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EPA Superfund Record of Decision:

Standard Steel and Metal Salvage Yard, (USDOT) Superfund Site, Anchorage, AK 7/16//1996

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 6TH AVENUE
SEATTLE, WASHINGTON

RECORD OF DECISION

DECLARATION,
DECISION SUMMARY,
AND
RESPONSIVENESS SUMMARY

FOR

FINAL REMEDIAL ACTION
STANDARD STEEL AND METALS SALVAGE YARD
SUPERFUND SITE
ANCHORAGE ALASKA

RECORD OF DECISION
STANDARD STEEL AND METALS
SALVAGE YARD SUPERFUND SITE
ANCHORAGE, ALASKA

DECLARATION

Site Name and Location
Standard Steel and Metals Salvage Yard
Anchorage Alaska

Statement of Basis and Purpose

This decision document presents the selected remedial action for the Standard Steel and Metals Salvage Yard, in Anchorage, Alaska, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, 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 State of Alaska concurs with the selected remedy.

Assessment of the Site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of the Selected Remedy

This is the final remedial action for the site. The site was not divided into operable units. EPA conducted a Removal Action to address the principle threats and most imminent sources of continued releases of hazardous substances, and to stabilize the site prior to conducting this remedial action. The Removal Action utilized treatment as a principle element for the principle sources.

The selected remedy entails the following major components:

- Removal of regulated material stockpiled on-site and investigation derived wastes with subsequent disposal in a RCRA Subtitle C or D landfill, or recycling of materials;
- Off-site disposal of remaining scrap debris by recycling or disposal in a RCRA Subtitle D landfill or; if the debris is a characteristic hazardous waste or contains greater than 50 mg/kg PCBs or $10ug/100cm^2$ by

standard wipe tests, treatment and disposal in a RCRA Subtitle C or TSCA landfill;

- Excavation and consolidation of all soils exceeding cleanup levels;
- Treatment of all soils at or greater than 1000 mg/kg lead and 50 mg/kg PCB by stabilization/solidification;
- On-site disposal of stabilized/solidified soils and excavated soils between 10 mg/kg and 50 mg/kg in a TSCA landfill;
- Excavation of soils impacted above 1mg/kg PCB's and 500 mg/kg lead from the flood plain and consolidation of these soils elsewhere on the site;
- Maintenance and Repair of erosion control structure on bank of Ship Creek;
- Maintenance of solidified/stabilized soils and the landfill;
- Institutional controls to limit land uses of the site and, if appropriate, access;
- Monitoring of groundwater at the site to ensure the effectiveness of the remedial action.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with or justifies a waiver of Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on-site above health based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Chuck Clarke (signature) 7/16/96 Date

Chuck Clarke
Regional Administrator
U.S. Environmental Protection Agency
Region 10

RECORD OF DECISION
STANDARD STEEL AND METALS SALVAGE YARD
DECISION SUMMARY
AND
RESPONSIVENESS SUMMARY

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RESPONSIVENESS SUMMARY

RECORD OF DECISION

STANDARD STEEL AND METALS SALVAGE YARD

1.0 SITE NAME, LOCATION, AND DESCRIPTION

1.1 Site Name

Standard Steel and Metals Salvage Yard

1.1.1 Site Location and Description

Standard Steel and Metals Salvage Yard (site) is located on a 6.2 acre parcel of land in Anchorage, Alaska, near the intersection of Railroad Avenue and Yakutat Street. The site is owned by the Federal Railroad Administration and in the possession and control of the Alaska Railroad Corporation. The site is situated in an industrialized area of Anchorage along the north side of lower Ship Creek (Figure 1-1). A warehouse is located directly north of the site. To the east are assorted light industries, warehouses and a produce packing facility, and to the west is a steel fabrication operation. Approximately 500 feet upstream of the site is the Elmendorf Fish Hatchery and the Eagle Glen Golf Course on Elmendorf Air Force Base. Non-adjacent land use is comprised of assorted light industry and the Alaska Railroad Corporation's rail yard.

The site has been cleared of most scrap metal and debris during previous CERCLA activities (see Section 2.0). There is a small stand of cottonwoods and small brush adjacent to Ship Creek, otherwise the site is covered with gravel/fill. The site was contaminated during 30 years of salvage operations, primarily by releases from lead acid batteries and PCB contaminated transformers. The site consists of all areas contaminated by PCBs and lead which resulted from activities at the Standard Steel and Metals Salvage Yard. These areas are defined in the remedial investigation and generally conform to the property boundaries.

1.2 Topography

The site is situated on a gently sloping outwash plain. The ground surface elevation ranges from approximately 70 to 80 feet above mean sea level. The site is built upon the reclaimed flood plain of Ship Creek. Ship Creek defines the southern border of the site. The site extends into Ship Creek's 100 year flood plain on the south-western corner of the site. A preservation wetland is also located in the south-western corner of the site (Figure 1-2). Review of historical aerial photographs showed that significant areas of the site have been excavated and subsequently filled to raise the surface elevation of the site to its current height of between 70 and 80 feet above sea level.

1.3 Zoning

The areas from Reeve Boulevard to Knik Arm surrounding Ship Creek and enclosing the site are zoned I-2, denoting a heavy industrial district. The areas south of this district (beginning 1/4 mile from the site) are zoned as business districts, light industrial districts, and public lands and institution districts. The area to the north (1/3 mile from the site) is reserved for the military.

The Municipality of Anchorage has adopted a land use plan that reflects and continues the current zoning of this area. The site, as well as all lands west of Reeve Avenue, south of Post Road, east of Wrangell Street and north of Ship Creek, is currently managed and controlled by the Alaska Railroad Corporation (ARRC) pursuant to an exclusive license issued by the United States under the authority of an act of Congress, the Alaska Railroad Transfer Act of 1983. ARRC assumed control of these properties from the United States government on January 5, 1985. The underlying property owner of the site is the United States, pending eventual transfer to ARRC as contemplated by that Act. The ARRC is a public corporation owned by the State of Alaska. ARRC has publicly taken the position that the zoning of the site and surrounding areas should remain industrial. An active rail line is located along Post Road, with a spur that connects the site to the main line.

1.4 Natural Resource Uses

1.4.1 Terrestrial Resources

The site has limited terrestrial natural resources. It was used during the 1950's as a gravel mine. There is very limited vegetation and habitat on the site. Small rodents, passerines and gulls have been observed on the site. Moose have been seen adjacent to the site along Ship Creek.

1.4.2 Aquatic Resources

The quantity and variety of fish in Ship Creek is dependent upon stocking, harvesting and environmental factors. Status of the stock is measured by fish harvest reports by the Alaska Department of Fish & Game. The only data collected on native fish of Ship Creek are from the annual harvest reports and visual fish counts, which concentrate on the chinook and coho species. In relation to the total numbers of chinook and coho in Ship Creek in any given year, it is important to note the regulated nature of fish stocking. Many variables influence the decision regarding the number of chinook and coho smelt to stock into Ship Creek each year; this, in turn, affects the total number of returning adults. Approximately 5 percent of chinook smelt and approximately 5-15 percent of coho smelt return to Ship Creek as adults. It is estimated that roughly twenty percent of both returning coho and chinook are of native stock. Small numbers of pink and chum salmon may also use Ship Creek.

1.4.3 Endangered Species/Wetlands

No threatened or endangered species have been observed at the site. The site has been heavily disturbed throughout it's history and provides little preferred or suitable habitat. A small wetland is located on the south-west boundary of the site. This area has not been contaminated by site activities. Threatened or endangered species which may be in the vicinity of the site are highly unlikely to utilize the site for feeding, resting, or propagating.

1.5 Location and Distance to Nearby Human Populations

The area around the site is dedicated to industrial/commercial use. The nearest residential area is located 1/2 mile south-east of the site on the other side of Ship Creek in the Mountainview area. Military housing at Elmendorf Air Force Base is located 1/3 mile north-east of the site. Population figures for the area in the immediate vicinity are not available. However, 1990 Anchorage Census Tracts 5 and 6, which cover the site and a large surrounding area including Mountainview residential area, contained 7,188 people. An unknown number of homeless adults are reported to live along Ship Creek and the Bluff north of the site during summer months.

1.6 General Surface-water, Groundwater Resources and Geology

1.6.1 Ship Creek Stage

The lower Ship Creek drainage basin covers roughly 27 square miles. The creek traverses approximately 10 miles from the Chugach Mountains to Cook Inlet. The site is located along the north bank of Ship Creek, approximately 2 miles upstream from the mouth. Ship Creek flows south and west adjacent to the site.

The U.S. Army Corp of Engineers (Alaska District) personnel made numerous cross section measurements (August 1976) in order to project possible flood magnitude in the area. Floodway boundaries were computed for each cross section with the HEC-2 computer program. The projected 100-year flood plain area is depicted on Figure 1-2.

1.6.2 Surface Water Runoff

A site map based on the topographic site survey is presented as Figure 1-2. The site is relatively flat, sloping slightly to the south with an average slope of less than 3 percent. Surface water drainage from the site appears to be variable, with the majority of precipitation infiltrating the soil rather than forming discrete runoff patterns. Only a single potential drainage channel leading from the site has been observed to date, but surface water has never been observed in the channel, and it is blocked by an earthen berm before it reaches Ship Creek. It is located outside of and approximately parallel to the fence along the south of the site. The slope in this channel appears to trend southwesterly and eventually joins the fairly pronounced gully southwest of the site which is visible on the site map (Figure 1-2). This gully heads toward Ship Creek downstream of the site.

Although the snow melted within a relatively short period of time during the spring of 1993, no surface runoff from the site to the creek or to surrounding properties was observed, except for a small amount flowing for several days southwest into the adjacent property. This surface runoff infiltrated into the soil soon after entering that property; no runoff to the creek was observed.

Available municipal and railroad records do not indicate existence of storm sewers that drain surface runoff from the site. Field teams did not find any storm sewer grates at the site or other water conduits down gradient of the site, except for a culvert near Yakutat Street, which drains a storm sewer on the northeast corner of Yakutat and Railroad Avenues.

1.6.3 Geology

The site is located in the Anchorage lowland area within the upper Cook Inlet region of Alaska. The lowland areas of the Cook Inlet region are surrounded by several heavily glaciated mountain ranges, including the Alaska, Talkeetna, Chugach, and Kenai Ranges. Unconsolidated glacial deposits, which are typical of the lowland areas surrounding Cook Inlet, have been deposited and reworked by three main agents: glacial ice; flowing water in streams or deltas; and still water in ponds, lakes and marine estuaries.

Several glacial events in the Cook Inlet area resulted in deposition of thick sequences of unconsolidated fine-grained glacial sediments in glacially-dammed lakes. The outwash from these glaciers has deposited rock flour and silt in the lowlands, producing large areas of mud flats along the Cook Inlet shoreline. These silt-rich deposits discontinuously overlay glacial and glacial fluvial materials. The lowland deposits are bordered by uplands or glacial moraine and drift deposits. The site is located in an active seismic area.

1.6.4 Regional Groundwater Conditions

The area commonly referred to as the Anchorage Bowl encompasses approximately 180 square miles and includes the site and most of the urban area of Anchorage. This area is bounded on the north, west and south by two estuaries, the Knik and Turnagain Arms of Cook Inlet, and on the east by the Chugach foothills. Two aquifers have been identified in this area separated by a thick aquitard (the Bootlegger Cove Formation). These aquifers are distinguished by their relatively coarse lithologies and capacity to transmit groundwater horizontally. An unconfined aquifer is located in the deposits above the Bootlegger Cove Formation and a confined aquifer is located in the deposits below the Bootlegger Cove Formation. The existence of potential water-bearing units beneath the confined aquifer at the site was not investigated.

The Bootlegger Cove Formation has been identified as an effective aquitard based on its relatively fine-grained lithology, thickness, and continuous areal extent over the study area. This aquitard is an important feature of the hydrogeologic model, because it impedes vertical groundwater flow and chemical transport. The three units are described below.

1.6.5 Unconfined Aquifer

An unconfined aquifer is located in a sheet of outwash plain deposits (chiefly sand and gravel) that covers much of the northeast, central and western parts of the Anchorage area. This aquifer generally extends from the flanks of the Chugach foothills on the east to Cook Inlet, including the Turnagain and Knik Arms, on the north, west and south. This aquifer consists of sand and gravel lenses intermixed with silty sand and gravel. In the vicinity of the site the aquifer is approximately 25 feet thick. This aquifer is naturally recharged by rain, snowmelt and leakage from streams. Groundwater flows to the south west with some water discharging to Ship Creek and the remainder to Cook Inlet.

1.6.6 Bootlegger Cove Formation Aquitard

The Pleistocene Bootlegger Cove Formation is a low permeability clay unit that underlies most of the Anchorage area. This unit is up to 270 feet thick and generally thickens with increasing distance from the mountains. In the vicinity of the site, the aquitard is 100 to 150 feet thick.

The aquitard consists of saturated, clayey glacially-derived sediments of very low permeability. Permeability tests were performed on five samples collected from the Bootlegger Cove Formation at the site and resulted in hydraulic conductivity values ranging from 0.0006 to 0.002 ft/day (2.1×10^{-7} to 7.0×10^{-7} cm/sec). These estimated hydraulic conductivity values are consistent with the regional value (0.0001 ft/day).

1.6.7 Confined Aquifer

The confined aquifer is composed of several layers of interbedded sand and gravel, till, and silty clay deposits. The more permeable sand and gravel layers are hydraulically connected and are considered to be a single aquifer. The aquifer is continuous below the entire Anchorage Bowl. The thickness generally increases from approximately 100 feet in the Chugach foothills to 1100 feet at a point between the Knik and Turnagain Arms. In the vicinity of the site, the aquifer is approximately 600 feet thick and is located approximately 100 to 300 feet below the ground surface.

1.6.8 Groundwater Occurrence

The depth to the top of the unconfined aquifer ranges from about 3 to 10 feet below the ground surface and the average saturated thickness is approximately 15 feet. The surface of the water table slopes southwest at the site and varies in elevation between approximately 65 and 74 feet above mean sea level. The water elevations measured during the RI field investigation were used to create water table contour maps. The two sets of contours are similarly shaped and show a difference in water table of 1 to 2 feet. The horizontal hydraulic gradient ranged from approximately 0.007 to 0.01 ft/ft.

1.6.9 Groundwater Supply

A survey of the water supply wells within 1/2 mile radius of the site revealed 9 potable water wells and 4 non-potable water wells. All of these wells draw from the lower confined aquifer with the potable wells ranging in depth from 76 feet below ground surface (bgs) to 850 feet bgs, and the non-potable wells ranging in depth from 152 feet bgs to 257 feet bgs. Only three of these wells, the Inlet Co. well, the Steel Fab well, and the Alaska Concrete Products well are located down gradient from the site. No groundwater wells completed in the unconfined aquifer were identified within a half-mile radius of the site.

2.0 SITE HISTORY AND ENFORCEMENT ACTIONS

The first documented use of the site occurred in October of 1950, when much of the site was leased by a construction company for maintenance and storage of heavy equipment and supplies. This operation continued on parts of the site until 1960.

Aerial photographs of the Ship Creek area are available for most years since 1939. Photographs prior to 1939 show little salvage material and debris and no buildings onsite. Aerial photographs show that considerable excavation occurred in the southern half of the site between 1950 and 1953. A haul road is visible up the bluff to the north leading to Elmendorf Air Force Base, and it is likely that gravel from the site was mined for use in base construction. Aerial photographs also show that these excavations had been backfilled by 1972 to establish the present site grade. Soil borings and test pits indicate that the fill material consisted mostly of sandy and silty soil. No material was encountered during subsurface investigations which indicates dumping of hazardous waste materials during fill operations.

Metal recycling and salvage businesses operated on the site beginning in 1955 and until 1993. From 1955 to 1986, metal recycling and salvaging occurred on the entire area within the present fence lines. Following EPA's initial response action in 1986, the scrap business was restricted to the small parcel northeast of the fenced area south of Railroad Avenue and west of Yakutat Street. During the period from 1955 to 1986, hundreds of thousands of tons of ferrous and nonferrous materials were handled at the site. At some time after 1955 batteries were handled at the site to recover their lead and transformers were handled primarily to recover the copper in the core windings.

Transformer oil was drained by site operators. The oil was released onto the ground, or used as hydraulic fluid in onsite equipment. There is no information (such as manifests) which indicate that transformer oils were shipped off-site for proper disposal or treatment. Copper transformer cores were removed from the cases and placed in an onsite incinerator to remove shellac and paper insulation. The copper cores were then shipped offsite for salvage. Batteries were stockpiled onsite and may have been processed onsite prior to sale for their lead content. Processing of batteries may have included draining fluid from cases and breaking the cases to remove the lead plates. Drums containing wastes and chemicals were also stored onsite as part of the salvaging operations.

Aerial photographs from the 1960s through 1986 reveal salvage materials onsite. By 1975, the incinerator building, sales office trailer, and warehouse on the north end of the site had been constructed. The volume of salvage material and the number of buildings adjacent to the site continued to increase until 1985.

Although activities known to have resulted in hazardous substance releases were discontinued in April 1986, when an EPA Order was issued pursuant to 42 U.S.C. § 9606, site operations continued on the northeast corner of the site until April 1993. The site owners and site operator were requested to perform a removal action but declined to or were unable to conduct the work. The 1986 Order led to an EPA removal action and resulted in a portion of the site being fenced off and closed to public access. The removal action is described in more detail in Section 2.1 below. Figure 1-3 shows the location of former operations on the site and scrap-covered areas in existence when the removal action was begun by the EPA in 1986.

The site was proposed for listing on the National Priorities List (NPL) on July 14, 1989. The site was listed on the NPL on August 30, 1990. 55 Fed. Reg. 35502.

On December 6, 1991, the United States filed a lawsuit under Section 107 of CERCLA, 42 U.S.C. § 9607, against eight parties for recovery of EPA's costs incurred in performing the removal action and a determination of liability for future costs. The eight parties sued were the Alaska Railroad Corporation, Ben Lomand Inc., Chugach Electric Association, Inc., Westinghouse Electric Corporation, Sears, Roebuck and Co., Montgomery Ward and Co., Inc., J.C. Penny Company, Inc., and Bridgestone/Firestone, Inc. Certain other Federal entities are considered to be within the class of persons who may be liable under CERCLA. Those entities are the Federal Railroad Administration, Department of Transportation, Defense Reutilization and Marketing Service, Department of Defense, and the Army/Air Force Exchange Service.

On September 23, 1992, Chugach Electric Association entered into an Administrative Order on Consent to conduct a remedial investigation/feasibility study at the site. The RI commenced in October 1992 and ended in August 1994. The feasibility study was completed in January 1996. During the remedial investigation and feasibility study, treatability tests were performed for solidification and soil washing and a pilot scale soil washing unit was tested on-site. Supplemental soil sampling occurred during preparation of the feasibility study. During the EPA removal action, the RI/FS field work, and scrap/debris removal, wastes were containerized and placed within the fenced portion of the site. The current location of existing fence and the various containers and wastes are shown in Figure 1-4.

EPA issued a Unilateral Administrative Order on September 7, 1993 to the Alaska Railroad Corporation to remove armored personnel carriers sitting on a portion of the site to allow access to the site for completing the remedial investigation and feasibility study.

2.1 Scope and Role of Removal Action

During the period 1986 to 1988, the EPA Region X Superfund Removal and Investigations Section performed a removal action at the site under authority provided in Section 104 of CERCLA, 42 U.S.C. § 9604. The scope of the removal effort was directed towards removing the ongoing sources of releases or substantial threat of releases of hazardous substances from transformers, lead acid batteries and barrels and drums stored on the site. Additionally, soil and groundwater samples were collected. A rip-rap berm was constructed along the bank of Ship Creek on the southeast corner of the site to prevent erosion. Several areas of contaminated soils were excavated and placed in a mound on-site and sprayed with shotcrete (Figure 1-4). A more complete description of the removal action can be found in the On Scene Coordinators Report for the site.

The removal actions removed and treated the principle threats present at the site. These principle threats included more than one thousand gallons of PCB contaminated oils, eighty-two 55 gallon drums of RCRA hazardous waste, 10,450 gallons of waste oils, 185 PCB contaminated transformers and 781,000 pounds of lead acid batteries. The PCB oils were incinerated and the waste oil was recovered and the batteries were recycled.

Major Chronological Events of the Removal Action are as follows:

August 1985	Soil Samples collected by the Alaska Department of Environmental conservation (ADEC) identified PCB contamination in on-site surface soils as high as 110,000:
October 1985	EPA conducted a two week assessment documenting wide spread PCB and heavy metal contamination in soils, the presence of 175

transformers, hundreds of drums and thousands of batteries. Chlorinated Dioxins and Furans were identified in ash associated with an on-site incinerator.

April 1986	EPA issued a CERCLA 106 Order against potentially responsible parties to begin stabilization and cleanup of the site. No parties came forward to implement the cleanup.
June-July 31 1986	Phase 1 of the response action commenced by EPA. Site security was undertaken, removal of 1000 gallons of PCB contaminated oils, removal of eighty-five 55 gallon drums of RCRA hazardous waste, installation of four groundwater monitoring wells, isolation of dioxin/furan wastes, construction of an erosion control wall along Ship Creek, fish bioassay of resident fish in Ship Creek, initial PCB soil sampling.
May 1987	EPA Emergency Response Team and EPA contractors conducted additional site assessment including installing seven temporary monitoring wells, shallow surface soil borings, off-site sampling along Ship Creek.
June 1987-October 1987	EPA conducted phase II of removal action. Approximately 781,000 pounds of batteries and 10,450 gallons of waste oils were recycled, 1600 cubic yards of PCB contaminated soils were stockpiled and sprayed with a temporary concrete fiber cap.
June 1988	EPA conducted final phase of removal action. These activities were primarily focused on securing the site until further remedial actions could be undertaken.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Proposed Plan for the site was released to the public for comment on March 13, 1996. The plan identified EPA's recommendation for cleaning up lead and polychlorinated biphenyl contaminated soil at the Standard Steel and Metals Salvage Yard in Anchorage. The Proposed Plan was made available along with the RI/FS reports at the Information Repositories. The comment period lasted from March 18 to April 17, 1996. The selected remedy is based on the Administrative Record for this site. The Administrative Record is located in the EPA Region 10 office and in the site information repository located in the Bureau of Land Management Library in Anchorage, Alaska.

A public meeting was held on April 10 at the Fairview Community Recreation Center in Anchorage. On April 2 a reminder of the meeting was mailed. The meeting was attended by twenty-two people. EPA's project manager and Chugach Electric Association's project manager presented information about the site and the recommended cleanup alternative. Questions were answered and formal comment was taken. Four commentators presented oral comments at the meeting. Responses to the comments are included in the Responsiveness Summary to the ROD.

3.1 Summary of Community Relations Activities:

July 14, 1989 - Standard Steel proposed for inclusion on the NPL and 60-day comment period initiated.

July 22, 1992 - Community Relations Plan issued based on telephone interviews conducted throughout May of 1992.

October 2, 1992 - A fact sheet issued summarizing previous cleanup activities and upcoming investigations.

May 26, 1993 - A fact sheet announced an agreement signed by Chugach Electric Association to conduct investigations, and announced an informational meeting to be held on June 24.

June 24, 1993 - EPA attended meetings with local community groups to discuss the scope of the remedial investigation. EPA was interviewed by two local television stations.

November 24, 1993 - A fact sheet was published to update the public on activities at the site.

July 12, 1994 - A 30-day public comment period was announced on a proposed Consent Decree for past cost recovery between EPA and a number of federal and private parties.

March 16, 1995 - A fact sheet asked for input on cleanup alternatives being evaluated based on the completed RI/FS.

April 25, 1995 - EPA and the State of Alaska hosted an informational meeting regarding the remedial alternatives being evaluated.

June 23, 1995 - A fact sheet explained the need for delaying the Proposed Plan for cleanup and the need for additional studies to evaluate soil washing as a alternative for remediating the site.

April 10, 1996- A public meeting was held in Anchorage Alaska to present the Preferred Alternative to the community.

4.0 SUMMARY OF SITE CHARACTERISTICS

4.1 Nature and Extent of Contamination

The nature and extent of contamination has been evaluated using data presented in the OSC and the RI reports and supplemental soil sampling conducted during the feasibility study. These data show that, consistent with past site operations, the primary chemicals of concerns (COCs) are lead and polychlorinated biphenyls (PCBs).

For almost all samples where PCBs were detected, Aroclor 1260 was the only PCB congener which was found, so that the total PCB concentration is represented by Aroclor 1260.

4.2 Media of Concern

The media of concern utilized to evaluate the site are surface and subsurface soil, groundwater, surface water, sediment, and air. Contaminants were screened against Risk Screening Tables, Supplemental Guidance for Superfund Risk Assessments in Region 10, USEPA, October 30, 1992 (Table 6-1) (these values have been replaced in Region 10 by using the Region 3 risk tables), and local background values for inorganics. The tables utilize a residential exposure scenario, using standard default exposure (ingestion and inhalation) assumptions which would not result in a 1 in one million additional chance of developing cancer from exposure to a contaminant through ingestion or pose a non-carcinogenic risk as expressed by a Hazard Quotient (HQ) greater than 0.1 for contaminants in groundwater and 1xE-7 and 0.1 HQ in soils. Background values were derived from the Elmendorf Air Force Base Basewide Background Sampling Report, Volume 1. Contaminants which exceeded screening values were further evaluated in the Baseline Risk Assessment.

4.2.1 Surface and Subsurface Soil

Surface soil is defined as the ground surface to 12 inches depth. Subsurface soil is defined as below 12 inches depth. The following paragraphs discuss the COCs for surface and subsurface soil. Figures 5-1 through 5-3 depict surface and subsurface soil PCB and surface lead concentrations.

4.2.1.1 Lead

Lead was detected in 128 of 132 samples analyzed during the RI. The maximum concentration measured during the RI sampling was 4,300 mg/kg. The maximum lead concentration detected during EPA's removal actions investigations was 44,500 mg/kg. Supplemental sampling during the FS had detections up to 7,200 mg/kg in surface soil. The background soil concentration for lead is 13.3 mg/kg, as determined by studies conducted during the Elmendorf Air Force Base remedial investigations. Lead concentrations greater than 500 mg/kg do not extend below the first two feet of soil.

During the FS numerous additional samples were collected to conduct treatability tests. These samples focused on acquiring representative soils representing low, average, and high lead contamination. Low concentrations were around 500 mg/kg, average concentrations were around 1700 mg/kg, and high concentrations were around 5200 mg/kg. The highest lead concentration detected 24,000 mg/kg.

4.2.1.2 Other Inorganics

Arsenic, beryllium, cadmium, chromium, copper and zinc were detected above screening values and/or background. Arsenic concentrations were below background values (13.1mg/kg) in all but two samples (27 mg/kg and 55 mg/kg). These samples were located in areas with greater than 1000 mg/kg lead. Beryllium concentrations exceeded the screening criteria but were all below background. Cadmium concentrations (maximum of 11.6 mg/kg) exceeded background values (3.01 mg/kg) but were below the screening criteria (100mg/kg). Chromium concentrations were all within background (48.4 mg/kg surface soils and 76.1 mg/kg in subsurface soils) and below the screening value of 137 mg/kg in all but three samples. These samples were all located in areas with greater than 1000 mg/kg lead. The maximum chromium concentration detected was 151 mg/kg. Copper was detected above background (20 mg/kg) and above the screening value of 2,900 mg/kg in only one sample. This sample had greater than 1,000 mg/kg lead. Zinc was detected (maximum 2,520 mg/kg) above area background (103 mg/kg) but below the screening value of 80,000,mg/kg.

4.2.1.3 PCBs

PCBs were detected in 89 of 132 soil samples analyzed during the RI. The maximum concentration measured during the RI/FS sampling was 380 mg/kg. Twenty nine of 212 samples had concentrations above 50 mg/kg. Stockpiled (Section 4.2.1.7) soils from the Removal Action had maximum PCB concentrations of up to 10,600 mg/kg. During sample collection for treatability testing samples were obtained from the stockpiled soils which had concentrations up to 3,500 mg/kg.

Subsurface PCB contamination extends to groundwater in three locations on site. These locations are depicted in Figure 5-2. Of approximately 120 subsurface soil samples collected (RI/FS and Removal Actions) 3 had concentrations greater than 50 mg/kg. Maximum concentrations of up to 519 mg/kg PCBs were detected in subsurface soils associated with the LNAPL. The LNAPL had PCB concentrations of 4,500 mg/kg.

During the FS numerous additional samples were collected to conduct treatability studies. These samples were focused on acquiring representative samples of low, average and high soil PCB contaminated soils. Low soils were around 50 mg/kg, average soils were around 150 mg/kg and high soils were around 700 mg/kg. The maximum high detected was 2700 mg/kg PCBs.

4.2.1.4 Dioxins and Furans

The concentrations of the dioxins and furans are expressed as 2,3,7,8-tetrachlorodibenzo-p-dioxin equivalent (2,3,7,8-TCDD equivalent). Dioxins and furans were detected at 9 of 10 surface sample locations. The maximum 2,3,7,8-TCDD equivalent concentration was 0.0017 mg/kg. All nine samples exceeded the screening value of .0000004 mg/kg.

4.2.1.5 Volatiles and Semivolatiles

Several volatile and semivolatile organic compounds were detected in the surface soils. These compounds include methylene chloride, trichlorofluoromethane, tetrachloroethane, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, di-n-butylphthalate, di-n-octylphthalate, diethylphthalate, dimethylphthalate, 1,2,4-trichlorobenzene, 2-methylnaphthalene, acenaphthene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene. These compounds were all eliminated as potential COCs in the screening process after comparison of the maximum concentrations with the chemical specific RBCs.

One or more carcinogenic Polycyclic Aromatic Hydrocarbons (cPAH) were detected at 8 of 11 surface sample locations, often at estimated concentrations less than the practical quantification limit. No cPAHs were detected at the 9 subsurface soil sample locations. The maximum concentration of total cPAHs was 25.4 mg/kg.

4.2.1.6 Presence of Light Non-Aqueous Phase Liquid (LNAPL)

The LNAPL present at monitoring wells 17 and 19 locations is not evaluated separately as a medium of concern. The LNAPL is a very viscous, tarry material that cannot be effectively separated from the soil. Consequently, the LNAPL is considered as the same media of concern as subsurface soil.

During each groundwater sampling event all wells were monitored for the presence of both light and dense NAPL phases. DNAPL was not detected in any well. LNAPL was detected in MW-17A and MW-19A. Selected wells were examined for the presence of LNAPL using an oil/water interface probe during four separate measuring events. A layer of LNAPL was detected in MW-17A (0.23 to 0.44 feet thick) and MW-19A (0.05 to 0.89 feet thick). An LNAPL sheen was detected in well MW-17 for three events and in MW-19 for the first event only. Temporary wells MW-25 through MW-29 did not contain LNAPL during any of the measuring events. These data indicate that the

LNAPL plume is confined to the central part of the site in the vicinity of MW-17A and MW-19A bounded by the temporary well locations 25, 26, 27, 28 and 29, where a free product layer was not detected. A sample of LNAPL was collected from MW-17A and analyzed for volatile and semivolatile organics, PCBs, and metals. The LNAPL analyte concentrations are compared with risk based screening values and MCLs for groundwater in the paragraph below. However, the risk based screening values and MCLs for groundwater are not applicable for product layer and are mentioned for comparative purposes only.

4.2.1.6.1 Concentration of PCBs in LNAPL

The MW-17A product sample was analyzed for seven congeners of PCBs. Only PCB 1260 was detected, at a concentration of 4500 mg/kg (the laboratory reports product results in mg/kg instead of mg/L).

4.2.1.6.2 Concentration of Lead in LNAPL

Lead was detected in the MW-17A product sample at a concentration of 4.3 mg/kg.

4.2.1.6.3 Concentration of Other Contaminants in LNAPL

Volatile organic compounds detected in the MW-17A product sample indicated concentrations of methylene chloride (9300 mg/kg), tetrachloroethane (3600 mg/kg), 1,3-dimethyl-cyclohexane (3.0 mg/kg), 1,2-dichlorobenzene (0.62 mg/kg), 1,4-dichlorobenzene (2.8 mg/kg), ethylbenzene (1.7 mg/kg), tetrachloroethane (5.6 mg/kg), toluene (0.34 mg/kg), 1,1,1-trichloroethane (0.049 mg/kg), trichlorofluoromethane (0.017 mg/kg) and total xylenes (7.2 mg/kg), and six unknown hydrocarbon compounds.

Semivolatile organic compounds detected in the product sample included 1,4-dichlorobenzene (13 mg/kg), 1,2,4-trichlorobenzene (1300 mg/kg), 2-methylnaphthalene (33 mg/kg), and bis(2-ethylhexyl)phthalate (20 mg/kg).

Other metals detected in the product sample which exceeded screening values for groundwater included aluminum (116 mg/kg), calcium (84.5 mg/kg), chromium (0.72 mg/kg), copper (4.8 mg/kg), iron (148 mg/kg), magnesium (47.3 mg/kg), manganese (3.4 mg/kg), potassium (15.6 mg/kg) and vanadium (0.69 mg/kg). Arsenic, beryllium, cadmium, mercury, silver and thallium were not detected, but the detection limits were above their respective screening values.

4.2.1.7 Shotcrete Covered Soils

Approximately 1,600 cubic yards of PCB contaminated soils are covered with Shotcrete along the eastern boundary of the site. These soils have the highest concentration of PCBs detected at the site, with a maximum concentration of 10,600 mg/kg. An evaluation of frequency has not been conducted but the purpose of the stockpiling on-site was to address off-site hot spot areas which exceeded the OSC's off-site action level of 10 mg/kg. On-site soils which had high concentrations (not defined in OSC report but some were above 500 mg/kg PCB) of PCBs were excavated and placed in the are which was subsequently covered with shotcrete.

4.3 Groundwater

Three sets of groundwater data were obtained from twenty wells over approximately a one year period. Sampling was conducted at high and low groundwater events. Seven wells were installed as pairs to monitor for dense and light non-aqueous phase liquids. Because of sampling problems associated with high sediment levels in groundwater the first round groundwater data was not utilized for PCBs, metals and semivolatile organic compounds. Phase 1 and 2 data were used for evaluating volatile organic compounds. Volatile organic compounds were not measured during Phase 3. Phase 2 and 3 data were used for evaluating metals and semivolatile compounds, including PCBs.

4.3.1 Lead

Lead was detected at 3 of 9 down gradient groundwater monitoring locations in Round 2 at concentrations of 0.0016 to 0.0031 mg/L. Lead was not detected at any of 8 down gradient locations in Round 3.

Lead concentrations in Rounds 2 and 3 are low relative to the EPA promulgated action level of 0.015 mg/L, and relative to background at Elmendorf AFB (0.047 mg/L). Considering the low frequency of detection and the low concentrations detected relative to the guideline, lead was not retained as a COC for groundwater.

4.3.2 PCBs

PCBs were detected in none of 12 well locations during Round 2. During Round 3, PCBs were detected at 2 of 9 well locations ranging from 0.000023 mg/L to 0.000032 mg/L. The concentrations are about 20 times lower than the MCL (0.0005 mg/L). Considering the low frequency of detection and the low concentrations detected relative to the MCL, PCBs were not retained as a COC for groundwater.

4.3.3 Volatile Organic Compounds

Tetrachloroethane (PCE) was detected at 2 of 12 sample locations during Round 1, and 2 of 9 sample locations during Round 2. The MCL for PCE is 0.005 mg/L and the RBC was 0.002 mg/L. PCE was detected at 0.0075 mg/L (MW-21) and 0.0022 mg/L (MW-24) during Round 1 (January 1993). During Round 2 (April/May 1993), the concentrations at these well locations (non-detect at MW-21 and 0.0016 mg/L at MW-24) were below both the MCL and close to the RBC. The additional Round 2 detection

(0.0002 mg/L at well MW-23), was below both the MCL and the RBC. The 95% upper confidence limit concentration of PCE including Round 1 data (0.00176 mg/L) is less than the MCL and the RBC. PCE was not identified as a COC in soil in the RA. The maximum level of PCE measured in soil was 0.12 mg/kg. Based on the low levels of PCE in groundwater and no significant detections in soils, PCE is not retained as a COC for groundwater.

4.3.4 Semivolatile Organic Compounds

1,2,4-trichlorobenzene was detected at only two locations (MW-21 and MW-24). The measured levels were 0.0003 mg/L (MW-21) and 0.0007 mg/L (MW-24). These concentrations are below the state and federal MCLs (0.07 mg/L) and the RBC (0.02 mg/L). (1,2,4-trichlorobenzene was detected in MW-21 at 0.003 mg/L during Round 2, which is above the RBC. This concentration, however, was an estimated concentration below the practical quantification limit for that sample. 1,2,4-trichlorobenzene was detected at .024 mg/l at MW-21 during round 1, however this data was not utilized because of excessive sediment in the sample.) Consequently, 1,2,4-trichlorobenzene is not retained as a COC for groundwater.

4.3.5 Other Metals

Various metals in addition to lead were detected in groundwater samples from all twelve monitoring wells. As stated previously, Round 1 data will not be discussed here because high levels of sediments in those samples do not make them representative of groundwater conditions. Metals which exceeded screening values in Round 2 and/or Round 3 included arsenic (9 wells), cadmium (1 well), and manganese (1 well). Arsenic was the only metal that exceeded its screening value in up gradient monitoring well #23. The maximum reported detection for arsenic was 13.9 μg/L in well MW-18, which is below the MCL (50 μg/L). The only metal to exceed its MCL was cadmium, which exceeded the MCL of 5 μg/L in MW-13 (29.1 μg/L) and up gradient well MW-23 (16.9 μg/L). Concentration of arsenic in Anchorage groundwater production wells ranged from 2 to 10 μg/L. This indicates that the arsenic levels detected in the groundwater samples only slightly exceed area background for the lower aquifer.

The reported background level for cadmium is 0.1 μg/L. However, the detection frequency of cadmium was low. Cadmium was detected at 3 of 9 well locations within or down gradient of the fenced area. Cadmium was detected in 4 of 32 samples collected from these wells. Further, it was detected only in unfiltered groundwater samples. The levels of cadmium measured in unfiltered samples ranged from 2.4 to 29 μg/L. Finally, as noted above, it was also detected at the up gradient MW-23 well location at a concentration of 16.9 μg/L. These data suggest that the few detections of cadmium likely result from the cadmium associated with sediment in unfiltered samples. The data do not suggest elevated cadmium resulting from past site operations.

4.4 Surface Water

No surface water runoff was observed at the site during the course of the RI. The only surface water feature in the site vicinity is Ship Creek. The average flow rate in Ship Creek is approximately 90 million gallons per day.

4.5 Sediment

Ship Creek sediment quality was evaluated in the RI. Samples were analyzed for lead and PCBs. Washington State 1991 Marine Sediment Guidelines were utilized for screening sediments because no federal or Alaska criteria were as stringent or available at the time. The PCB screening value was .07 mg/kg dry weight and the lead value was 31.0 mg/kg. The RI data revealed no significant impacts to Ship Creek sediment immediately adjacent to the site and as far as 500 feet below the site from ongoing or current releases from the site. The scope of the RI did not include sampling further downstream because there were reported, non-site related, PCB spills into Ship Creek and sediments are periodically dredged from Ship Creek. These two activities would have made evaluating past site releases into Ship Creek impractical. Only two of 22 creek sediment samples contained lead (CS-261: 34 mg/kg and CSA6-3: 45 mg/kg) above the screening value; however, the CS-261 sediments were not found to be toxic to aquatic life as a result of using two toxicity tests and downstream benthic macro invertebrate samples indicated that the benthic communities appeared to be similar to upstream communities. Two of 22 creek sediment sampling locations (CS-268 and CSA6-3) contained PCBs above the detection limit. The measured concentration were 0.2 mg/kg and 0.078 mg/kg, which are above the screening value. Creek sampling locations are shown on Figure 5-4.

The detections of lead and PCBs may have resulted from transport of soil containing lead and PCBs from the site into the creek or from transport of sediments containing lead and PCBs from locations upstream from the site. Soil transport from the site could occur as surface water runoff (although surface water runoff from the site was not observed during the RI field investigations) or during flood events. The estimated area of submergence during a 100-year flood event is depicted on Figure 1-2. The soils present in the areas that would be submerged generally contain low levels of lead (maximum 350 mg/kg) and PCBs (maximum 12 mg/kg). The general lack of lead and PCB detections at significant concentrations in Ship Creek sediment samples, the lack of observed surface water runoff from the site, and the relatively low levels of lead and PCBs in soils that would be submerged during flooding suggest that impacts to the creek sediment from lead and PCBs originating from the site would not be significant. These soils are not creek sediments and as explained earlier, there is no direct surface water runoff pathway to transport them into Ship Creek.

The location of a wetland identified in the vicinity of the site is shown on Figure 1-2. No samples of the sediment in the wetland were collected during the RI; however, the nearest soil samples, located between the fenced area of the site and the wetland, about 50 feet from the edge of the wetland, contained low levels of lead (74 to 110 mg/kg) and PCBs (<0.03 to 1.4 mg/kg).

4.6 Air

Air dispersion modeling was performed to estimate potential maximum off-site ambient air concentrations and deposition of PCBs and lead resulting from contaminant emissions from the site under current site conditions and during salvage operations (pre 1986). Modeling was conducted using the EPA-approved Industrial Source Complex- Long-term Dispersion Model (ISCLT2). Modeling conclusions were that air concentrations and subsequent deposition were insignificant.

Air is not retained as a medium of concern.

4.7 Summary

The highest and most consistent detections of the principle contaminants, lead and PCBs, was found in surface and subsurface soils. These levels were not as high as those initially detected during the Removal Action. However, the RI did not re-sample the soil stockpile and therefore higher concentrations than were reported in the RI are likely present in the stockpile.

5.0 SUMMARY OF SITE RISKS

CERCLA response actions at the site as described in this ROD are intended to protect human health and the environment from current and potential future exposure to hazardous substances found at the site.

To assess the risks posed by site contamination, a "Baseline Human Health and Ecological Risk Assessment," (Risk Assessment) was conducted by EPA. The Risk Assessment assumes that there is no further site cleanup.

The site was divided into three Areas of Concerns (AOC) (Figure 6-1). The AOC's were selected based on current site conditions and historical activities. AOC-1 comprises the north eastern portion of the site. This area was where transformers and other materials were handled frequently. AOC-1 is characterized by the highest concentrations of PCBs and lead. It is also the area where PCB contaminated soils were stockpiled and covered during the Removal Action. AOC-2 comprises the remaining portions of the site within the EPA erected fence and areas bordering the site along Ship Creek.. This area was used primarily as a storage area for the salvage operations prior to EPA's Removal Action. AOC-3 consists of areas outside the fence primarily on the north-west side of the site.

5.1 Human Health Risks

The site is currently a vacant lot. Past uses of the site and the surrounding property is industrial/commercial. Activities at the site are anticipated to stay industrial/commercial.

An assessment of the risks to human health involve a four-step process: identification of contaminants of potential concern (COPCs), an assessment of contaminant toxicity, an exposure assessment for the population at risk, and a quantitative characterization of the risk.

5.1.1 Contaminants of Potential Concern

An initial screening analysis was done to identify the chemicals of potential concern (COPCs). This screening involved two steps. In the first step, COPCs were selected based upon a very conservative estimate of potential health risk. Maximum concentrations of chemicals in media (*e.g.*, soil and groundwater) on the site were compared to conservative risk based concentrations (EPA Region 3 Risk Based Concentration Table) and background values for inorganics. The risk based concentrations were derived assuming residential exposures; acceptable cancer risk levels of $1x10^{-7}$ for soil and $1x10^{-6}$ for water; and acceptable HQs of 0.1 (Table 6-2). For lead, the risk based criteria selected were 500 mg/kg for soil (After completion of the Baseline Risk Assessment, EPA lowered the screening level for lead to 400 mg/kg in soils. This change does not affect the conclusions of the Risk Assessment at this site) and 15 ug/l for water. These values are recommended by Superfund guidance.

The second step in the selection of COPCs was a more refined screening which narrowed the list of COPCs by considering factors such as frequency of occurrence of each COC and detection limits.

The final list of COCs for soil and groundwater are: Arsenic, cadmium, copper, chromium, lead, dioxins/furans, PAH's, PCB's, tetrachloroethane, and 1,2,4-trichlorobenzene. The potential for these COCs to impact health was further evaluated using more realistic and site-specific exposure assumptions.

5.1.2 Risks Related to Compounds Other Than Lead

The methods used to assess exposure and toxicity and to characterize risk are different for lead than for other contaminants. Therefore, lead is discussed separately from the other contaminants in Section 5.4.

5.1.2.1 Toxicity Assessment

Toxicity information was provided in the Risk Assessment for the chemicals of potential concern (COPCs). Generally cancer risks are calculated using toxicity factors known as slope factors (SFs), while noncancer risks are assessed using reference doses (RfDs).

EPA developed SFs for estimating excess lifetime cancer risks associated with exposure to potential carcinogens. SFs are expressed in units of $(mg/kg\text{-}day)^{-1}$ and are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper-bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes underestimates of the actual cancer risk highly unlikely. SFs are derived from the results of human epidemiological studies, or chronic animal bioassay data, to which mathematical interpolation from high to low doses, and from animal to human studies, have been applied.

EPA developed RfDs to indicate the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure for humans, including sensitive subpopulations likely to be without risk of adverse effect. Estimated intakes of contaminants of concern from environmental media (*e.g.*, the amount of a contaminant of concern ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied.

The Risk Assessment relied on oral and inhalation SFs and RfDs. For the two chemicals for which dermal exposures were able to be estimated (PCBs and chlorinated dioxins/furans), SFs were derived from oral SFs by adjusting for oral absorption. Toxicity factors were obtained from the Integrated Risk Information System (IRIS) or, if no IRIS values were available, from the Health Effects Assessment Summary Table (HEAST).

5.1.2.2 Exposure Assessment

The exposure assessment characterizes the exposure scenarios, identifies potentially exposed populations and their exposure pathways and routes of exposure, and quantifies exposure in terms of chronic daily dose (mg/kg/day or milligrams of contaminant taken into the body per kilogram of body weight per day).

For current land use, exposures to long-term workers in AOC 3 were considered, AOC 1 and 2 are fenced off and are not currently used. For future land-use, on-site exposures to workers as well as potential future residents were added for evaluation. For residential exposures, the following pathways were considered: (1) exposure to soil contaminants through soil ingestion and dermal contact, and inhalation of soil contaminants that have volatilized or have been resuspended on particles in the air; and (2) exposure to groundwater contaminants through ingestion of drinking water and inhalation of volatiles during showering. For industrial exposures, all of the same pathways were considered except inhalation during showering.

EPA Superfund guidance recommends that both reasonable maximum exposures (RMEs) and average exposures be calculated in site risk assessment. RME exposures are calculated using assumptions that result in higher than average exposures to ensure that the risk assessment results are protective of the reasonably maximally exposed individual. For this risk assessment, RME and average exposures were quantified by using EPA default exposure factors (*e.g.*, body weight, contact rate, exposure frequency and duration) with site-specific exposure point concentrations. Both RME and average (more typical) exposures were calculated for residents and workers.

To estimate exposure point concentrations (EPCs) for soil for ingestion and dermal exposures, the 95 percent upper confidence levels (UCLs) on the mean were calculated separately for soils in each AOC. Because the EPA removal data representing soils below the shotcrete cap were not quantitatively evaluated, the EPCs do not include the highest PCB concentrations observed in soils at the site. For drinking water, the maximum values of the COPCs in individual wells were used as the EPCs.

5.1.2.3 Risk Characterization

For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the specific carcinogen. Excess lifetime cancer risk is calculated by multiplying the SF (see toxicity assessment, Section 5.1.2.1) by the quantitative estimate of exposure, the "chronic daily intake." These risks are probabilities generally expressed in scientific notation (*e.g.*, $1x10^{-6}$). An excess lifetime cancer risk of $1x10^{-6}$ indicates that an individual has a one in one million (1:1,000,000) chance of developing cancer as a result of site-related exposure to a carcinogen under the specific exposure conditions assumed.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (lifetime) with a RfD (see toxicity assessment section above) derived for a similar exposure period. The ratio of exposure to toxicity is called a hazard quotient (HQ). Hazard quotients are calculated by dividing the exposure by the specific RfD. By adding the hazard quotients for all contaminants of concern that affect the same target organ (liver, nervous system, etc), the hazard index (HI) can be calculated.

The RME provides a conservative but reasonable exposure scenario for considering remedial actions at a Superfund site. Based on the RME, when the excess lifetime cancer risk estimates are below $1x10^{-6}$, or when the noncancer HI is less than 1, EPA generally considers the potential human health risks to be below levels of concern. Remedial action may be warranted when excess lifetime cancer risks exceed $1x10^{-4}$ (one in ten thousand) and HIs exceed 1.0. Between $1x10^{-6}$ and $1x10^{-4}$, clean up may or may not be selected, depending on individual site conditions including human health and ecological concerns.

The following discussion summarizes the cancer and noncancer risk characterization results for the site.

5.1.2.4 Soil COC's

Cadmium, chromium, and copper were identified in the Risk Assessment (RA) as preliminary COCs for surface soils. None of these metals were identified in the RA as posing a carcinogenic risk above 10^{-6} or non-carcinogenic risk greater than a HQ of 1.0 . The RA determined that metals other than lead do not contribute significantly to risk. These metals were not retained as COCs for developing Remedial Action Objectives (RAOs); however, their potential contribution to cumulative systemic toxicity was utilized in evaluating overall risks for the site. RAOs are discussed in Section 6.

Polycyclic Aromatic Hydrocarbons; Each of the polycyclic aromatic hydrocarbons (PAHs) identified in the RA as a potential COC is a suspected carcinogen. The compounds are generally discussed as a group and referred to as carcinogenic PAHs (cPAHs). Neither total or individual cPAH risks exceeded the lower end of EPA's range (1xE-4) for any scenario or exposure pathway. Five of the cPAHs posed a risk greater than 1xE-6 for residential exposure via ingestion, and only two cPAHs posed greater than 1xE-6 risk for long-term worker industrial exposure via ingestion (Benzo(a)pyrene 3.2xE-6 risk and Chrysene 1.9xE-6 risk). The RA concluded that cPAHs are not a significant risk driver at the site and cPAHs were not retained as COCs for development of RAOs.

5.2 Combined Short- and Long-Term Worker Exposure Pathways

Both short- and long-term workers may be exposed to soil ingestion, dermal contact, and particulate inhalation pathways. Short-term workers are characterized as construction, or utility workers who would be exposed to the site for a limited amount of time. Short term workers have a higher ingestion rate (480 vs. 50 mg/day) but shorter exposure frequency (<75 days/year vs. 250 days/year) and duration (1 year vs. 25 years) and averaging time for noncarcinogens (365 days vs. 9,125 days) than long-term workers.

5.2.1 Short-Term Worker

Combined RME short-term worker pathway excess cancer risks are 3E-5 in AOC-1, and combined AOC-1 hazard indices are 3.1. Risks are primarily contributed by PCBs. Cancer risks are within the 1E-4 to 1E-6 target risk range, while the hazard index exceeds the level of exposure unlikely to result in adverse health effects.

5.2.2 Long-Term Worker

Combined RME long-term excess cancer risks are 1E-3 in AOC-1 and combined AOC-1 hazard indices are 5.3. Combined RME long-term cancer risks are 1E-4 in AOC's 2 and 3, while combined hazard indices are 1.0 in AOC-3 and less than 1.0 in AOC-2. These risks are also primarily contributed by PCBs. PCB cancer risks exceed or are equivalent to the 1E-4 target risk range in all the AOCs. The hazard index in AOC-1 exceeds the level of exposure unlikely to result in adverse health effects.

5.3 Combined Residential Exposure Pathways

Combined RME excess cancer risks are 5E-3 in AOC-1, 6E-4 in AOC-2, and 9E-4 in AOC-3. Combined RME hazard indices exceed unity in all AOCs. PCB and 2,3,7,8-TCDD equivalent cancer risks exceed the 1E-4 to 1E-6 target risk range in all AOCs. Hazard indices for all AOCs exceed the level of exposure that is unlikely to result in adverse health effects. PCBs contribute the greatest to site risks, estimated at approximately 80%. Lead risks were not quantified but exceed EPA's soil screening values in all AOCs. Groundwater risks do not contribute significantly to total risks.

The RA reported that 2,3,7,8-TCDD equivalent presented a residential cancer risk exceeding 10^{-4}. Dioxins and furans are retained as soil COCs for development of RAOs, because of their potential to contribute to the cumulative excess cancer risk. However, residential use of the site is highly unlikely and the risk posed by dioxins/furans to long and short term workers is within the acceptable risk range.

Combined Short- and Long-term workers, and residential risks are summarized in Tables 6-3 and 6-4.

The groundwater pathways do not contribute significantly to risk if inorganic risks are not considered, due to high background concentrations. The inorganic risks were attributed to background contaminants. Lead risks are discussed below.

5.4 Risks Related to Lead Only

There is substantial scientific literature on the toxicological effects of lead in humans. Children appear to be the segment of the population at greatest risk from the toxic effects of lead. Health impacts from lead are primarily assessed by using levels of lead in blood. At blood lead levels of 40 to 100 micrograms per deciliter (ug/dL), children have exhibited nerve damage, permanent mental retardation, colic, anemia, brain damage, and death. Blood lead levels as low as 10ug/dL (or lower) have been associated with neurological and developmental defects in children. Blood lead levels of concern for adults are generally higher than for children. However, studies examining the relationship between lead exposure and blood pressure suggest that blood lead levels from as low as 7 ug/dL upward to approximately 30 or 40 ug/dL may increase blood pressure. In addition, studies suggest that low levels of exposure for pregnant women may increase the risk for developmental effects in the unborn child.

For lead in soil, EPA's Office of Solid Waste and Emergency Response (OSWER) has issued Interim Soil Lead Guidance for CERCLA sites. In this guidance, a 400 mg/kg screening level for lead in soil under residential land use is recommended. This level was derived using the Integrated Exposure Uptake/Biokinetic (IEUBK) Model to estimate a soil concentration that will not result, under default residential exposure assumptions, in an unacceptable blood lead level in children. Exceeding this level does not necessarily indicate that a remedial action is necessary, but does indicate that a site-specific study of risks is warranted. Residential cleanup standards for CERCLA remedial actions can be developed using the IEUBK Model on a site-specific basis where site data support modification of model default parameters. EPA considers this model to be the most appropriate and widely applicable tool available for evaluating residential risks from lead.

Lead was not included in the quantitative risk estimates of the Risk Assessment because: (1) EPA-approved RfDs and Sfs are unavailable, and (2) EPA guidelines specify the use of the EPA Integrated Exposure Uptake/Biokinetic (IEUBK) model for estimating acceptable lead levels in soil for children in residential scenarios but there is no EPA accepted model for estimating lead exposure to adults in Industrial scenarios.

The IEUBK model estimates the blood lead concentrations expected to result from exposure to lead concentrations in soil and other media (e.g., air, water, diet, dust, and paint) for children. EPA recommends a benchmark of either 95 percent of the sensitive population of children having blood lead levels below 10ug/dL or a 95 percent probability of an individual child having a blood lead level below 10ug/dL. When the IEUBK model is run using this benchmark and all the model's default parameters, an acceptable soil screening level of about 400 mg/kg is predicted for lead. [Note: When the Risk Assessment was done for the site the IEUBK model in use by EPA predicted an acceptable soil screening level of about 500 mg/kg. The newer version of the model predicts a level around 400 mg/kg.]

The IEUBK model does not address lead exposure to older children or adults. Therefore, potential risks associated with exposures of adult residents and workers could not be quantitatively evaluated using the IEUBK model. However, the exposure potential and sensitivity of older receptors are generally lower than those of young children.

Health impacts for lead were characterized by comparing the exposure point concentrations calculated for lead in soil at the site, using the methods summarized above to 500 mg/kg (for residential exposures); and to 1,000 mg/kg (for industrial exposure). In both cases, risks associated with either residential or industrial exposures to the elevated concentrations of lead in site soil were determined to present significant risks to human health. Therefore, a cleanup action to address the lead-contaminated soil at the site is warranted.

5.5 Ecological Risk Assessment

The objective of the ecological risk assessment was to evaluate potential harm to ecological receptors posed by chemicals in environmental media both on- and off-site. The scope of the assessment was limited to the two primary chemicals-of-concern, PCBs and lead. The assessment identifies several groups of potential ecological pathways and receptors:

- Vegetation potentially exposed through contact with soils
- Soil-dwelling invertebrates potentially exposed through contact with soil
- Small mammals potentially exposed through ingestion of soil and contaminated food
- Aquatic life potentially exposed through contact with sediments, or through ingestion of contaminated prey.

The ecological risk assessment concluded that the most sensitive ecological habitat in the site vicinity is found in Ship Creek. It further concluded that the data indicate that conditions within Ship Creek, within the study area, are not significantly impacted by contamination from the site.

The ecological risk assessment observed that the highest contaminant concentrations were measured in the area where former site operations were concentrated and that, because of the gravelly fill material and shotcrete cap, little ecological habitat is present in this area.

Based on the information presented in the ecological risk assessment, it appears that risk to ecological receptors are small, due to the poor habitat of the site. Concentrations of PCBs outside the existing fence and adjacent to Ship Creek pose a risk to ecological receptors.

5.6 Uncertainty in the Risk Assessment

The accuracy of the risk characterization depends in large part on the accuracy and representativeness of the sampling, exposure, and toxicological data. Most assumptions are intentionally conservative so the risk assessment will be more likely to overestimate the risk than to underestimate it. For instance, the Risk Assessment did not alter the exposure frequency to account for at least five months of frozen, or snow covered soils at the site.

Uncertainty in the toxicity evaluation may over-estimate risks by relying on slope factors that describe the upper confidence limit on cancer risk from carcinogens. Also, evidence for carcinogenicity of the contaminants of potential concern are based on animal studies and limited human data. Some under-estimation of risk may occur, however, due to lack of quantitative toxicity information for some contaminants detected at the site, and because the PCB-contaminated soils below the shotcrete were not quantitatively evaluated. The soils stockpiled below the shotcrete had PCB detections up to 10,600 mg/kg.

5.7 Conclusion

The Baseline Risk Assessment supports the conclusion that hazardous substances are found on the site and that the actual or threatened release of these substances from this site, if a response action is not taken, may present an imminent and substantial endangerment to the public health, welfare, or the environment.

6.0 REMEDIAL ACTION OBJECTIVES AND CLEANUP STANDARDS

The overall objective of the remedial actions for the Standard Steel and Metals Salvage Yard Site is to provide an effective mechanism for protecting human health and the environment from contaminated site soils, while allowing future industrial use of the property. Remediating the site to industrial cleanup levels is appropriate because the existing land use is industrial/commercial and future land use plans of the municipality of Anchorage call for maintaining industrial/commercial zoning at the site and surrounding area. The following remedial action objectives for each contaminated media have been developed to describe what site remedial actions will need to be accomplished.

Groundwater is not retained as a medium of concern for development of RAOs; however, prevention of future migration of contaminants into groundwater will be addressed by the selected remedy.

Sediment is not retained as a contaminated medium for development of RAOs; however, prevention of future migration of contaminants into creek or wetland sediments will be addressed by the selected remedy.

Surface and subsurface soil (which includes the LNAPL soil) are retained as media of concern for development of RAOs. Table 5-1 shows the COCs for the soil medium. Groundwater, surface water, and sediments are not retained as contaminated media for development of RAOs; however, prevention of future migration of contaminants into groundwater, surface water, and sediments will be addressed by the selected remedy.

PCBs are the dominant quantified risk driver, estimated to contribute at least 80% of the risk at the site. While lead was not quantified, a comparison of the lead concentrations to other contaminants, besides PCBs, showed that lead represents the next most significant contaminant at the site. Based on the majority of risks being contributed by lead and PCBs, and the fact that all other contaminants are co-located with PCBs and lead, these two compounds were selected as "limiting chemicals" for evaluating the site and remedial action objectives.

Remedial actions at the site are required for contaminated soils only. Groundwater, sediments, and surface water do not pose an unacceptable risk and therefore do not require remedial actions. These three media, as well as air, are media of concern because, without taking action on contaminated soils, these media would potentially pose an unacceptable risk in the future.

6.1 Remedial Action Objectives

The RAO's identified for the site are to:

- Prevent exposure by inhalation, ingestion, and dermal contact with contaminated soils that would result in an excess lifetime carcinogenic risk above 1E-4 for industrial use, and off-site non-industrial use;
- Prevent exposure by inhalation, ingestion, and dermal contact with contaminated soils that would result in noncarcinogenic health effects as indicated by an HI greater than 1.0;
- Prevent off-site migration of contaminants caused by mechanical transport, surface water runoff, flood events, and wind erosion;
- Prevent leaching or migration of soil contaminants into groundwater that would result in groundwater contamination in excess of regulatory standards.

These RAO's will protect surface water and sediment media of concern.

6.2 Cleanup Standards

Using the RAOs, cleanup standards were developed for each of the contaminants of concern. Cleanup technologies can be evaluated against these cleanup standards.

6.2.1 Soil Cleanup Standards

Based upon future industrial land use on the site, cleanup standards for the soil on-site are required for 2 contaminants: PCBs and lead. The estimated upper-bound cancer risks were unacceptable ($>1x10^{-4}$) for PCBs. Lead levels were found on site which exceed the residential screening level (400 mg/kg) and which are above typical industrial cleanup levels. Two sets of cleanup standards will apply to the site. One set for the area of the site which will have engineering and/or institutional controls applied to it. In general, the controlled area will be inside the existing fence. Another set of cleanup standards for lead and PCBs will be for areas on the site that will have unrestricted access and which pose more ecological concerns. In general, those areas will be outside of the existing fence. PCBs have been detected at levels which would pose a risk to ecological receptors beyond the fence line and pose an estimated 1E-4 risk to long-term workers in AOC 3.

There are no federal or Alaska regulatory cleanup standards for PCBs or lead in soil. The cleanup standards applied at the site soil are derived from two main sources:

- EPA guidance on soil cleanup levels (for PCBs and lead);
- Risk-based concentrations when guidance is not available.

6.2.1.1 PCB Cleanup Standards

For PCBs in soil, EPA established a nationwide spill cleanup policy under the Toxic Substance Control Act (TSCA), 15 U.S.C. § 2601 *et. seq*. The requirements specified under 40 CFR 761, Subpart G, particularly with respect to the clean up of PCB-contaminated soil, are considered a to-be-considered (TBC) guidance for purposes of CERCLA actions. The TSCA cleanup policy applies to spills containing PCBs at concentrations greater than 50 mg/kg. The cleanup standard for surface soils in restricted access areas is 25 mg/kg and for nonrestricted access areas is 10 mg/kg, with at least a 10 inch cover of clean (less than 1.0 mg/kg PCB) soil.

Less stringent cleanup standards may be approved by EPA on a site-specific basis, as defined in 40 CFR § 761.120(c), if factors associated with the spill "may mitigate expected exposures and risks or make clean up to these requirements impracticable." Alternatively, more stringent levels may be required by EPA based on site-specific factors (e.g., depth to groundwater or presence of drinking water wells) as outlined in 40 CFR § 761.120(b).

For CERCLA sites, EPA developed guidance which recommends action levels for contaminated soils in both residential and industrial land use scenarios. The action level for industrial sites is between 10-25 mg/kg PCBs in soils.

Based on the above guidances and site-specific conditions, EPA has selected 10 mg/kg PCB as the cleanup level for soil within the current fenced area (industrial use) and 1 mg/kg PCB for soils outside of the fenced area. The soil above these levels will have to be a part of the response action. Table 6-5 presents residual risks posed by the main risk drivers, excluding lead.

6.2.1.2 Lead Cleanup Standards

For Standard Steel and Metal Salvage Yard an industrial land-use scenario is considered most appropriate. Unfortunately, the IEUBK Model is applicable only to children, and no IEUBK model is currently approved by EPA for developing an adult industrial screening level for lead.

To mitigate health impacts from lead exposure, a 1000 mg/kg soil cleanup level was chosen as protective. This level is consistent with other Superfund lead cleanup levels at industrial sites and past EPA guidance (current EPA guidance suggests a 400 mg/kg screening level is protective for residential scenarios, no screening level is given for industrial scenarios).

Soil lead concentrations exceed 1000 mg/kg over much of the site in surface soils. The RI data show that all soils with greater than 1,000 mg/kg lead in surface soils were within the 10 mg/kg PCB surface soil contour.

Lead in excavated soil is a RCRA hazardous waste when the results of the Toxicity Characteristic Leaching Procedure (TCLP) exceeds 5 mg/kg. When a soil fails TCLP for lead it is known as a "characteristic" hazardous waste. Concentrations of 1,000 mg/kg for lead in site soils have failed TCLP, and therefore, are considered hazardous waste.

Considering the RCRA characteristic waste criteria, collocation of soils with greater than 10 mg/kg PCBs with 1000 mg/kg lead contaminated soils, EPA's lead cleanup guidance, and other lead cleanup levels at Superfund sites, the soil cleanup standard for lead at 1000 mg/kg was selected for the site. Soils exceeding 500 mg/kg outside the current fenced area will be consolidated into the remediation area. A 500 mg/kg cleanup level was selected instead of current guidance of 400 mg/kg lead screening level in soils because the surrounding land use is industrial, and will remain industrial in the future. These soils are not considered RCRA wastes. However, these soils could be transported to Ship Creek in the future by surface activities or surface water runoff and pose an unacceptable risk to biological receptors.

Therefore, excavating and treating soils with greater than 1000 mg/kg lead would occur to reduce the risks posed by lead in those soils and those soils would require treatment to comply with RCRA. Cleanup levels established for lead at other industrial sites in the region were considered in establishing the cleanup standard at the site.

6.3 Cleanup Standards Conclusions

Based on the information gathered and evaluated in the RI/FS, EPA concludes that contaminated soil on the site presents an unacceptable risk to human health, welfare, and the environment. All other contaminants of concern detected at the site above risk based levels were contained within soils with greater than 10 mg/kg PCBs and 1000 mg/kg lead. Therefore actions taken for PCBs and lead will address all remaining unacceptable risks at the site.

As stated above, the area within the existing fence line is considered the remediation area. This area, depending upon the alternative, will require an element of remediation (capping, treatment, or excavation) and institutional controls. The area outside of the existing fence line will not have engineered controls, thus, those areas will have a 1 mg/kg PCB and a 500 mg/kg lead cleanup level for protection of ecological receptors adjacent and within Ship Creek. All soils removed from outside of the existing fence line will be consolidated and disposed of within the existing fence boundary, outside of the flood plain.

Liquid PCBs, if present, are considered a principle threat at the site for PCBs. Principle threat lead soils are those which will always fail TCLP. TCLP tests run during the RI found a concentration of 3,000 mg/kg lead always exceeded 5 mg/L lead. The determination of principle threat lead soils is not a significant factor for evaluating remedial actions at the site, but all principle threat soils will be treated. All soils failing TCLP are a continuing source which could impact groundwater, and soils with greater than 500 mg/kg PCBs pose an estimated one to two orders of magnitude greater risk than the acceptable low end risk range, 1Ex-4 and are a potential source for impacting groundwater.

EPA evaluated the impacts of dioxins/furans in the Baseline Risk Assessment. The assessment determined that dioxins/furans do pose a risk. These soils are collocated with PCB soils having greater than 10 mg/kg PCBs. All actions taken to address PCBs will also address dioxins/furans.

Soil cleanup standards* for the site are:

Contaminant	Within Fence Line	Beyond Fence Line
PCBs	10 mg/kg	1 mg/kg
Lead	1,000 mg/kg	500 mg/kg

* EPA altered the subsurface cleanup level contained in the FS for PCBs from 50 mg/kg to 10 mg/kg to consolidate all soils which would pose an unacceptable risk if these soils were exposed in the future by site activities or erosion. This consolidation will ensure that all surface soils contain less than 10 mg/kg PCBs even after remedial actions are complete without monitoring soil concentrations or maintaining a clean soil layer (when applicable). The cost of this alteration is not considered significant because treatment of soils between 10 mg/kg and 50 mg/kg is not required and there is a reduction in monitoring and maintenance costs by consolidating contaminated soils.

7.0 DESCRIPTION OF ALTERNATIVES

General response actions and the process options chosen to represent the various technology types are combined to form alternatives for the site as a whole. Alternatives were developed to represent a range of potential remedial actions, including institutional controls, on-site containment, on-site treatment, and off-site treatment and disposal.

The alternatives include a no-action alternative (Alternative 1); an alternative using institutional controls with limited on-site remedial actions (Alternative 2); a capping alternative (Alternative 3); two alternatives that combine containment of low threat soil with treatment of principal threat soil (Alternatives 4 and 5); three alternatives that incorporate on-site treatment of both low threat and principal threat soil (Alternatives 6, 7, and 8); and two alternatives that incorporate off-site treatment and disposal of both low threat and principal threat soil (Alternatives 9 and 10).

All alternatives considered except Alternative 1, include: (1) excavation and disposal within the existing fence line of contaminated soils from ecologically sensitive areas (flood plains and wetlands); and (2) treatment or disposal of materials stockpiled on-site from EPA removal actions, remaining scrap material that are deemed hazardous wastes under RCRA or as PCB wastes under TSCA, and investigation derived wastes.

An important element in considering each alternative is the residual risk to human health and the environment after completion of remedial actions. The risk equations and exposure parameters used in the residual risk calculations were the same as those used in the Baseline Risk Assessment except for Exposure Frequency. The exposure frequency was changed to 150 days/year to account for the presence of frozen ground for five months of the year at the site.

Estimates of volumes of soil to be excavated, treated, and disposed of were obtained in the following manner. In the feasibility study, volumes of soil are divided into two major categories: principal threat soils (i.e., soils with greater than 3,000 mg/kg lead and soils with greater than 500 mg/kg PCBs) and soils exceeding remedial action goals (i.e., soils with greater than 1,000 mg/kg lead and/or greater than 10 mg/kg PCBs, and subsurface soils with greater than 1,000 mg/kg lead and/or greater than 50 mg/kg PCBs).

After the FS was completed EPA decided that the subsurface soil PCB cleanup level was should be 10 mg/kg. This change will affect the volume estimates for subsurface excavation for the selected remedy. This alteration was deemed more protective of human health and the environment because it ensures future releases would not occur from vehicular traffic, freeze thaw process and erosion. Based on current site information this alteration should not result in a significant volume increase in excavated soils.

For each category of soil, a range of potential volumes was estimated. The minimum estimated volumes of soil are obtained using existing soil data with limited extrapolation into areas where sampling was not conducted. The maximum estimated volumes of soil are obtained using the existing soil data with extrapolation that involved estimating a potential maximum extent of contaminated area based on assessment of existing data.

Present worth cost of each of the alternatives was estimated using the procedures described in the EPA *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA 1988). Consistent with this guidance the cost for each alternative (where appropriate) consisted of an estimation of capital (based on volume estimates, and contingencies) operation and maintenance, and present worth costs determined for 30 years at a 10 percent discount rate. Operation, maintenance and monitoring costs vary per alternative depending on action (soil cover vs geomembrane cap, removal of all soils vs removal of principle threat soils) and groundwater monitoring results after five year reviews) Ranges of costs are presented based on the sensitivity of the costs to the volume of soil requiring remediation and the unit costs of transportation, treatment, and disposal.

7.1 Individual Analysis of Alternatives

Detailed description of these elements is presented in the discussion of the selected remedy only. (See chapter 10)

7.1.1 Alternative 1 - No Action/Monitoring

Alternative Description

Alternative 1 includes these key components:

- Long-term groundwater and surface water monitoring

The existing fence would provide a margin of protection by restricting access; however, the fence would not provide long-term protection because it would not be maintained under this alternative, and a fence is not an engineering control to eliminate migration of contaminated soil by wind erosion, site activities, or a major flood event. The hazardous substances stockpiled on site would also remain and, over time, present a threat of future releases into the environment. Detoxification of the soil as a result of the natural degradation of the COCs over time is not expected to contribute significantly to long-term effectiveness as lead does not degrade and degradation of PCBs is slow. The half-lives of the more highly-chlorinated PCB congeners in soil environments are estimated to be 20 to 30 years, under controlled laboratory conditions.

7.1.1.1 Cost

Capital Cost	$ 0.0
30 Years Operations and Maintenance Cost	$ 264,000
Present Worth(1)	$ 264,000

(1) Discount rate (10%) is the average rate of return on private investment, before taxes and after inflation.

7.1.2 Alternative 2 - Limited Action

Alternative Description

Alternative 2 includes these key components:

- Removal of regulated material stockpiled on-site and disposal in a RCRA Subtitle C or D landfill
- Excavation and, consolidation within existing fenceline, of impacted and estimated 650 cubic yards (cy) soil from flood plain
- Installation and maintenance of a protective cover over upland areas
- Off-site disposal of 150 tons of scrap and debris by recycling or in a TSCA or RCRA Subtitle C or D landfill
- Maintenance of the existing fence to restrict access to the site
- Institutional controls to restrict land uses
- Long-term groundwater and surface water monitoring

Institutional controls would limit site use to industrial/commercial use and would prohibit use of the site for potentially high-exposure commercial use such as a day care facility. Land use restrictions combined with the fence would greatly reduce the potential for future exposure of children to lead in site soils. This alternative would require long-term maintenance of the existing shotcrete cover over the northern part of the site and establish health and safety procedures for future workers should soil excavation be conducted.

Other long-term management controls would include groundwater and surface water monitoring and installation and maintenance of a protective cover. The cover would consist of 12 inches of soil over the existing contaminated surface soils to prevent direct exposure to COCs. The protective cover would reduce long-term worker exposure (by about one order of magnitude based on EPA's PCB guidance) and would prevent erosion and migration of contaminated soil to surface water or wetlands. The alternative contains no provisions for treatment or containment of the LNAPL soil.

The relatively small volume of soil containing greater than 500 mg/kg lead or 1 mg/kg PCBs that is present in the flood plain would be consolidated within the fenced area and beneath the protective cover.

7.1.2.1 Cost

Capital Cost	$ 1,290,000
30 Years Operations and Maintenance Cost	$ 283,000
Present Worth(1)	$ 1,573,000

(1) Discount rate (10%) is the average rate of return on private investment, before taxes and after inflation.

7.1.3 Alternative 3 - Capping

Alternative Description

The key components of Alternative 3 include:

- Removal of regulated material stockpiled on-site and disposal in a RCRA Subtitle C or D landfill
- Off-site disposal of 150 tons of scrap debris by recycling or disposal in a TSCA or RCRA Subtitle C or D landfill
- Capping all soils exceeding the cleanup levels
- Consolidation, under the cap, of an estimate 1,800 cy of soil exceeding cleanup levels from areas outside the proposed capping area
- Installation and maintenance of a protective cover over remaining upland areas of the site
- Institutional controls to restrict land use

The cap would cover an area of about 19,000 square yards. The capped area is entirely outside of the limits of the 100-year floodplain. Soil from areas beyond the proposed capping area with lead or PCBs above cleanup levels would be excavated and consolidated beneath the cap, however, none of these soils would be a characteristic hazardous waste by TCLP-lead or would contain greater than 50 mg/kg PCBs. Soil stockpiled during the EPA removal action would also be capped.

The consolidation area would be compacted prior to cap placement. The consolidation area would be capped with a composite layer consisting of a 6-inch sand base layer, a minimum 60 mil thick synthetic liner, a 6-inch sand drainage layer, and a 12-inch soil top layer. Run-on water would be diverted away from the capped area. Based on groundwater modeling, this cap configuration would limit groundwater infiltration to less than 0.01 feet per year and decrease the potential for groundwater contamination. The LNAPL soil would be capped but not treated.

The cap would be designed to be resistant to freeze-thaw and burrowing animals. Since the low permeability layer of the cap consists of a synthetic liner and not clay, freeze-thaw resistance could be achieved by providing a base for the synthetic liner that is composed of non-frost susceptible material, such as sand. Resistance to burrowing animals could be achieved by incorporating a layer of cobbles or heavy-gauge wire mesh above the synthetic liner. The cap would also be designed to support vehicle traffic.

This alternative would require long-term maintenance and repair of the cap. Maintenance would include yearly inspections of the cap. The inspections would assess any damage to the synthetic liner or cover materials caused by surface water erosion, freeze-thaw action, or human or animal activities. The inspections would be conducted after breakup, when any potential effects of erosion and freeze-thaw would be most visible.

A protective cover would be placed over upland areas that are not capped. The cover would consist of 12 inches of soil containing less than 1 mg/kg PCBs.

Protection of Ship Creek and wetland sediment and water quality would be achieved through installation of the cap, as the cap would effectively isolate impacted soil from surface water. Soil within the flood plain containing >500 mg/kg lead or >1 mg/kg PCBs would be excavated and consolidated on-site beneath the cap.

7.1.3.1 Cost

	Low	High
Capital Cost	$ 2,839,000	$ 2,862,000
30 Years Operations and Maintenance Cost	$ 283,000	$ 283,000
Present Worth(1)	$ 3,122,000	$ 3,145,000

(1) Discount rate (10%) is the average rate of return on private investment, before taxes and after inflation.

7.1.4 Alternative 4 - Containment with Treatment of Principal Threat Soils by Stabilization/Solidification

Alternative Description

The key components of Alternative 4 include:

- Removal of regulated material stockpiled on-site and disposal in a RCRA Subtitle C or D landfill, or recycling
- Off-site disposal of 150 tons of scrap debris by recycling or in a TSCA or RCRA Subtitle C or D Landfill
- Excavation and treatment by stabilization/solidification of an estimated 4,400 cy of soil containing lead and PCBs above principal threat concentrations
- Capping all remaining soils exceeding the cleanup levels
- Containment of the LNAPL soil within a 20,000 square foot slurry wall
- Excavation and consolidation beneath the cap of impacted soil from the flood plain
- Installation and maintenance of a protective cover over remaining upland areas of the site
- Institutional controls to restrict land use
- Groundwater monitoring meeting the requirements of 40 CFR § 271.75 (b)(6)

The combination of treatment of principal threat soils and containment of low threat soils is consistent with the NCP (40 CFR § 300.430(a)(iii)(A) through (C)).

The cap would be constructed in the same manner and would cover the same area for this alternative as for Alternative 3 (Capping). The area of the cap, the source areas that would be consolidated beneath the cap, the principal threat soil source areas, and the location of the slurry wall are depicted on Figure 8-1. The cap would have the same beneficial effects in preventing contact with impacted soil and minimizing surface water infiltration as discussed for Alternative 3. The area contained by the vertical barrier (discussed below) would be included within the capped area. Areas outside of the cap would be covered with 12 inches of soils containing less than 1 mg/kg PCB.

All principal threat soil (greater than 3000 mg/kg lead and 500 mg/kg PCBs) at the site would be treated to significantly reduce mobility of the contaminants using stabilization/solidification. The stabilization/solidification treatment is described in greater detail under Alternative 6. The treated soil would be placed on-site beneath the cap above the zone of groundwater fluctuation and below 1 foot depth. Some principal threat soil is present in the stockpiled soil from the EPA removal action. The principal threat soil would be treated and the remainder of the stockpiled soil would be consolidated beneath the cap. The stabilization/solidification treatment would result in a soil volume increase (estimated to be 15 to 30%) due to addition of stabilizing agents.

Further groundwater protection would be provided by containing the LNAPL soil area (the area beneath grids B4 through E5, Figure 8-1) within a low-permeability soil/bentonite slurry wall that is keyed five feet into the low-permeability Bootlegger Cove Formation. The LNAPL containment area is included within the capped area. The perimeter of the wall is approximately 800 feet and the area of wall (assuming the Bootlegger Cove Formation is an average of 25 feet from the soil surface) is 20,000 square feet. The wall would be formed by excavating a trench around the area to be contained. The trench would be filled with a bentonite slurry. The soil excavated from the trench, which is not expected to be significantly contaminated, would be mixed with bentonite, and the slurry mixture backfilled into the trench to form the cutoff wall.

Protection of Ship Creek and wetland sediment and water quality would be achieved through the treatment for mobility of the principle threat soils and installation of the cap, as the cap would effectively isolate impacted soil from surface water. Soil within the flood plain containing >500 mg/kg lead or >1 mg/kg PCBs would be excavated and consolidated on-site beneath the cap.

Institutional controls, including land use and access restrictions would be used. The deed and access restrictions would be the same as those described for Alternative 3. Groundwater monitoring would be conducted meeting the requirements of 40 CFR 271.75(b)(6).

7.1.4.1 Cost

	Low	High
Capital Cost	$ 4,367,000	$ 4,505,000
30 Years Operations and Maintenance Cost	$ 283,000	$ 283,000
Present Worth(1)	$ 4,650,000	$ 4,788,000

(1) Discount rate (10%) is the average rate of return on private investment, before taxes and after inflation.

7.1.5 Alternative 5 - Stabilization/Solidification with Treatment of PCB Principal Threat Soils by Thermal Desorption

Alternative Description

The key components of Alternative 5 include:

- Removal of regulated material stockpiled on-site and disposal in a RCRA Subtitle C or D landfill, or recycling
- Off-site disposal of 150 tons of scrap debris in an appropriate landfill (TSCA, RCRA Subtitle C or D)
- Treatment of an estimated 3,500 cy of soil exceeding the PCB principal threat level using thermal desorption
- Excavation and on-site stabilization/solidification of an estimated 12,600 cy of soils exceeding cleanup levels
- Disposal of treated soil on-site in a TSCA landfill
- Off-site disposal of thermal desorption process residuals, including lead-contaminated dusts (RCRA Subtitle C landfill) and desorbed PCBs (incineration)
- Excavation and consolidation within the existing fenceline of impacted soil from the flood plain
- Installation and maintenance of a protective cover over upland areas of the site
- Institutional controls to restrict land use
- Long-term maintenance of a fence to restrict access to the containment area

Soil above cleanup levels would be excavated and pre-processed. Soil containing greater than 500 mg/kg PCBs would be segregated for treatment using thermal desorption. Soil containing less than 500 mg/kg but greater than 50 mg/kg PCBs and greater than 1,000 mg/kg lead would be stabilized. Soil containing less than 1,000 mg/kg lead and 50 mg/kg PCBs would be disposed of on-site at a depth of greater than one foot but above the zone of groundwater fluctuation. The zone of groundwater fluctuation would be backfilled with clean fill. The locations and approximate depths of the soil that would be treated are depicted on Figure 8-2. After pre-processing, the volume of soil to be treated by thermal desorption would be approximately 2,400 to 2,900 cubic yards, and the volume treated by stabilization/solidification would be approximately 7,700 to 12,600 cubic yards. Detailed descriptions of the stabilization/solidification and thermal desorption treatments are presented under Alternatives 6 and 8, respectively.

The LNAPL soil would be excavated, solidified and disposed of on-site or, if PCB concentrations are greater than 500 mg/kg, treated by thermal desorption.

A protective cover consisting of 12 inches of soil containing less than 1 mg/kg PCBs would be placed over upland areas of the site to minimize erosion and potential for migration of contaminants to surface water or wetlands. Soil within the flood plain containing >500 mg/kg lead or >1 mg/kg PCBs would be excavated and consolidated on-site beneath the cover. Long-term groundwater monitoring would be conducted to assess the effectiveness of the treatment for protecting groundwater.

7.1.5.1 Cost

	Low	High
Capital Cost	$ 7,346,000	$ 8,866,000
30 Years Operations and Maintenance Cost	$ 283,000	$ 283,000
Present Worth(1)	$ 7,629,000	$ 9,149,000

(1) Discount rate (10%) is the average rate of return on private investment, before taxes and after inflation.

7.1.6 Alternative 6 - Stabilization/Solidification

Alternative Description

The key components of Alternative 6 include:

- Removal of regulated material stockpiled on-site and disposal in a RCRA Subtitle C or D landfill
- Disposal of 150 tons of scrap debris by recycling or disposal in a TSCA or RCRA subtitle C or D landfill

Excavation of an estimated 12,600 cy of soil with subsequent treatment by stabilization/solidification of soils

- Disposal of an estimated 18,300 cy of stabilized/solidified soil on-site in a TSCA landfill
- Excavation and consolidation within the existing fenceline of impacted soil from the flood plain
- Installation and maintenance of a protective cover over upland areas of the site

- Institutional controls to restrict land use
- Long-term Operation, Maintenance, and Monitoring of the stabilized/solidified soils and the protective cover (if no re-use of solidified soils)
- Groundwater monitoring that meets the requirements of 40 CFR § 761.75(b)(6)

Soil above cleanup levels would be excavated and pre-processed to remove debris and oversized rocks. Soil containing between 10 mg/kg and 50 mg/kg PCBs would be backfilled on-site at a depth of greater than one foot but above the zone of groundwater fluctuation in the on-site TSCA landfill. The zone of groundwater fluctuation would be backfilled with clean fill. The locations and approximate depths of the soil that would be treated are depicted on Figure 8-3. The excavated, pre-processed soil would be added to a pug mill where it would be mixed with the stabilizing additives and placed in the landfill. After pre-processing the total volume of soil to be treated would be approximately 7,700 to 12,600 cubic yards. A mixture of 16% cement and 8% fly ash, which was determined to be the most effective combination during the treatability study, is the suggested stabilizing agent combination. The LNAPL soil may be included with the soil that is stabilized/solidified.

The exact mixing ratios and long-term durability would be evaluated by further testing during remedial design, including freeze-thaw and wet-dry testing. If inadequate durability is obtained, engineering controls (for example, changing the agent:soil ratio, increasing the burial depth, or providing a low-permeability liner above or below the treated soil) would be implemented. Based on treatability study results, a soil volume increase of about 15 to 30% is anticipated after stabilization.

Stabilization/solidification is anticipated to be a very effective treatment for protecting groundwater because of two factors: (1) stabilization/solidification of the lead and PCBs results in lower potential leaching of COCs to groundwater from the stabilized mass and (2) the low permeability of the stabilized material results in very slow rates of infiltration to the aquifer. Leaching tests (TCLP) conducted during treatability studies indicate that the concentrations of lead and PCBs in leach water would be less than MCLs. The TCLP test uses an acidic solution to simulate leaching, which generally results in more leaching of COCs than would occur under natural conditions at the site. Permeability tests indicate very low hydraulic conductivities of the stabilized soil, ranging from 7×10^{-7} to 8×10^{-8} centimeters per second (cm/sec). By comparison, the average hydraulic conductivity of site soils estimated from grain-size distribution relationships was 5×10^{-3} cm/sec (Woodward-Clyde 1994a), and the hydraulic conductivity in the site vicinity was estimated by the USGS to be about 3×10^{-2} cm/sec (USGS 1988). The TSCA chemical waste landfill liner hydraulic conductivity requirement is 10^{-7} cm/sec which indicates that the solidified material itself will meet the requirements of a landfill liner.

A potentially important factor in evaluating stabilization/solidification is the effect of the presence of the solidified mass on future land use. The solidified soil would not be placed within the 100-year flood plain and would be placed at least one foot above the maximum groundwater table elevation. Clean soil (less than 1 mg/kg PCBs) from on-site sources would be used to replace soil excavated from the groundwater table zone. A gravel course would be placed over the treated soils to provide a wearing surface and minimize erosion. The ground surface elevations will increase due to the volume increase from the treatment and the addition of the cover layer. The solidified mass would be configured to accommodate future site development. The solidified mass will provide excellent foundation support for structures and excellent stability during seismic events. Excavation of the solidified soil, however, could not be conducted by conventional methods. Disposal of solidified material would be in accordance with TSCA disposal and landfill requirements, 40 CFR §§ 761.60 and 761.75. Justification for waiving select technical requirements of 40 CFR § 761.75 have been justified in the feasibility study, and are discussed in more detail in section 9.2.

A protective cover consisting of 12 inches of soil would be placed over upland areas of the site to minimize erosion and migration of contaminants to surface water or wetlands. Soil within the flood plain containing >500 mg/kg lead or >1 mg/kg PCBs would be excavated and consolidated on-site. Groundwater monitoring in compliance with 40 CFR § 761.75(b)(6) would be conducted to assess the effectiveness of the remedy for protecting groundwater.

Institutional controls to limit land uses and restrict access would be used. At a minimum, land use restrictions must be recorded on the title of the property to keep activities limited to commercial/industrial uses and restrict high exposure uses of children, such as day care facilities. Unless the solidified soils are designed and used as a building foundation, a fence or other access barrier may be required to limit unrestricted access onto the landfill.

Long-term monitoring and, if needed, maintenance of the landfill will be required.

7.1.6.1 Cost

	Low	High
Capital Cost	$ 4,434,000	$ 5,396,000
30 Years Operations and Maintenance Cost	$ 283,000	$ 283,000
Present Worth[(1)]	$ 4,717,000	$ 5,679,000

(1) Discount rate (10%) is the average rate of return on private investment, before taxes and after inflation.

7.1.7 Alternative 7 - Soil Washing

Alternative Description

The key components of this remedial alternative include:

- Removal of regulated materials stockpiled on-site and disposal in a RCRA Subtitle C or D landfill
- Off-site disposal of 150 tons of scrap debris by recycling or disposal in a TSCA or RCRA Subtitle C or D landfill
- Excavation of 17,700 cy of soil and treatment by enhanced soil washing of an estimated 12,600 cy (after screening) of soil exceeding cleanup levels
- Backfilling of an estimated 16,200 cy of screened and washed soil on-site
- Stabilization (if necessary) of soil containing elevated levels of lead prior to on site disposal
- Dewatering and stabilization of contaminated fines and disposal in an off-site TSCA landfill
- On-site treatment of process water and disposal in a POTW
- Excavation and consolidation within the existing fenceline of impacted soil from the flood plain
- Installation and maintenance of a protective cover over upland areas of the site
- Institutional controls to restrict land use
- Groundwater monitoring in compliance with 40 CFR § 761.75(b)(6)

Soil above cleanup levels would be excavated. Surface soils containing less than 1,000 mg/kg lead and 50 mg/kg PCBs but above cleanup levels would be backfilled on-site at a depth of greater than one foot but above the zone of groundwater fluctuation. Soil containing greater than 1,000 mg/kg lead or 50 mg/kg PCBs would be treated by soil washing. The LNAPL soil would be excavated and treated.

The excavated soil would be screened to remove oversize material including large gravel and scrap material. The soil aggregates would then be broken down and the soil separated into fine (fine sand and smaller particle sizes) and coarse fractions using a trommel. The fine fraction is estimated to be 12% to 20% of the total volume washed, based on particle-size analyses. The fine fraction (particles smaller than 0.15 mm diameter) would be dewatered, stabilized to pass TCLP-lead criteria, and disposed of in an off-site TSCA landfill. The fine fraction is estimated to be 25% solids prior to dewatering and 50% solids after dewatering. The fines would be disposed of off-site in a TSCA landfill. The coarse fraction would be treated in one or two steps. Particulate lead may be removed using a specific gravity separation technique, such as jigging. The soil would then be washed using surfactant-enhanced water. Approximately 7,700 to 12,600 cubic yards of soil would be washed in this manner.

Process water and water removed from the sludge fraction would be treated on-site as needed and discharged to the POTW. Five thousand gallons of process water was generated during the pilot tests. A full scale soil washing system must be more effective at minimizing process water generation. Lead concentrations in the process water were as high as 32 mg/L (sample SS-WWH4). The POTW discharge standard for lead is 5.0 mg/L; there is no standard for PCBs. Process water would be treated to reduce inorganic chemicals, organic chemicals and surfactants, and pH neutralization. Water treatment may include one or more of the following processes: oil\water separation, Electrofloc®, precipitation, ultraviolet oxidation, neutralization, and carbon adsorption.

The treated coarse fraction would be disposed on-site. Treated soil that contains greater than greater than 1,000 mg/kg lead or 10 mg/kg PCBs would not be replaced within the top foot or within the zone of groundwater fluctuation. Disposal of soils with greater than 50 mg/kg PCBs would invoke TSCA disposal and landfill requirements, 40 CFR §§ 761.60 and 761.75. Waivers of parts of 40 CFR § 761.75 would be required, however justification for waiving bottom liners and leachate collection systems can not be justified.

A protective cover consisting of 12 inches of soil would be placed over upland areas of the site to minimize erosion and migration of contaminants to surface water or wetlands. Soil within the flood plain containing >500 mg/kg lead or >1 mg/kg PCBs would be excavated and consolidated on-site beneath the cover.

Deed and access restrictions would be used as described under Alternative 6. Periodic groundwater monitoring would be conducted after remediation is completed.

7.1.7.1 Cost

	Low	High
Capital Cost	$ 6,563,000	$ 8,881,000
30 Years Operations and Maintenance Cost	$ 234,000	$ 234,000
Present Worth(1)	$ 6,797,000	$ 9,115,000

(1) Discount rate (10%) is the average rate of return on private investment, before taxes and after inflation.

Because of the relatively high unit cost of treatment, the estimated cost for this alternative is sensitive to the volume of soil requiring treatment. In addition, the volume of fines generated requiring treatment, transportation, and disposal has significant cost implications, again due to the relatively high unit disposal cost for this soil fraction. This is particularly true if incineration of fines is required. The cost estimate assumes no soil or fines will require incineration. The volume and ultimate treatment requirements for the process water may have significant impact on the final cost for this alternative. Cost estimates assumes local treatment of process water will be employed, and that incineration will not be required. Finally, cost estimates assumed stabilization of treated soils to obtain a TCLP-lead level of <5 mg/L will not be required. If this supplemental treatment process is necessary, an additional cost of approximately $300,000 - $425,000 can be expected. The Operation and Maintenance cost reduce groundwater monitoring after the first 10 years.

7.1.8 Alternative 8 - Thermal Desorption

Alternative Description

The key components of this remedial alternative include:

- Removal of regulated materials stockpiled on-site and disposal in a RCRA Subtitle C or D landfill
- Off-site disposal of 150 tons of scrap debris by recycling or disposal in a TSCA or RCRA Subtitle C or D landfill
- Excavation of an estimated 17,700 cy of soils exceeding cleanup levels and treatment of 12,000 cy of soils by thermal desorption
- Backfilling treated soil on-site
- Stabilization of 5,000 cy of soil and dusts containing elevated lead prior to on-site disposal
- Disposal of process residuals, including lead-contaminated dusts (off-site landfill) and desorbed PCBs (off-site incineration)
- Excavation and consolidation within the existing fenceline of impacted soil from the flood plain
- Installation and maintenance of a protective cover over upland areas of the site
- Institutional controls to restrict land use

Soil above cleanup levels would be excavated and pre-processed. Surface soil containing less than 1,000 mg/kg lead and 50 mg/kg PCBs but above surface soil cleanup levels would be backfilled on-site at a depth of greater than one foot but above the zone of groundwater fluctuation. Soil containing greater than 50 mg/kg PCBs would be treated by low-temperature thermal desorption. Soil containing greater than 1,000 mg/kg lead would be treated by stabilization. The estimated volume of soil that would be treated by thermal desorption following pre-processing is 7,200 to 12,000 cubic yards. The estimated volume of soil that would be treated by stabilization following pre-processing is 3,300 to 5,000 cubic yards. The LNAPL soil would be excavated and treated.

The excavated, pre-processed soil would be treated using thermal desorption. The vacuum-enhanced desorption process is incorporated in the alternative as a potential process option. The soil would be fed into a batch processing unit where the temperature is raised to volatilize PCBs. A negative pressure (vacuum up to 28 inches

Hg) would be maintained within the processing unit to control air emissions and to allow PCBs to volatilize at a lower temperature (300 to 400°F) than at atmospheric pressure (1,100 to 1,300°F). The volatilized PCBs would be condensed and concentrated in an oil phase. The captured PCBs would be drummed and transported off-site to a TSCA incinerator. Lead-contaminated dusts collected in the air emissions system would be stabilized and land filled off-site. The quantity of dust that would be generated is estimated to be 750 to 1,000 tons.

The vacuum-enhanced process option is currently undemonstrated and not TSCA-permitted for PCBs. The vacuum-enhanced process may be unavailable when remedial activities begin at the site. The high-temperature process option is demonstrated for PCBs; however, it would be much more expensive to mobilize to Alaska.

Further studies would be required during remedial design to demonstrate effectiveness and to determine the most appropriate treatment operating parameters for site soils. In addition, further studies should probably be conducted to evaluate materials-handling aspects, such as rewetting of the soil after treatment.

The treated soil would be disposed of on-site. Treated soils with lead concentrations exceeding 1,000 mg/kg would be stabilized prior to disposal on-site. The thermally desorbed soil would require rewetting before it can be stabilized. The water volatilized during the desorption process may be used to rewet the soil if it is free of lead and PCBs. Treated soil that contains greater than 1,000 mg/kg lead or greater than 10 mg/kg PCBs would not be replaced within the top foot of soil.

A protective cover consisting of 12 inches of soil would be placed over upland areas of the site to minimize erosion and migration of contaminants to surface water or wetlands. Soil within the flood plain containing >500 mg/kg lead or >1 mg/kg PCBs would be excavated and consolidated on-site beneath the cover.

Deed restrictions would be used as described under Alternative 6. Periodic groundwater monitoring in compliance with 40 CFR § 761.75(b)(6) would be conducted after remediation is completed.

7.1.8.1 Cost

	Low	High
Capital Cost	$ 9,316,000	$ 12,709,000
30 Years Operations and Maintenance Cost	$ 234,000	$ 234,000
Present Worth(1)	$ 9,550,000	$ 12,313,000

(1) Discount rate (10%) is the average rate of return on private investment, before taxes and after inflation.

The estimated present worth cost for Alternative 8 ranges from $9,550,000 to $12,313,000. Because of the relatively high unit cost of treatment, the estimated cost for this alternative is sensitive to the volume of soil requiring treatment. The unit cost for processing and cost for mobilization used in the cost estimate assumed that the vacuum-enhanced thermal desorption process option, which is currently unproven, will not be available when remediation of the site is conducted. The high-temperature thermal desorption process option costs were used in the estimate.

7.1.9 Alternative 9 - Off-site Disposal

Alternative Description

The key components of this remedial alternative include:

- Removal of regulated material stockpiled on-site and disposal in a RCRA Subtitle C or D landfill
- Disposal of 150 tons of scrap debris by recycling or disposal in a TSCA or RCRA Subtitle C or D landfill
- Excavation of an estimated 17,700 cy of soils exceeding cleanup levels and disposal of an estimated 12,600 cy of soils in an off-site TSCA/RCRA landfill
- Backfilling of excavations with imported clean soil
- Excavation and consolidation within the existing fenceline of impacted soil from the flood plain
- Installation and maintenance of a protective cover over upland areas of the site
- Institutional controls to restrict land use

Soil above cleanup levels would be excavated. Soils containing greater than 1,000 mg/kg lead would be disposed of in a solid waste landfill, except that any soils above 5 mg/L TCLP-lead will require stabilization prior to disposal. Surface soil containing less than 1,000 mg/kg lead and 50 mg/kg PCBs but above cleanup levels would be backfilled on-site at a depth greater than one foot but above the zone of groundwater fluctuation. The excavations would be backfilled with imported clean fill material. Soil containing greater than 50 mg/kg PCBs would be disposed of in an off-site TSCA landfill. The LNAPL soil would be excavated and disposed of off-site.

Prior to disposal, all debris and material larger than two inches would be screened out. The estimated volume of material to be disposed is 7,700 to 12,600 cubic yards. The remaining material would be loaded on rail gondola cars to be transported to a permitted landfill in the lower 48 states for disposal. All soils would be stabilized for lead prior to landfilling.

A protective cover consisting of 12 inches of soil, containing less than 1 mg/kg PCBs, would be placed over upland areas of the site to minimize erosion and migration of contaminants to surface water or wetlands. Soil within the flood plain containing >500 mg/kg lead or >1 mg/kg PCBs would be excavated and consolidated on-site beneath the cover.

Institution controls would be used to prevent exposure to contaminated soils.

7.1.9.1 Cost

	Low	High
Capital Cost	$ 8,246,000	$ 12,168,000
30 Years Operations and Maintenance Cost	$ 139,000	$ 139,000
Present Worth(1)	$ 8,385,000	$ 12,307,000

(1) Discount rate (10%) is the average rate of return on private investment, before taxes and after inflation.

7.1.10 Alternative 10 - Off-site Incineration

Alternative Description

The key components of this remedial alternative include:

- Removal of regulated material stockpiled on-site and disposal in a RCRA Subtitle C or D landfill
- Off-site disposal of 150 tons of scrap debris by recycling or disposal in a TSCA or RCRA Subtitle C or D landfill
- Excavation of an estimated 17,700 cy of soils exceeding cleanup levels, treatment of an estimated 12,600 cy of soils at an off-site TSCA incinerator, and stabilization of incinerator ash for lead
- Backfilling excavations with clean imported soil
- Excavation and consolidation within the existing fenceline of impacted soil from the flood plain
- Installation and maintenance of a protective cover over upland areas of the site
- Institutional controls to restrict land use

Soil above cleanup levels would be excavated. Surface soil containing less than 1,000 mg/kg lead and 50 mg/kg PCBs but above cleanup levels would be backfilled on-site at a depth greater than one foot but above the zone of groundwater fluctuation. The excavations would be backfilled with imported clean fill material. Soil containing greater than 1,000 mg/kg lead or 50 mg/kg PCBs would be transported off-site and treated at a

TSCA incinerator. The LNAPL soil would be excavated and treated off-site. Lead-contaminated incinerator ash would be stabilized.

Prior to disposal, all debris and material larger than two inches would be screened out. The volume of material to be treated/disposed is estimated to range from 7,700 to 12,600 cubic yards. The remaining material would be loaded on rail gondola cars to be transported to a TSCA incinerator in the lower 48 states for disposal.

A protective cover consisting of 12 inches of soil, containing less than 1 mg/kg PCBs, would be placed over upland areas of the site to minimize erosion and migration of contaminants to surface water or wetlands. Soil within the flood plain containing >500 mg/kg lead or >1 mg/kg PCBs would be excavated and consolidated on-site beneath the soil cover.

Institutional controls would be used to restrict land use.

The estimated present worth cost for Alternative 10 ranges from $21,880,000 to $34,318,000. Because of the very high unit costs of transportation and disposal, the estimated cost for this alternative is very sensitive to the volume of soil requiring treatment.

7.1.10.1 Cost

	Low	High
Capital Cost	$ 21,741,000	$ 34,179,000
30 Years Operations and Maintenance Cost	$ 139,000	$ 139,000
Present Worth(1)	$ 21,880,000	$ 34,318,000

(1) Discount rate (10%) is the average rate of return on private investment, before taxes and after inflation.

7.2 Groundwater Component

The remedial investigation determined that groundwater is not a media of concern requiring treatment. Although there is a LNAPL present in the center of the site, no dissolved contaminants were identified at the boundary of the site. The physical properties of the LNAPL are conducive to excavation with contaminated soils. The LNAPL will be remediated by the same treatment as the soils, unless it is determined during remedial design testing that the LNAPL requires off-site disposal because it is considered a liquid as determined by Method 9095 (Paint Filter Liquids Test) contained in 40 CFR § 268.32(i).

7.3 Applicable or Relevant and Appropriate Requirements

Remedial actions implemented under CERCLA must meet legally applicable or relevant and appropriate requirements (ARARs). ARARs include promulgated environmental requirements, criteria, standards, and other limitations. Other factors to be considered (TBCs) in remedy selection may include nonpromulgated standards, criteria, advisories, and guidance, but are not evaluated pursuant to the formal process required for ARARs. ARARs of federal or state governments must be complied with during CERCLA response actions. Local ordinances with promulgated criteria or standards are not considered ARARs, but may represent TBCs. Major chemical-specific, location-specific, and action-specific ARARs and TBCs for the remedial alternatives are presented below.

7.3.1 Chemical-Specific ARARs

Clean Water Act, 33 U.S.C. § 1314, establishes water quality criteria for freshwater surface waters for lead and PCBs.

Clean Water Act, 33 U.S.C. § 1313 and 40 CFR § 131.36(d)(12), establishes and implements the National Toxics Rule, and sets water quality standards for Alaska.

40 CFR § 141, Subpart B and F, the Safe Drinking Water Act Maximum Contaminant Levels and Maximum Contaminant Level Goals establishes cleanup standards for metals and organic compounds, including PCBs, in ground water.

7.3.2 Action-Specific ARARs

Toxic Substances Control Act, 15 U.S.C. § 2601 et seq., and 40 CFR §§ 761.60, 761.70, and 761.75 for the treatment, incineration, and disposal of PCBs.

Clean Water Act, 33 U.S.C. § 1311, 40 CFR § 122.26, direct discharges must meet technology-based standards, and storm water regulations for controlling discharges associated with industrial or construction activities.

Clean Water Act, 33 U.S.C. § 1314(b)(1) and 40 CFR Part 230, substantive requirements for dredge and fill requirements in waters of the United States.

40 CFR Part 403, pretreatment standards for discharges to Publicly Owned Treatment Works.

40 CFR §§ 268.45 and 268.48. RCRA Land Disposal Restrictions for Hazardous Debris treatment and disposal.

40 CFR § 261.24. RCRA Characteristic Hazardous Waste Determination is applicable for identifying soil that must be managed as hazardous waste (i.e. lead).

40 CFR 264, Subpart C, RCRA Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; Preparedness and Prevention is applicable for staging and implementing the remedy.

40 CFR 264.310(a), RCRA Subtitle C Landfill Regulation is relevant and appropriate for the cover design of a landfill, if appropriate.

40 CFR 268, Subparts C and D, Prohibitions on Land Disposal and Treatment Standards (i.e. lead and California List Wastes) is applicable for preventing the disposal of Characteristic and California List Wastes;

Alaska Air Quality Regulations 18 AAC Chapter 50 for dust suppression.

7.3.3 Location-Specific ARARs

Executive Order 11988, 40 CFR 6, App. A, action within floodplains, avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values.

Executive Order 11990, 40 CFR 6, App. A, action within wetlands, avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values.

7.3.4 To-Be-Considered (TBC) Guidances and Policies

EPA's Groundwater Protection Strategy, August 1984.

40 CFR Part 761, Subpart G, TSCA PCB Spill Cleanup Policy.

Guidance on Remedial Actions at Superfund Sites with PCB Contamination, OSWER Directive 9355.4-01.

8.0 COMPARATIVE ANALYSIS

In this section, the relative performance of each alternative in relation to each specific evaluation criterion is assessed. According to the RI/FS guidance, "the purpose of the comparative analysis is to identify the advantages and disadvantages of each alternative relative to one another so that the key tradeoffs the decision maker must balance can be identified".

The NCP requires that a CERCLA remedy provide overall protection of human health and the environment and comply with ARARs. These criteria are referred to as the "threshold criteria." The remaining five criteria that are analyzed in the FS are referred to as the "balancing criteria." The balancing criteria are:

- Long-Term Effectiveness and Permanence;

- Reduction in Toxicity, Mobility, or Volume (TMV) through Treatment;
- Short-Term Effectiveness;
- Implementability; and
- Cost.

The final two criteria, state acceptance and community acceptance, are evaluated by EPA after public comment on the Proposed Plan and are referred to as the "modifying criteria."

8.1 Overall Protection of Human Health and the Environment

Evaluation of this criterion focused on how exposure pathways (ingestion, inhalation, dermal contact of soils) are eliminated, reduced, or controlled through engineering or institutional controls.

Alternatives 1 and 2 would not be protective of human health and the environment because site conditions would remain fundamentally unchanged except for a ten inch soil cover in Alternative 2, which would not be protective, nor effective over the long term because activities on-site and/or weather would easily disturb or remove the ten inches of soil and expose the contaminated soils below. Alternative 2 does not comply with TSCA disposal requirements. They will not be discussed further. All other alternatives would be protective of human health and the environment. Alternatives 9 and 10 would provide the greatest degree of protection for receptors in Anchorage Alaska because the contaminants would be treated and/or disposed off-site. Alternatives 3, 4, 5, 6, 7, 8, 9, and 10 would be protective of human health and the environment.

The principal tradeoffs are between alternatives that provide permanent reductions in residual risks to human health and the environment through treatment and/or off-site disposal (Alternatives 5, 6, 7, 8, 9, and 10) and alternatives that are less permanent but involve less short-term risk and are easier to implement (Alternative 3). Alternative 4 provides a compromise in that it combines slightly lower levels of permanence relative to Alternatives 5, 6, 7, 8, 9, and 10, but has less short-term risk and easier implementability.

8.2 Compliance with ARARs

This criterion addressed whether each alternative meets the action-specific, chemical-specific, and location-specific ARARs relevant for each alternative at the site.

8.2.1 Assessment

It is anticipated that Alternatives 5, 6, 8, 9, and 10 would comply with all ARARs or meet the criteria for a waiver.

Alternatives 2, 3, and 4 would not meet the TSCA treatment and disposal requirements because no treatment or disposal in an approved chemical waste landfill would occur and, as proposed, these alternatives would not meet the criteria for a waiver under TSCA's landfill regulation.

Alternatives 2, 3, and 4 do not comply with Safe Drinking Water MCLs because they would not treat contaminated, on-site groundwater.

Alternative 7 would not meet RCRA LDR ARARs because the treatment method would not be able to remove the toxicity characteristic for lead, nor would it achieve the percent reductions required for a treatability variance.

Alternatives 5, 6, 7, 8, 9, and 10 would meet all TBCs.

Alternatives 3 and 4 do not meet the response objectives of the PCB Spill Cleanup Policy because soil containing greater than 10 mg/kg would not be excavated to a depth of 10 inches.

Alternative 3 does not meet the response objectives of the CERCLA PCB guidance because containment of low threat soils and treatment of principal threat soils would not be provided.

8.3 Long-Term Effectiveness and Permanence

The evaluation of alternatives under this criterion addresses the results of a remedial action in terms of the risk remaining at the site after response objectives have been met. The criterion is composed of two components: magnitude of residual risk and adequacy and reliability of controls used to manage residuals at the site.

As part of the Removal Action all liquid principle threats were removed and treated or disposed.

8.3.1 Magnitude of Residual Risk

Estimated residual long-term worker cancer risk levels in the range of 10^{-5} to 10^{-6} and an HI of less than 1.0 are estimated after remediation is completed for Alternatives 3 through 10. Protection of the environment, including groundwater, surface water, and sediments in the short term, would be achieved for each of these alternatives. The potential for impacts to groundwater from the LNAPL soil would be slightly higher for Alternative 3 than for Alternatives 4, 5, 6, 7, 8, 9, and 10, although no impacts to groundwater, outside of a very small on-site area, have been observed to date.

8.3.2 Adequacy and Reliability of Controls

Alternatives 5 through 10 have reliable controls to ensure their permanence. Alternative 4 relies on a cap and slurry wall which is not as reliable or permanent as solidification, thermal desorption or off-site disposal/treatment.

Institutional controls provided for Alternatives 4, 5, 6, 7, 8, 9, and 10 are consistent with the long-term management controls listed in the PCB guidance and are considered to be adequate and reliable for the levels of lead and PCB residuals that would be left at the site.

The institutional controls provided for Alternatives 2 and 3 (Capping) are not anticipated to be adequate for long-term protection of human health, surface water, and sediments. Alternative 1 does not include institutional controls.

8.3.3 Assessment

Long-term effectiveness and permanence at the site would be greatest for Alternatives 9 (Off-site Landfill) and 10 (Off-site Incineration). The maximum residual long-term worker cancer risk is in the range of 10^{-5} to 10^{-6} and the HI is less than 1.0. Protection of the environment would be achieved for each of these alternatives. Adequate and reliable controls would be provided for the concentrations of lead and PCBs left on-site. Future land use would be unrestricted except for a restriction on residential use.

Alternative 8 (Thermal Desorption) was ranked next highest for long-term effectiveness and permanence. Residual long-term worker cancer risks in the range of 10^{-5} to 10^{-6} are estimated for this alternative. Long-term protection of the environment would be achieved. Future land use, however, would be restricted by the presence of elevated concentrations of lead in soil. The alternative includes reliance on institutional controls to protect workers from exposure to lead and to maintain the soil cover.

Alternatives 5 (Stabilization/Solidification with Treatment of PCB Principal Threat by Thermal Desorption) 6 (Stabilization/Solidification), and 7 (Soil Washing) were ranked next highest for long-term effectiveness and permanence. The maximum residual long-term worker cancer risk is also in the range of 10^{-5} to 10^{-6} and the HI is also less than 1.0. Protection of the environment would be achieved for each of these alternatives by either destruction of principle threat COCs or the immobilization of all soils above cleanup levels. Although, higher levels of COCs in treated soil would be left on-site compared to Alternatives 8, 9, and 10, long-term groundwater monitoring would be required to assess protection of groundwater, and future land use will be restricted to maintain industrial exposures. Additionally these alternatives would rely on institutional controls and long-term maintenance of solidified soils and soil cover.

Alternative 4 (Containment with Treatment of Principal Threats by Stabilization) was ranked significantly lower. It also achieves a maximum residual long-term worker cancer risk in the range of 10^{-5} to 10^{-6}, an HI of less than 1.0, and protection of the environment. However, while principle threat COCs are immobilized, destruction of COCs would not be achieved and the majority of PCB and lead contaminated soil would be untreated and left on-site under a cap. Institutional controls would be required for maintenance and monitoring of the cap. Permanence of the cap would depend on future land use, and would rely more on institutional controls to keep it intact. A cap and slurry wall are less permanent and reliable in the long term than solidification of soils. Future catastrophic events, such as flooding and seismic events would pose a significant threat to the cap and require greater operation, maintenance and monitoring procedures than solidification or off-site disposal.

Alternative 3 (Capping) was ranked lower than Alternative 4, although the residual long-term worker health risks are 10^{-5} to 10^{-6} and the HI is less than 1.0, and impacts to the environment are not anticipated. All COCs (except the emergency removal action and scrap removal action wastes) would remain on-site as untreated residuals. The LNAPL soil would not be treated or contained, and some potential for long-term groundwater impacts would exist. Similar to Alternative 4, a higher reliance on future land use restrictions would be required to maintain the cap.

8.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

This evaluation focuses on the NCP expectation of reduction of toxicity, mobility, or volume (TMV) for principal threats. The components of the criterion are:

- Treatment process used and materials treated
- Amount of hazardous material destroyed or treated
- Degree of expected reductions in toxicity, mobility, or volume
- Degree to which treatment is irreversible
- Type and quantity of treatment residuals remaining after treatment

8.4.1 Discussion

Alternatives 8 and 10 are expected to achieve significant reductions (anticipated to be 95% or greater) in TMV through treatment. All soil above cleanup levels would be remediated. It is estimated that greater than 90% of the mass of lead would be immobilized and greater than 90% of the mass of PCBs would be destroyed.

Alternatives 5, 6, and 7 also treat and/or contain all soil above cleanup levels; however, these were downgraded relative to Alternatives 8 and 10 because of lower TMV reductions and the volume increase (estimated to be 15 to 30%) associated with stabilization/solidification (all soils are stabilized/solidified in Alternative 6; all soil except principal threat PCBs are stabilized/solidified in Alternative 5; and sludges and lead-contaminated soils are stabilized as part of Alternative 7). Average PCB reductions of 93% are estimated for Alternatives 5 and 6 (based on TCLP reduction, however TCLP reductions are difficult to reproduce and leaching of PCBs is not a significant issue). PCB reductions of 57% to 94% were observed during pilot testing for Alternative 7. For Alternative 7, lead reductions as low as 7% and as high as 99% were observed during pilot testing. Alternative 5 was ranked higher than 6 or 7 because destruction of principal threat PCBs would be achieved.

Alternatives 4 (Containment with Treatment of Principal Threats by Stabilization) was downgraded somewhat because low threat soil would not be treated.

Alternative 9 (Off-site Landfill) was rated significantly lower because the only reduction in TMV that would be achieved is associated with stabilization that is required for lead.

Alternatives 3, 4, 6, and 9 would produce little or no process residuals. Alternative 7 followed by 5, 8, and 10 produce the greatest amount of process residuals that would require further treatment or off-site disposal. Alternative 5 produces an intermediate amount of process residuals.

Alternatives 4, 5, 6, 7, 8, and 10 would satisfy the statutory preference for treatment as a principal element. Alternatives 3 and 9 would not satisfy the statutory preference.

8.4.2 Assessment

Alternatives 8 (Thermal Desorption) and 10 (Off-site Incineration) are ranked highest. Lead would be treated using BDAT and greater than 95% of PCBs would be destroyed. Alternative 5 (Stabilization/Solidification with Treatment of PCB Principal Threats by Thermal Desorption) is ranked next highest. Lead in principal threat soil would be treated using stabilization/solidification and greater than 95% of PCBs contained in principal threat soil would be destroyed.

Alternatives 4, 6 and 7 are comparable. Lead would be treated by stabilization/solidification and PCBs would be treated using solidification (80 to 99% reduction in mobility). The tradeoffs involved in rating the alternatives are that Alternative 7 would produce relatively large quantities of process residuals, whereas, Alternative 6 would produce a relatively large volume increase, while Alternative 4 presents a compromise in that a somewhat smaller mass of COCs would be treated but relatively small residual amounts and volume increases would be produced.

Alternative 9 (Off-site Disposal) is ranked significantly lower. The treatment for toxicity employed would be minimal and the wastes would be transferred to another location to contain.

8.5 Short-Term Effectiveness

In this section, two criteria are considered: protection of the community, workers, and the environment during remedial actions and the time until remedial response objectives are achieved.

8.5.1 Short-Term Protection of the Community, Workers, and the Environment

Alternative 3 (Capping) involves no excavation, above ground treatment, or transport of wastes; therefore, the associated community, worker, and ecological exposures during the remedial actions are lowest.

Alternatives 4 (Containment with Treatment of Principal Threat Soil by Stabilization), 5 (Stabilization/Solidification with Treatment of PCB Principal Threats by Thermal Desorption) 6 (Stabilization/Solidification), 7 (Soil Washing), 8 (Thermal Desorption), 9 (Off-site Disposal), and 10 (Off-site Incineration) are generally similar in that the potential for human or environmental exposures exists during excavation activities. The potential community and worker exposures include physical injury and inhalation of contaminated dusts. The potential environmental exposures are releases of contaminated dusts and runoff water to surface water or wetlands and mobilization of COCs to groundwater. The potential exposures are significantly less for Alternatives 4 and 5 than Alternatives 6, 7, 8, 9, and 10 because of the much smaller volumes of excavation involved.

Alternatives 5, 7, 8, 9, and 10 have additional potential exposures during transportation of contaminated wastes or process residuals to the continental U.S. for treatment/disposal. These potential exposures are associated with overland transport, overseas transport, and on- and off-loading. Alternatives 9 and 10 involve the largest volumes of transported wastes and Alternative 5 the smallest volume. Alternative 10 also includes potential releases of COCs to air at the incinerator site and exposures during treatment and transport of lead-contaminated ash.

Alternatives 4, 5, 6, 7, and 8 involve additional potential exposures resulting from on-site treatment of soil. The potential exposures include physical hazards and releases of contaminated residuals. The greatest potential exposure from release of treatment residuals is estimated to result from dry, lead-contaminated dusts and volatile COCs associated with the thermal desorption treatment (Alternatives 5 and 8). The potential exposures are greater for Alternative 8 than Alternative 5 because of the larger volume of soil treated. Alternative 7 is anticipated to result in an intermediate level of exposures during treatment including process water management, while the exposures associated with the stabilization/solidification treatment used in Alternatives 4 and 6 are expected to be less.

8.5.2 Time Until Remedial Response Objectives are Achieved

The time frame for completing Alternatives 3 (Capping) is shortest because no excavation is involved. Excavation of smaller volumes of soil at shallower depth is included in Alternatives 4 and 5, and delays due to excavation are not anticipated. The times for completing excavations under Alternatives 6, 7, 8, 9, and 10 are likely to be longer because excavation of relatively large volumes of soil, likely including soil beneath the groundwater table, is required. Excavation times could be lengthened if wet weather, which is common in Anchorage in the summer, is encountered. For Alternatives 9 (Off-site Disposal) and 10 (Off-site Incineration), the time to obtain all necessary approvals for shipment of wastes to the off-site treatment/disposal facility could be significant.

The time frames for completing the treatment component of Alternatives 5 (Stabilization/Solidification with Treatment of PCB Principal Threats by Thermal Desorption) 7 (Soil Washing), and 8 (Thermal Desorption) would likely be longer because of factors including:

- Pilot and/or pre-remediation testing of equipment
- Uncertainty of equipment availability
- Multiple treatment/containment processes

It is reasonable to expect that each of Alternatives 3, 4, 6, 9, and 10 can be completed in a single construction season. Despite the relatively small treatment volumes under Alternative 5, a significant potential exists that the Alternative would not be completed in a single construction season because of the need for two separate treatment processes and the uncertainties of equipment availability, effectiveness, and implementability. Alternatives 7 and 8 have the greatest potential for extended remediation times.

8.5.3 Assessment

Alternative 3 (Capping) has the highest short-term effectiveness. No excavation or above ground treatment is involved; therefore, the associated community, worker, and ecological exposures during the remedial actions are small. Human exposure and the potential for migration of COCs to surface water or groundwater are significantly reduced in a relatively short (one construction season) time period. The short-term effectiveness of Alternative 4 (Containment with Treatment of Principal Threats by Stabilization) is nearly as good as Alternative 3 (Capping). Excavation volumes are limited, no significant exposures have been identified for the treatment process, and it is anticipated that the remediation can be completed within a single construction season using locally available contractors and materials. Alternative 6 (Stabilization/Solidification) is similar to Alternative 4 but was downgraded because of the larger excavation volumes, although the short-term impacts due to excavation could be prevented by using an in-situ process option and mitigation methods such as dust control.

Overall short-term effectiveness is similar for Alternatives 5, 9, and 10. The tradeoffs are that smaller volumes of soil are excavated and less waste is transported over long distances with Alternative 5, but potential exposures and schedule delays associated with the treatment process are greater.

The poorest short-term effectiveness is associated with Alternatives 7 (Soil Washing) and 8 (Thermal Desorption). Both involve excavation of large volumes of soil, relatively complex treatment processes, and transport of residual wastes over long distances. Each involves potential exposures and schedule delays associated with the treatment process.

8.6 Implementability

In this section, three criteria are compared: technical feasibility, administrative feasibility, and availability of services and materials.

8.6.1 Technical Feasibility

Few technical feasibility considerations have been identified for Alternative 3 (Capping).

Greater implementability concerns exist for Alternatives 5, 6, 7, 8, 9, and 10 because of the potential need to control groundwater during excavation near the groundwater table. An additional consideration is availability of space to conduct excavation, soil staging and dewatering (if required), and treatment/loading.

Few concerns exist with respect to the ability to successfully operate the stabilization/solidification technology (Alternatives 4, 5, and 6). Stabilization is a common remedy chosen for CERCLA sites and has been accepted in EPA guidance as a treatment technology for PCBs. Stabilization/Solidification has also been identified as Best Demonstrated Available Technology (BDAT) for treating lead under the land disposal restrictions. Treatability studies conducted on soil from the site indicate that leaching of lead (measured using the TCLP test) is reduced by greater than 99% and leaching of PCBs is reduced by 80 to 99% (not a significant issue) following stabilization/solidification treatment. The FS provides a summary of the detailed analyses conducted to address potential implementability and permanence issues associated with stabilization/solidification. These analyses confirmed that the technology is effective, permanent, and implementable at the site. A potential implementability concern for Alternatives 4, 5, and 6 is designing the stabilized monolith to withstand freeze thaw conditions at the site. These concerns would be addressed during remedial design.

The greatest technical feasibility considerations are associated with soil washing (Alternative 7) and thermal desorption (Alternatives 5 and 8). These considerations are related to uncertainties in the ability to successfully operate the technologies and possible schedule delays resulting from technical problems and equipment unavailability.

8.6.2 Administrative Feasibility

Administrative feasibility considerations are expected to be low for Alternatives 3 (Capping), 4 (Containment with Treatment of Principal Threat Soil by Stabilization), and 6 (Stabilization/Solidification). Some concerns related to the long distance transport of contaminated material exist for Alternatives 5 (Stabilization/Solidification with Treatment of PCB Principal Threats by Thermal Desorption) 7 (Soil Washing), 8 (Thermal Desorption), 9 (Off-site Disposal), and 10 (Off-site Incineration). Additional implementability considerations for Alternatives 5, 7, and 8 are related to meeting process water disposal and air emissions (Alternatives 5 and 8 only) requirements.

8.6.3 Availability of Services and Materials

Availability of services and materials is not anticipated to be a problem for Alternatives 3, 4, 6, 9, and 10. Alternatives 3, 4, and 6 can be implemented using local materials and contractors. Treatment/disposal under Alternatives 9 and 10 would require services available only in the lower 48 states. Availability of services and materials is a concern for Alternatives 5, 7, and 8. Availability of services is particularly a concern for Alternatives 5 and 8 since only one contractor can currently supply the process option evaluated. It is unlikely that Alternatives 5, 7, and 8 can be completed using local contractors.

8.6.4 Assessment

The fewest considerations are associated with Alternatives 3 (Capping), 4 (Containment with Treatment of Principal Threat Soil by Stabilization), and 6 (Stabilization/Solidification). Alternative 6 was downgraded somewhat because of technical implementability considerations related to excavation near the groundwater table.

Alternative 5 (Stabilization/Solidification with Treatment of PCB Principal Threats by Thermal Desorption) is ranked next highest for implementability, but was downgraded significantly relative to Alternative 6 (Stabilization/Solidification) because of uncertainties of the ability to successfully operate the thermal desorption equipment, the potential for schedule delays due to equipment problems, the need to meet air emissions and process water disposal requirements, administrative considerations related to long-distance transport of wastes, and the potential for poor availability of services, and the difficulties in operating multiple treatment trains on a site with limited available space.

Alternative 7 (soil washing) is ranked with Alternative 5 due to implementability considerations summarized above, including wash water volume and corresponding treatment requirements, and potential operational difficulties due to input materials variability. Excavation near the water table, equipment reliability, and transport of residual waste over long distances are additional implementability considerations associated with this alternative.

Alternatives 9 (Off-site Landfill) and 10 (Off-site Incineration) are ranked below Alternative 5. The tradeoffs are that excavation near the groundwater table and transport of larger volumes of waste would be required under Alternatives 9 and 10, and this would more than balance the greater concerns with equipment availability and reliability and meeting air emissions and process water disposal requirements that are associated with Alternative 5.

Alternative 8 (Thermal Desorption) is ranked lowest for implementability. This alternative has numerous implementability considerations, including excavation near the water table, equipment availability and reliability, process water disposal and air emissions (Alternative 8) requirements, and transport of waste over long distances.

8.7 Cost

Costs for the ten alternatives range from a low of $0.3 million for Alternative 1 (No Action) to a high of $21.9 to $34.3 million for Alternative 10 (Off-site Incineration). The remaining eight alternatives rank as follows (from low to high):

- Alternative 2 (Limited Action)—$1.6 million
- Alternative 3 (Capping)—$3.1 million
- Alternative 4 (Containment with Treatment of Principal Threat Soils by Stabilization/Solidification)—$4.7 to $4.8 million
- Alternative 6 (Stabilization/Solidification)—$4.7 to $5.8 million
- Alternative 7 (Soil Washing)—$6.8 to $9.1 million.
- Alternative 5 (Stabilization/Solidification with Treatment of PCB Principal Threats by Thermal Desorption)—$7.6 to $9.1 million
- Alternative 9 (Off-site Landfilling)—$8.4 to $12.3 million
- Alternative 8 (Thermal Desorption)—$9.6 to $12.3 million

8.8 State Acceptance

The State of Alaska concurs with the selected remedy.

8.9 Community Acceptance

Comments received during the Public Review were both receptive and opposed to the preferred alternative. Comments opposed were mainly concerned with future releases of contaminants from the TSCA landfill. Some of these concerns will be addressed during remedial design of the landfill. More complete responses to the comments received are contained in the Responsiveness Summary attached to this Record of Decision.

9.0 THE SELECTED REMEDY

9.1 Remedy Description

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives using the nine criteria, and public comments, EPA has determined that Alternative 6 (Solidification/stabilization), with changes from the feasibility study described below, is the most appropriate remedy for the Standard Steel and Metals Salvage Yard Site in Anchorage, Alaska.

The key components of the selected remedy include:
(Refer to Table 9-1 for cleanup and treatment level summary)

- Removal of regulated material stockpiled on-site and investigation derived wastes with subsequent disposal in a RCRA Subtitle C or D landfill, or recycling of materials;
- Off-site disposal of remaining scrap debris by recycling or disposal in a RCRA Subtitle D landfill or, if the debris is a characteristic hazardous waste or contains greater than 50 mg/kg PCBs or 10ug/100cm^2 by standard wipe tests, treatment and disposal in a RCRA Subtitle C or TSCA landfill;
- Excavation and consolidation of all soils exceeding a 10 mg/kg PCBs or 1000mg/kg lead cleanup level;
- Treatment of all soils at or greater than 1000 mg/kg lead or 50 mg/kg PCB, or greater, by stabilization/solidification;
- On-site disposal of stabilized/solidified soils and excavated soils between 10 mg/kg and 50 mg/kg PCBs in a TSCA landfill;
- Excavation of soils impacted above 1mg/kg PCBs and 500 mg/kg lead from the flood plain and consolidation of these soils elsewhere on the site;
- Maintenance and repair of erosion control structure on bank of Ship Creek;
- Maintenance of solidified/stabilized soils and the landfill;
- Institutional controls to limit land uses of the site and, if appropriate, access;
- Monitoring of groundwater at the site to ensure the effectiveness of the remedial action.

Scrap Debris Disposal

Approximately 150 tons of debris generated during the scrap removal action remain stockpiled on-site. All scrap and debris, including that generated during soil pre-screening and located in the channel of Ship Creek, would be transported off-site and disposed at a permitted Subtitle C, D or TSCA landfill. Disposal will comply with all applicable rules and regulations. Scrap metal is to be recycled through a legally permitted scrap metal recycler. This recycling must include resmelting/melting of all scrap metal. (Scrap metal may be incorporated into the on-site TSCA landfill if it will not compromise the integrity of the landfill.)

Regulated Material Removal

Approximately 290 drums are currently stored on-site. The drums contain materials stored by EPA during the emergency removal actions, oil and fuel salvaged during the scrap removal actions, and decontamination wastes and personal protective equipment generated during the RI field work. Also remaining on-site are a shipping container with the former site incinerator, various batteries, and other wastes. Off-site disposal of some of these materials is regulated by RCRA, depending on the specific waste. Disposal options include off-site landfilling or off-site incineration. Final disposal actions will be decided during remedial design and will be based on cost, and availability of services. Disposal will comply with all applicable rules and regulations.

Excavation

All soils above 10 mg/kg PCBs and all soils above 1000 mg/kg lead will be excavated and placed in the on-site TSCA landfill. Soils within the flood plain will be excavated when it exceeds 1 mg/kg PCBs or 500 mg/kg lead and placed elsewhere on-site.

Contaminant levels will be determined prior to excavation by current data or additional sampling. Soils may not be stockpiled in a manner which would reduce the contaminant concentrations to below the treatment level of 50 mg/kg PCBs or 1000mg/kg lead, unless the stockpiled soils will be treated.

Soil above cleanup levels would be excavated, screened and pre-processed to remove materials not suitable for stabilization/solidification. Soil containing less than 1,000 mg/kg lead and less than 50 mg/kg PCBs but greater than 10 mg/kg PCB will be consolidated on-site in the TSCA landfill at a depth of greater than one foot below the surface, but above the zone of groundwater fluctuation. The change of the subsurface cleanup level contained in the feasibility study from 50 mg/kg to 10 mg/kg PCBs is appropriate to insure future site activities and flood events do not expose greater than 10 mg/kg PCBs contaminated soils. This change is more cost effective than requiring a TSCA cap over the entire site and associated monitoring and maintenance of the soils and cap. If soils with PCB concentrations between 10 mg/kg and 50 mg/kg are placed on the top of the landfill a cover which will prevent erosion, infiltration and contact with untreated soils will be required above those soils.

Grading/Backfilling/Cover

The zone of groundwater fluctuation would be backfilled with clean fill (less than 1 mg/kg PCBs). The site will be graded to prevent surface water runoff to Ship Creek (see Stormwater Management section). Excavated areas above the groundwater fluctuation zone will be backfilled with soils containing less than 10 mg/kg PCBs. The surface of the site will be graded with clean soils which will support a vegetative cover or paved to prevent erosion of surface soils. If no immediate reuse of the TSCA landfill occurs than it will be covered with a protective cap to (1) allow the landfill to function with minimal maintenance and (2) promote drainage, reduce freeze thaw effects and minimize erosion or abrasion of the treated soils. 40 CFR 264.310(a) is relevant and appropriate for this action.

Soil Pretreatment/Prescreening

All soil that needs to be treated (greater than or equal to 50 mg/kg PCBs and 1000 mg/kg lead) would go through a pretreatment step to screen out material which is oversized and may interfere with the treatment process. Potential material to be screened out includes wood, cardboard, wire, cobbles and scrap debris. As observed during the site investigations, the scrap debris include predominantly pieces of metal and wood. If remedial design determines that scrap will not interfere in the performance of the monolith than this material may be included in the monolith. Wood and other organic debris will be screened out and disposed of off-site pursuant to all rules and regulations (see above discussion on Scrap Debris Disposal)

Soils and debris will be kept wet during screening to minimize dust. The cobbles may be separated from the debris in an additional screening step. The cobbles could be used along fill material to backfill the excavations or be disposed of in the TSCA landfill.

Stabilization/Solidification Process

The excavated, pre-processed soil would be added to a pug mill where it would be mixed with the stabilizing additives. After pre-processing the total volume of soil to be treated would be approximately 7,700 to 12,600 cubic yards. A mixture of 16% cement and 8% fly ash, which was determined to be the most effective combination during the treatability study is anticipated as a likely mix ratio. However, additional design testing will be conducted to refine the mix ratio to minimize volume increases, reduce freeze thaw effects and maximize the solidified mass's long-term durability and potential as a building platform. The addition of pozzolans will be evaluated to reduce pH changes in the solidified soils and temperature increases during curing. The LNAPL will be included with the soil that is stabilized/solidified if it is determined that it will not interfere with curing and is not considered a liquid. If the LNAPL is considered a liquid or will interfere with the curing of the monolith then the LNAPL will be collected and transported off-site for incineration. Contaminated soils associated with the LNAPL will be stabilized if they do not interfere with the stabilization process.

An expanded treatability study shall be conducted as soon as practicable to further assess the stability and physical characteristics of the stabilization/solidification process and to demonstrate the predicted effectiveness of the stabilization/solidification process. The recommended tests shall include, but not be limited to: (1) PSA Mod. MCC-1 Static Leach Test (U.S. DOE-5820) or comparable test procedure; (2) TCLP analysis on the solidified material; (3) additional leaching test(s) on solidified samples subjected to test procedures to simulate long term weathering such as freeze-thaw, compression, etc.; and (4) evaluation of chemical/physical properties such as temperature and pH on the solidification process. A life expectancy of 1000 years will be a design goal. Life expectancy is defined as the time before contaminants are released above design criteria from the TSCA landfill.

If inadequate durability is obtained, additional engineering controls (for example, changing the agent: soil ratio, increasing the burial depth, or providing a low-permeability liner above and/or below the treated soil) would be implemented at the discretion of EPA. Based on treatability study results, a soil volume increase of about 15 to 30% is anticipated after stabilization.

A potentially important factor in evaluating stabilization/solidification is the effect of the presence of the solidified mass on future land use. The solidified soil would not be placed within the 100-year flood plain and would be placed at least one foot above the maximum groundwater table elevation. Clean soil (less than 1mg/kg PCBs) and other fill would be used to replace soil excavated from the groundwater table zone. In the event there is no planned future use of the landfill as a building foundation or parking area, a cover to protect the landfill will be placed to provide a wearing surface, prevent infiltration and minimize erosion. The cover will be maintained until reuse of the monolith occurs. The ground surface elevations will increase due to the volume increase from the treatment and the addition of the cover layer (see Grading/Backfilling/Cover section). The solidified mass will be configured to accommodate future site development to the greatest extent practicable.

There are potential short-term human health and environmental impacts associated with excavation and the solidification/stabilization process. One potential impact is dust, which could be inhaled by workers or members of the community or could migrate to surface water or adjacent properties. The steps that would be taken to minimize these impacts include use of dust suppressants and collection and analysis of air samples. A second potential impact is migration of COCs to ecological receptors via surface water runoff. These impacts would be controlled by covering impacted soils and using berms and diversion ditches. A final potential impact is physical injury to workers. These impacts would be controlled by instituting appropriate health and safety procedures. A third potential impact is the volatilization of PCBs during the solidification process. This potential will be evaluated during treatability testing and appropriate measures will be taken to prevent volatilization of PCBs or control the release of volatilized PCBs during treatment.

In order to evaluate the effectiveness of the stabilization/solidification process, the following physical and chemical tests of treated solidified soil shall be established as minimum performance standards. The minimum performance standards shall be demonstrated in the laboratory and in field testing during construction.

1. The Toxicity Characteristic Leaching Procedure (TCLP) test for PCBs shall be .5 ug/L or less. For lead the values shall be 5 mg/L or less. These values reflect the MCL for PCBs and the Maximum Concentration of Contaminants for the Toxicity Characteristic test, pursuant to 40 CFR 261.24, Table 1.

2. The 28-day unconfined compressive strength shall be greater than 50 psi (ASTM Method D2166 or equivalent). Depending upon the additive mix ratio this test may be inappropriate and another test will be utilized to determine unconfined compressive strength, with the approval of EPA.

3. The triaxial permeability shall be less than 1 x 10[-7] cm/sec (USACE Method 1110-2-1906 or equivalent).

4. PSA Mod. MCC-1 Static Leach Test (U.S. DOE-5820) This test will demonstrate that the treated soils do not leach lead above 15 ug/L. The goal is to not increase the leachability of lead under neutral water conditions.

If during design testing it is determined that the Performance Standards for unconfined compressive strength and triaxial permeability will reduce the permanence of the containment system these standards may be altered with the approval of EPA. Engineered controls shall be employed to compensate for the reduction of compressive strength and permeability.

Confirmation Sampling

All soils to be excavated, treated or disposed will include confirmation sampling to determine the amount of soil to be excavated and treated and to document that soils above cleanup levels are removed and treated if necessary. Confirmation testing would include analysis for both lead and PCBs. If the excavation testing indicates that the lead or PCB cleanup level is exceeded, additional material would be excavated vertically and horizontally until cleanup levels are met. Samples of the stabilized soil will be collected for future evaluation and testing.

Treatment Equipment and Staging Areas Preparation

A soil staging area would be set up on the site. The area, which would be on the order of 200 by 200 feet, would be lined by plastic sheeting. An area on the order of 100 feet by 200 feet, depending on the needs for the project, would be cleared near the soil staging area and compacted prior to construction of a bermed pad for equipment set up. Utility hook-ups would be established as appropriate for the equipment.

Consolidation of Soil from Flood Plain Within Upland Areas

Soils within the floodplain which contain lead or PCBs at concentrations at or greater than 500 mg/kg lead or at or greater then 1 mg/kg PCBs would be excavated and consolidated within the existing fence line outside of the 100 year floodplain. These lower action levels (compared to the 1,000 mg/kg lead and 10 mg/kg PCBs cleanup levels for non-flood plain soils) would be used to provide an additional margin of protection in ecologically-sensitive areas. Figure 2-3 shows the approximate extent of the 100-year flood plain (based on 1988 mapping). A small flood plain area beyond the southwest corner of the fence contains soil with greater than 1 mg/kg PCBs. A comparison of Figure 2-3 with Figures 1-6 and 1-8 indicates that no mapped wetlands contain soil with greater than 500 mg/kg lead or 1 mg/kg PCBs. The area disturbed by excavation would be restored to the original grade and revegetated with native species. The consolidation action would not include any excavation or disposal of hazardous waste or TSCA-regulated material.

Disposal of Treated Soils

Treated soil and soils at or above 10 mg/kg PCBs would be disposed into an on-site TSCA landfill. The location and dimensions of the landfill shall be determined during remedial design and must be outside the 100-year floodplain. The relevant TSCA regulations for design are provided in 40 CFR § 761.75(b), except the requirements waived pursuant to 40 CFR § 761.75(c)(4) below. Solidified soils with lead or PCB concentrations at or greater than 1,000 or 50 mg/kg, respectively, would not be replaced in the top foot or in the zone of groundwater fluctuation. Surface concentrations of the treated soils will be less than 10 mg/kg PCBs. Routine maintenance and inspection of the TSCA landfill shall be conducted during groundwater monitoring events and after any seismic or flood event. The landfill will be designed and located to maximize future use of the site, specifically to utilize the solidified soils as a building foundation or parking area. If use of the landfill as a foundation or parking lot does not occur a cover consisting of an impermeable liner, drainage layer, and erosion control layer will be provided. These layers will consist of a impermeable (less than 1xE-6 permeability) liner, a one foot boundary layer and one foot of growth media.

The following technical requirements specified in 40 CFR § 761.75(b) are waived: (1),(2),(3),(7), and (8). 40 CFR § 761.75(b)(9)(i) may be waived if conditions discussed below occur. The following evaluation justifies waiving these requirements:

- Soils. This standard specifies that the landfill be located in a thick, relatively impermeable soil or rock formation or a low-permeability in-place soil with a minimum thickness of 4 feet or on a compacted, low permeability liner with a minimum thickness of 3 feet. [40 CFR § 761.75(b)(1)]. The Selected Remedy includes encapsulation of the COCs. Through proper design, this encapsulation will be equivalent to the relatively impermeable soils, low permeability soils, and low permeability liner specified in the standard. The solidified mass will have an extremely low permeability such that leachate generation out of the disposal unit will be minimized. The treatability study completed for the site supports this determination. The hydraulic conductivities of solidified treatability study samples ranged from 8×10^{-8} to 7×10^{-7} cm/sec, similar to the hydraulic conductivity requirement provided in 40 CFR § 761.75(b)(1). Additionally, research and applicable experience at CERCLA sites provide further evidence that a properly designed stabilization/solidification remedy can adequately, through groundwater releases, protect against an unreasonable risk of injury to health or the environment by reducing leachate generation to extremely low levels.

- Synthetic Membrane Liners. This standard specifies that a synthetic membrane liner with a minimum thickness of 30 mils will be used when, in the judgment of the Regional Administrator, the hydrologic or geologic conditions at the landfill require such a liner to provide at least a permeability equivalent to the soils described above. [40 CFR § 761.75(b)(2)]. This requirement addresses a bottom liner under the waste. As noted above, the soil treatment design will be developed such that the stabilized/solidified soils provide a level of protection comparable to a low permeability liner, (e.g. a 30 mil synthetic bottom liner system as specified in the regulations). In general, a top liner would be needed at a disposal site to minimize infiltration into the waste if hydrologic or geologic conditions were such that precipitation could enter the waste at a rate greater than it could leave the waste. This would not be the case with the selected remedy because the treated soils would have an extremely low permeability as compared to the underlying and surrounding native soils. Following the path of least resistance, precipitation would instead tend to migrate around the solidified mass rather than through it. Therefore waiving this requirement will not present an unreasonable risk of injury to health or the environment.

- Hydrologic Conditions. In part, this standard specifies that the bottom of the landfill be at least 50 feet above the historical high water table. [40 CFR § 761.75(b)(3)]. The very minimal amount of leachate that could result from a properly designed and implemented solidification/stabilization remedy would not result in excessive risk to human health or the environment. This determination is supported by the groundwater sampling results, the treatability study, and the soil stabilization/solidification durability assessment. Waiving this requirement will not present an unreasonable risk of injury to health or the environment even though not located 50 feet above the high water table.

- Leachate Collection. This standard describes methods for collection and analysis of leachate produced by the landfill. [40 CFR § 761.75(b)(7)]. The amount of leachate produced from a properly designed and implemented solidification/stabilization remedy would be minimal because precipitation would travel around, rather than through, the treated soils. Additionally, as shown in the treatability study, the concentration of PCBs in the leachate is expected to be low (the average concentration of PCBs in 8 treatability study TCLP samples was 0.26 $\mu g/L$, as compared to the PCBs MCL of 0.5 $\mu g/L$). The combination of low volumes of leachate and low PCB concentrations within the leachate make it appropriate to waive this requirement because such a waiver will not present an unreasonable risk of injury to human health or the environment.

- Chemical Waste Landfill Operations. Operation requirements contained in 40 CFR § 761.75(b)(8) are not applicable to the TSCA landfill on this site because no liquid or other types of wastes other than the solidified soils and low concentration PCB soils will be placed in it before final closure.

- Fence, Wall or Similar Device. The requirement, contained in 40 CFR § 761.75(b)(9)(i), to place a fence, wall or similar device around the landfill will not be waived unless the solidified soil mass is designed and used as a building foundation or it is paved over for a parking lot. A waiver of fence or other access barrier is appropriate under these two scenarios because access to unauthorized persons and animals would be effectively prohibited by the building or pavement.

Based on the evidence presented in the remedial investigation and feasibility study and other information contained in the administrative record for this Record of Decision, it has been determined that waiving these requirements will not result in an unreasonable risk of injury to health or the environment from PCBs.

Waste Shipment

Shipment of wastes would be conducted as part of debris, and potentially LNAPL disposal. This debris and wastes will be shipped pursuant to Department of Transportation rules and regulations regarding transport of hazardous waste, if applicable. All off-site facilities will be in compliance with the off-site Disposal Rule (40 CFR 300.440)

Repair of Erosion Control Wall Along Ship Creek

The erosion control wall constructed during the Removal Action along Ship Creek will be repaired and, where needed, reconstructed. Repair and maintenance of this structure is needed to meet the goals of the Floodplain and Protection of Wetlands Executive Orders, as well as, to ensure protection of the TSCA landfill once constructed. Repair and, where necessary, reconstruction of the erosion control wall must comply with the substantive requirements of Section 404(b)(1) of the Clean Water Act and its implementing regulations.

Flood Evaluation

As part of Remedial Design a study will be conducted to evaluate the 100 year and 500 year flood potential for Ship Creek and potential impacts on the site. This study will produce an updated flood map depicting the 100 year flood plain and 500 year flood plain for the site. The results of the study will be used to design appropriate controls to prevent damage to the landfill from flooding.

Institutional Controls

In addition to the remedial actions used to treat COCs, institutional controls would be used to prevent unacceptable exposure to contamination remaining at source areas at concentrations above acceptable levels. Institutional controls for soil left on-site that contains greater than 1 mg/kg PCBs were selected following EPA guidance for long-term management controls of CERCLA PCB sites. Specific controls will include restrictions limiting future land use, preventing groundwater use, and limiting site access. EPA guidance suggests selecting institutional controls for solidified PCBs based on mobility (TCLP) testing and exposure potential.

Deed Notice and Land Use Restrictions

A deed notice will be recorded on the title records for the site, if possible, and will notify any subsequent purchaser and/or successor in interest that the property is subject to a CERCLA Record of Decision. The selected cleanup levels for the COCs are based on a future industrial land use scenario. Consequently, land use restrictions must be implemented at the site to assure that no residential land uses, or commercial uses with potential chronic exposures of children (i.e., day care center) are allowed. To assure long-term protectiveness, the land use restrictions shall run with the land, bind all successors in interest, and be recorded in the property records. The objectives of the land use restrictions are:

- Ensure that site use continues to be industrial or commercial and prevent use of the site for commercial developments that involve potential chronic exposures of children to soil (e.g., use of the site for a day care center);

- Restrict activities at the site that could potentially impair the integrity of the TSCA landfill; and
- Prevent movement of soil containing greater than 1,000 mg/kg lead or 10 mg/kg PCBs to the surface or within the top foot of soil where chronic long-term worker exposures could occur.

Groundwater Use Restrictions

Groundwater use restrictions are necessary to prevent the installation of groundwater supply wells at the site. The property interest implemented to assure acceptable future land use shall include provisions for restricting use of groundwater underlying the site for any purpose.

In addition, to the recorded restrictions all available regulatory controls shall be undertaken by providing written notification of restrictions and site conditions to local, regional, and state agencies, departments, and utilities. The property owner(s) will be responsible for providing these restrictions.

Access Restrictions

Access to all areas impacted by soil contamination shall be limited during the construction of the remedial action. Access to the landfill should be prohibited to the general public and limited to long or short-term workers in compliance with 40 CFR § 761.75(b)(9)(i), which requires a six foot woven mesh fence, wall, or similar device. However, if the solidified soil mass is designed and used as a building foundation or parking lot, this requirement may be waived. Long term public access will be limited to those areas of the site where surface contamination of greater than 1 mg/kg PCBs remains after all excavation, treatment, and disposal is complete. Public access will be limited by installing and maintaining a six foot fence, or similiar structure.

Groundwater Monitoring

Ground water monitoring for PCBs and metals shall be conducted twice a year for the first two years of operation and may be reduced to annually thereafter with approval of EPA in consultation with Alaska Department of Environmental Conservation for a minimum of ten years. After ten years an assessment of the groundwater data will be conducted to determine whether groundwater monitoring is still required or whether the frequency will be altered.

Groundwater monitoring would be conducted to assess the effectiveness of the remedy for protecting groundwater. The groundwater standards that are to be achieved are the MCL and action level for PCBs and lead, 0.5 ug/L and 15 ug/L respectively.

Monitoring of groundwater down gradient of the landfill for PCBs (EPA method 8080), lead (EPA method 6000/7000), pH, specific conductance, and chlorinated organics (40 CFR § 761.75(b)(6)((iii)), or methods with equivalent detection limits and accuracy will be conducted to ensure the landfill is not contributing contamination to groundwater, nor altering groundwater conditions.

Stormwater Management

The site will be graded to prevent surface water discharges to Ship Creek. Site storm water structures will be designed to meet the requirements of 40 CFR § 761.75(b)(4)(ii), and constructed to prevent contaminated discharges of storm water to Ship Creek and prevent the transport of contaminated sediments off-site, including to Ship Creek.

Operation and Maintenance

The remedy will be operated and maintained for as long as the stabilized soils (landfill) remains on-site. Operation and maintenance of the remedy will include:

- Maintenance of the landfill to ensure that it retains its structural integrity and prevents release of PCBs and lead through any of the following mechanisms: erosion (including flood and seismic events), leaching, excavation;
- Maintenance of the rip rap erosion control wall along Ship Creek. The erosion control wall will be inspected once a year for the first five years and after flood and seismic events and extreme precipitation events defined as 24-hour, 25-year storms;
- Maintenance of a six foot (minimum) woven mesh fence, wall or similar device or other means to prevent unauthorized access to the site, if deemed necessary after remedial design.

10.0 STATUTORY DETERMINATIONS

The selected remedy satisfies the statutory requirements of Section 121 of CERCLA. The following sections discuss how the selected remedy meets these requirements.

10.1 Protective of Human Health and the Environment

The selected remedy is protective of human health and the environment. The existing exposure pathways will be eliminated by preventing inhalation, dermal contact, and ingestion of the COC's through treatment and containment. Site risks will be reduced to within the 1E-4 to 1E-6 risk range for carcinogens and the Hazard Indices will be less than 1.0 for non-carcinogens in an industrial land-use scenario. No unacceptable short-term risks or cross media impacts will be caused by implementation of the remedy. The selected remedy is the best alternative for the site because it is cost effective, reliable, and allows future use of the site.

10.2 Applicable or Relevant and Appropriate Requirements

The selected remedy will comply with all ARARs and, based on the administrative record, justifies waiving certain TSCA landfill requirements as discussed in Section 9.1 above. The chemical-specific, action-specific, and location-specific applicable or relevant and appropriate requirements (ARARs) that will be attained are:

Clean Water Act, 33 U.S.C. § 1313 and 40 CFR § 131.36(d)(12) are applicable for preventing future releases to Ship Creek, establishes and implements the National Toxics Rule, and sets water quality standards for Alaska.

40 CFR § 141, Subpart B and F, the Safe Drinking Water Act Maximum Contaminant Levels are applicable and Maximum Contaminant Level Goals are relevant and appropriate, establishes cleanup standards for metals and organic compounds, including PCBs, in ground water.

Toxic Substances Control Act, 15 U.S.C. § 2601 et seq., and 40 CFR §§ 761.60 and 761.75(b), (except the waived requirements as described in section 9.0), is applicable for the on-site disposal of PCBs.

Clean Water Act, 33 U.S.C. § 1311, 40 CFR § 122.26 is applicable, direct discharges must meet technology-based standards, and storm water regulations for controlling discharges associated with industrial or construction activities.

Clean Water Act, 33 U.S.C. § 1314(b)(1) and 40 CFR Part 230, substantive requirements for dredge and fill requirements in waters of the United States is applicable for repairing the erosion control wall.

40 CFR § 261.24. RCRA Characteristic Hazardous Waste Determination is applicable for identifying soil and debris that must be managed as hazardous waste (i.e. lead).

40 CFR 264, Subpart C, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; Preparedness and Prevention is applicable for staging and conducting the remedial action.

40 CFR 264.310(a) RCRA Subtitle C Landfill regulation is relevant and appropriate for the cover design of the landfill, if appropriate.

40 CFR 268, RCRA Subparts C and D, Prohibitions on Land Disposal and Treatment Standards are applicable to the disposal of Characteristic and California List wastes, including contaminated debris.

Alaska Air Quality Regulations 18 AAC Chapter 50 for dust suppression and PCB emissions is applicable.

Executive Order 11988, 40 CFR 6, App. A, is applicable for action within floodplains, and to avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values.

Executive Order 11990 Protection of Wetlands is applicable for activities in wetlands or which could impact wetlands.

Off Site Disposal Rule 40 CFR 300.440 is applicable for disposing of contaminated materials off site.

To-Be-Considered (TBC) Guidances and Policies:

40 CFR Part 761, Subpart G, TSCA PCB Spill Cleanup Policy.

Guidance on Remedial Actions at Superfund Sites with PCB Contamination, OSWER Directive 9355.4-01.

10.3 Cost Effectiveness

The selected remedy affords overall effectiveness proportional to their costs. The selected remedy provides the best long-term permanence and risk reduction by treating the mobility of the COCs and preventing exposure via containment.

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

EPA has determined, by utilizing the nine criteria of CERCLA, that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be used cost-effectively at the Standard Steel and Metals Salvage Yard Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the selected remedy provides the best balance in terms of long-term effectiveness and permanence; reduction in toxicity, mobility or volume achieved through treatment; short-term effectiveness; implementability; cost; and the statutory preference for treatment as a principle element and considering state and community acceptance.

The selected remedy will provide for permanent containment of the contaminants of concern. Greater protection could have been achieved by transporting the wastes off-site. However, because Alaska does not have chemical or hazardous waste treatment or disposal facilities, this option was deemed less implementable, too costly, and along with increased short-term risks, would not have reduced the risks substantially more than on-site treatment and containment.

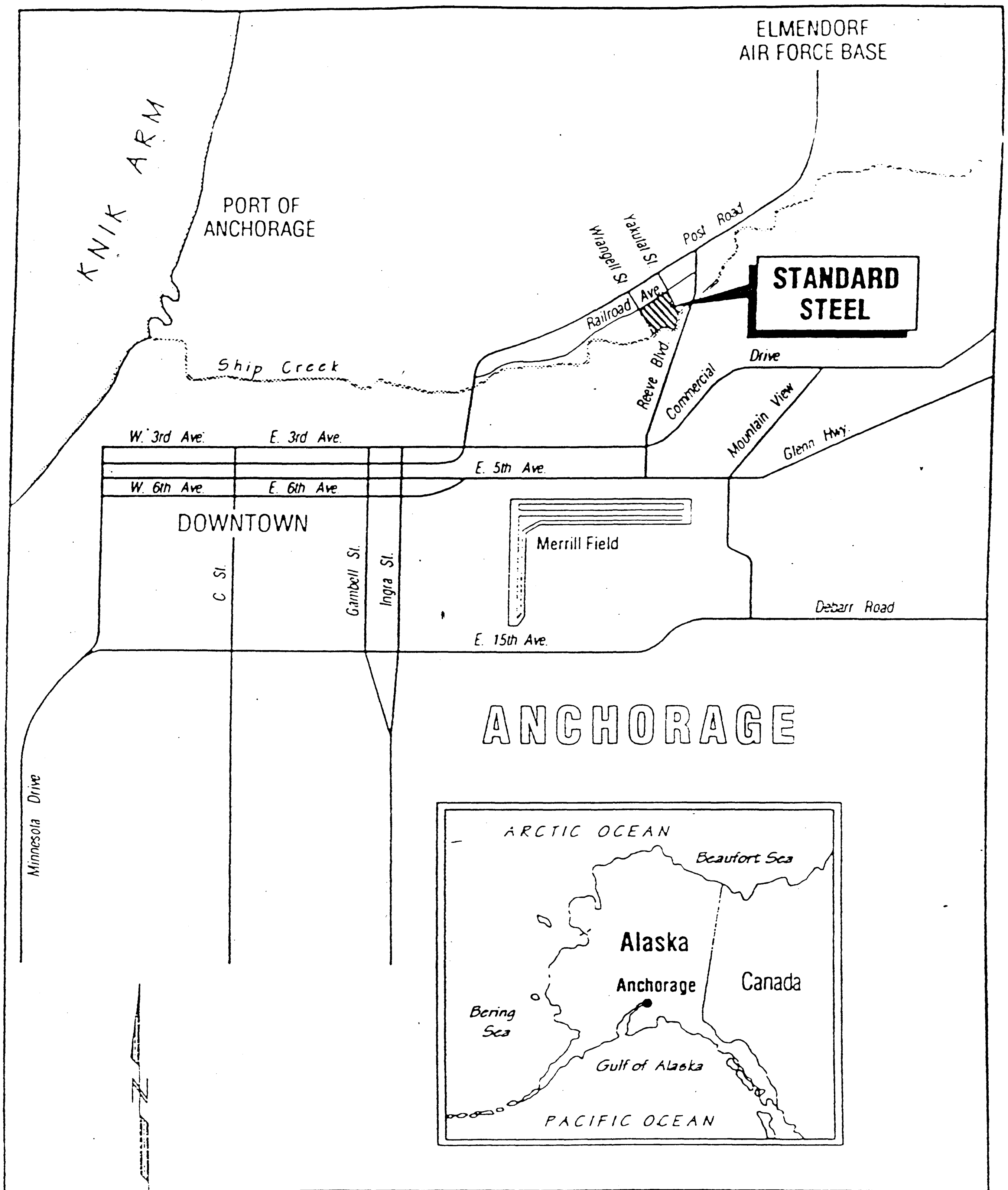
10.5 Preference for Treatment as a Principle Element

The preference for treatment is satisfied by the selected remedy because EPA's removal action treated the principle threats and additional treatment is being implemented. The treatment will immobilize lead and PCBs in soil as well as eliminate lead contaminated soils as a Characteristic Waste, pursuant to RCRA.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

No significant changes to the proposed remedy, as presented to the public in the Proposed Plan have occurred. EPA altered Alternative 6, as presented in the feasibility study, in proposing its preferred alternative to the public. EPA determined that the subsurface cleanup standard should be 10 mg/kg for PCBs instead of 50 mg/kg. This alteration was deemed necessary to ensure future releases of hazardous substances from the site would not occur. The change is not anticipated to result in a significant change in estimated costs for the remedial action.

Additionally, the feasibility study and the Proposed Plan incorporated the Removal Action as a common element of the analysis of alternatives. The Removal Action included the construction of an erosion control wall along Ship Creek. In describing the selected remedy, EPA has more specifically included a requirement that the erosion control wall be repaired and maintained.

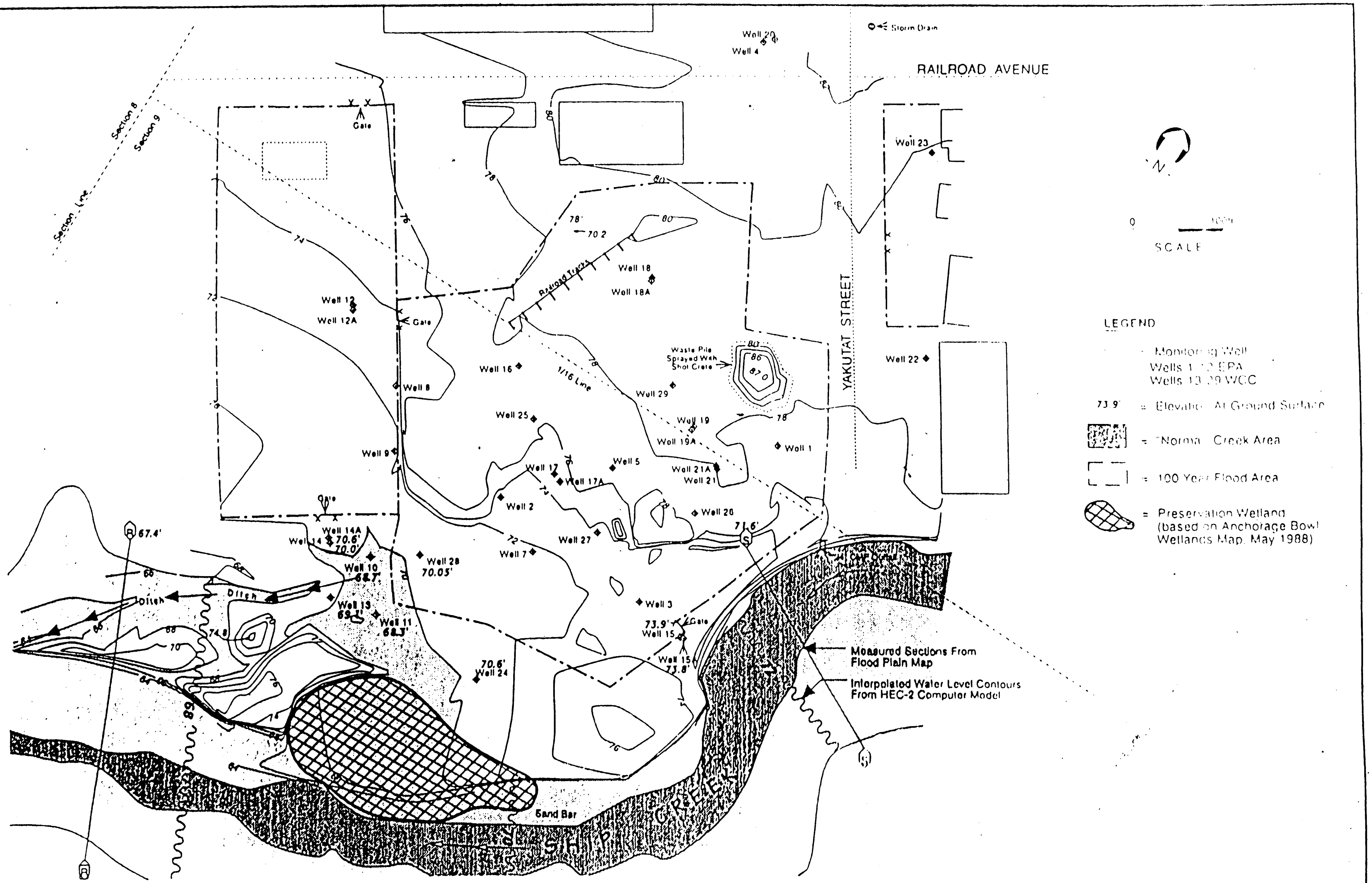


SITE LOCATION MAP

STANDARD STEEL & METALS SITE

Woodward-Clyde Consultants

Figure 1-1

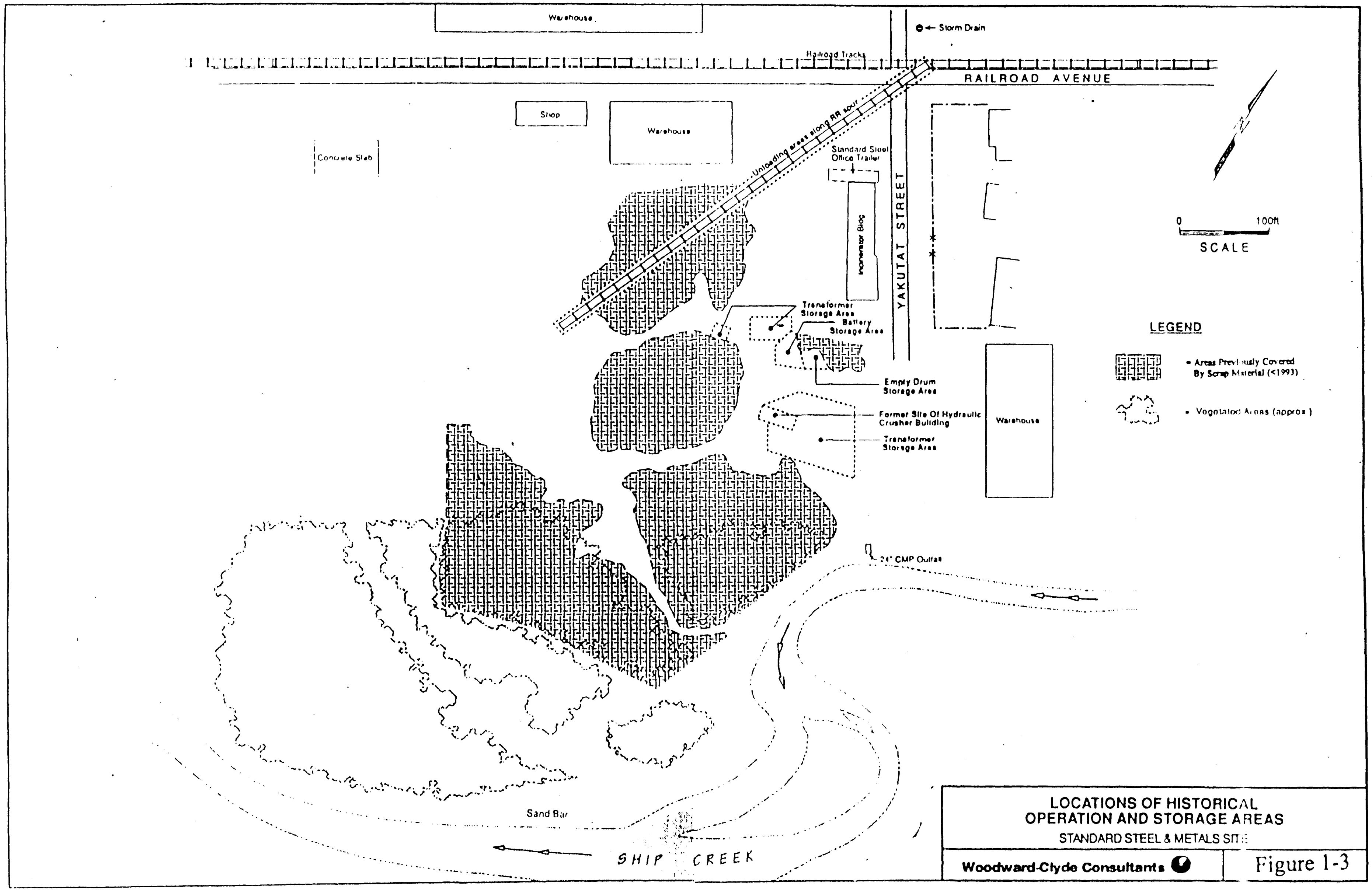


FLOOD PLAIN AND WETLANDS MAP

STANDARD STEEL & METALS SITE

Woodward-Clyde Consultants

Figure 1-2

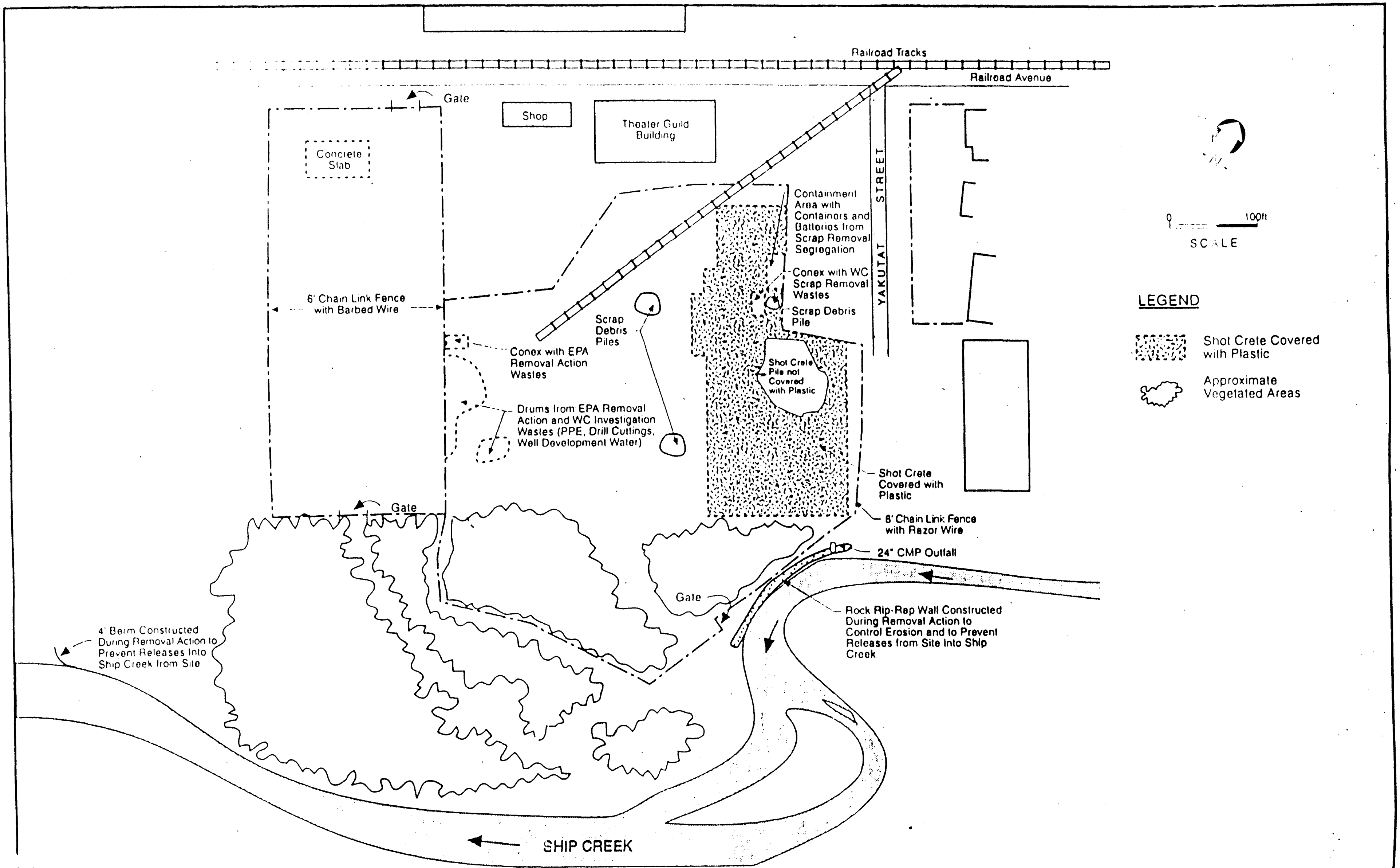


LOCATIONS OF HISTORICAL OPERATION AND STORAGE AREAS

STANDARD STEEL & METALS SITE

Woodward-Clyde Consultants

Figure 1-3



CURRENT SITE STATUS (POST-SCRAP REMOVAL)

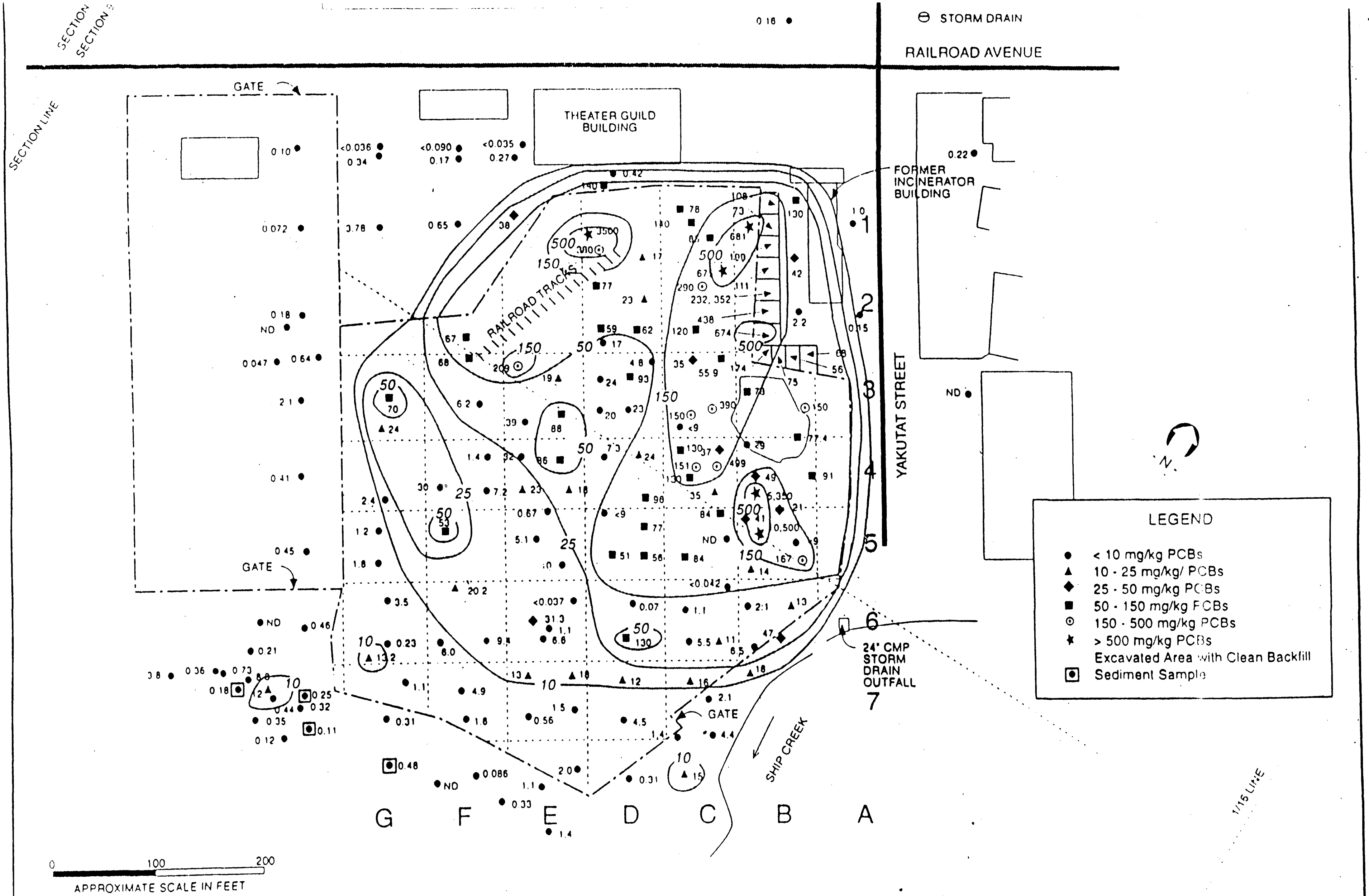
STANDARD STEEL & METALS SITE

Woodward-Clyde Consultants

Figure 1-4

Table 5-1
SUMMARY OF MEDIA AND CHEMICALS OF CONCERN

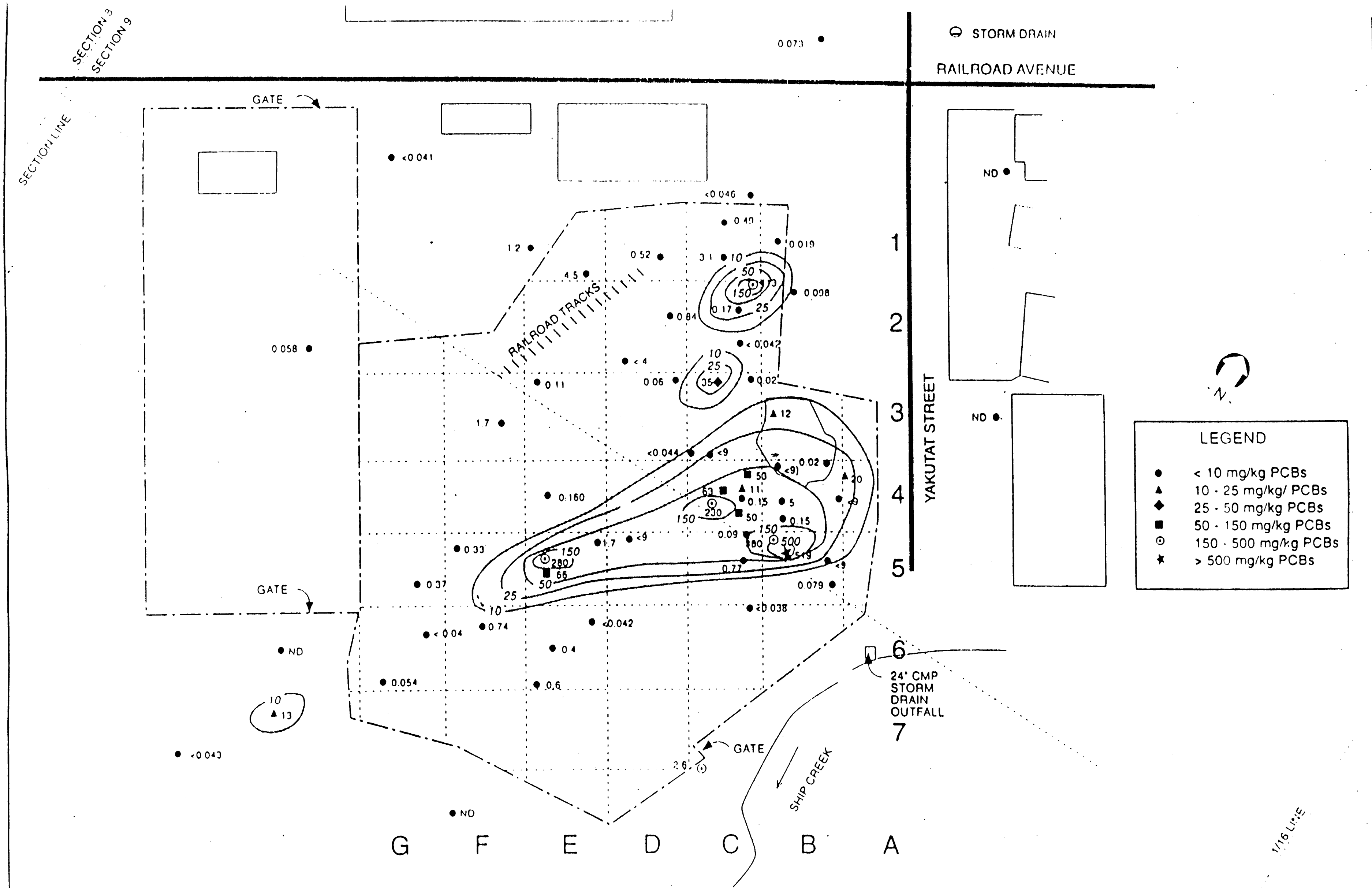
Media of Concern	Chemicals of Concern
Surface and Subsurface Soil	PCBs Lead Dioxins and Furans (co-located with PCBs)



CONCENTRATION OF PCBs IN SURFACE SOIL
STANDARD STEEL & METALS SITE

Woodward-Clyde Consultants

Figure 5-1



0 100 200

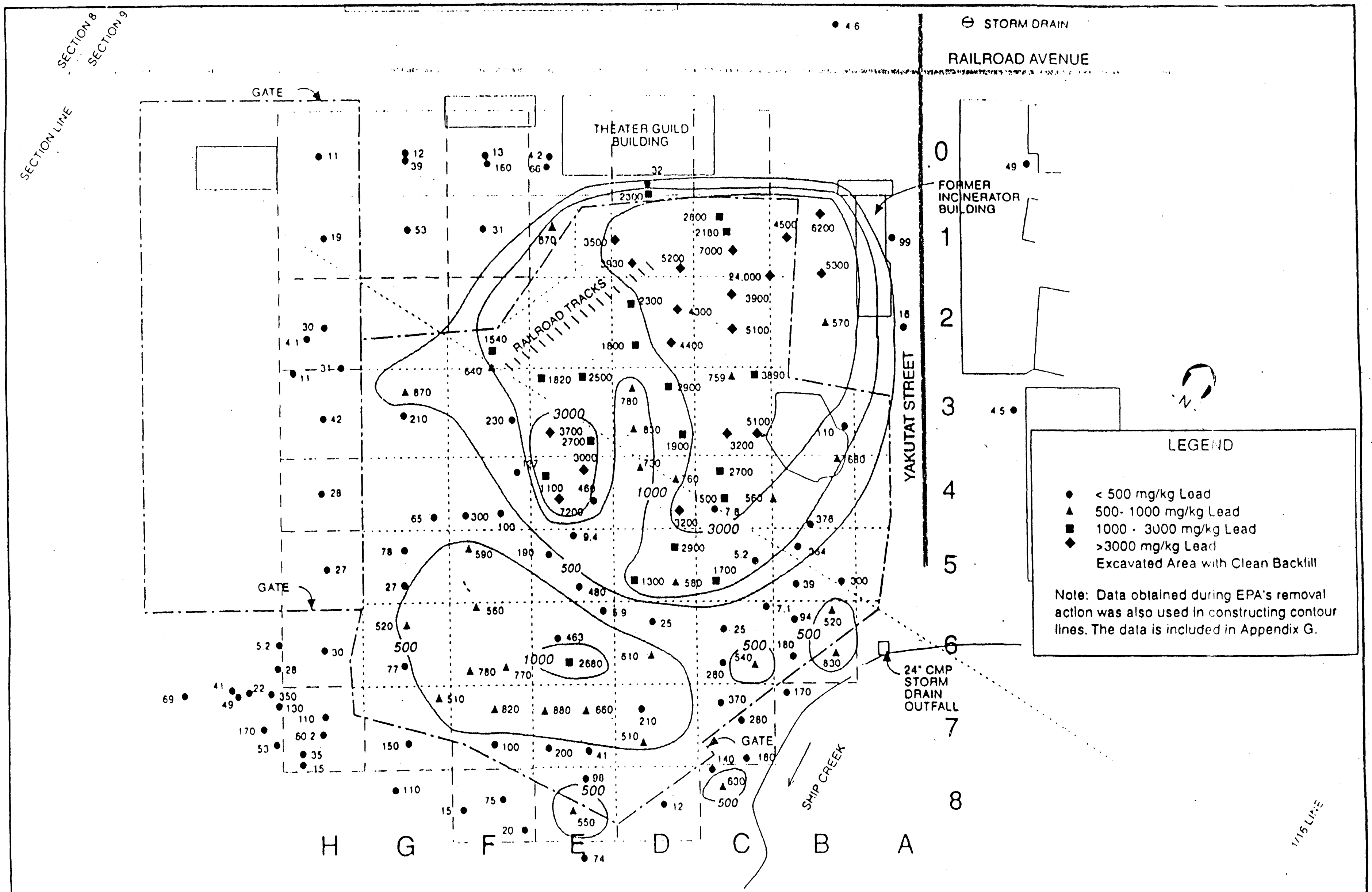
APPROXIMATE SCALE IN FEET

CONCENTRATION OF PCBs IN SOIL WITHIN THE WATER TABLE ZONE

STANDARD STEEL & METALS SITE

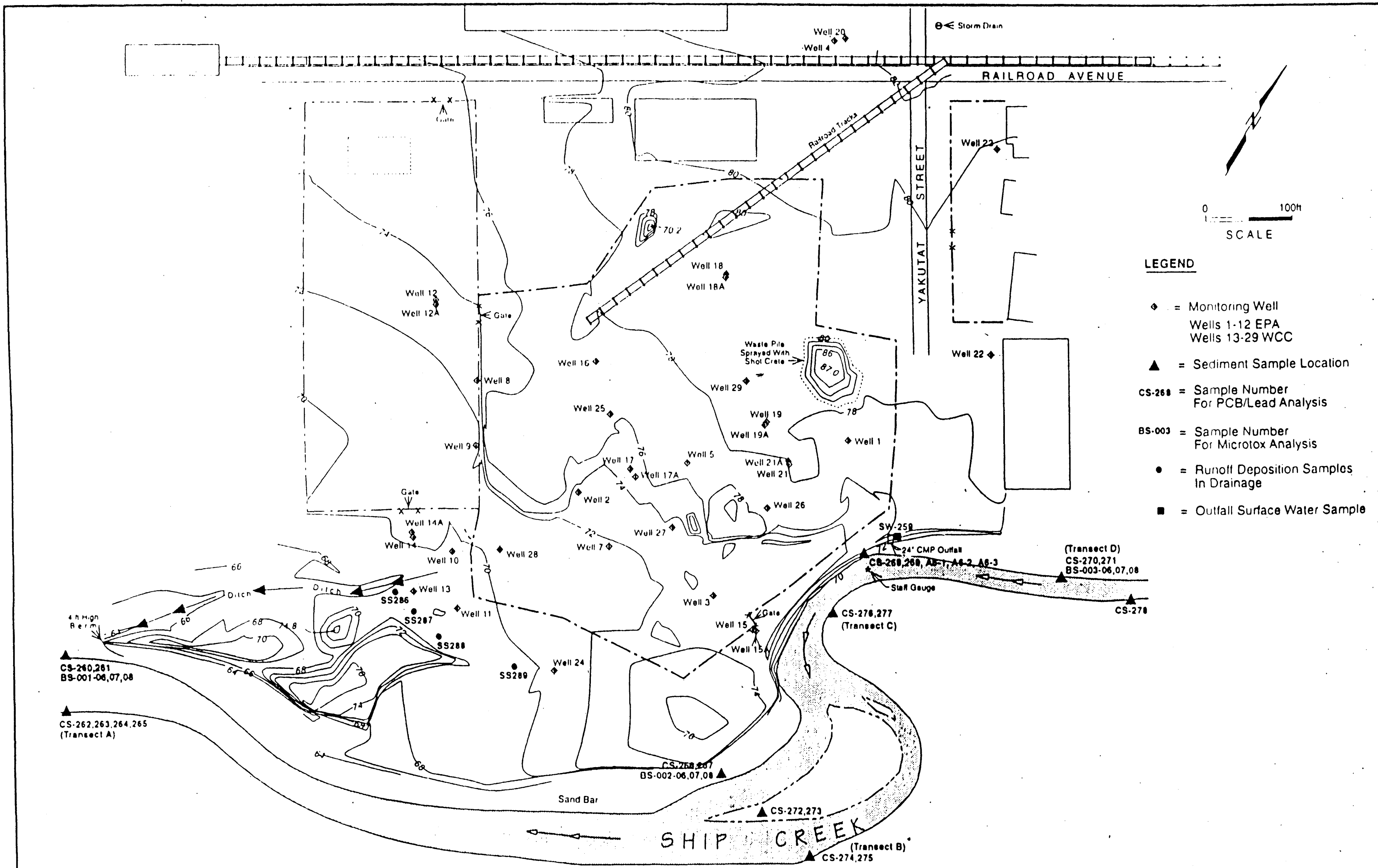
Woodward-Clyde Consultants

Figure 5-2



CONCENTRATION OF LEAD IN SURFACE SOIL
STANDARD STEEL & METALS SITE

Woodward-Clyde Consultants | Figure 5-3



MONITORING WELL AND SHIP CREEK SEDIMENT SAMPLING LOCATIONS

STANDARD STEEL & METALS SITE

Woodward-Clyde Consultants

Figure 5-4

Table 6-1
RESIDENTIAL RISK BASED CONCENTRATIONS, BACKGROUND CONCENTRATIONS, AND MAXIMUM CONCENTRATIONS OF PCOC'S IN SOILS AND GROUNDWATER

Chemical	Risk Based Concentration mg/kg in soil & mg/L in groundwater	Background Concentration[1] mg/kg in soil & mg/L in groundwater	Maximum Concentration[2] mg/kg in soil & mg/L in groundwater	Maximum Concentration (EPA Removal Action)[3] mg/kg in soil & mg/L in groundwater
SOIL				
PCBs	0.008	NA	380	10,600
Chrysene	0.009	NA	7.8	NA
Benzo(b)fluoranthene	0.009	NA	4.9	NA
Benzo(k)fluoranthene	0.009	NA	1.6	NA
Benzo(a)pyrene	0.009	NA	3.8	NA
Indeno(1,2,3-c,d)pyrene	0.009	NA	2.5	NA
Dibenzo(a,h)anthracene	0.009	NA	0.68	NA
2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)	0.0000004	NA	0.00172	NA
Cadmium	10	1.13	11.60	128
Chromium	136.7	19.80	151	1,570
Copper	1000	14.85	3,320	7,700
Lead	500	6.89	7,200	44,500
GROUNDWATER				
Tetrachloroethylene	0.002	NA	0.0075	0.043
1,2,4-Trichlorobenzene	0.002	NA	0.024	0.39
Arsenic	0.00005	0.010	0.0159	ND
Cadmium	0.02	0.0001	0.0291	ND
PCBs	0.00001	NA	0.000032	2.025
Lead	NA	0.047	0.0031 J	0.00076

(1) Background concentrations in soil from Standard Steel Human Health Risk Assessment Report. Background concentrations in groundwater from Elmendorf AFB OU-5 Report.

(2) For maximum concentrations in groundwater, Phases 1 and 2 (unfiltered and filtered samples) data are used for tetrachloroethylene and 1,2,4-trichlorobenzene. Phases 2 (unfiltered and filtered samples) and 3 data are used for maximum groundwater concentrations of metals and PCBs.

(3) Maximum detection during EPA removal action investigations.

NA = Not available

ND = Not detected

Table 6-2
PARAMETERS USED TO CALUCULATE RISK-BASED SCREENING CONCENTRATIONS

Media	Scenario/ Receptor	Exposure Route	Target Cancer Risk Level	Target Hazard Index	Parameter/Reasonable Maximum Exposure Values				
					Ingestion Rate	Exposure Frequency (days/year)	Exposure Duration (years)	Body Weight (kg)	Averaging Time (days)
Soil	Residential/ Adult	Ingestion	1.00E-07	0.1	100 mg/day	350	24	70	25,550 (Carcinogen) 10,950 (Noncarcinogen)
	Residential/ Child	Ingestion	1.00E-07	0.1	200 mg/day	350	6	15	25,550 (Carcinogen) 10,950 (Noncarcinogen)
Groundwater	Residential/ Adult	Ingestion	1.00E-06	0.1	2 L/day	350	30	70	25,550 (Carcinogen) 10,950 (Noncarcinogen)

Table 6-3

SUMMARIES OF RME HAZARD INDICES

Exposure Pathway	Short-Term Worker			Long-Term Worker			Resident		
	AOC 1	AOC 2	AOC 3	AOC 1	AOC 2	AOC 3	AOC 1[a]	AOC 2[b]	AOC 3
Soil Ingestion	1.8	1	0.3	1.4	0.1	0.3	10.6	1	2
Soil Dermal Contact	1.3	0.8	0.2	3.9	0.5	0.7	8.5	1.1	1.6
Particulate Inhalation	2E-5	4E-6	4E-6	NA	NA	NA	NA	NA	NA
Groundwater Ingestion	NA	NA	NA	NA	NA	NA	0.6	1.6	NA
Groundwater Dermal Contact	NA	NA	NA	NA	NA	NA	0.03	0.1	NA
Inhalation of Volatile Organic Compounds During Showering	NA	NA	NA	NA	NA	NA	0.01	NA	NA
Total Hazard Indices	3.1	1.8	0.5	5.3	0.6	1	19.7	3.8	3.6

NA Not applicable

[a] Includes hazard indices attributed to MW-21 groundwater exposure pathways

[b] Includes hazard indices attributed to MW-13 groundwater exposure pathways

Table 6-4

SUMMARIES OF RME EXCESS CANCER RISKS

Exposure Pathway	Short-Term Worker			Long-Term Worker			Resident		
	AOC 1	AOC 2	AOC 3	AOC 1	AOC 2	AOC 3	AOC 1[a]	AOC 2	AOC 3
Soil Ingestion	2E-5	9E-6	3E-6	3E-4	4E-5	5E-5	3E-3	3E-4	5E-4
Soil Dermal Contact	1E-5	6E-6	2E-6	8E-4	1E-4	1E-4	2E-3	3E-4	4E-4
Particulate Inhalation	1E-10	1E-10	4E-12	9E-8	7E-8	NA	1E-7	1E-7	NA
Groundwater Ingestion	NA	NA	NA	NA	NA	NA	1E-4[b]	NA	NA
Groundwater Dermal Contact	NA	NA	NA	NA	NA	NA	5E-6	NA	NA
Inhalation of Volatile Organic Compounds During Showering	NA	NA	NA	NA	NA	NA	7E-8	NA	NA
Total Excess Cancer Risk	**3E-5**	**1E-5**	**5E-6**	**1E-3**	**1E-4**	**1E-4**	**5E-3**	**6E-4**	**9E-4**

NA Not applicable

a Includes risks attributed to MW-21 groundwater exposure pathways

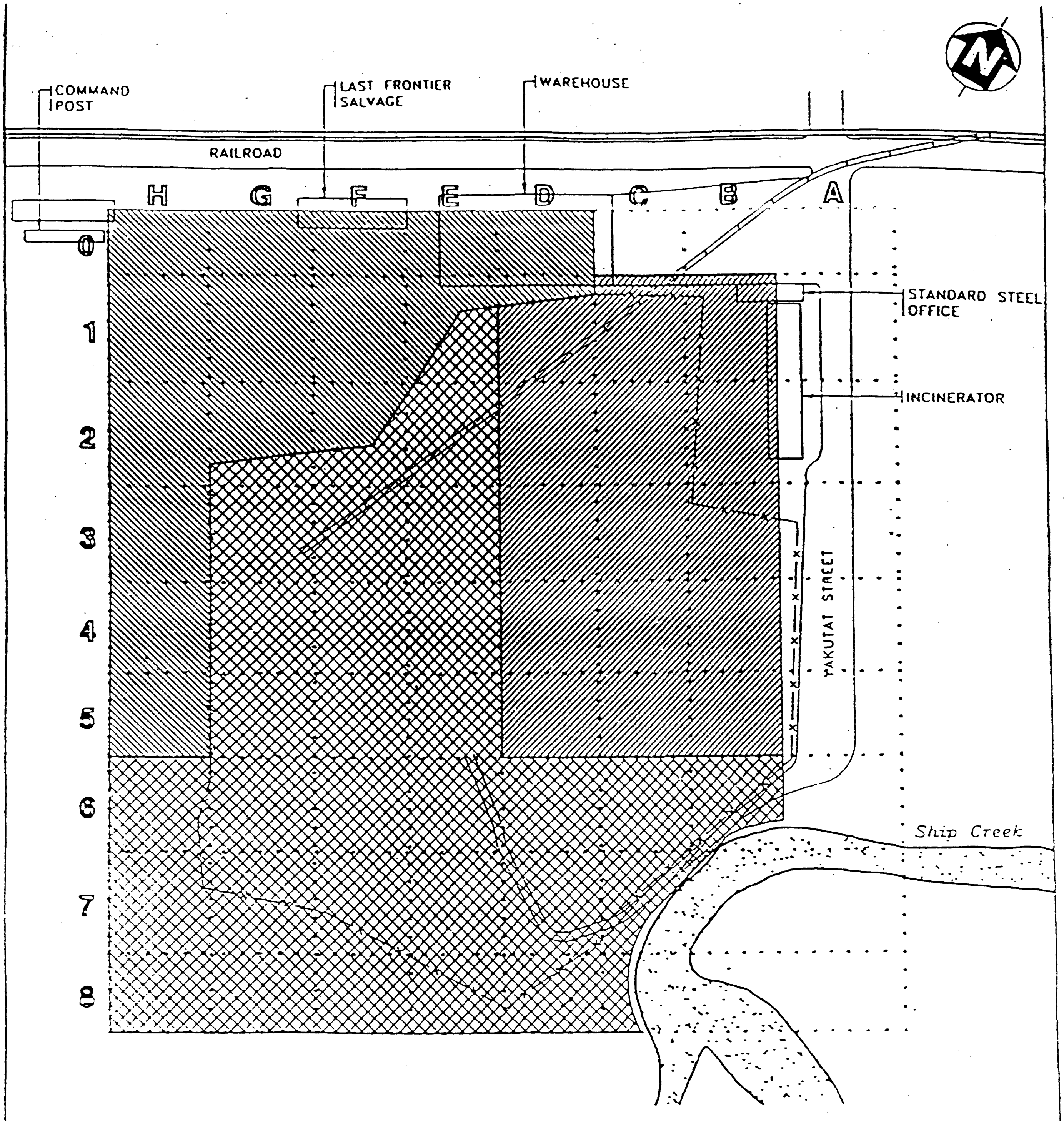
b Preliminary groundwater data for October 1993 reports PCB detections in MW-18 and MW-19 in the 3E-5 cancer risk range

Table 6-5

SUMMARY OF ESTIMATED EXCESS CANCER RISKS ASSOCIATED WITH 10mg/kg PCB CLEANUP LEVEL

Compound	PCBs	Dioxins and Furans	Total cPAHs	Cumulative
Concentration, mg/kg	10	0.00012[1]	0.25	--
Estimated RME risk: Long-term worker—combined dermal contact with ingestion[2]	3.0E-05	6.4E-06	5.8E-08[3]	3.6E-05

Notes:
(1) Expressed as 2,3,7,8-TCDD equivalent
(2) The procedure used to calculate risk is described in Appendix A
(3) Risk for cPAHs is ingestion only; EPA has not recommended absorption factors for dermal uptake of PAHs and states that further research is required on the bioavailability of PAHs in soil



LEGEND

SITE FENCE

GRID (80×80 FEET)

AREA OF CONCERN 1

AREA OF CONCERN 2

AREA OF CONCERN 3

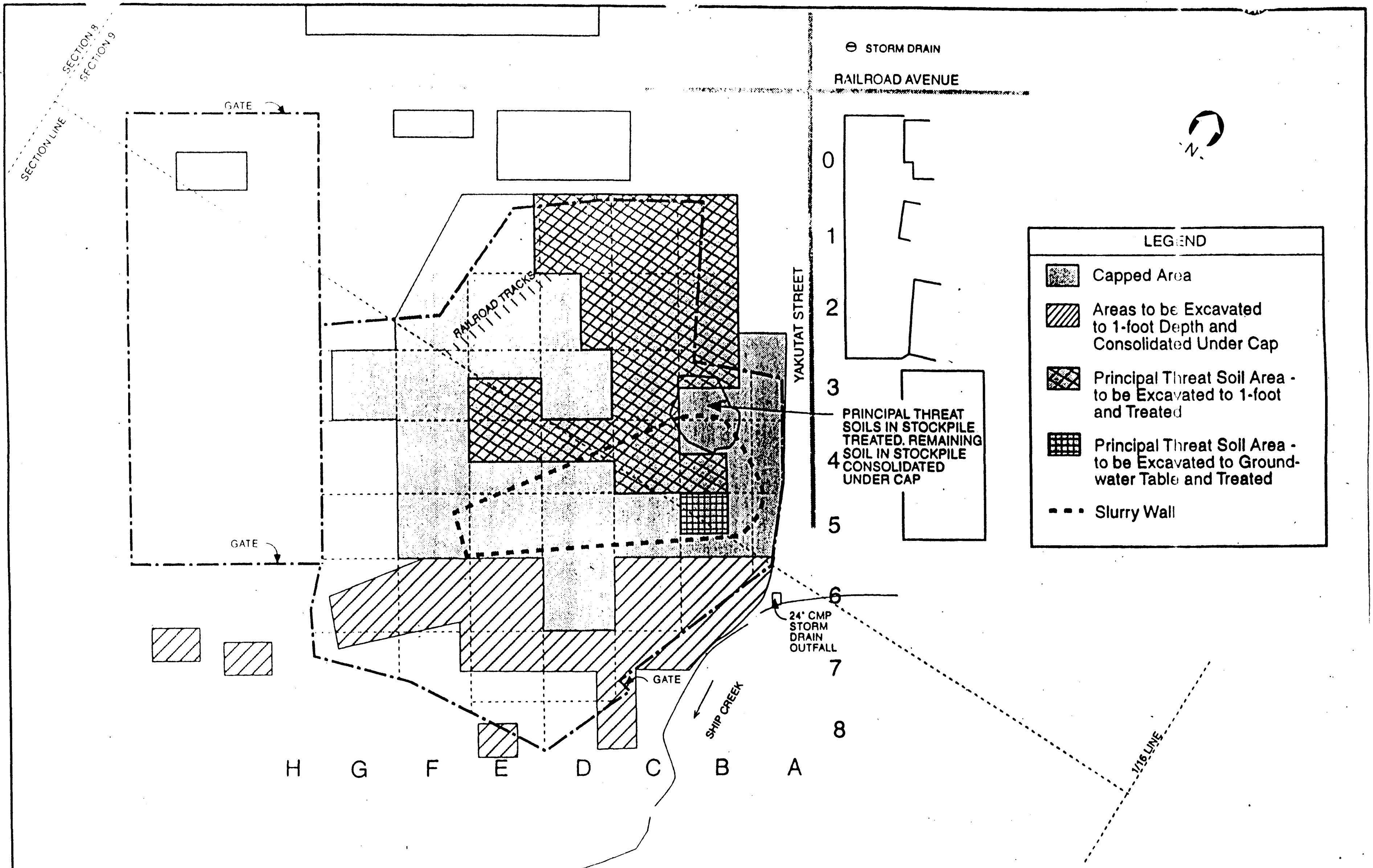
60 0 60 120

APPROXIMATE SCALE 1" = 120'

Figure 6-1

AREAS OF CONCERN
STANDARD STEEL RISK ASSESSMENT

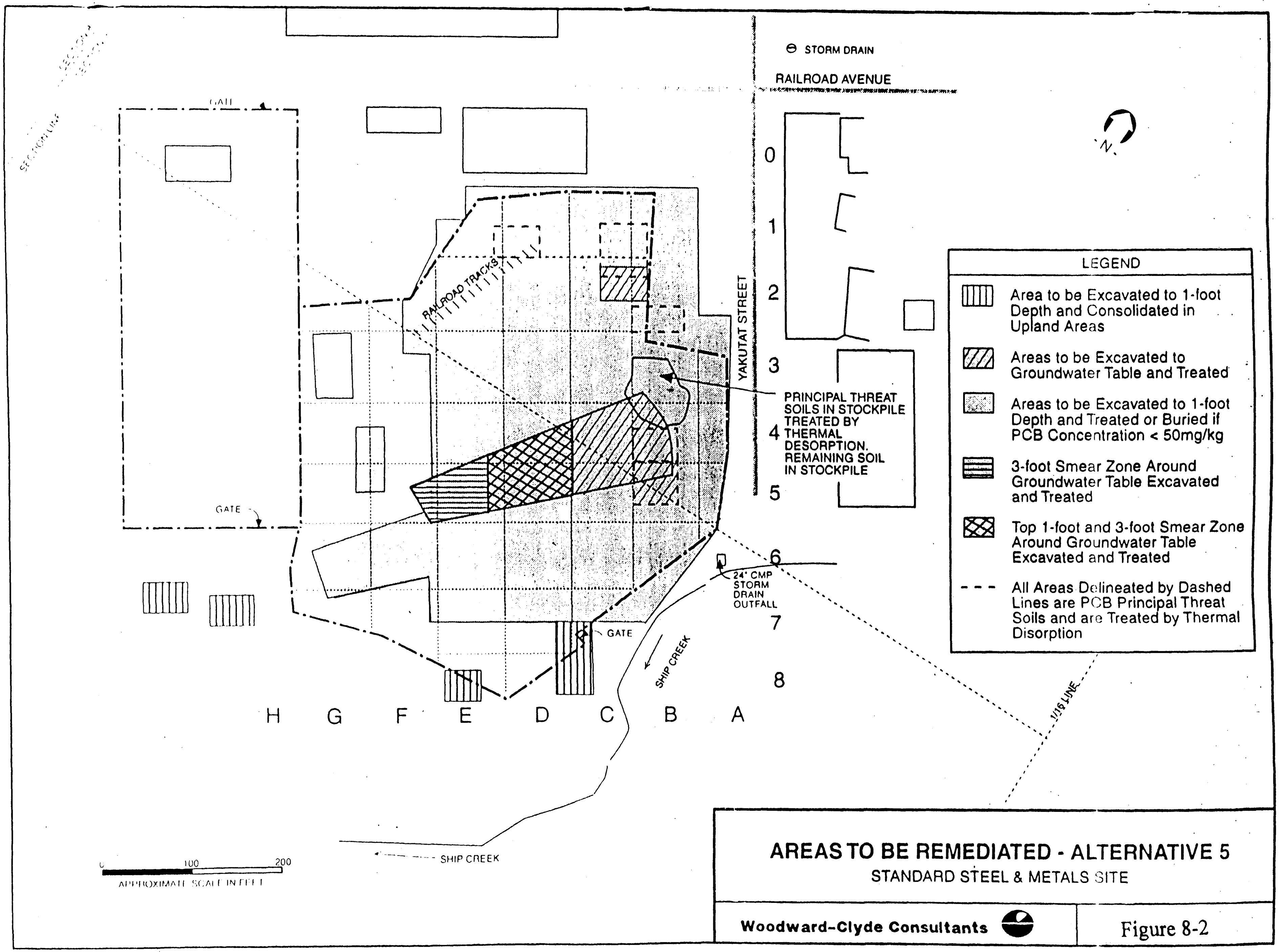
PRC ENVIRONMENTAL MANAGEMENT, INC.



AREAS TO BE REMEDIATED - ALTERNATIVE 4
STANDARD STEEL & METALS SITE

Woodward-Clyde Consultants

Figure 8-1

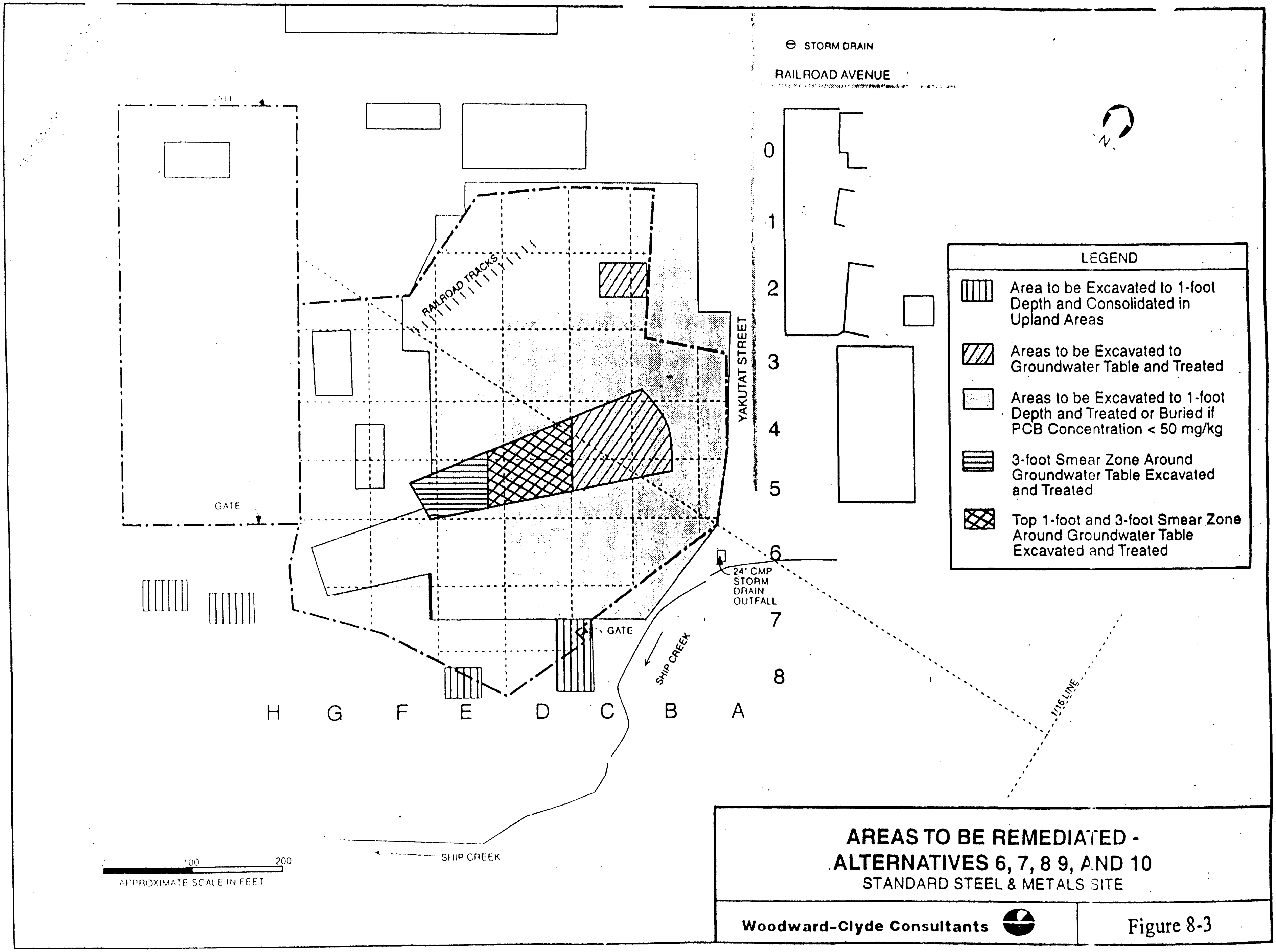


AREAS TO BE REMEDIATED - ALTERNATIVE 5

STANDARD STEEL & METALS SITE

Woodward-Clyde Consultants

Figure 8-2



AREAS TO BE REMEDIATED - ALTERNATIVES 6, 7, 8 9, AND 10
STANDARD STEEL & METALS SITE

Woodward-Clyde Consultants | Figure 8-3

Table 9-1

Soil Cleanup Level Summary

PCB (mg/kg)	Lead (mg/kg)	Action*
<1	<500	No Action
1-9.9	500-999	Flood plain soils only, excavate and consolidate elsewhere on-site
10-49	NA	Excavate and consolidate soils in onsite TSCA landfill below 1 foot of landfill surface
50 or greater	1000 or greater	Excavate soils and treat by solidification/stabilization, then dispose in a on-site TSCA landfill. Treated soils cannot be placed in top foot of landfill unless concentration is less than 10 mg/kg PCBs or within the groundwater fluctuation zone.

* Groundwater fluctuation zone will be backfilled with soils containing less than 1 mg/kg PCBs. All other excavated areas will be backfilled with soils containing less than 10 mg/kg PCBs. Soils may not be stockpiled, and subsequently backfilled, in a manner which reduces the concentrations below 10 mg/kg, or to avoid treatment.

RESPONSIVENESS SUMMARY
STANDARD STEEL AND METALS
SALVAGE YARD SITE

The purpose of this responsiveness summary is to summarize and respond to public comments submitted regarding the Proposed Plan for the remedy at the Standard Steel and Metals Salvage Yard site located in Anchorage, Alaska. The public comment period for the Proposed Plan was held from March 18, 1996 through April 17, 1996.

This responsiveness summary meets the requirements of Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA).

Four verbal comments were received during the April 10, 1996 public meeting held in Anchorage, Alaska. All four comments supported the selection of stabilization/solidification as a final remedy for the site.

Six written comments were received postmarked by April 17, 1996. These comments are listed and responded to in the following text. Similar comments have been combined and the text is paraphrased due to the length of comments. All comments are included in the Administrative Record.

Two comments were received after the end of the public comment period. These comments are very similar and reflect the same concerns as those submitted by Greenpeace and the Anchorage Waterways Council. EPA will address these comments in this responsiveness summary.

Comment 1: Chugach Electric Association commented on EPA's alteration of the PCB subsurface soil cleanup level from 50 mg/kg to 10 mg/kg. Chugach commented that there was insufficient notice about the change because it was not evaluated in the feasibility study. Chugach also commented that it is concerned that EPA's proposed alteration of Alternative 6 may invalidate the results of the FS. Of particular concern to Chugach is the effect on the cost of implementing the additional excavation. Chugach also notes that there is little legal basis for selecting a 10 ppm cleanup level. Chugach mentioned that if EPA limits the extent of this alteration to the three known areas of subsurface PCB contamination that their above concerns "will not be triggered". Chugach also stated that they look forward to working with EPA on implementing the remedy.

Response: In the Proposed Plan EPA presented the preferred alternative to the public with a 10 mg/kg cleanup level for both surface and subsurface soils, instead of a 10 mg/kg surface and 50 mg/kg subsurface cleanup level, as presented in the FS. The change from the FS was identified and explained in the Proposed Plan and during the public meeting. EPA supplied sufficient notice to the public and informed them of why the change was proposed. No other comments were received objecting to the proposed subsurface cleanup standard.

Chugach's concern with the alteration of the price is warranted and EPA did consider it in proposing the alteration from the FS. In EPA's judgment, the change in volume to be excavated will not have a significant impact on actual costs of implementing the remedy. Since soils between 10ppm and 50ppm are only required to be consolidated in the TSCA landfill, as is proposed with surface soils, and not treated with stabilization the only impact will be on costs of excavating and backfilling. The cost of excavating soils is estimated (FS estimates) at \$25.00/cy and backfilling and compaction at \$8.00/cy. The cost of increasing subsurface excavations by 1000 cy is estimated at \$33,000. Even with an additional 3000 cy of subsurface soils requiring excavation the increase in cost will be less than \$100,000, which is approximately 2% of the low-end estimation of the preferred alternative. Additionally, the small increase in costs resulting from additional excavation and backfilling would be less than the costs of monitoring and maintenance of the cap that would have been required over areas of the site that would have had 50 mg/kg in the subsurface.

Chugach's comment about the legal basis of selecting a 10 mg/kg cleanup level is noted. There is no federal or state ARAR that sets PCB soil cleanup levels. The cleanup levels at this site were based on residual risk, long-term protection, and consideration of cleanup standards contained in the TSCA Spill Policy and Superfund PCB Guidance and policies. Although the TSCA Spill Policy may not require 10 mg/kg beyond 10 inches, EPA has the discretion to select a more stringent cleanup level. We selected 10 mg/kg as the cleanup level for PCBs because commercial activities on the site and the nature of the climate in Anchorage cast doubt on the effectiveness of a one foot soil layer over soils containing 50 mg/kg at depth. EPA decided that either a substantial cap (asphalt, geomembrane) would be needed to prevent exposure to soils with up to 50 mg/kg PCBs, or an alternative was to excavate soils above the surface soil cleanup level and contain with other soils exceeding the cleanup level. Containing moderately contaminated soils with the treated soils was determined to be more cost effective and practical than capping most of the site and maintaining that cap forever.

Regarding the extent of subsurface soil excavations above 10 mg/kg PCBs. EPA anticipates, based on current data, that these areas are limited to four locations on-site. EPA's alteration is based on the need to prevent future releases from the site. Considering that subsurface characterization is limited and additional sampling may determine significant areas of subsurface contamination beyond the three areas identified in the RI/FS, EPA can not put a limit on the need for addressing these soils. However, EPA will reevaluate the remedy if very significant areas of subsurface contamination are discovered that would greatly increase volumes to be excavated and contained. In that event, EPA will work with the participating parties conducting the remedial action and the community to address these soils in a protective manner.

Comment 2: Anchorage Waterways Council (AWC) submitted substantial comments regarding the lack of information on current stream bed conditions and hydraulic characteristics of Ship Creek in the Administrative Record. AWC does not support stabilization/solidification as the remedy at the site and can "concur only with options 9 or 10. Main points raised by AWC are listed below.

1) Degree of aggradation of Ship Creek, a study is needed to quantify and qualify the degree of aggradation.

2) Ship Creek has been channelized in some locations upstream of the site and significant urbanization may significantly alter the slug flow and flooding characteristics of Ship Creek.

3) Dams located upstream may significantly affect the stream bed condition, gradient, and elevation. AWC states that " There appears to be a significant chance of catastrophic failure of one or both of the fish hatchery dams during a flooding event." This could significantly alter the stream bed.

4) The Standard Steel site is located in an area which "will almost certainly be inundated by a 100, 500 or 1000 year flood event, just as it was in the flood of August 1989." AWC raised concerns of changes in global weather patterns and that flooding and inundation will be more frequent.

5) EPA's evaluation of remedial options may contain errors regarding which options achieve long-term permanence and that alternatives 2, 3, 5, and 6 must be included in the category of alternatives which could be effected by catastrophic events.

6) EPA's evaluation fails to adequately consider the economic and health aspects of the release of site contaminants to Ship Creek.

7) AWC recommends EPA perform an analysis of potential economic and health effects of a release of contamination from this site. Also, that leaving these wastes on-site is in effect leaving an "environmental timebomb".

Response to points 1) ,2), 3), 4) and 5): As part of Remedial Design a study of flooding potential in the Ship Creek basin will be required. This study will evaluate the impacts of a 100 and 500 event on the site. The landfill and solidification mix will be designed to resist at a minimum a 100-year flood event in accordance with TSCA landfill requirements. It should be noted that there are common engineering solutions to designing structures in flood plains. The fact that the structure contains PCBs and lead does not prevent the structure from being designed to withstand flooding, erosion or seismic events.

The stabilized mass will immobilize the waste and not allow PCBs or lead to be released from the site. The solidified wastes and groundwater will be monitored. If monitoring shows releases of hazardous substances above drinking water standards or site cleanup levels, such releases will be addressed. It should be noted that significant transport of contaminated soils did not occur after the August 1989 flood event. This is supported by sampling data from the EPA removal actions and comparison to RI/FS sampling. The landfill will not be placed within the 100 year flood plain.

The erosion control bank along the site's border and Ship Creek will be repaired and, if necessary, improved. This erosion control structure will be maintained as long as the landfill exists.

Response to point No. 6: Concerning Long-term effectiveness and permanence, EPA stated in the Proposed Plan (March 18, 1996) that

> "Alternative 4 would require maintenance of a cap and containment measures forever, and therefore receives a low rating. Alternatives 5,6,8,9, and 10 would all have a high long term reliability because the contaminants would either be removed from the site or solidified. Although the containment cell would require monitoring, there is sufficient experience with solidification to predict that it would be reliable over time. Alternative 7 would remove most (90%) of PCBs, but would not provide as significant on-site controls (constructed mechanisms) to prevent long term releases as Alternative 6. Potential releases from Alternatives 4 and 7 would be caused by very significant site disturbances, such as earthquakes, flooding, or failure of land use controls."

EPA does not disagree with AWQ's position that "Any" waste left on-site could (EPA emphasis added) be affected by catastrophic events or improper application of land use controls. However, CERCLA states that EPA is to evaluate risk based on reasonable land use scenarios and base remedies on reasonable assumptions. Flood and seismic events can be anticipated and the landfill designed to minimize releases associated with such events. All potential effects from global warming, acts of God, or war cannot be anticipated. EPA considers the evaluation presented in the Proposed Plan as an accurate evaluation of which alternatives comply with the criteria of long-term protection and effectiveness, and that our assumptions and remedy is reasonable.

Response to point No. 7: EPA has evaluated effects of releases from the site and has determined that there are no current releases from the site. We have also determined that by implementing this remedy future releases will be highly unlikely. EPA strongly disagrees with the statement that the wastes at this site are in effect an environmental timebomb. Neither PCBs or lead are mobile in water, substantial actions have been undertaken which have eliminated risks posed by the principle threats at the site (PCB oils), and on-site containment versus offsite containment or treatment poses fewer risks due to transportation. Exposure through other pathways, such as direct contact, inhalation, ingestion will be eliminated by solidification.

Comment 3 and 4: Greenpeace and Bob French submitted the following comments (comments were separate but similar enough to address together):

1) EPA stated the life expectancy of the monolith is approximately 30 years. The commenters concern is that the short life expectancy is too short to ensure protection of environmental and human health. The commenter also states that this technology is untested in subarctic environments and that a GAO report states that EPA officials believe that technologies must be used multiple times under a variety of conditions before their cost and performance data become reliable and acceptable for cleanup decisions.

2) EPA has minimized the severity of pollution problems ensuing from the creek and that a DEC Site Summary for Standard Steel stated groundwater was contaminated with PCBs, lead, and tetrachloroethylene (not addressed in the Proposed Plan) and that sediments in Ship Creek are contaminated with PCBs. The commenter feels the scope of the investigation was too limited to address impacts to offsite drinking water sources and bioaccumulation of persistent organochlorine contaminants downstream from the site.

3) EPA has not adequately considered the endocrine disruption potential for the organochlorine chemicals in wildlife and humans. EPA has not fully discussed the fate of dioxin/furan contaminated ash, and that the containers with the dioxin/furans are not secured.

4) Greenpeace feels that with "the serious uncertainties and lack of proven technology regarding the proposed remedy, the best solution to the problem is Alternative 9- Offsite disposal.

Responses:

1) EPA stated during the public meeting that the "life expectance is at least thirty years. We say it could go on indefinitely." Stabilization (cement/concrete) technology has been employed for thousands of years and has a long history of data to draw from. The design of the containment cell will be for hundreds of years, and Institutional Controls will be required to ensure the remedy is maintained and changes in land use do not pose an unacceptable risk to human health or the environment.

Regarding the GAO report, without knowing the report referred to and its context, EPA cannot directly respond to that statement. EPA has a national policy to promote the use of innovative technologies when they have a reasonable chance of providing a cost effective, efficient, and reliable treatment solution. Stabilization/solidification has been used at other Superfund cleanups, and EPA has proposed stabilization/solidification as an alternative remedial alternative for PCBs under the Toxic Substances Control Act, Resource Conservation and Recover Act and the Comprehensive Environmental Response, Compensation and Liability Act.

EPA acknowledges the challenge of implementing this remedy in a subarctic environment. However, solidification has been implemented successfully at many Superfund Sites in the lower forty eight states which have similar climatic conditions as Anchorage, Alaska.

2) Both EPA and DEC were involved in the scoping of the RI/FS and concurred on the scope of the RI/FS investigation. EPA maintains that groundwater is not contaminated at levels which require remediation. The tetrachloroethylene contamination the commenter is referring to was located onsite and only in one well. This does not constitute a situation requiring remediation of groundwater, nor does it necessitate a different remedial alternative. The selected remedy includes monitoring of groundwater to ensure that there is no migration of contaminants off-site.

Ship Creek was evaluated by EPA, with the input by DEC and a Biological Technical Advisory Committee consisting of the U.S. Fish and Wildlife Service, Alaska Department of Fish and Game, Elmendorf AFB Natural Resource Trustee. This group concurred with the conclusion that the Standard Steel site is not currently releasing contaminants to Ship Creek. Ship Creek is a heavily impacted waterway by many point and non-point sources. There have been other PCB spills adjacent to the creek and some directly into the creek as well, as urban runoff, storm sewers and other unknown sources. It was decided during scoping that correlating past releases from the Standard Steel site to Ship Creek was impractical.

3) EPA did evaluate the impacts of dioxin/furans in the Baseline Risk Assessment. The assessment determined that dioxins/furans do pose a risk. EPA is taking action to mitigate these risks by stabilizing/solidifying all soils containing dioxins/furans. These soils are collocated with PCB soils requiring excavation and treatment.

The dioxin/furan contaminated equipment is secured on site in a locked shipping container. This container is within the fence boundary and located on private property maintained by the Alaska Railroad Corporation. Ash from the incinerator was placed in the shipping container with the incinerator equipment. The equipment and ash will be properly disposed off-site as part of the selected remedy.

4) EPA feels the uncertainty related to the effectiveness and reliability of stabilization/solidification is low and that remedial design will result in a protective long-term solution for the site. EPA feels that shipping large volumes of soils from Anchorage Alaska to a disposal facility in the lower forty eight states poses greater short-term risks, does not alter the long-term risks and would simply transfer the waste to another location at a substantial cost.

Comment 5: The Municipality of Anchorage submitted a comment concerning erosion by Ship Creek along the bank of the site. The commenter does not oppose the proposed alternative in concept.

Response: The remedy will require an assessment of Ship Creek erosion potential and mitigation requirements. The remedy will include maintenance of the erosion control structure along the site bank.

Comment 6: Sears Roebuck and Co commented that the proposed plan for remediation of the site represents an effective and pragmatic approach to remediating the subject site. However, the commenter has concerns with the selected 1000 mg/kg treatment level for lead. The commenter feels it is "excessively conservative". The commenter provided an Attachment entitled "Calculation of Lead PRG Using Bowers Et. Al. (1994) Model" This calculation results in a PRG of 7,850 mg/kg lead in soil.

Response: EPA appreciates that the commenter supports the proposed remedy. The treatment level for lead is not solely driven by risk alone. Pursuant to the Resource Conservation Recovery Act, the lead present in soils at the site is considered a characteristic RCRA hazardous waste (waste code D008) when generated (excavated). Pursuant to RCRA Land Disposal Restrictions characteristic wastes must be treated prior to land disposal or obtain at Treatability Variance. Soils at the site failed the characteristic test (SW-846, TCLP) of leaching greater than 5.0mg/kg lead when the soil concentrations was as low as 780mg/kg (Table 2-10 of FS). It was shown in the soil treatability tests that soils above 1700mg/kg lead would consistently fail the characteristic test and would be considered Hazardous Waste.

Since soils exceeding 10 mg/kg PCBs will be excavated and placed in the TSCA landfill and these soils have greater the than 1000mg/kg lead, the presence of lead forces treatment of these materials prior to land disposal.

The 1000 mg/kg cleanup level has been utilized at many other Superfund sites with an industrial land use. This level is considered protective by EPA in these circumstances. As EPA and the commenter noted an acceptable method of quantitatively evaluating the risk posed by lead to adults at industrial sites is unavailable. The Bowers Et. Al. (1994) model is being evaluated by EPA for general application in the Superfund program. However, the model has not yet been generally accepted in Superfund guidance and it was not being considered at the time the Baseline Risk Assessment was completed for this Site.

EPA utilizes the Baseline Risk Assessment to determine whether an evaluation of remedial alternatives is warranted at a site. EPA does re-evaluate risks when new information becomes available. However, unless that new information demonstrates that a significant change (either greater or lesser risk) in risk from the previous risk assessment would occur, EPA does not consider it necessary to delay cleanup and incur additional cost to revise the risk assessment or reassess alternatives.

EPA (Mark Maddaloni, EPA Lead Evaluation Workgroup, chair of the sub-committee for non-residential exposure) did a limited evaluation of the analysis Sears submitted using the Bowers Et. Al. (1994) model and disagrees with two default assumptions used by Sear's consultant. First and foremost, EPA cannot support adjustment of the frequency of contact (FOC) to account for EPA's default industrial exposure duration divided by a lifetime (i.e., 25 years / 70 years). An elevated blood Pb level will reflect current exposure conditions and has nothing to do with the how long people tend to live. Rather than integrate the blood lead level over a lifetime, EPA is interested in exposure durations that could be limited to nine months - that duration representing the gestational period in which lead would be transferred from mother to fetus. Second, bioavailability is an issue. The value used by Sears (8%) represents a lower bound estimate in that it reflects conditions where bioavailability was measured during a fed rather than fasted state. Absorption is much greater when lead is introduced to an empty stomach. A default value employed at the Leadville Superfund Site of 12% would be recommended.

The Bowers Et. Al. (1994) model may be an appropriate tool for evaluating lead risks at non-residential sites. However, EPA does not think it would be in the best interests of the community, or the site to delay cleanup and conduct another evaluation of risks at the site, when the outcome would not likely be a significant change in cleanup level or cleanup costs. EPA considers a 1000 mg/kg cleanup level for lead appropriate at the site based on a qualitative evaluation of lead risks, previous remedial action levels at other Superfund sites, and the collocation of lead and PCBs at the site.

It would be very expensive and delay cleanup to conduct TCLP tests on all soils prior to treatment to determine whether they fail the TCLP test, and it is impractical to separate the lead contaminated soils from the PCB soils. Therefore EPA will retain the 1000mg/kg treatment level for lead contaminated soils.

Late Comments: Two comments were received from the Sierra Club, Alaska Chapter and the Downtown (Anchorage) Community Council. There concerns are that EPA does not have enough information for selecting stabilization/solidification as a final remedy and groundwater and Ship Creek Sediments are contaminated and need to be addressed. They submitted similar concerns as the above comments regarding flooding and seismic events.

Response: EPA believes there is sufficient information to assess stabilization/solidification. Treatability tests have been conducted on site soils and have determined that s/s is effective at binding the wastes in a monolith. Further testing will be conducted to determine how to address freeze/thaw process. If these tests determine that the monolith can not be constructed to withstand freeze/thaw process and maintain its goal of preventing exposure and release of the contaminants then an alternative remedy will need to be selected.

EPA does not concur that groundwater and sediments in Ship Creek require remedial action to address contamination. The data within the RI and the Risk Assessment clearly illustrate that groundwater does not pose an unacceptable risk to human health or the environment. The LNAPL is a high risk material, but is considered to be a "source" to potential groundwater contamination and not considered to be groundwater. The LNAPL and LNAPL contaminated soils will be excavated and treated as part of the selected remedy. RI data on Ship Creek sediments show no PCB contamination is not present in sediment adjacent to the site which pose an unacceptable risk to human health or the environment and therefore does not require remedial action. Stream sediment samples adjacent to the site and downgradient did not detect PCB or lead contamination which demonstrated a release from the site. These samples were obtained in depositional areas and would indicate whether there have been recent releases. Past releases may have occurred but would be distinguishable, if detected, from non-site releases.

Flooding and seismic events will be addressed during design of the monolith. These are common engineering restraints which any activity within the Ship Creek basin and throughout most of Anchorage would have to accommodate.