment decontamination, and enforcing OSHA construction safety standards. The risk to the community would be reduced by limiting access to the areas where construction activities are being conducted by utilizing engineering controls such as construction tape and fencing. Nearby residents might be exposed to noise during excavation, drilling, or direct-push activities; however, noise control would be reduced by limiting areas where construction activities were being conducted and would be limited by the hours of work. Dust control measures would also be instituted during excavation and other on-site construction activities. All appropriate precautions to prevent runoff and thereby protect sensitive environments would be undertaken.

Compliance with ARARs

The selected remedy of excavation and treatment and ISCO complies with all ARARs. The ARARs are presented in more detail in Table 11.

Chemical Specific: Chemical-specific ARARs include the following:

- Federal Identification and Listing of Hazardous Wastes, 40 CFR § 261
- Federal Standards Applicable to Generators of Hazardous Wastes, 40 CFR §§ 262-262.11
- Federal Clean Water Act, 33 USC § 1251-1376
- Federal Water Quality Criteria, 40 CFR § 131
- Federal National Pollutant Discharge Elimination System (NPDES), 40 CFR §§ 122, 125

- Nebraska Hazardous Waste Management Regulations, Title 128
- Nebraska Integrated Solid Waste Management Regulations, Title 132
- Nebraska Surface Water Quality Standards, Title 117, Chapter 4
- Nebraska Groundwater Quality Standards and Use Classification, Title 118

Location Specific:

Location-specific ARARs are requirements that might apply to a remedial action due to the Site's unique cultural, archaeological, historical, or physical setting. Location-specific ARARs will not apply to the remedial action at the Second Street Subsite (OU 12) because there are no such features in the Subsite area.

Action Specific:

- Federal Solid Waste Disposal Act (SWDA) Subtitle C as amended by the Resource Conservation and Recovery Act (RCRA) of 1976, 42 USC §§ 6901 *et seq.*
- Federal Criteria for Classification of Solid Waste Disposal Facilities and Practices, 40 CFR § 257
- Federal Hazardous Waste Management Systems General, 40 CFR §§ 260-268
- Federal Identification and Listing of Hazardous Wastes, 40 CFR § 261
- Federal Standards Applicable to Generators of Hazardous Waste, 40 CFR §§ 262-262.11
- Federal Standards Applicable to Transporters of Hazardous Waste, 40 CFR § 263
- Federal Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, 40 CFR §§ 264 and 265
- Federal Land Disposal, 40 CFR § 268
- Federal Hazardous Materials Transportation Act, 49 USC §§ 1801-1813
- Federal Hazardous Materials Transportation Regulations, 49 CFR §§ 107, 171-177
- Federal Safe Drinking Water Act, 42 USC §§ 300 (f) *et seq.*
- Federal National Pretreatment Standards, 40 CFR § 141
- Federal Clean Water Act, 33 USC §§ 1251-1376
- Federal NPDES, 40 CFR §§ 122-125
- Federal Water Quality Criteria, 40 CFR § 131
- Federal Clean Air Act, 42 USC §§ 7401 *et seq.*
- Federal National Ambient Air Quality Standards/NESHAPS/NSPS/BACT/PSD/LAER, 40 CFR §§ 50.1-.17, .50-.54, .150-.154, .480-.489; §§ 53.1-.33; §§ 61.01-.18, .50-.112, .240-.247
- Federal Noise Control Act of 1972, 42 USC §§ 4901 *et seq.*
- Nebraska Environmental Protection Act, Chapter 81, Article 15
- Nebraska Integrated Solid Waste Management Act, Neb. Rev. Statutes 13-1701 *et seq.*
- Nebraska Rules and Regulations Pertaining to the Management of Wastes, Title 126
- Nebraska Hazardous Waste Management Regulations, Title 128
- Nebraska Integrated Solid Waste Management Regulations, Title 132
- Nebraska Regulations Governing Licensure of Water Well and Pump Installation Contractors and Certification of Water Well Drilling and Pump Installation Supervisors, Title 456, Chapters 10 and 12, and Nebraska Rev. Statutes §§ 46-602 *et seq.*

- Nebraska Water Well Standards and Contractor's Licensing Act, Title 178 and Neb. Statutes §§ 46-1201 *et seq.*
- Nebraska Water Well Construction and Abandonment Standards, Title 178 and Neb. Statutes §§ 46-602
- Nebraska Pretreatment Regulations, Title 127
- Nebraska Surface Water Quality Standards, Title 117
- Nebraska Rules and Regulations Pertaining to the Issuance of Permits Under the NPDES, Title 119
- Nebraska Groundwater Quality and Use Classification, Title 118
- Nebraska Rules and Regulations for Injection Wells and Mineral Production Wells, Title 122
- Nebraska Air Quality, Title 129 § 0607

Cost Effectiveness

The amended remedy is cost effective and represents a reasonable value for the expenditure required. 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 §300.430(f)(1)(ii)(D)]. The determination of cost effectiveness was made by evaluating the overall effectiveness of the amended remedy and comparing that to the costs of its implementation. The conclusion supported the determination that the selected remedy is cost effective. The estimated present-worth cost of the selected remedy is $15,927,300.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent

The amended remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at OU 12. The amended remedy is protective of human health and the environment and complies with ARARs. It 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 and bias against off-site treatment and disposal. The selected remedy has acceptance by the community and the state.

The amended remedy offers superior long-term effectiveness and an acceptable reduction of volume and mobility through treatment. Application of ISCO will reduce the contamination levels in the subsurface to action levels in approximately 15 years. Excavation and treatment of contaminated soils and source materials in the upper vadose zone will, in addition to ISCO, ensure that RAOs are met.

Preference for Treatment

Principal threats at OU 12, as defined by CERCLA, consist of the VOC- and SVOC-contaminated soils and source materials currently present at the Subsite. As documented, application of ISCO will reduce the contamination levels in the subsurface to remediation goals in approximately 15 years. Excavation and treatment (as required for disposal) of contaminated

soils and source materials in the upper vadose zone, in addition to ISCO deeper, will ensure that remedial action objectives are met. The statutory preference for remedies that employ treatment as a principal element is satisfied by the amended remedy as ISCO is a significant portion of this remedy.

Five-Year Review Requirement

Because the selected remedy will result in hazardous substances, pollutants, or contaminants remaining on the Site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action to ensure the remedy is and will be protective of human health and the environment. The five-year review process was initiated five years after the Well 3 Subsite (OU 7 of the Hastings Groundwater Contamination Site) remedial action began. The next sequential submission of this document would be in December 2012.

SECTION VIII. PUBLIC PARTICIPATION COMPLIANCE

The Proposed Plan for the Amendment to the ROD was issued to meet public participation provisions mandated under Section 117(a) of CERCLA, as amended, and Section 300.435(c)(2)(ii) of the NCP. The Proposed Plan for Amendment to the ROD was made available to the public in the Administrative Record file located at the Hastings Public Library Hastings, Nebraska, and the EPA Region VII office in Kansas City, Kansas, on May 26, 2008. A public notice was published in the Hastings Tribune on May 28, 2008, announcing the commencement and length of the public comment period and the availability of the Administrative Record file for public review. A public comment period was held from May 28 through June 27, 2008. The attached Responsiveness Summary addresses the written comments received regarding the Proposed Plan for the ROD Amendment during the public comment period.

SECTION IX. RESPONSIVENESS SUMMARY

Overview

EPA with concurrence from NDEQ made a preliminary selection of the preferred remedial alternative in the Proposed Plan. The preferred remedial alternative addressed contaminated subsurface soils and groundwater for OU 12 of the Hastings Subsite. The treatment technologies included within the preferred alternative were (1) excavation and thermal treatment of shallow soils and materials, (2) in situ chemical oxidation of soils inaccessible to excavation and groundwater, (3) and an IC based on the Nebraska Uniform Environmental Covenants Act.

In accordance with 40 CFR §300.435(c)(2)(ii)(D), the opportunity for a public meeting was provided during the public comment period if requested. The request was advertised through over 100 fact sheets that went out to the public and other interested parties as well as in the Hastings Tribune. No request was received for a public meeting. During the public comment period only one comment was submitted. The comment was from a citizen who was interested in future use of the property and presented an alternative remedy. The comment is included in "The Summary of Comments Received During the Public Comment Period."

Background on Community Involvement

The Proposed Plan for OU 12 for the Amendment was released to the public on May 26, 2008. The Administrative Record (which includes numerous remedial investigation documents, the Feasibility Study report, and the Proposed Plan) was made available for public review at the information repositories maintained at the Hastings Public Library and at EPA Region 7 office in Kansas City, Kansas. The notice of availability of the Administrative Record was published in The Hastings Tribune on May 28, 2008. The public comment period on the Proposed Plan ran for 30 days from May 28 to June 27, 2008. No extensions to the public comment period were requested.

Summary of Comments Received During the Public Comment Period

Oral Comments Received during the Public Meeting

No public meeting was held or requested.

Written Comments Received From Interested Citizens

One letter was received in which an interest citizen provided these comments:

1. I am replying to a notice in the Hastings Tribune dated May 31, 2008, requesting public comment. It is regarding the EPA's recommendation for groundwater remediation for the Subsite of the Hastings Groundwater Contamination site. We live near it.

2. Although the current view is that there are no anticipated residential uses for the property, I think the goal to remediate the groundwater and the land will be below what is best for the area. Recently, there are more people choosing to live in the Downtown area of Second Street (especially upstairs of the business fronts) so there could be a greater need for housing in the area. It is important that a good and thorough job be done for everyone.

3. The EPA's goal to remediate is great and I propose that using the Grander Water System that was used in New Zealand to take back the land and water that even the birds and animals had shunned. The Grander Water System enabled the land to have rejuvenated water so that vegetation and grass could grow, the birds returned and the land became useful for building residential buildings in less time than expected.

Response

Use classifications for Superfund sites are based on a number of factors including current use, anticipated future use, and risk management (i.e., potential and/or actual complete exposure pathways). Based on discussions with the city of Hastings, who owns the property, the Second Street Subsite's commercial zoning of the Subsite is not anticipated to change. There is currently no justification for cleanup to a standard other than commercial.

In regard to the use of the Grander Water System at the Subsite, this technology has not been evaluated as a possible remedy for extraction, removal, or treatment of coal tars in the subsurface per the remedy selection process outlined in the National Contingency Plan. EPA is required by the Superfund law to follow the NCP process. As a result, the Granderwater System can not be considered in the evaluation of alternatives for the Subsite.

Written Comments Received from Potentially Responsible Parties (PRPs)

None received.

Written Comments from Other Interested Parties

None received.

GLOSSARY OF TERMS

Specialized terms used in this ROD are defined below:

Administrative Order on Consent (Consent Order): In this ROD the Consent Order is a legal agreement signed by EPA and a potentially responsible party (PRP) that requires the PRP to perform a response action that is necessary as a result of a release or threat of release of hazardous substances.

Administrative Record: The body of documents that *forms the basis* for selection of a particular response at a site. An AR is available at or near the site to permit interested individuals to review the documents and to allow meaningful public participation in the remedy selection process.

Aquifer: An underground layer of rock, sand, or gravel capable of storing water within cracks and pore spaces or between grains. When water contained within an aquifer is of sufficient quantity and quality, it can be used for drinking or other purposes. The water contained in the aquifer is called groundwater.

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and state environmental laws and regulations that a selected remedy will meet.

Capital Costs: Expenses associated with the initial construction of a project.

Chemicals of Concern (COCs): Chemicals, identified during the site investigations and risk assessments that pose a potential risk because of their toxicity and potential routes of exposure to public health and the environment.

Comprehensive Environmental, Response, Compensation, and Liability Act (CERCLA): The law enacted by Congress in 1980 to evaluate and clean up abandoned, hazardous waste sites. The EPA was charged with the mission to implement and enforce CERCLA.

Consent Decree: A legal document, approved by a judge, that formalizes an agreement between EPA and one or more PRPs outlining the terms by which the response action will take place. A Consent Decree is subject to a public comment period prior to its approval by a judge and is enforceable as a final judgment by a court.

Contaminant Plume: A column of contamination with measurable horizontal and vertical dimensions that is suspended in and moves with groundwater.

Downgradient: Downstream from the flow of groundwater. The term refers to groundwater flow in the same way that it does to a river's flow.

Groundwater: Water beneath the earth's surface that fills pores in soils or openings in rocks to the point of saturation. Groundwater is often used as a source of drinking water via municipal or domestic wells.

In situ Chemical Oxidation (ISCO): A technology using chemicals called oxidants to destroy and convert contaminants in soil and groundwater into harmless compounds, like water and carbon dioxide. The chemical oxidation process requires direct contact of the oxidants with contaminated media. This process is conducted in situ (or in place) rather than through extracting contaminated media to be treated at the ground surface.

Institutional Controls (ICs): The placement of laws, regulations, restrictions, etc., on a site/property, which assist or assure protection of human health by eliminating exposure pathways.

Maximum Contaminant Levels (MCLs): The maximum permissible level of a contaminant in water that is delivered to any user of a public water system.

Migrate: To move from one area to another—to change location.

Operable Unit (OU): Term for each of a number of separate activities undertaken as part of a Superfund site cleanup.

Operation and Maintenance (O&M): Activities conducted at a site after the construction phase to ensure that the cleanup continues to be effective.

Parts per Billion (ppb): A unit of measurement used to describe levels of contamination. For example, one gallon of solvent in one billion gallons of water is equal to 1 ppb.

Performance Standards: Measurable values in the environment that allow evaluation of whether a remedial action has met a given objective.

Plume: A body of contaminated groundwater flowing from a specific source.

Polynuclear aromatic hydrocarbons (PAHs): A group of over 100 different chemicals that are formed during the incomplete burning of coal, oil, gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot. Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides.

Potentially Responsible Parties (PRPs): Any individual(s) or company(ies) (such as owners, operators, transporters or generators) who are potentially responsible for the contamination problems at a Superfund site. Whenever possible the EPA requires PRPs, through administrative and legal actions, to clean up a hazardous waste site.

Present-Worth Analysis: A method of evaluation of expenditures that occurs over different time periods. By discounting all costs to a common base year, the costs for different remedial actions can be compared on the basis of a single figure for each alternative.

Record of Decision (ROD): The decision document in which EPA selects the remedy for a Superfund site.

Remedial Action Objective: The specific purpose of a remedial action usually put in terms of measurable standards in environmental media.

Remedial Alternatives: The technology or combination of technologies used by EPA in treating, containing, or controlling contamination at a Superfund site.

Soil Vapor Extraction (SVE): (1) A treatment technology that removes vapors from air spaces in contaminated soil by setting up a pressure gradient or vacuum, often used in conjunction with air sparging (the injection of air into the ground). (2) Systems are used to vacuum air and other gases from the unsaturated (vadose) zone above the water table. (3) An in situ soil aeration process designed and operated to maximize the volatilization of low-molecular-weight compounds with some biodegradation occurring.

Superfund: The nickname given by the press for CERCLA because the program was well funded in the beginning.

Semi-Volatile Organic Compounds SVOCs: A general term for organic compounds that volatilize relatively slowly at standard temperature (20°C) and pressure (1 atmosphere).

Volatile Organic Compounds (VOCs): Carbon compounds (such as solvents) which readily volatilize at room temperature and atmospheric pressure. Most are not readily dissolved in water, but their solubility is above health-based standards for potable use. Some VOCs can cause cancer.

ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirement
BGS	Below Ground Surface
BNSF	Burlington Northern Santa Fe Railway
BTEX	Benzene, Toluene, Ethyl benzene, and Xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMS	Community Municipal Services, Inc.
COCs	Contaminants of Concern
DNAPL	Dense, Non-aqueous, Phase Liquid
EPA	United States Environmental Protection Agency
FMGP	Former Manufactured Gas Plant
IWA	In-well Aeration
ISCO	In situ Chemical Oxidation
LUST	Leaking Underground Storage Tank
MCLs	Maximum Contaminant Levels
MCLGs	Maximum Contaminant Level Goals
MG/KG	Milligram per Kilogram
MG/L	Milligram per Liter
MW-9	Monitoring Well 9
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDEQ	Nebraska Department of Environmental Quality
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PAHs	Polynuclear Aromatic Hydrocarbons
PRPs	Potentially Responsible Parties
PRGs	Preliminary Remediation Goals
ROD	Record of Decision
SVE	Soil Vapor Extraction
SVOCs	Semi-volatile Organic Compounds
TBC	To Be Considered
TCE	Trichloroethylene
VCP	Voluntary Cleanup Program
VOCs	Volatile Organic Compounds

FIGURES

Figure 1 - Site Location

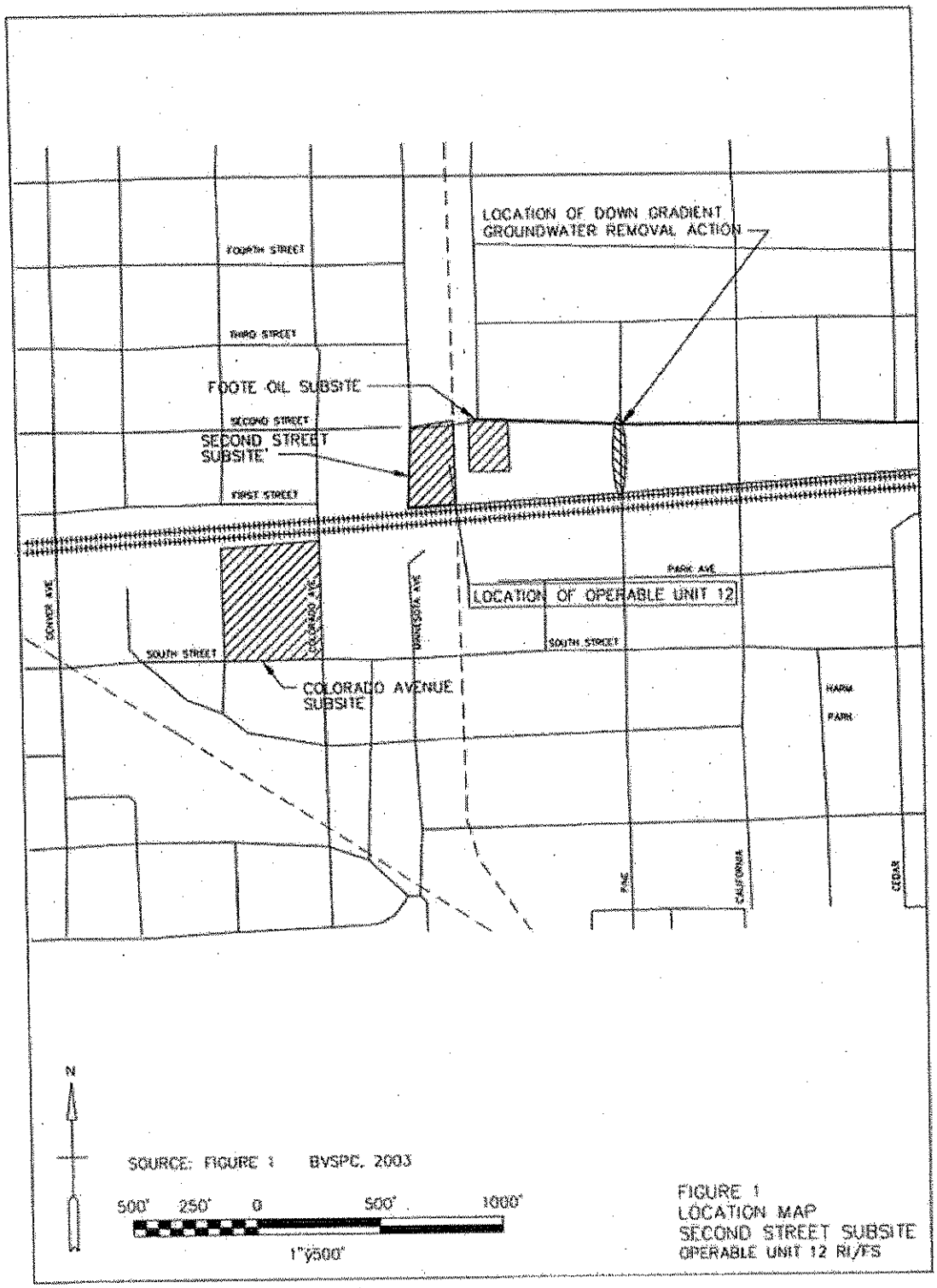
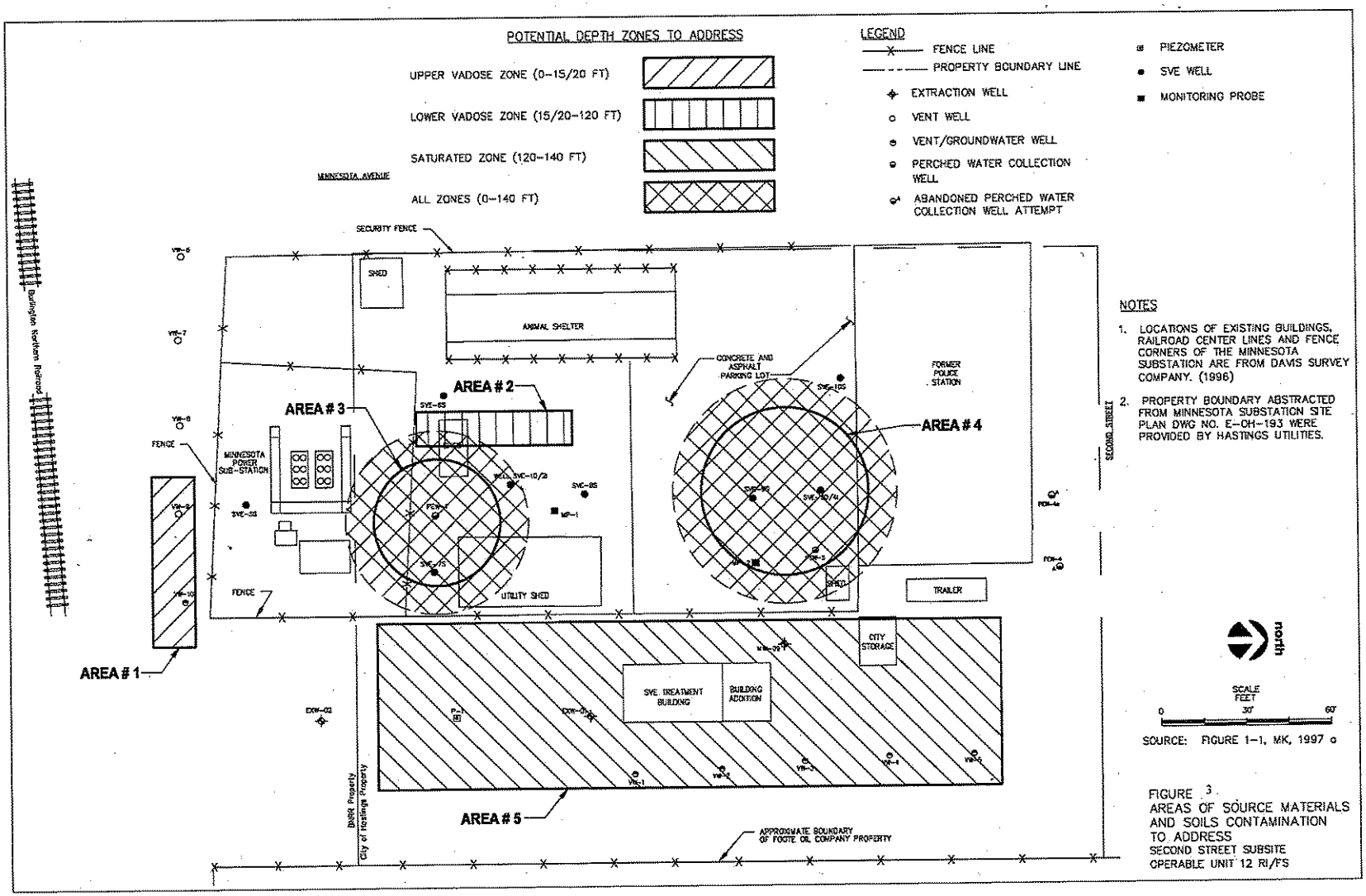


Figure 2 – Treatment Areas



TABLES

Table 8 — Soil Remediation Goals for Excavation
(For Soils 0 – 20 Feet)

Soil Remediation goals - Second Street Subsite		
Contaminant	Cleanup Level (mg/kg)	Rationale
Benzene	16.0	VCP
Benzo(a)anthracene	21.0	VCP
Benzo(a)pyrene	2.1	VCP
Benzo(b)fluoranthene	21.0	VCP
Benzo(k)fluoranthene	210.0	VCP
Chrysene	2,100.0	VCP
Dibenzo(a,h)anthracene	2.1	VCP
Dibenzofuran	1,239.0	Health Based
Ethyl Benzene	400.0	Health Based
Fluoranthene	17,824.0	Health Based
Fluorene	17,824.0	Health Based
Indeno(1,2,3-cd)pyrene	21.0	VCP
Isopropyl Benzene	88.0	Health Based
2-Methylnaphthalene	1,239.0	Health Based
Naphthalene	14.0	Health Based
Pyrene	16,710.0	Health Based
Styrene	1,481.0	Health Based
Toluene	654.0	Health Based
Xylenes	418.0	Health Based

mg/kg	milligrams per kilogram
	Health Based 10^{-6} cancer risk or HI>1
VCP	Nebraska Department of Environmental Quality Voluntary Cleanup Program VCP values are calculated based on 10^{-5} or HI>1

Table 9 — Groundwater Remediation Goals

Groundwater Cleanup Levels - Second Street Subsite		
Contaminant	Cleanup Level (µg/l)	Rationale
Benzene	5.0	MCL
Benzo(a)anthracene	.1	Detection Limit
Benzo(a)pyrene	.2	MCL
Benzo(b)fluoranthene	.1	Detection Limit
Benzo(k)fluoranthene	.2	Health Based
Chrysene	1.6	VCP
Dibenzo(a,h)anthracene	.1	Detection Limit
Ethyl Benzene	700.0	MCL
Fluorene	370.0	VCP
Indeno(1,2,3-cd)pyrene	.10	Detection Limit
2-Methylnaphthalene	.63	Health Based
Naphthalene	1.1*	Health Based
Pyrene	140.00	VCP
Styrene	100.00	MCL
Toluene	1,000.00	MCL
Xylenes	10,000.00	MCL

$*10^{-5}$	
µg/l	micrograms per liter
MCL	federal and state Maximum Contaminant Level (SDWA and Title 118)
Health Based	10^{-6} cancer risk or HI>1 for ingestion only
VCP	Nebraska Department of Environmental Quality Voluntary Cleanup Program VCP values are calculated based on 10^{-6} or HI>1 or MCL for ingestion and inhalation

Table 10 — Groundwater Protection Remediation Goals For Soil

(For Soils Greater Than 20 Feet)

Soil Remediation goals - Second Street Subsite		
Contaminant	Cleanup Level (mg/kg)	Rationale
Benzene	.034	VCP – DAF 20
Benzo(a)anthracene	.390	VCP – DAF 20
Benzo(a)pyrene	8.200	VCP – DAF 20
Benzo(b)fluoranthene	.790	VCP – DAF 20
Benzo(k)fluoranthene	45.000	VCP – DAF 20
Chrysene	39.000	VCP – DAF 20
Dibenzo(a,h)anthracene	.170	VCP – DAF 20
Dibenzofuran	5.700	VCP – DAF 20
Ethyl Benzene	13.000	VCP – DAF 20
Fluoranthene	260.000	VCP – DAF 20
Fluorene	200.000	VCP – DAF 20
Indeno(1,2,3-cd)pyrene	2.100	VCP – DAF 20
Isopropyl Benzene	2.300	VCP – DAF 20
Naphthalene	.080	VCP – DAF 20
Pyrene	1,200.000	VCP – DAF 20
Styrene	3.500	VCP – DAF 20
Toluene	12.000	VCP – DAF 20
Xylenes	210.000	VCP – DAF 20

VCP — Nebraska Department of Environmental Quality Voluntary Cleanup Program
VCP values are calculated based on 10^{-6}, MCLs, or HI>1
DAF — Dilution Attenuation Factor

Table 11 — ARARs

Chemical-Specific ARARs		
Standard, Requirement, Criteria, or Limitation	Citation	Description
FEDERAL		
Soil/Solid Waste		
Identification and Listing of Hazardous Wastes and Standards Applicable to Generators of Hazardous Waste	40 Code of Federal Regulations (CFR) Parts 261-262	Would be applicable in identifying if a substance in the soils at the Second Street Subsite is identified as a hazardous waste. Any wastes identified as hazardous wastes would have to be handled as such. These standards may apply as both chemical-specific and action-specific ARARs to Alternatives 2, 3, 4, and 5.
STATE		
Nebraska Environmental Protection Act	Neb. Rev. Statutes 81-1501 *et. seq.*	
Soil/Solid Waste		
Nebraska Hazardous Waste Management Regulations	Title 128	Requires that the wastes at the site be characterized to determine if the wastes meet the definition of hazardous waste in the citation. These standards may apply as both chemical-specific and action-specific ARARs to Alternatives 2, 3, 4, and 5.
Integrated Solid Waste Management Regulations	Title 132	Defines procedures for solid waste management, including special waste. These standards may apply as both chemical-specific and action-specific ARARs to Alternatives 2, 3, 4, and 5.
Nebraska Cleanup Goals for Voluntary Cleanup Program (VCP)	Have not been promulgated; Draft May 2005	Defines cleanup goals at sites with known or suspected hazardous substance contamination. Since not promulgated as standards, these goals would not be applicable, relevant, or appropriate requirements for OU12, but would be "to be considered" (TBC) criteria. These requirements are TBCs for all alternatives.
Groundwater		
Groundwater Quality Standards and Use Classification	Title 118	Establishes procedures including anti-degradation clauses and numerical standards for contaminants introduced to groundwater. Requirements defined in Title 118 also require contaminated soils be cleaned up so that groundwater would not become contaminated above maximum contaminant level(s) or result in an excess cancer risk of greater than 1×10^{-6} or hazard index of greater than 1, whichever is less. These requirements would be considered chemical-specific ARARs for all alternatives.

Action-Specific ARARs		
Standard, Requirement, Criteria, or Limitation	Citation	Description
FEDERAL		
Solid Waste/Soil Excavation, Treatment, and Disposal		
Solid Waste Disposal Act (SWDA), Subtitle C as amended by the Resource Conservation and Recovery Act of 1976	42 USC) §§ 6901 *et. seq.*	
Criteria for Classification of Solid Waste Disposal Facilities and Practices	40 CFR Part 257	Establishes criteria and requirements for the disposal of solid wastes at a solid waste landfill. These requirements are applicable to Alternatives 2, 3, 4, and 5.
Hazardous Waste Management Systems General	40 CFR Part 260 to 268	Establishes procedures and definitions pertaining to generation, treatment, storage, or disposal of solid and hazardous wastes. Requirements may be applicable or relevant and appropriate to Alternatives 2, 3, 4, and 5.
Hazardous Materials Transportation Act	49 USC §§ 1801-1813	
Hazardous Materials Transportation Regulations	49 CFR Parts 107, 171-177	Regulates transportation of hazardous materials. These requirements would be applicable to Alternatives 2, 4, and 5.
Water Discharge		
Clean Water Act	33 USC §§ 1251 – 1376	
National Pollutant Discharge Elimination System (NPDES)	40 CFR Parts 122 – 125	Requires permits for the discharge of pollutants from any point source into the waters of the United States. A permit is not required for on-site CERCLA response actions, but the substantive requirements are applicable if an alternative involves discharge into a creek or other surface water on-site. May apply to actions such as excavation dewatering when waters generated are discharged to the ground or surface water. The requirements of this regulation maybe applicable to Alternatives 2, 4, and 5.

Action-Specific ARARs		
Standard, Requirement, Criteria, or Limitation	Citation	Description
Water Discharge, Continued		
Water Quality Criteria	40 CFR Part 131	Establishes non-enforceable standards to protect aquatic life. May be relevant and appropriate to surface water discharges, or may be a TBC. May apply to actions such as excavation dewatering when waters generated are discharged to the ground or surface water. The requirements of this regulation maybe applicable to Alternatives 2, 4, and 5.
Injections to Water		
Underground Injection Control (UIC) Regulations	40 CFR Parts 144 – 147	Provides for requirements for the protection of underground sources of drinking water. The requirements would be applicable or relevant and appropriate for Alternatives 4 and 5.
Air Treatment		
Clean Air Act	42 USC §§. 7401 *et. seq.*	
National Ambient Air Quality Standards / NESHAPS / NSPS / BACT / PSD / LAER	40 CFR 50.1-.17. .50-.54; .150-.154 .480-.489; 40 CFR 53.1-.33; 40 CFR 61.01-.18 .50-.112, .240-.247	Treatment technology standards for emissions to air from: incinerators, surface impoundments, waste piles; landfills, and fugitive emissions. The requirements would be applicable or relevant and appropriate for Alternatives 2, 3, 4, and 5.
Other		
Noise Control Act of 1972	42 USC §§. 4901 *et. seq.*	Federal activities must not result in noise that will jeopardize the health or welfare of the public. The requirements would be applicable to Alternatives 2, 3, 4, and 5.

Action-Specific ARARs		
Standard, Requirement, Criteria, or Limitation	Citation	Description
STATE		
Nebraska Environmental Protection Act	Neb. Rev. Statutes 81-1501 *et. seq.*	
Solid Waste/Soil Excavation, Treatment, and Disposal		
Nebraska Integrated Solid Waste Management Act	Neb. Rev. Statutes 13-1701 *et. seq.*	
Nebraska Hazardous Waste Management Regulations	Title 128	Establishes procedures for hazardous waste determination, management requirements, transportation requirements for off-site disposal, and on-site handling requirements. The requirements of this regulation maybe applicable to Alternatives 2, 3, 4, and 5.
Integrated Solid Waste Management Regulations	Title 132	Establishes procedures for solid waste management including special waste. May be applicable for materials sent for an off-site landfill for disposal as specified waste. The requirements of this regulation would be applicable to Alternatives 2, 3, 4, and 5.
Well Drilling		
Regulations Governing Licensure of Water Well and Pump Installation Contractors and Certification of Water Well Drilling and Pump Installation Supervisors	Title 456, Chapters 10 and 12, and Nebraska Rev. Stat. §§ 46-602 *et. seq.*	Regulates well drilling and pump installation in the State. These standards and requirements would be applicable for activities such as drilling and installation of SVE wells defined in Alternatives 3 and 4.
Water Well Standards and Contractor's Licensing Act	Title 178 and Neb. Stat. §§ 46-1201 *et. seq.*	Regulates well drillers and well construction. These standards and requirements would be applicable for activities such as drilling and installation of SVE wells defined in Alternatives 3 and 4.
Well Drilling, Continued		
Water Well Construction and Abandonment Standards	Title 178 and Neb. Stat. §§ 46-602	Regulates well abandonment. These standards and requirements would be applicable for activities such as drilling and installation of SVE wells defined in Alternatives 3 and 4.
Water Discharge		

Action-Specific ARARs		
Standard, Requirement, Criteria, or Limitation	Citation	Description
Nebraska Surface Water Quality Standards	Title 117	Establishes numeric environmental quality standards for the surface waters of the State. May be relevant and appropriate to surface water discharge or a TBC. May apply to actions such as excavation dewatering when waters generated are discharged to the ground or surface water. The requirements of this regulation maybe applicable to Alternatives 2, 4, and 5.
Rules and Regulations Pertaining to the Issuance of Permits Under the National Pollutant Discharge Elimination Systems	Title 119	Requires a permit for discharging pollutants from a point source into the waters of the State. Would be complied with if treated effluent is discharged off-site to a surface water body. Any on-site discharge would need to comply with substantive standards, but a permit would not be required. May apply to actions such as excavation dewatering when waters generated are discharged to the ground or surface water. The requirements of this regulation may be applicable to Alternatives 2, 4, and 5.
Injections to Water		
Groundwater Quality and Use Classification	Title 118	Establishes procedures including anti-degradation clauses and numerical standards for contaminants introduced to groundwater. The requirements would be applicable or relevant and appropriate for the injection of in situ soil treatment materials into the saturated zone such as those defined in Alternatives 4 and 5.
Rules and Regulations for Injection Wells and Mineral Production Wells	Title 122	Establishes procedures for permitting underground injections (including hazardous wastes) into or above an underground supply of drinking water. The requirements would be applicable or relevant and appropriate for the injection of in situ soil treatment materials into the saturated zone such as those defined in Alternatives 4 and 5.
Air Treatment		
Nebraska Air Quality	Title 129	Establishes control technology standards for emission of toxic air pollutants from new, modified, or reconstructed sources. Regulations pertaining to fugitive emissions (such as dust) would be applicable, if they are more stringent than federal requirements. The requirements of this regulation maybe applicable to Alternatives 2, 3, 4, and 5.

Table 12 — Cost Estimate for Selected Remedy

CAPITAL COSTS				
Cost Estimate Component	***Quantity***	***Units***	***Unit Cost***	***Capital Cost***
Upper Vadose Zone Treatment				
South Holder (No. 1) -Area 3	1	LS	1	$1,239,500
North Holder (No. 2) -Area 4	1	LS	1	$1,923,500
Area Near RR Tracks - Area 1	1	LS	1	$444,000
ISCO				
Pilot Test Area 2	1	LS	1	$144,000
DIRECT CAPITAL COST				$3,751,000
Bid Contingency (15%)				$562,700
Scope Contingency (15%)				$562,700
TOTAL DIRECT CAPITAL COST				$4,876,400
Permitting and Legal (5%)				$243,800
Construction Services (10%)				$487,600
CONSTRUCTION COST TOTAL				$5,607,800
Engineering Design (8%)				$448,600
TOTAL CAPITAL COST				**$6,056,400**
ANNUAL O&M COSTS				
Year-Cost Description				***O&M Cost***
YR1 - Areas 2-5 ISCO costs (see below)				$1,738,000
YR2 - Areas 2-5 ISCO costs (see below)				$1,738,000
YR3 - Areas 2-5 ISCO costs (see below)				$1,738,000
YR4 - Areas 3-5 ISCO costs (see below)				$1,595,000
YR5 - Areas 3&4 ISCO costs (see below)				$1,164,000
YR6 - Areas 3&4 ISCO costs (see below)				$1,164,000
YR7 - Areas 3&4 ISCO costs (see below)				$1,164,000
YR8 - Area 3 ISCO costs (see below)				$474,000
YR9 - Area 3 ISCO costs (see below)				$474,000
YR10 - Area 3 ISCO costs (see below)				$474,000
YR11 - Area 3 ISCO costs (see below)				$474,000
YR12 - Area 3 ISCO costs (see below)				$474,000
YR13 - Area 3 ISCO costs (see below)				$474,000
YR14 - Area 3 ISCO costs (see below)				$474,000
YR15 - Area 3 ISCO costs (see below)				$474,000
Total Cost of Annual O&M Costs				$14,093,000
TOTAL PRESENT WORTH O&M COST				**$9,870,900**
*Yearly O&M costs includes: Years 1-3, ISCO for Area 2 $143,000 annually. Years 1-15, ISCO for Area 3 $474,000 annually. Years 1-7, ISCO for Area 4 $690,000 annually. Years 1-4, ISCO for Area 5 $431,000 annually.				
Discount Rate		7 %		

SUMMARY OF PRESENT WORTH COSTS				
PRESENT WORTH COST				***TOTAL COST***
TOTAL CAPITAL COST				**$6,056,400**
TOTAL PRESENT WORTH O&M COST				**$9,870,900**
TOTAL PRESENT WORTH COST				**$15,927,300**