RECORD OF DECISION

ST. MARIES CREOSOTE SITE

ST. MARIES, IDAHO

July 20, 2007

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 10

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ATTACHMENTS

PART 1. DECLARATION

1.1 Site Name and Location

St. Maries Creosote Site

1369 Railroad Avenue

St. Maries, Idaho 83861

National Superfund Database (CERCLIS) Identification Number: ID SFN1002095

1.2 Statement of Basis and Purpose

This decision document presents the Selected Remedy for the St. Maries Creosote site, located within the Coeur d'Alene Indian Reservation in St. Maries, Idaho. The Selected Remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for this site.

The Coeur d'Alene Tribe concurs with the Selected Remedy.

1.3 Assessment of the Site

The Environmental Protection Agency (EPA) has determined that a release of hazardous substances is occurring and will continue to occur at the Site. The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. Such a release or threat of a release may present an imminent and substantial endangerment to public health, welfare, or the environment.

1.4 Description of the Selected Remedy

This ROD selects the final remedy for the Site. This remedy is designed to protect human health and the environment from the release of a hazardous substance. Creosote, RCRA listed hazardous waste # F034, is the principal threat waste at the Site, and its constituents constitute the sole risk drivers. Creosote contamination is found in five contiguous subareas of the Site (See Figure 1):

- Upland soils and groundwater
- Riverbank soils and groundwater
- River shoreline sediments
- Nearshore river sediments
- Offshore river sediments

The Selected Remedy for the Site provides treatment for the bulk of the Site's creosote contamination that is found within the top 20 feet of the upland soils. Remaining deeper contaminated upland soils will be chemically stabilized in place rendering the contamination immobile. Existing contaminated groundwater will be addressed by incorporating it in the stabilization process thereby preventing the leaching of contamination into groundwater and preventing the migration of contamination to the St. Joe River. The Selected Remedy also removes and treats contaminated sediments in the St. Joe River. Features of the Selected Remedy include (See Figures 2 and 3):

- Excavation and onsite thermal treatment of the top 20 feet of contaminated upland soils.
- In-situ chemical stabilization of deeper contaminated upland soils and associated groundwater (20 to 60 feet bgs).
- Excavation and on-site thermal treatment of contaminated bank soils.
- Further assessment, delineation, excavation, and on-site thermal treatment of contaminated shoreline, nearshore, and offshore sediments in the St. Joe River.

- Thermal treatment of excavated soils and sediments to health-based levels that achieve the determination that they no longer contain hazardous waste.
- Placement of thermally treated soils and sediments back on Site within the upland and bank soil excavation area with possible off site disposal of excess materials.
- Backfilling areas of sediment excavation within the St. Joe River to the original bathymetry with clean gravels and sediments appropriate for a healthy benthic community.
- Treatment and river discharge of all groundwater and pore water collected during the upland and bank soil excavation and sediment dewatering processes.
- Institutional controls to restrict land use protecting the integrity of the subsurface stabilization.
- Continued monitoring of upland soils, groundwater, surface water, and sediments to confirm compliance with cleanup standards and remedial action objectives (RAOs).

1.5 Statutory Determinations

The Selected Remedy satisfies the statutory requirements of CERCLA Section 121 and the regulatory requirements of the NCP. The Selected Remedy is protective of human health and the environment, complies with applicable or relevant and appropriate requirements (ARARs), is cost effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. This remedy also satisfies the statutory preference for treatment as a principle element of the remedy (i.e., permanently and significantly reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants through treatment).

Because the remedy will result in hazardous substances, pollutants, or contaminants remaining on Site above levels that allow for unrestricted use and unrestricted exposure, statutory reviews will be conducted every five years after initiation of remedial action to ensure that the remedy is, and continues to be, protective of human health and the environment. The five-year reviews will continue unless a determination can be made that no hazardous substances, pollutants, or contaminants remain on-site above levels that allow for unlimited use and unrestricted exposure.

1.6 ROD Data Certification Checklist

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record file for this site.

Data / Information	ROD Section Number
Identification of chemicals of concern and their respective concentrations.	2.7
Baseline risk represented by the chemicals of concern.	2.7
Cleanup levels established for chemicals of concern and the basis for these levels.	2.8
How source materials constituting principal threats are addressed.	2.12
Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD.	2.6
Potential land and groundwater use that will be available at the site as a result of the Selected Remedy.	2.4
Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected.	2.10.7
Key factor(s) that led to selecting the remedy (i.e., describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision).	2.12

1.7 Authorizing Signatures

7/20/2007
Date

/s/
Daniel D. Opalski, Director
Office of Environmental Cleanup
U.S. Environmental Protection Agency, Region 10

PART 2. DECISION SUMMARY

This Decision Summary provides a description of the site-specific factors and analyses that lead to selection of the remedy for the St. Maries Creosote site. It includes information about the site background, the nature and extent of contamination, the assessment of human health and environmental risks, and the identification and evaluation of remedial alternatives.

The Decision Summary also describes the involvement of the public throughout the process along with the environmental programs and regulations that may relate to or affect the remedial alternatives considered. The Decision Summary concludes with a description of the remedy selected in this Record of Decision and a discussion of how the Selected Remedy meets the requirements of CERCLA, as amended by SARA, and to the extent practicable, the NCP.

The Decision Summary is presented in the following sections:

- Section 2.1 Site Name, Location, and Description
- Section 2.2 Site History and Enforcement Activities
- Section 2.3 Community Participation
- Section 2.4 Scope and Role of Response Action
- Section 2.5 Site Characteristics
- Section 2.6 Current and Potential Future Site and Resource Uses
- Section 2.7 Summary of Site Risks
- Section 2.8 Remedial Action Objectives
- Section 2.9 Description of Alternatives
- Section 2.10 Comparative Analysis of Alternatives
- Section 2.11 Principal Threat Waste
- Section 2.12 Selected Remedy
- Section 2.13 Statutory Determinations

Documents supporting this Decision Summary are included in the Administrative Record for the site. Key documents include the following:

- Remedial Investigation and Baseline Risk Assessment (July 2003)
- Remedial Investigation Addendum: June 2003 Data (April 2004)
- Feasibility Study (December 2004)
- Proposed Plan (June 2005)
- Supplemental Feasibility Study (July 2006)
- Revised Proposed Plan (December 2006)

2.1 Site Name, Location, and Description

St. Maries, Idaho (population 2,800) is located along the southern bank of the St. Joe River (river) in Benewah County. The St. Maries Creosote Site, CERCLIS # ID SFN1002095, lies within the boundaries of the Coeur d'Alene Indian Reservation, and is on the river side of a flood control levee approximately 2,600 feet downstream (west) from the river's confluence with the St. Maries River (see Figure 4).

The Site has been used primarily for industrial purposes and specifically, for approximately 25 years, the Site was used to store and treat logs and poles with creosote. Creosote and its various constituents constitute the principal threat waste found at the site. Creosote contamination has been found in the upland soils, groundwater, riverbank soils, and sediments in the St. Joe River including the shoreline, nearshore and offshore areas. The Site encompasses approximately two acres of uplands along the south bank of the river, as well as approximately three acres of adjacent riverbank and bottom sediments in the St. Joe River. There are no wetlands near the Site. The river provides a migratory route for the listed threatened bull trout. Because ancestral Coeur d'Alene Tribal villages are known to be sited near water bodies in and around Northern Idaho including the St. Joe River, the Site holds potential as a location for historical cultural artifacts.

EPA is the lead agency for cleanup activities and the Coeur d'Alene Tribe is the support agency. EPA anticipates that through a judicial consent decree the potentially responsible parties (PRPs): B.J. Carney & Co, Inc., Carney Products, Ltd., and the City of St. Maries, will implement the Selected Remedy.

2.2 Site History and Enforcement Activities

From 1939 through 1964, the Site was used for peeling and treating logs to be used for poles. The poles were treated with creosote to retard decomposition after the poles were installed into the ground. The bottom portions of the poles were soaked in large butt vats filled with heated creosote. The butt vats were located in the uplands approximately 50 to 75 feet from the bank of the St. Joe River. Historically, as the treated poles were loaded onto rail cars, creosote drips and spills occurred onto the soil around the butt vats and rail cars. Additionally, dumping of process wastes, including creosote, may have occurred along the riverbank. Historical photographs show that three treating tanks, two aboveground storage tanks, and a wood-fired boiler building were operated in the main treatment area. Site features are shown in Figure 5.

In December 1998, the City reported an oily sheen on the riverbank and in the water of the St. Joe River to the Federal National Response Center. In early 1999, the City and Carney Products conducted a removal action at the Site pursuant to a CERCLA Unilateral Administrative Order with EPA oversight. The action included the excavation and removal of approximately 195 tons of debris and creosote-impacted soil along the bank of the St. Joe River in the area of the observed sheen. Since the removal action, small areas of sheen have been noted occasionally on the river surface near the removal area. A containment boom and adsorbent pads have been installed to contain the sheens.

Several businesses, including B.J. Carney & Company, were involved in the operation and maintenance of the creosote treating operation from approximately 1939 to 1964, when the treatment facilities were demolished and removed. Since approximately 1965, the Site and surrounding area have been used only for peeling, sorting, and storage of untreated poles. In 1982, Carney Products began operating a pole storage yard at the Site on eight company-owned acres and four acres leased from the City. Carney Products shut down operations in early 2003. B.J. Carney & Company, Carney Products, and the City have been identified by EPA as potentially responsible parties (PRPs) at the Site.

The results of investigations conducted by the City, Carney Products, and EPA from 1998 to 2000 indicated that soil, groundwater, and sediments have been contaminated by the creosote pole treating operations. In December 2000, the Site was proposed for listing on the National Priorities List (NPL). Although EPA has not proceeded to finalize listing of the Site, investigations and cleanup activities have been conducted in accordance with the CERCLA and the regulations set forth in the NCP.

In August 2001, the City, Carney Products, EPA, and the Tribe entered into an Administrative Order on Consent (AOC) under CERCLA. In accordance with the AOC, the City and Carney Products agreed to perform a Remedial Investigation, Baseline Risk Assessment, and Feasibility Study for the Site (RI/BLRA/FS). The RI and BLRA were begun in August 2001 and focused on soils in the upland area (the ground above and next to the river) where the pole treating took place, Site groundwater, riverbank soils, nearshore and offshore sediments, and surface water. The FS was begun in January 2003. The City and Carney Products added supplemental information to the FS in January and July 2006 (revised FS).

2.3 Community Participation

To date, EPA Region 10 has completed several community involvement activities for the Site. On June 17 and 18, 2002, EPA staff held community interviews at the St. Maries Library to listen to citizens' and local officials' comments, concerns, and suggestions about the Site. The information gathered was used to write the Site's Community Involvement Plan (CIP), published in August 2002. The CIP outlines EPA's planned community involvement activities and community members' recommendations. The CIP also lists citizens' and local officials' concerns, and how people said they wanted to be involved, and informed about the Site cleanup.

In October 2002, EPA worked closely with a local group that applied for a Technical Assistance Grant (TAG) for the Site. EPA sent the group a request for a revision to their initial application in order to meet key TAG eligibility criteria. Although the group revised their application, ultimately, several obstacles remained for meeting the eligibility criteria, and the grant was not awarded.

In August 2005, EPA held an extended 73 day public comment period from July 22, 2005 to October 12, 2005 and a public meeting in St. Maries on August 11, 2005 to gather comments on the July 2005 Proposed Plan. Those comments led to a new remedial alternative being added to the list of alternatives considered and generated a new preferred alternative.

EPA held a second 30-day public comment period from December 6, 2006 to January 5, 2007 and held a second public meeting on December 13, 2006 in St. Maries to obtain public comment on the Revised Proposed Plan, which described the new preferred alternative. At these meetings, representatives from EPA, the Coeur d'Alene Tribe, the PRPs, and the Idaho Department of Environmental Quality answered questions about Site's environmental status, the process involved with creating remedial alternatives, and the remedial alternatives being considered. Comments received during both comment periods and both public meetings are addressed in the responsiveness summary contained in Part 3 of this ROD.

EPA has compiled a 160-address mailing list and sent out six fact sheets, dated from December 2000 through November 2006. EPA also established an information repository at the St. Maries Library where interested persons can review the Site Administrative Record, which contains the documents EPA used to make the remedy decision. These documents including the Remedial Investigation, Remedial Investigation Addendum, Baseline Risk Assessment, and Feasibility Study reports (RI/FS) can also be viewed at the Superfund Record Center on the 7th floor of the EPA Region 10 office building at 1200 6th Avenue, Seattle, Washington, 98101. A St. Maries Creosote Site web page was created in the EPA Region 10 web site (www.epa.gov/r10earth). Site history, contacts, technical, and community involvement information are available on this web page.

2.4 Scope and Role of Response Action

This ROD selects the final remedy for the Site. The Site is not divided into separate operable units although the alternative remedies evaluated and the Selected Remedy address contamination at five different subareas at the Site (See Figure 1). These five areas are:

- Upland Soils and Groundwater
- River Bank Soils and Groundwater
- Shoreline Sediment

- Nearshore Sediment
- Offshore Sediment

Subarea remedies may be implemented separately or concurrently as scheduled during the remedial design phase.

This ROD describes how the selected remedial action will protect human health and the environment by reducing exposure to chemicals of concern (COCs). This will be achieved through treatment, containment, and institutional controls. Early actions completed at the Site are described in Section 2.2.

Upon the completion of the remedy construction, the top 20 feet of the upland and riverbank portions of the Site will be available for their reasonably anticipated future industrial land use. The river portion of the Site will be fully protective of a healthy benthic community and the river's designated beneficial uses. Site groundwater will be returned to its beneficial use as a drinking water source. Institutional controls will be implemented to prevent excavation or drilling below 20 feet in depth in the upland area to protect the integrity of the subsurface stabilization.

2.5 Site Characteristics

This section summarizes information obtained during the development and publication of the Remedial Investigation/Feasibility Study (RI/FS). It includes a description of the following areas:

- Geographical, topographical, and hydrological information including groundwater modeling information;

- Contamination types, sources, effects, concentrations, location, migration, and current and future exposure routes;

- Sampling strategies utilized by media, where and when and how many - results; and
- Conceptual site model, upon which alternatives are based.

2.5.1 Geographical, topographical, and hydrological information

The Site is located on a level floodplain at 2,135 ft above sea level on the south side of the St. Joe River, just north of downtown St. Maries. The upland portion of the Site covers less than 2 acres and contamination has been detected in approximately 3 acres of shoreline and river bottom sediments. The former creosote treating operation covered approximately 0.7 acre of upland area. The treatment facility utilized a boiler to heat creosote in butt tanks in which logs were treated. Creosote was also stored in other above ground tanks nearby. These facility structures were demolished and removed in the mid 1960s. Concrete pads and foundations mark the former location of treatment operations. An abandoned railroad track running east and west lies just north of the former treatment area (See Figure 5).

Since approximately 1965, the Site and surrounding area have been used only for peeling, sorting, and storage of untreated poles. In 1982, Carney Products began operating a pole storage yard at the Site on eight company-owned acres and four acres leased from the City. Carney Products shut down operations in early 2003.

Immediately to the south of the Site is an earthen flood-control levee protecting the City from the seasonal floodwaters of the St. Joe River. The estimated frequency of Site flooding is five to ten times per decade. In the early 1940s, the U.S. Army Corps of Engineers (USACE) erected levees along the southern bank of the St. Joe River to minimize damage due to flooding. Since then, this levee system has grown in height and extent so that there are now eight levee districts within the City. The two major levees, Meadowhurst and Riverdale, are 14,000 and 11,000 feet long, respectively, and protect large tracts of the City. With the construction of levees, small-scale flooding within the City has been virtually eliminated. However, the levee system does not protect the upland portion of the Site from flooding since it lies between the river and the levee. The levee system protects St. Maries up to 2,149 ft above sea level, 7 ft above the 100-year flood level. At the 100-year flow rate of 69,000 cubic feet per second (cfs), the flood level of the St.

Joe River is 2,142 ft above sea level at its confluence with the St. Maries River, which is approximately seven feet above the Site's upland surface elevation.

The floodplain on which the Site is situated is comprised of interbedded unconsolidated sand, silt, and clay to a depth of at least 65 ft (See Figure 6). A veneer of fill material 2 to 5 ft thick overlies the Site and armors much of the southern riverbank. Native alluvial sediments underlie the fill and include five recognizable stratographic units: upper silt unit (15 to 20 ft thick), upper interbedded unit (12 to 21 ft thick), sand unit (13 to 16 ft thick), lower interbedded unit (0 to 10 ft thick), and lower silt unit (at least 10 ft thick). The surface of the deepest unit (the lower silt unit) generally slopes to the northeast, towards the river. The lower silt unit is acting as an aquitard for the groundwater above.

The depth to groundwater varies seasonally, ranging from 2.5 to 7 ft below ground surface (bgs) except during periods of flooding. During most of the year, groundwater flow is northward toward the river. However, the groundwater flow direction varies in response to river stage and during the summer, when the river stage is high, groundwater flow is southward. Temporary and local reversals in flow direction (southward from the river to the Site) also occur when the river rises during floods. Generally, groundwater in the upper silt unit flows north toward the river at a rate of approximately 38 to 136 feet per year. Groundwater in the sand unit flows north toward the river at a rate of approximately 313 feet per year.

The river channel adjacent to the upland portion of the Site is about 300 ft wide and is steeply banked. The deepest portion of the channel ranges from 25 to 31 ft in depth. The mean annual flow for the St. Joe River ranges from 1,000 to 3,800 cfs. The St. Joe River flows into the southern end of Lake Coeur d'Alene, which in turn drains into the Spokane River. Flow regulation at the Post Falls Dam on the Spokane River controls water levels in Lake Coeur d'Alene and the lower portion of the St. Joe River, including the reach adjacent to the Site. Except during flood conditions, water in the St. Joe River near the Site is slack.

Near the shore, the river bottom generally consists of unconsolidated fine-grained sediments with a high percentage of natural organic material. The central channel of the river consists primarily of fine to medium sand, overlain with woody debris and logs. Native sediment under the surface substrate consists of coarser-grained, compacted material, with trace silts and clays present.

2.5.2 Contamination Types and Effects

Contamination at the Site is related to the past use of creosote for wood preserving. Creosote is derived from coal tare and has been the most widely used wood preservative in the United States. Creosote is a listed hazardous waste, F034, under the Resource Conservation and Recovery Act (RCRA) and is the principal threat waste found at the Site. Creosote is found in non-aqueous phase liquid (NAPL) form in the upland soils and its dissolved phase constituents are migrating with the groundwater. No evidence has been found that chlorinated products were used during wood treating operations.

The fate and transport of creosote through the surrounding environment, whether in the liquid, sorbed, dissolved, or vapor phase, is controlled by the molecular weight and chemical structure of the creosote constituents. These factors control the creosote density and viscosity, the constituent solubility, vapor pressure, the affinity for adsorbing to organic matter, and the amount of partitioning between the air, water, and solid phases.

Creosote is a mixture primarily consisting of polynuclear aromatic hydrocarbons, also called polycyclic aromatic hydrocarbons (PAHs), including anthracene, naphthalene, and phenanthrene derivatives. The creosote contamination found at this Site includes lighter end hydrocarbons including benzene. The chemicals of concern (COCs) at the Site were identified as PAHs, benzene, toluene, ethelbenzene, xylenes (BTEX), and other semivolitile organic compounds (SVOCs). Seven PAH compounds are classified as carcinogenic: [benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoroanthene, dibenzo(a,h)anthracene, chrysene, and indeno(1,2,3-cd)pyrene)].

Creosote was observed in soil borings completed beneath the former treatment area, in hand auger borings completed in soils between the treatment area and along the riverbank, and in surface and subsurface sediments in the river. The highest concentrations of contaminants, 34,888 milligrams per kilogram (mg/kg) total PAH (tPAH) [471,459 mg/kg tPAH -oc (normalized for organic carbon)], were found in the river sediments from 0 to 2.8 feet in depth near the bank next to the former treatment area. A plume of contaminated groundwater extends north, approximately 175 feet (ft), from the treatment area to the river with the highest concentration of 11,444 micrograms per liter (ug/L) detected between the former treatment area and the river. COCs have not been detected above screening levels in surface water.

The BLRA identified several exposure pathways that present risk to human and ecological receptors. An unacceptable risk exists to humans who come into contact with or use Site groundwater as a drinking water source. The contaminants in the upland and riverbank soils threaten potential commercial/industrial workers or recreational users through direct contact or ingestion of the soils although risks are marginal. Contaminated riverbank, nearshore, and areas of offshore sediments are toxic to benthic (bottom or sediment dwelling) invertebrates and epibenthic (bottom dwelling) fish. Risk to a local mink population could not be ruled out due to possible consumption of contaminated epibenthic fish and sediment ingestion. Groundwater moving toward the river contacts creosote in the upland soils and conveys contamination into the river sediments posing risk to benthic organisms. No actionable risk was determined to exist for biota primarily exposed only to the water column.

2.5.3 Conceptual Site Model

A graphic representation of the conceptual site model depicting contaminant source, location and migration at the site is presented in Figure 7. The primary sources of contamination include leaks, spills, drips, storage and other potential releases of creosote-based contaminants including possible disposal of waste materials along the riverbank that may have occurred during operations at the former wood treating facility.

As the spills and leaks occurred, the contaminants moved as a mobile NAPL into and through the vadose (unsaturated) zone, adsorbing onto soil particles, volatilizing into soil gas, and dissolving in pore water and migrating down to the water table. Similar partitioning occurs as the NAPL reaches the water table. PAHs comprise a large portion of the NAPL. Many of the PAHs exhibit very low aqueous solubilities and are strongly adsorbed to particulate surfaces. Volatilization is a dominant release mechanism for the lower-molecular-weight PAH with higher vapor pressures. As NAPL moves downward through the Site's soil column and into the ground water, phase separation occurs creating light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL). These two phases continue to migrate along various pathways:

LNAPL accumulates at the water table surface and migrates laterally with the ground water, eventually emerging in the St. Joe River.

DNAPL continues migrating downward by force of gravity through the aquifer until it encounters the relatively low-permeability lower silt layer. The silt layer dips to the north, towards the river. DNAPL may also move laterally through high-permeability sand lenses, or during temporary accumulation on finer-grained (less permeable) stratographic lenses or layers within the aquifer.

Some of the NAPL dissolves as it encounters groundwater creating dissolved-phase contaminants. These contaminants continue moving with the groundwater, flowing laterally toward the St. Joe River, where river sediments can become contaminated.

2.5.4 Sampling Strategies and Results

Since 1999, several phases of sampling have been conducted at the Site. Samples have been collected from soils, groundwater, sediment, and surface water to help define the extent of contamination and the physical conditions at the Site (See Figure 8). The constituents of creosote, which have been identified as contaminants of concern (COCs), are listed in the first columns of Tables 23 through 26. High concentrations of COCs were found in many samples collected from the Site. Most of the COCs are PAHs, the dominant constituents of creosote. The concentrations of PAHs vary substantially with depth and relative distance from the former treatment area.

Over 100 soil samples were collected using soil borings, test pits, direct push probes, and hand augers. The maximum detected soil concentration of tPAH at the Site was 33,503 mg/kg found in a sample collected from soils along the riverbank at a depth of 1 to 2 ft bgs. This area of contaminated soil was excavated during a removal action in early 1999. The highest concentration of total PAH detected in surface soils remaining in the upland area of the Site is 15,094 mg/kg found in a sample collected from soils at a depth of 2 ft below the former treatment area. Creosote has been found in deeper soil samples up to depths of 54 ft beneath the former treatment area. A concentration of 32,569 mg/kg was detected at a depth of 30 to 31.5 ft bgs between the former treatment area and the river.

Three rounds of groundwater sampling were conducted for the RI. Samples were collected from six wells in the shallow aquifer zone (upper silt unit from 5 to 20 ft bgs) and five wells in the deep aquifer zone (sand unit from 35 to 55 ft bgs). PAHs were detected in many of the samples. The maximum detected groundwater concentration of tPAH was 11,449 μg/L collected from a shallow aquifer well located midway between the treatment area and the river. Based on the sampling results, a plume of contaminated groundwater extends from the treatment area to the river and is estimated to contain about 900,000 gallons of water.

Because of the Site's close proximity to the river, dissolved PAHs in groundwater migrate and partition to river sediment causing a potentially unacceptable risk to benthic organisms. To evaluate this potential, groundwater PAH concentrations sampled from the Site were used as input parameters to EPA's BIOSCREEN model to estimate the groundwater PAH concentrations as it enters the river. The results from the model were then used to calculate an estimated sediment concentration using sediment-water partitioning coefficients. Results show that with no cleanup, after 30 years, naphthalene could accumulate in sediments to concentrations (21.8 mg/kg) that are more than 10 times the concentrations toxic to benthic organisms [2.1 mg/kg, the lowest apparent effects threshold (LAET)] (Table 25).

In the river, surface sediment [0 to 10 centimeters (cm) in depth] samples were collected from 18 locations and subsurface sediment samples (up to 14 ft bgs) were collected from ten locations. The highest concentration of tPAH detected in surface sediment was 122,128 mg/kg found in a sample collected from the area of the 1999 removal in the shoreline sediments. The highest concentration of total PAH detected in subsurface sediment was 34,888 mg/kg found between 0 and 2.8 ft depth in a sample collected from shoreline sediments. This shoreline and nearshore area of highly contaminated surface and subsurface sediments is estimated to extend nearly 150 ft into the river from the riverbank and nearly 400 ft along the shoreline. The concentration of tPAH at one location was as great as 10,836 mg/kg at a depth of 1.7 to 4.05 ft within the nearshore area.

An area of contaminated surface and subsurface sediments extends beyond the nearshore area further into the river into the offshore area. This offshore area extends up to 150 ft into the river from the riverbank and contamination has been detected as far as 900 feet downstream of the 1999 removal area. PAH concentrations in surface sediment in this offshore area are anticipated to be less than sediment cleanup levels; however, higher concentrations were observed in sediment core layers just beneath the surface layer. For example, the concentration of tPAH in the offshore area at a sampling location approximately 540 feet downstream of the 1999 removal area was 382 mg/kg at a depth of 5.9 to 6.8 ft.

Three rounds of surface water sampling were conducted for the RI. Surface water samples were collected from five locations in the St. Joe River. Creosote constituents were not detected at concentrations exceeding the Water Quality Standards for Approved Surface Waters of the Coeur d'Alene Tribe in any of the surface water samples collected from the river.

The Selected Remedy addresses soil, groundwater, and sediment contaminated by releases of creosote from pole treating operations at the Site. These releases have resulted in a localized area of 0.7 acres of upland soil contamination to depths up to 54 ft, a plume of contaminated groundwater that flows from the former treatment area to the St. Joe River, and approximately three acres of impacted sediments in the nearshore and offshore areas.

2.6 Current and Potential Future Site and Resource Uses

The Site is in a unique situation with regard to human use. The upland portion lies vacant on a floodplain between the St. Joe River and a flood control levee. The river portion extends out into the river approximately 150 feet and approximately 900 feet downstream. The Site occupies less than five acres of upland and river bottom area. (See Figure 1) On average, the river floods the Site every other year, which limits use of the Site. For the past 70 years, the Site has been used for industrial/commercial purposes or has been vacant. For the upland portion of the Site, the most likely future uses are industrial/commercial in nature. Land adjacent to the Site is used for commercial, industrial, or recreational purposes. City zoning prohibits placement of a residence on the Site and City code prohibits the use of Site groundwater. The use of Site groundwater as a drinking water source in the future is unlikely due to it location, size, City ordinance, and availability of drinking water from other sources.

The St. Joe River is protected by the Water Quality Standards for Approved Surface Waters of the Coeur d'Alene Tribe (Tribal WQS) for aquatic life uses of the Cutthroat Trout (and similar species), recreational and cultural uses, and domestic and agricultural water supplies. No sediment quality standards have been developed for the river sediments. There are no known wetlands at the Site.

Cultural Resource usage at and near the Site includes subsistence (e.g. hunting, gathering) use and recreational use (e.g. fishing). The Site is a potential location for cultural historic artifacts.

The St. Joe River is part of the Lake Coeur d'Alene Basin, which supports the spawning of the federally listed threatened bull trout (Salvenlinus confluentus). The bull trout migrates up the St. Joe River past the Site and finally into the St. Maries River. The St. Joe River is included in the Lake Coeur d'Alene Basin Recovery Unit of the Bull Trout Recovery Plan prepared by the U.S. Fish and Wildlife Service in 2002 to protect the species.

Additional future human and ecological uses for the Site may be identified during the remedial design phase.

2.7 Summary of Site Risks

As part of the RI/BLRA/FS, an assessment of the human health and ecological risks at the Site was conducted. This assessment estimates what risks exist at the Site if no action were taken. It contains detailed information on current and future human and ecological health risks resulting from exposure to the Site's contaminants. It quantifies the risks associated with the contaminants and exposure pathways at the Site and is used to evaluate the need for remedial action. Section 2.7.1 summarizes the human health risk assessment portion of the BLRA and Section 2.7.2 summarizes the ecological risk assessment. A summary of the BLRA conclusions and the statement describing EPA's basis for action can be found in Section 2.7.3.

2.7.1 Human Health Risk Assessment

The risk assessment identified and characterized the toxicity of chemicals of potential concern, the possible exposure pathways, the potential human receptors, and the possible human health risks at the site. This section of the ROD summarizes results of the baseline risk assessment for impacted soil, groundwater, and adjacent river sediments.

Chemicals of Potential Concern (COPC) carried forward in the risk assessment included each chemical detected in at least one sample from each medium analyzed if an EPA-derived toxicity value was available. The COPC, along with detection frequency, minimum and maximum detected concentrations, and the exposure point concentration (EPC) used in the quantitative risk assessment are presented in Tables 1 through 3. Chemicals without an EPA-derived toxicity value were evaluated qualitatively for overall risk contribution. Only sample results that met all validation requirements were used in the risk assessment.

Individuals who are potentially exposed by direct contact to contaminants include future residents, future on-site commercial/industrial workers, future on-site construction workers, and current and future on-site adult/child recreational users. The risks to these populations are summarized in the following table:

Summary of Human Health Risk

Risk Scenario	Carcinogenic Risk	Non-Carcinogenic Risk (Hazard Index)
Current on site adult recreational user/trespasser	5×10^{-6}	0.006
Current on site child recreational user/trespasser	1×10^{-5}	0.02
Future on site commercial/industrial workers	5×10^{-6}	0.0001
Future on site construction workers	2×10^{-6}	0.1
Future hypothetical on site resident (drinking water only)	4×10^{-3} (shallow groundwater); 1×10^{-3} (deep groundwater)	20 (shallow groundwater); 7 (deep groundwater)

The shallow and deep groundwater aquifers at the site are assumed to be potential sources of drinking water. Consequently, future residential exposures through ingestion of contaminated groundwater and inhalation of volatile organics released from groundwater were also evaluated. Potential workers and recreational users were evaluated for contact and ingestion of contaminated soil, sediment, and groundwater. Potential exposure pathways and receptors are summarized in Table 4.

Carcinogenic risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. The calculated risks are based on USEPA-recommended assumptions that are health-protective of even the most sensitive subpopulation and site-specific exposure parameters. Toxicity factors and exposure assumptions used in estimating risks are presented in Tables 5 through 10. EPA's generally acceptable risk range for site related exposures is 1 in 10,000 (1×10^{-4}) to 1 in 1,000,000 (1×10^{-6}). This risk range means that an individual could face a 1 in ten thousand or 1 in 1 million chance of developing cancer because of exposure to contaminants beyond those cancers expected from other causes. Although risks in this range may not in and of themselves individually trigger a cleanup action, once cleanup is initiated, the target risk goal is often 1×10^{-6}. Noncancer effects were evaluated by calculating the ratio between the estimated intake of a contaminant and its corresponding reference dose (the intake level at which no adverse health effects are expected to occur). If this ratio, called a hazard index, is less than 1, noncancer health effects are not expected at the site. A hazard index (HI) greater than 1 is an indication that toxic effects may occur, especially in sensitive subpopulations, but is not a mathematical prediction of the severity or incidence of the effects.

The chemicals and pathways contributing to potentially unacceptable risk for each receptor and media are summarized in Tables 11 to 15 and are discussed below. The estimated excess cancer risk from contact with upland surface and subsurface soil, riverbank surface and subsurface soil, and surface sediment were between 1×10^{-4} and 1×10^{-6} for all receptors. The estimated noncancer risk from contact with upland surface and subsurface soil, riverbank surface and subsurface soil, and surface sediment were below the noncarcinogenic threshold of HI = 1 for all receptors.

Carcinogenic risks for domestic water use (drinking water) for the on-site commercial/industrial worker and future on-site resident were above 1×10^{-4}, and above the noncarcinogenic threshold of HI = 1. Carcinogenic risks from contact and ingestion of groundwater for the on-site construction worker were below 1×10^{-6}, and were below the noncarcinogenic threshold of HI = 1.

Uncertainties associated with the Human Health Risk Assessment were identified and their potential effects evaluated. The major uncertainties that may result in underestimation of risk include (1) the assumption that chemicals not detected in a sample are not present at that location, and (2) risks were not calculated for those COPC for which numerical toxicity data are not available. The major uncertainties that may result in overestimation of risk include (1) that risk and doses are additive; (2) use of the reasonable maximum exposure concentration; and (3) the shallow or deep aquifer groundwater from across the site is a potential future drinking water source. The major uncertainties that may result in either underestimation or overestimation of risk is the assumption that chemical concentrations will be constant over the duration of exposure and the fact that the toxicity of some chemicals at the site is unknown.

2.7.2 Ecological Risk Assessment

The Ecological Risk Assessment addresses the current and future impacts and the potential risks to ecological receptors posed by contaminants at the Site if no cleanup action is taken. Ecological management goals for the Site include attainment of sediment conditions supportive of aquatic-dependent receptors and reduction of potential sediment toxicity. Potential ecological effects associated with surface sediment were determined for the following St. Joe River receptors selected as representative for the Site:

- Aquatic Invertebrate Community (i.e. zooplankton)
- Benthic Invertebrate Community (i.e., sediment-dwelling insect larvae, worms, and other organisms)
- Benthic and Pelagic Fish Communities, represented by the brown bullhead and the brown trout, respectively
- Piscivorous Riparian Wildlife, represented by the mink

Assessment endpoints used in the ecological risk assessment focused on population survival and reproduction. The measures of exposure and effect used to evaluate the assessment endpoints included concentration of contaminants in surface sediment and the responses of receptors species to those concentrations. Responses were quantitatively evaluated through comparisons of exposure point concentrations to ecological screening benchmarks (ESB) and assessment of the potential bioaccumulation of selected chemicals to ecological receptors. Exposure point concentrations and screening benchmarks for surface water and sediment are presented in Tables 16 and 17, respectively. Ecological receptors, assessment endpoints, and measurement endpoints are summarized in Table 18.

Potential ecological risk at the site was estimated by calculating hazard quotients. Hazard quotients are generated by taking the exposure point concentrations in surface sediment for each chemical of potential ecological concern and dividing by the ESB for the selected representative species. If the hazard quotient for any specific indicator species exceeds 1, it is recommended by the ecological risk assessment that the areas represented by these samples be included for remediation, additional sampling and analysis, or sediment bioassays. The following table summarizes risks for ecological receptors at the Site:

Summary of Risk for Ecological Receptors

Receptor	Exposure Pathway	Potential for Risk
Aquatic invertebrates (i.e., zooplankton)	Surface water	No
Benthic invertebrates (i.e., sediment dwelling insect larvae, worms, and other organisms)	Sediment	Yes
Benthic fish (i.e., brown bullhead)	Sediment	Yes
Migratory/Resident fish (i.e., bull trout)	Surface water	No
Piscivorous riparian wildlife (i.e., mink)	Fish consumption	Yes

The approach used for the risk assessment follows USEPA framework and guidelines for assessing ecological risks that includes a two-tiered process for assessing risk. The first tier corresponds to a screening level risk assessment (SLRA), with the goal of identifying those contaminants and exposure pathways requiring further evaluation. The second tier corresponds to a baseline ecological risk assessment (BLRA), which further evaluates relevant pathways and contaminants. For the purposes of this ecological risk assessment for the St. Maries site, three levels of risk evaluation were developed and are discussed briefly below:

- **Tier 1A SLRA** - The intent of a SLRA is to minimize the chance of concluding that there is no risk when in fact risk to ecological receptors is present. Therefore, conservative (protective) assumptions are built into a SLRA evaluation (e.g., maximum media-specific measured site concentrations and thresholds for no observed adverse effect). Generally screening level risk assessments are assessments of only abiotic media (i.e., sediment and water); risks to higher trophic level receptors are estimated through conservative modeling (e.g., chemicals are 100 percent bioavailable and ecological receptors are continuously exposed). At the conclusion of a screening level risk assessment results are reviewed to determine if there are chemicals or exposure pathways that may be excluded.

Those constituents with a calculated SLRA risk exceeding unity (HQ greater than 1) are retained for further evaluation in the Refined Screening Level Risk Assessment (RSLRA) or a BLRA. Chemicals of interest (COI) carried forward to the next tier of risk analysis are termed chemicals of potential ecological concern (COPECs).

- **Tier 1B SLRA -** In an iteration conducted using the same data set as the SLRA, data are reviewed and refined to include site-specific exposure considerations and toxicity endpoints to further characterize ecological effects and risk. Only those COI identified as COPEC are evaluated in this tier. The RSLRA results in a refined risk estimate that provides the basis for defining potential site ecological risks.

- **Tier 2 BLRA -** A BLRA incorporates additional site-specific receptor data (e.g., lines of evidence) from field studies and/or bioassays. Six surface sediment samples were submitted for bioassay testing using 10-day (sub-chronic) test protocols on two sediment invertebrate species, the amphipod Hyalella azteca and the midge fly Chironomus tentans, and two test endpoints, survival and growth. In addition, a longer-term sub-chronic 20-day test was run on Chironomus tentans.

This sequential process involves multiple components to evaluate risk. Results of these evaluations are presented in Table 19. Chemicals of concern to ecological receptors include 16 polycyclic aromatic hydrocarbons (PAH) detected in sediment and identified in Table 17.

The initial, conservative screening level risk assessment (Tier 1A) indicated that ecological risk could not be excluded for the benthic invertebrate, benthic fish, and piscivorous wildlife communities due to exposure to the PAH, dibenzofuran and carbazole content in sediment. No significant risk was found for the pelagic fish and aquatic invertebrate communities primarily exposed to the water column.

Additional evaluation (Tier 1B and Tier 2) of ecological risk based on more site-specific conditions indicated that under current conditions there may be significant ecological risk to benthic invertebrates and benthic fish in areas adjacent and immediately downstream of the Site. There is insufficient data available to conclusively demonstrate risk in the downstream, offshore area. Current ecological risk to the mink cannot be excluded, although the magnitude is marginal.

Bioassays were run on sediment samples collected from areas outside of most highly contaminated nearshore Area. All samples passed indicating sediment impacts from site-related COPEC are absent in sediments with concentrations equal or lower than the tested samples.

On the basis of available site-specific data, significant ecological risk from surface sediment contaminant sources at the Site is spatially limited to the nearshore Area adjacent to the site.

Uncertainties associated with the ecological risk assessment, which may cause risk to be underestimated, include: (1) lack of toxicological information for some chemicals and (2) not considering the physical stressors such as temperature extremes, food, water, nutrient limitations, and physical injuries in the environment that may increase sensitivity to contaminant stress. Uncertainties that may cause overestimation of ecological risk include (1) the inclusion of representative species that may or may not use the site; (2) the use of maximum detected concentrations to estimate risk; (3) the assumption that area use is 100 percent; (4) absorption factors are assumed to be 1; and (5) the use of standard allometric body weight conversions to extrapolate from test species to wildlife receptor.

2.7.3 Basis for Action

Based on the RI, the BLRA, and available information, remediation of the groundwater, soil, and sediment at the site is warranted. Exposure to future residents, recreational users and workers at the site poses a threat to human health above the discretionary range (See Tables 11 - 15). Adverse biological effects have been documented in the nearshore and shoreline areas and may exist in the offshore area. Biological effects are associated with heavy sediment contamination in the river adjacent to the upland portion where releases of contamination continue to occur.

It is EPA's current judgment that implementing the Selected Remedy identified in this Record of Decision is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. Such a release or threat of a release may present an imminent and substantial endangerment to public health, welfare, or the environment.

2.8 Remedial Action Objectives, Screening, Treatment, and Clean up Levels

Remedial Action Objectives (RAOs) provide a general description of the goals that the remedial action is expected to accomplish. These RAOs address the risks identified in Section 2.7 and support the current and reasonably anticipated future use of the Site. The RAOs for the Site are:

- RAO 1 - Protect aquatic and benthic organisms by preventing direct contact of benthic organisms with COCs in surface sediment in the St. Joe River at concentrations greater than protective levels.

- RAO 2 - Prevent migration of impacted groundwater and free-phase creosote to surface sediment in the St. Joe River that would result in COC concentrations greater than protective levels for aquatic and benthic organisms.

- RAO 3 - Prevent the downstream transport of COCs that result in COC concentrations in water or sediment that exceed levels protective of aquatic and benthic organisms.

- RAO 4 - Prevent human dermal contact with or ingestion of COCs in soils at concentrations greater than protective levels.

- RAO 5 - Prevent exposure to and contamination of groundwater by COCs at concentrations exceeding levels protecting the use of groundwater as a drinking water source.

The list of RAOs has been refined since the submittal of the Supplemented Feasibility Study as the result of consideration of public comments and emphasis on EPA's preference for returning contaminated groundwater to its beneficial use as a drinking water source.

EPA has determined that the RAO initially identified in the FS as RAO 2 with the objective of preventing visible oil sheens on the St. Joe River is not appropriate for developing remedial alternatives for the Site. RAOs are generated in a process that specifically identifies both chemically and quantitatively the contaminants and/or media which have been determined to harm human health and/or the environment. RAOs also address receptor exposure pathways and establish preliminary remediation goals. The determination of whether sheen is visible or not does not lend itself to a quantifiable threat to human health or the environment. Although EPA believes that creosote-based sheens will be eliminated by applying the remaining five RAOs (above), the sheen RAO cannot be used to develop remedial alternatives. The RAOs have been renumbered as shown following the deletion of the former sheen RAO 2.

Expectations for contaminated groundwater are stated in the National Oil and Hazardous Substances Contingency Plan (NCP) as follows: "EPA expects to return usable ground waters to their beneficial uses whenever practicable within a timeframe that is reasonable given the particular circumstances of the site. When restoration of groundwater to beneficial uses is not practicable, EPA expects to prevent further migration of the plume, prevent exposure to the contaminated ground water, and evaluate further risk reduction." Even though Site groundwater is not likely to be used as a drinking water source due to its size, location and proximity of other readily available sources, RAO 5 was added to the list of RAOs to clarify and emphasize this preference and to insure that the Site groundwater could be used as a source of drinking water in the future.

The cleanup levels and standards associated with the five RAOs are described in the following sections.

2.8.1 Cleanup, Treatment, and Screening Levels

The rationale for selecting specific cleanup, treatment, and/or screening levels for upland soil, groundwater, river sediments, surface water, and air emissions is discussed below. At this Site, cleanup levels will be used to determine if a cleanup action is necessary. Treatment levels are criteria that the various media treatment technologies must achieve prior to return back into the environment. Screening levels will be utilized to identify river sediments that require further biological testing to better quantify impacts the environment. Cleanup, treatment, and screening levels for the COCs in upland soils, groundwater, river sediments, and surface water discharges are listed in Tables 23, 24, 25, and 26 respectively.

2.8.2 Upland Soil Cleanup and Treatment Levels

The upland soils and sediments contain a RCRA listed hazardous waste, and as a result, RCRA requirements apply until contaminated environmental media no longer contain hazardous waste. EPA may make a determination that such contaminated media does not contain hazardous waste when the hazardous constituents are present or treated below health-based, risk-based levels. Such a finding is called a "contained-in determination." Current EPA guidance recommends that such determinations for listed hazardous waste be based on direct exposure using a reasonable maximum exposure scenario and that conservative, health-based standards be used to develop the site-specific health-based levels.

EPA has made a contained-in determination for listed hazardous waste in the soils and sediments at the Site by selecting the most stringent of the following standards:

1) EPA Region 9 Preliminary Remediation Goals (PRGs) for Residential Soils (which is based on a 10^{-6} excess cancer risk or a hazard index of 1, and which considers soil ingestion, dermal contact and vapor and particulate inhalation pathways);

2) EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soils;

3) EPA Superfund Soil Screening Levels for Migration to Groundwater with a Dilution Attenuation Factor or 20 (DAF 20); and

4) EPA Superfund Soil Screening Levels for Migration to Groundwater with a Dilution Attenuation Factor of 1 (DAF 1). Supporting documentation for the contained-in determination is included in the Administrative Record.

Additionally, RCRA’s land disposal restrictions (LDRs) apply to the soils and sediments prior to being disposed on-site in the uplands area or off-site at a Subtitle D (non-hazardous waste) landfill. The LDR program identifies treatment standards that are either concentration levels or methods of treatment that must be met. The LDRs include the technology-based universal treatment standards (UTS) (40 CFR 268.48) for addressing underlying hazardous constituents and the alternative treatment standards applicable to soils (40 CFR 268.49).

EPA used the most stringent of the contained-in determination standards and the LDRs to develop soil clean up levels and soil and sediment treatment levels (See Table 23). Contaminated sediments removed from the river were included in this category because they will also be thermally treated under the Selected Remedy. Once contaminated soils and sediments have been excavated and thermally treated, they must meet these RCRA standards before disposal in the upland area. Some of the thermally treated soils and sediments may be hauled to an off site disposal area if there is no longer room in the upland area for disposal.

Clean up levels will apply to both excavated soils and to soils selected for in situ stabilization. Treatment levels apply to all excavated bank and upland soils and all excavated river sediments. Additional discussion on the application of these clean up/treatment levels can be found in Section 2.12.

2.8.3 Cleanup and Treatment Levels for Groundwater Discharge to Surface Water

Site groundwater poses actionable risk (> 10^{-6} carcinogenic risk or a HI > 1) from three exposure pathways:

- Human health risk if used as a drinking water source
- Human health risk to Site worker from dermal contact and incidental ingestion
- Ecological risk to aquatic and benthic organisms from migration to and accumulation in sediments

Because of these three different pathways, cleanup levels for each chemical of concern for groundwater and its discharge to surface water were selected as the lowest of either:

1) The federal drinking water standard Maximum Contaminant Levels (MCLs)

2) EPA Region 9 Tap Water Preliminary Remediation Goals (PRGs)

3) A site-specific groundwater concentration calculated to be protective of sediment

4) Water Quality Standards of the Coeur d'Alene Tribe, Water Quality Criteria for Toxic Pollutants

Selection of the lowest of these values as a clean up and treatment level ensures that all three risk pathways will be addressed. The calculation described in 3) above is detailed in the RI. Groundwater cleanup and treatment levels for the COCs are listed in Table 24. Groundwater monitoring locations and points of compliance where cleanup levels are applied will be defined during the remedial design phase.

Groundwater encountered during the excavation and dewatering of the upland and riverbank soils remedy will be collected, treated, and discharged to the St. Joe River as described in Section 2.8.5 below.

2.8.4 Cleanup, Treatment, and Screening Levels for Sediments

Shoreline, nearshore, and potentially some offshore sediments currently pose an unacceptable risk to benthic organisms. Neither the Coeur d'Alene Tribe, the State of Idaho, nor EPA has established freshwater sediment cleanup levels that would be applicable for the Site. However, the State of Washington has promulgated standards for marine sediments in the Washington State Sediment Management Standards (Chapter 173-204 WAC). Although the St. Joe River sediments are freshwater sediments, EPA has determined that the differences between marine and freshwater sediments are not material for the contaminants at this Site, and that the sediment quality standards (Washington SQS) taken from the Washington State Sediment Management Standards are sufficiently protective of freshwater benthic organisms to be used as cleanup levels for contaminated sediments. PAH compounds affect aquatic organisms by means of narcosis, a mode of arresting biological activity. This mode of action is not significantly affected by ion strength, the predominant difference between fresh water and marine water. The goal of this approach is to remediate sediments that pose a current or future risk to benthic organisms.

Sampling will be done in the remedial design phase to determine which shoreline, nearshore and offshore sediments will be excavated (or dredged), using the following stepwise procedure:

- **Step One.** Screen sediment concentrations against the chemical values listed in Table 25. These values are the Washington SQS and corresponding Lowest Apparent Effects Threshold (LAET) equivalents for sediments in marine waters in Puget Sound. The LAET values are used in cases of sediments with either very low (<0.2%) or very high (>4%) organic carbon content. Sediments with contaminant concentrations exceeding the chemical SQS (or LAET) will be dredged or excavated, unless they are determined not to be toxic using the biological "test out" procedure described in Step Two.

- **Step Two.** For those sediments with concentrations of COCs that exceed any of the Washington SQS (or LAET) values in Table 25, biological testing will be performed to evaluate whether the contaminants in those sediments are toxic to benthic organisms. Biological testing methods will be those set forth in the Washington Department of Ecology's April 2003 Sediment Sampling and Analysis Plan Appendix, or equivalent methods reviewed and approved by EPA.

Shoreline and Nearshore Sediments: A watertight sheetpile wall will be constructed at or outside the boundary of the shoreline and nearshore areas as depicted in Figure 2. These sediments are the most highly contaminated sediments in the River, and their excavation will eliminate further risk to the benthic community and their further potential as a continuing contaminant source to the remaining river sediments during scour events. All nearshore and shoreline sediments that exceed the Washington SQS (or LAET) values will be excavated and thermally treated. If approved by EPA, the "test out" procedure described in Step Two above may be used to modify the boundary of the sheetpile wall and may also be used to determine the horizontal and vertical extent of shoreline and nearshore sediment excavation. Treatment levels for all removed sediments are the same as those described for soils in Section 2.8.2. All areas of excavation will be backfilled with clean gravels and sediments suitable to provide habitat for benthic organisms.

Offshore Sediments: All offshore sediments that exceed the Washington SQS (or LAET) values will be excavated or dredged and thermally treated. Treatment levels for these removed sediments are the same as those described for soils in Section 2.8.2. All areas of excavation will be backfilled with clean gravels and sediments suitable to provide habitat for benthic organisms.

The steps described above, in concert with sediment scour modeling results, may be used to identify which offshore sediments require excavation based upon their toxicity and likelihood of exposure. Offshore sediments which exceed the Washington SQS (or LAET) values in Table 25 and fail toxicity tests in the biologically active zone (top 10 cm) will be excavated, thermally treated, and disposed of as described in Section 2.8.2. The values in Table 25 will also be used to determine the depth of excavation.

A sediment transport analysis will be performed in offshore areas where the top 10 cm does not exceed the Washington SQS or biological standards, but deeper sediments (below 10 cm) exceed these standards. The sediment transport analysis will be capable of adequately predicting the likelihood of these sediments' exposure due to potential scour events. Any sediments that may so likely be exposed will be excavated, thermally treated, and disposed of as described in Section 2.8.2. All excavated areas will be backfilled with clean gravels and sediments suitable to prevent erosion and provide habitat for benthic organisms, to the original pre-excavation topography.

It may be possible to develop a site-specific standard for the offshore sediments using the biological and chemical testing data collected during the implementation of the stepwise approach. If EPA determines that site-specific cleanup standards protective of benthic organisms can be developed, these new standards will be documented in Explanation of Significant Differences (ESD).

2.8.5 Limits for Surface Water Discharges

Although surface water discharges have not been identified as a risk to human health or the environment at the Site, such discharges are anticipated to occur during the implementation of the Selected Remedy. These discharges include groundwater removed from the upland area during remediation, water removed from contaminated sediments during their dewatering process (prior to thermal treatment), turbidity generated by the removal of contaminated sediments from the river, and storm water runoff from the Site during remedy construction.

Groundwater extracted from the upland area and the water generated during sediment dewatering will be stored in a tank(s) on Site, hard-line plumbed to a treatment system (to comply with RCRA regulations), and then discharged to the St. Joe River in compliance with the treatment levels (effluent limitations) established in Table 26. These effluent limitations have been taken from the EPA General NPDES Idaho Groundwater Remediation Discharge Permit and are based upon the most stringent of technology-based standards or water quality based standards for the COCs. Activated carbon treatment has been shown to be an effective treatment technology for these same COCs at other sites; however, other treatment technologies may be utilized if they are demonstrated to be effective during the remedial design phase.

The turbidity generated during sediment removal will be addressed using engineering controls and best management practices designed for the control of turbidity such as sheetpile walls, silt curtains, containment booms, timing and sequencing of sediment removal activities, monitoring, and any other practices deemed effective in preventing an exceedence of Site sediment clean up levels or a violation of Coeur d'Alene Tribal Surface Water Quality Standards (WQS) or other provisions of Sections 401 and 404 of the Clean Water Act.

Storm water will be addressed using best management practices (BMPs) designed to insure that storm water discharges comply with WQS. If necessary, storm water will be treated prior to discharge into the river. The use of BMPs, monitoring, and other engineering controls addressing storm water discharges will be detailed in a pollution prevention plan similar to that specified in the EPA's National Pollutant Discharge Elimination System (NPDES) General

Permit for Storm Water Discharges from Construction Activities issued for Indian country within the State of Idaho.

Located immediately upstream of the riverbank portion of the Site are two culverts which discharge municipal storm water into the river. Due to their proximity and the possibility that outside sources could contribute contaminants to the Site, discharges from these culverts will be monitored and assessed as to their potential to recontaminate the remedy. Source control measures may be developed during the remedial design phase to address risk of recontamination.

2.8.6 Air Emissions

Although air emissions have not been identified as a risk to human health or the environment at the Site, emissions will likely occur during implementation of the Selected Remedy. Emissions are anticipated from the on-site thermal treatment of contaminated soil and sediment and dust and VOC emissions are expected from excavation and backfilling operations.

The thermal treatment system will be pilot tested to evaluate risks to human health and the environment that may accompany the thermal treatment operation. Once safe operating parameters have been established, operation of the thermal treatment unit will be monitored to ensure that the system complies with all ARARs, including the hazardous waste incinerator standards 40 CFR 264.340 and the National Emission Standards for Hazardous Air Pollutants for Combustions 40 CFR 63. 1200. The monitoring program includes measurement of stack emissions as well as treated soil and sediment contaminant concentrations.

Dust suppression best management practices will be employed in accordance with the Federal Air Rules for Indian Reservations in Idaho, Oregon, and Washington and will be implemented as necessary to eliminate the generation of airborne particulates. VOC emissions are not expected to be significant to residents due to the distance of residents from Site. On Site workers will be protected from VOC sources as described in a Site Health and Safety Plan.

2.9 Description of Alternatives

The remedial alternatives investigated during the FS are summarized in Table 22. Alternatives were developed to address contaminated soils and groundwater in the upland area, as well as contaminated sediments and groundwater within the river bank, shoreline, nearshore, and off shore areas. These areas are shown in Figure 1. In addition to the no action alternative, 12 alternatives were evaluated which include various combinations of remedies including containment, excavation, capping, and/or treatment. Each alternative is briefly described below.

Common Elements

Several activities are common to the remedial alternatives, except the No Action alternative. The common components are:

1) **Regulatory Status of Waste.** Soils, sediments, and groundwater containing COC related to creosote at the Site are considered to “contain” creosote, an F034 listed hazardous waste under EPA’s RCRA regulations. Additionally, soil and sediment from the Site contain PAHs at concentrations greater than 10 times universal treatment standards (UTS), and therefore if removed, must be treated prior to land disposal. These LDRs may be met either by treatment to less than 10 times the UTS level or by 90% reduction of contaminants. Attainment of these standards or “exit levels” qualifies the media for land disposal.

   For alternatives that include removal of soil and/or sediments, these materials would be treated, either at an offsite facility or on site using mobile treatment technologies, prior to final disposal.

2) **Permitting Exemption.** On site CERCLA cleanup actions are exempt from federal, state, and local permitting requirements; however, the substantive requirements of applicable permits will be met (See Section 2.13.2).

3) **Institutional Controls.** Institutional controls are actions, such as legal controls or administrative restrictions that help minimize the potential for human exposure to

contamination by ensuring appropriate land or resource use. Institutional controls are used when contamination is first discovered, when remedies are ongoing and when residual contamination remains onsite at a level that does not allow for unrestricted use and unlimited exposure after cleanup. For all alternatives except Alternative 7, contamination will remain on site after clean up actions are implemented, therefore institutional controls to restrict groundwater and/or land use (e.g., prohibition on well drilling or excavation at the Site, limiting the Site to industrial use, deed restrictions, etc.) are included in each alternative. Five-year reviews will be completed after remedial actions are initiated.

4) **Human Health and the Environment.** Protection of human health and the environment will be achieved and maintained upon implementation of the remedy. Monitoring will include soil, groundwater, and sediment sampling to ensure that the remedy is protective.

5) **Costs.** All costs have been adjusted as necessary using a discount rate of 7% and are presented in 2007 dollars. Total Cost for each alternative is the sum of the total capital costs and the total operation and maintenance (O&M) costs. O&M costs are reported as present worth estimates summed over a period of 30 years. Each of the costs are estimates based upon a specific remedy, and could change due to information obtained during remedy design or construction. Total costs for each alternative are expected to be within +50 to -30 percent of the actual cost.

Alternative 1*:** ***No Action

- Total Cost: $0

<u>Alternative 2</u>: ***Shoreline Removal, Enhanced Natural Recovery of Nearshore Sediments, Monitoring of Groundwater and Offshore Sediments, Off-Site Disposal***

- Estimated Total Cost: $4,787,000 (Capital Cost: $2,640,000; O&M Cost: $2,147,000)
- Estimated Removal Volume: 1,296 cubic yards (CY)
- Estimated Construction Timeframe: Less than one year
- Estimated Time to Achieve RAOs: Uncertain due to rate of natural recovery processes

Alternative 2 is a combination of removal and natural recovery. Shoreline soils and adjacent nearshore sediments would be removed to address the risk to benthic organisms. Natural processes would be allowed to reduce COC concentrations in groundwater to levels protective of sediments prior to reaching the sediments. Impacted nearshore sediments would be removed to a depth of 2 ft. A thin-layer cap of clean sediment would be placed over the area of remaining impacted nearshore sediments. This cap would be monitored to determine the effectiveness. Offshore sediments would be monitored to evaluate long-term protection of the aquatic and benthic organisms. Institutional controls would be used to restrict groundwater and land use.

<u>Alternative 3a</u>: ***Shoreline Removal and Solidification, Nearshore Sediment Cap, Monitoring of Groundwater and Offshore Sediments, Off-Site Disposal***

- Estimated Total Cost: $5,840,000 (Capital Cost: $3,830,000; O&M Cost: $2,010,000)
- Estimated Removal Volume: 1,559 CY
- Estimated Construction Timeframe: One year
- Estimated Time to Achieve RAOs: Uncertain due to rate of natural recovery processes

Alternative 3a is a combination of removal, in-place solidification, capping, and natural recovery. Shoreline soils and adjacent nearshore sediments would be addressed through a combination of removing some material and solidifying other material in order to remediate and prevent further risk to benthic organisms. Natural processes would be allowed to reduce COC concentrations in groundwater to levels protective of sediments prior to reaching the sediments. Impacted nearshore sediments would be removed to a depth of 2 ft. An engineered cap of clean sediment would be placed over the area of remaining impacted nearshore sediments. The cap would be monitored to determine the effectiveness. Offshore sediments would be monitored to evaluate long-term protection of the aquatic and benthic organisms. Institutional controls would be used to restrict groundwater and land use.

***Alternative 3b*: Shoreline Removal and Solidification, Nearshore Sediment Cap, Enhanced Biodegradation of Groundwater, Monitoring of Offshore Sediments, Off-Site Disposal**

- Estimated Total Cost: $7,723,000 (Capital Cost: $5,358,000; O&M Cost: $2,365,000)
- Estimated Removal Volume: 2,092 CY
- Estimated Construction Timeframe: One year
- Estimated Time to Achieve RAOs: Uncertain due to rate of biodegradation processes and natural recovery

Alternative 3b is a combination of enhanced natural recovery, removal, in-place solidification, capping, and natural recovery. Shoreline soils and adjacent nearshore sediments would be addressed through a combination of removing some material and solidifying other material in order to address and prevent further risk to benthic organisms. Natural biodegradation processes would be enhanced through air sparging in order to reduce COC concentrations in groundwater to levels protective of sediments prior to reaching the sediments. Impacted nearshore sediments would be removed to a depth of 2 ft. An engineered cap of clean sediment would be placed over the area of remaining impacted nearshore sediments. The cap would be monitored to determine the effectiveness. Offshore sediments would be monitored to evaluate long-term protection of the aquatic and benthic organisms. Institutional controls would be used to restrict groundwater and land use.

***Alternative 3c*: Shoreline Removal and Solidification, Nearshore Sediment Cap, Containment of Groundwater, Monitoring of Offshore Sediments, Off-Site Disposal**

- Estimated Total Cost: $8,041,000 (Capital Cost: $6,031,000; O&M Cost: $2,010,000)
- Estimated Removal Volume: 3,065 CY
- Estimated Construction Timeframe: One year
- Estimated Time to Achieve RAOs: Uncertain due to rate of natural recovery processes

Alternative 3c is a combination of removal, solidification, containment, and capping. Shoreline soils and adjacent nearshore sediments would be addressed through a combination of removing some material and solidifying other material in order to address and prevent further risk to benthic organisms. A 3-sided soil/bentonite containment wall would be constructed to prevent contaminated groundwater in the fill and shallow silt units from reaching the sediments. Impacted nearshore sediments would be removed to a depth of 2 ft. An engineered cap of clean sediment would be placed over the area of remaining impacted nearshore sediments. The cap would be monitored to determine the effectiveness. Offshore sediments would be monitored to evaluate long-term protection of the aquatic and benthic organisms. Institutional controls would be used to restrict groundwater and land use.

***Alternative 4a*: Shoreline Removal and Solidification, Removal and Backfilling of Nearshore Sediment, Monitoring of Groundwater and Offshore Sediments, Off-Site Disposal**

- Estimated Total Cost: $9,992,000 (Capital Cost: $8,482,000; O&M Cost: $1,510,000)
- Estimated Removal Volume: 5,175 CY
- Estimated Construction Timeframe: Less than one year
- Estimated Time to Achieve RAOs: Uncertain due to rate of natural recovery processes

Alternative 4a is a combination of removal, solidification, capping, and natural recovery. Shoreline soils and adjacent nearshore sediments would be addressed through a combination of removing some material and solidifying other material in order to address and prevent further risk to benthic organisms. Natural processes would be allowed to reduce COC concentrations in groundwater to levels protective of sediments prior to reaching the sediments. Impacted nearshore sediments would be removed to a depth of 3 ft. The removal area would be capped to match the existing river bathymetry. The cap would be monitored to determine the effectiveness. Offshore sediments would be monitored to evaluate long-term protection of the aquatic and benthic organisms. Institutional controls would be used to restrict groundwater and land use.

***Alternative 4b*: Shoreline Removal and Solidification, Removal and Backfilling of Nearshore Sediment, Enhanced Biodegradation of Groundwater, Monitoring of Offshore Sediments, Off-Site Disposal**

- Estimated Total Cost: $11,905,000 (Capital Cost: $10,040,000; O&M Cost: $1,865,000)
- Estimated Removal Volume: 5,708 CY
- Estimated Construction Timeframe: One year
- Estimated Time to Achieve RAOs: Uncertain due to rate of biodegradation processes and natural recovery

Alternative 4b is a combination of removal, solidification, enhanced biodegradation, capping, and natural recovery. Shoreline soils and adjacent nearshore sediments would be addressed through a combination of removing some material and solidifying other material in order to address and prevent further risk to benthic organisms. Natural biodegradation processes would be enhanced through air sparging in order to reduce COC concentrations in groundwater to levels protective of sediments prior to reaching the sediments. Impacted nearshore sediments would be removed to a depth of 3 ft. The removal area would be capped to match the existing river bathymetry. The cap would be monitored to determine the effectiveness. Offshore sediments would be monitored to evaluate long-term protection of the aquatic and benthic organisms. Institutional controls would be used to restrict groundwater and land use.

<u>Alternative 4c</u>: ***Shoreline Removal and Solidification, Removal of Nearshore Sediment, Containment of Groundwater, Monitoring of Offshore Sediments, Off-Site Disposal***

- Estimated Total Cost: $12,224,000 (Capital Cost: $10,714,000; O&M Cost: $1,510,000)
- Estimated Removal Volume: 6,681 CY
- Estimated Construction Timeframe: Less than one year
- Estimated Time to Achieve RAOs: Uncertain due to rate of natural recovery processes

Alternative 4c is a combination of removal, in-place solidification, containment, and capping. Shoreline soils and adjacent nearshore sediments would be addressed through a combination of removing some material and solidifying other material in order to address and prevent further risk to benthic organisms. A soil/bentonite containment wall (3-sided) would be constructed to contain groundwater in the fill and shallow silt units to prevent impacted groundwater from reaching the sediments. Impacted nearshore sediments would be removed to a depth of 3 ft. The removal area would be capped to match the existing river bathymetry. The cap would be monitored to determine the effectiveness. Offshore sediments would be monitored to evaluate long-term protection of the aquatic and benthic organisms. Institutional controls would be used to restrict groundwater and land use.

<u>Alternative 5</u>: ***Integrated Removal of Shoreline Soils and Nearshore Sediments, Containment of Groundwater, Capping of Offshore Sediments, Off-Site Disposal***

- Estimated Total Cost: $32,390,000 (Capital Cost: $31,364,000; O&M Cost: $1,026,000)

- Estimated Removal Volume: 15,428 CY
- Estimated Construction Timeframe: One to two years
- Estimated Time to Achieve RAOs: Achieved upon completion of construction

Alternative 5 is a combination of removal, containment, and capping. Shoreline soils and nearshore sediments would be excavated by constructing a temporary sheetpile cell around the impacted area. Soil and sediment within the cell would be removed to an average depth of 8 ft. The area would be backfilled with clean material to match the existing river bathymetry. The river sides of the sheetpile cell would be removed after completion of the removal and backfilling activities. The upland side of the sheetpile wall would remain and become part of the groundwater containment wall. The sheetpile removed from the river would be reused to form the other two sides of the groundwater containment wall. The containment wall would be constructed to a depth of 60 ft to prevent impacted groundwater from reaching the sediments. To prevent erosion of sediments in the offshore, an erosion resistant cap would be installed. The type of cap will be determined during remedial design. Groundwater and the sediment cap would be monitored to evaluate long-term protectiveness. Institutional controls would be used to restrict groundwater and land use.

Alternative 6: ***Solidification of Upland Soils, Removal of Shoreline Soils, Nearshore Sediments and Offshore Sediments, Off-Site Disposal***

- Estimated Total Cost: $50,420,000 (Capital Cost: $50,137,000; O&M Cost: $283,000)
- Estimated Removal Volume: 34,121 CY
- Estimated Construction Timeframe: One to two years
- Estimated Time to Achieve RAOs: Achieved upon completion of construction

Alternative 6 is a combination of removal and solidification. Shoreline soils and adjacent nearshore sediments would be removed in order to address and prevent further risk to benthic organisms. Upland soils would be solidified to prevent leaching of COC from soil to groundwater and prevent impacted groundwater from reaching sediments in St. Joe River. Solidification of the upland soils would be achieved through in situ shallow soil mixing with a cement and bentonite mix. The specific methods to be used would be determined during remedial design. The solidification would extend to the bottom of the interbedded unit (approximately 35 ft). Nearshore and offshore sediments would be removed to an average depth of 8 and 6 ft, respectively. The area would be backfilled with clean material to match the existing river bathymetry.

Alternative 7: ***Complete Removal of Upland Soils and Nearshore and Offshore Sediment, Off-Site Disposal***

- Estimated Total Cost: $76,921,000 (Capital Cost: $76,638,000; O&M Cost: $283,000)
- Estimated Removal Volume: 56,821 CY
- Estimated Construction Timeframe: One to two years
- Estimated Time to Achieve RAOs: Achieved upon completion of construction

Alternative 7 includes the complete removal of accessible soil and sediment from the Site that exceed PRGs. Soil and the associated groundwater would be removed to an approximate depth of 60 ft. Shoring would be required to allow excavation in these soils and to minimize infiltration of groundwater into the excavation. The methods to be used would be determined during remedial design. Nearshore and offshore sediments would be removed to an average depth of 8 and 6 ft, respectively. The area would be backfilled with clean material to match the existing river bathymetry.

Alternative 8: ***Integrated Removal of Shoreline Soils and Nearshore Sediments, Containment of Groundwater, Capping of Offshore Sediments, Off-Site Disposal***

- Estimated Total Cost: $11,723,000 (Capital Cost: $10,853,000; O&M Cost: $870,000)

- Estimated Removal Volume: 13,300 CY

- Estimated Construction Timeframe: One to two years

- Estimated Time to Achieve RAOs: Achieved upon completion of construction

Alternative 8 is a combination of removal, containment, and capping that was developed by EPA as the proposed plan was assembled. It is similar to Alternative 5 with modifications to provide a higher level of long-term effectiveness at lower cost. A sheetpile wall would be installed near the top of the river bank to serve as a buttress for shoreline soils and nearshore sediments removal, which would be excavated or dredged to an average depth of 8 ft. After removal, the area would be backfilled with clean material to match the existing river bathymetry. After dewatering sediments, the contaminated soil and sediment would be thermally treated onsite and the treated soil would be taken to a landfill for disposal.

A bentonite slurry wall would be installed beginning at the upstream and downstream ends of the sheetpile wall and extending landward to encircle the area of contaminated soil and groundwater. The sheetpile and bentonite containment walls would be constructed to a depth of 60 ft to prevent impacted groundwater from reaching the sediments. A low permeability cap would then be placed over the top of the containment area to prevent infiltration of precipitation or surface water during flood events. Groundwater would be monitored on the river side of the sheetpile wall and at each end to verify the effectiveness of the containment system. Institutional controls would be used to restrict groundwater and land use.

To prevent erosion of offshore sediments, an erosion-resistant cap would be installed. The type of cap will be determined during remedial design. The cap for the offshore sediments would be monitored to verify that an appropriate thickness of capping materials is maintained.

***Alternative 9a*: Removal, On Site Thermal Treatment, and On Site Disposal of Surface Upland Soils, Contaminated Bank Soils, Nearshore Sediments, and Selected Offshore Sediments; In Situ Stabilization of Deeper Upland Soils, Backfilling**

of Nearshore and Offshore Sediment Removal Sites; Monitoring of Upland Soil, Groundwater, Bank Soil, Nearshore, and Offshore Sediments

- Estimated Total Cost: $12,007,000 (Capital Cost: $11,546,000; O&M Cost: $461,000)
- Estimated Removal Volume: 70,000 CY
- Estimated Construction Timeframe: Two to three years
- Estimated Time to Achieve RAOs: Achieved upon completion of construction

Alternative 9A is a combination of excavation and on site thermal treatment of soils and sediments, on site disposal of treated soils/sediments, in-situ stabilization, capping/backfilling of excavated areas, monitoring, and institutional controls.

The top 20 feet of the contaminated upland and contiguous river bank soils would be excavated and along with removed and dewatered contaminated river sediments would be thermally treated on site with a portable thermal desorption unit (thermal treatment). The treated soils and sediments would later be deposited within the footprint of the upland excavation. The surface of all thermally treated soils and sediments deposited in the upland area would be amended with organics and/or topsoil and seeded to provide a vegetative cover resistant to scouring during flood events. If necessary, excess thermally treated soils/sediments may be hauled to an off site disposal facility. The specifications for soil amendments and seeding as well as specifications for backfilling and capping materials would be determined during the remedial design process.

The portable thermal treatment unit would be operated and monitored in accordance with applicable RCRA and Clean Air Act guidance and regulations for desorption units and/or incinerators. The riverbank excavation would be backfilled with clean scour resistant materials. Contaminated upland and riverbank soils below the 20 foot excavation, up to 40 more feet in depth or the confining lower silt unit, would be solidified in place with cementaceous materials such as Portland cement to significantly reduce groundwater permeability and contaminant leaching. Pilot studies would be completed during the remedial design phase to develop a mixture and application rate that best achieves RAOs. Monitoring wells would be installed near the solidified subsurface matrix to ensure that contaminants are not leaching into the groundwater.

A temporary watertight sheetpile wall would be installed around the most contaminated nearshore sediments to facilitate their removal by dredging, followed by dewatering, thermal treatment and on site upland disposal. All contaminated nearshore sediments containing concentrations of COCs above the sediment clean up level would be removed. The dredged area would be returned to its original topography by backfilling or capping with clean gravels and sediments appropriate for a healthy benthic community and the sheetpile wall would be removed. If necessary, in-situ stabilization would be implemented as a contingency remedy to address deeper contaminated sediments not suitable for removal as determined in the Remedial Design phase.

Offshore sediments would be sampled and a stepwise process involving chemical analysis, toxicity testing, and sediment scour and transport investigations (detailed in Section 2.8.4) would be instituted to determine the extent of contaminated river bottom sediments that pose a current or reasonably anticipated future risk to benthic organisms. These so identified sediments would be removed, dewatered, thermally treated if necessary (as determined during remedial design), and disposed of in the upland area. Areas of removal would be backfilled with clean gravels and sediment. As a contingency remedy, contaminated sediments, which do not lend themselves to efficient removal, may be capped with scour resistant materials to prevent future exposure. The details specifying which sediments require removal, thermal treatment, backfilling and/or capping would be as determined during the remedial design process.

Water collected during the upland excavation and the dewatering of contaminated nearshore and offshore sediments would be stored in containment tank(s) on site, treated in activated carbon units, and discharged to the St. Joe River. This discharge would be monitored to ensure compliance with applicable surface water quality standards.

Monitoring would occur both during and after the construction of the remedy to ensure that the remedy achieves compliance with all RAOs and ARARs. This includes monitoring groundwater, surface water discharges, air emissions, riverine sediments, and thermally treated soils and sediments.

Institutional controls would be used to protect sediment caps and to restrict and land use as necessary.

2.10 Comparative Analysis of Alternatives

In accordance with the NCP, EPA used nine criteria to evaluate each alternative developed in the FS individually and against each other in order to select a remedy for the Site. This section profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other alternatives under consideration. Although the nine criteria are all essential to EPA's decision making process, they are weighted differently depending whether or not a particular criterion is a threshold, balancing, or modifying criterion. The nine evaluation criteria are:

- Threshold Criteria:
    1) overall protection of human health and the environment;
    2) compliance with Applicable or Relevant and Appropriate Requirements (ARARs);
- Balancing Criteria:
    3) long-term effectiveness and permanence;
    4) reduction of toxicity, mobility, or volume of contaminants through treatment;
    5) short-term effectiveness;
    6) implementability;
    7) cost;

- Modifying Criteria:
  8) state/support agency acceptance; and
  9) community acceptance.

A detailed analysis of the twelve alternatives considered for this Site can be found in the FS. The following alternative evaluation divides the Site into each of five subareas (as shown in Figure 1), and the remedial actions for each subarea are analyzed using the nine criteria. The five subareas are:

1) Upland Soils and Groundwater
2) Bank Soils
3) Shoreline Sediment
4) Nearshore Sediment
5) Offshore Sediment

For each of these subareas, a variety of remedial actions, ranging from no action to full removal, were presented in the FS.

2.10.1 Overall Protection of Human Health and the Environment

---

Overall Protection of Human Health and the Environment *determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.*

Upland Soils and Groundwater. Since the No Action Alternative, Alternative 1, does not adequately satisfy this criteria, it has been eliminated from further consideration in this alternative comparison process.

Alternatives 2, 3a, 3b, 4a, and 4b rely on natural attenuation or enhanced biodegradation to reduce COC concentrations in the upland soils and ground water thereby preventing groundwater from further impacting river sediments. Although these alternatives were included in the comparative analysis section of the July 2005 Proposed Plan, comments received during the public comment period requested further analysis of natural attenuation timeframes and efficiencies. This analysis resulted in the determination that both natural attenuation and enhanced natural attenuation (i.e. air sparging) of the upland soils and groundwater is not effective in remediating contamination. Therefore these alternatives are not protective of human health and the environment and are also excluded from further consideration.

The remaining alternative remedies include subsurface containment walls (Alternatives 3c, 4c, 5, and 8), solidification (Alternative 6 and deeper soils in 9A) and excavation and thermal treatment (Alternative 7 and the upper soils of 9A) to prevent human contact with the contamination and to prevent migration of contaminated groundwater to the river. These alternatives prevent direct contact with soil or ingestion of contaminated groundwater using either containment and institutional controls and/or using removal and treatment, thereby protecting human health and the environment from the contaminants in soil and groundwater.

Bank Soils. All of the alternatives include removal of contaminated bank soils combined with backfilling, capping, or solidification and capping, or backfilling with clean scour resistant materials and would be protective of human health and the environment.

Shoreline Sediment. All of the alternatives include removal of contaminated shoreline sediments combined with backfilling, or capping, or solidification and capping, and would be protective of human health and the environment.

Nearshore Sediment. All of the alternatives include removal of contaminated nearshore sediments to various depths combined with backfilling or capping, and would be protective of human health and the environment.

Offshore Sediment. Alternatives 3c and 4c include monitored natural recovery for offshore sediments and may not be protective of the environment for areas with elevated COCs.

Additionally, these alternatives offer no protection against scour that might expose more highly contaminated buried sediments. Alternatives 5 and 8 include an erosion-resistant cap for the offshore sediments and Alternatives 6, 7, and 9A include removal of all contaminated sediments all of which would be protective of human health and the environment.

2.10.2 Compliance with ARARs

Compliance with ARARs *evaluates whether the alternative meets federal, state, and tribal environmental statutes, regulations, and other requirements that pertain to the Site or whether a waiver is justified.*

Upland Soils and Groundwater. All of the remedial alternatives can be implemented such that they comply with ARARs. Alternatives 3c, 4c 5, and 8 which include subsurface containment walls are expected to meet ARARs at the boundaries of their respective containment cells (waste management areas) upon completion of construction, although they leave contaminated soils and groundwater immobilized in place. Alternatives 6 and Alternative 9A both immobilize contaminated soils and groundwater in situ by chemically stabilizing them within a solid, low permeable matrix. Alternative 9A augments the in situ stabilization remedy by first removing and treating the most highly contaminated soils and groundwater. Alternative 7 removes all contaminated soils and groundwater and treats them satisfying the EPA preference for returning groundwater to drinking water standards.

Bank Soils. All of the remedial alternatives would comply with ARARs.

Shoreline Sediment. All of the remedial alternatives would comply with ARARs.

Nearshore Sediment. All of the remedial alternatives would comply with ARARs.

Offshore Sediment. All of the remedial alternatives would comply with ARARs.

2.10.3 Long-Term Effectiveness and Permanence

Long-Term Effectiveness and Permanence *considers the ability of an alternative to maintain protection of human health and the environment over time.*

Upland Soils and Groundwater. Alternatives 3c, 4c, 5, and 8 include subsurface walls to provide long-term containment and protection of sediment quality. Alternative 8 provides a higher level of protection than these four previous alternatives as its walls fully encloses the contaminated area and includes a surface cap to exclude precipitation and surface water. Alternatives 6 and 9A further improve on long term effectiveness and permanence by providing in situ stabilization remedies binding contaminated soils and groundwater into solid matrices. Alternative 9A further improves on effectiveness and permanence in that it removes the most highly contaminated soils and groundwater and treats them on site along with its deeper soil stabilization remedy. Alternative 7 provides the greatest effectiveness and permanence in that it removes and treats all contaminated upland soils and groundwater.

Bank Soils. All of the remedial alternatives include bank soil removal that would be effective in the long term unless there is recontamination via migrating groundwater or erosive processes expose deeper contamination. Alternatives 7, 8, and 9A provide the greatest long term effectiveness and permanence by removing all contaminated bank soils and preventing recontamination with more permanent and effective upland soil and groundwater remedies.

Shoreline Sediment. Alternative 3c, which includes removal of two feet of sediment and replacement with a two-foot thick scour-resistant sand and gravel cap, would be effective in the long term. Alternative 4c, which includes removal of three feet of contaminated sediment and replacement with three feet of scour-resistant cap, would be slightly more permanent because of the thicker layer of capping materials. Alternatives 5, 6, 7, 8, and 9A, which include between 6 and 8 feet of sediment removal and replacement with a sand and gravel backfill, are considered to be the most effective and permanent remedies.

Nearshore Sediment. Alternatives 3c and 4c, which include removal of the top 2 to 3 ft of material and replacement with clean backfill, would leave in place residual contamination that could leach to surface sediments or be exposed by erosion. Alternatives 5, 6, 7, 8, and 9A include removal of all sediment with the potential to cause risk to receptors and are considered to be the most effective and permanent alternatives.

Offshore Sediment. Alternatives 3c and 4c include monitored natural recovery for the offshore sediments, which would be protective unless a flood event with sufficient force scoured the area and exposed contaminated sediment. Alternatives 5 and 8 include a scour-resistant cap for the offshore sediments, which is considered effective in the long-term. Alternatives 6, 7, and 9A include removal and treatment of all the contaminated sediments, followed by backfilling with sand and gravel, which is considered the most effective and permanent.

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

---

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.*

Upland Soils and Groundwater. The remedial alternatives include containment, monitoring, and soil solidification, or removal (with treatment). Alternatives 3c, 4c, 5, and 8, rely on containment and do not include treatment and therefore are ranked lowest under this criterion. All contaminated upland soils in Alternative 6 and the deeper contaminated upland soils in Alternative 9A undergo in situ stabilization to reduce the mobility of contaminants; however, the toxicity and volume of material remaining in place would not be reduced. Alternative 9A removes the top 20 feet of contaminated soil for thermal treatment while Alternative 7 includes removal and thermal treatment of all upland soil reducing the concentrations of COC (greater than 10x UTS) prior to disposal. The latter two alternatives best address this criterion.

Bank Soils. The remedial alternatives include solidification or removal (with thermal treatment). As per the actions for upland soils, removal of bank soils with treatment would do the most to reduce toxicity, mobility and volume of contaminants. Alternatives 5, 6, 7, 8, and 9A best satisfy this criterion.

Shoreline Sediment. The remedial alternatives include removal and treatment of impacted sediments at increasing depths up to 8 ft. All of the removal alternatives would be effective in reducing toxicity, mobility and volume of contaminants, however since Alternatives 3c and 4c remove only 2 and 3 feet of contaminated sediments respectively, they rank lowest for this criterion. Alternatives 5, 6, 7, 8, 9A would result in more reduction in toxicity, mobility and volume because a greater quantity of material would be removed and treated.

Nearshore Sediment. The remedial alternatives include monitoring, capping, or removal (with treatment). Capping Alternatives 3c and 4c do not include treatment and are ranked lowest under this criterion. Alternatives 5, 6, 7, 8, and 9A include removal and thermal treatment of contaminated sediments, best satisfying this criterion.

Offshore Sediment. The remedial alternatives include monitoring, capping, or removal. The monitoring and capping alternatives (Alternatives 3c, 4c, 5, and 8) do not include treatment and are therefore ranked lowest under this criterion. Alternatives 6, 7, and 9A include removal and thermal treatment of contaminated sediments, which would best reduce their mobility, toxicity and volume.

2.10.5 Short-Term Effectiveness

Short-Term Effectiveness *considers the length of time needed to implement an alternative, the length of time until cleanup standards are met, and the risks the alternative poses to workers, residents, and the environment during implementation.*

Upland Soils and Groundwater. Alternatives 3c, 4c, 5, and 8 include containment, which requires the use of heavy equipment and time to implement. With the increasing complexity of equipment use comes greater safety risk to workers, residents and the environment. However, reductions in risks to the environment would be achieved sooner after implementation. Soil solidification (Alternative 6 and the deeper soils in 9A) and removal (Alternative 7 and upper soils in 9A) would require substantially more excavation and equipment use therefore would require more construction time which poses a greater safety risk to workers and the environment and requires more time to implement. Alternative 9A would pose less risk to residents because the treated soils would be disposed of on site. All of the alternatives are designed to achieve cleanup standards upon the completion of the remedy construction.

Bank Soils. The soil solidification and removal alternatives would take approximately the same amount of time to implement, pose approximately the same short-term risk to workers and the environment, and achieve cleanup standards upon completion of construction. Alternative 9A would pose less risk to residents because the treated soils would be disposed of on site. There is a potential for short-term impacts to the aquatic environment during soil removal; however, use of proper engineering controls, such as silt curtains, would be included during any removal and capping/backfilling operation to minimize these impacts.

Shoreline Sediment. The sediment excavation accompanying each alternative would pose approximately the same short-term risk to workers and the environment. Engineering controls would be used to minimize short-term impacts to the aquatic environment. Alternative 9A would pose less risk to residents because the removed and treated sediments would be disposed of on site. Attainment of cleanup standards would occur at the completion of the remedy construction for all the alternatives.

Nearshore Sediment. All the alternatives attain cleanup standards upon completion of remedy construction. Alternatives 3c and 4c include less excavation and associated disruption of contaminated sediments than Alternatives 5, 6, 7, 8, and 9A, have the shortest construction time, and therefore the lowest short-term risk to the workers and the environment. Alternatives 5, 6, 7, 8 and 9A have a higher short-term risk to the environment because of higher potential for incidental releases during excavation. Of these last five alternatives, Alternative 9A would pose the least risk to residents because the removed and treated sediments would be disposed of on site. All of the alternatives would utilize engineering controls to minimize short-term impacts to the aquatic environment.

Offshore Sediment. Alternatives 3c and 4c would have the lowest short-term risk to the workers, residents, and the environment because there are no construction activities; however, it is uncertain when or if cleanup standards would be achieved. Alternatives 5 and 8 include capping which should have minimal short-term risk to the environment and workers. Cleanup standards would be met upon the installation of the cap. Alternatives 5, 6, 7, and 9A have the highest short-term risk to the environment because of the potential for incidental releases during dredging. As above, Alternative 9A would pose the least risk to residents because the removed and treated sediments would be disposed of on site. All of the dredging alternatives would utilize engineering controls to minimize short-term impacts to the aquatic environment. Cleanup standards would be met upon completion of the construction.

2.10.6 Implementability

Implementability *considers the technical and administrative feasibility of implementing the alternative such as relative availability of goods and services.*

While all of the alternatives can be implemented at the Site, some are more easily implemented than others are. In general, technical implementability decreases with increasing complexity of construction and use of specialized equipment. Administrative implementability decreases with the increase in substantive requirements that apply to permitting.

Upland Soils and Groundwater. Alternatives 3c, 4c, 5, and 8 include sheetpile or slurry walls, which should be relatively easy to implement because this is well known technology. Alternative 6 and 9A, which include solidification of contaminated soil and groundwater would be more difficult to implement because more soil would require processing and the technology is less common and would require bench testing. Alternative 9A, also includes removal of the top 20 feet of upland soils, their thermal treatment, and on-site disposal that makes it more complex and difficult to implement. Alternative 7, due to its volume and depth of soil excavation, thermal treatment, and off-site disposal, would be the most difficult to implement.

Bank Soils. All of the alternatives include removal and backfilling so there is no distinction for this medium.

Shoreline Sediment. Although the depth of sediment removal and capping/backfilling varies, this does not affect the relative implementability for the alternatives in this category.

Nearshore Sediment. Alternatives 3c and 4c include 2 and 3 foot excavations of contaminated sediment and capping, which would be the easiest to implement. Alternatives 5, 6, 7, 8 and 9A include dredging, which would be the most difficult to implement. Of these latter alternatives, Alternative 9A would be the easiest to implement because treated sediments would be placed on site.

Offshore Sediment. Alternatives 3c and 4c include monitored natural recovery, which would be the easiest to implement. Alternatives 5 and 8 include capping, which would be the next easiest to implement. Alternatives 6, 7, and 9A include dredging, which would be the most difficult to implement, although Alternative 9A would be favored because of on site disposal of treated sediments.

2.10.7 Cost

Cost *includes estimated capital and operation and maintenance costs as well as present worth costs. Present worth cost is the total cost of an alternative over time in terms of 2007 dollars. O&M costs are based on 30 years. Cost estimates are expected to be accurate within a range of +50 to -30 percent.*

Costs increase with the increased complexity of the proposed remedial alternatives and the quantity of material requiring treatment. Alternatives were developed to give a broad range of options that would span from less aggressive, lower cost remedies to very aggressive, higher cost remedies. Estimated costs for each alternative are:

- Alternative 3c Total Cost: $8,041,000
  (Capital Cost: $6,031,000; O&M Cost: $2,010,000)

- Alternative 4c Total Cost: $12,224,000
  (Capital Cost: $10,714,000; O&M Cost: $1,510,000)

- Alternative 5 Total Cost: $32,390,000
  (Capital Cost: $31,364,000; O&M Cost: $1,026,000)

- Alternative 6 Total Cost: $50,420,000
  (Capital Cost: $50,137,000; O&M Cost: $283,000)

- Alternative 7 Total Cost: $76,921,000
  (Capital Cost: $76,638,000; O&M Cost: $283,000)

- Alternative 8 Total Cost: $11,723,000
  (Capital Cost: $10,853,000; O&M Cost: $870,000)

- Alternative 9A Total Cost: $12,007,000
  (Capital Cost: $11,546,000; O&M Cost: $461,000)

These estimates are approximate and made without detailed engineering design. The actual cost of the project would depend on the final scope of the remedial action and on other unknowns. Additional information addressing cost effectiveness can be found in Section 2.13.3.

2.10.8 State/Support Agency Acceptance

State/Support Agency Acceptance *considers whether the state agrees with the EPA's analyses and recommendations of the RI/FS and the Proposed Plan.*

The Coeur d'Alene Tribe concurs with the Selected Remedy. EPA has consulted with the State of Idaho during the development of the Selected Remedy. The State concurred with the Selected Remedy as it pertains to downstream resources managed by the State.

2.10.9 Community Acceptance

Community Acceptance *considers whether the local community agrees with the EPA's analyses and preferred alternative. Comments received on the Proposed Plan are important indicators of community acceptance.*

EPA has considered all comments submitted during the public comment periods and at the public meetings held for both the July 2006 Proposed Plan and the December 2006 Revised Proposed Plan and has taken those comments into account during the selection of the remedy. During the 2005 Proposed Plan public comment period, EPA received a proposal for a new alternative submitted by the PRP's consultant on behalf of the PRPs. EPA and the Tribe worked with the PRP's consultant to further develop this new preferred alternative, Alternative 9A, which is now the Selected Remedy. In general, EPA has received comments supporting the Revised Proposed Plan and comments that directed EPA to look more closely at the less expensive alternatives. Some comments questioned the allocation of cleanup costs between the PRPs and how costs would affect City residents. Some of the comments received were based on the commenter's comparisons of proposed alternatives at this Site with EPA actions taken at other sites. Since this ROD and Selected Remedy addresses only the St. Maries Site, many of these later types of comments could not be addressed. EPA's responses to all comments received from public comment periods and public meetings are included in the Responsiveness Summary contained in Part 3 of this ROD.

2.11 Principal Threat Waste

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP §300.430(a)(1)(iii)(A)). Principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health and the environment should exposure occur.

Creosote and its constituents found in the upland soils, groundwater, bank soils, shoreline, nearshore and offshore sediments constitute the principal threat wastes at the St. Maries Site. The high concentrations of PAHs within the upland and bank soils soil are a threat to human activity at the Site through dermal contact as well as through the ingestion of contaminated soils and groundwater. Groundwater passing through the contaminated subsurface soils enroute to the river mobilizes dissolved fractions of the PAHs and delivers them to the shoreline and nearshore sediments. Nearshore sediments contain very high concentrations of PAHs that can further be mobilized during flooding or other scouring events further contaminating offshore sediment. PAHs have been carried more than 900 ft downstream from the site and have impacted surface and subsurface sediment in the offshore area.

The excavation portions of the Selected Remedy will utilize the presumptive remedy of thermal desorption to treat and remove principal threat wastes from contaminated soils and sediments. The deepest contaminated upland soils (> 20 feet bgs) will be stabilized in place to treat the associated contaminated groundwater, prevent further contamination of ground water, and to prevent possible migration of principal threat waste into the river environment.

2.12 Selected Remedy

2.12.1 Summary of Rationale for the Selected Remedy

Based on the information currently available, EPA chose Alternative 9A as the Selected Remedy because it meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. Changes to the remedy since the selection of Alternative 9A in the December 2006 Revised Proposed Plan as the result of public comment or new information are documented in Section 2.14.

2.12.2 Description of the Selected Remedy

The Selected Remedy is a combination of excavation and on site thermal treatment of contaminated soils; further assessment, delineation and excavation of river sediments; on site disposal of treated soils/sediments; in-situ stabilization of deeper soils; backfilling of excavated areas; confirmation sampling; monitoring; and institutional controls (See Figures 2 and 3). Both thermal desorption and in-situ stabilization are recognized presumptive remedies for sites contaminated with creosote. The timing and sequencing of the individual remedy components will be determined during the remedial design.

The top 20 feet of the contaminated upland and contiguous river bank soils exceeding clean up levels (Table 23) will be excavated, thermally treated on site with a portable thermal desorption unit, and following deeper soil in situ stabilization (described below), will be deposited on Site within the footprint of the upland excavation. Following further sampling and assessment conducted during the remedial design, all contaminated shoreline, nearshore, and offshore sediments exceeding the sediment clean up levels in Table 25 will be excavated, thermally treated, and deposited on Site with the upland treated soils. EPA may approve a “test out” procedure to identify river sediments for excavation as described below. All excavated soils and sediments will be treated to a level (Table 23) which meets EPA’s site specific determination that the treated soils and sediments no longer contain hazardous waste (contained in determination) and which allows for their on site disposal under RCRA (See Section 2.8.2).

The portable thermal treatment unit will be tested, operated, and monitored in accordance with applicable RCRA and Clean Air Act guidance and regulations including RCRA Subparts O and X for desorption units and incinerators (See Section 2.8.6).

The riverbank excavation will be backfilled with clean scour-resistant materials. Contaminated upland and riverbank soils below the excavation, up to 40 more feet in depth or the confining lower silt unit, will be stabilized in place with cementitious materials such as Portland cement to significantly reduce its permeability and contaminant leaching. Pilot studies will be completed during the remedial design phase to determine potential for contaminant leaching from the stabilized volume and to develop a mixture and rate of application of stabilization materials which best achieves RAOs. Since the deeper soil stabilization will reduce the permeability of the stabilized soils, an assessment will be made during remedial design to determine if groundwater flow will be altered to an extent that may compromise the stability of the remedy or its surroundings. This deeper soil stabilization incorporates contaminated groundwater into the stabilization matrix thereby treating it and making it no longer available as a source of drinking water. Monitoring wells will be installed near the solidified subsurface matrix to ensure that contaminants bound up in the stabilization matrix no longer leach into the groundwater.

A temporary watertight sheetpile wall will be installed around the most contaminated shoreline and nearshore sediments at or outside the nearshore/offshore boundary as depicted in Figure 2. Following additional sampling and chemical analysis to better delineate contaminated sediments, all such contaminated shoreline and nearshore sediments containing concentrations of COCs which exceed screening levels in Table 25 will be excavated followed by dewatering, thermal treatment, and on site upland disposal. All areas of sediment excavation will be returned to the original topography by backfilling with clean gravels and sediments appropriate for a healthy benthic community after which the sheetpile wall will be removed.

Outside the sheetpile wall, additional chemical sampling will also be utilized to further identify those sediments which exceed the sediment clean up levels in Table 25. All offshore sediments exceeding the values in Table 25 will be excavated, dewatered, thermally treated and deposited in the upland area with other thermally treated soils and sediments.

If approved by EPA, a “test out” process may be implemented to determine the extent of contaminated shoreline, nearshore, and offshore sediments which pose a current or reasonably anticipated future risk to benthic organisms (See Section 2.8.4). These so identified sediments will be removed, dewatered, thermally treated, and deposited of in the upland area. Areas of removal will be backfilled with clean gravels and sediment. The details specifying which sediments require removal and the specifications for backfilling materials will be determined during the remedial design process.

The “test out” procedure may be used in concert with approved sediment scour modeling results to identify which offshore sediments require excavation based upon their toxicity and likelihood of exposure. Offshore sediments which exceed the Washington SQS (or LAET) values in Table 25 and fail toxicity tests in the biologically active zone (top 10 cm) will be excavated, thermally treated, and disposed of as described in Section 2.8.2. The values in Table 25 will be used to determine the depth of excavation.

If approved by EPA, a sediment transport analysis may be performed in offshore areas where the top 10 cm does not exceed the Washington SQS or biological standards, but deeper sediments (below 10 cm) exceed these standards. The sediment transport analysis must be capable of adequately predicting the likelihood of these sediments' exposure due to potential scour events. Any sediments which may likely be exposed will be excavated, thermally treated, and disposed of as described in Section 2.8.2. All excavated areas will be backfilled with clean gravels and sediments suitable to prevent erosion and provide habitat for benthic organisms, to the original pre-excavation topography.

It may be possible to develop a site-specific standard for the offshore sediments using the biological and chemical testing data collected during the implementation of the "test out" proceedure. If EPA determines that site-specific cleanup standards protective of benthic organisms can be developed, these new standards will be documented in Explanation of Significant Differences (ESD).

Water collected during the upland excavation and the dewatering of contaminated nearshore and offshore sediments will be stored in containment tank(s) on site, hard-line plumbed to a treatment process such as carbon filtration, treated, and discharged to the St. Joe River. This discharge will be monitored to ensure compliance with NPDES regulations and surface water quality standards (See Section 2.8.5). Sludges and spent filter media will be disposed of in accordance with applicable RCRA regulations and guidance.

The surface of all thermally treated soils and sediments deposited in the upland area will be amended with organics and/or topsoil and seeded to provide a vegetative/substrate cover resistant to scouring during flood events. If necessary, excess thermally treated soils/sediments may be hauled to an off-site disposal facility. The specifications for soil amendments and seeding as well as specifications for backfilling materials will be determined during the remedial design process.

Monitoring will occur both during and after the construction of the remedy to ensure that the remedy achieves compliance with all RAOs and ARARs. This includes monitoring groundwater, surface water discharges, air emissions, riverine sediments, and thermally treated soils and sediments.

Institutional controls restricting land use will be utilized as necessary to protect the integrity of the subsurface stabilization.

2.12.3 Summary of the Estimated Remedy Costs

The information in the Selected Remedy cost estimate is based on the best available information regarding the anticipated scope of the Selected Remedy. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedy components. Major changes may be documented in the form of a memorandum in the Administrative Record file, an explanation of significant difference (ESD), or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. Details of the cost estimate can be found in Tables 20 and 21.

- Estimated Total Cost: $12,007,000 (Capital Cost: $10,790,704; O&M Cost: $461,000)
- Estimated Removal Volume: 70,000 CY
- Estimated Construction Timeframe: 2 to 3 years.
- Time to Achieve RAOs: Achieved upon completion of construction.

2.12.4 Expected Outcomes of the Selected Remedy

EPA expects the Selected Remedy to satisfy the following statutory requirements of CERCLA Section 121(b):

1) be protective of human health and the environment;
2) comply with ARARs;

3) be cost effective;

4) utilize permanent solutions and alternative treatment technologies to the maximum extent practicable; and

5) meet the preference for selecting remedies with treatment as a principle element.

CERCLA requires that remedial actions that result in any hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure be subject to a five-year review to ensure protection of human health and the environment. The Site will be subject to five year reviews by EPA because there will be contaminants left in place, incorporated into the upland soil stabilization.

Upon the completion of the remedy construction, the top 20 feet of the upland and riverbank portions of the Site will be available for their reasonably anticipated future industrial land use. The river portion of the Site will be fully protective of a healthy benthic community and the river's designated beneficial uses. Site groundwater will be returned to its beneficial use as a drinking water source. Institutional controls will be implemented to prevent excavation or drilling below 20 feet in depth in the upland area to protect the integrity of the subsurface stabilization.

2.13 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 applicable or relevant and appropriate requirements (unless a statutory waiver is justified), 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 principle element and a bias against off-site disposal of untreated wastes. The following sections discuss how the Selected Remedy meets these statutory requirements.

2.13.1 Protection of Human Health and the Environment

The Selected Remedy will protect human health and the environment through the following actions:

- Removal, onsite thermal treatment, and on site disposal of contaminated upland and riverbank soils within 20 feet of the surface.
- In place stabilization of contaminated upland and riverbank soils and the ground water contained within these soils at depths greater than 20 feet. Monitoring of groundwater just outside of and down gradient of the stabilized soils.
- Removal, on site thermal treatment, and on site upland disposal of contaminated shoreline, nearshore and offshore sediments exceeding Washington SQS in Table 25.
- If approved by EPA, the use of bioassays ("test out" procedure in Section 2.8.4) to identify contaminated shoreline, nearshore, and offshore sediments, followed by thermal treatment, dewatering, and upland disposal.
- Backfilling of all sediment excavations to the original topography with clean gravels and sediments appropriate for a healthy benthic community.
- Implementation of institutional controls to prevent disturbance of subsurface stabilized soils.

2.13.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) and other Policies, Guidance, and Directives To Be Considered (TBCs)

The Selected Remedy will comply with all chemical-specific, action-specific, and location-specific ARARs. Chemical, location, and action-specific ARARs include the following:

Clean Water Act (33 USC 1251-1387; 40 CFR 100-149):

- National Pollutant Discharge Elimination System. Although the NPDES program requires permits for point-source discharges of pollutants to surface waters, obtaining such a permit is not required for on-site response actions under CERCLA Section 122(e). However, substantive requirements of NPDES permits will be used in establishing clean up levels for the Selected Remedy.

- Acute and chronic fresh water quality criteria requirements for the St. Joe River from non-point sources (groundwater to surface water at the mud line), storm water runoff, and from discharges from soil/sediment dewatering activities.

- Prohibition on oil films or sheens on surface water (40 CFR 110.b(b).

- Dredge and Fill Requirements (Sections 401 and 404 (33 USC 1341; 33 USC 1413; 40 CFR 230, 231; 33 CFR 320-330) These regulations are applicable to the discharge of dredged or fill material to waters of the U.S. The 404(b)(1) evaluation will be completed for the construction of the sheetpile wall, dredging, and backfilling operations and will comply with the requirements.

- Water Quality Standards for Approved Surface Waters of the Coeur d'Alene Tribe. These standards address the surface waters of the Coeur d' Alene Lake and the St. Joe River within the exterior boundaries of the Coeur d' Alene Reservation. The purpose of these standards is to restore, maintain and protect the chemical, physical, biological, and cultural integrity of the Coeur d' Alene Reservation Waters; to promote the health, social welfare, and economic well-being of the Coeur d' Alene Tribe, its people, and all the residents of the Coeur d' Alene Reservation; to achieve a level of water quality that provides for all cultural uses of the water, the protection and propagation of fish and wildlife, for recreation in and on the water, and all existing and designated uses of the water; to promote the holistic watershed approach to management of Reservation waters of the Coeur d' Alene Tribe; to provide for the protection of threatened and endangered species and to provide necessary guidance for the protection and/or maintenance of water quality throughout Reservation waters. These standards will be used in establishing cleanup levels for the Selected Remedy.

- The Selected Remedy includes on-site discharges to the St. Joe River as a result of the dewatering and treatment process for soils and sediments. The General NPDES Permit for Groundwater Remediation Discharge Facilities in Idaho (Permit No. ID-G91-0000) is designed to cover facilities contaminated with PAHs and ex situ groundwater treatment facilities, including excavation dewatering, in which treated water is discharged to waters of the United States in Idaho. Because receiving waters within the Coeur d' Alene Reservation are excluded from this general permit, the substantive requirements of this general permit wiil be used in establishing clean up levels.

- The Selected Remedy also includes construction-related activities. The substantive requirements of EPA's NPDES General Permit for Storm Water Discharges from Construction Activities are applicable to such activities at the Site, including clearing, grading, and excavation and stockpiling. Best Management Practices must be used, and appropriate monitoring performed, to ensure that storm water runoff does not cause an exceedance of water quality standards in the St. Joe River.

- Rivers and Harbors Appropriations Act (33 USC 403; 33 CFR 322).

- Section 10 of this act establishes requirements for activities that may obstruct or alter a navigable waterway; activities that could impede navigation and commerce are prohibited. These requirements are anticipated to be applicable to remedial actions, such as construction of the sheetpile wall, dredging, and backfilling operations.

Safe Drinking Water Act (42 USC 300f - 399j-26:

- National Primary Drinking Water Regulations (40 CFR Part 141) promulgated under the Safe Drinking Water Act (SDWA). These regulations protect the quality of public drinking water supplies through regulation of chemical parameters and constituent concentrations as maximum contaminant levels (MCLs). The MCLs are relevant and appropriate for human health COCs in groundwater.

Solid Waste Disposal Act Resource Conservation and Recovery Act (RCRA) (42 USC 1601-1692):

- 40 CFR 261. This applies to the identification of hazardous wastes. Creosote is listed hazardous waste # F034.

- 40 CFR 264 Subpart X. Treatment of Hazardous Waste. This is applicable to treatment process units that must be located, designed, constructed, operated, and closed in a manner that will ensure protection of human health and the environment. This includes requirements for the disposal of treatment process sludges and filtrates.

- 40 CFR 264 Subpart O Regulations addressing the operation, monitoring, and performance standards for incinerators.

- 40 CFR 264 Subpart BB. Air Emission Standards for Equipment Leaks. This is applicable to equipment to prevent organic emissions from leaking into the atmosphere.

- 40 CFR 264.1080 and 265.1080 Subpart CC. Air Emission Standards for Tanks, Surface Impoundments and Containers. This is relevant and appropriate to tanks, containers, surface impoundments, etc., that manage volatile hazardous waste.

- 40 CFR 268. Land Disposal Restrictions. This is applicable to the land disposal of listed or characteristic hazardous waste materials disposed off-site.

- Off Site Disposal Rule (40 CFR 300.440) Wastes being treated or disposed off-site may only go to facilities that are in compliance with EPA’s Off-site Rule.

EPA's Contained-In Policy as it applies to excavated materials:

- Environmental media is not a hazardous waste regulated under RCRA. However, environmental media may become subject to RCRA if it "contains" a characteristic or listed hazardous waste. RCRA requirements apply until contaminated environmental media no longer contain hazardous waste. The determination that contaminated media does not contain hazardous waste is called a "contained-in determination." Current EPA guidance recommends that such determinations for listed hazardous waste be based on direct exposure using a reasonable maximum exposure scenario and that conservative, health-based standards be used to develop the site-specific health-based levels. EPA has made a contained-in determination for the contaminated soils and sediments at the Site (see Section 2.8.2).

Federal Endangered Species Act of 1973 (16 USC 1531 et seq.; 50 CFR 200, 402):

This regulation is applicable to any remedial action performed at this site and its potential for providing habitat to threatened and/or endangered species. The special species of concern at this Site is the bull trout.

National Historic Preservation Act (36 CFR Parts 60, 63 and 800):

- These regulations require agencies to consider the possible effects on historic sites or structures of actions proposed for federal funding or approval and are applicable to the Selected Remedy at the Site. Historic sites or structures are those included on or eligible for the National Register for Historic Places, generally older than 50 years. If an agency finds a potential adverse effect, such agency must evaluate alternatives to "avoid, minimize, or mitigate" the impact in consultation with the Tribal Historic Preservation Officer. These regulations are applicable to remedial activities such as excavation, which could disturb historical sites or structures.

U.S. Fish and Wildlife Coordination Act (16 USC 661 et seq.):

- The St. Joe River provides potential habitat for the species identified above and is used as a salmonid migratory route. This act prohibits water pollution with any substance deleterious to fish, plant life, or bird life, and requires consultation with the U.S. Fish and Wildlife Service and appropriate state agencies. Criteria are established regarding site selection, navigational impacts, and habitat remediation. These requirements are applicable for remedial activities at the site.

Migratory Bird Treaty Act (MBTA) (16 USC 703-712):

- The MBTA makes it unlawful to pursue, capture, hunt or take actions aversely affecting a broad range of migratory birds. The MBTA and its implementing regulations are applicable to remedial activities that could affect any protected migratory birds. The Selected Remedy will be carried out in a manner that avoids taking or killing of protected migratory species, including individual birds or their nests.

American Indian Religious Freedom Act (42 USC 1996 et seq.):

- This program is applicable to ground-disturbing activities such as soil grading and excavation at the Site. It protects religious, ceremonial and burial sites and the free practice of religions by Native American groups. If sacred sites are discovered in the course of soil disturbances, work will be stopped and the Coeur d'Alene Tribe will be contacted.

Native American Graves Protection and Repatriation Act (NAGPRA) (25 USC 3001 et seq; 43 CFR Part 10):

- These regulations protect Native American graves from desecration through the removal and trafficking of human remains and cultural items including funerary and sacred objects. To protect Native American burials and cultural items, the regulations require that if any such items are inadvertently discovered during excavation, the excavation must cease and the affiliated tribe must be notified and consulted. This program is applicable to ground-disturbing activities such as excavation and grading at the Site.

2.13.3 Cost Effectiveness

EPA has determined that the Selected Remedy is cost-effective and represents reasonable value for the anticipated cost. In making this determination, the following definition was used: “A remedy shall be cost-effective if costs are proportional to its overall effectiveness. “ (NCP

300.430(f)(1)(ii)(D)). The overall effectiveness of the alternatives meeting the threshold criteria (protective of human health and the environment and ARAR compliant) was assessed using three of the five balancing criteria: long-term effectiveness and permanence, reduction in toxicity, mobility, and volume through treatment, and short-term effectiveness. The overall effectiveness was then compared to costs to determine cost-effectiveness. The overall effectiveness of the Selected Remedy was determined to be proportional to its cost; therefore, the Selected Remedy represents a reasonable value for its cost.

The cost of the Selected Remedy totals $12,007,000. Although other alternatives were less costly, the effectiveness of these remedies was limited as they failed to treat any volume or else treated a much smaller volume of contaminated materials at a much higher unit cost. More costly alternatives ranged to nearly five times the Selected Remedy cost with no treatment or else treatment at much higher unit costs with either poorer or nearly equal effectiveness ratings. Therefore, EPA believes that the Selected Remedy the most cost effective alternative and represents the highest value for the anticipated cost.

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

EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site. Of those alternatives meeting the threshold criteria (protective of human health and the environment, ARAR and TBC compliant), the Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria while also satisfying the statutory preference for treatment as a principle element, the bias against offsite treatment and disposal, and community and Tribal acceptance.

The Selected Remedy thermally treats those source materials that contain the greatest mass of contamination at the Site. This treatment is also applied to the most contaminated upland and riverbank soils as well as contaminated shoreline, nearshore, and offshore river sediments. The thermal treatment removes creosote related contaminants to levels which soils and sediments no longer contain hazardous wastes (contained in determination) and further to comply with RCRA Universal Treatment Standard Land Disposal Restrictions, allowing the treated soils and sediments to be deposited back on site.

The less contaminated deeper upland soils (below 20 feet bgs) are treated by stabilizing them in place preventing the contamination of groundwater and preventing the migration of contaminants into the river sediments. The stabilization process changes the chemical consistency of the contaminated soil and groundwater by binding up the soils and groundwater into a matrix of very low permeability, incorporating the groundwater in a manner that does not allow for its extraction. The stabilized matrix also prevents further leaching of contaminants into surrounding subsurface soils and groundwater. As such, restrictions on groundwater use at the Site are no longer necessary. These actions are effective in both the long and short terms and are considered permanent.

2.13.5 Preference for Treatment as a Principal Element

By thermally treating the majority of contaminated soils and sediments found at the Site and chemically stabilizing deeper, less accessible contaminated soils, the Selected Remedy satisfies the statutory preference that treatment technologies constitute a principle element of the remedy.

2.13.6 Institutional Controls.

Although all contamination at the Site will be treated to eliminate further risk to human health and the environment, the possibility exists that future land use activities could compromise the integrity of the subsurface stabilization located 20 feet below the upland soil surface. Institutional controls to protect the integrity of the stabilized soils such as deed restrictions and/or City ordinance prohibiting excavation or well drilling below the 20 foot depth will be established. City ordinance enforcement would be the City’s responsibility, whereas the owner would be responsible for enforcing deed restrictions. Other avenues of enforcement may be explored in the development of the Consent Decree.

The use of Site groundwater is currently prohibited by a City ordinance. Once the Selected Remedy is complete, no contaminated groundwater will be accessible at the Site so no groundwater institutional controls are necessary

2.13.7 Five Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action to insure that the remedy is, and continues to be, protective of human health and the environment.

2.14 Documentation of Changes from the Preferred Alternative in the Proposed Plan

The selected remedy is a logical outgrowth of the preferred alternative identified in the proposed plan. Some minor modifications and clarifications have been made as discussed below:

- **Changes to RAO #4.** Remove the word groundwater and address the groundwater remedial action objective more clearly in new ROA #5 (as described below). Also, clarify that RAO #4 addresses human dermal contact or ingestion of soils.

- **Addition of RAO #5.** The list of RAOs has been refined as the result of consideration of public comments and emphasis on EPA's preference for returning contaminated groundwater to its beneficial use as a drinking water source. Expectations for contaminated groundwater are stated in the National Oil and Hazardous Substances Contingency Plan (NCP) as follows: "EPA expects to return usable ground waters to their beneficial uses whenever practicable within a timeframe that is reasonable given the particular circumstances of the site. When restoration of groundwater to beneficial uses is not practicable, EPA expects to prevent further migration of the plume, prevent exposure to the contaminated ground water, and evaluate further risk reduction." Even though Site groundwater is not likely to be used as a drinking water source due to its size, location and proximity of other readily available sources, RAO 5 was added to the list of

RAOs to clarify and emphasize this preference and to insure that the Site groundwater could be used as a source of drinking water in the future.

- **Addition of Freshwater Quality Criteria for use in Groundwater Cleanup.** Acute and chronic fresh water quality criteria are protective requirements for the St. Joe River from non-point sources. Therefore, the addition of acute and chronic fresh water quality criteria from the Water Quality Standards for Approved Surface Waters of the Coeur d'Alene Tribe was added to the list of selection criteria for developing groundwater cleanup levels (Table 24)

- **Removal of Waste Management Area Designation.** The December 2006 Proposed Plan describes the proposed deeper Upland contaminated soils remedy as in situ stabilization from approximately 20 feet depth to 60 feet depth accompanied with the designation of this stabilized volume as a RCRA Waste Management Area (WMA). However, EPA has since determined that after the selected remedy is implemented the stabilized soils will not constitute and will not require management as a waste management area.

- **Removal of Sediment Capping Contingency.** The Proposed Plan described the offshore sediment remedy as excavation of contaminated sediments unless excavation is impracticable in which case the contaminated sediments would be capped with scour-resistant materials.

  The goal of the offshore portion of the Selected Remedy is to remove all contaminated sediments which currently or may in the future cause risk to human health or the environment. If all such contamination is excavated, a capping remedy is not necessary. In addition, at this time, no evidence exists of conditions that would render contaminated offshore sediment excavation impracticable. Therefore, the offshore sediment-capping contingency was removed from the ROD. Should excavation of all contaminated sediments become impracticable, a capping remedy may be reinstituted as part of the remedy as documented in an Explanation of Significant Difference (ESD).

- **Removal of Development of Site-Specific Sediment Clean Up Levels.** The Proposed Plan outlined a possible procedure to develop site specific clean up levels for river sediments using a combination of chemical testing and bioassay analysis. At this time, EPA does not feel this approach is practical for use at the Site. However, if a procedure can be implemented which develops EPA approved site specific clean up levels, utilization of this approach at the Site will be documented in an ESD.

PART 3. RESPONSIVENESS SUMMARY

EPA reviewed all of the public comments submitted during two separate public comment periods held from July 22, 2005 to October 12, 2005, and from December 6, 2006 to January 5, 2007. In addition, EPA reviewed the oral comments provided during the formal oral comment portion of the two public meetings held in St. Maries on August 11, 2005 and December 13, 2006. These comments and their responses are divided into eight broad categories:

A. Superfund Process/Determination of Potentially Responsible Parties
B. Cost of Preferred Remedy
C. Contaminant Source and Migration
D. Risks to Human Health and the Environment
E. EPA's Selection of the Preferred Alternative
F. Coeur d'Alene Tribe Involvement and ARARS
G. Public Process and Extension of Comment Period
H. Comparison to Other EPA Sites

Individual comments were extracted from comment letters, emails, meeting transcripts, etc. and placed in the category which best characterized the subject matter of the comment. Each comment is identified by number within each category, along with the commentor's name and the date on which the comment was made. To avoid duplication of responses, comments of similar topic were grouped together consecutively within each category, followed by a response addressing all similar comments within that group. If a comment contains subject matter which also fits into other categories, a reference to a response in that category is given to augment the response. For example: (See also comment B.13). EPA responses to comments appear in red. All comments appear in their entirety in Attachment 1 to this Responsiveness Summary. The transcripts of both the August 11, 2005 and December 13, 2006 public meetings, including the informal question and answer portions, can be found in the Administrative Record for the Site.

One commentor prefaced their comments with quoted passages from the July 2005 Proposed Plan beginning with the section and page number. This quoted passage was followed by a comment in bold font. EPA responded to the bolded comments.

A. Superfund Process/Determination of Potentially Responsible Parties

A1. Comment:
Gwen Fransen, IDEQ, October 12, 2005 and January 3, 2007
During a July 18, 2005 meeting between Benewah County Commissioner Buell, Acting Region 10 EPA Administrator Kreisenbach, IDEQ Director Hardesty and others, EPA stated its position concerning the City of St. Maries. St. Maries is alleged to be the party that owns part of the site and rented it to B.J. Carney, who operated the facility that released hazardous materials to the environment. Given this alleged relationship, EPA stated that it would require access to the property from the City of St. Maries, but would require Carney Products, B.J. Carney & Company's successor, to fund the remediation. The State would like to see EPA reaffirm their position stated in the July 18th meeting in the Record of Decision that EPA issues concerning the St. Maries Creosote site.

EPA Response:
EPA has identified three PRPs at the St. Maries Creosote Site: the City of St. Maries, Carney Products, and B.J. Carney and Co. Because CERCLA holds PRPs jointly and severally liable for cleanup costs at PRP funded sites, any PRP may be liable for a portion of or the entire cost of a cleanup. It is EPA's current understanding that the City of St. Maries, Carney Products, and BJ Carney have entered into an agreement which allocates cleanup costs among themselves. All three PRPs have indicated a willingness to negotiate a consent decree with the United States to implement the remedial design and remedial action described in this ROD. Although EPA expects that the City will be granting access to the site for the purpose of cleanup, EPA is not aware of how the PRPs have allocated cleanup costs among themselves. See also response to Comment A17.

A2. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
3.0 p. 4 "The St Maries Creosote Site was proposed for listing on the National Priorities list (NPL) in December 2000. Although EPA has not proceeded to finalize listing of the Site, investigations and cleanup are being conducted in accordance with the Superfund law and the regulations set forth in the NCP." **Lake Coeur d'Alene is already listed on NPL as part of the Bunker Hill Superfund Site. The St Joe River opposite the site is at lake level in the summer. Is the river here already listed on the NPL? What are the borders of Lake Coeur d'Alene listed in the NPL for Bunker Hill?**

***EPA Response*:**
Currently, the St. Maries Creosote Site does not overlap the Bunker Hill Superfund Site and it is not anticipated to do so in the future.

A3. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
Also, EPA's CIP states on p. 2 "At this time, EPA is delaying a final decision on its proposal to add the St. Maries site to the National Priorities List, while the RI/FS is conducted. Listing

still remains an option for the future. As part of the listing deliberations, EPA will evaluate whether to designate the site a "Superfund Alternative" site. The principle of a Superfund Alternative response action is to provide the same level of cleanup as if the site were listed on the NPL. Future decisions on listing will depend on the type of cleanup remedy that is identified for the site, as well as the willingness of the potentially responsible parties to voluntarily do the cleanup." **This sounds like EPA is coercing the city with the threat of a listing, when other PRPs may be out there, including the Federal Government, that EPA is not pursuing. Explain.**

EPA Response:
EPA has chosen not to pursue listing at this time as a result of negotiations with the Tribe and State and the willingness of the PRPs to fund the remedy. See also the response to comment A7.

A4. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
Also, where was the riverbank during operations and all of this spillage? Figure 3-1 of the Data Gaps Report shows a very different shoreline in 1960 than today. If the bed and banks were different during operations, who owned, and is responsible for what???

And:
A5. Comment:
3.0 p. 5 "A number of businesses, including B.J. Carney & Company (not related to Carney Products, Ltd.), have been associated with activities at the Site. These businesses were involved in the operation and maintenance of the treating operation…" **Who were these other businesses at the time of spillage? If they no longer exist, who are their successors? Why aren't there more PRPs?**

EPA Response:
As stated in the ROD, the City of St. Maries, B.J. Carney and Company and Carney Products Co., Ltd. have been identified as PRPs for the Site. Additionally, there are several corporate PRPs that no longer exist. Cook Cedar Company treated poles with creosote at the Site in the 1920's. During these operations, spills and releases of creosote and other hazardous substances occurred. In 1960, Cook Cedar dissolved, and B.J. Carney and Company acquired substantially all of its assets including the leasehold interest and fee lands at the St. Maries Site. In 1980, B.J. Carney and Company sold the 8-acre portion of the Site to B.J. Carney and Company, Ltd., a company organized in Canada. In 1982, B.J. Carney and Company, Ltd. sold this property to Carney Products Co., Ltd. In 1987, B.J. Carney and Company dissolved and transferred its assets and liabilities to B.J. Carney Limited Partnership. In 1990, the Limited Partnership dissolved and its assets were distributed to the general and limited partners. The U.S. Bank National Association and certain individuals serve as trustees for the general partners of the Limited Partnership. EPA expects to negotiate the cleanup of the Site with B.J. Carney (meaning B.J Carney and Company, B.J. Carney and Company Ltd. Partnership and U.S. Bank, as Trustee) as well as the City and Carney Products. Any variance in the riverbank would not affect liability. Also see response to Comment A7.

A6. Comment:
Rog and Toni Hardy: Finally, we see no evidence in the technical data and findings to support that Carney Products or the City of St Maries should have been named as potential responsible parties for the St Joe River.

EPA Response:
In accordance with CERCLA 107(a), Carney Products and the City were identified as PRPs based on their status as current owner and/or owner at the time hazardous substances were released at the Site.

A7. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
3.0 p. 5 "Carney Products, Ltd., and the City of St. Maries have been identified by EPA as potentially responsible parties (PRPs) that are liable for cleanup costs at the Site." **Why isn't B.J. Carney a PRP? What are the criteria of Superfund that determine who is a PRP and who does (and pays for) what in these situations? Why isn't the owner of the River (the Federal Government) where the contamination exists a PRP?**

EPA Response:
B. J. Carney has been identified as a PRP. CERCLA Section 107(a) sets forth the categories of PRPs which include owners and operators, owners or operators at the time hazardous waste was disposed, and/or arrangers and transporters. The determination of who does what and who pays for what varies from site to site. EPA understands that at this Site, an agreement exists between the three PRPs which governs these issues. The areas in the upland portion of the Site are the primary sources of contamination. Contamination has migrated from these areas into the sediments of the St. Joe River.

***A8. Comment*:**
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
3.0 p. 5 "A St. Maries web page was created within the EPA Region 10 web site (www.epa.gov/r10earth). People can find site history, contacts, and technical and community involvement documents on this web page." **While more information was on this website than in the library, it was only available to people with access to computers, the documents are incomplete, and many are very time consuming to view. Also, no documents were posted between August 2002 and July 2005. The RI, FS, and BLRA were not posted.**

EPA Response:
In response to this and other similar comments, EPA will be posting more information on its St. Maries Site web page. However, EPA is unable to post all technical documents related to a site on its web page, as some documents take up a large amount of memory on the system, and take a long time for customers to download. The website does not and cannot contain more information than that which is available at the designated information repositories. EPA is required to place all documents that form the basis for a response action including the RI, FS, and BLRA in the Site's Administrative Record (AR). The AR is available for public viewing at two designated locations: the St. Maries Public Library, 822 W. College Avenue, St. Maries,

Idaho, 208-245-3732 and at the EPA Superfund Records Center, 1200 6th Avenue, Seattle, Washington, 206-553-4494. EPA encourages people interested in reviewing documents not posted on the St. Maries web page to access the designated information repositories, or call the site's Project Manager or Community Involvement Coordinator to obtain copies.

A9. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
3.0 p. 6 "In October 2002, EPA worked closely with a local group that applied for a Technical Assistance Grant (TAG) for the Site. Despite a number of revisions to the application, EPA found there were several difficulties in meeting the criteria that could not be overcome by the group. Therefore, EPA and the local group agreed a grant could not be awarded." **Who was this group? What were the criteria that could not be met?**

EPA Response:
This group was the Greater St. Joe Development Association. The criteria the group did not meet to be awarded the Technical Assistance Grant were:

providing required written assurance that it did not receive funds from ineligible entities, such as a potentially responsible party for the site, a township, or a municipality;

and providing required details on how it would reach out to the community to get a broader membership with a diverse range of opinions. For example, the group was asked to give more details about a brochure it proposed to develop, including how this brochure would help the community learn about and be involved in site cleanup, and how it would be advertised and distributed to the larger community.

The group was also asked to provide required details on how the technical advisor would spend his or her time, including percentage spent on helping the public understand the cleanup process, and percentage spent helping evaluate site health care issues.

On April 25, 2003, EPA sent a letter to the Greater St. Joe Development Association asking for a revised application. The group sent a revised application which remained incomplete. On June 24, 2003, EPA sent the group a second letter requesting a complete revised application. The group did not respond further. This TAG was not awarded. However, a TAG is still available for the site if an eligible group were to come forward and apply.

A10. Comment:
Idaho State Senator Joyce Broadsword, October 11, 2005
As with most small rural towns, there is never enough money to pay for needs. If a workable solution can be reached that would have the desired effect, by meeting the requirements of the EPA and holding the City harmless, in my opinion that would be best for all affected parties.

EPA Response:
The City of St. Maries, Carney Products, and B.J. Carney and Co. have apparently reached a workable solution among themselves and entered into a settlement agreement. See also the response to Comment A17.

A11. Comment:
Kim Schwanz August 17, 2005
It over whelms the residents of the city of St. Maries that such a small site with common contaminates that are still used daily throughout the united states can be deemed a super fund site needing over 10 million dollars to clean up.

EPA Response:
Although these chemicals may be in use throughout the United States, improper use, handling, or disposal practices at this Site created the contamination to which EPA is responding.

A12. Comment:
Kim Schwanz, August 17, 2005
Why is it that you have to try and bankrupt a community for a common problem is your next step going to be to attack the wharves at every major port in the United States and have them tear out all of the pilings because of the creosote? The sheen of oil that leaches to the surface along the rivers edge is smaller than what is seen along any piling wall or railroad trestle across a body of water. You are making a mountain out of a mole hill at our expense. Is this your first attempt at making a name for yourself by seeing how much money you can spend on a problem?

EPA Response:
EPA is responding to the release of hazardous substances at the St. Maries Creosote which has occurred in concentrations and quantities which harm both human health and the environment. EPA's response is in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act passed into law by the United States Congress in 1980 as amended (CERCLA). EPA seeks to implement a cleanup that protects human health and the environment in accordance with the provisions set forth by law.

A13. Comment:
Jack Botts August 11, 2005
As Dean said, Mr. Gentry pointed out, this creosote has been used for a purpose. It's in waterways all over the world. Some of the finest fishing bridges in this country are on top of creosoted poles. These fish don't seem to be bothered. We've been eating fish that have been around these creosoted poles all of our lives and the people all around the world have all of their lives. You talked about a sheen on the water from creosote. I don't know if you've walked down to the pier around in Seattle lately and seen the sheen on the water there, and those are creosoted timbers.

EPA Response: Comment noted. See also response to Comment A12.

A14. Comment:
Rog Hardy, August 11, 2005:
But one thing I see is an extremely weak argument. No evidence and a weak argument for an actual migration of upland soil contamination into the river. I see plenty of evidence that there's a lot of contamination along the riverbank. It's my conclusion the most likely way it got there is it

floated along the surface or someone carried a barrel over there and dumped it or it came off a boat that was dumping logs. There are all kinds of ways it got there. You don't know how it is. To nail a principal responsible party regardless of how they get there. They're funding to clean up the entire river for something that might have been dumped directly in the river by some party that's long gone.

EPA Response: EPA is following the CERCLA procedures for identifying PRPs. Please also see responses to comments A6, A7, and C4.

A15. Comment:
Nancy Wolff, August 11, 2005
I've been asked to correct the record just because there seems to be some misunder- -- not misunderstanding, but some perhaps factual misstatements, at least with respect to the environmental fact sheet that was mailed and circulated to all of the members of the City here. The statement that the site is owned, and we're talking about the St. Maries creosote site, the statement that the site is owned by the City of St. Maries is inaccurate. There are two components to the site geographically. One part of the site, which is not adjacent to the river, is privately owned in fee simple at least at this time by the current owner of Carney Products, the company that was working down there under lease. The property adjacent to the river is still, at least if you look at your title reports, title is still vested in the United States of America. The City does not have title in fee simple of this property, and the Mayor asked me to correct that tonight on the record.

EPA Response:
EPA is aware of the City's rationale supporting its position that it is not the owner of the St. Maries Creosote Site. However, the City leased this property to various entities over the years as early as 1939, including the Cook Cedar Company and Carney Products. Please also see response to comments A16, 17, and 18.

A16. Comment:
Dean C. Gentry, January 4, 2007:
Also from reading of NEPA I have real questions and concerns regarding **The finding of Potentially responsible Parties (PRP).** "EPA looks for evidence to determine liability by matching wastes found at the site with parties that may have contributed wastes to the site."

And:
A17. Comment:
Dean C. Gentry, January 4, 2007:
The City of St.Maries was named as PRP. The City does not own the Site. The City did not contribute any of the waste to the Site. In good faith the City has expended approximately $400,000 to resolve this. Our City does not have sufficient money for maintaining and providing the infrastructure for basic services. The expenditure by the City to date will cause hardship and restrict and delay the ability to make needed repairs and improvements within the City. The City's involvement in this Site historically is leasing a portion of the Site for a token fee (not financial gain) to provide a site for a commercial business to operate creating employment

opportunity and economic activity for the area. This was all done during a period when using creosote was not associated with any human health or environmental risks. The business that operated at the Site provided a product that was a basic necessity to utilities, public entities and the federal government throughout the United States.

EPA Response:
CERCLA Section 107(a) sets forth the categories of PRPs which include owners and operators, owners or operators at the time hazardous waste was disposed, and/or arrangers and transporters. EPA identified the City as a PRP based on its ownership and status. Under Section 107 of CERCLA, current owners of facilities may be PRPs regardless of whether the owner contributed any waste to the site. EPA is unaware of how much funding the City has spent on the Site.

The City is part of a PRP group that has previously conducted response actions at the Site and is expected to implement the selected remedy. EPA is not aware of the provisions of the settlement agreement amongst the PRPs which may allocate costs at the Site. However, EPA is generally aware, based upon statements made at the December 13, 2006 public meeting, that the City may be using insurance proceeds for costs incurred at the Site.

A18. Comment
Dean C. Gentry, January 4, 2007:
Carney Products was also named as a PRP. Carney Products did not contribute any waste to the Site. The creosote treatment facilities were demolished and removed in 1964. This was seventeen years before Carney Products began operations at the Site in 1982 without the use of any creosote or any other toxic materials. As a direct result of the EPA naming Carney Products a PRP their business in St.Maries was closed. Nine local employees lost their jobs. It is my understanding the Carney Products business is financially distressed or bankrupt due to the PRP decision of EPA. The economic loss to the St.Maries community was large. St.Maries is the county seat of Benewah County which continually has one of the top three highest unemployment rates of the forty – four counties in the State of Idaho.

EPA Response:
EPA identified Carney Products as a PRP based on its ownership status. Under Section 107 of CERCLA, current owners of facilities may be PRPs regardless of whether the owner contributed any waste to the site. EPA is not aware of the reasons why Carney Products closed its business.

A19. Comment
Dean C. Gentry, January 4, 2007:
The findings of the PRP's should be reviewed and the City of St. Maries and Carney Products should be made whole for all unwarranted expenditures to date and made exempt from any future action.

EPA Response:
EPA is not aware of any unwarranted expenditures incurred by the City or Carney Products related to the Site. Because EPA considers them to be PRPs, EPA expects that the City and Carney Products will be involved in future response actions at the Site..

A20. Comment:
Idaho State Representative Dick Harwood, December 13, 2006:
I just had them questions that I asked earlier. But I was listening to - - they said what kind of an impact will that have in St. Maries. And my district-takes in the Silver Valley, so I'm in the Superfund site up there, and EPA's presence there has been pretty dramatic to the Silver Valley as far as investors and stuff. It's starting to come back now, but it's been that way for a long time. People don't want to move there because of it, and I think you'll see that as an impact here. My one concern is and I guess my comment would be we've: been five or six years now doing this, and I know the longer that the EPA drags it out, the more money they get every year for doing it, but it just kind of frustrates you that it's taken so long' to do this. I mean, it's frustrating. And then to come in and you say you have an alternative plan. Then come in and say, well, we've got another --at least another year before we do anything is frustrating again.

EPA Response:
EPA regrets any delay in the cleanup process for the Site and is committed to moving toward cleanup as expeditiously as possible. Although EPA issued a proposed plan in July 2005 based upon an RI/FS conducted by Carney Products and the City, EPA was open to subsequently considering a.different cleanup alternative supported by all of the PRPs. The supplemental FS, Revised Proposed Plan, and additional public comment period added time to the process, but EPA believes that it was the appropriate course to follow.

B. Cost of Preferred Remedy

B1. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
6.2 p. 21 "Estimated costs have a plus 50 to minus 30 percent accuracy." **So, a cost estimated at ten million dollars might cost as much as fifteen million dollars, right?**

EPA Response: *Correct.*

B2. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
7.2 p. 29: **For removal and capping of bank soil and shoreline sediment, EPA does not include a discussion the different costs of each alternative. We have no feel for which alternative might be the most cost effective. Digging deeper might be only marginally more effective.**

And

B3. Comment:
6.2 p. 25 "*Alternative 8 (New)…* Estimated Total Cost: $10,239,000 (Capitol Cost: $9,479,000; O&M Cost: $760,000)" **How do these costs divide among the subareas and specific actions? What are time and volume rate costs? Who pays for what? If this isn't worked out yet,**

what are the range of possibilities? How can the public fully comment before this information is made available?

And
B4. Comment:
7.7 p. 33 "These estimates are approximate and made without detailed engineering design. The actual cost of the project would depend on the final scope of the remedial action and on other unknowns." **Again, EPA provides no rationale for how these costs were determined, no breakdown by subarea or action, or who might pay them. This is wholly inadequate, and precludes the public from meaningfully commenting on the Proposed Plan.**

EPA Response:
Costs for each of the 13 alternatives developed during the RI/FS process, including the costs for the Selected Remedy, Alternative 9A, are broken out by subarea and action in Appendix H of the Supplemental FS. This and all other information which EPA used to make its decision is required to be part of the Administrative Record (AR) for the Site. The St. Maries Site AR was made available to the public at two designated locations during the two public comment periods. EPA understands that cleanup costs are allocated among the PRPs in accordance with agreements which exist between them. Although generally aware of these agreements, EPA is not privy to their details and they are not a part of the public record.

B5. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
6.2 p. 26 "The area will be capped to prevent precipitation and flood water infiltration and be resistant to scouring during flood events." **This shouldn't cost much and is worth doing.**

EPA Response:
After its initial proposal by the PRPs and further development by EPA and the PRPs, Alternative 9A was chosen as the Selected Remedy for the Site. The Selected Remedy improves upon a capping remedy by excavating and thermally treating the majority of contamination found in the upland soils. The Selected Remedy further renders contamination in the Site's deeper soils immobile, preventing not only the contamination of groundwater, but also the recontamination of river sediments through the groundwater recharge process. The Selected Remedy better satisfies NCP's preference for treatment as a principle element of the remedy and also uses presumptive remedies in addressing Site contamination. EPA believes that the Site contamination is best addressed by the Selected Remedy. Further description of this preference is described in the Comparative Analysis of Alternatives section of the ROD.

B6. Comment:
Jack Botts, August 11, 2005
This is a very poor county. Traditionally ranks in the highest unemployment in the State of Idaho. Our people have -- probably have to receive more in government paid health benefits than any other area. We don't have this kind of money to spend to do something like this. And I don't see and I have yet to be convinced that it is needed.

EPA Response: Comment noted

B7. Comment:
Jack Botts August 11, 2005
I think it is absolutely nauseous to think about even mentioning, while there might be grant money to pay for it, it's still $10 million, and I don't think it's needed to be spent. And in a nutshell, I think the whole thing is probably way beyond ridiculous at this point.

EPA Response: Comment noted

B8. Comment
Dean Gentry, August 11, 2005:
I'd like to just --my name is Dean Gentry. I'd like to reiterate what Jack has said, but St. Maries – the City of St. Maries paid a heavy price up to this date due to this problem, whether you consider it a problem or just a made-up thing. I understand they spent about $356,000 on this, which is $137.00 per person based on a population of 2600 people. Family of four, $548.00. If you're talking about 10.4 million, 2600 people, if we had to pay it, that's $4,000.00 per person, 16,000 for a family of four. The Carney Pole Company down here that operated here, as I understand it we had nine full-time jobs down there. Jack talked about our high unemployment rate and our poverty level. We lost nine jobs. They're down at Juliaetta, Idaho. Our loss, their gain. In addition to the jobs, all the operating expenses, they bought power from Avista to run the plant. They had equipment that they maintained and bought parts and fuel. There's probably another half a million dollars circulated through the community, and it's gone. And I have no idea, I've heard millions of dollars that that company has had to pay out, along with the city, to get where we're at today.

EPA Response:
The City is part of a PRP group that has previously conducted response actions at the Site and is expected to implement the selected remedy. EPA is not aware of the provisions of the settlement agreement amongst the PRPs which may allocate costs at the Site. However, EPA is generally aware, based upon statements made at the December 13, 2006 public meeting, that the City may be using insurance proceeds for costs incurred at the Site.

B9. Comment
Dean Gentry January 4, 2007:
Do we know the costs? No, the costs are "uncertain". This is an indication we do not really know what we are doing and exactly how we are going to do the task. The range from uncertain to an estimate of $11,222,000 with a variable of plus 50 % ($16,833,000) to minus 30 % ($7,85540) is far in excess of what I believe is necessary to achieve a remedy that would provide a positive solution to the majority, if not all of the nine evaluating criteria you have listed.

EPA Response:
Costs are estimated for each alternative in accordance with Chapter 6, Detailed Analysis of Alternatives, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, October 1988:

> Accuraccy of Cost Estimates.
> Site characterization and treatability investigation information should permit the user to refine cost estimates for remedial action alternatives. It is important to consider the accuracy of the costs developed for alternatives in the FS. Typically, these "study estimates" costs made during the FS are expected to provide an accuracy of +50 percent to -30 percent and are prepared using data available from the RI."

C. Contaminant Source and Migration

C1. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
3.2 p. 7 "The major source area is the former treating area. There may have also been disposal of wastes at the riverbank that contributed to the impacts observed in the bank soils and shoreline and nearshore sediments." **What is the relative contribution to the bank soils and nearshore sediments from the treating area, and from disposal at the riverbank? The bed and the banks of the river have a different owner (the Federal Government). Shouldn't they be a PRP?**

EPA Response:
The site investigation work identified the nature (type of contamination) and extent (where the contamination is) through multiple rounds of sample collection (soil, groundwater, and sediment) and analysis. This characterization effort has identified current site conditions to the best ability of the investigation tools applied. Site records were reviewed to determine the method of release of contaminants; however, site records did not document waste disposal activities. Due to the dynamic nature of contaminant transport in the subsurface and in the sediments, and the amount of time that has passed since the site has been used for pole treating, it is not possible to determine how much material was contributed from which potential source.
The areas in the upland portion of the Site are the primary sources of contamination. Contamination has migrated from these areas into the sediments of the St. Joe River. EPA did not consider the owner of the bed and banks of the river to be a PRP at the Site.

C2. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
3.2 p. 8 "Creosote in the upland soil, groundwater, and sediments will continue to act as a source of contamination to the environment unless actions are taken to control ongoing releases**." We assume by 'environment' you mean the river. Again, what data supports this statement? This CSM appears to suggest this only as a plausible alternative. What data do you have to preclude another plausible alternative that the great majority of river contamination could be the result of surface flow during operations, and/or dumping directly at the riverbank, as you state could have happened?**

And
C3. Comment:
Also, the last known discharge from the treatment was nearly 40 years ago. At the rates of groundwater flow (~40ft to ~300ft per year, p. 7) it seems plausible most dissolved DNAPL that is going to reach the river (if any did through groundwater flow) has already done so. Discuss.

And
C4. Comment:
Finally, why didn't someone notice and report seepage and this 'sheen' at the riverbank before 1998? If contamination was migrating through groundwater, and given the groundwater flow rates and distances involved, it seems plausible the river bank contamination would have been more visible much earlier.

EPA Response:
In June 2003, a soil and sediment investigation was conducted by Geomatrix on behalf of BJ Carney and Company (Remedial Investigation Addendum: June 2003 Data, Retec, 2004a). Three soil borings were located at the former treating area (GGP-3), midway between the treating area and the river (GGP-2), and near the riverbank (GGP-1). Data from the boring at the former treating area indicated significant groundwater weathering of the creosote in the subsurface in this area. Data from boring GGP-2 indicated that creosote impacts at depth were not from surface deposition but from lateral migration. Data from boring GGP-1 indicated both a potential surface source and a source at depth from lateral migration. This data set confirmed the original investigation work documented in the Final Remedial Investigation (RI) (Retec, 2004b). The CPT-ROST data clearly show the stair-stepping downward pattern of the bulk of the creosote body as it migrated away from the source area, laterally in the sand beds of the interbedded unit beneath the site. Data indicate that creosote released from the main treating area has migrated both vertically and laterally in the subsurface. In addition, data indicate that there may also have been surface spills in the area close to the riverbank.

Groundwater impacts resulting from leaching from contaminated soils are discussed in Section 6.2.2 of the Final RI. Once dissolved, the rate at which a chemical migrates to a receptor is based on advection, diffusion, dispersion, sorption, and biodegradation. Based on these factors, those constituents in DNAPL with relatively higher water solubilities and low retardation rates will dissolve and travel with groundwater. Those constituents in DNAPL with lower water solubilities and high retardation rates will stay associated with the soil and not move. Naphthalene is most prevalent in the dissolved phase due both to its low retardation factor (7) and relatively high effective solubility (2.3 mg/L). Based on solubility limits (RI Table 6-3), other constituents such as phenanthrene, acenaphthene, and fluorene are likely to be present in groundwater in the area of a DNAPL source. But of these constituents, only acenaphthene and fluorene are likely to migrate rapidly from the source. The presence of benzene in impacted soil and groundwater at the St. Maries Creosote Site suggests that this compound is a component of the St. Maries creosote, and, due to its chemical nature, it is also likely to migrate more rapidly from the source. Higher molecular weight constituents of DNAPL, like the carcinogenic polynuclear aromatic hydrocarbons (PAHs) (e.g., benzo(a)pyrene) are not readily dissolved in groundwater and therefore will remain in soils close to the original source area.

During the records search, EPA found no information identifying the presence of a sheen on the river prior to 1998. A sheen may have been present, but it was not reported.

C5. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
7.0 p. 26 "This evaluation differs from the FS analysis of alternatives in that the Site was divided into five subareas (as shown in Figure 4)." Figure 4 is far too general to accurately show these subdivisions, and gives no information as to the data that supported the edges of the subareas. EPA presenting such a cursory cartoon in the Proposed Plan is condescending to the public. Also, the 'bank soils' line does not point to the river bank. As this is the most contaminated subarea (Data Gap Report), this is a glaring error, and undermines the credibility of the Proposed Plan.

EPA Response:
The commentor is correct in that Figure 4 is too general to precisely show the boundaries of each subarea. The boundaries have been estimated based upon data collected during the Remedial Investigation. Additional data to be collected during the remedial design phase will provide more detailed boundary information. EPA has updated Figure 4 to address the commentor's concerns regarding the arrow pointing to the bank soils

C6. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
7.1 p. 27 "The time needed to reduce concentrations to acceptable levels is site specific and can take tremendously long periods of time, especially for DNAPL sites…. Though natural degradation processes are most likely occurring along the edges of the contaminated upland area, data show that dissolved phase contaminants and DNAPL are reaching the St. Joe River at concentrations greater than risk-based protective levels." **We have read the Preferred Plan, and we see no mention of data that 'show' contaminants are reaching the river from the upland area in greater than acceptable levels. Instead, we see a question mark on the CSM cartoon (fig 1), and the sentences:** "<u>It is believed</u> that creosote in this shallower zone has moved laterally towards the river, resulting in releases to the sediment and surface water (p.7). And, "Because of the site's close proximity to the river, dissolved PAH in groundwater <u>could</u> migrate and partition to river sediment causing a <u>potentially</u> unacceptable risk to benthic organisms." (p 8). **(Underlined emphasis ours.)**

EPA Response:
See also the response to the comment C2 above. With groundwater discharging to surface water, the groundwater quality is a concern with respect to surface water quality and partitioning to surface sediment. The amount of attenuation that occurs as the groundwater migrates from the source area to the mudline, and the resultant groundwater concentration at the river mudline were estimated using the USEPA modeling program BIOSCREEN. Methods and results of the model were presented in detail in Section 6.2.4 and Appendix S of the Final RI. For groundwater

partitioning to sediments, adsorption to the organic material in sediment is controlled by the solubility of the individual compounds and their sediment/water partitioning coefficients. The higher the partitioning coefficient, the more strongly compounds are adsorbed to sediment. Therefore, heavy PAH will be adsorbed most strongly, lighter PAH less strongly, and phenolic compounds would be least strongly adsorbed. Future sediment concentrations predicted from the BIOSCREEN model using current groundwater concentrations, were compared to site-specific screening levels to determine the potential future impact due to partitioning of dissolved groundwater contamination to the river sediments. Groundwater concentrations of naphthalene are predicted to affect sediment quality in the upper silt unit. Concentrations exceed screening criteria for both human health and ecological criteria. In the interbedded unit, the model predicted naphthalene concentrations to be above human health and ecological screening levels in the sediment within 30 and 100 years.

C7. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
7.1 p. 27 "For DNAPL sites, the EPA recommends that natural attenuation be selected as part of a remedy only in conjunction with source removal or containment." **EPA is just spouting dogma that is not relevant to this site. We are sure EPA would agree that natural containment in low permeability soils out of the reach of any drinking water wells occurs in other sites. And, you present no evidence in the Proposed Plan that contaminants are reaching the river through groundwater from the upland area.**

EPA Response:
See responses to comments C2 and C6 above.

C8. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
7.1 p. 28 "All of the remedial actions include removal or solidification of bank soils and are considered to be protective of human health and the environment". **No argument here, but EPA does not adequately characterize the nature and extent of these bank soils, or the cost and volume needed to remove them. And, EPA does not adequately determine how these bank soils got contaminated, who did it, or who might pay for this part of the action.**

And
C9. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
7.1 p. 27 "All of the remedial actions include removal of shoreline sediments and are considered to be protective of the environment; however, alternatives that include removal of contaminated material from greater depths are considered to provide a higher degree of protectiveness." **Our comment on bank soils applies to shoreline sediments too.**

EPA Response:
EPA believes that the bank soils and shoreline sediments have been adequately characterized to determine the nature and extent of contamination and to select an appropriate remedy. Additional characterization may be conducted during the remedial design phase to further guide

excavation. The costs and volume estimates associated with contaminated bank soil removal for each remedial alternative are detailed in Appendix H of the Supplemental Feasibility Study. Also see responses to comments A6 and A7.

C10. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
3.2 p. 7 "This contaminated groundwater migrates towards the river and is released to sediments and surface water." **Data shows that groundwater does usually migrate toward the river, but what data shows the river sediments contamination is actually from this contaminated groundwater?. What data shows that there is even surface water contamination?**

EPA Response:
See also the responses to the comments C4 and C6 above.

Surface water samples collected from the St. Joe River were compared to risk-based screening criteria. Concentrations were all less than screening criteria established for the site chemicals of concern (as stated in Section 6.2.3. of the Final RI).

C11. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
3.2 p. 7 "It is believed that creosote in this shallower zone has moved laterally towards the river, resulting in releases to the sediment and surface water." Why does this sentence start with "It is believed"? Also, there is a question mark in Figure 3, and a gap in DNAPL contaminated layers at this location. A lot of data exists in this area, but the conceptual site model text and figure introduce ambiguity on the connection between the upland soil and bank and river bodies of contamination.

EPA Response:
Given the physical soil data documented in soil boring logs, chemical data from soil and groundwater sampling and analysis, and in-situ soil physical and chemical testing (push-probe) data, a conceptual site model was developed. An iterative process was used to guide the site investigation. The initial round of sampling and analysis was conducted to get a general idea of the site conditions. EPA reviewed these sampling data and identified gaps in the understanding of the nature and extent of contamination. Several rounds of additional investigations were conducted to fill identified data gaps until a good understanding of the site soil, groundwater, and sediment conditions was achieved. There are still gaps in the data set where additional testing could give a more definitive understanding of the site. However, the evidence that exists supports the conclusions presented in the Proposed Plan: that creosote has migrated from the former treating area in both the product and dissolved phase, and is contributing to sediment contamination found in the St. Joe River.

C12. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
3.2 p 7 "Once the creosote reached the river sediments, contaminated sediments were mobilized during periodic flooding events and deposited down stream." **Actually, some high flow events**

that caused this re-depositing may have been at low river levels, and not associated with flooding. And, some floods have been the result of the lake backing up in a slack-water current regime, and not resulted in re-deposition, but deposition of clean sediment on top of the contaminated sediment. This may be relevant in the choosing and design of your proposed plan for river sediments.

Also, re-deposition downstream will result in a dilution of the contaminants. EPA provides no discussion of how long it would take for nature to dilute the contaminants in the river to the point they are no longer harmful. This may be a very long time, but this should be discussed in consideration of the 'no action' alternative.

EPA Response:
The comments made about the flooding dynamics in the St. Joe River adjacent to the Site have been noted and will be considered should capping become necessary.

EPA does not consider dilution as a favorable remediation process as it only spreads contamination further into the environment. Although the dilution of contaminated sediments is undoubtedly occurring, the rate of dilution is unpredictable and uncontrollable. Contamination could be spread much further downstream than it already has, impacting natural resources,-prior to achieving concentrations protective of those resources. EPA, in selecting its remedy, prefers that contamination either be treated or contained. To meet these goals, EPA has chosen a remedy which will achieve compliance with the Remedial Action Objectives (RAOs) at the completion of the remedy construction.

C13. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
3.2 p. 8 "Through time, the periodic flooding and re-depositing of contaminated sediments has resulted in contaminated sediments observed at least 900 ft downstream of the site." **EPA shows no data control points in the Proposed Plan maps to support this. The Data Gaps Report, available on the web, shows control points constraining a contaminated sediment range of about 400ft by 100ft. Has there been sampling since the Data Gaps Report? Explain.**

EPA Response:
The field investigation program supporting the Feasibility Study and Proposed Plan is presented in detail in Section 3 of the Final RI (Retec, 2004b). Samples are identified in Table 2-3 and shown on Figures throughout the Final RI. Figure 7 in the ROD shows the locations of the sampling points used to develop the CSM and the remedial alternatives considered for the Site. Several sampling locations in the offshore area were used to estimate the sediment impacts as far as 900 feet downstream.

C14. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
3.3 p. 8 "Based on the sampling results, a plume of contaminated groundwater extends from the treatment area to the river and contains about 900,000 gallons of water." **Based on the CSM, a**

more accurate statement would substitute the word "to" with "near" and "under" the river.

EPA Response:
The 900,000 gallon estimate was based on the aerial extent of the groundwater plume identified in Figure 3-1 of the Supplemental Feasibility Study (Arcadis, 2006), the estimated depth of contamination (approximately 45 ft), and the porosity of the soil. This estimate applies to the upland soil area and does not include the area within the river channel.

C15. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
3.3 p 8 "Because of the site's close proximity to the river, dissolved PAH in groundwater could migrate
and partition to river sediment causing a potentially unacceptable risk to benthic organisms." **Again, this is plausible, but you have lots of data, and are using the words 'could' and 'potentially'. Why?**

With all this data, why did EPA chose to run a model? Who paid for this effort?

EPA Response:
Even though there is much evidence to indicate risk to natural resources from exposure to site-related contamination, it is difficult to predict exactly what will happen in the future. Therefore, the BIOSCREEN model was used as a tool to predict potential future impacts to river sediments if contaminated soil and groundwater were left untreated.
In accordance with the AOC between EPA and the PRPs, EPA will seek cost recovery from the PRPs for all RI/FS work done at the Site

C16. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
3.3 p. 9 "However, during times of low water, creosote can be seen seeping in small quantities from the riverbank into the river." **What data connects this observation to the issue of groundwater contamination flowing into the river? You don't say whether this seepage is out of clean fill, or old bank that may have received dumping directly.**

EPA Response:
Dissolved phase contaminants in groundwater are distinctly different than sheen or free phase product. Dissolved phase cannot be seen and must be tested for in water samples. However, sheen, as well as creosote drops, can be observed in the water within the riverbank area where the containment boom is currently located. Due to the riprap covering the bank in this area, it is not possible to directly observe exactly where the free phase creosote it coming from. Borings placed in the upland area, close to the area where the sheen and creosote drops have been observed, show a highly contaminated zone at 9.5 feet below ground surface (bgs). This zone of separate phase product could be migrating towards the river, released, and observed as sheen. Information collected during the remedial design and construction phase, which includes the

removal of all contaminated materials, may provide evidence as to the source or sources of the sheen.

C17. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
6.2 p. 26 "Bank soils, shoreline sediments, and nearshore sediment will be removed, treated on site, and
disposed off site. Removal of these most highly contaminated areas (to a depth of 8 ft) and backfilling with clean material to the original bathymetry will restore the aquatic and benthic environment and prevent further migration of contaminated sediments downstream." **EPA has mixed a wide range of sediment types in settings in this long sentence, with a huge range of contamination levels. There is a core of bank and shoreline sediments that may warrant removal., The large majority of this material, however, has much lower contamination levels that, with removal of the high-level core, may dilute to acceptable levels in an acceptable amount of time. Again, EPA needs to discuss natural dilution through transport down-river.**

EPA Response:
See the response to comment C12 above.

C18. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
p. 7-20: "we believe based o the evidence that there's still creosote and contamination that is moving from this site into the river…", and 10-25: ""And over time creosote…moves down until it…can't move any more and then moves laterally. And in this case it's not very far from the river and it's moving into the river.", and 18-8: "…and keep that large pool of contamination from continuing to feed into the river." Please state what document submitted states that creosote IS PRESENTLY MOVING into the river. We've read a lot of "possibly", and "may be", but the authors of the RI/FS repeatedly resisted EPA pressure to say creosote IS PRESENTLY MOVING into the river. Please explain.

If EPA still stands by the statement of Ms Carpenter on p. 54-21, that **"…we believe it (creosote) is migrating based on the evidence that was collected…"**, please cite the evidence.

EPA Response:
See also the responses to C4, C6 and C11. The weight of evidence collected in support of the remedial investigation indicates that there is an uncontrolled source of creosote remaining in site soils. This creosote source is currently impacting groundwater, which in turn, is migrating to the river.

Contaminated groundwater at unacceptable concentrations has been detected in the groundwater which is moving into the river.
Site groundwater poses a risk from two exposure pathways:

- Human health risk from use as a future drinking water source

- Ecological risk to aquatic and benthic organisms from migration to and accumulation in sediments

Because of these two different pathways, cleanup levels for groundwater for each chemical of concern were selected as the lowest of either the federal drinking water standards, called Maximum Contaminant Levels (MCLs) (or the EPA Region 9 PRGs for tap water where MCLs have not been established), or a site-specific groundwater concentration calculated to be protective of sediment. Selection of the lowest of these values ensures that both of the risk pathways will be protected. The calculation method is detailed in the RI. Groundwater cleanup levels for the Site chemicals of concern are listed in Table 5.

C19. Comment
Dean Gentry, January 4, 2007:
My understanding is creosote does not dissolve in water but will slowly and safely dilute over time. The fact that the creosote was first used at this Site 1939 and the St.Joe River water remains well below toxic levels seems to give evidence suggesting the River has a sufficient flow of water to safely and naturally dilute any toxins in the River sediment or likely to seep (or not seep) into the sediment.

EPA Response:
A lower percentage of creosote does dissolve in water. As a result, an effort to predict the impacts of those dissolved contaminants on river sediments and water quality was implemented during the Remedial Investigation using the USEPA modeling program BIOSCREEN. The results indicated that contaminants dissolved in the groundwater will adversely impact river sediments in the long term. Also see response to comments C6, C12, and C18 above.

D. Risks to Human Health and the Environment

D1. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
3.3 p. 9 "Based on field observations and physical and chemical testing, the amount of creosote with the potential to migrate is limited." **Then, just how great is the threat to the environment?**

EPA Response:
Risks to human health and the environment were calculated as part of the baseline risk assessment, and presented in Table 1 of the Proposed Plan:

> "An Ecological Risk Assessment indicated that the potential for significant ecological impacts at the Site is high. The BLRA indicated that there is current risk to benthic invertebrates and benthic fish in the nearshore area. Potential risk to mink could not be ruled out. No significant risk was found for pelagic fish and aquatic invertebrate communities exposed primarily to the water column."

D2. Comment:

Rog and Toni Hardy, October 12, 2005 and January 5, 2007
4.1 p. 11 "For humans, there were no unacceptable excess cancer risks (greater than 10-4) or noncarcinogenic risks (hazard index (HI) greater than 1) for current or future exposure scenarios except for a hypothetical on-site resident exposed to drinking water." **Explain how the expenditure level of over ten million dollars for the proposed plan is appropriate given this lack of human risk.**

EPA Response:
There are actionable cancer risk rates greater than 10^{-6} for several soil exposure scenarios, and, as the commentor noted, a hazard index greater than one for the use of Site groundwater as a drinking water source. The Selected Remedy eliminates the causes of these risks in an efficient manner using preferred remedy components called out in the NCP

D3. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
4.2 p. 11 "An Ecological Risk Assessment indicated that the potential for significant ecological impacts at the Site is high." **Explain what you mean by 'significant'; the BLRA shows risk principally to insect larvae and worms in a 150ft by 900ft area. Explain how the expenditure level of over ten million dollars for the proposed plan is appropriate given this level of ecological impact.**

EPA Response:
Significant refers to those impacts which induce toxicity to benthic organisms. The ecological risk evaluation used a two tiered screening process (Tier 1B and Tier 2) of ecological risk based on more site-specific conditions. In Tier 1B, site data were reviewed and refined to include site-specific exposure considerations and toxicity endpoints to further characterize ecological effects and risk. The Tier 2 evaluation incorporated additional site-specific receptor data (e.g., lines of evidence) from field studies and bioassays. This evaluation indicated that there may be significant ecological risk to benthic invertebrates and benthic fish in areas next to and immediately downstream of the site.

The EPA has the authority to address these impacts under the National Contingency Plan:

> "The NCP applies to and is in effect for:
> (1) Discharges of oil into or on the navigable waters of the United States, on the adjoining shorelines, the waters of the contiguous zone, into waters of the exclusive economic zone, or that may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States (See sections 311(c)(1) and 502(7) of the CWA).
> (2) Releases into the environment of hazardous substances, and pollutants or contaminants which may present an imminent and substantial danger to public health or welfare of the United States."

The Selected Remedy is a cost effective approach to address impacts to the environment from contaminants released from the St. Maries site.

D4. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
4.2 p. 11 "The bull trout migrates up the St. Joe River past the Site and finally into the St. Maries River."
How much time would Bull Trout actually feed in the contaminated area? Explain how the expenditure level of over ten million dollars for the proposed plan is appropriate given this level of ecological impact?

EPA Response:
No significant risk was found for resident or migratory fish, including the Bull Trout nor the aquatic invertebrate communities exposed primarily to the water column. Therefore the Selected Remedy does not address the Bull Trout or its water column environment and there is no cost associated with this exposure pathway

D5. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
5.2 p. 14 "The Site does not pose an unacceptable risk to human health from direct contact exposure to soils… Site groundwater poses a risk from two exposure pathways: Human health risk from use as a potential drinking water source, and ecological risk to aquatic and benthic organisms from migration to and accumulation in sediments…Shoreline, nearshore, and offshore sediment currently pose an unacceptable risk to aquatic and benthic organisms." **Human health risks can be managed by not drilling drinking water wells. Ecological risk is only to worms and insect larvae. Have we missed something? Given the size of the area, and the risks, does this small area need a ten million dollar remedy?**

EPA Response:
In addition to using Site groundwater as a source of drinking water, the Site does pose an actionable risk to human health from direct contact exposure to soils (ie. risk greater than 10-6) by industrial/commercial workers and recreationalists.

Ecological risk exists not only for worms and insect larva, but also to other organisms as the contamination moves up the food chain. The BLRA identified risk to sediment-dwelling fish and, to animals such as mink,who consume contaminated fish.

EPA has determined that the Selected Remedy complies with the requirements of CERCLA and the NCP. The Selected Remedy is protective of human health and the environment, complies with ARARs, is cost effective, and utilizes permanent solutions and alternative treatment technologies.

D6. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007

6.2 p. 26 "Upland soils and groundwater would be contained on site with a four-sided sheetpile and slurry wall in a waste management area. The wall will be extended into the lower silt unit (approximate depth of 60 ft) to prevent migration of DNAPL and impacted groundwater to the river." **EPA has not made a convincing argument that the upland groundwater is enough a risk to the river to justify this expense. Justify.**

EPA Response:
The commentor is referring to Alternative 8 which was presented as the preferred alternative in the July 2005 Proposed Plan. As the result of a proposal received during the July 2005 Proposed Plan public comment period, the PRPs and EPA developed a new alternative, Alternative 9A. EPA presented Alternative 9A as the New Preferred Alternative in the December-2006 Revised Proposed Plan. After considering comments presented during the public comment period associated with the December 2006 Revised Proposed Plan, EPA chose Alternative 9A as the Preferred Remedy. The rationale for this choice is described in detail in the December 2006 Revised Proposed Plan and in this ROD.

EPA has determined that the concentrations of contaminants in the groundwater are high enough to pose unacceptable risk to humans and the river's benthic community.

Site groundwater poses a risk from two exposure pathways:

- Human health risk from use as a drinking water source
- Ecological risk to aquatic and benthic organisms from migration to and accumulation in sediments

Because of these two different pathways, cleanup levels for groundwater for each chemical of concern were selected as the lowest of either the federal drinking water standards, called Maximum Contaminant Levels (MCLs) (or the EPA Region 9 PRGs for tap water where MCLs have not been established), or a site-specific groundwater concentration calculated to be protective of sediment. Selection of the lowest of these values ensures that both of the risk pathways will be protected. The calculation method is detailed in the RI. Groundwater cleanup levels for the Site chemicals of concern are listed in Table 5

D7. Comment:
Jack Botts, August 11, 2005:
Thank you. And I'm a long-time resident. I was born in St. Maries. And I appreciate the comments that have been made from the scientific and geological standpoint. I've learned a lot tonight. And I appreciate the comments from the audience. And I'm a retired pharmacist, and I think I know a little about public health, and I haven't seen anything in this presentation that has caused me to have concern for public health of the people of this area or now, past or in the future. There is theoretically some possibilities, some damage to some organisms that may or may not be in the ground, worms and larva, and this is a very small plot of ground, and I don't think that is worth spending $10 million for in cleanup.

EPA Response:
Comment noted. Also see response to comment D8.

D8. Comment:
Dean Gentry, January 4, 2007:
It is stated the only human health risk is from the use of ground water at the Site and to people who may work or play and have contact with the contaminated ground. You also state the City prohibits water wells in the City thus eliminating ground water exposure risk.

The ecological risks are unknown and the future risks resulting from the proposed remedy (during the work and after) are unknown. My reasoning is this. Are the River sediments and benthic invertebrates toxic or are they not toxic? If either or both are toxic, is this really an environmental and ecological risk? If so, how large a risk? Do we know how much sediment and benthic invertebrates a catfish would be required to consume so as to become toxic? Do we know how long that catfish would need to feed in this one isolated minuscule spot of sediment of the River to become toxic? Do we know the short and long term damage which may occur from disturbing the sediments below water?

EPA Response:
Remedial Investigation data for the Site indicate that the higher concentrations of PAHs in the river sediments are toxic to the local population of invertebrates.

For both invertebrates and fish, toxicity has two major sources in creosote mixtures, polynuclear aromatic hydrocarbons (PAHs) and oil-related substances. There is scientific consensus that PAHs cause toxicity through a mechanism called "narcosis," which slows and eventually stops biological processes in fish and invertebrates. The effects are cumulative (more PAH, more effect) and additive (different PAH compounds act similarly, and can be summed to predict an effect level). For the oil portion of the creosote, there is also an inherent toxicity. Instead of slowing the organism's responses, oil interferes with ("fouls") the organism's surface processes. In fish, it reduces the amount of oxygen available to the fish from fouled gills. For benthic organisms, it inhibits respiration and coats food particles, reducing the ability of the organisms to find food

Benthic populations (bottom-dwelling worms, clams, arthropods, etc.) that are in direct contact with PAH compounds suffer direct toxicity and are not able to substantially break down PAHs in their bodies. Fish, on the other hand, can break down limited amounts of PAHs in their liver, and are less susceptible to the toxic effects of PAHs taken up from their food. The impacts to fish health can be estimated using published values based upon measured sediment and tissue concentrations. Toxicity testing is the primary tool used to measure toxic effects on invertebrates.

For human, it is possible to calculate the risk to fish/shellfish consumers based upon their fish/shellfish ingestion rates (grams per day, for example).

Dredging in flowing water does dislodge sediment which can be transported by the river currents to other areas. However, there are practices which, when implemented, isolate the dredging from flowing water (ie silt curtains or sheetpiles). The Selected Remedy will-utilize these best management practices to minimize the short-term effects of sediment suspension and releases of dissolved compounds.

E. EPA's Selection of the Preferred Alternative

E1. Comment
Dean C. Gentry, January 4, 2007:
As the EPA states, creosote was commonly used as a wood preservative for decades prior to learning it contained toxic chemicals. There are certainly millions of gallons of creosote on poles and timbers used in bridges, trestles and retaining walls submerged in water throughout the United States. There are undoubtedly sediment, fish and benthic invertebrates in and around most all of the submerged wood. We have not reacted to knowledge of the toxic chemicals in this submerged wood by immediately bringing the United States economy to its knees and removing all submerged creosote treated bridges, trestles and retaining walls. Instead we have used common sense and stopped using creosote to treat wood. The same common sense must be applied to remedy the St. Maries Creosote Site.

EPA Response:
EPA is responding to spills, leaks, and perhaps dumping of a hazardous substance at the St. Maries Creosote Site which has created a threat to both human health and the environment. EPA has worked in cooperation with the PRPs to further develop a remedial alternative proposed by the PRPs to clean up the Site. After comparing this new alternative to all of the other alternatives previously developed using the nine comparison criteria as outlined in the NCP, EPA chose the new alternative as the Selected Remedy for the Site.

E2. Comment:
Frank Werner, December 13, 2006:
I am not satisfied with the depth to which the lower cost alternatives have been studied.

EPA Response:
The common remedy among the lower cost alternatives is monitored natural attenuation or monitored enhanced natural attenuation (e.g. with air sparging). EPA has determined that these alternatives are not acceptable at the St. Maries Site because they do not reduce risk to acceptable levels in a reasonable amount of time. Comments received during the public comment period requested further analysis of natural attenuation timeframes and efficiencies. This analysis (Attachment 2) determined that both natural attenuation and enhanced natural attenuation (i.e. air sparging) of the upland soils and groundwater is not effective in the short term. The earliest effectiveness is estimated at 30 years) Risk to construction/industrial workers would remain unacceptable and the continued transport of contaminants carried by groundwater into the river would continue to impact-the benthic community and could also recontaminate river sediment remedies. These alternatives failed to meet the first of the nine comparison

criteria, a threshold criteria, Overall Protection of Human health and the Environment (detailed in Section 2.10 of the ROD), and therefore were excluded from further consideration.
.

E3. Comment:
Joyce Broadsword, October 11, 2005
It is my understanding that the Principally Responsible Parties have recently sent you an alternative plan to those offered by the EPA. The three PRP's worked together to come up with a collaborative proposal that will address the problem and will relieve the City itself of the burden of paying for any of the clean-up.

I support the City of St. Maries and ask you to give time and consideration to the alternative plan offered by the PRP's.

EPA Response:
EPA worked with the PRPs to study and further develop the alternative they proposed. EPA issued a Revised Proposed Plan in December 2006 which compared and highlighted the new alternative to all of the previously developed alternatives. After considering all comments submitted during the public comment periods, EPA chose the new alternative as the Selected Remedy for the Site.

E4. Comment:
Kim Schwanz, August 17, 2005:
If the bottom of the river in this small section is absent of some micro organisms and worms because of the creosote that was dumped there or is minutely leaching there why is it that we cannot put in a piling wall with bentonite slurry behind it to stop the migration. For the river bottom itself wouldn't it be possible of positioning bentonite bags along the bottom and then placing ballast on top of it to hold the seal in place. This would be a far more inexpensive way to contain this area.

EPA Response:
The Selected Remedy will remove and thermally treat the top twenty feet of contaminated upland soil and contaminated bank soil and stabilize those contaminated upland soils below 20 feet to eliminate contact with groundwater and stop the migration of contaminants from the source into the river. The PRPs proposed these actions in their October, 7 2005 comments to the 2005 Proposed Plan (Attachment 3). EPA believes that these actions will be adequate to address the migration of contaminants from the upland source and are cost effective. See also Comment E23.

E5. Comment:
Gwen Fransen, Idaho DEQ, October 12, 2005:
The Department of Environmental Quality has reviewed the technical memoranda, remedial investigation, feasibility study and the proposed plan for the St. Maries Creosote site. Thank you for the opportunity to review these documents and provide comment. The Department finds the proposed plan protective of human health and the environment, down stream of the site in Coeur d'Alene Lake, where resources managed by the state could potentially be adversely affected. The

Department finds the estimated cost of the remediation to be in a reasonable range for the work required to address the threats to human health, ground and surface water.

EPA Response:
Comment noted.

E6. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
6.2 p. 26 "Groundwater inside and outside this waste management area will be monitored to evaluate the effectiveness of the containment cell." **Groundwater should be monitored to better understand migration into the river BEFORE a containment cell is constructed.**

EPA Response:
Groundwater samples were taken from 11 wells during the Remedial Investigation. The samples were analyzed for PAHs, other SVOCs, BTEX, and natural attenuation parameters. Results are shown in Table 3-11 of the Remedial Investigation Report. Additional groundwater sampling will occur during the remedial design phase to better assess the extent of the contamination. Groundwater monitoring will be an integral part of the post remedy monitoring program designed to evaluate the effectiveness of the remedy.

E7. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
6.2 p. 26 "Additional chemical and biological testing to determine the extent and depth of contaminated sediments will be conducted to determine the boundaries of the offshore area that would be capped (costs assume 100% of the area will be capped)." This testing should be done to determine the most highly contaminated core of the bank material and bottom sediments to be removed. **This will probably be an area about 300ft by 50ft, and only a few feet deep. A cap is not necessary, given the minimal threat to the environment of the remaining sediment, and additionally, the cap would prevent dilution.**

And ;
E8. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
6.2 p. 26 "Physical conditions of the river would also be assessed to determine design parameters for a scour-resistant cap. The material and thickness of the cap will be determined during remedial design." **This should be done before deciding a cap is even feasible, as there is a very good chance the cap might be scoured out. We see no EPA consideration of the effect of low stand, high velocity flow events, involving pack ice dragging on shallower portions of the cap.**

And:
E9. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
6.2 p. 26 "Institutional controls would be used to restrict groundwater and land use, and to protect the sediment cap." **IC's will be effective in controlling the drilling of drinking water**

wells, but will be wholly ineffective in protecting any cap from large boat propeller scour and anchor dragging. Again, we see the cap as an infeasible waste of money in this location.

EPA Response:
The stated goal of the Selected Remedy is to remove and thermally treat all contaminated sediments. In such a case, a capping remedy would not be necessary. However should conditions arise making it impracticable to remove all contaminated sediments, a cap designed to be resistant to anticipated erosive forces, including prop wash and anchorage, will be designed and implemented. Institutional controls may be applied to augment a capping remedy.

E10. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
7.1 p. 27 "Because the "no action" remedial actions are not protective of human health and the environment, it was eliminated from consideration under the remaining eight criteria." **Contamination has and will further dilute with time through chemical and hydrological processes under 'no action'. This natural process may eventually be protective of human health and the environment. This may take an unacceptably long time for some of the contaminants and some people, but this is an alternative that should be discussed. The Proposed Plan is incomplete without it.**

And:
E11. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
7.1 p. 27 "If natural processes are occurring, there has not been adequate time or distance needed to reduce contamination by natural processes; therefore, using natural attenuation or enhanced biodegradation to address contaminated upland soils and groundwater is not considered." **Well, it should be considered, since EPA's evidence the contamination in this upland soil 'plume' is going anywhere that is harming the environment is weak. The evaluation of the alternatives portion of the Proposed Plan doesn't link and is not supported by statements in the Site Background section.**

And:
E12. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
7.1 p. 28 "Alternative 2 includes monitored natural recovery of the nearshore sediment, which is not considered protective of the environment." **Again, EPA does not discuss how long natural attenuation of all or part of these sediments would take to reduce the river to acceptable levels.**

EPA Response:
In response to your comments, EPA reviewed its conclusion that natural attenuation is not an acceptable remedy at the Site. During this review, EPA requested empirical estimates which bracketing timeframes required for natural attenuation to reach protectiveness. A modeling

effort (Attachment 2) estimated a minimum timeframe at 30 years, perhaps even longer than 100 years.

Upon request, consultants representing both the PRPs and the Tribe briefly reviewed the application of natural attenuation and enhanced natural attenuation at the Site as it relates to the migration of contaminated groundwater from the uplands portion of the Site to the river. Across the board they concluded that natural attenuation and enhanced natural attenuation are not effective remedies at this Site due to the volumes of source material and its proximity to the river. All concurred that as groundwater encounters the source contamination and continues to migrate to the river that there is not enough time nor distance for natural attenuation and enhanced natural attenuation to effectively reduce contaminant concentrations. Also see response to comment E2.

E13. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
7.1 p. 28 "Alternatives 3a, 3b, and 3c include capping of nearshore sediment, which would be effective unless there is vertical migration of contaminants through the cap." **We feel this is highly likely for shallower portions of any cap through high velocity water flow, and ice and boat scour. A cap could be a huge waste of money, and EPA has not adequately considered this.**

EPA Response:
The Selected Remedy includes removal of all contaminated nearshore sediments followed by backfilling with clean materials. Therefore, a cap is not necessary. If a cap were part of the remedy, components of the cap would be designed to effectively contain all contamination including vertical migration. In addition, the surfacing component of the cap would be designed to be resistant to all reasonably anticipated forms of scour including boat and ice scour.

E14. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
7.1 p. 28 "Though there is potential that during the assessment process a flood event could occur that would further distribute contaminated sediments downstream, these alternatives will eventually provide environmental protection and prevent scour." **EPA does not discuss how 'flood event(s)' might be a good thing that could dilute the offshore sediments to acceptable levels over time.**

EPA Response:
EPA does not favor dilution as a remedy. See response to comment C12.

E15. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
8.1 p. 34 Upland soils and Groundwater: **After reading the Proposed Plan, we conclude the sheetpile and bentonite slurry walls are not worth the cost based on the lack of evidence presented that the upland soils are a significant source to the river. The scour resistant cap is warranted. Monitoring is warranted.**

EPA Response:
Since this comment was made, EPA proposed and selected a new remedy for the Site. Sheetpile and slurry walls are no longer part of the Selected Remedy. The Selected Remedy includes both excavation of all sediments which may cause risk to human health or the environment and monitoring of upland soils, groundwater, and river sediments to ensure the effectiveness of the remedy.

E16. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
8.2 p. 34 Bank Soils, Shoreline Sediments, and Nearshore Sediments: **Removal of a portion of this material is warranted after more detailed sampling. The actual volumes will be probably be far less if a 'natural attenuation' alternative is considered. Appropriate placement of clean fill in the bank and shoreline is appropriate. The nearshore zone will be most susceptible to scour, and, based on the information presented, we think a cap has a high chance of failure.**

EPA Response:
The Selected Remedy removes all contaminated bank soils, shoreline sediments and nearshore sediments. Also see response to comment E12 addressing natural attenuation.

E17. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
8.3. p. 35 Offshore Sediments: **Contamination levels are lower here, exposure to the environment less, so 'natural attenuation' should be considered before any cap is decided on.**

EPA Response:
The Selected Remedy removes all contaminated offshore sediments which currently cause or may in the future cause risk to human health or the environment. Natural attenuation is not considered to be a viable remedy (See response to comment E12

E18. Comment:
Rog and Toni Hardy, October 12, 2005:
Based on a thorough review of the Proposed Plan, on documents submitted to the St Maries repository, including the final RI/FS, and on the transcript of the August 11, 2005 meeting, we stand by our comments at the public meeting and assert that the proposed action selected by the EPA with input by the Coeur d'Alene Tribe is not justified by the technical data and findings, and is far more work and expense than is needed to adequately protect human health and the environment.

EPA Response:
Comment noted.

E19. Comment:
Rog and Toni Hardy, October 12, 2005:
We assert that limited bank and nearshore sediment removals and monitoring are the appropriate actions.

EPA Response:
See response to comment E16 above.

E20.Comment:
Dean Gentry, August 11, 2005
And it's for the benthic organisms and for the worms, and you know, it just seems so ridiculous. I would like to recommend that you find a much less expensive alternative, like the do nothing alternative, number one, no action. Maybe monitor it and see if it doesn't become a problem to human health and the river, the quality of the water in the river. No one wants to ruin the river.

EPA Response:
EPA rejected further consideration of the “no action” alternative because it is not protective of human health and the environment. Both human health and the environment (ecosystem) are at risk from the contamination at the Site. Monitoring has been included as a component of the Selected Remedy to confirm that the remedy remains protective of human health and the environment.

E21. Comment:
Dick McEwan, August 11, 2005:
I'm Dick McEwan. As I said before, I'm a taxpayer of St. Maries, Benewah County. Through the conversations and everything that's been presented, I don't think that there is the data that verifies taking action to spend $10 million. I think there's got to be a lot less expensive alternative, I'm talking a hundred thousand dollars, period. Pull that stuff back up out of there, put in some sheet-piling, if you wish, fill it in with some clay, which we have lots of clay here which is very resistant to things. But before doing that, I think this thing ought to be monitored for a considerable amount of time to see if it is moving. And if it is in fact getting into the water and there is a sheen, put your absorbent barriers, in there to trap it like you're doing now.

And;
E22. Comment:
Dick McEwan, August 11, 2005:
I just don't think that we as taxpayers or people living in St. Maries have the ability to pay this kind of bill, and there's got to be a lot less expensive alternative. And I think those alternatives ought to be identified. I think they ought to be priced realistically and not pick some great big $10 million number. And if that number is picked, those dollars will be spent, plus some probably, but at least that much will be spent. There is no reason for it.

EPA Response:
After analyzing all the alternatives developed for the St. Maries Creosote Site, EPA chose Alternative 9A as its Selected Remedy. A brief description of the Selected Remedy can be found in Section 2.12 of the ROD

E23. Comment:
Gwen Fransen, Idaho DEQ, January 3, 2007:
The Department of Environmental Quality has reviewed the technical memoranda, remedial investigation, the two feasibility studies and the two proposed plans for the St Maries Creosote site. Thank you for the opportunity to review these documents and provide comments. The Department finds the current proposed plan (9A) protective of human health and the environment, down stream of the site in Coeur d'Alene Lake, where resources managed by the state could potentially be adversely affected. The Department finds the estimated cost of the remedial plan to be in a reasonable range for the work required to address the threats to human health, benthic aquatic life, and ground and surface water. The slightly higher capital costs of Alternative 9A compared to alternative 8 are more than balanced by the smaller operation and maintenance (O&M) costs. If O&M costs are the responsibility of the alleged property owner, the City of St. Maries, alternative 9A will be a benefit to this small community with limited funding resources.

EPA Response: Comment noted.

E24. Comment:
Letter from Allan G. Steckelberg, ARCADIS U.S., Inc.; January 5, 2007
This correspondence is in regard to the St. Maries Creosote Site Revised Proposed Plan dated December 2006 that was developed by the Environmental Protection Agency (EPA), in consultation with the Coeur d'Alene Tribe (Tribe), and presented for public comment at a public meeting held on December 13, 2006 at the Avista Building, 502 College Street, St. Maries, Idaho, 83861. The stated purpose of the Revised Proposed Plan is to present a preferred alternative for the remediation of the St. Maries Site (the Site) located in St. Maries, Idaho.

In July 2005, EPA issued a Proposed Plan (2005 PP) for the Site, which described a number of clean up alternatives for the Site and identified Alternative 8 as the preferred alternative. During the public comment period, EPA received comments on the 2005 PP including a proposal for a new remedial alternative submitted by ARCADIS U.S. Inc. (ARCADIS) on behalf of the City of St. Maries (City), Carney Products Co. Ltd. (Carney Products), and B.J. Carney and Company (BJ Carney). The City and Carney Products agreed to further develop this alternative, which later became known as Alternative 9, in a Supplemental Feasibility Study. Previously both parties had conducted a Remedial Investigation and Feasibility Study for the Site pursuant to a 2001 Administrative Order on Consent (AOC). After receiving the Supplemental Feasibility Study and further technical development of Alternative 9 by EPA, ARCADIS, and the Tribe, EPA determined that a new preferred alternative was appropriate for the Site. EPA issued this Revised Proposed Plan to describe the new preferred alternative, Alternative 9A, and to solicit input from the public. The revised proposed plan describes Alternative 9A as:

• Removal, On Site Thermal Treatment, and On Site Disposal of Surface Upland Soils, Contaminated Bank Soils, Nearshore Sediments, and Selected Offshore Sediments; In Situ Stabilization of Deeper Upland Soils, Backfilling of Nearshore and Offshore Sediment Removal Sites; Monitoring of Upland Soil ,Groundwater, Bank Soil, Nearshore, and Offshore Sediments.

ARCADIS, on behalf of itself and its clients, the City, Carney Products and BJ Carney, appreciates the opportunity to comment upon the preferred alternative (Alternative 9A) presented in the Revised Proposed Plan. The PRP's want to continue to be proactive as underscored by our participation in the December 13, 2006 public meeting and our willingness to continue to assist EPA in developing and implementing a timely remedial solution at the St Maries Site. We would like to continue to contribute to the public process by providing our collective support for the preferred remedy. We believe that the additions that EPA have included in this preferred alternative strengthen the preferred remedy suggested in the July 2005 proposed plan. For example, Alternative 9A is a combination of excavation and on site thermal treatment of soils and sediments, on-site disposal of treated soils/sediments, in-situ stabilization, capping/backfilling of excavated areas, monitoring, and institutional controls that represents a solution that will have long term effectiveness and permanence. This alternative is generally more effective than the previous alternative in reducing toxicity, mobility, and volume of contaminants. Alternative 9A implements a series of actions and activities including treatment through thermal desorption, in situ soil stabilization and pathway elimination that will lead to the reduction or elimination of as much source contaminant mass as technically feasible and practicable.

It is important to point out Alternative 9A also focuses on removal of contaminated sediments, to the degree practicable, followed by backfilling with clean gravels to the original bathymetry providing a greater degree of protectiveness. Alternative 9A may also include scour-resistant capping if necessary to address contaminated sediments which are not suitable for removal as determined during the remedial design process. This alternative also recognizes the site specific uniqueness of the Site with regard to the beneficial use of groundwater. While groundwater is expected to meet MCLs as a result of the treatment and stabilization techniques applied to the Site, City zoning prohibits placement of a residence on the Site and City code prohibits the use of Site groundwater. ARCADIS is looking forward to working with EPA during the remedial design process to further refine the various remediation techniques and practices needed to implement this preferred alternative.

During the process of refining the Feasibility Study and the development of the Revised Proposed Plan, we have had the opportunity to meet with a number of EPA Region 10 remediation staff and legal counsel as well as representatives of the Tribe to work on expediting the cleanup of the Site. ARCADIS and its clients are very interested in marshalling all of the parties' resources in order to accelerate a quality remedy at the Site. We realize the process has taken eight years and it is our goal is to work together and develop an agreed to schedule that considers the availability of all resources with the objective of field implementation of the project in the August/September time frame of 2007.

There are certain construction constraints concerning the Site work, including the significant need to perform some specific sediment work within the weather season of low water levels in the St. Joseph River. We believe that expeditiously implementing a remedy at this Site that meets all of the cleanup requirements is a priority for EPA and the Tribe and is consistent with the State of Idaho's legislative and environmental agenda. We believe it is possible and desirable to meet a late summer/ fall construction schedule of the cleanup if there is a willingness to commit the necessary federal resourses to a flexible process that will enhance responsiveness and focus on the resolution of any technical, policy or legal impediments that are identified. At a minimum we would:

- Continue to work diligently to facilitate finalizing the Proposed Plan, and EPA drafting and signing a Record of Decision by the beginning of March 2007,

- Be willing to begin negotiation now on limited issues that will help parties streamline negotiations on the Consent Decree instead of waiting until after the Record of Decision is signed, and

- Reach agreement on working in a parallel fashion on a number of project elements, simultaneously, to reach our respective goal of completing the cleanup in a timely fashion.

In conclusion we would like to reiterate our support of Alternative 9A that is set forth in the Revised Proposed Plan and look forward to working with EPA in completing the next steps in the process that will lead to the implementation of the preferred remedy as early as possible in 2007.

EPA Response: Comment noted.

E25. Comment:
Dean Gentry, January 4, 2007:
The excessively contaminated ground (both upland and the River bank) could easily be removed a reasonable depth, replaced with clean fill and then capped. The quantity of ground to be handled could accurately be measured and a firm cost established. Also, institutional controls to prevent future contact with the ground and ground water could be instituted to eliminate all human risk factors. This provides remedy down to the low water elevation of the River for humans and the piscivorous riparian wildlife (i.e., mink).

EPA Response:
The subarea actions described in the Selected Remedy closely parallel your comments. See Section 2.12 of the ROD for a detailed description of the Selected Remedy. Quantity and costs for the Selected Remedy can be found in Appendix H of the Supplemental Feasibility Study. Institutional controls will be put in place for those subareas which still contain contamination after remedy construction is complete.

E26. Comment:
Dean Gentry, January 4, 2007:
The Revised Proposed Plan calls for an extremely large expenditure which is expected to provide an uncertain remedy intended to resolve uncertain risks.

And
E27. Comment:
Dean Gentry, January 4, 2007:
The Alternative 9A suggests excess, over kill and questionable assessment of the overall risk to human health and the environment. The emphasis appears to be to spend a tremendous amount of money to give the citizens a good feeling of achieving unknown and uncertain results to an unknown and uncertain Site.

EPA Response:
EPA disagrees. EPA has selected a remedy which-will be-protective of human health and the environment upon the completion of its construction. The Selected Remedy is more cost-efficient when compared to the other developed remedy costs, and involves very specific activities carefully designed to reduce known, tangible risks to both human health and the environment. The major components of the Selected Remedy were proposed by the PRPs. In addition to EPA, the PRPs, the Tribe, and the State support the remedy

E28. Comment:
Dean Gentry, January 4, 2007:
I am strongly opposed to the selected Alternative 9A remedy as well as each of the other alternatives you have offered as a remedy to this Site.

EPA Response: Comment noted.

E29. Comment:
Kim Schwanz, August 17, 2005
The comment period was ridiculously small when you bury the information in 9000 pages of information. You had months and hundreds of man hours to build this information, or more to the point information that has been used in other areas and then you used it as fluff to make your case sound better. I feel that the proposed cleanup option that you have selected is poorly selected and basically is a pork barrel patch for a small cleanup site.

EPA Response:
The original public comment period in 2005 was extended beyond the typical 30 days to more than 80 days. In addition, a second public comment period was held in concert with the issuance of a Revised Proposed Plan in December 2006. The basis of the Revised Proposed Plan was an alternative developed by the PRPs and submitted to EPA for consideration during the original 2005 public comment period. EPA has selected the alternative proposed in the Revised Proposed Plan as the Selected Remedy for the Site.

F. Coeur D'Alene Tribe Involvement and ARARS

F1. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
1.0 p. 3 "The Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA), as lead agency, in consultation with the Coeur d'Alene Tribe (the Tribe)…" **Explain why the Tribe was consulted. This is former reservation, and the Tribe owns no land near here. According to the Supreme Court, the river adjacent to the site is owned by the Federal Government in trust for the Tribe.**

And
F2. Comment:
Rog and Toni Hardy, October 12, 2005
Also, we assert the Coeur d'Alene Tribe does not have standing to be consulted on the proposed action, and should be treated like any interested stakeholder within the greater Coeur d'Alene Basin

EPA Response:
The St. Maries Creosote site is located within the boundaries of the Coeur d'Alene Indian Reservation. It is EPA's national and regional policy to consult with tribal governments on matters which may directly affect the environment, resources, treaty rights or other legal rights of a federally recognized tribe. EPA has and will continue to consult with the Tribe at certain milestones in the CERCLA process including the RI/FS, proposed plans, and the ROD. Additionally, the Tribe was a signatory to the Administrative Order on Consent (AOC) for the Remedial Investigation/Feasibility Study (RI/FS) with EPA, the City, and Carney Products.

F3. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
We note the Coeur d'Alene Tribe appears to want to weaken or circumvent NEPA related to the proposed Native American Connectivity Act. We understand this Act is not connected to Carney Pole, but the NEPA process governed Carney. We think Chief Allan's letter to Senator Craig dated September 2, 2005, indicates possible intent to further negate or stop rural landowner/public voice in decisions made about private land that is overwhelmingly held in fee by non-tribal people comprising the vast majority of population in this area. We note that NEPA mandates the consideration of alternatives and voice for affected stakeholders, yet Chief Allen states concerns about NEPA as follows:

"NEPA compliance may add unnecessary delay to the federal approval of Tribal projects and consent to jurisdiction in Federal court may provide citizen groups with another avenue for blocking the decisions of federal agencies as to Tribal lands. NEPA compliance can be a complicated and lengthy process. "

Further, "Indian lands are not public lands, rather they are lands intended for the exclusive use and benefit of the tribe and its members. NEPA review will add delay and expense to the federal approval of land transactions that will likely be necessary to develop telecommunications systems on the Coeur d'Alene Reservation."

Additionally, "………the Tribe believes that Congress should take this opportunity to evaluate alternatives to NEPA on tribal lands, that allow for some public involvement, yet preserve the primacy of tribal decision-making."

We find Chief Allan's suggestions alarming. They appear to run counter to EPA's statements on Environmental Justice, inclusion, fairness extended to all stakeholders. They also echo our experience within the federalized action under NEPA, the precedent Union Pacific Superfund Trail Remedy in which our rightful landowner/stakeholder voices were circumvented, abused, ignored. We are concerned.

EPA Response:
Comment noted. EPA is unclear as to this comment's relevance to the St. Maries Creosote Site.

F4. Comment:
Philip Cenera, January 5, 2007
The Coeur d'Alene Tribe (Tribe) is pleased to provide comments to the US Environmental Protection Agency (EPA) on the above-referenced document. We recognize the effort that has gone into the plan and see this as a step forward in our goal to clean up the St. Joe River. We support the selection of Alternative 9A to the extent that it provides a path forward to a permanent solution for contaminated sediments, and offer the following comments to help clarify the record.

As you know, the Tribe has been involved with the project for a number of years. Our primary goal is to see that the sources of contamination to the St. Joe River are eliminated and to see that the water and sediment in the St. Joe River are returned to the condition they were in before releases of creosote contaminated the site.

Although the Proposed Plan does not specify the remedial design for offshore sediments, we are confident that it does provide for development of a remedial design that will be a permanent solution for these contaminated sediments. We look forward to reviewing a Record of Decision, a Consent Decree, and a Remedial Design that are increasingly specific, and that avoid the use of a model to support selection of "natural recovery", or slow burial, of the contaminated sediments.

Over the last several years we have worked with EPA as we have developed tribal water quality standards. EPA has recognized the validity of our standards at the site in prior communications, which are quoted below. We point this out so that EPA can add specificity to the Record of Decision (ROD) for the St. Maries site by indicating that the remedy must be implemented to achieve tribal water quality standards as applicable within EPA's applicable or relevant and appropriate (ARAR) framework. In support of this position, we are providing a quote from Rich McAllister, EPA Region 10 attorney. The quote is a comment provided to RETEC, the former consultant for the project, in an email dated November 30, 2004 on the draft Feasibility Study, dated November 1, 2004.

RM. p.3-8 sec. 3.1.3.2, 2d para, this sentence incorrectly characterizes the water quality standards (WQS) of the Coeur d'Alene Tribe. As discussed further below, the WQS of the Coeur d'Alene Tribe have been formally adopted into law by the Tribal Council, the governing body of the Coeur d'Alene Tribe. In addition, there are no water quality standards under the CWA in effect in the waters of the Reservation; however, there are other water quality criteria and requirements under the CWA to consider.

For purposes of making Superfund cleanup decisions, the Tribe's standards that are in effect under tribal law are considered applicable to this action, and are thus an ARAR. The Tribe's WQS are considered an ARAR as soon as the standard is promulgated under tribal law by the Tribal government.

In March 1999, the Coeur d'Alene Tribe submitted an application for eligibility for treatment as a state under sec. 518 of the CWA. At that time, the Tribe submitted water quality standards which had been adopted by the Tribal Council after offering opportunities for public participation, including a public hearing. For purposes of a CERCLA response, the WQS adopted by the Tribe in 1999 are considered applicable ARARs for this response that is taking place along the St. Joe River.

Most recently, as the Tribe has been updating its TAS application and WQS, it developed water quality standards for the Reservation waters of Lake Coeur d'Alene and the St. Joe River. By Resolution dated May 27, 2004, the Tribal Council adopted those revised standards, which are now in effect under the laws of the Coeur d'Alene Tribe.

Mr. McAllister's position is supported by the preamble to EPA's National Contingency Plan (NCP), which discusses the role of tribes in a Superfund cleanup. The following is from the March 8, 1980 Federal Register 55 FR 8741. Subsequent to this message EPA conferred TAS status (of this interim partial TAS application which Rich is speaking of) to the Tribe as outlined in the above cited most recent TAS application. The Tribe is in the process of finalizing its WQS for ultimate submission and approval by EPA. The various standards pertinent to this discussion are not expected to be changed by the Tribe prior to submission to EPA nor are they expected to be disapproved by EPA. With the conference of TAS status, the Tribe also gained immediate authority to issue CWA Sec. 401 water quality certifications for any Federal permits (such as 404 permits) which may be needed for this clean up action.

Indian tribe commenters contended that ARARs should not be defined as promulgated laws, regulations, or requirements because some Indian tribe laws, which could apply to a Superfund cleanup, may not be promulgated in the same fashion as state or federal laws. CERCLA section 126 directs EPA to afford Indian tribes substantially the same treatment as states for certain specified subsections of CERCLA sections 103, 104 and 105; EPA believes, as a matter of policy, that it is similarly appropriate to treat Indian tribes as states for the purpose of identifying ARARs under section 121(d)(2). EPA realizes that tribal methods for promulgating laws may vary, so any evaluation of tribal ARARs will have to be made on a case-by-case basis. Tribal requirements, however, are still subject to the same eligibility criteria as states, as described in 300.400(g)(4).

In summary, the Coeur d'Alene Tribe is optimistic that the cleanup of the St. Maries Creosote site will begin soon. We are looking forward to concurring with a Record of Decision, and a Consent Decree that specify a clear bias toward a permanent solution for the contaminated sediments. We are anxious to provide favorable comments on a Remedial Design that provides for removal of sediments where necessary and practical, and for appropriate in situ treatment of what cannot be removed. We are also confident that EPA understands that the Tribe's water quality standards are applicable to cleanup actions at the site. If you have any questions, or if you would like to discuss our comments, please feel free to contact Rob Spafford at (208) 667 5772.

EPA Response:
EPA is applying the Coeur d'Alene Tribe's water quality standards to the Site cleanup. Any discharges of process wastewater, storm water and/or groundwater to the St. Joe River during the remedy construction will be required to comply with the Coeur d'Alene Tribe's water quality standards.

EPA appreciates the Tribe's support of the Selected Remedy and looks forward to its successful implementation.

F5. Comment:
Gwen Frandsen, State of Idaho DEQ, October 12, 2005 and January 3, 2007:
The State of Idaho manages natural resources down stream of the St Maries Creosote site which is wholly within the boundaries of the Coeur d'Alene Reservation.

EPA Response: Comment noted.

F6. Comment:
Dean Gentry, January 4, 2007:
Reading from the U.S. Government web site of NEPA and CERCLA has raised many questions of the EPA process and the formation of the proposed alternative.

"EPA and states share responsibility for environmental protection and work as partners so solve the nation's environmental challenges." The EPA criteria for evaluating cleanup alternatives numbered 7. "State/ Tribal acceptance". The State of Idaho has been invisible and unheard from throughout the process of developing acceptable alternative remedies for the Site. We look to our State expertise and accountability in develop a remedy for this Site. The absence of our State is a justifiable concern to myself and other area citizens.

EPA Response:
EPA disagrees that the State of Idaho has been invisible or unheard from during the development of remedial alternatives for the Site. In 1998, IDEQ requested assistance from EPA investigating and responding to the conditions at the Site. At IDEQ's request, Carney Products took temporary measures to contain the oily sheen in the St. Joe River by placing an absorbent pad and booms. The State has followed the development of the RI/FS and has provided written comments on both the July 2005 Proposed Plan and the December 2006 Revised Proposed Plan.

F7. Comment:
Dean Gentry, January 4, 2007:
It is my understanding of NEPA our State has the authority to intervene before a record of decision is made. I am requesting our State officials do intervene and stop the selection and implementation of the Proposed Plan. I respectfully request the EPA to work with our State as a full partner in seeking a common sense remedy for this Site. I also request the EPA to correct the injustices they have done to both the City of St.Maries and Carney Products.

EPA Response:
EPA has coordinated with the State of Idaho during the development of the RI/FS, Proposed Plans and the Selected Remedy. The State of Idaho Department of Environmental Quality (DEQ) found the proposed plan to be protective of human health and the environment in Coeur d'Alene Lake, where resources managed by the state could potentially be adversely affected. DEQ also stated that the estimated cost of the proposed remedy is reasonable for the work required to address the threats to human health, ground and surface water (See Comment E5).

EPA has followed law and guidance in designating the PRPs at this Site and is not aware of any injustice done to the City or Carney Products.

G. Public Process and Extension of Comment Period

G1. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
2.0 p. 3 "The Administrative Record for this Site, which includes such documents as the Baseline Risk Assessment, the RI Report, the FS Report, and supporting documentation, has been made available to the public for a thirty-day public comment period that begins on July 22, 2005, and concludes on August 22, 2005. All information considered in the development of this Proposed Plan is included in the Administrative Record for public review. An information repository has been established at the St. Maries Public Library, 822 W. College Avenue, St. Maries, Idaho, where site related information may be reviewed." **This infers the documents of the AR, such as the CIP, BLRA, Data Gaps Report, RI, and FS, were in the library for public review. As of July 29, 2005, they were not. Only the Proposed Plan was. Explain this discrepancy.**

And
G2. Comment:
Also, the CIP, available on the web but not in the library, states on p. 3 "All technical documents and reports will be placed in the Information Repository located at the St. Maries Public Library…" **This was not true. EPA did not do what they said they would do. Explain why.**

And:
G3. Comment:
3.0 p. 5 “EPA also established an information repository at the St. Maries Library.” **Again, this was not true. As of July 29, only the Proposed Plan was available.**

EPA Response:
EPA failed to submit the complete Administrative Record to the St. Maries Public Library by the required date of July 22, 2005. Upon notification, the complete Administrative Record for the Site was placed in the St. Maries Library for public review by August 13, 2005 and the public comment period was extended 60 days hence to October 12, 2005 to rectify the error and accommodate requests for more review time.

G4. Comment:
Rog Hardy, September 9, 2005:
Since EPA got to "review and correct inaccuracies" in the transcript, should not the public/citizens who commented have the same consideration? How can we make corrections, should there need to be some made?

EPA Response:
*(response by Tony Fornier, Community Involvement Coordinator, September 9, 2005**):***
In respect to substance and overall content, the transcript seemed accurate based on our recollection of the meeting. The items we noted were not substantive errors, but primarily typographical errors and misspellings of names and acronyms.

G5. Comment:
Joyce Broadsword, Idaho State Senator, August 19, 2005:
Thank you for heeding the public's wishes and extending the comment period on the St. Maries Creosote Site. As I wade through the material and come upon more questions, I will be in touch.

EPA Response: Comment noted.

G6. Comment:
Rog and Toni Hardy:
We protest the 30-day comment period. Yes, the time was extended, but that was due to the fact that none of the documents EPA said had been sent, were actually available in the St. Maries Library Repository. It was EPA's error, rather than public request, that lengthened the comment time. Since there are about 9,000 pages of materials to be read and understood, we request at least a 60-day further extension. It is unreasonable to ask folks (most who work full-time) to ingest tomes of information in so short a time. (We do not recall being asked to read that much for a single college class in such a short time.) In fact, to give such a short response time for the public to ingest technical documents, could be viewed as a "tactic" to discourage public input. At the least, it is unreasonable and unfair, and does not encourage public participation.. Please let us know to whom to write to protest the 30-day time period.

And:

G7. Comment:

Frank Werner, August 11, 2005:

My comment is that the amount of time allotted to this community to look at the issues and look at the data 30 days in closing comment period is totally inadequate, and I would request that to be extended a year.

EPA Response:

In response to public request during the first public comment period held in 2005, EPA extended the public comment period 60 days after placing the missing documents in the St. Maries Library. The total length of the first comment period was 83 days. The second comment period lasted 30 days. No requests for additional time were received during the second comment period.

G8. Comment:

Joyce Broadsword, Idaho State Senator, October 11, 2005:

As the state senator for the St. Maries area, I am very interested in the cleanup plan for the St. Maries Creosote site. I appreciated you and your co-workers coming to St. Maries to discuss the proposed alternative clean-up plans.

Thank you for allowing those of us from the public to comment on the alternatives. It will be much better for all concerned if a decision is reached that will have the desired effect of cleaning up any creosote before it reaches the near by river while taking into account the feelings of those in the community Please contact me should you need further
information or if I may be of assistance.

EPA Response: Comment noted.

G9. Comment:

Rog and Toni Hardy, October 12, 2005:

We expect the EPA to respond each of our questions attached, and, as we proposed in the meeting, return to St Maries with a conceptual site model and appropriate preferred action you can support using the data and findings of the documents in the repository.

We look forward to your reply within the time mandated by EPA's public policy.

EPA Response:

EPA has responded to each question and/or comment provided during the two public comment periods associated with the publication of the two proposed plans. By rule, EPA is required to respond to these public comments in a responsiveness summary, which is published as part of the ROD. EPA is unaware of any other policy which outlines different timeframes for responses to these comments.

G10. Comment:
Dean Gentry, August 11, 2005:
And as far as the time for making comments here, I went to the library today -- you all might be interested in this --to inquire if they had received that information. I think it was three boxes. And I appreciate the fact that it was no small job to copy those. It would be no small job -- there's no way I can, I can tell you that. Just forget it. I did well reading your 41-page flyer. And I really appreciate the fact that there may be some people in the room, like Mr. Hardy and Mr. Werner, that may have the capacity and the ability to read these facts and data and get something out of it, but thank you.

EPA Response: Comment noted.

G11. Comment:
Rog Hardy, August 11, 2005:
I don't like having dead spots in my comments, so I don't think I'll dig through them and read them up. I've written some of them up. Some of them went in an OpEd piece in the paper. But I just -- what I guess I'll end my comment like you did with an extension for the comment period. I know there will be a lot of behind-the-scenes work going on while the public now has 9,000 pages to dig through or you can get a CD rom. It's laborious to go through the thing, but you can get the thing on a CD. I would like to see you people come back here with a defensible conceptual site model, because that cartoon that you're saying, oh, well, that's not current and it's the PRPs' consultants that made that, that's inexcusable. In all my experience with the Union Pacific thing, at least they came with work that they could try and defend and were proud of. So I want to see you back here for another meeting just like this one after you have -- and I also want to see -- you know, don't insult the intelligence of these people. Show where the data points are, both in cross-section and on a map. You know, you can explain to us with all these DNA, PLs and all that kind of – show us the control points. Show us where there's none detected. Show us the numbers. They're in the reports. The public deserves to see that kind of stuff without having to wade through -- find it on page 8,735 out of 9,000. Thanks.

And
G12. Comment:
Toni Hardy, August 11, 2005:
And give us the data and you can make it -- you have an obligation under law to make it so we can understand it without saying, oh, this -- this is just, you know, glossing it over. People are smart. We can all get it. And you need to bring the data, because you don't have it. I don't read like these guys do, but you do not have the data, it's clear. Back it up. Tell the scientists. Notice they're not here tonight. Interesting.

EPA Response:
EPA held two public comment periods and two public meetings for the St. Maries Creosote Site. For both public comment periods, EPA presented its proposed plans documenting EPA's remedy comparison process. EPA also presented summaries of each cleanup alternative being considered. EPA summarized the data gathered during the RI/FS and followed published

guidance to prepare the proposed plans. EPA placed all data used to develop the alternatives and all data used reach remedy decisions in the Site's Administrative Record as required by the NCP. Although all of the data was not presented in EPA's proposed plans nor was all the data presented at the associated public meetings, it was made available in the Administrative Record EPA further placed all of the Administrative Record documents including the complete RI/FS on CDs for the use of the public interested in detailed data.

G13. Comment:
Nancy Wolff, August 11, 2005:
Thank you. My name is Nancy Wolff, and I am the appointed City Attorney for the City of St. Maries, and I have two very brief comments that I have been asked to give on behalf of Mayor Robert Allen and our City Council. But first, I think the City would like to thank all of the members of our community who have come here tonight. We really appreciate you taking the time to listen and to participate in this public hearing, because this is really an important hearing. It's important that the EPA hear and listen to what you have to say. So, on behalf of all of us, thank you for coming.

With respect to comments, now, the City of St. Maries is a signer of the Administrative Order on Consent, the AOC that has --we have proceeded with our technical consultant in conjunction with Carney Products to as best we can produce our RI/FS, and we've produced a Feasibility Study with a number of alternatives listed. The EPA Proposed Plan that we have received on July 22nd is actually a new alternative. The EPA has pulled together components from parts of the Feasibility Study, and so what we now have to comment, to study and address is essentially a new alternative. Not one developed by the PRPs in its entirety, although the components are there. And so certainly 30 days is absolutely inadequate for the potentially responsible parties, for the PRPs, for the City of St. Maries, for Carney Products, and for B.J. Carney. It is not an adequate amount of time for us to respond, because we will be preparing written technical comments that will be certainly much more in depth than we would be able to present in a public hearing. So you will receive a formal request from us, but as a courtesy to you all tonight, you need to know that we will need more time in order to substantially provide the comments that we need to produce for this.

EPA Response:
In response to several requests from the public, EPA extended the first (2005) public comment from its originally scheduled length of 30 days to a total length of 83 days. The second public comment period lasted 30 days. No requests for additional time were received during the second comment period.

G14. Comment:
Dean Gentry, January 4, 2007:
Another EPA criteria is "Community Acceptance". The following four items are from the EPA "About Environmental Justice": "(1) potentially affected community residents have an opportunity to participate in decisions about a proposed activity that will affect their environment and/or health; (2) the public's contribution can influence the regulatory agency's decision; (3) the

concerns of all participants involved will be considered in the decision making process; and (4) the decision makers seek out and facilitate the involvement of those potentially affected."

I compliment the EPA persons who have worked to involve the St.Maries residents in this process. The fact that a larger number of local people are not involved is due to a number of things i.e. apathy, let some one else do it, the State (DEQ) will take care of it, I don't understand it, I don't have time, I can't make a difference anyway - - - - . The noticeable decline in attendance from the first public meeting held in St.Maries on August 11, 2005 and the last public meeting December 13, 2006 may be due to all of
the above as well as the long time lapse between the two meetings with no feedback to the public and no response to written comments submitted in 2005 by the public and little if any response to unanswered oral comments and questions at the 2005 public meeting. There was no dialog to indicate public comments were a contributing factor to the EPA decision making process. It appears more like a process of soothing the local residents to meet the minimum requirements of NEPA but failing to meet the spirit of Congressional intent and EPA objectives of Environmental Justice.

EPA Response:
The public comments offered during the two public comment periods provided significant contributions to EPA's decision making process regarding the St. Maries Creosote Site. Included among these were comments notifying EPA that the St. Maries Library Administrative Record was incomplete, comments requesting an extension to the public comment period, and most importantly, comments which suggested a new cleanup alternative which EPA further developed and chose as the Selected Remedy for the Site. EPA also carried out further natural attenuation modeling in response to several comments questioning the depth to which natural attenuation had been studied,

G15. Comment:
Rog and Toni Hardy, January 5, 2007
We object strenuously to this repeated process where citizens are asked to particpate and comment, then are ingored. We provided extensive comment on October 10, 2005 (attached below in a Word document) with numerous questions and issues identified that required EPA response BEFORE the plan was amended. The process of taking all public comment, holding it confidential until a Record of Decision (ROD) has been issued, is fatally flawed. Further, it makes a disdainful mockery of EPA's lip service about public involvement. We find this omission to be another example of EPA not "living" its Mission, particularly related to citizen voice, participation, right to inclusion under NEPA, rights to Environmental Justice as a rural community, and according to EPA Public Policy mandates. We see the lack of answers as yet another serious breach of public trust similar to those we have protested over the past decade related to the UPRR Superfund Trail as "Remedy." We have attached, again our comments in a Word Document and again, we request replies to our questions before the ROD is finalized.

This is the same egregious behavior EPA exhibited again, recently, under Michael Bogert's tenure. EPA refused to respond to valid and well researched issues we raised showing how EPA processes blantlanty ignore the public, and how this arrogant (at best) behavior has led to violations of NEPA and EPA's own Public Policy mandates within the Superfund "Remedy" Trail of the Coeur d'Alenes. A dismissive letter from (then) EPA Region 10 Director Bogert----sent to us months after our carefully documented submissions and very shortly before he moved to D.C.----misstated facts, showed ignorance related to documents governing the UPRR CERCLA Remedy (the consent decree, for example), and generally displayed clear acceptance (rather than open, honest investigation) of tribal and agency positions. When we pointed these clear errors out with documentation, EPA simply said, "we're done with the issues". That is unacceptable and, we assert, illegal.

Given EPA's clear concession that the "Site does not pose an unacceptable risk to human health," and EPA's attempts to protect the economy in one of the poorest counties in the entire state of Idaho, we question the Preferred Alternative and ask that EPA address concerns outlined in our (attached) comments submitted last October.

EPA Response:
The public comments provided during the two separate public comment periods were critical to EPA's decision making process. See comment G14 response above. EPA followed regulations and published guidance in conducting the public comment periods and in responding to all public comments.

H. Comparison to other EPA sites

H1. Comment:
Kim Schwanz, August 17, 2005
After reading through the summary that was presented along with the proposed cleanup proposals, I find it most disturbing that a site of such small magnitude is blown out of proportions by you as project manager and the EPA as a whole. This site is a fraction of the size when you compare it to the Trail of the Coeur d alenes; EPA allowed a site that has hundreds of thousands of tons of material to be band aid patched along just the top portion which allowed surface and ground water contamination to continue where it had leached away from the track area.

And:
H2. Comment:
Rog and Toni Hardy January 5, 2007
In addition, we question the total exclusion of Carney Pole from all Basin Commission activities and discussion when this Superfund is part of the overall Watershed, as well as affected by lake level fluctuations and other Lake Management issues. The final NAS report recommended a wholistic approach to the Watershed and shared issues, and certainly all the various Superfunds (no matter how small) contribute to the overall human and ecological health in north Idaho and related waters. Including Carney Pole within the Basin Commission discussions and PFT's would, further, encourage local control (one stated purpose of the Commission while supporting State involvement within the various aspects of this small Superfund in Benewah County.

In closing, EPA's behavior within Carney Pole is reminiscent of agency response to "fatal flaw" information we submitted within the Remedial Investigation/Feasibility Study (RI/FS) for the Basin. Rather than deal with the information, EPA chose to remove the UPRR Superfund from the RI/FS and subsequent RO, after stating in the Engineering Evaluation/Cost Analysis (the EE/CA---substituted for the NEPA-mandatory EIS) that these UPRR issues would be included within the RI/FS. We conclude that EPA is more interested in playing politics than in respecting citizen rights and protecting human health and our shared environment.

And:

H3. Comment:

Rog Hardy, August 11, 2005:

I'll speak loud. I'm going to remain sitting so I can refer to some documents I've brought. My name is Rog Hardy. I'm a geologist with over 30 years international oil exploration, so I have some experience in hydrocarbons moving through the ground in a natural state and different types of sediments and sedimentary rocks. I'm here tonight because we have a -- we live up south of Harrison on Lake Coeur d'Alene. We have a EPA response action. They say they're done, but it's going on in our property, and the contrasts with this one are just incredible. We're not down here out of some altruistic desire to help the people of St. Maries. We're down here to learn more about how EPA works and how they - - to compare our project with that one. That project is 2000 acres. It's got 140 mile perimeter to it. It's a $58 million project. By estimate of Union Pacific Railroad, most of that money went into trail facilities. But for the six miles that are in Lake Coeur d'Alene and along the shoreline, there were seven tiedowns. There were derailments, and the creosote was dumped in the lake. It was left there for 40 years. The sheen, the gunk was incredible. The landowners complained to the railroad. The railroad said, well, we're under some negotiations about abandonment. The remedy that was enacted was to address lead, not creosote. The thousands of tiedowns, plus the post -- the posts -- the old posts on the swing bridge trestle across the lake were just cut off and left there and the new ones put in. They have the sheen that everyone's talking about. Now, volume-wise it may be a lot less than here, but my point is when we asked EPA just when all this was starting, 1999, 2000, what about all that creosote, they said we're removing the debris and the top six inches of soil when the lake level is low. They did that. By and large, they burned some of the ties on location. They did no testing whatsoever for all this stuff. They had declared it clean, don't worry about it, forget about it. I reported, an active iron oxide seep, seven of them actually, that are not related to creosote because they're visible, it's lead contamination, and EPA gave me a statement, "Oh, seeps are just" -- and this is a written statement to the same procedure the City of St. Maries did in 1998, "Oh, seeps are everywhere. We see them when we're hiking. Don't worry about it." And I'm here to contrast that situation with what I see here. And as I dig into this data, I have pages of written comments. I don't even know if I have the energy to submit them.

Especially when you contrast it with the way Union Pacific Railroad is being treated up where we are where they weren't even compelled to test for creosote, it's just mind boggling. I have numerous statements here about the lack of mobility.

And:

H4. Comment:

Toni Hardy, August 11, 2005: :

Okay. He pretty much said it probably better than I can, but I just want to add that my grandparents who homesteaded there at O'Gara reported creosote to Union Pacific for years, too, and we're talking -- that was 1910 on, so nothing was done. And what I want the people of St. Maries to realize is what you're going through, we've been going through for eight years. And EPA, as far as I'm concerned it is inexcusable what you're doing to this little tiny blip. What about our invertebrates in these dead tiedowns? Shingle in O'Gara Bay are dead. They've been dead, and you plugged them up and made them even more dead. No separate testing for creosote. None planned. So EPA --my prediction is EPA will come back in five years and test for creosote. It's good grant money. It's job. Or the Tribe will do it in their IR&P, they'll find creosote. But you know what, this is a huge issue. And I've talked with Patricia Bonner in Washington, D.C. You have revised your public policy. You are now including recourse against Tribes and things like that, for people who have been wronged. And I submit that this is an example, my final comment, of a breach of environmental justice. It's like reverse racism here. What you have done to a group of world people is inexcusable.

And:

H5. Comment:

Rog and Toni Hardy, October 12, 2005 and January 5, 2007

3.1 p. 6 "The former creosote treating operation covered approximately 0.7 acre." **This is a tiny area, even when the offshore portion is included, when compared to the UPRR Response, just from Chatcolet to Harrison. This stretch of the UPRR ROW, about eight miles by 150 feet, or about 145 acres (over 100 times the size of St Maries!), was the subject of over 100 years of ore concentrate spillage in Lake Coeur d'Alene and adjacent sensitive wetlands. Numerous creosote-soaked tie dump areas were also present in stagnant slough for decades, and trains spilled fertilizer feedstocks and products. No RI, FS, or BLRA was conducted. No CIP was conducted. The EE/CA contained two alternatives based on cursory centerline testing for metals only, with no attempt to define the lake side edge of contaminants. The EE/CA stated that complete metals removals would be attained. However, numerous locations still contain metals, which are visibly seeping into the environment, and no post-remediation testing was conducted on the lake edge of the ROW. Ties and a veneer of sediment were removed, but no post remediation testing for creosote was conducted. EPA has invoked very different responses to two contaminated sites in close proximity to one another. Explain this discrepancy.**

And:

H6. Comment:

Rog and Toni Hardy, October 12, 2005 and January 5, 2007

Also, so what? Historically, EPA has reacted to reports of seeps in an arbitrary manner. We reported iron oxide seems emanating from the UPRR causeway on our family property in 2004 in an area already considered remediated by EPA, but where UPRR was granted an alternate to removals by EPA. After no response for one year, EPA replied in March 2005: **"We appreciate the photos you provided and your direct communication on this issue and can**

appreciate your concerns. Seeps are natural phenomena in altered and natural environs, and are a result of hydraulic head pressure attempting to equalize a head differential across a boundary. I've stumbled across reddish/orange seeps, just like the ones displayed in the photos, in highly pristine areas and do not view them as an indicator of particular environmental contamination. At this time, there are no compelling factors that would suggest a need to perform discreet sampling at the locations you've suggested." Here, the EPA has refused to sample the seep areas. Explain EPA's difference in reaction to notification of seeps at these two locations.

And:
H7. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
In the UPRR CERCLA Response Action, contamination exists on numerous municipal and private properties, yet only UPRR is named a PRP. What is the difference with this site?

And:
H8. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
4.1 p. 10 "Under EPA's oversight, the City of St. Maries and Carney Products prepared the BLRA using **the data collected during the RI."** Why was no BLRA conducted for the UPRR Response? Thousands of creosote-soaked ties languished in stagnant sloughs on our property for decades emitting visible and smelly DNAPL to water and soil, on hundreds of acres. The ties and a veneer of sediment were removed but no post-remediation sampling was conducted. In addition to this, over a hundred thousand cubic yards of metal contaminated soils were removed from hundreds of acres. Why was there no BLRA for the UPRR Superfund?

And:
H9. Comment:
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
4.2 p. 13 "It is EPA's current judgment that the Preferred Alternative identified in this Proposed Plan is necessary to protect public health, welfare, and the environment from actual or threatened releases of hazardous substances into the environment.

Compare and contrast EPA's preferred alternative here with the preferred alternative for the UPRR response action for six miles in and adjacent Lake Coeur d'Alene from Chatcolet to Harrison. EPA never conducted a BLRA; Despite extremely high levels of metals at significant depth along the centerline, EPA never sampled to determine the edges of contamination on the lake side of the right of way. EPA never tested for creosote, despite thousands of ties in numerous dumps in stagnant sloughs in hydrologic communication with the lake. EPA accepted UPRR's statement in 2002 that reads: "Given that the Cal's Pond area will be inundated, except during years of very low lake levels, the potential for human health exposure to the sediments in Cal's Pond through direct contact or ingestion of soils is very low. This combined with an average lead concentration for the post removal surface of the sediments that is below the action threshold of 1,000 mg/kg indicates that the removal should be protective of human health." **Cal's Pond is about the size of the upland**

Carney area, yet in the UPRR response, EPA ignored environmental risk, and creosote and has left documented lead in place. It appears EPA's judgment is highly variable, and lacks standard environmental and human health criteria. Explain.

And:
H10. Comment
Rog and Toni Hardy, October 12, 2005 and January 5, 2007
How does this area fit when compared to contaminated sites nationwide? Is EPA spending this much time and superfund money on specific sites of like size and risk in the nearby Bunker Hill Superfund Site?

EPA Response:
The purpose of this responsiveness summary portion of the St. Maries Creosote Site Record of Decision is to address comments as they relate to the St. Maries Creosote Site. Questions referring to or comparing EPA authority or responses at other sites is beyond the scope of this document and will not be addressed here.

FIGURES

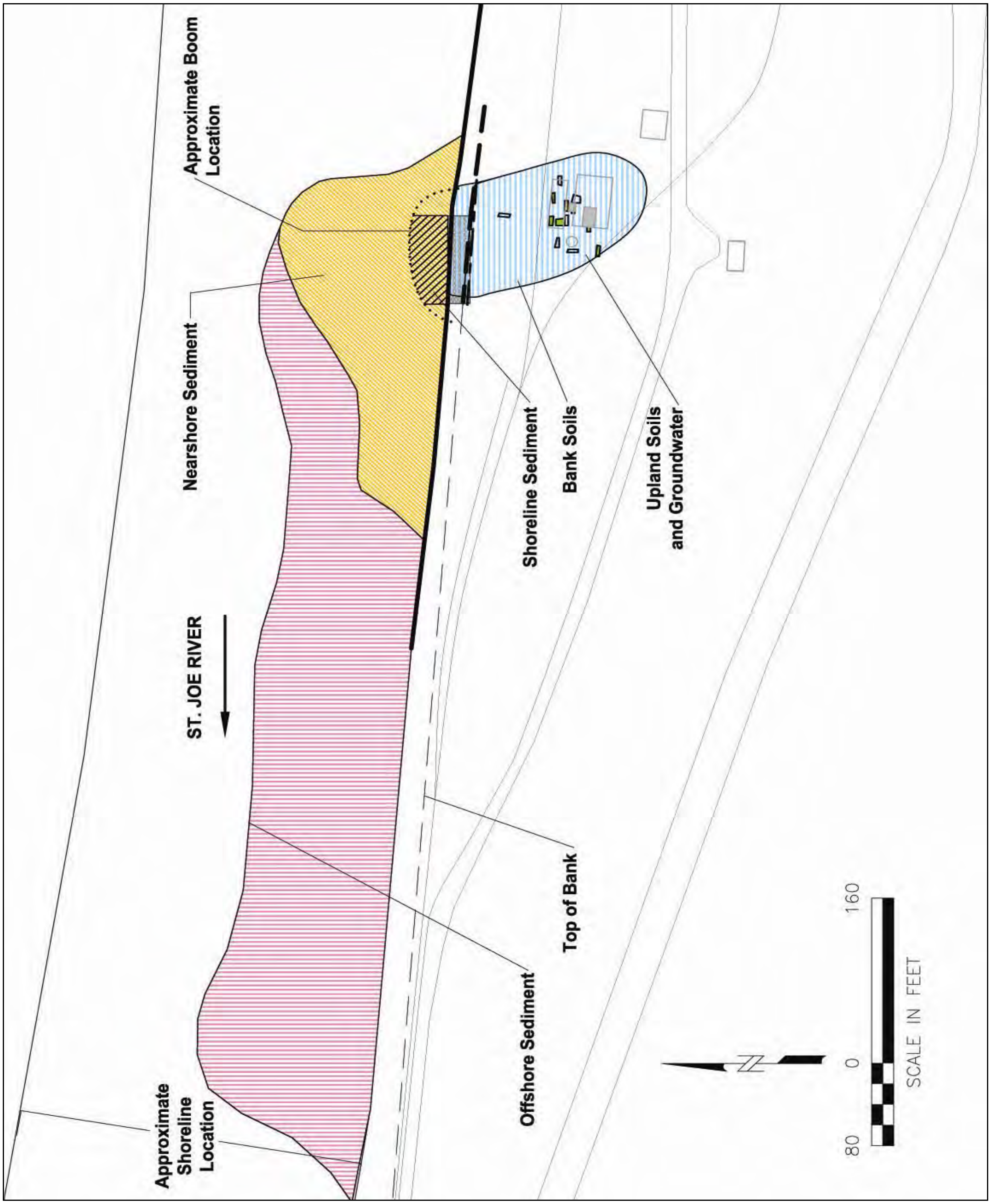

Figure 1. Site Subareas

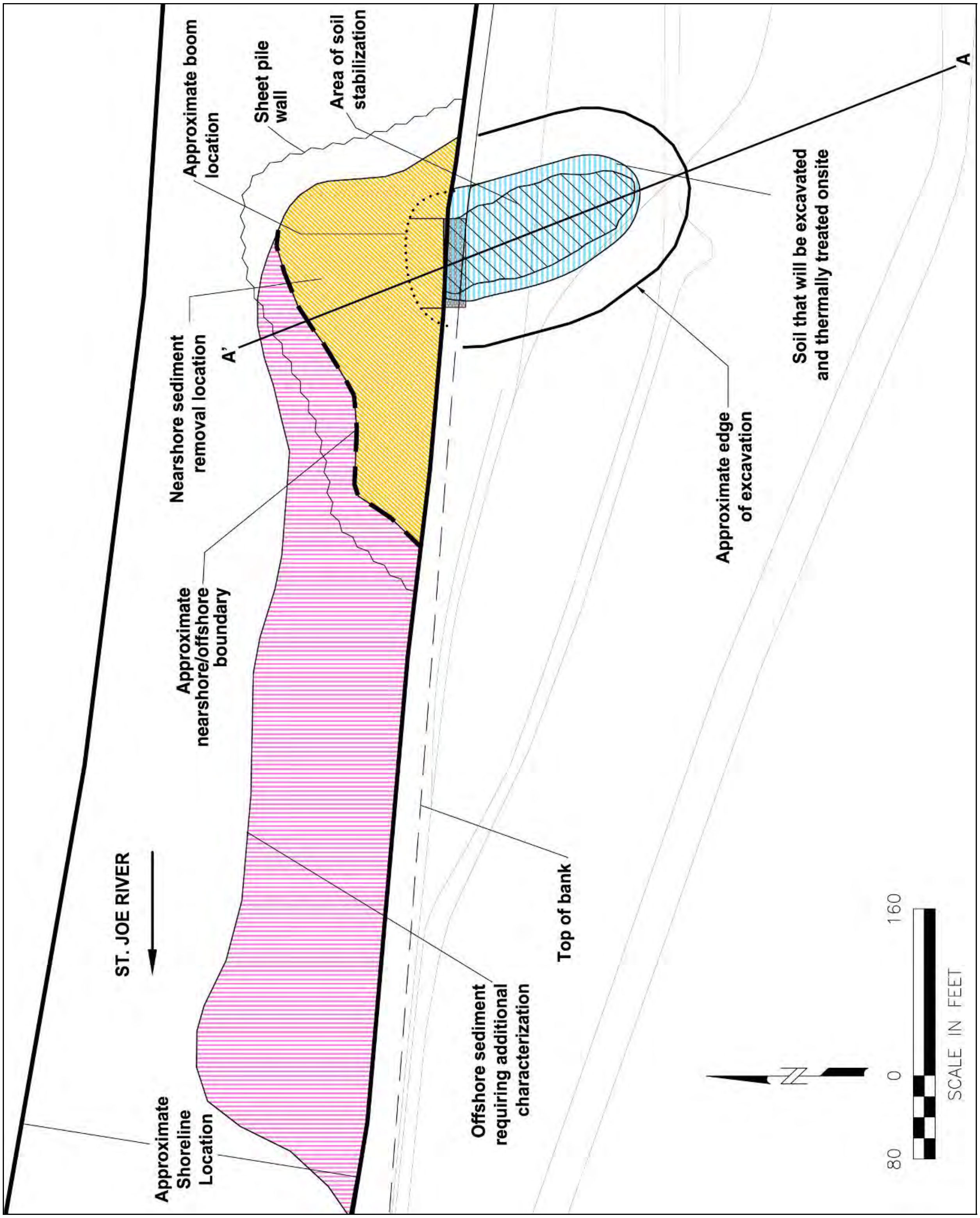

Figure 2. Components of EPA's Selected Remedy – Plan View

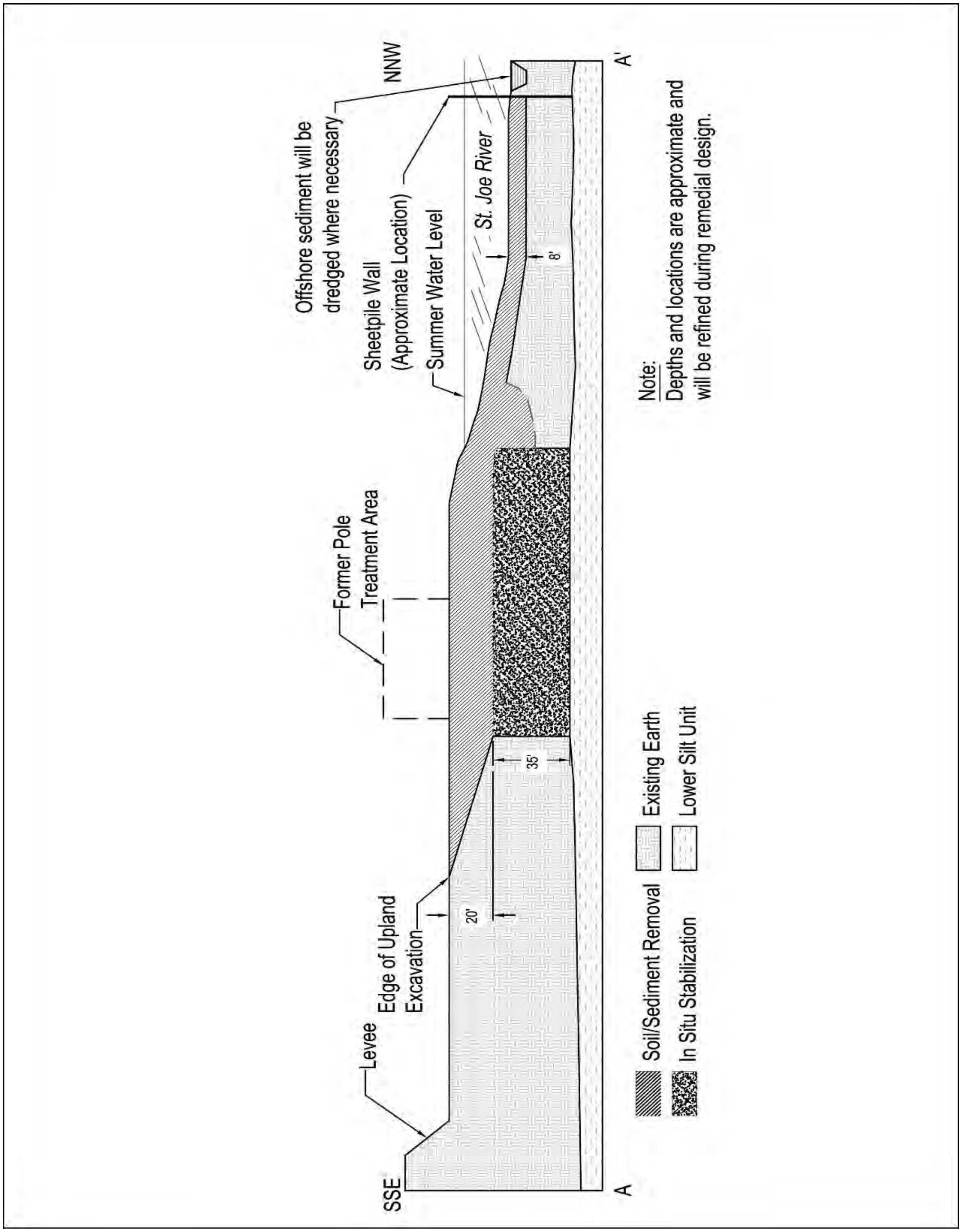

Figure 3. Components of EPA's Selected Remedy – Cross Section

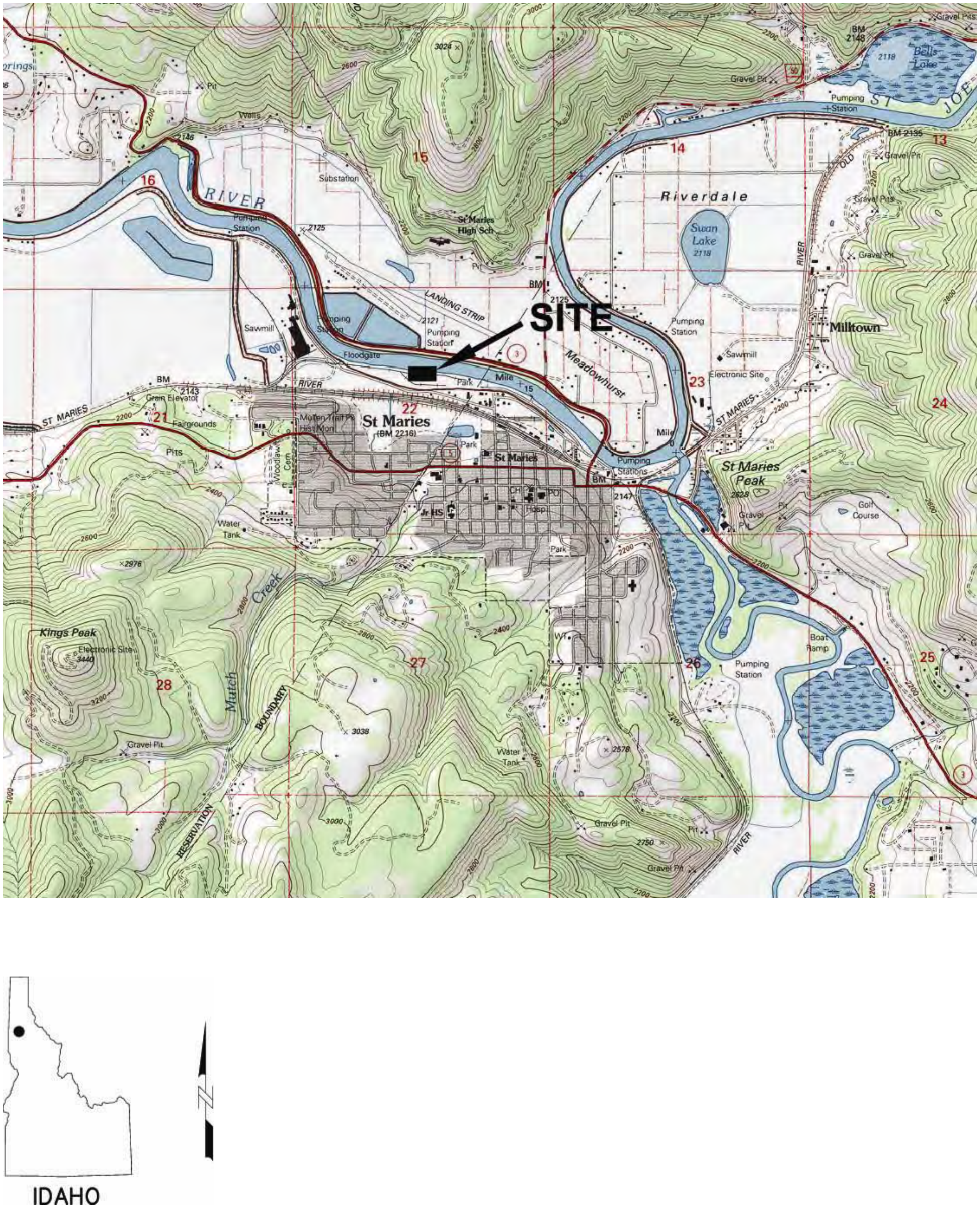

Figure 4. Site Vicinity Map

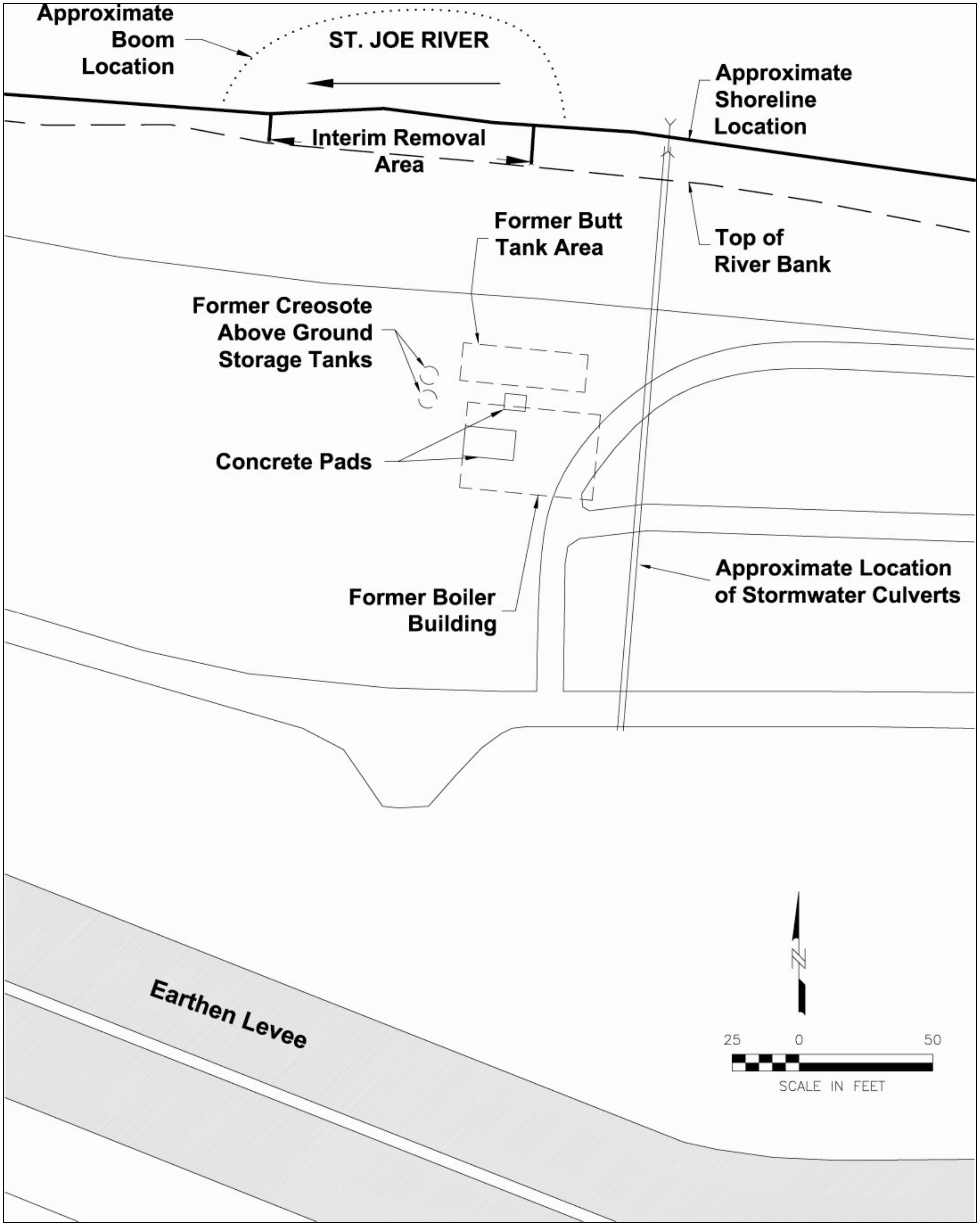

Figure 5. Former Treating Plant Layout

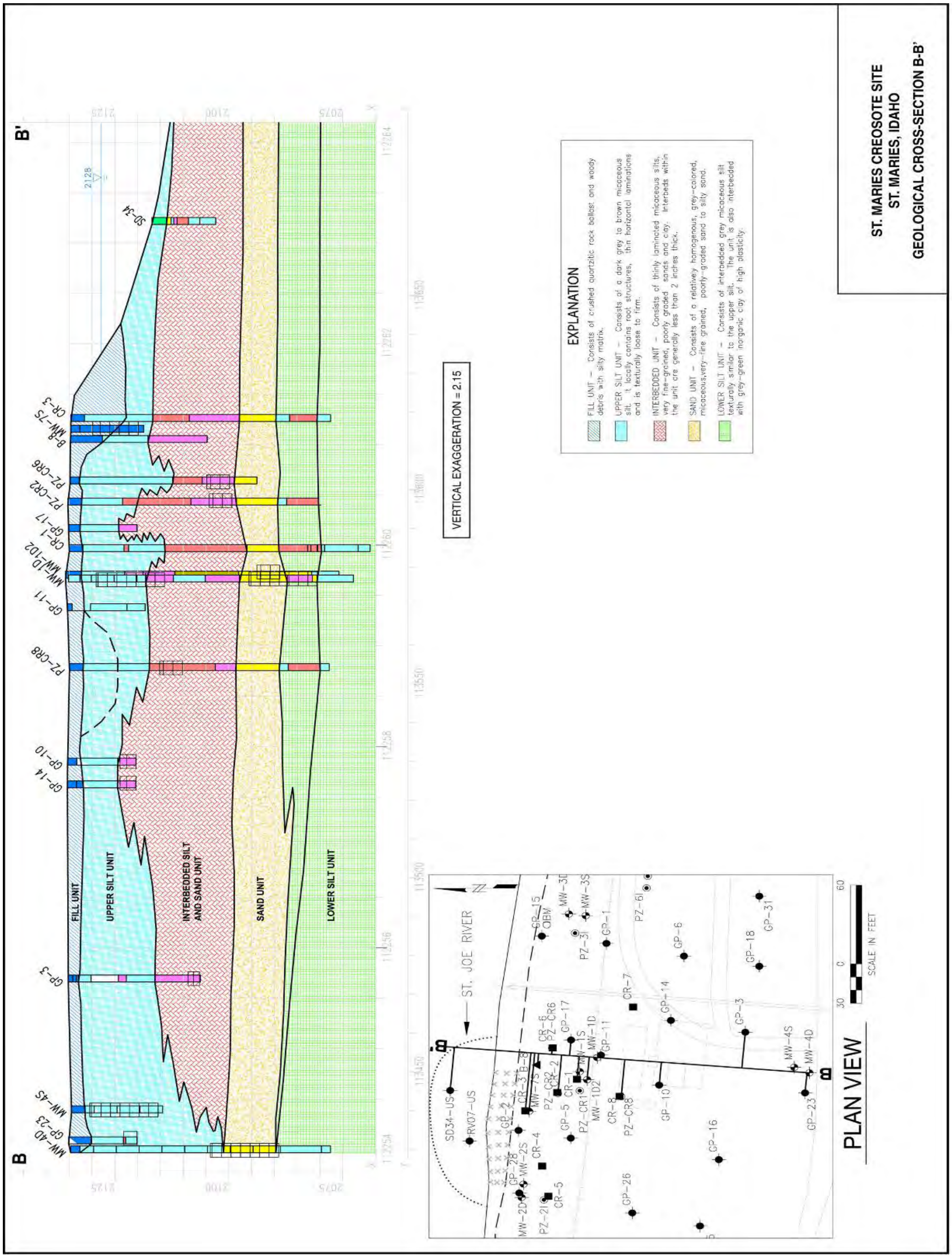

Figure 6. Geologic Cross Section

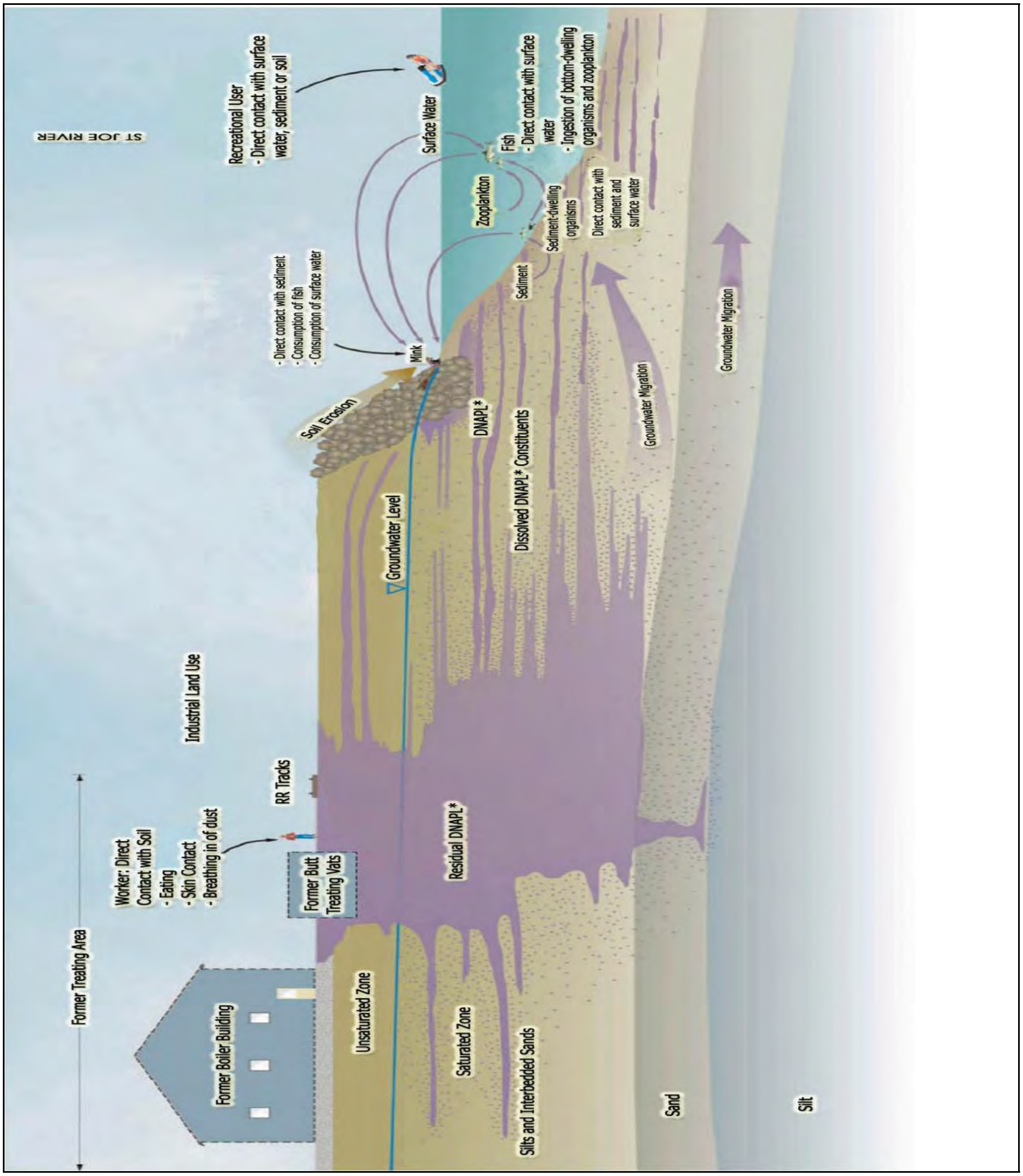

Figure 7. Conceptual Site Model

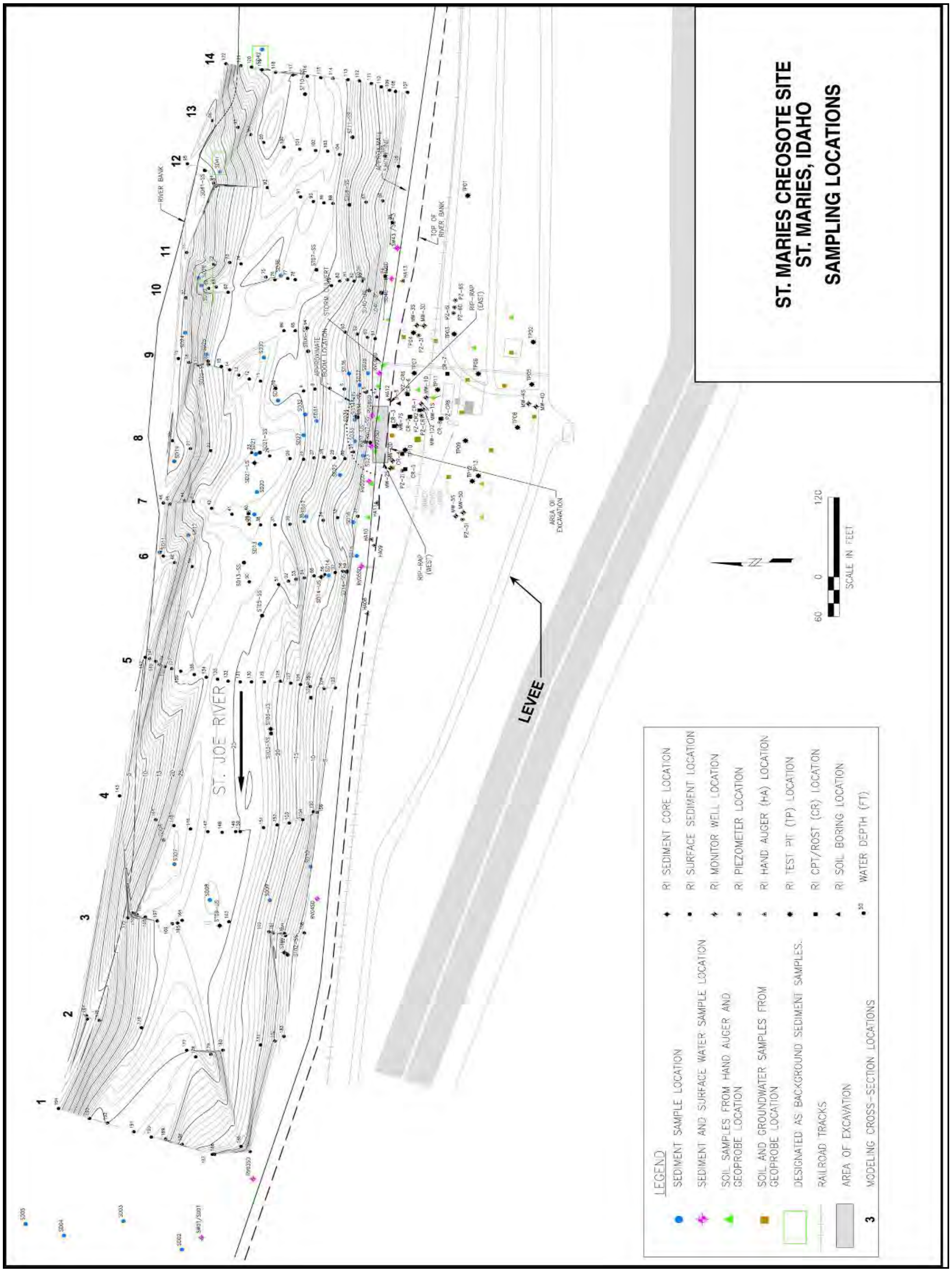

Figure 8. Sampling Locations

TABLES

Table 1. Summary of Chemicals of Potential Concern and Medium-Specific Exposure Point Concentrations - Soil

Exposure Point	Chemical of Potential Concern	Max. Detection Limit (mg/kg)	Max. Detected Conc. (mg/kg)	Frequency of Detection (%)	EPC (mg/kg)	Statistical Measure
Upland Surface Soil: On-Site Commercial/Industrial Worker On-Site Construction Worker On-site Adult/Child Recreationalist	Acenaphthene	1.1	1.3	20	1.30	Max
	Anthracene	1.1	12	80	12.0	99% Chebyshev (MVUE) UCL
	Benzene	0.12	0.29	50	0.29	Max
	Benzo(a)anthracene	1.1	26	100	26.0	99% Chebyshev (MVUE) UCL
	Benzo(a)pyrene	2.8	77	100	77.0	99% Chebyshev (MVUE) UCL
	Benzo(b)fluoranthene	2.8	78	100	78.0	99% Chebyshev (MVUE) UCL
	Benzo(k)fluoranthene	1.1	44	100	44.0	99% Chebyshev (MVUE) UCL
	Carbazole	1.1	2.3	20	2.30	Max
	Chrysene	1.1	60	100	60.0	99% Chebyshev (MVUE) UCL
	Dibenz(a,h)anthracene	1.1	17	80	17.0	99% Chebyshev (MVUE) UCL
	Ethylbenzene	0.12	0.0018	30	0.002	Max
	Fluoranthene	1.1	16	100	16.0	99% Chebyshev (MVUE) UCL
	Fluorene	1.1	0.044	20	0.04	Max
	Indeno(1,2,3-cd)pyrene	1.1	56	100	56.0	99% Chebyshev (Mean,Std.) UCL
	Naphthalene	1.1	14	60	5.92	99% Chebyshev (MVUE) UCL
	Pyrene	1.1	29	100	29.0	99% Chebyshev (MVUE) UCL
	Styrene	NA	NA	NA	NA	NA
	Toluene	0.13	0.33	60	0.33	99% Chebyshev (MVUE) UCL
	Xylenes (Total)	NA	NA	NA	NA	NA
Riverbank Surface Soil: On-Site Construction Worker On-site Adult/Child Recreationalist	Acenaphthene	3.3	1,660	61.5	336	Standard Bootstrap
	Anthracene	0.3	1,010	84.6	311	Standard Bootstrap
	Benzene	0.0017	0.0098	50	0.01	Max
	Benzo(a)anthracene	0.3	796	84.6	230	Standard Bootstrap
	Benzo(a)pyrene	0.38	406	84.6	100	Standard Bootstrap
	Benzo(b)fluoranthene	0.38	416	92.3	134	Standard Bootstrap
	Benzo(k)fluoranthene	0.38	260	84.6	260	99% Chebyshev (MVUE) UCL
	Carbazole	0.14	2.1	50	2.10	Max
	Chrysene	0.38	555	100	555	99% Chebyshev (MVUE) UCL
	Dibenz(a,h)anthracene	0.3	128	76.9	128	99% Chebyshev (MVUE) UCL
	Ethylbenzene	0.0017	ND	0	0.001	1/2 the Maximum Detection Limit
	Fluoranthene	0.3	1,950	92.3	428	Standard Bootstrap
	Fluorene	3.3	1,180	61.5	265	Standard Bootstrap
	Indeno(1,2,3-cd)pyrene	0.3	372	84.6	90.2	Standard Bootstrap
	Naphthalene	3.3	3,070	30.8	652	Standard Bootstrap
	Pyrene	0.3	1,380	92.3	390	Standard Bootstrap
	Styrene	NA	NA	NA	NA	NA
	Toluene	0.0017	0	83.3	0.01	95% H-UCL
	Xylenes (Total)	NA	NA	NA	NA	NA

Exposure Point	Chemical of Potential Concern	Max. Detection Limit (mg/kg)	Max. Detected Conc. (mg/kg)	Frequency of Detection (%)	EPC (mg/kg)	Statistical Measure
Upland Subsurface Soil: On-Site Construction Worker	Acenaphthene	0.33	0.0313	50	0.0313	Max
	Anthracene	0.33	0.164	25	0.164	Max
	Benzene	0.01		0	0.005	Max
	Benzo(a)anthracene	0.33	0.162	25	0.162	Max
	Benzo(a)pyrene	0.33	0.132	25	0.132	Max
	Benzo(b)fluoranthene	0.33	1.28	25	1.28	Max
	Benzo(k)fluoranthene	0.33	0.0474	25	0.0474	Max
	Carbazole	0.33		0	0.165	Max
	Chrysene	0.33	0.137	50	0.137	Max
	Dibenz(a,h)anthracene	0.33	0.0152	25	0.0152	Max
	Ethylbenzene	0.01		0	0.005	Max
	Fluoranthene	0.33	0.345	50	0.345	Max
	Fluorene	0.33	0.0921	25	0.0921	Max
	Indeno(1,2,3-cd)pyrene	0.33	0.0822	25	0.0822	Max
	Naphthalene	0.33	0.038	50	0.038	Max
	Pyrene	0.33	0.366	75	0.366	Max
	Styrene	1.2	3.5	25	3.5	Max
	Toluene	1.2	3.6	16.7	1.5	Standard Bootstrap
	Xylenes (Total)	1.2	16	50	16	Max
Riverbank Subsurface Soil: On-Site Construction Worker	Acenaphthene	10	3,080	88.9	979.62	Standard Bootstrap
	Anthracene	10	6,810	100	5,185.96	99% Chebyshev (MVUE) UCL
	Benzene	1.2	ND	0	0.60	1/2 the Maximum Detection Limit
	Benzo(a)anthracene	10	527	100	527.00	99% Chebyshev (MVUE) UCL
	Benzo(a)pyrene	10	963	100	963.00	99% Chebyshev (MVUE) UCL
	Benzo(b)fluoranthene	10	512	100	512.00	99% Chebyshev (MVUE) UCL
	Benzo(k)fluoranthene	10	984	100	984.00	99% Chebyshev (MVUE) UCL
	Carbazole	10	46	100	46	Max
	Chrysene	10	2,220	100	2,220.00	99% Chebyshev (MVUE) UCL
	Dibenz(a,h)anthracene	10	134	100	134.00	99% Chebyshev (MVUE) UCL
	Ethylbenzene	1.2	1.7	50	1.7	Max
	Fluoranthene	10	4,140	100	4,140.00	99% Chebyshev (MVUE) UCL
	Fluorene	10	2,220	100	2,220.00	99% Chebyshev (Mean,Std.) UCL
	Indeno(1,2,3-cd)pyrene	10	446	100	446.00	99% Chebyshev (MVUE) UCL
	Naphthalene	10	7,840	77.8	2,452.05	Standard Bootstrap
	Pyrene	10	3,370	100	3,370.00	99% Chebyshev (MVUE) UCL
	Styrene	1.2	ND	0	0.6	1/2 the Maximum Detection Limit
	Toluene	1.2	0.52	50	0.52	Max
	Xylenes (Total)	1.2	5.6	50	5.6	Max

Table 2. Summary of Chemicals of Potential Concern and Medium-Specific Exposure Point Concentrations - Sediment

Exposure Point	Chemical of Potential Concern	Max. Detection Limit (mg/kg)	Max. Detected Conc. (mg/kg)	Frequency of Detection (%)	EPC (mg/kg)	Statistical Measure
Surface Sediment: On-Site Adult/Child Recreationalist	Acenaphthene	77	4,300	76.2	234	Standard Bootstrap
	Benzo(a)anthracene	77	980	65.1	58.0	Standard Bootstrap
	Benzo(a)pyrene	77	360	76.2	24.1	Standard Bootstrap
	Benzo(b)fluoranthene	77	270	74.6	21.0	Standard Bootstrap
	Benzo(k)fluoranthene	77	300	71.4	22.0	Standard Bootstrap
	Bromomethane	1.2	1.8	12.5	0.58	Standard Bootstrap
	Carbazole	38	2,700	47.6	132	Standard Bootstrap
	Chrysene	77	1,400	74.6	97.1	Standard Bootstrap
	Dibenz(a,h)anthracene	10	60	49.2	60.0	Large variance amongst non-detect replacement values - 95-UCL determination not appropriate
	Dibenzofuran	77	2,600	65.1	129	Standard Bootstrap
	Fluoranthene	77	3,500	79.4	217	Jackknife
	Fluorene	77	3,800	73	203	Standard Bootstrap
	Indeno(1,2,3-cd)pyrene	10	120	61.9	7.59	Standard Bootstrap
	Naphthalene	77	89,000	65.1	3,850	Standard Bootstrap

Table 3. Summary of Chemicals of Potential Concern and Medium-Specific Exposure Point Concentrations - Groundwater

Exposure Point	Chemical of Potential Concern	Max. Reporting Limit (µg/L)	Max. Detected Conc. (µg/L)	Frequency of Detection (%)	EPC (µg/L)	Statistical Measure
Deep Aquifer Groundwater: Hypothetical On-site Resident	2,4-Dimethylphenol	11	70	20	16.3	Standard Bootstrap
	2-Methylphenol	1	3.2	13.3	1.5	Standard Bootstrap
	4-Methylphenol	1	9.9	20	3.2	Standard Bootstrap
	Acenaphthene	40	310	20	99.7	Standard Bootstrap
	Benzene	0.22	13	20	3.5	Standard Bootstrap
	Benzo(a)anthracene	0.7	17	13.3	4.2	Standard Bootstrap
	Benzo(a)pyrene	0.8	6.2	13.3	1.7	Standard Bootstrap
	Benzo(b)fluoranthene	0.8	6.2	13.3	1.7	Standard Bootstrap
	Benzo(k)fluoranthene	0.8	7.6	13.3	1.9	Standard Bootstrap
	bis(2-Ethylhexyl)phthalate	2	62	80	15.4	Standard Bootstrap
	Carbazole	34	110	20	32.4	Standard Bootstrap
	Chrysene	0.8	12	13.3	3.0	Standard Bootstrap
	Dibenz(a,h)anthracene	0.8	0.46	6.7	0.46	Max
	Dibenzofuran	47	190	20	53.6	Standard Bootstrap
	Ethylbenzene	0.2	13	20	4.0	Standard Bootstrap
	Fluoranthene	0.7	95	20	23.1	Standard Bootstrap
	Fluorene	38	190	20	58.7	Standard Bootstrap
	Indeno(1,2,3-cd)pyrene	0.8	1.6	6.7	1.6	Max
	m,p-Xylenes	0.66	19	20	6.2	Standard Bootstrap
	Naphthalene	48	3800	26.7	957.9	Standard Bootstrap
	o-Xylene	0.24	16	20	4.5	Standard Bootstrap
	Pyrene	1	68	20	15.9	Standard Bootstrap
	Toluene	0.36	20	40	5.2	Standard Bootstrap

Exposure Point	Chemical of Potential Concern	Max. Reporting Limit (µg/L)	Max. Detected Conc. (µg/L)	Frequency of Detection (%)	EPC (µg/L)	Statistical Measure
Shallow Aquifer Groundwater: On-Site Commercial/Industrial Worker On-Site Construction Worker Hypothetical On-site Resident	2,4-Dimethylphenol	1401	1400	33.3	271.5	Standard Bootstrap
	2-Methylphenol	471	470	16.7	77.1	Standard Bootstrap
	4-Methylphenol	731	730	22.2	123.1	Standard Bootstrap
	Acenaphthene	641	640	44.4	166.8	Standard Bootstrap
	Benzene	25	24	33.3	4.4	Standard Bootstrap
	Benzo(a)anthracene	75	74	22.2	12.4	Standard Bootstrap
	Benzo(a)pyrene	33	32	16.7	5.6	Standard Bootstrap
	Benzo(b)fluoranthene	33	32	16.7	5.9	Standard Bootstrap
	Benzo(k)fluoranthene	42	41	16.7	7.0	Standard Bootstrap
	bis(2-Ethylhexyl)phthalate	34	33	38.9	7.5	Standard Bootstrap
	Carbazole	371	370	33.3	99.1	Standard Bootstrap
	Chrysene	63	62	22.2	10.47	Standard Bootstrap
	Dibenz(a,h)anthracene	2.6	1.6	5.6	1.6	Max
	Dibenzofuran	351	350	50	80.0	Standard Bootstrap
	Ethylbenzene	64	63	33.3	16.7	Standard Bootstrap
	Fluoranthene	361	360	22.2	58.4	Standard Bootstrap
	Fluorene	411	410	38.9	83.7	Standard Bootstrap
	Indeno(1,2,3-cd)pyrene	12	11	16.7	2.5	Standard Bootstrap
	m,p-Xylenes	121	120	33.3	29.4	Standard Bootstrap
	Naphthalene	9401	9400	50	2810.1	Standard Bootstrap
	o-Xylene	62	61	33.3	16.1	Standard Bootstrap
	Pyrene	281	280	22.2	44.5	Standard Bootstrap
	Toluene	141	140	33.3	27.2	Standard Bootstrap

Table 4. Summary or Exposure Pathways and Receptors

Pathways Quantitatively Evaluated in the Risk Assessment		Receptors: On-site Commercial/ Industrial Worker - Upland Area	Off-site Commercial/ Industrial Worker	On-site Construction Worker - Upland Area and Riverbank Area	Off-site Construction Worker	Hypothetical On-Site Resident[a]	On-site Adult/Child Recreationalist - Upland Area and Riverbank Area
Surface Soil (0 - 1.5 ft)	Ingestion	X		X			X[2]
	Dermal Contact	X		X			X[2]
	Particulate Inhalation	X		X			X[2]
	Volatile Inhalation of Ambient Air						
Surface Water	Ingestion						X[1]
	Dermal Contact						X[1]
	Volatile Inhalation						
Surface Sediment (0 - 1 ft)	Ingestion						X
	Dermal Contact						X
Subsurface Soil (1.5 - 10 ft)	Ingestion			X			
	Dermal Contact			X			
	Particulate Inhalation			X			
	Volatile Inhalation of Ambient Air						
	Volatile Inhalation of Indoor Air						
Groundwater	Ingestion					X	
	Dermal Contact			X		X[3]	
	Volatile Inhalation of Ambient Air						
	Volatile Inhalation of Indoor Air					X[3]	
Fish	Ingestion						
Water Potatoes and/or Freshwater Mussels	Ingestion						

Notes:
[1] Although surface water exposure is a complete pathway - no Detected Contaminants of Potential Concern (COPCs) were identified.
[2] Exposure pathway is complete only if the receptor is trespassing.
[3] Exposure is based on showering

Table 5. Toxicity Data Summary

Chemical	Toxicity Data									
	WOE	Chronic Oral RfD (mg/kg/d)	Source	Oral CSF (1/mg/kg/d)	Source	Inhalation RfD (mg/kg/d)	Inhalation RfC (mg/m^3)	Source	Inhalation CSF (1/mg/kg/d)	Source
Acenaphthene	NA	6.00E-02	I	NA		NA	NA		NA	
Anthracene	D	3.00E-01	I	NA		NA	NA		NA	
Benzo(a)anthracene	B2	NA		7.30E-01	E	NA	NA		NA	
Benzo(a)pyrene	B2	NA		7.30E+00	I	NA	NA		3.10E+00	E
Benzo(b)fluoranthene	B2	NA		7.30E-01	E	NA	NA		NA	
Benzo(k)fluoranthene	B2	NA		7.30E-02	E	NA	NA		NA	
Carbazole	B2	NA		2.00E-02	H	NA	NA		NA	
Chrysene	B2	NA		7.30E-03	E	NA	NA		NA	
Dibenzofuran	D	4.00E-03	E	NA		NA	NA		NA	
Dibenz(a,h)anthracene	B2	NA		7.30E+00	E	NA	NA		NA	
Dimethylphenol, 2,4-	NA	2.00E-02	I	NA		NA	NA		NA	
Fluoranthene	D	4.00E-02	I	NA		NA	NA		NA	
Fluorene	D	4.00E-02	I	NA		NA	NA		NA	
Indeno(1,2,3-cd)pyrene	B2	NA		7.30E-01	E	NA	NA		NA	
Methylphenol, 2-	D	5.00E-02	I	NA		NA	NA		NA	
Methylphenol, 4-	D	5.00E-03	H	NA		NA	NA		NA	
Naphthalene	D	2.00E-02	I	NA		9.00E-04	3.15E-03	I	NA	
Pyrene	D	3.00E-02	I	NA		NA	NA		NA	
Benzene	A	3.00E-03	E	5.50E-02	I	1.70E-03	5.95E-03	E	2.90E-02	I
Bromomethane	D	1.40E-03	I	NA		1.40E-03	4.90E-03	I	NA	
Ethylbenzene	D	1.00E-01	I	NA		2.90E-01	1.02E+00	I	3.85E-03	N
Styrene	NA	2.00E-01	I	NA		2.86E-01	1.00E+00	I	NA	
Toluene	D	2.00E-01	I	NA		1.14E-01	3.99E-01	I	NA	
o-xylene	D	2.00E+00	H	NA		NA	NA		NA	
m,p-xylenes	D	2.00E+00	H	NA		NA	NA		NA	
Xylenes, total	D	2.00E-01	I	NA		3.00E-02	1.05E-01	I	NA	

Notes:

NA = Not Available or Not Applicable
WOE = Weight of Evidence for Cancer Classification

Weight of Evidence / Carcinogenic Classifications:

Class A = Known human Carcinogen
Class B = Probable human carcinogen (B1 - limited evidence in humans; B2 - inadequate evidence in humans
Class C = Possible Human Carcinogen
Class D = Not Classifiable
NA = Data not available

Sources:

I = IRIS
H = Heast 1997
E = U.S. EPA-NCEA provisional value; EPA Region III RBC Table April 2001

Table 6. Physical Data Summary

Chemical	Physical Data								
	Dermal Permeability Constant Kp (cm/hr)	Source	Absorption Factor (Oral)	Source	Absorption Factor (Dermal)	Source	Absorption Factor (Inhalation)	Soil to Air Particulate Emission Factor (kg/m^3)	Source
Acenaphthene	0.15		0.28	5	0.10	5	1	7.35E-10	7
Anthracene	0.16	2	0.28	5	0.10	5	1	7.35E-10	7
Benzo(a)anthracene	0.47	1	0.28	5	0.02	5	1	7.35E-10	7
Benzo(a)pyrene	0.7	1	0.28	5	0.02	5	1	7.35E-10	7
Benzo(b)fluoranthene	0.7	1	0.28	5	0.02	5	1	7.35E-10	7
Benzo(k)fluoranthene	0.76	2	0.28	5	0.02	5	1	7.35E-10	7
Carbazole	0.5	1	1		0.0005	3	1	7.35E-10	7
Chrysene	0.47	1	0.28	5	0.02	5	1	7.35E-10	7
Dibenzofuran	0.15	2	0.28		0.1	7	1	7.35E-10	7
Dibenz(a,h)anthracene	1.50	1	0.28	5	0.02	5	1	7.35E-10	7
Dimethylphenol, 2,4-	0.11	1	1		0.10	4	1	7.35E-10	7
Fluoranthene	0.22	1	0.28	5	0.10	5	1	7.35E-10	7
Fluorene	0.17	1	0.28	5	0.10	5	1	7.35E-10	7
Indeno(1,2,3-cd)pyrene	1.00	1	0.28	5	0.02	5	1	7.35E-10	7
Methylphenol, 2-	0.016	1	0.50	6	0.1	3	1	7.35E-10	7
Methylphenol, 4-	0.01	1	1		0.1	7	1	7.35E-10	7
Naphthalene	0.047	1	0.28	5	0.1	5	1	7.35E-10	7
Pyrene	0.28	2	0.28	5	0.1	5	1	7.35E-10	7
Benzene	0.1	1a	1		0.05	3	1	7.35E-10	7
Bromomethane	0.0035	1	1		0.0005	3	1	7.35E-10	7
Ethylbenzene	1	1a	1		0.03	3	1	7.35E-10	7
Styrene	0.037	1	1		0.03	3	1	7.58E-10	7
Toluene	0.031	1	1		0.03	3	1	7.58E-10	7
o-xylene	0.053	1	1		0.03	3	1	7.35E-10	7
m,p-xylenes	0.053	1	1		0.03	3	1	7.35E-10	7
Xylenes, total	0.053	1	1		0.03	3	1	7.58E-10	7

Notes:

1. Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment Interim Table 3.1 for Inorganics and Exhibit B-2 for organic contaminants in water. September 2001

1a. U.S. EPA Dermal Exposure Assessment: Principles and Applications. January 1992 Table 5-8 based on measured results

2. Permeability Factor was calculated using U.S. EPA guidance 2001 Equation 3.8 in Appendix A page A-2. $\log K_{ow}$ values were determined from the Soil Screening Guidance. Users Guide Table 36. April 1996.
3. U.S. EPA Region 3 Technical Guidance Manual, Risk Assessment , Assessing Dermal Exposure from Soil. December 1995.
4. U.S. EPA Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E: Supplemental Guidance for Dermal Risk Assessment; Interim Guidance). 1998
5. U.S. EPA Region IV Technical Services Supplemental Guidance to RAGS, Region IV Bulletins. October 1996.
6. Magee, B., P. Anderson and D. Burmaster. 1996. Absorption Adjustment Factor (AAF) Distribution for Polycylic Aromatic Hydrocarbons (PAHs). April 1.
7. U.S. EPA, 1996 "Soil Screening Guidance, User's Guide, Equation 5.

Table 7. Exposure Assumptions for the Future On-Site Commercial/Industrial Worker

General Assumptions	**Site-specific**		
BW (body weight)	71.8 kg		mean body weight of adult male/female combined 18 - 75 years - high confidence [USEPA, 1997b - T1-2 and T7-2]
AT (averaging times):			
Carcinogenic effects	75 yrs		average life expectancy /recommended exposure factor - high confidence [USEPA, 1997b - T1-2]
Chronic effects (noncarc.)	25 yrs		recommended RME duration for industrial worker [USEPA,1991]
Surface Soil Exposure Assumptions			
EF (exposure frequency)	187.5 days/yr		based on conservative assumption of 75% of days without snow cover (Weatherbase, 2003 and NOAA , 2003) - 250 days per year is the standard RME default for industrial worker [USEPA, 1989a; USEPA, 2001d exhibit 3.5]
ED (exposure duration)	25 yrs		recommended RME duration for industrial worker [USEPA, 1991; USEPA, 2001d exhibit 3.5]
Dermal Contact			
BSAE (body surface area exposed)	3300 cm^2		recommended RME value for industrial worker [USEPA, 2001d exhibit 3.5]
FBE (fraction of body exposed)	100.0%		assumes total contact with exposed skin surface
AF (soil adherence factor)	0.2 mg/cm^2		recommended RME value for industrial worker [USEPA, 1998a; USEPA, 2001d exhibit 3.5]
FC (fraction of potentially impacted)	10%		assumes 10% of the commercial industrial worker's area is (depth and location) is potentially impacted - conservative assumption based upon 1 acre of the 14 acre work area is potentially impacted
ABS (absorption factor)	chemical-specific		value varies according to chemical [USEPA, 1996; USEPA, 1998a; Magee et al., 1996]
Inhalation of Dust			
IR (inhalation rate)	1.3 m^3/hr		mean inhalation rate for outdoor worker - hourly average [USEPA, 1997b - T5-23]
ET (exposure time)	0.8 hr/day		assumes 10% of the commercial industrial worker's area is (depth and location) is potentially impacted - conservative assumption based upon 1 acre of the 14 acre work area is potentially impacted - 10% of a normal 8-hour workday (RME) [USEPA, 1989a]
Incidental Ingestion			
IR (ingestion rate)	50 mg/day		recommended mean soil ingestion rate for adults [USEPA,1997b - T1-2]
FI (fraction ingested)	10%		assumes 10% of the commercial industrial worker's area is (depth and location) is potentially impacted - conservative assumption based upon 1 acre of the 14 acre work area is potentially impacted
ABS (absorption factor)	chemical-specific		value varies according to chemical [MADEP, 1995; Magee et al., 1996; EPA Region IV, 1992]
Groundwater Exposure Assumptions			
Dermal Contact			
ET (exposure time)	8 hr/day		based on normal 8-hour workday (RME) [USEPA, 1989a]
EF (exposure frequency)	187.5 days/yr		based on conservative assumption of 75% of days without snow cover (Weatherbase, 2003 and NOAA , 2003) - 250 days per year is the standard RME default for industrial worker [USEPA, 1989a; USEPA, 2001d exhibit 3.5]
ED (exposure duration)	25 yrs		recommended RME duration for industrial worker [USEPA, 1991; USEPA, 2001d exhibit 3.5]
BSAE (body surface area exposed)	3300 cm^2		recommended RME value for industrial worker [EPA, 2001 exhibit 3.5] - based on head, hands, and forearms
FBE (fraction of body exposed)	100.0%		assumes total contact with exposed skin surface as defined by BSAE
Incidental Ingestion			
IR (ingestion rate L/day)	1.0 L/day		drinking water intake rate for commercial/industrial workers (RME) [U.S. EPA, 1991]

Notes:

USEPA, 1997b. Exposure Factors Handbook. Vols I-III. Office of Research and Development, Washington, D.C. EPA/600/P-95/002Fa. August.

USEPA, 1989a. Risk Assessment Guidance for Superfund

USEPA, 1992. Region IV Risk Assessment Guidance.

USEPA, 1998a. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Supplemental Guidance. Dermal Risk Assessment. Interim Guidance. Office of Emergency and Remedial Response, Washington, D.C.

USEPA, 1997b. Exposure Factors Handbook. Vols I-III. Office of Research and Development, Washington, D.C. EPA/600/P-95/002Fa. August.

USEPA, 1996. Region IV Human Health Risk Assessment Bulletin - Supplemental Guidance to RAGS, October, 1996.

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Office of Solid Waste and Emergency Response, Washington, D.C.

Magee, B., P. Anderson, D. Burmaster. 1996. Absorption Adjustment Factor Distributions for Polycyclic Aromatic Hydrocarbons. *Submitted to Human and Ecological Risk Assessment*.

RME = Reasonable Maximum Exposure

Weatherbase, 2003. Historical Weather Database for St Marie's, Idaho. http://www.weatherbase.com/weather/weatherall.php3?s=016057&refer=&units=us. St Marie’s, Idaho receives, on average, 58.7 inches of snow each year and has, on average, 139.1 days a year below 32 degrees Fahrenheit.

NOAA, 2003. National Oceanic and Atmospheric Administration’s (NOAA) Satellite and Information Services Snow Cover daily snow cover maps from October 1, 2001 to April 30, 2002. http:www.ssd.noaa.gov/PS/SNOW/ARCH01/USA. A review National Oceanic and Atmospheric Administration’s (NOAA) Satellite and Information Services Snow Cover daily snow cover maps from October 1, 2001 to April 30, 2002 found that the area near St Marie’s had snow cover for approximately 130 days; although this evaluation only covered the 2001-2002 winter season, it is 30% greater than the assumed number of snow cover days (91 days).

Table 8. Summary of Exposure Assumptions for Future On-Site Construction Worker

General Assumptions	Site-specific		
BW (body weight)	71.8 kg		body weight of adult male/recommended exposure factor - high confidence [USEPA, 1997b - T1-2]
AT (averaging times):			
Carcinogenic effects	75 yrs		average life expectancy /recommended exposure factor - high confidence [USEPA, 1997b - T1-2]
Chronic effects (noncarc.)	1 yrs		based on size of areas potentially undergoing construction [professional judgment]
Groundwater Exposure Assumptions			
Dermal Contact			
ET (exposure time)	8 hr/day		based on normal 8-hour workday (RME) [USEPA, 1989a]
EF (exposure frequency)	10 days/yr		based on typical sewer line construction activities [professional judgment]
ED (exposure duration)	1 yrs		based on size of areas potentially undergoing construction [professional judgment]
BSAE (body surface area exposed)	3300 cm^2		recommended RME value for industrial worker [EPA, 2001 exhibit 3.5] - based on head, hands, and forearms
FBE (fraction of body exposed)	100.0%		assumes total contact with exposed skin surface
EF (exposure frequency)	10 days/yr		based on typical sewer line construction activities [professional judgment]
ED (exposure duration)	1 yrs		based on size of areas potentially undergoing construction [professional judgment]
Dermal Contact			
BSAE (body surface area exposed)	3300 cm^2		recommended RME value for industrial worker [USEPA, 2001d exhibit 3.5] - based on head, hands, and forearms
FBE (fraction of body exposed)	100.0%		assumes total contact with exposed skin surface
AF (soil adherence factor)	0.2 mg/cm^2		recommended RME value for industrial worker [USEPA, 1998a; USEPA, 2001d exhibit 3.5]
FC (fraction of potentially impacted)	100%		assumes 100% of area (depth and location area) are potentially impacted
ABS (absorption factor)	chemical-specific		value varies according to chemical [USEPA, 1996; USEPA, 1998a; Magee et al., 1996]
Inhalation of Dust			
IR (inhalation rate)	1.5 m^3/hr		mean inhalation rate for outdoor worker engaged in moderate activities [USEPA, 1997b - T5-23]
ET (exposure time)	8 hr/day		based on normal 8-hour workday (RME) [USEPA, 1989a]
Incidental Ingestion			
IR (ingestion rate)	50 mg/day		recommended mean soil ingestion rate for adults [USEPA,1997b - T1-2]
FI (fraction ingested)	100%		assumes worst-case assumption that all soil ingested is absorbed
ABS (absorption factor)	chemical-specific		value varies according to chemical [MADEP, 1995; Magee et al., 1996; EPA Region IV, 1992]

Notes:

EPA, 2001d. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Part E Supplemental Guidance for Dermal Risk Assessment. Interim. Review Draft. Office of Emergency and Remedial Response, Washington, D.C. EPA/540/R/99/00

USEPA, 1992. Region IV Risk Assessment Guidance.

USEPA, 1998a. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Supplemental Guidance. Dermal Risk Assessment. Interim Guidance. Office of Emergency and Remedial Response, Washington, D.C.

USEPA, 1997b. Exposure Factors Handbook. Vols I-III. Office of Research and Development, Washington, D.C. EPA/600/P-95/002Fa. August.

USEPA, 1996. Region IV Human Health Risk Assessment Bulletin - Supplemental Guidance to RAGS, October, 1996.

USEPA, 1989a. Risk Assessment Guidance for Superfund. Vol I, Human Health Evaluation Manual (Part A). Office of Emergency and Remedial Response, Washington, D.C. EPA/540/1-89/002. December.

USEPA, 1992b. Dermal Exposure Assessment: Principles and Applications.

Magee, B., P. Anderson, D. Burmaster. 1996. Absorption Adjustment Factor Distributions for Polycyclic Aromatic Hydrocarbons. *Submitted to Human and Ecological Risk Assessment*. April 1.

RME = Reasonable Maximum Exposure

Table 9. Summary of Exposure Assumptions for Current/Future On-site Adult/Child Recreationalist

General Assumptions	Site-Specific	
BW (body weight)	71.8 kg	body weight of adult male/recommended exposure factor - high confidence [USEPA, 1997b - T1-2]
	16.6 kg	mean body weight of children (age 1-6) [USEPA, 1997b - T7-3]
AT (averaging times):		
Carcinogenic effects	75 yrs	average life expectancy /recommended exposure factor - high confidence [USEPA, 1997b - T1-2]
Chronic effects (noncarcinogenic)	24 yrs	standard default assumption (RME) - adults [USEPA, 1991]
	6 yrs	standard default assumption (RME) - children [USEPA, 1991]
ED (exposure duration)	24 yrs	standard default assumption (RME) - adults [USEPA, 1991]
	6 yrs	standard default assumption (RME) - children [USEPA, 1991]
Surface Soil Exposure Assumptions (via Trespasser Scenario)		
ET (exposure time)	3 hr/day	likely amount of time spent recreating along riverbank area [professional judgement] - 1.5 hours in the Upland Area and 1.5 hours in the Riverbank Area
EF (exposure frequency)	30 days/yr	based on typical recreational activities [professional judgement]
Dermal Contact		
TBS (total body surface area)	5700 cm^2	recommended RME value for residential exposure [USEPA, 2001d exhibit 3.5]
	2800 cm^2	recommended RME value for residential exposure [USEPA, 2001d exhibit 3.5]
FBE (fraction of body exposed)	100.0%	assumes complete exposure
AF (soil adherence factor)	0.008 mg/cm^2	based on adherence factor for groundskeeper (No. 5) [USEPA, 1997b;T6-11 and T6-12]
	0.032 mg/cm^2	based on adherence factor for soccer (No. 1) for child [USEPA, 1997b;T6-11 and T6-12]
ABS (absorption factor)	chemical-specific	value varies according to chemical [USEPA, 1996; USEPA, 1998a; Magee et al., 1996]
FC (fraction of potentially impacted)	25.0%	fraction of day in contact with soil during recreational activities - 12.5% in the Upland Area and 12.5% in the Riverbank Area - based upon 3hr/day of a 12hr day = 25.0 %
Inhalation of Dust		
IR (inhalation rate)	1.0 m^3/hr	Recommended value for short-term light activity levels - adults [USEPA, 1997b - T5-23]
	1.0 m^3/hr	Recommended value for short-term light activity levels - adults [USEPA, 1997b - T5-23]
Incidental Ingestion		
IR (ingestion rate)	50 mg/day	recommended mean soil ingestion rate for adults [USEPA,1997b - T1-2]
	100 mg/day	recommended mean estimate for children [USEPA, 1997b - T4-23]
FI (fraction ingested)	50.0%	assumes that 1/2 of daily soil ingestion occurs while recreating in soil - 1/4 in the Upland Area and 1/4 in the Riverbank Area
ABS (absorption factor)	chemical-specific	value varies according to chemical [MADEP, 1995; Magee et al., 1996; EPA Region IV, 1992]
Sediment Exposure Assumptions		
Incidental Ingestion		
EF (exposure frequency)	30 days/yr	based on typical recreational activities [professional judgement]
ET (exposure time)	1.5 hr/day	likely amount of time spent recreating in river [professional judgement]
IR (ingestion rate)	50 mg/day	recommended mean soil ingestion rate for adults [USEPA,1997b - T1-2]
	100 mg/day	recommended mean estimate for children [USEPA, 1997b - T4-23]
FI (fraction ingested)	25.0%	assumes that 1/4 of daily soil ingestion occurs while recreating in sediment
ABS (absorption factor)	chemical-specific	value varies according to chemical [MADEP, 1995; Magee et al., 1996; EPA Region IV, 1992]

Dermal Contact			
TBS (total body surface area)	5700 cm^2		recommended RME value for residential exposure [USEPA, 2001d exhibit 3.5]
	2800 cm^2		recommended RME value for residential exposure [USEPA, 2001d exhibit 3.5]
FBE (fraction of body exposed)	100.0%		assumes complete exposure
AF (soil adherence factor)	0.239 mg/cm2		adult: based on adherence factor for reed gatherers [USEPA, 1997b; T6-11 and T6-12]
	0.221 mg/cm2		child: based on adherence factor for reed gatherers [USEPA, 1997b; T6-11 and T6-12]
ABS (absorption factor)	chemical-specific		value varies according to chemical [USEPA, 1996; USEPA, 1998a; Magee et al., 1996]
FC (fraction of potentially impacted)	12.50%		fraction of day in contact with sediment during recreational activities - based upon 1.5hr/day of a 12hr day = 12.5 %

Notes:

MADEP, 1995. Mass. Department of Environmental Protection, Guidance for Disposal Site Risk Characterization

Magee, B., et al., 1996. Absorption Adjustment Factor Distributions for Polycyclic Aromatic Hydrocarbons.

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Office of Solid Waste and Emergency Response, Washington, D.C.

USEPA, 1992. Region IV Risk Assessment Guidance.

USEPA, 1997b. Exposure Factors Handbook. Vols I-III. Office of Research and Development, Washington, D.C. EPA/600/P-95/002Fa. August.

USEPA, 2001d. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Part E Supplemental Guidance for Dermal Risk Assessment. Interim. Review Draft. Office of Emergency and Remedial Response, Washington, D.C. EPA/540/R/99/00

RME = Reasonable Maximum Exposure

Table 10. Summary of Exposure Assumptions for Future On-Site Resident

General Assumptions	Site-specific	
BW (body weight)	71.8 kg	body weight of adult male/recommended exposure factor - high confidence [U.S. U.S. EPA, 1997;T1-2]
AT (averaging times):		
Carcinogenic effects	75 yrs	life expectancy /recommended exposure factor - high confidence [U.S. EPA, 1997;T1-2]
Chronic effects (noncarc.)	30 yrs	standard default assumption - adult - 95th percentile [U.S. EPA, 1991]
Exposure Assumptions		
EF (exposure frequency)	350 days/yr	standard residential default assumption [U.S. EPA, 1991]
ED (exposure duration)	30 yrs	standard residential default assumption adult [U.S. EPA, 1991]
Groundwater Exposure Assumptions		
Ingestion		
IR (ingestion rate)	2 L/day	standard residential default assumption [U.S. EPA, 1991]
FI (fraction ingested)	100%	assumes 100% intake of tap water
Dermal Contact		
TBS (total body surface area)	1.8 m^2	Recommended value for residential showering/bathing RME scenario [U.S. EPA, 2001; Exhibit 3-2]
FBE (fraction of body exposed)	100.0%	assumes contact with entire body [U.S. EPA, 1997; T6-5]
ET (exposure time)	0.583 hr/day	recommended 95% shower duration (35-minutes) [U.S. EPA, 1997;T15-21]
PC (chemical permeability factor)	chemical-specific	Value varies according to chemical [U.S. EPA, 1992]
Conversion Factor	1×10^{-3} L/cm^3	
Inhalation of Volatiles while Showering		
IR (inhalation rate)	1 m^3/hr	short-term inhalation rate for adults in light activities [U.S. EPA, 1997;T5-23]
ET (exposure time)	0.583 hr/day	recommended 95% shower duration (35-minutes) [U.S. EPA, 1997;T15-21]

Notes:

EPA, 2001d. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Part E Supplemental Guidance for Dermal Risk Assessment. Interim. Review Draft. Office of Emergency and Remedial Response, Washington, D.C. EPA/540/R/99/00

U.S. EPA, 1999. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E: Supplemental Guidance for Dermal Risk Assessment; Interim Guidance). Office of Solid Waste and Emergency Response, Washington, DC. PB99-963312

U.S. EPA, 1997. Exposure Factors Handbook. Vols. I-III. Office of Research and Development, Washington, D.C. EPA/600/P-95/0002FA. August.

MDEP, 1994. Mass. Department of Environmental Protection Risk Assessment Guidance.

U.S. EPA, 1996. Region IV Human Health Risk Assessment Bulletin - Supplemental Guidance to RAGS, October, 1996.

U.S. EPA, 1994. Supplemental Guidance to RAGS: Region IV Bulletin - Exposure to Voss During Domestic Water Use: Contributions from Ingestion, Showering and Other Uses.

U.S. U.S. EPA, 1992. Dermal Exposure Assessment: Principles and Applications

U.S. EPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive: 9285.6-03. March 25.

Table 11. Risk Characterization Summary - Future On-Site Commercial/Industrial Worker

Medium	Exposure Medium	Chemical of Potential Concern	Ingestion	Dermal	Inhalation	Total	Ingestion	Dermal	Inhalation	Total
			Risk: Noncancer Effects				Risk: Cancer Effects			
Upland Surface Soil	Soil	Acenaphthene	2.17E-07	1.02E-06	NA	1.24E-06	NA	NA	NA	NA
		Anthracene	4.01E-07	1.89E-06	NA	2.29E-06	NA	NA	NA	NA
		Benzene	3.46E-06	2.28E-06	NA	5.74E-06	1.90E-10	1.26E-10	NA	3.16E-10
		Benzo(a)anthracene	NA	NA	NA	NA	6.34E-08	5.97E-08	NA	1.23E-07
		Benzo(a)pyrene	NA	NA	NA	NA	1.88E-06	1.77E-06	NA	3.65E-06
		Benzo(b)fluoranthene	NA	NA	NA	NA	1.90E-07	1.79E-07	NA	3.69E-07
		Benzo(k)fluoranthene	NA	NA	NA	NA	1.07E-08	1.01E-08	NA	2.08E-08
		Carbazole	NA	NA	NA	NA	5.49E-10	3.62E-12	NA	5.52E-10
		Chrysene	NA	NA	NA	NA	1.46E-09	1.38E-09	NA	2.84E-09
		Dibenz(a,h)anthracene	NA	NA	NA	NA	4.14E-07	3.91E-07	NA	8.05E-07
		Ethylbenzene	6.44E-10	2.55E-10	NA	8.99E-10	NA	NA	NA	NA
		Fluoranthene	4.01E-06	1.89E-05	NA	2.29E-05	NA	NA	NA	NA
		Fluorene	1.10E-08	5.19E-08	NA	6.30E-08	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	1.36E-07	1.29E-07	NA	2.65E-07
		Naphthalene	2.96E-06	1.40E-05	NA	1.69E-05	NA	NA	NA	NA
		Pyrene	9.68E-06	4.56E-05	NA	5.53E-05	NA	NA	NA	NA
		Styrene	NA	NA	NA	NA	NA	NA	NA	NA
		Toluene	5.90E-08	2.34E-08	NA	8.24E-08	NA	NA	NA	NA
		Xylenes (Total)	NA	NA	NA	NA	NA	NA	NA	NA
	Dust	Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	4.35E-10	
					Total Soil Noncancer Risk =	***1.05E-04***			***Total Soil Cancer Risk =***	***5.23E-06***

Medium	Exposure Medium	Chemical of Potential Concern	Ingestion	Dermal	Inhalation	Total	Ingestion	Dermal	Inhalation	Total
			Risk: Noncancer Effects				Risk: Cancer Effects			
Shallow Aquifer Groundwater	Water	2,4-Dimethylphenol	9.71E-02	2.82E-01	NA	3.79E-01	NA	NA	NA	NA
		2-Methylphenol	1.10E-02	4.66E-03	NA	1.57E-02	NA	NA	NA	NA
		4-Methylphenol	1.76E-01	4.65E-02	NA	2.23E-01	NA	NA	NA	NA
		Acenaphthene	1.99E-02	7.88E-02	NA	9.87E-02	NA	NA	NA	NA
		Benzene	1.05E-02	2.77E-02	NA	3.82E-02	5.77E-07	1.52E-06	NA	2.10E-06
		Benzo(a)anthracene	NA	NA	NA	NA	2.16E-05	2.68E-04	NA	2.90E-04
		Benzo(a)pyrene	NA	NA	NA	NA	9.72E-05	1.80E-03	NA	1.89E-03
		Benzo(b)fluoranthene	NA	NA	NA	NA	1.02E-05	1.89E-04	NA	1.99E-04
		Benzo(k)fluoranthene	NA	NA	NA	NA	1.21E-06	2.44E-05	NA	2.56E-05
		Bis(2-Ethylhexyl) phthalate	2.69E-03	2.13E-03	NA	4.83E-03	2.51E-07	1.99E-07	NA	4.51E-07
		Carbazole	NA	NA	NA	NA	4.73E-06	6.24E-05	NA	6.71E-05
		Chrysene	NA	NA	NA	NA	1.82E-07	2.26E-06	NA	2.44E-06
		Dibenz(a,h)anthracene	NA	NA	NA	NA	2.79E-05	1.10E-03	NA	1.13E-03
		Dibenzofuran	1.43E-01	5.70E-01	NA	7.13E-01	NA	NA	NA	NA
		Ethylbenzene	1.20E-03	3.16E-02	NA	3.28E-02	NA	NA	NA	NA
		Fluoranthene	1.05E-02	6.07E-02	NA	7.12E-02	NA	NA	NA	NA
		Fluorene	1.50E-02	6.72E-02	NA	8.22E-02	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	4.32E-06	1.14E-04	NA	1.18E-04
		m,p-xylenes	1.05E-03	1.47E-03	NA	2.52E-03	NA	NA	NA	NA
		Naphthalene	1.01E+00	1.25E+00	NA	2.25E+00	NA	NA	NA	NA
		o-Xylene	5.77E-04	8.07E-04	NA	1.38E-03	NA	NA	NA	NA
		Pyrene	1.06E-02	7.85E-02	NA	8.91E-02	NA	NA	NA	NA
		Toluene	9.72E-04	7.95E-04	NA	1.77E-03	NA	NA	NA	NA
					Total Shallow Aquifer Groundwater Noncancer Risk =	***4.0062***			***Total Shallow Aquifer Groundwater Cancer Risk =***	***3.73E-03***

Medium	Exposure Medium	Chemical of Potential Concern	Ingestion	Dermal	Inhalation	Total	Ingestion	Dermal	Inhalation	Total
			Risk: Noncancer Effects				Risk: Cancer Effects			
Deep Aquifer Groundwater	Water	2,4-Dimethylphenol	5.84E-03	1.70E-02	NA	2.28E-02	NA	NA	NA	NA
		2-Methylphenol	2.15E-04	9.07E-05	NA	3.05E-04	NA	NA	NA	NA
		4-Methylphenol	4.64E-03	1.22E-03	NA	5.86E-03	NA	NA	NA	NA
		Acenaphthene	1.19E-02	4.71E-02	NA	5.89E-02	NA	NA	NA	NA
		Benzene	8.37E-03	2.21E-02	NA	3.05E-02	4.60E-07	1.22E-06	NA	1.68E-06
		Benzo(a)anthracene	NA	NA	NA	NA	7.35E-06	9.12E-05	NA	9.85E-05
		Benzo(a)pyrene	NA	NA	NA	NA	2.91E-05	5.37E-04	NA	5.66E-04
		Benzo(b)fluoranthene	NA	NA	NA	NA	3.03E-06	5.60E-05	NA	5.90E-05
		Benzo(k)fluoranthene	NA	NA	NA	NA	3.26E-07	6.53E-06	NA	6.86E-06
		Bis(2-Ethylhexyl) phthalate	5.50E-03	4.35E-03	NA	9.85E-03	5.13E-07	4.06E-07	NA	9.20E-07
		Carbazole	NA	NA	NA	NA	1.54E-06	2.04E-05	NA	2.19E-05
		Chrysene	NA	NA	NA	NA	5.26E-08	6.52E-07	NA	7.05E-07
		Dibenz(a,h)anthracene	NA	NA	NA	NA	8.01E-06	3.17E-04	NA	3.25E-04
		Dibenzofuran	9.58E-02	3.82E-01	NA	4.78E-01	NA	NA	NA	NA
		Ethylbenzene	2.85E-04	7.52E-03	NA	7.80E-03	NA	NA	NA	NA
		Fluoranthene	4.13E-03	2.40E-02	NA	2.81E-02	NA	NA	NA	NA
		Fluorene	1.05E-02	4.71E-02	NA	5.76E-02	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	2.79E-06	7.35E-05	NA	7.63E-05
		m,p-xylenes	2.21E-04	3.09E-04	NA	5.30E-04	NA	NA	NA	NA
		Naphthalene	3.43E-01	4.25E-01	NA	7.68E-01	NA	NA	NA	NA
		o-Xylene	1.62E-04	2.26E-04	NA	3.88E-04	NA	NA	NA	NA
		Pyrene	3.78E-03	2.80E-02	NA	3.18E-02	NA	NA	NA	NA
		Toluene	1.87E-04	1.53E-04	NA	3.41E-04	NA	NA	NA	NA
	Total Deep Aquifer Groundwater Noncancer Risk =					***1.5003***	***Total Deep Aquifer Groundwater Cancer Risk =***			***1.16E-03***

Table 12. Risk Characterization Summary - Future On-Site Construction Worker

Medium	Exposure Medium	Chemical of Potential Concern	Ingestion	Dermal	Inhalation	Total	Ingestion	Dermal	Inhalation	Total
			Risk: Noncancer Effects				Risk: Cancer Effects			
Upland Surface Soil	Soil	Acenaphthene	1.16E-07	5.46E-07	NA	6.61E-07	NA	NA	NA	NA
		Anthracene	2.14E-07	1.01E-06	NA	1.22E-06	NA	NA	NA	NA
		Benzene	1.84E-06	1.22E-06	NA	3.06E-06	4.06E-12	2.68E-12	NA	6.74E-12
		Benzo(a)anthracene	NA	NA	NA	NA	1.35E-09	1.27E-09	NA	2.63E-09
		Benzo(a)pyrene	NA	NA	NA	NA	4.00E-08	3.77E-08		7.78E-08
		Benzo(b)fluoranthene	NA	NA	NA	NA	4.06E-09	3.82E-09	NA	7.88E-09
		Benzo(k)fluoranthene	NA	NA	NA	NA	2.29E-10	2.16E-10	NA	4.44E-10
		Carbazole	NA	NA	NA	NA	1.17E-11	7.72E-14	NA	1.18E-11
		Chrysene	NA	NA	NA	NA	3.12E-11	2.94E-11	NA	6.06E-11
		Dibenz(a,h)anthracene	NA	NA	NA	NA	8.84E-09	8.33E-09	NA	1.72E-08
		Ethylbenzene	3.43E-10	1.36E-10	NA	4.79E-10	NA	NA	NA	NA
		Fluoranthene	2.14E-06	1.01E-05	NA	1.22E-05	NA	NA	NA	NA
		Fluorene	5.88E-09	2.77E-08	NA	3.36E-08	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	2.91E-09	2.75E-09	NA	5.66E-09
		Naphthalene	1.58E-06	7.45E-06	NA	9.04E-06	NA	NA	NA	NA
		Pyrene	5.16E-06	2.43E-05	NA	2.95E-05	NA	NA	NA	NA
		Styrene	NA	NA	NA	NA	NA	NA	NA	NA
		Toluene	3.15E-08	1.25E-08	NA	4.39E-08	NA	NA	NA	NA
		Xylenes (Total)	NA	NA	NA	NA	NA	NA	NA	NA
	Dust	Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	1.07E-11	NA
					Total Upland Surface Soil Noncancer Risk =	***5.58E-05***			***Total Upland Surface Soil Cancer Risk =***	***1.12E-07***

Medium	Exposure Medium	Chemical of Potential Concern	Ingestion	Dermal	Inhalation	Total	Ingestion	Dermal	Inhalation	Total
			Risk: Noncancer Effects				Risk: Cancer Effects			
Upland Subsurface Soil	Soil	Acenaphthene	1.11E-05	5.25E-05	NA	6.37E-05	NA	NA	NA	NA
		Anthracene	6.70E-06	3.16E-05	NA	3.83E-05	NA	NA	NA	NA
		Benzene	1.29E-06	8.48E-07	NA	2.13E-06	2.83E-12	1.87E-12	NA	4.69E-12
		Benzo(a)anthracene	NA	NA	NA	NA	2.68E-09	2.52E-09	NA	5.20E-09
		Benzo(a)pyrene	NA	NA	NA	NA	7.78E-08	7.34E-08	NA	1.51E-07
		Benzo(b)fluoranthene	NA	NA	NA	NA	7.54E-09	7.11E-09	NA	1.46E-08
		Benzo(k)fluoranthene	NA	NA	NA	NA	9.73E-10	9.17E-10	NA	1.89E-09
		Carbazole	NA	NA	NA	NA	2.03E-10	1.34E-12	NA	2.04E-10
		Chrysene	NA	NA	NA	NA	1.45E-10	1.37E-10	NA	2.82E-10
		Dibenz(a,h)anthracene	NA	NA	NA	NA	1.55E-08	1.46E-08	NA	3.01E-08
		Ethylbenzene	4.25E-07	1.68E-07	NA	5.93E-07	NA	NA	NA	NA
		Fluoranthene	3.82E-04	1.80E-03	NA	2.18E-03	NA	NA	NA	NA
		Fluorene	1.26E-05	5.94E-05	NA	7.21E-05	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	4.10E-09	3.86E-09	NA	7.96E-09
		Naphthalene	7.05E-05	3.32E-04	NA	4.03E-04	NA	NA	NA	NA
		Pyrene	3.78E-04	1.78E-03	NA	2.16E-03	NA	NA	NA	NA
		Styrene	3.34E-07	1.32E-07	NA	4.66E-07	NA	NA	NA	NA
		Toluene	1.43E-07	5.67E-08	NA	2.00E-07	NA	NA	NA	NA
		Xylenes (Total)	1.53E-06	6.04E-07	NA	2.13E-06	NA	NA	NA	NA
	Dust	Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	2.08E-11	NA
	Total Upland Subsurface Soil Noncancer Risk =					***4.92E-03***	***Total Upland Subsurface Soil Cancer Risk =***			***2.12E-07***

Medium	Exposure Medium	Chemical of Potential Concern	Ingestion	Dermal	Inhalation	Total	Ingestion	Dermal	Inhalation	Total
			Risk: Noncancer Effects				Risk: Cancer Effects			
Riverbank Surface Soil	Soil	Acenaphthene	2.99E-05	1.41E-04	NA	1.71E-04	NA	NA	NA	NA
		Anthracene	5.54E-06	2.61E-05	NA	3.17E-05	NA	NA	NA	NA
		Benzene	6.23E-08	4.11E-08	NA	1.03E-07	1.37E-13	9.05E-14	NA	2.28E-13
		Benzo(a)anthracene	NA	NA	NA	NA	1.20E-08	1.13E-08	NA	2.33E-08
		Benzo(a)pyrene	NA	NA	NA	NA	5.22E-08	4.92E-08	NA	1.01E-07
		Benzo(b)fluoranthene	NA	NA	NA	NA	6.97E-09	6.57E-09	NA	1.35E-08
		Benzo(k)fluoranthene	NA	NA	NA	NA	1.35E-09	1.27E-09	NA	2.63E-09
		Carbazole	NA	NA	NA	NA	1.07E-11	7.05E-14	NA	1.08E-11
		Chrysene	NA	NA	NA	NA	2.89E-10	2.72E-10	NA	5.61E-10
		Dibenz(a,h)anthracene	NA	NA	NA	NA	6.66E-08	6.28E-08	NA	1.29E-07
		Ethylbenzene	1.62E-10	6.42E-11	NA	2.26E-10	NA	NA	NA	NA
		Fluoranthene	5.71E-05	2.69E-04	NA	3.26E-04	NA	NA	NA	NA
		Fluorene	3.53E-05	1.67E-04	NA	2.02E-04	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	4.69E-09	4.42E-09	NA	9.11E-09
		Naphthalene	1.74E-04	8.21E-04	NA	9.96E-04	NA	NA	NA	NA
		Pyrene	6.94E-05	3.27E-04	NA	3.97E-04	NA	NA	NA	NA
		Styrene	NA	NA	NA	NA	NA	NA	NA	NA
		Toluene	9.54E-10	3.78E-10	NA	1.33E-09	NA	NA	NA	NA
		Xylenes (Total)	NA	NA	NA	NA	NA	NA	NA	NA
	Dust	Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	1.40E-11	NA
	Total Riverbank Surface Soil Noncancer Risk =					***2.12E-03***	***Total Riverbank Surface Soil Cancer Risk =***			***2.80E-07***

Medium	Exposure Medium	Chemical of Potential Concern	Ingestion	Dermal	Inhalation	Total	Ingestion	Dermal	Inhalation	Total
			Risk: Noncancer Effects				Risk: Cancer Effects			
Riverbank Subsurface Soil	Soil	Acenaphthene	8.72E-05	4.11E-04	NA	4.98E-04	NA	NA	NA	NA
		Anthracene	9.23E-05	4.35E-04	NA	5.28E-04	NA	NA	NA	NA
		Benzene	3.82E-06	2.52E-06	NA	6.33E-06	8.39E-12	5.54E-12	NA	1.39E-11
		Benzo(a)anthracene	NA	NA	NA	NA	2.74E-08	2.58E-08	NA	5.32E-08
		Benzo(a)pyrene	NA	NA	NA	NA	5.01E-07	4.72E-07	NA	9.73E-07
		Benzo(b)fluoranthene	NA	NA	NA	NA	2.66E-08	2.51E-08	NA	5.17E-08
		Benzo(k)fluoranthene	NA	NA	NA	NA	5.12E-09	4.82E-09	NA	9.94E-09
		Carbazole	NA	NA	NA	NA	2.34E-10	1.54E-12	NA	2.36E-10
		Chrysene	NA	NA	NA	NA	1.15E-09	1.09E-09	NA	2.24E-09
		Dibenz(a,h)anthracene	NA	NA	NA	NA	6.97E-08	6.57E-08	NA	1.35E-07
		Ethylbenzene	3.24E-07	1.28E-07	NA	4.53E-07	NA	NA	NA	NA
		Fluoranthene	5.53E-04	2.61E-03	NA	3.16E-03	NA	NA	NA	NA
		Fluorene	2.96E-04	1.40E-03	NA	1.69E-03	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	2.32E-08	2.19E-08	NA	4.51E-08
		Naphthalene	6.55E-04	3.09E-03	NA	3.74E-03	NA	NA	NA	NA
		Pyrene	6.00E-04	2.83E-03	NA	3.43E-03	NA	NA	NA	NA
		Styrene	5.72E-08	2.27E-08	NA	7.99E-08	NA	NA	NA	NA
		Toluene	4.96E-08	1.96E-08	NA	6.92E-08	NA	NA	NA	NA
		Xylenes (Total)	5.34E-07	2.12E-07	NA	7.46E-07	NA	NA	NA	NA
	Dust	Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	1.34E-10	NA
	Total Riverbank Subsurface Soil Noncancer Risk =					***1.31E-02***	***Total Riverbank Subsurface Soil Cancer Risk =***			***1.27E-06***
Total Soil Noncancer Risk =						***2.02E-02***	***Total Soil Cancer Risk =***			***1.87E-06***

Medium	Exposure Medium	Chemical of Potential Concern	Ingestion	Dermal	Inhalation	Total	Ingestion	Dermal	Inhalation	Total
			Risk: Noncancer Effects				Risk: Cancer Effects			
Shallow Aquifer Groundwater	Water	2,4-Dimethylphenol	NA	1.04E-02	NA	1.04E-02	NA	NA	NA	NA
		2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA
		4-Methylphenol	NA	1.09E-03	NA	1.09E-03	NA	NA	NA	NA
		Acenaphthene	NA	4.07E-03	NA	4.07E-03	NA	NA	NA	NA
		Benzene	NA	1.75E-03	NA	1.75E-03	NA	3.84E-09	NA	3.84E-09
		Benzo(a)anthracene	NA	NA	NA	NA	NA	1.29E-07	NA	1.29E-07
		Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA
		Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA
		Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA
		Bis(2-Ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA	NA
		Carbazole	NA	NA	NA	NA	NA	1.21E-07	NA	1.21E-07
		Chrysene	NA	NA	NA	NA	NA	NA	NA	NA
		Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA
		Dibenzofuran	NA	2.77E-02	NA	2.77E-02	NA	NA	NA	NA
		Ethylbenzene	NA	1.16E-03	NA	1.16E-03	NA	NA	NA	NA
		Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA
		Fluorene	NA	2.53E-03	NA	2.53E-03	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA
		m,p-xylenes	NA	5.41E-05	NA	5.41E-05	NA	NA	NA	NA
		Naphthalene	NA	6.90E-02	NA	6.90E-02	NA	NA	NA	NA
		o-Xylene	NA	3.08E-05	NA	3.08E-05	NA	NA	NA	NA
		Pyrene	NA	NA	NA	NA	NA	NA	NA	NA
		Toluene	NA	NA	NA	NA	NA	NA	NA	NA
					Total Groundwater Noncancer Risk =	***0.1177***			***Total Groundwater Cancer Risk =***	***2.54E-07***
					Total Noncancer Risk =	***0.1***			***Total Cancer Risk =***	***2E-06***

Table 13. Risk Characterization Summary - Current On-Site Adult Recreationalist

Medium	Exposure Medium	Chemical of Potential Concern	Ingestion	Dermal	Inhalation	Total	Ingestion	Dermal	Inhalation	Total
			Risk: Noncancer Effects				Risk: Cancer Effects			
Upland Surface Soil	Soil	Acenaphthene	8.68E-08	1.41E-08	NA	1.01E-07	NA	NA	NA	NA
		Anthracene	1.60E-07	2.61E-08	NA	1.86E-07	NA	NA	NA	NA
		Benzene	1.38E-06	3.15E-08	NA	1.41E-06	7.30E-11	1.67E-12	NA	7.47E-11
		Benzo(a)anthracene	NA	NA	NA	NA	2.43E-08	7.93E-10	NA	2.51E-08
		Benzo(a)pyrene	NA	NA	NA	NA	7.21E-07	2.35E-08	NA	7.44E-07
		Benzo(b)fluoranthene	NA	NA	NA	NA	7.30E-08	2.38E-09	NA	7.54E-08
		Benzo(k)fluoranthene	NA	NA	NA	NA	4.12E-09	1.34E-10	NA	4.25E-09
		Carbazole	NA	NA	NA	NA	2.11E-10	4.80E-14	NA	2.11E-10
		Chrysene	NA	NA	NA	NA	5.62E-10	1.83E-11	NA	5.80E-10
		Dibenz(a,h)anthracene	NA	NA	NA	NA	1.59E-07	5.18E-09	NA	1.64E-07
		Ethylbenzene	2.58E-10	3.52E-12	NA	2.61E-10	NA	NA	NA	NA
		Fluoranthene	1.60E-06	2.61E-07	NA	1.86E-06	NA	NA	NA	NA
		Fluorene	4.41E-09	7.18E-10	NA	5.12E-09	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	5.24E-08	1.71E-09	NA	5.41E-08
		Naphthalene	1.19E-06	1.93E-07	NA	1.38E-06	NA	NA	NA	NA
		Pyrene	3.87E-06	6.31E-07	NA	4.50E-06	NA	NA	NA	NA
		Styrene	NA	NA	NA	NA	NA	NA	NA	NA
		Toluene	2.36E-08	3.23E-10	NA	2.39E-08	NA	NA	NA	NA
		Xylenes (Total)	NA	NA	NA	NA	NA	NA	NA	NA
	Dust	Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	1.93E-10	NA
					Total Upland Surface Soil Noncancer Risk =	***9.48E-06***			***Total Upland Surface Soil Cancer Risk =***	***1.07E-06***

Medium	Exposure Medium	Chemical of Potential Concern	Ingestion	Dermal	Inhalation	Total	Ingestion	Dermal	Inhalation	Total
			Risk: Noncancer Effects				Risk: Cancer Effects			
Riverbank Surface Soil	Soil	Acenaphthene	2.24E-05	3.66E-06	NA	2.61E-05	NA	NA	NA	NA
		Anthracene	4.16E-06	6.77E-07	NA	4.84E-06	NA	NA	NA	NA
		Benzene	4.67E-08	1.07E-09	NA	4.78E-08	2.47E-12	5.63E-14	NA	2.52E-12
		Benzo(a)anthracene	NA	NA	NA	NA	2.16E-07	7.02E-09	NA	2.23E-07
		Benzo(a)pyrene	NA	NA	NA	NA	9.40E-07	3.06E-08	NA	9.71E-07
		Benzo(b)fluoranthene	NA	NA	NA	NA	1.25E-07	4.09E-09	NA	1.30E-07
		Benzo(k)fluoranthene	NA	NA	NA	NA	2.43E-08	7.93E-10	NA	2.51E-08
		Carbazole	NA	NA	NA	NA	1.92E-10	4.38E-14	NA	1.92E-10
		Chrysene	NA	NA	NA	NA	5.19E-09	1.69E-10	NA	5.36E-09
		Dibenz(a,h)anthracene	NA	NA	NA	NA	1.20E-06	3.90E-08	NA	1.24E-06
		Ethylbenzene	1.22E-10	1.66E-12	NA	1.23E-10	NA	NA	NA	NA
		Fluoranthene	4.28E-05	6.97E-06	NA	4.98E-05	NA	NA	NA	NA
		Fluorene	2.65E-05	4.31E-06	NA	3.08E-05	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	8.44E-08	2.75E-09	NA	8.72E-08
		Naphthalene	1.31E-04	2.13E-05	NA	1.52E-04	NA	NA	NA	NA
		Pyrene	5.21E-05	8.48E-06	NA	6.05E-05	NA	NA	NA	NA
		Styrene	NA	NA	NA	NA	NA	NA	NA	NA
		Toluene	7.15E-10	9.79E-12	NA	7.25E-10	NA	NA	NA	NA
		Xylenes (Total)	NA	NA	NA	NA	NA	NA	NA	NA
	Dust	Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	2.52E-10	NA
					Total Riverbank Surface Soil Noncancer Risk =	***3.24E-04***			***Total Riverbank Surface Soil Cancer Risk =***	***2.68E-06***
					Total Soil Noncancer Risk =	***3.33E-04***			***Total Soil Cancer Risk =***	***3.75E-06***
Surface Sediment	Sediment	Acenaphthene	1.56E-05	7.61E-05	NA	9.18E-05	NA	NA	NA	NA
		Benzo(a)anthracene	NA	NA	NA	NA	5.43E-08	5.29E-08	NA	1.07E-07
		Benzo(a)pyrene	NA	NA	NA	NA	2.26E-07	2.19E-07	NA	4.45E-07
		Benzo(b)fluoranthene	NA	NA	NA	NA	1.96E-08	1.91E-08	NA	3.87E-08
		Benzo(k)fluoranthene	NA	NA	NA	NA	2.05E-09	2.00E-09	NA	4.05E-09
		Bromomethane	5.88E-06	4.00E-08	NA	5.92E-06	NA	NA	NA	NA
		Carbazole	NA	NA	NA	NA	1.21E-08	8.21E-11	NA	1.21E-08
		Chrysene	NA	NA	NA	NA	9.08E-10	8.84E-10	NA	1.79E-09
		Dibenz(a,h)anthracene	NA	NA	NA	NA	5.62E-07	5.46E-07	NA	1.11E-06
		Dibenzofuran	1.29E-04	6.29E-04	NA	7.59E-04	NA	NA	NA	NA
		Fluoranthene	2.17E-05	1.06E-04	NA	1.28E-04	NA	NA	NA	NA
		Fluorene	2.04E-05	9.91E-05	NA	1.20E-04	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	7.10E-09	6.91E-09	NA	1.40E-08
		Naphthalene	7.72E-04	3.76E-03	NA	4.53E-03	NA	NA	NA	NA
					Total Sediment Noncancer Risk =	***5.63E-03***			***Total Sediment Cancer Risk =***	***1.73E-06***
					Total Noncancer Risk =	***0.006***			***Total Cancer Risk =***	***5E-06***

Table 14. Risk Characterization Summary - Current On-Site Child Recreationalist

Medium	Exposure Medium	Chemical of Potential Concern	Ingestion	Dermal	Inhalation	Total	Ingestion	Dermal	Inhalation	Total
			Risk: Noncancer Effects				Risk: Cancer Effects			
Upland Surface Soil	Soil	Acenaphthene	7.51E-07	1.20E-07	NA	8.71E-07	NA	NA	NA	NA
		Anthracene	1.39E-06	2.22E-07	NA	1.61E-06	NA	NA	NA	NA
		Benzene	1.20E-05	2.68E-07	NA	1.22E-05	1.58E-10	3.54E-12	NA	1.61E-10
		Benzo(a)anthracene	NA	NA	NA	NA	5.26E-08	1.68E-09	NA	5.43E-08
		Benzo(a)pyrene	NA	NA	NA	NA	1.56E-06	4.99E-08	NA	1.61E-06
		Benzo(b)fluoranthene	NA	NA	NA	NA	1.58E-07	5.05E-09	NA	1.63E-07
		Benzo(k)fluoranthene	NA	NA	NA	NA	8.91E-09	2.85E-10	NA	9.19E-09
		Carbazole	NA	NA	NA	NA	4.56E-10	1.02E-13	NA	4.56E-10
		Chrysene	NA	NA	NA	NA	1.21E-09	3.89E-11	NA	1.25E-09
		Dibenz(a,h)anthracene	NA	NA	NA	NA	3.44E-07	1.10E-08	NA	3.55E-07
		Ethylbenzene	2.23E-09	2.99E-11	NA	2.26E-09	NA	NA	NA	NA
		Fluoranthene	1.39E-05	2.22E-06	NA	1.61E-05	NA	NA	NA	NA
		Fluorene	3.81E-08	6.10E-09	NA	4.42E-08	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	1.13E-07	3.63E-09	NA	1.17E-07
		Naphthalene	1.03E-05	1.64E-06	NA	1.19E-05	NA	NA	NA	NA
		Pyrene	3.35E-05	5.36E-06	NA	3.89E-05	NA	NA	NA	NA
		Styrene	NA	NA	NA	NA	NA	NA	NA	NA
		Toluene	2.04E-07	2.75E-09	NA	2.07E-07	NA	NA	NA	NA
		Xylenes (Total)	NA	NA	NA	NA	NA	NA	NA	NA
	Dust	Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	2.09E-10	NA
						Total Upland Surface Soil Noncancer Risk =	***8.18E-05***			***Total Upland Surface Soil Cancer Risk =***	***2.31E-06***

Medium	Exposure Medium	Chemical of Potential Concern	Ingestion	Dermal	Inhalation	Total	Ingestion	Dermal	Inhalation	Total
			Risk: Noncancer Effects				Risk: Cancer Effects			
Riverbank Surface Soil	Soil	Acenaphthene	1.94E-04	3.11E-05	NA	2.25E-04	NA	NA	NA	NA
		Anthracene	3.60E-05	5.76E-06	NA	4.17E-05	NA	NA	NA	NA
		Benzene	4.04E-07	9.06E-09	NA	4.13E-07	5.34E-12	1.20E-13	NA	5.46E-12
		Benzo(a)anthracene	NA	NA	NA	NA	4.66E-07	1.49E-08	NA	4.81E-07
		Benzo(a)pyrene	NA	NA	NA	NA	2.03E-06	6.50E-08	NA	2.10E-06
		Benzo(b)fluoranthene	NA	NA	NA	NA	2.71E-07	8.68E-09	NA	2.80E-07
		Benzo(k)fluoranthene	NA	NA	NA	NA	5.26E-08	1.68E-09	NA	5.43E-08
		Carbazole	NA	NA	NA	NA	4.16E-10	9.32E-14	NA	4.16E-10
		Chrysene	NA	NA	NA	NA	1.12E-08	3.59E-10	NA	1.16E-08
		Dibenz(a,h)anthracene	NA	NA	NA	NA	2.59E-06	8.29E-08	NA	2.67E-06
		Ethylbenzene	1.05E-09	1.41E-11	NA	1.07E-09	NA	NA	NA	NA
		Fluoranthene	3.70E-04	5.93E-05	NA	4.30E-04	NA	NA	NA	NA
		Fluorene	2.29E-04	3.67E-05	NA	2.66E-04	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	1.83E-07	5.84E-09	NA	1.88E-07
		Naphthalene	1.13E-03	1.81E-04	NA	1.31E-03	NA	NA	NA	NA
		Pyrene	4.50E-04	7.21E-05	NA	5.22E-04	NA	NA	NA	NA
		Styrene	NA	NA	NA	NA	NA	NA	NA	NA
		Toluene	6.19E-09	8.32E-11	NA	6.27E-09	NA	NA	NA	NA
		Xylenes (Total)	NA	NA	NA	NA	NA	NA	NA	NA
	Dust	Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	2.72E-10	NA
					Total Riverbank Surface Soil Noncancer Risk =	***2.80E-03***			***Total Riverbank Surface Soil Cancer Risk =***	***5.79E-06***
					Total Soil Noncancer Risk =	***2.88E-03***			***Total Soil Cancer Risk =***	***8.1E-06***
Surface Sediment	Sediment	Acenaphthene	1.35E-04	1.50E-04	NA	2.85E-04	NA	NA	NA	NA
		Benzo(a)anthracene	NA	NA	NA	NA	1.17E-07	2.60E-08	NA	1.43E-07
		Benzo(a)pyrene	NA	NA	NA	NA	4.88E-07	1.08E-07	NA	5.96E-07
		Benzo(b)fluoranthene	NA	NA	NA	NA	4.24E-08	9.38E-09	NA	5.18E-08
		Benzo(k)fluoranthene	NA	NA	NA	NA	4.44E-09	9.81E-10	NA	5.42E-09
		Bromomethane	5.08E-05	7.86E-08	NA	5.09E-05	NA	NA	NA	NA
		Carbazole	NA	NA	NA	NA	2.61E-08	4.03E-11	NA	2.61E-08
		Chrysene	NA	NA	NA	NA	1.96E-09	4.34E-10	NA	2.40E-09
		Dibenz(a,h)anthracene	NA	NA	NA	NA	1.21E-06	2.68E-07	NA	1.48E-06
		Dibenzofuran	1.12E-03	1.24E-03	NA	2.36E-03	NA	NA	NA	NA
		Fluoranthene	1.88E-04	2.08E-04	NA	3.96E-04	NA	NA	NA	NA
		Fluorene	1.76E-04	1.95E-04	NA	3.71E-04	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	1.54E-08	3.40E-09	NA	1.88E-08
		Naphthalene	6.68E-03	7.38E-03	NA	1.41E-02	NA	NA	NA	NA
					Total Sediment Noncancer Risk =	***1.75E-02***			***Total Sediment Cancer Risk =***	***2.33E-06***
					Total Noncancer Risk =	***0.02***			***Total Cancer Risk =***	***1E-05***

Table 15. Risk Characterization Summary - Future On-Site Resident

Medium	Exposure Medium	Chemical of Potential Concern	Ingestion	Dermal	Shower Inhal.	Combined	Ingestion	Dermal	Shower Inhal.	Combined
			Risk: Noncancer Effects				Risk: Cancer Effects			
Shallow Aquifer Groundwater	Water	2,4-Dimethylphenol	3.63E-01	2.08E-01	NA	5.71E-01	NA	NA	NA	NA
		2-Methylphenol	4.12E-02	3.44E-03	NA	4.46E-02	NA	NA	NA	NA
		4-Methylphenol	6.58E-01	3.43E-02	NA	6.92E-01	NA	NA	NA	NA
		Acenaphthene	7.43E-02	5.82E-02	NA	1.32E-01	NA	NA	NA	NA
		Benzene	3.92E-02	2.04E-02	1.00E-02	6.96E-02	2.59E-06	1.35E-06	1.98E-07	4.13E-06
		Benzo(a)anthracene	NA	NA	NA	NA	9.68E-05	2.38E-04	NA	3.34E-04
		Benzo(a)pyrene	NA	NA	NA	NA	4.36E-04	1.59E-03	NA	2.03E-03
		Benzo(b)fluoranthene	NA	NA	NA	NA	4.58E-05	1.67E-04	NA	2.13E-04
		Benzo(k)fluoranthene	NA	NA	NA	NA	5.44E-06	2.16E-05	NA	2.70E-05
		Bis(2-Ethylhexyl) phthalate	1.01E-02	1.58E-03	NA	1.16E-02	1.13E-06	1.76E-07	NA	1.30E-06
		Carbazole	NA	NA	NA	NA	2.12E-05	5.53E-05	NA	7.64E-05
		Chrysene	NA	NA	NA	NA	8.16E-07	2.00E-06	NA	2.82E-06
		Dibenz(a,h)anthracene	NA	NA	NA	NA	1.25E-04	9.77E-04	NA	1.10E-03
		Dibenzofuran	5.34E-01	4.21E-01	NA	9.55E-01	NA	NA	NA	NA
		Ethylbenzene	4.47E-03	2.34E-02	2.24E-04	2.80E-02	NA	NA	9.99E-08	9.99E-08
		Fluoranthene	3.90E-02	4.48E-02	NA	8.38E-02	NA	NA	NA	NA
		Fluorene	5.59E-02	4.96E-02	NA	1.06E-01	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	1.93E-05	1.01E-04	NA	1.20E-04
		m,p-xylenes	3.93E-03	1.09E-03	3.80E-03	8.81E-03	NA	NA	NA	NA
		Naphthalene	3.75E+00	9.21E-01	1.21E+01	1.68E+01	NA	NA	NA	NA
		o-Xylene	2.15E-03	5.96E-04	2.08E-03	4.83E-03	NA	NA	NA	NA
		Pyrene	3.96E-02	5.79E-02	NA	9.75E-02	NA	NA	NA	NA
		Toluene	3.63E-03	5.87E-04	9.23E-04	5.14E-03	NA	NA	NA	NA
	Total Shallow Aquifer Groundwater Noncancer Risk =					***19.6***	***Total Shallow Aquifer Groundwater Cancer Risk =***			***3.91E-03***

Medium	Exposure Medium	Chemical of Potential Concern	Ingestion	Dermal	Shower Inhal.	Combined	Ingestion	Dermal	Shower Inhal.	Combined
			Risk: Noncancer Effects				Risk: Cancer Effects			
Deep Aquifer Groundwater	Water	2,4-Dimethylphenol	2.18E-02	1.25E-02	NA	3.43E-02	NA	NA	NA	NA
		2-Methylphenol	8.01E-04	6.69E-05	NA	8.68E-04	NA	NA	NA	NA
		4-Methylphenol	1.73E-02	9.03E-04	NA	1.82E-02	NA	NA	NA	NA
		Acenaphthene	4.44E-02	3.47E-02	NA	7.91E-02	NA	NA	NA	NA
		Benzene	3.13E-02	1.63E-02	8.00E-03	5.56E-02	2.06E-06	1.08E-06	1.58E-07	3.30E-06
		Benzo(a)anthracene	NA	NA	NA	NA	3.29E-05	8.08E-05	NA	1.14E-04
		Benzo(a)pyrene	NA	NA	NA	NA	1.30E-04	4.76E-04	NA	6.06E-04
		Benzo(b)fluoranthene	NA	NA	NA	NA	1.36E-05	4.96E-05	NA	6.32E-05
		Benzo(k)fluoranthene	NA	NA	NA	NA	1.46E-06	5.79E-06	NA	7.24E-06
		Bis(2-Ethylhexyl) phthalate	2.05E-02	3.21E-03	NA	2.37E-02	2.30E-06	3.60E-07	NA	2.66E-06
		Carbazole	NA	NA	NA	NA	6.92E-06	1.81E-05	NA	2.50E-05
		Chrysene	NA	NA	NA	NA	2.36E-07	5.78E-07	NA	8.13E-07
		Dibenz(a,h)anthracene	NA	NA	NA	NA	3.59E-05	2.81E-04	NA	3.17E-04
		Dibenzofuran	3.58E-01	2.82E-01	NA	6.40E-01	NA	NA	NA	NA
		Ethylbenzene	1.06E-03	5.55E-03	5.32E-05	6.67E-03	NA	NA	2.37E-08	2.37E-08
		Fluoranthene	1.54E-02	1.77E-02	NA	3.31E-02	NA	NA	NA	NA
		Fluorene	3.92E-02	3.48E-02	NA	7.40E-02	NA	NA	NA	NA
		Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	1.25E-05	6.51E-05	NA	7.76E-05
		m,p-xylenes	8.25E-04	2.28E-04	7.98E-04	1.85E-03	NA	NA	NA	NA
		Naphthalene	1.28E+00	3.14E-01	4.12E+00	5.72E+00	NA	NA	NA	NA
		o-Xylene	6.04E-04	1.67E-04	5.84E-04	1.35E-03	NA	NA	NA	NA
		Pyrene	1.41E-02	2.07E-02	NA	3.48E-02	NA	NA	NA	NA
		Toluene	7.00E-04	1.13E-04	1.78E-04	9.91E-04	NA	NA	NA	NA
					Total Deep Aquifer Groundwater Noncancer Risk =	***6.7***			***Total Deep Aquifer Groundwater Cancer Risk =***	***1.22E-03***

Table 16. Occurrence, Distribution, and Selection of Chemicals of Potential Concern - Surface Water

Chemical of Interest	Detection Frequency (%)	Maximum Detected Concentration (µg/L)	Non-Detect Concentration		Surface Water Criteria (µg/L)	Source	Compound Carried Forward as a COPC?	
			Minimum (µg/L)	Maximum (µg/L)			Yes/No	Rationale
VOC								
Ethylbenzene	33	0.4	0.2	0.2	130	Tier II SCV	No	Maximum detected concentration did not exceed the screening level
Toluene	67	1.1	0.2	0.2	7.3	Tier II SCV	No	
Benzene	50	0.2	0.2	0.2	9.8	Tier II SCV	No	
o-Xylene	33	0.6	0.2	0.2	NA	NA	No	Screening level not available
m,p-Xylenes	67	1.3	0.4	0.4	NA	NA	No	
Xylene (total) [1]	NA	1.9	0.3	0.3	13	Tier II SCV	No	Maximum detected concentration did not exceed the screening level
SVOC - PAH								
Anthracene	0	--	0.1	0.1	20.73	EPA FCV	No	Not detected
Pyrene	0	--	0.1	0.1	10.11	EPA FCV	No	
Benzo(g,h,i)perylene	0	--	0.1	0.1	0.4391	EPA FCV	No	
Indeno(1,2,3-cd)pyrene	0	--	0.1	0.1	0.275	EPA FCV	No	
Benzo(b)fluoranthene	0	--	0.1	0.1	0.6774	EPA FCV	No	
Fluoranthene	0	--	0.1	0.1	7.109	EPA FCV	No	
Benzo(k)fluoranthene	0	--	0.1	0.1	0.6415	EPA FCV	No	
Acenaphthylene	0	--	0.1	0.1	306.9	EPA FCV	No	
Chrysene	0	--	0.1	0.1	2.042	EPA FCV	No	
Benzo(a)pyrene	0	--	0.1	0.1	0.9573	EPA FCV	No	
Dibenz(a,h)anthracene	0	--	0.1	0.1	0.2825	EPA FCV	No	
Benzo(a)anthracene	0	--	0.1	0.1	2.227	EPA FCV	No	
Acenaphthene	0	--	0.1	0.1	55.85	EPA FCV	No	
Phenanthrene	0	--	0.1	0.1	19.13	EPA FCV	No	
Fluorene	0	--	0.1	0.1	39.3	EPA FCV	No	
Naphthalene	33	0.46	0.1	0.1	193.5	EPA FCV	No	Maximum detected concentration did not exceed the screening level
SVOC - Other								
2-Methylnaphthalene	33	0.38	0.1	0.1	72.16	EPA FCV	No	Maximum detected concentration did not exceed the screening level
4-Methylphenol	0	--	1	1	NA	NA	No	Screening level not available
bis(2-Ethylhexyl)phthalate	0	--	0.12	4.2	3	Tier II SCV	No	Maximum detected concentration did not exceed the screening level
Bis-(2-Chloroethyl) Ether	0	--	2	2	NA	NA	No	Screening level not available
Carbazole	0	--	1	1	NA	NA	No	
Dibenzofuran	0	--	0.1	0.1	3.7	Tier II SCV	No	Maximum detected concentration did not exceed the screening level
N-Nitroso-Di-N-Propylamine	0	--	2	2	NA	NA	No	Screening level not available
Pentachlorophenol	0	--	5	5	15	NRWQC	No	Maximum detected concentration did not exceed the screening level

Notes:

[1] Total Xylenes were estimated by summing o- and m,p-xylenes. Where chemical were not detected, concentrations were assumed to be present at half the detection limit.

Table 17. Occurrence, Distribution, and Selection of Chemicals of Potential Concern - Sediment

Chemical of Interest	Detection Frequency (%)	Detected Concentration	Non-Detect Concentration		Sediment Quality Benchmarks (Low)			Compound Carried Forward as a COPC?	
		Maximum (µg/kg)	Minimum (µg/kg)	Maximum (µg/kg)	µg/kg	µg/kg oc	Source	Yes/No	Rationale
VOCs									
Benzene	4	380	1.3	18	—	5,700	OSWER Ecotox	No	Detection frequency < 5%
Ethylbenzene	21	14000	1.3	18	—	360,000	OSWER Ecotox	No [1]	
Toluene	17	6700	1.3	18	—	67,000	OSWER Ecotox	No [1]	
o-Xylene	13	7.3	1.3	2.3	—	2,500	OSWER Ecotox	No	Maximum concentration is less than the screening level
m,p-Xylenes	13	14	1.3	2.3	—	2,500	OSWER Ecotox	No	
Xylenes (Total)	21	54000	1.3	18	—	2,500	OSWER Ecotox	No [1]	
PAHs									
Anthracene	73	6400000	1.9	318	220	—	OMOE, 1993	Yes	
Pyrene	81	2800000	192	318	490	—	OMOE, 1993	Yes	
Benzo(g,h,i)perylene	60	78000	1.9	682	170	—	OMOE, 1993	Yes	
Indeno(1,2,3-cd)pyrene	62	120000	1.9	637	200	—	OMOE, 1993	Yes	
Benzo(b)fluoranthene	75	270000	1.9	637	—	—	—	Yes [2]	
Fluoranthene	79	3500000	1.9	318	750	—	OMOE, 1993	Yes	
Benzo(k)fluoranthene	71	300000	1.9	318	240	—	OMOE, 1993	Yes	
Acenaphthylene	33	160000	1.9	16000	1,900	—	WA FSQV	Yes	
Chrysene	75	1400000	1.9	29200	340	—	OMOE, 1993	Yes	
Benzo(a)pyrene	76	360000	1.9	318	370	—	OMOE, 1993	Yes	
Dibenz(a,h)anthracene	49	60000	1.9	1710	60	—	OMOE, 1993	Yes	
Benzo(a)anthracene	65	980000	1.9	318	320	—	OMOE, 1993	Yes	
Acenaphthene	76	4300000	187	318	3,500	—	WA FSQV	Yes	
Phenanthrene	81	5700000	192	318	560	—	OMOE, 1993	Yes	
Fluorene	73	3800000	1.9	318	190	—	OMOE, 1993	Yes	
Naphthalene	65	89000000	12	500	—	48,000	OSWER Ecotox	Yes	
Other SVOCs									
1,2,4-Trichlorobenzene	--	--	19	300000		920,000	OSWER Ecotox	No	
1,2-Dichlorobenzene	--	--	19	300000		34,000	OSWER Ecotox	No	Not detected
1,3-Dichlorobenzene	--	--	19	300000		170,000	OSWER Ecotox	No	
2-Methylnaphthalene	67	2900000	2.7	500	—	—	—	No	
1-Methylnaphthalene	44	720000	19	341	—	—	—	No	
2,4-Dimethylphenol	3	4100	19	300000	—	—	—	No	Screening levels not available
4-Methylphenol	8	860	19	300000	—	—	—	No	
bis(2-Ethylhexyl)phthalate	--	--	13	300000	640	—	WA FSQV	No	Not detected
Butylbenzylphthalate	--	--	1.9	300000	—	1,100,000	OSWER Ecotox	No	
Carbazole	48	2700000	19	500	140		WA FSQV	Yes	

Chemical of Interest	Detection Frequency (%)	Detected Concentration	Non-Detect Concentration		Sediment Quality Benchmarks (Low)			Compound Carried Forward as a COPC?	
		Maximum (µg/kg)	Minimum (µg/kg)	Maximum (µg/kg)	µg/kg	µg/kg oc	Source	Yes/No	Rationale
Di-n-Butylphthalate	3	156	1.9	300000	—	1,100,000	OSWER Ecotox	No	Maximum detected concentration did not exceed the low screening level
Dibenzofuran	65	2600000	1.9	500	—	200,000	OSWER Ecotox	Yes	
Diethylphthalate	--	--	1.9	300000	—	63,000	OSWER Ecotox	No	Not detected
Hexachloroethane	--	--	19	300000	—	—	—	No	
Pentachlorophenol	2	43	96	760000	—	—	—	No	Detection frequency < 5% and screening level not available
Retene	89	9400	38	2900	—	—	—	No	Screening levels not available

Notes:

[1] BTEX COI were not carried forward as COPCs because in addition to the low detection frequency of benzene and the lack of screening level exceedance for xylene (m,p- and o-), exceedance of low screening levels (the OSWER Ecotox thresholds) only occurred in one sample (RV08SD) collected in 1999. The RI 2002 sampling effort indicated no BTEX screening level exceedances in the vicinity of station RV08SD; however, this area (adjacent to the riverbank) is know to be impacted by other COIs (particularly PAHs) where concentrations are known to exceed high screening level thresholds.

[2] All PAHs will be carried forward as COPCs even though benzo(b)fluoranthene has no screening levels because PAH toxicity was evaluated, in part, based on sum total PAH concentrations.

Table 18. Ecological Exposure Pathways of Concern

Representative Receptor	Exposure Medium	Endangered/ Threatened Species Flag (Y or N)	Exposure Routes	Assessment Endpoint	Measurement Endpoint	Risk Criteria
Zooplankton	Surface Water	N	Ingestion	Aquatic Invertebrate Population Survival and Reproduction	*Tier 1A Screening* - Surface water chemistry	*Tier 1 Screening* - Comparison of site concentrations to surface water benchmarks
Benthic community	Surface Water Sediment	N	Ingestion, respiration, and direct contract with chemicals in surface water and sediment	Benthic and Epibenthic Invertebrate Population Survival and Reproduction	*Tier 1A Screening* - Sediment chemistry - Surface water chemistry	*Tier 1 Screening* - Comparison of site concentrations to surface water and sediment benchmarks
Amphipods Chironomids	Surface Water Sediment	N	Ingestion, respiration, and direct contract with chemicals in surface water and sediment		*Tier 1B/Tier 2* - Sediment bioassays - Total PAH evaluation (organic carbon normalization)	*Tier 1B/Tier 2 Investigation* - Bioassays: survival and growth as compared to the control or reference - Comparison of site concentrations to surface water - Comparison to total PAH benchmarks
Brown bullhead	Surface Water Sediment	Y	Ingestion, respiration, and direct contract with chemicals in surface water and sediment	Fish Survival and Reproduction	*Tier 1A Screening* - Surface water chemistry	*Tier 1 Screening* - Comparison of site concentrations to surface water benchmarks
					Tier 1B/Tier 2 - Total PAH sediment chemistry	*Tier 1B/Tier 2 Investigation* - Comparison of total PAH sediment concentrations to benchmarks
Mink	Fish Tissue	N	Ingestion of fish	Piscivorous Mammal Survival and Reproduction	*Tier 1 Screening* - Total PAH bioaccumulation modeling, conservative assumptions	*Tier 1A Screening* - *Comparison of total daily dietary dose to a dietary TRV*
					Tier 2 Investigation - Total PAH bioaccumulation modeling with revised exposure assumptions	*Tier 1B Investigation* - Comparison of total daily dietary dose to a dietary TRV

Table 19. Risk Characterization Summary - Sediment

Location ID	Depth Interval (0 - end)	Sample Date	TOC (%)	Total PAH (16 PAH)		Tier 1A HQs Low screen	Tier 1B HQs High screen (2)		Tier 2 HQs	Bioassay Result
				Total	Organic Carbon Normalized	4 mg/kg (1)	22.7 mg/kg (3)	10 mg/g OC (4)	Bioassays (5)	
				mg/kg	mg/g OC	16 PAH (6)	16 PAHS	16 PAH	16 PAH-total	
99SMRV08SD	0.5	12-Feb-99	1.9	119228	6146	29807	5252	614.6	2056	
RV-7	0.3	27-Jul-02	1.9	19850	1023	4963	874	102.3	342	
SD-34	0.5	03-Nov-99	3.9	7836	204	1959	345	20.4	135	
SD-33	0.5	03-Nov-99	3.3	2939	88	735	129	8.8	51	
SD-34	0.3	27-Jul-02	2.1	1385	66	346	61	6.6	24	
99SMRV06SD	0.5	12-Feb-99	1.9	1222	63	305	54	6.3	21	
SD-23	0.5	03-Nov-99	3.0	767	26	192	34	2.6	13	
99SMRV07SD	0.5	12-Feb-99	1.9	358	18	89	16	1.8	6.2	
SD-27	0.5	03-Nov-99	3.1	248	8.0	62	11	0.8	4.3	
ST-3	0.9	26-Jul-02	1.9	145	7.5	36	6.4	0.7	2.5	
SD-14	0.5	02-Nov-99	2.0	143	7.0	36	6.3	0.7	2.5	
SD-32	0.5	03-Nov-99	3.1	133	4.2	33	5.9	0.4	2.3	
SD-16	0.5	03-Nov-99	2.5	114	4.6	28	5.0	0.5	2.0	
SD-31	0.5	03-Nov-99	2.2	112	5.2	28	4.9	0.5	1.9	
SD-22	0.5	03-Nov-99	1.8	80.7	4.4	20	3.6	0.4	1.4	
99SMRV05SD	0.5	12-Feb-99	1.9	65.7	3.4	16	2.9	0.3	1.1	
99SMRV09SD	0.5	12-Feb-99	1.9	60.9	3.1	15	2.7	0.3	1.0	
SD-14	0.3	24-Jul-02	2.0	58.0	2.8	15	2.6	0.3	1.0	PASS
ST-3	0.3	23-Jul-02	2.4	45.6	1.9	11	2.0	0.2	0.8	PASS
SD-15	0.5	02-Nov-99	1.9	40.6	2.1	10	1.8	0.2	0.7	
SD-37	0.5	04-Nov-99	1.7	27.9	1.7	7.0	1.2	0.2	0.5	
SD-17	0.5	03-Nov-99	3.7	17.0	0.5	4.3	0.8	0.0	0.3	
ST-4	0.3	23-Jul-02	1.8	12.7	0.7	3.2	0.6	0.1	0.2	PASS
SD-3	0.5	02-Nov-99		11.7	(7)	2.9	0.5	0.1	0.2	
99SMRV04SD	0.5	12-Feb-99		11.2	(7)	2.8	0.5	0.1	0.2	
SD-38	0.5	04-Nov-99		8.3	(7)	2.1	0.4	0.1	0.1	
SD-10	0.5	02-Nov-99		7.6	(7)	1.9	0.3	0.1	0.1	
SD-9	0.5	02-Nov-99		7.2	(7)	1.8	0.3	0.1	0.1	
SD-4	0.5	02-Nov-99		6.5	(7)	1.6	0.3	0.1	0.1	
99SMRV10SD	0.5	12-Feb-99		6.0	(7)	1.5	0.3	0.1	0.1	
SD-39	0.5	04-Nov-99		5.0	(7)	1.3	0.2	0.1	0.1	
SD-40	0.5	04-Nov-99		4.7	(7)	1.2	0.2	0.0	0.1	
SD-2	0.5	02-Nov-99		4.6	(7)	1.2	0.2	0.0	0.1	
SD-26	0.5	03-Nov-99		4.5	(7)	1.1	0.2	0.0	0.1	
SD-36	0.5	04-Nov-99		4.4	(7)	1.1	0.2	0.0	0.1	
ST-5	0.3	23-Jul-02		4.2	(7)	1.0	0.2	0.0	0.1	
SD-1	0.5	02-Nov-99		4.0	(7)	1.0	0.2	0.0	0.1	
SD-5	0.5	02-Nov-99		3.7	(7)	0.9	0.2	0.0	0.1	PASS
SD-43	0.5	04-Nov-99		3.3	(7)	0.8	0.1	0.0	0.1	

Location ID	Depth Interval (0 - end)	Sample Date	TOC (%)	Total PAH (16 PAH)		Tier 1A HQs	Tier 1B HQs		Tier 2 HQs	Bioassay Result
						Low screen	High screen (2)			
				Total	Organic Carbon Normalized	4 mg/kg (1)	22.7 mg/kg (3)	10 mg/g OC (4)	Bioassays (5)	
				mg/kg	mg/g OC	16 PAH (6)	16 PAHS	16 PAH	16 PAH-total	
SD-18	0.5	03-Nov-99		3.1	(7)	0.8	0.1	0.0	0.1	
SD-12	0.5	02-Nov-99		2.8	(7)	0.7	0.1	0.0	0.0	
SD-35	0.5	04-Nov-99		2.7	(7)	0.7	0.1	0.0	0.0	
SD-7	0.5	02-Nov-99		2.7	(7)	0.7	0.1	0.0	0.0	
SD-25	0.5	03-Nov-99		2.7	(7)	0.7	0.1	0.0	0.0	
SD-11	0.5	02-Nov-99		2.6	(7)	0.7	0.1	0.0	0.0	
ST-6	0.3	24-Jul-02		2.5	(7)	0.6	0.1	0.0	0.0	
SD-20	0.5	03-Nov-99		2.4	(7)	0.6	0.1	0.0	0.0	
SD-19	0.5	03-Nov-99		2.4	(7)	0.6	0.1	0.0	0.0	
SD-24	0.5	03-Nov-99		2.4	(7)	0.6	0.1	0.0	0.0	
SD-13	0.5	02-Nov-99		2.4	(7)	0.6	0.1	0.0	0.0	
SD-8	0.5	02-Nov-99		2.3	(7)	0.6	0.1	0.0	0.0	
SD-21	0.5	03-Nov-99		2.3	(7)	0.6	0.1	0.0	0.0	
SD-30	0.5	03-Nov-99		2.2	(7)	0.6	0.1	0.0	0.0	
SD-40	0.3	25-Jul-02		2.2	(7)	0.6	0.1	0.0	0.0	
SD-6	0.5	02-Nov-99		2.0	(7)	0.5	0.1	0.0	0.0	
99SMRV03SD	0.5	12-Feb-99		1.9	(7)	0.5	0.1	0.0	0.0	
ST-7	0.3	28-Jul-02		1.8	(7)	0.4	0.1	0.0	0.0	PASS
ST-2	0.3	23-Jul-02		1.3	(7)	0.3	0.1	0.0	0.0	PASS
ST-1	0.3	22-Jul-02		0.4	(7)	0.1	0.0	0.0	0.0	
SD-21	0.3	24-Jul-02		0.3	(7)	0.1	0.0	0.0	0.0	
SD-13	0.3	28-Jul-02		0.1	(7)	0.0	0.0	0.0	0.0	
SD-25	0.3	28-Jul-02		0.0	(7)	0.0	0.0	0.0	0.0	
ST-8	0.3	28-Jul-02		0.6	(7)	0.2	0.0	0.0	0.0	

Notes:

1. The screening level (Tier 1) benchmark is the OMOE Threshold Effect Level of 4 mg/kg below which effects are unlikely
2. The refined screening level (Tier 1B) benchmarks are the effect levels above which effects are likely to be seen
3. The lowest high screen is the Consensus Probable Effect Level (PEL) of 22.7 mg/kg (McDonald et al. 2000)
4. The higher high screen is the OMOE Severe Effect Level (SEL) of 10 mg/g organic carbon. For sites with high PAH content, the data is normalized to site-specific organic carbon. For samples without organic carbon information the site wide mean of 1.94% OC was applied. For samples with little PAHs the default SEL based on 1% OC was applied.
5. The baseline level (Tier 2) benchmark is the highest PAH concentration showing no significant effect on the sediment bioassays. Samples with less than this concentration are assumed to pass a bioassay. The threshold for all PAHs is 116 mg/kg.
6. "All PAHs" is the sum of all 16 PAHs using 1/2 the sample Quantitation Limit for non-detected PAHs
7. Site specific OC normalization not done. Samples compared against default standard based on 1% TOC

Yellow shading indicates that the HQ is >1.

Green shading indicates that the HQ for the sample is greater than 10.

Table 20. Estimated Cost of Remedy Construction

COST ESTIMATE SUMMARY	QUANTITY	UNIT	UNIT COST $	TOTAL COST $
Upland Soils				
Mob/Demob - Process Equipment	1	LS	75,000	75,000
Mob/Demob - Excavation Equipment	1	LS	35,000	35,000
Site Controls	1	LS	15,000	15,000
Stockpile Cell Construction	1	LS	40,000	40,000
Excavate and Stockpile - Contaminated Soil	25,000	CY	8	200,000
Excavate and Stockpile - Uncontaminated Soil	16,000	CY	8	128,000
Water Handling	1,728,000	Gal	0.03	51,840
Water Treatment (NPDES Standards)	1,728,000	Gal	0.35	604,800
Site Restoration	1	LS	20,000	20,000
Soils - Thermal Treatment	30,000	Ton	70	2,100,000
Soil Stabilization	11,000	CY	50	550,000
Riverbank and Nearshore Soils and Sediments				
Mob - Pile Driver	1	LS	25,000	25,000
Site Preparation	1	LS	50,000	50,000
Drive Sheet Pile Wall	43,680	SF	10	436,800
Mob - Conventional Equipment	1	LS	28,000	28,000
Remove Riprap	556	CY	11	6,116
Excavate Soils and Sediments	12,037	CY	12	144,444
Dewatering System	1	LS	40,000	40,000
Water Handling	1,023,148	Gal	0.03	30,694
Water Treatment	1,023,148	Gal	0.35	358,102
Backfill/Compaction	12,037	CY	8	96,296
Site Restoration	1	LS	50,000	50,000
Solidification	1,395	CY	50	69,750
Drying Agent	284	Ton	120	34,080
Soil Thermal Treatment	5,688	Ton	75	426,600
Offshore Sediments				
Pre-construction Characterization	1	LS	58,000	58,000
Barge Rental	1	LS	44,000	44,000
Mob - Conventional Equipment	1	LS	10,000	10,000
Sheet pile Extraction	43,680	SF	20	873,600
Excavate Sediments	16,978	CY	20	339,560
Transport/Disposal of Excess Clean Sediments	8,600	CY	8	68,500
Water Treatment	1,443,111	Gal	0.35	505,089
Backfill/Compaction	5,348	CY	8	42,784
Other Direct Costs	1	LS	23,880	23,880
Drying Agent	400	Ton	80	32,000
Sediment Thermal Treatment	8,022	Ton	70	561,540
TOTAL CAPITAL COSTS				**$ 10,790,704**

Table 21. Estimated Operations and Maintenance Costs of Selected Remedy

SUMMARY OF OPERATIONS AND MAINTENANCE COSTS		
Year	**Monitoring Costs $**	**5 Year Review Costs $**
1	304,199	
2	19,013	
3	19,013	
4	19,013	
5	19,013	27,520
6	19,013	
7	19,013	
8	19,013	
9	19,013	
10	19,013	27,520
11	19,013	
12	19,013	
13	19,013	
14	19,013	
15	19,013	27,520
16		
17		
18		
19		
20	19,013	27,520
21		
22		
23		
24		
25	19,013	27,520
26		
27		
28		
29		
30	19,013	27,520
TOTALS	**$627,412**	**$165,120**
TOTAL O&M COSTS	**$ 792,532**	

Table 22. Summary of Remedial Alternatives

Remedial Action Component	Alternative												
	1	**2**	**3a**	**3b**	**3c**	**4a**	**4b**	**4c**	**5**	**6**	**7**	**8**	**9A**
Upland Soils and Groundwater													
• No action	x												
• Natural attenuation		x	x			x							
• Enhanced biodegradation by air sparging				x			x						
• Containment - 3-sided slurry wall to depth of 60 ft (to lower silt unit)					x			x					
• Containment - 3 sided sheetpile wall to depth of 60 ft (to lower silt unit)									x				
• Containment - 4 sided sheetpile and slurry wall to lower silt unit with surface soil cap												x	
• Soil solidification										x			
• Removal, on site treatment, and on site disposal of surface soils (<20 feet), deeper soil in-situ stabilization													x
• Removal, off site treatment and off site disposal											x		
Bank Soils													
• No action	x												
• Removal and fill with thin layer cap		x											
• Solidification to upper silt unit with 2 ft cap			x	x	x	x	x	x					
• Removal into upper silt unit, backfill to original bathymetry									x	x	x	x	x
Shoreline Sediment													
• No action	x												
• Removal of top 2 ft with a clean thin layer cap		x											
• Removal of top 2 ft and cap with clean backfill			x	x	x								
• Removal of top 3 ft and cap with clean backfill						x	x	x					
• Removal of top 6 ft and cap with clean backfill										x	x		
• Removal of top 8 ft and cap with clean backfill									x			x	
• Removal of all contaminated sediment, cap with clean backfill													x
Nearshore Sediment													
• No action	x												
• Thin layer cap		x											
• 2 to 3 ft clean cap over existing sediments			x	x	x								
• Removal of top 3 ft and cap with clean backfill						x	x	x					
• Removal of top 6 ft (average) and cap with clean backfill										x	x		
• Removal of top 8 ft (average) and cap with clean backfill									x			x	
• Removal of all contaminated sediment and cap with clean backfill													x
Offshore Sediment													
• No action	x												
• Monitoring with clean cap over 20 to 100% of existing sediments		x	x	x	x	x	x	x				x	
• 2 ft cap over existing sediments									x				
• Assessment with removal and cap with clean backfill													x
• Removal of top 6 ft and cap with clean backfill										x	x		

Table 23. Cleanup Levels for Upland Soil Excavation and/or Stabilization, and Treatment Levels for Thermally Treated Soils and Sediments to be Deposited On Site

Chemical of Concern	Proposed Cleanup Concentration (mg/kg)	Universal Treatment Standards (mg/kg)(1)	Land Disposal Requirements - soils (mg/kg)(2)	Proposed Contained In Determination Concentration (mg/kg) (4)
Napthalene	**4**	5.6	56	4
Acenaphthylene	**3.4**	3.4	34	NA
Acenaphthene	**3.4**	3.4	34	29
Fluorene	**3.4**	3.4	34	28
Phenanthrene	**5.6**	5.6	56	NA
Anthracene	**3.4**	3.4	34	590
Fluoranthene	**3.4**	3.4	34	210
Pyrene	**8.2**	8.2	82	210
Benz(a)anthracene	**0.062**	3.4	34	0.062
Chrysene	**3.4**	3.4	34	8
Benzo(b)fluoranthene	**0.2**	6.8	68 (sum) (3)	0.2
Benzo(k)fluoranthene	**2**	6.8	68 (sum) (3)	2
Benzo(a)pyrene	**0.062**	3.4	34	0.062
Indeno(l ,2,3,-c,d)pyrene	**0.62**	3.4	34	0.62
Dibenzo(a,h) -anthracene anthracene	**0.062**	8.2	82	0.062
Benzo(g,h,i)perylene	**1.8**	1.8	18	NA
Benzene	**0.002**	10	100	0.002
Toluene	**0.6**	10	100	0.6
Ethylbenzene	**0.7**	10	100	0.7
Xylenes	**10**	30	300	10
Carbazole	**0.03**	NA	NA	0.03
Dibenzofuran	**150**	NA	NA	150
4-Methylphenol	**310**	NA	NA	310
2,4-Dimethylphenol	**0.4**	14	140	0.4

NA = No value available from this source

Notes:

(1) Universal Treatment Standards from 40 CFR 268.48

(2) Alternative LDR treatment standards for contaminated soil from 40 CFR 268.49, based on 10 times the Universal Treatment Standard

(3) Because benzo(b)fluoranthene and benzo(k)fluoranthene coelute on gas chromatography columns, this constituent is regulated as a sum of the compounds.

(4) EPA will review these contained in levels during remedial design and will make them more stringent through an ESD if EPA determines it is necessary to protect the sediments in the river.

Table 24. Cleanup Levels for Groundwater

Chemical of Concern	MCL (µg/L)	EPA Region 9 Tap Water PRG (µg/L)	Site-Specific Groundwater Concentration Protective of Sediment (µg/L)	Water Quality Standards of the Coeur d'Alene Tribe, Water Quality Criteria for Toxic Pollutants	Groundwater Cleanup Level (µg/L)
Naphthalene	NA	6.2	85	NA	**6.2**
Acenaphthylene	NA	NA	45	NA	**45**
Acenaphthene	NA	370	6.5	670 B	**6.5**
Fluorene	NA	240	5.8	1100 B	**5.8**
Phenanthrene	NA	NA	15	NA	**15**
Anthracene	NA	1,800	42	8300 B	**42**
Fluoranthene	NA	1,500	12	130 B	**12**
Pyrene	NA	NA	20	830	**20**
Benz(a)anthracene	NA	0.092	0.72	0.0038 B,C	**0.0038**
Chrysene	NA	9.2	1.1	0.0038 B,C	**0.0038**
Benzo(b)fluoranthene	NA	0.092	0.16	0.0038 B,C	**0.0038**
Benzo(k)fluoranthene	NA	0.92	0.15	0.0038 B,C	**0.0038**
Benzo(a)pyrene	0.2	--	0.21	0.0038 B,C	**0.0038**
Indeno(1,2,3,-c,d)pyrene	NA	0.092	0.02	0.0038 B,C	**0.0038**
Dibenzo(a,h)anthracene	NA	0.0092	0.01	0.0038 B,C	**0.0038**
Benzo(g,h,i)perylene	NA	NA	0.03	NA	**0.03**
2-Methylnaphthalene	NA	NA	NA	NA	**NA**
Benzene	5	--	NA	2.2	**2.2**
Toluene	700	--	NA	1300 Z	**700**
Ethylbenzene	1000	--	NA	530	**530**
Xylenes	10,000	--	NA	NA	**10,000**
Carbazole	NA	3.4	NA	NA	**3.4**
Dibenzofuran	NA	12	NA	NA	**12**
4-Methylphenol	NA	180	NA	NA	**180**
2,4-Dimethylphenol	NA	730	NA	NA	**730**

NA - Not applicable or no value is available from this source

B - This criterion has been revised to reflect The Environmental Protection Agency's ql* or RfD, as contained in the Integrated Risk Information System (IRIS) as of May 17, 2002. The fish tissue bioaccumulation factor (BCF) from the 1980 Ambient Water Quality Criteria document was retained in each case

C - This criterion is based on a carcinogenicity factor of 10^{-6} risk.

Z - A more stringent MCL has been issued by EPA. Refer to drinking water regulations (40 CFR 141) or Safe Drinking Water Hotline (1 800 426 4791 for values.

Table 25. Cleanup Levels for Nearshore and Shoreline Sediments and Screening Levels to Determine if River Sediments Need Further Analysis

Chemical Parameter	SQS (mg/kg-OC)*	LAET [µg/kg (dry weight)]**
Naphthalene	99	2100
Acenaphthylene	66	560
Acenaphthene	16	500
Fluorene	23	540
Phenanthrene	100	1500
Anthracene	220	960
2-Methylnaphthalene	38	670
LPAH, Total	**370**	**5200**
Fluoranthene	160	2500
Pyrene	1000	3300
Benzo(a)anthracene	110	1600
Chrysene	110	2800
Total Benzofluoranthenes	230	3600
Benzo(a)pyrene	99	1600
Indeno (1,2,3,-c,c)pyrene	34	690
Dibenzo (a,h)anthracene	12	230
Benzo(g,h,i)perylene	31	720
HPAH, Total	**960**	**17,000**

***** SQS - Washington State Marine Sediment Quality Standards normalized for organic carbon
** LAET - Washington State lowest apparent effect thresholds for the Puget Sound Estuary Program

Table 26. Surface Water Discharge Effluent Limits For Treated Groundwater and Water from Sediment Dewatering

Chemical of Concern	Effluent Limits for Discharge to Surface Water (µg/l) (1)
Naphthalene	100
Acenaphthylene	*
Acenaphthene	*
Fluorene	*
Phenanthrene	*
Anthracene	*
Fluoranthene	*
Pyrene	*
Benz(a)anthracene	0.0028
Chrysene	0.0028
Benzo(b)fluoranthene	0.0028
Benzo(k)fluoranthene	0.0028
Benzo(a)pyrene	0.0028
Indeno(1,2,3,-c,d)pyrene	0.0028
Dibenzo(a,h)anthracene	0.0028
Benzo(g,h,i)perylene	*
2-Methylnaphthalene	Not Available
Benzene	1.2
Toluene	Not Available
Ethylbenzene	Not Available
Xylenes	Not Available
Carbazole	Not Available
Dibenzofuran	Not Available
4-Methylphenol	Not Available
2,4-Dimethylphenol	Not Available

(1) Taken from EPA's NPDES Idaho Groundwater Remediation Discharge General Permit

* Indicates a Group II PAH. Total concentrations of Group II PAHs must not exceed 200 µg/l

Not Available - Cleanup or discharge concentrations have not been developed. However, if other listed discharge limits are achieved, it is assumed that these parameters will not be present in concentrations which could cause harm to human health or the environment.

ATTACHMENTS

Attachment 1. St. Maries Creosote Site Public Comments Compilation: 2005 and 2006 Comment Periods – Includes Oral Testimony Given at the Two Public Hearings

Attachment 2. Preliminary Natural Attenuation Data - March 29, 2007

Attachment 3. Arcadis Alternative 9 Proposal - October 07, 2005

ATTACHMENT 1

St. Maries Creosote Site Public Comments Compilation: 2005 and 2006 Comment Periods – Includes Oral Testimony Given at the Two Public Hearings

ATTACHMENT 2

Preliminary Natural Attenuation Data - March 29, 2007

ATTACHMENT 3

Arcadis Alternative 9 Proposal - October 07, 2005