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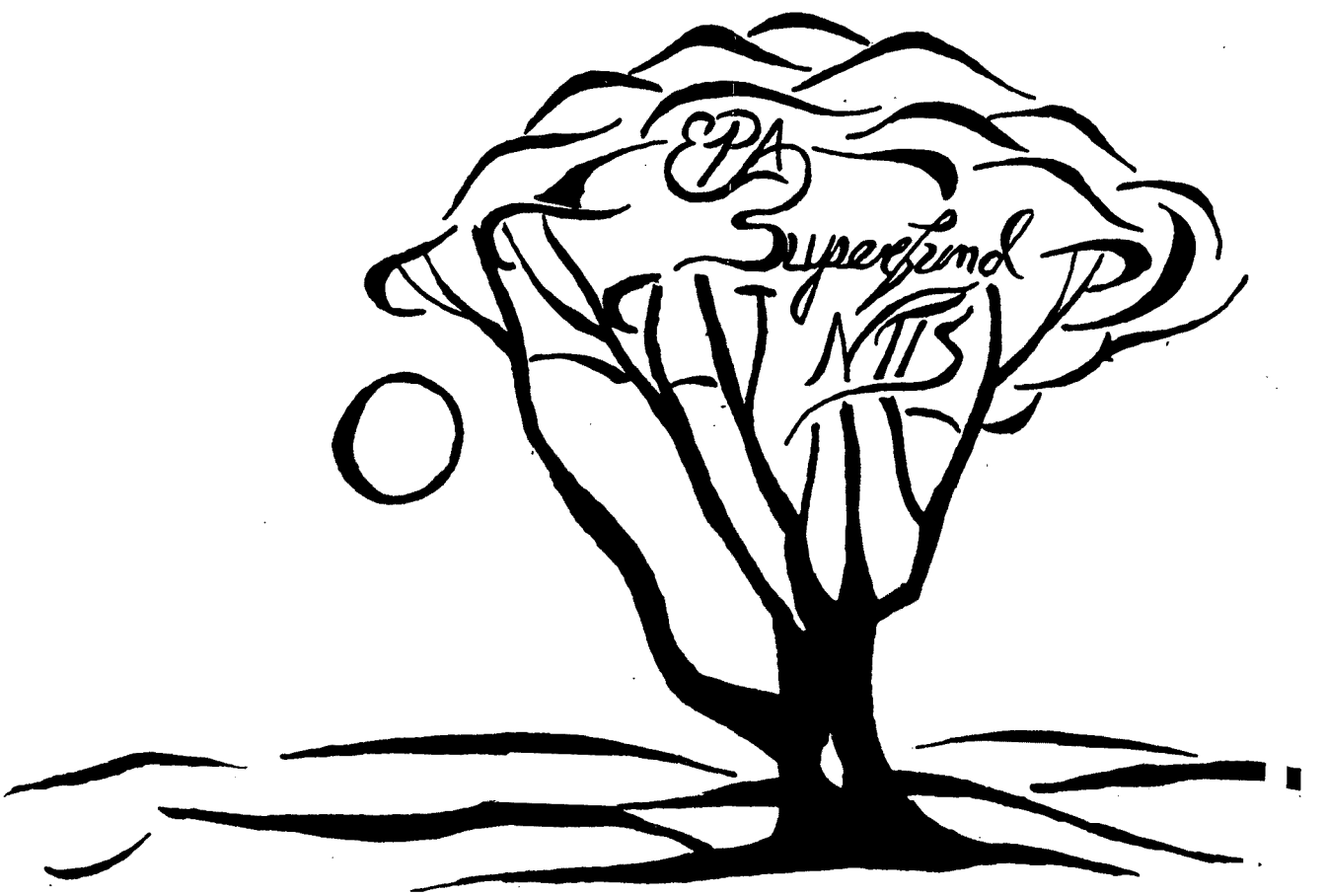
July 1994

EPA Superfund Record of Decision:

Sharon Steel Site, Midvale, UT



FINAL
DECLARATION FOR THE RECORD OF DECISION

Sharon Steel (Operable Unit 01)
Sharon Steel/Midvale Tailings Site
Midvale, Utah

DECEMBER 1993

U.S. Environmental Protection Agency Region VIII
Utah Department of Environmental Quality

Document Control No. 7760-019-DD-CXZM

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Sharon Steel (Operable Unit 01, Sharon Steel/Midvale Tailings), Midvale, Utah

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Sharon Steel, Operable Unit 01 (OU1) Site, in Midvale, Utah. The selected remedial action was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record (AR) for this site.

The U.S. Environmental Protection Agency (EPA) has requested the State of Utah's concurrence on the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances at and 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 the public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedial action for OU1 will incorporate the contaminated soils from the OU2 remedial action. The selected remedy for the OU2 residential soils is fully described in detail in the OU2 ROD dated September 25, 1990. The OU2 selected remedy included excavating

the contaminated soils within the OU2 area and storing them in a repository on the OU1 mill site.

EPA has selected a remedy and has provided a contingency process to allow the State to enhance the remedy for the contaminated tailings and soils on the Sharon Steel mill site (OU1). The selected remedy includes capping of the site with groundwater monitoring and containment. The contingency process would allow for an alternative remedy which includes excavation, transport, and offsite containment of the contaminated tailings and soils from the OU1 site.

EPA and the Utah Department of Environmental Quality (UDEQ) have agreed in principle to this contingency process for determining which remedial alternative will be implemented. The process provides a schedule of activities by which EPA, in consultation with UDEQ, will complete an evaluation and issue a decision on whether the selected or contingency remedy will be implemented. The plan establishes dates which EPA will use as "triggers" for commitments on the part of the State of Utah to seek the funds necessary to implement the contingency alternative. If these trigger dates are not met, or if EPA determines at any point during the schedule of activities that the process is not leading to an expeditious cleanup of the site, then pursuant to its decision authority in CERCLA Section 121, and in consultation with the State of Utah, EPA will proceed to implement the capping alternative as detailed in this ROD.

The selected remedy has the following major components:

- Excavation and relocation of the tailings within 150 feet of the center line of the Jordan River. These tailings will be distributed on top of the existing tailings.
- Removal of the top two feet of soil in the mill building area. This soil will be spread over the tailings pile. Clean fill will be brought in to replace the contaminated soil which was excavated. The area will be revegetated.

- Dredging of the wetlands to remove contaminated sediments and placement of this soil on the tailings pile. The wetlands will be returned to their natural state.

- Excavation of tailings on the west bank of the Jordan River and placement on the tailings pile.

- Construction of a five-foot vegetated soil cap (or design-based equivalent) over the entire tailings and soil pile. The cap will be designed such that it will allow access to pedestrian traffic. In order to maintain the integrity of the cap, only those structures specified in the remedial design will be allowed.

- Installation of an interceptor trench along the eastern edge of the tailings pile to control subsurface lateral groundwater flow.

- Rehabilitation of the Galena Canal to control stormwater runon.

- Installation of monitoring wells to sample and test the groundwater.

- Monitoring of shallow groundwater to ensure that ARARs are not exceeded at point of compliance.

- Treatment of groundwater if ARARs are exceeded in compliance point monitoring wells. The goal of treatment will be to contain contaminated groundwater and prevent offsite migration.

- Onsite use restrictions of groundwater and other institutional controls which may be identified during design.

A technical review of the selected remedy has been conducted by EPA Headquarters and documented in a memorandum dated November 24, 1993. As a result of the review, EPA has identified three issues which will require special attention and evaluation during design. These include:

- Potential incorporation of a flexible membrane liner (FML) into the cap to further reduce the potential for infiltration of water.

- Evaluation of additional geotechnical measures to reduce the potential for seismically-induced damage to the cap and underlying tailings.

- Evaluation of additional measures to reduce tailings slope instability along the Jordan River.

Based on the findings of evaluations performed during design, EPA will incorporate those measures which it determines are appropriate to address these issues.

The contingency alternative would have the following characteristics:

- Removal of the top two feet of soil in the mill building area. This soil will be stockpiled on the existing tailings pile. Clean fill will be brought in to replace the contaminated soil which was excavated and the area will be revegetated.
- Excavation of the tailings on the west bank of the Jordan River with placement on the tailings pile.
- Dredging of the wetlands to remove sediments and placement of this soil on the existing tailings pile. The wetlands will be returned to their natural state.
- Excavation of the existing tailings (including the first two feet of undisturbed soil below the tailings), stockpiled soils and sediments from the site, and OU2 soils previously deposited on the site. Transportation and disposal will occur at a State and EPA approved offsite disposal cell.
- Once all tailings and contaminated soils are removed from the mill site, clean fill will be brought in and the site revegetated.
- The disposal cell will be capped and vegetated. The cell will be maintained and the groundwater monitored as necessary.
- Groundwater at the mill site will be monitored. Extraction and treatment will be conducted if ARARs are exceeded at the compliance point.
- Onsite use restrictions of shallow groundwater.

Both the selected remedy and the contingency alternative will remove the principal threat at OU1 which is potential exposure of the public to the contaminated tailings and groundwater. Capping the tailings in place will eliminate blowing and physical contact with the tailings. It will also reduce percolation of water through the tailings and thus reduce potential leaching of metals into the groundwater. The interceptor trench will further isolate the tailings from contact with water, further reducing percolation of water through the tailings. The continued monitoring and containment of the groundwater will mitigate the threat of contaminants migrating offsite or entering a drinking water aquifer. The excavation, transport, and offsite

disposal remedy (contingency alternative) will eliminate the potential for exposure to the contaminated tailings and soils at the site. Continued groundwater monitoring and treatment, if necessary, will mitigate the potential threat of contaminants migrating.

STATUTORY DETERMINATION

Both the selected remedy and the contingency alternative are protective of human health and the environment, and comply with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action. The selected remedy is cost-effective. The contingency alternative is not cost effective, so its implementation is contingent upon the State ensuring payment of the costs above the selected remedy (pursuant to 42 U.S.C. §9621[f][2][B]) as detailed in this ROD. The selected remedy uses permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable for this site. However, because treatment of the principal threats of the site was not found to be practicable, the selected remedy does not include the statutory preference for treatment.

If the selected remedy is implemented, hazardous substances will remain onsite above health-based levels, thus 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. In the event that the contingency alternative is implemented, the source of contamination will be removed. However, because residual contamination may remain in groundwater beneath the tailings, a five year review will be conducted to ensure adequate protection of human health and the environment.

Jack McGraw

12/9/93
Date

Jack McGraw
Acting Regional Administrator
United States Environmental Protection Agency
Region VIII

FINAL

DECISION SUMMARY

Sharon Steel (Operable Unit 01)
Sharon Steel/Midvale Tailings Site
Midvale, Utah

DECEMBER 1993

U.S. Environmental Protection Agency, Region VIII
Utah Department of Environmental Quality

FINAL
DECISION SUMMARY
SHARON STEEL SUPERFUND SITE
OPERABLE UNIT 01 - SHARON STEEL/MIDVALE TAILINGS

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

TABLE OF CONTENTS (continued)

LIST OF FIGURES

DECISION SUMMARY

I. SITE NAME, LOCATION, AND DESCRIPTION

The Sharon Steel/Midvale Tailings site is located in Midvale, Utah, approximately 12 miles south of Salt Lake City. Operable Unit (OU) 1 is defined by the Sharon Steel property boundaries and is the source of contamination. OU2 is comprised of residential and high use public areas located adjacent to the Sharon Steel property which contain contamination primarily from windblown tailings.

OU1 is a 270-acre site which is bounded on the north by 7800 South Street, on the northeast by South Holden Street and Lennox Street, on the southeast by Main Street, and on the west and south by the Jordan River. The western border extends to include a smaller 2.3-acre tailings pile on the western side of the Jordan River. OU1 includes the tailings and a wetlands area to the south. The main feature of OU1 is an estimated 9-million cubic yards of sand-like tailings which remain onsite.

There are three main topographic and geologic features of the Sharon Steel/Midvale tailings site: the Jordan River floodplain, terraces from the Great Salt Lake/Lake Bonneville system, and artifacts from the mining industry. The tailings (OU1) from the mill are located on the Jordan River floodplain, and the mill site (OU1) and nearby residential area (OU2) are on the terraces. The terrace soils, having originated from the weathering of sedimentary and igneous rocks from the Wasatch Mountains, are generally well drained.

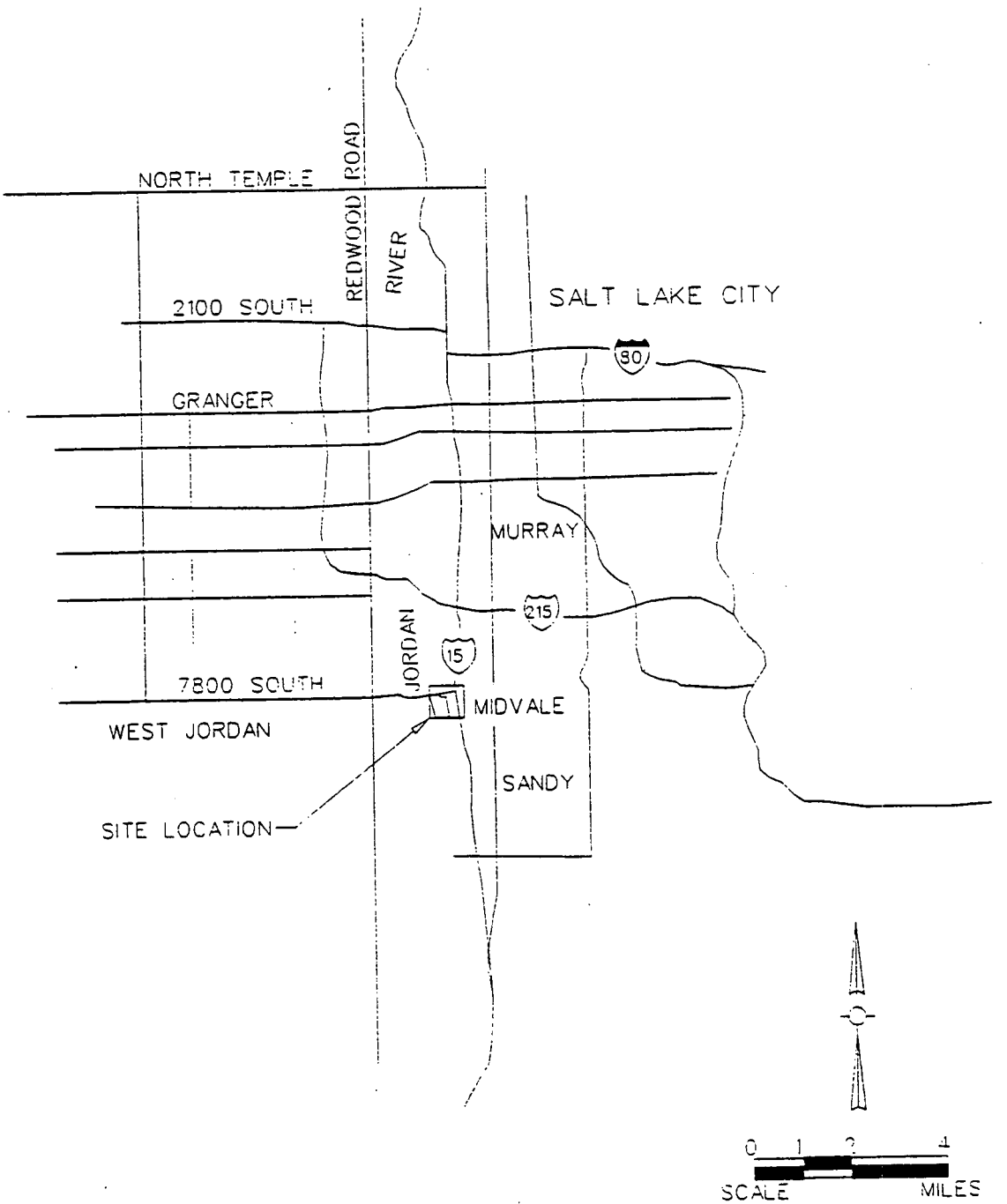
OU2 encompasses part of the City of Midvale, Utah, and surrounding areas. Approximately 44,000 people live within a two-mile radius of the mill site; 12,000 within the City of Midvale; 8,000 people within one mile of the site; and 1,400 people within a quarter mile of the mill site. The age distribution of the population is 36 - 39 percent from 0 - 16 years; 48 - 49 percent from 17 - 54 years; and 11 - 16 percent over 54 years.

The land south and west of Midvale is used primarily for agricultural and commercial activities; the land north and east of Midvale is mostly urban. The entire area is drained by the Jordan River which provides both cold and warm water habitats for fish; however, the river is more heavily used for agricultural irrigation. Adjacent to the Jordan River, and in OU1, are wetlands and potential wildlife habitat. The Salt Lake Valley has substantial groundwater resources consisting of shallow and deep aquifers which are used for various domestic, agricultural, and industrial applications. There are a number of public drinking water supply wells within a three-mile radius of the site. These wells, most of which use the deep aquifer, serve approximately 440,000 people. Data suggest that the shallow and deep aquifers are hydraulically connected. However, the Remedial Investigation/Feasibility Study (RI/FS) shows that only the shallow aquifer directly under the mill site itself (OU1) has been contaminated. Groundwater in the shallow aquifer flows west/northwest, and discharges to the Jordan River. To date, none of the public water supply wells have been contaminated.

2. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Sharon Steel/Midvale tailings site includes a former milling operation originally owned and operated by the U.S. Smelting, Refining and Mining Company, later known as UV Industries, Inc. The general location of the site is shown on Figure 1, and the site boundaries are illustrated on Figure 2. The mill operated from 1906 to 1971. During the milling operation, sulfide concentrates of lead, copper, and zinc were extracted from the ore by froth flotation. The facility operated as a custom mill, receiving ore from many sources, then concentrating and extracting a variety of metals. The tailings from the milling operations are located at the mill site (OU1) in uncovered piles over 50 feet deep, and have an estimated volume of 9-million cubic yards. The tailings are fine grained and the piles resemble sand dunes. Sharon Steel Corporation purchased the mill site in 1979.

An environmental health problem was first suspected in 1982 when the Utah Department of Health was notified that local citizens were gathering windblown tailings and then using them for sandboxes and gardens. The tailings had high concentrations of lead, cadmium, and



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SHARON STEEL/MIDVALE TAILINGS SITE
MIDVALE, UTAH
SITE LOCATION

Figure 1

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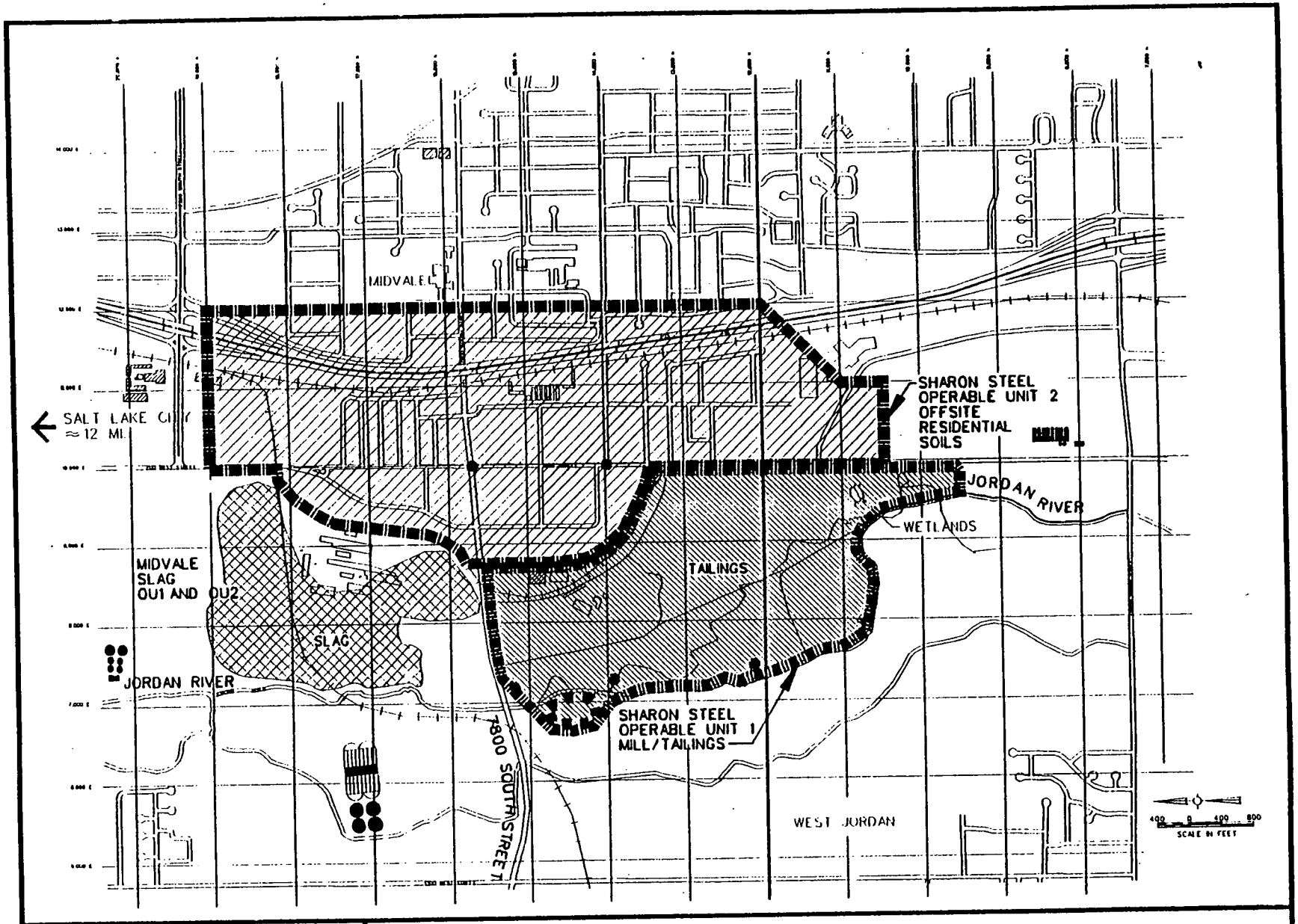

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SHARON STEEL/MIDVALE
TAILINGS SITE
OPERABLE UNIT STUDY AREAS

Figure 2

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arsenic. A public education campaign was launched to warn residents about the dangers of this practice. In addition to the residential use of the tailings, an investigation in 1988 revealed that tailings and other dusts had been blown by the wind and had contaminated the soil with lead, cadmium, and arsenic over a 571-acre area of the City of Midvale located downwind of the mill site. Analysis of the contaminants in the residential soil strongly suggests that a major contributor to OU2 contamination was the windblown tailings from the Sharon Steel mill site (OU1). Some of the contamination may also have originated from the smelter at an adjacent Superfund site (Midvale Slag). Of the 571-acre residential area contaminated by the tailings, further investigations have revealed that about a 142-acre area (with an estimated volume of 248,300 cubic yards) contains soils which exhibit levels of lead and/or arsenic above the action levels of 500 milligrams per kilogram (mg/kg) lead and 70 mg/kg arsenic.

The Sharon Steel/Midvale tailings site, including both the mill site (OU1) and the residential areas (OU2), was proposed for the Superfund National Priorities List (NPL) in 1984 and was finalized on that list on August 28, 1990. The State of Utah was the lead agency for the site between 1985 and 1987. Since 1987, the U.S. Environmental Protection Agency (EPA) has been the lead agency. The initial Remedial Investigation (RI) for the site was completed in June 1988. A Feasibility Study (FS) for the entire site was published in June 1989, and a Proposed Plan issued in July 1989. A public hearing on this Proposed Plan was held in Midvale in August 1989. As a result of extensive public comment, EPA decided to divide the site into two operable units, with OU1 referring to groundwater, the mill site, and its tailings, and OU2 referring to the residential soils contaminated by windblown tailings. The decision to divide the site into two operable units was based on the threat presented by the residential soils and the need to further investigate the groundwater beneath the mill site. Issuance of the Record of Decision (ROD) was postponed for one year to allow additional studies to answer questions posed by the public. Further RI/FS studies and reports concerning groundwater and residential soils were completed during 1989 and 1990.

The FS for OU2 was completed and the Proposed Plan was issued on June 6, 1990. The ROD for OU2 was issued on September 24, 1990. It required excavation and removal of contaminated soils on business and residential properties. Soils removed from OU2 were to be incorporated into the OU1 remedy.

A FS and Proposed Plan for OU1 were completed in October 1990. This FS also included an evaluation of private sector proposals for processing of the contaminated soils and tailings. In response to public comment, EPA enlisted the U.S. Bureau of Mines (BOM) to perform a study on the ability to beneficiate the tailings. EPA re-evaluated the results of the 1990 OU1 FS and incorporated the results of the BOM study and also private industry proposals for transport and containment of the tailings into a new FS which was issued in May 1992. A Proposed Plan for OU1 was issued in May 1992 and a public hearing was held in Midvale on June 17, 1992.

While the Superfund process has been underway, EPA and the State of Utah have been working with Sharon Steel to suppress the release of fugitive dust from the mill site to prevent further contamination of the residential soils and to prevent re-contamination after implementation of the remedy. This has been accomplished by spraying the site with a polymer to bind the dust particles.

Three Potentially Responsible Parties (PRPs) were identified for the site. These include: (1) Sharon Steel Corporation (Mining Remedial Recovery Company, a company formed during bankruptcy proceedings of Sharon Steel Corporation, is the current owner of the mill site); (2) UV Industries, Inc. and UV Industries, Inc. Liquidation Trust, the former owner and operator of the mill site; and (3) Atlantic Richfield Company, a generator of hazardous substances disposed of at the mill site and a potential former operator of the mill. General notice letters were sent to the PRPs on August 28, 1985, and requests for information were sent on May 12, 1988 (CERCLA 104e). No special notice letters were sent. EPA and the State of Utah reached settlement with all three PRPs. Money from that settlement is being spent on response actions at both OUs.

3. HIGHLIGHTS OF COMMUNITY PARTICIPATION

CERCLA (Sections 113(k)(2)(B)(i-v) and 117) requires that EPA and the State keep the community informed and allow the public to participate in the decision-making process in selecting a remedy for a Superfund site in their neighborhood. The legislation requires at a minimum: (1) notice to potentially affected persons and the public; (2) reasonable opportunity to comment; (3) an opportunity for public hearing; (4) response to each significant comment submitted; and (5) a statement of the basis and purpose of the selected action.

This section describes the specific community participation activities which occurred in the process of selecting a remedy for the Sharon Steel OU1 site. These activities not only meet the minimum requirements but exceed them significantly, indicating a commitment by EPA and the State of Utah to meet both the letter of the law and the spirit of community participation at this site. In addition, this ROD document fulfills two requirements of CERCLA: (1) it contains a response to each comment submitted by the public (see the Responsiveness Summary section of this document); and (2) it provides a statement of the basis and purpose of the remedy.

1982 - The Utah Department of Health advised the public against removing tailings from the site for use in landscaping, gardens, and sandboxes at their homes.

1983 - Community interviews were held for the purpose of warning nearby residents about using tailings for sandboxes and gardens, and a press release was issued detailing the potential for the site to be listed on the NPL. Shortly afterwards, another press release warned people not to garden in soils containing tailings.

1984 - Sharon Steel site was proposed for the NPL.

1985 - A fact sheet, which briefly described the site and potential contamination, was mailed to Midvale residents near the site. Interviews were also conducted with residents of Midvale. The Midvale City Council created the Tailings Committee, later called the Community Liaison Council, to disseminate site information to interested citizens.

1986 - The State met with local officials and the Community Liaison Council to discuss public concerns regarding the site. As a result of these discussions, the State posted signs in Asian and English languages to warn against site entry; distributed pamphlets to area residents warning against site access; and conducted an epidemiological survey of the neighboring Asian population to evaluate concerns regarding health effects.

1987 - EPA and the State of Utah met with Midvale officials to establish information repositories. The repositories identified were the Ruth Vine Tyler Library in Midvale, Midvale City Hall, and the Utah Department of Health. Meeting locations in Midvale were identified as the Midvale City Auditorium, Midvale Middle School, Hillcrest High School, Utah Power and Light Auditorium, and Midvale Bowery. A fact sheet, mailed out in September, 1987, summarized EPA's Superfund process and described the study being conducted.

August 1988 - The Final Community Relations Plan was completed. Also a fact sheet update was mailed to Midvale residents in May while another fact sheet was mailed in August which summarized the findings of the EPA's RI.

February 1989 - A press release was sent out regarding the fencing of the site.

June 1989 - Another press release clarified the decision process on cleanup of the site. In the same month, a press release was issued announcing the preferred alternative and Proposed Plan, the dates of the comment period, and the public meeting date and location. Also, this same information was advertised in the three local papers on June 14. The site at this time was considered one OU.

July 1989 - A fact sheet, Proposed Plan for Sharon Steel/Midvale Tailings Site, was mailed to 1,200 residents in Midvale. The Community Relations Plan was revised on July 31.

August 1989 - Prior to the public meeting at the Midvale Bowery on August 17, the public meeting was advertised and a press release issued. On August 16, a Congressional briefing, two Editorial Board meetings, and a meeting of the State Health Department were conducted.

September 1989 - As a result of comments given to EPA on the Proposed Plan for the Sharon Steel/Midvale Tailings site, the preferred alternative was not accepted by the State of Utah. EPA extended the study period and the public comment period for the site, identified a separate OU for residential soil, and issued a press release to announce these changes.

November 1989 - Interviews were conducted on November 6, 7, and 8 with Midvale residents and business people to determine what concerns they might have with regard to the Sharon Steel site. On the 28th of November, EPA's Regional Administrator met with the Utah Department of Health, *Deseret News* Editorial Board, *Salt Lake City Tribune* Editorial Board, and then Utah Governor Norman Bangerter. The same day, EPA and the State hosted Public Forum #1, at the Utah Power and Light Auditorium. The meeting was advertised in the local paper, and a press release was issued. EPA and the Governor of Utah jointly sent out an invitation to selected officials and interested parties inviting them to attend. At the meeting, a status report was given on site investigations and studies. A Plan for Responding to Public Comment was developed. EPA then announced that additional studies on soils and groundwater would be conducted in response to public comment received during the August 1989 public hearing.

January 1990 - A fact sheet, Questions and Answers About Lead and Arsenic in the Soils, was developed and mailed to over 1,200 Midvale residents by EPA. In response to numerous unsolicited private proposals EPA announced criteria for submittal of private industry tailings reprocessing proposals; and a pre-proposal conference was held with reprocessors in Salt Lake City.

February 1990 - Public Forum #2 was held in Midvale for the purpose of updating residents on groundwater investigations, private industry reprocessing proposals, soils investigations, and setting soil action levels. This was advertised in the local newspaper; EPA and the Utah Department of Health jointly sent out invitation letters to selected officials and interested parties; a press release was issued announcing the meeting; and the meeting was previously highlighted in the January fact sheet. As a result of the interviews conducted in November 1989, the revised Community Relations Plan was released February 12, 1990.

March 1990 - Another fact sheet, RI/FS Project Status Report, was mailed to Midvale residents. Twelve reprocessing proposals were received and evaluated; and numerous telephone contacts between reprocessors and EPA occurred.

May 1990 - A Soils Data letter was sent to over 200 Midvale residents giving the results of the soil sampling on their properties. Availability sessions were scheduled all day and evening May 22, and all day May 23, to answer and interpret the individual soil data results. A meeting was scheduled the same night to answer questions regarding the FS and to hear concerns prior to the public meeting.

June 1990 - An advertisement was placed in the local daily papers announcing the Proposed Plan for OU2. A few days prior to this, a fact sheet, Proposed Plan for Operable Unit 2: Residential Soils, was mailed to Midvale residents. A public meeting on OU2 Residential Soils was held June 14. A press release was issued announcing the meeting and approximately 80 people attended. RI/FS reports for OU2 were placed in repositories for public review.

July 1990 - PRPs requested an extension period for public comment, and EPA placed an advertisement in the daily and local newspapers announcing the additional 30-day extension (ending August 1990).

August 1990 - A Congressional briefing was conducted by Congressional aides to discuss site studies in progress with specific emphasis on the reprocessing proposal evaluation process. The Mayor of Midvale was in attendance, and the Mayor of West Jordan was invited but did not attend. Responses to public comments regarding OU2 were initiated.

September 1990 - A public meeting was held in Midvale. Attendees were not pleased with EPA's conclusion that the information submitted in the reprocessing proposals was insufficient to determine the feasibility of reprocessing at the site. In response to public input, EPA decided to contract with the BOM to re-evaluate the feasibility of reprocessing for the Sharon Steel tailings.

October 1990 - The FS and the Proposed Plan for OU1 were published and the public comment period was opened.

January 1991 - A Fact Sheet was published which postponed the previously scheduled public meeting. The public was notified that the comment period was closed but would be reopened at a later date.

February 1991 - A public forum was held at Midvale Middle School to update the public on the progress on OU1 and OU2. Approximately 50 people attended the forum.

April 1992 - A Fact Sheet mailed to the public summarized the results of the BOM study on beneficiation.

May 1992 - A Public Forum was held at the Midvale City Auditorium to formally present the findings of the BOM study, to review current and pending activities pertaining to the site, and to provide an opportunity for citizens to ask questions.

June 1992 - A revised FS and Proposed Plan were published for OU1. This Proposed Plan announced the commencement of a 30-day public comment period and also notified the

public of a public meeting, which was subsequently held on June 17 at Midvale Middle School. At the meeting, the public comment period was extended for an additional 30 days. The plan also presented a timeframe by which EPA and UDEQ agreed to evaluate a removal alternative.

August 1992 - The State of Utah Department of Environmental Quality (UDEQ) mailed an OU1 update newsletter to the residents of Midvale. A public forum was held on August 10 at the Midvale City Auditorium to allow citizens to comment on the Proposed Plan. Approximately 22 people attended the meeting. The public comment period was closed on August 14.

In addition to the above specified highlights, EPA and the State of Utah cooperated between 1989 and 1992 in conducting the following activities:

- EPA and the State met numerous times with Midvale officials to discuss the status of EPA and State activities.
- A list of contacts and interested parties was made and kept updated. The list includes Utah Federal Senators and Congressmen, State-elected officials, Utah Department of Health Officials, area media, and interested groups and individuals, as well as a mailing list of over 1,200 Midvale residents.
- A Technical Advisory Committee (TAC) was formed October 19, 1989, in response to comments made at the August 17, 1989 public meeting to keep participants, residents, and other interested parties informed regarding technical activities and project status at the Sharon Steel/Midvale Tailings site. The TAC, which consisted of representatives from the Utah State Department of Health, Salt Lake City and County Health Department, PRPs, representatives from Midvale city government, U.S. Geological Survey, and the U.S. Bureau of Reclamation, generally met one to two times per month. These meetings were held to discuss project status, ongoing technical studies, future studies, and current data interpretations in an effort to resolve technical differences in opinion or approach as they arose.
- A Technical Assistance Grant (TAG) was provided to a group of concerned citizens in Midvale. The TAG was used to review the technical findings

resulting from the RI/FS process. This group has recommended the tailings be moved.

4. SCOPE AND ROLE OF THIS OPERABLE UNIT WITHIN SITE STRATEGY

As previously stated in this ROD, there are two operable units within the Sharon Steel/Midvale tailings Superfund site: OU1 is the mill site with its tailings piles, and OU2 is the residential and commercial area of Midvale, Utah, contiguous to the site, where soils have been contaminated with windblown mill tailings. The selected remedy for OU2 involves excavation of the contaminated soils and temporary storage of these soils on the OU1 mill site property. The tailings and contaminated soils for both operable units are addressed by the remedy for OU1. Since a major threat to human populations involves direct contact with contaminated soils and tailings, removal of the contamination from people's properties and homes (the OU2 selected remedy) will substantially reduce their current exposure. OU2 is currently in the Remedial Design/Remedial Action (RD/RA) stage. Cleanup has begun on the first phase of residential properties and is expected to be complete within five years.

The remedy for OU1, selected in this ROD, addresses contaminated soils, tailings, and groundwater on the OU1 mill site, as well as soil removed during the OU2 remedial action. OU1 poses a principal threat to human health and the environment because of the risks from possible ingestion or inhalation of, and dermal contact with the soils and tailings. There is also the threat of contaminant migration from the site both in the form of windblown tailings, and by migration of contaminants from the tailings into the underlying groundwater that either discharges to the Jordan River or is a source of drinking water for the local residents. The purpose of this response is to prevent current or future exposure to the contaminated soils and tailings, to isolate the tailings from contact with water, to reduce contaminant migration into the groundwater, and to prevent contaminant migration offsite via groundwater. This remedy will be the final response action for this site.

5. SUMMARY OF SITE CHARACTERISTICS

The soils and tailings at OU1 and OU2 are contaminated with high levels of lead, arsenic, cadmium, and lower levels of other toxic metals. Only arsenic has migrated into the groundwater beneath OU1 to an extent sufficient to warrant an evaluation of public health risks. Contaminated groundwater has not migrated offsite. The major source of these metals are the tailings at the Sharon Steel mill site (OU1). For many years, these tailings were blown by the wind and then deposited in soils throughout the community (OU2). In addition, it was reported that unsuspecting residents were collecting the tailings and using them for fill, sandboxes, and gardens. There are a number of ways the contamination can migrate from the OU1 site: (1) the tailings can be blown by the wind and deposited in adjacent areas; (2) the soil can be disturbed by human activities which could extend the depth of contamination; (3) the dust transported by the wind can enter homes and buildings; (4) contaminants in the soil can be incorporated into plants during growth; (5) earthworms can redistribute the contaminants in the soil; (6) adults and children can come in direct contact with the contamination and transport soil on their bodies, clothing, work boots, and tools; (7) pets can get the contamination on their fur and carry it with them; and (8) contaminants can leach into the groundwater which supplies drinking water for local residents.

The total volume of the tailings present in OU1 is estimated to be 9-million cubic yards. In addition, there is an area of tailings west of the Jordan River covering 2.3 acres with a thickness of approximately 6 feet, or approximately 22,300 cubic yards. The total volume of soil requiring remedial action is estimated at 1,632,900 cubic yards. This estimate includes subtailings soil, mill site soil, wetland sediments, and contaminated soil and debris excavated and transported to the mill site from OU2.

The tailings at the mill site aver ~e 5,470 mg/kg lead and 320 mg/kg arsenic. Background soil concentrations for this area are less than 100 mg/kg lead and less than 20 mg/kg arsenic. In the OU2 study area, the surface soils had lead concentrations ranging from 33.8 mg/kg to 7,210 mg/kg with a mean of 839 mg/kg. The arsenic concentrations in the surface soils

ranged from 3.5 mg/kg to 3.520 mg/kg with a mean of 101 mg/kg. The arsenic concentrations in groundwater samples taken from monitoring wells on the site were found to range from 2.5 micrograms per liter (µg/L) to 246 µg/L, with an average of 28.14 µg/L. The average onsite arsenic groundwater concentration does not exceed the regulatory Maximum Contaminant Level (MCL) of 50 µg/L. Monitoring wells where arsenic levels exceed the MCL are located within the tailings. Arsenic concentrations in the Jordan River have consistently ranged from 10 to 15 µg/L. The Federal Ambient Water Quality Criterion (AWQC) for arsenic is 190 µg/L.

Geometric means for contaminants of concern in various media are given in Table 1, and estimated volumes of contaminated media are shown in Table 2.

6. SUMMARY OF SITE RISKS

Human Health Risks

Risk assessments (RAs) were developed in 1990 for both soils/tailings (May, 1990) and groundwater (October, 1990) to evaluate potential human health risks associated with site contamination in the absence of any remedial action. The risk assessments were completed prior to the designation of OU1 and OU2.

Contaminant Identification

Many inorganic chemicals were detected at the Sharon Steel/Midvale Tailings site during the RI. The results of an Endangerment Assessment based on data from the RI indicated that arsenic, cadmium, and lead are the most likely chemicals to pose risks at the site. Therefore, the RA focused on these three chemicals. The groundwater RA focused on arsenic since it is the only chemical that has migrated into the groundwater to an extent that may pose public health risks, and since no other chemicals appear to threaten the groundwater.

TABLE 1
GEOMETRIC MEAN OF CONTAMINANTS OF CONCERN IN VARIOUS MEDIA

Element	Local Background[a] Soil		Contaminated Surface Soil				Tailings		
	Terrace	Floodplain	Terrace	Floodplain	Residential	Mill Site	Surface (Oxidized)	Surface (Dunes)	Subsurface (Unoxidized)
	(mg/kg)								
Aluminum	13,669.0	7,283.0	12,461.0	10,883.0	9,560.0	9,267.0	3,982.0	3,270.0	3,002.0
Antimony	6.1	<5.5	6.4	8.8	5.7	72.7	73.5	16.0	17.0
Arsenic	15.2	5.7	31.5	40.7	65.5	158.0	425.1	320.2	411.2
Cadmium	3.2	2.0	5.4	7.1	12.5	27.6	46.8	37.3	36.4
Chromium	18.0	11.9	17.8	18.6	15.8	29.8	25.4	17.0	18.3
Copper	81.4	40.7	160.6	344.6	195.1	324.1	298.5	760.2	578.1
Lead	97.0	78.6	373.2	536.8	722.0	2,100.0	6,278.0	5,470.0	5,209.0
Manganese	454.3	249.5	466.0	452.8	508.9	833.7	1,199.0	1,497.0	2,032.0
Silver	1.4	<1.4	1.9	2.8	3.0	10.4	26.9	24.9	27.1
Thallium	BDL[d]	BDL	BDL	1.6	1.4	2.0	3.3	3.2	8.0
Zinc	124.3	100.3	320.8	537.4	591.8	2,143.0	4,821.0	6,048.0	6,372.0
n[b]	4	5	23	17	22	31	13	22	4

Element	Sediment		Jordan River Surface Water		Groundwater			Air Data From December 1987 Event	
	Upstream	Downstream	Upstream	Downstream	Perched in Tailings	Upper Sand & Gravel/Shallow	Deep Princ. Aquifer/ Residential Wells	Upwind	Downwind
	(mg/kg)		(µg/L)					(mg/kg)	
Aluminum	1,492.0	3,365.0	1,010.0	1,030.0	27.0	25.84	26.15	-	-
Antimony	<29.0	<34.0	<60.0	<60.0	<28.0	30.18	29.59	-	-
Arsenic	1.5	16.1	14.0	10.0	7.63	28.14	1.64	314.0	438.0
Cadmium	<1.5	2.2	0.36	0.44	3.0	3.0	3.0	<3.0	25.2
Chromium	3.8	7.3	<3.0	<3.0	5.0	5.0	5.67	8.4	108.0
Copper	4.0	151.0	7.0	10.0	6.24	5.93	8.08	24.0	787.0
Lead	5.8	115.0	6.0	11.0	1.78	1.19	1.28	37.0	3,865.0
Manganese	38.2	128.9	53.0	53.0	163.79	218.65	9.16	-	-
Silver	<2.0	3.0	<0.2	<0.2	5.0	5.23	5.16	-	-
Thallium	BDL	BDL	<10.0	<10.0	4.81	8.17	2.89	-	-
Zinc	16.0	331.0	19.0	20.0	7.38	49.96	8.26	90.0	5,422.0
n[b]	3	3	1	1	8	9	5	2	5

[a] "Local Background" as defined in the RI (1988).
[b] n = Number of samples.
[c] Samples were collected at other locations within the upper sand and gravel aquifer.
[d] BDL = Below Detection Limit.

TABLE 2
VOLUMES OF CONTAMINATED MATERIAL BY MEDIA

Tailings	
Main Pile (Includes Pyrite concentrate)	9,000,000 cubic yards (84,000 cubic yards)
Piles West of Jordan River	22,300 cubic yards
Soil	
Below Tailings Pile	1,134,000 cubic yards
Mill Building Vicinity	132,000 cubic yards
Wetland Area (SE quadrant)	43,600 cubic yards
OU2 Soil (and Debris)	323,300 cubic yards*

* Volume estimate has been revised since FS report. Source: personal communication, Wayne Rich, 1993.

The concentrations of the chemicals of concern on which the RAs were based are given in Tables 3, 4, 5 and 6.

Toxicity Assessment

For RAs, chemicals are typically categorized as producing either carcinogenic, or non-carcinogenic effects.

Health Effects Criteria for Potential Carcinogens. Cancer slope factors, expressed in units of $(mg/kg/day)^{-1}$, are the toxicological parameters used in combination with chemical intake estimates to derive an upperbound excess lifetime cancer risk. These slope factors are developed by EPA's Carcinogen Assessment Group (CAG) for potentially carcinogenic chemicals, and in the case of arsenic, was derived from the results of human epidemiological studies. These estimates of the upper limits on lifetime risk are unlikely to underestimate risks. Therefore, while the actual risks associated with exposures to potential carcinogens are unlikely to be higher than the risks calculated using a cancer slope factor, they could be considerably lower.

EPA also assigns weight-of-evidence classifications to potential carcinogens. Under this system, the toxicological evidence is characterized separately for human studies and animal studies as sufficient, limited, inadequate, no data, or evidence of no effect. Arsenic is classified as a Group A chemical, or a human carcinogen. This classification indicates that there is sufficient evidence to support the causal association between exposure to arsenic in humans and cancer. Cadmium has been classified as a Group B1 or probable human carcinogen for inhalation exposure only. This classification is for chemicals with sufficient evidence of carcinogenicity in animals but limited evidence in humans. Lead has been classified as a Group B2 or probable human carcinogen. This means that there is sufficient evidence of carcinogenicity in animals, but inadequate evidence of carcinogenicity in humans. However, EPA had not developed a cancer slope factor for lead at the time the RA was performed.

TABLE 3
SUMMARY OF
SURFICIAL MILL SITE TAILINGS CONCENTRATIONS USED FOR THE RA (a)

	Concentration (mg/kg)		
Element	Minimum	Maximum	Arithmetic Mean
Arsenic	96	1,596	428
Cadmium	18	405	53
Lead	1,300	17,400	6,378

(a) n = 38. See Appendix 5D, Final Draft RI (1988).

TABLE 4
SUMMARY OF RESIDENTIAL SOILS CONCENTRATIONS USED FOR THE RA

Element	Depth Interval (inches)	Concentration (mg/kg)		
		Minimum	Maximum	Arithmetic Mean
Arsenic	0 - 2	3.5	3,520	101
	2 - 6	4.5	515	82
	6 - 12	3.0	618	83
Cadmium	0 - 2	0.5	52.5	10
	2 - 6	0.3	73.2	11
	6 - 12	0.1	52.9	9
Lead	0 - 2	34	7,210	839
	2 - 6	16	4,800	731
	6 - 12	9	3,920	601

TABLE 5
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS USED FOR THE RA

	Arsenic Concentration (µg/L)		
	Maximum	Minimum	Average
Offsite Residential	44.5	29.0	36.8
Onsite Residential[2]	258	8.51	144[b]

2 Individual well arithmetic averages were calculated first, followed by arithmetic averages for groups of essentially colocated wells.

b This value represents the upper 95% confidence limit.

TABLE 6

METAL CONCENTRATIONS IN BACKGROUND AND SITE SOILS[a, b]
(All concentrations in mg/kg)

Soils Type	Arsenic		Cadmium		Lead	
	Range of Detected Concentrations	Geometric Mean	Range of Detected Concentrations	Geometric Mean	Range of Detected Concentrations	Geometric Mean
Estimated Local Background Soils	< 0.4 - 22	5.7	1.3 - 4.3	2.0	30 - 143	79
Floodplain	11 - 22	15	1.6 - 4.4	3.2	26 - 143	97
Terrace						
Estimated Contaminated Soils						
Terrace	0.35 - 335	32	2 - 9.9	5.4	169 - 2,440	373
Floodplain	16 - 715	61	3.9 - 19	7.1	184 - 5,330	537
Residential	9.5 - 787	66	3.9 - 42	13	158 - 2,620	722
Onsite	7.9 - 815	179	3.3 - 66	28	31 - 10,100	2,100

[a] Tailings data are not included in this table.

[b] Source: Final Draft RI (1988)

Health Effects Criteria for Noncarcinogens. Health effects criteria for chemicals exhibiting noncarcinogenic effects are generally developed using reference doses (RfDs) developed by the EPA RfD Work Group, or RfDs obtained from Health Effects Assessment Summary Tables (HEAST). The chronic RfD, expressed in units of mg/kg/day, is an estimate of the daily exposure to the human population (including sensitive subpopulations) that is likely to be without an appreciable risk of deleterious effects during a lifetime. These RfDs are usually derived either from human studies involving workplace exposures or from animal studies, and are adjusted using uncertainty factors. The uncertainty factors used in developing RfDs use conservative assumptions based on the differences between the environmental human exposure situation and the animal bioassay from which the data were derived. Due to the conservative nature of these factors, a margin of safety is implicit in their use. The RfD provides a benchmark to which chemical intakes by various routes (e.g., via exposure to contaminated environmental media) may be compared.

The chemical specific human health effects criteria for carcinogenic and noncarcinogenic effects used in the RA are listed in Table 7. EPA has not developed a toxicity value for lead because lead has no known toxicity threshold. Instead, EPA has developed an Integrated Uptake/Biokinetic (IU/BK) model for lead that is used to predict potential risks.

Effects of Exposure to Contaminants

The contaminants of primary concern at this site are lead, arsenic, and cadmium. The major adverse health effects associated with lead are alterations in blood and nerves. Exposure to high levels of lead results in severe lead poisoning, which may include coma, convulsions, profound and irreversible mental retardation, seizures, and even death. Less severe effects at lower dosages include damage to receptor nerves, anemia, delayed cognitive development, reduced IQ, high blood pressure, and impaired hearing. Even smaller dosages have been implicated in enzyme inhibition, changes in red blood cell chemistry, interference with Vitamin D metabolism, cognitive dysfunction in infants, changes in the ability of nerves to transmit signals, and reduced childhood growth. Because their nervous systems are still

TABLE 7
HEALTH EFFECTS CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN

Chemical	Reference Dose (RfD) (mg/kg/day)	Safety Factor (a)	Source (b)	Slope Factor $(mg/kg/day)^{-1}$	Source (b)	Weight of Evidence (c)
Oral:						
Arsenic	1E-03 (d)	1	HEAST	2E+00	(e)	A
Cadmium	5E-04 (water)	10	IRIS	--	--	--
	1E-03 (food.f)	10	IRIS	--	--	--
Lead	--	--	--	--	IRIS	B2
Inhalation						
Arsenic	--	--	--	50	IRIS	A
Cadmium	--	--	--	6.1	IRIS	B1
Lead	--	--	--	--	--	--

(a) Safety factors used to develop reference doses are the products of uncertainty and modifying factors. Uncertainty factors consist of multiples of 10, with each factor representing a specific area of uncertainty in the data available. The standard uncertainty factors include:

- a 10-fold factor to account for the variation in sensitivity among the members of the human population;
- a 10-fold factor to account for the uncertainty in extrapolating animal data to the case of humans;
- a 10-fold factor to account for the uncertainty in extrapolating from less-than-chronic NOAELs to chronic NOAELs; and
- Modifying factors are applied at the discretion of the reviewer to cover other uncertainties in the data.

(b) IRIS = the chemical files of EPA's Integrated Risk Information System; and HEAST = Health Effects Assessment Summary Tables. Data obtained in 1990.

(c) EPA weight of evidence classification scheme for carcinogens:

A = Human Carcinogen, sufficient evidence from human epidemiological studies;
B1 = Probable Human Carcinogen, limited evidence from epidemiological studies and adequate evidence from animal studies; and
B2 = Probable Human Carcinogen, inadequate evidence from epidemiological studies and adequate evidence from animal studies; and
C = Possible Human Carcinogen, limited evidence in animals in the absence of human data.
D = Not classified

(d) RfD under review by Inter-Office Agency Workgroup at the time the RA was completed.

(e) EPA 1988. Special Report on Ingested Inorganic Arsenic Skin Cancer Nutritional Essentiality. Risk Assessment Forum, Washington, DC. EPA/625/3-87/031F. July 1988.

(f) In accordance with EPA guidance, the cadmium RfD for food is used for ingestion of food and other nonaqueous materials (e.g., soils).

-- = Criterion has not been developed for this chemical.

developing, fetuses and children 0 - 3 years of age are most affected by the lower doses and are, therefore, the most sensitive population. A compilation summarizing the various effects noted in the literature along with the blood lead level concentrations at which these effects occurred is given in the Baseline Risk Assessment Report (Appendix I) of the OU1 FS.

Arsenic also is a well-known poison. Acute inhalation exposure produces severe irritation of nasal mucosa, larynx, and bronchi, reversible effects of blood, and cardiovascular system, and disturbances of receptor nerves. Chronic oral exposure of humans to arsenic can produce toxic effects on the entire nervous system, age spots and warts, thickening and darkening of the skin, skin lesions, blood damage, and cardiovascular damage. In addition, arsenic is a known human carcinogen. Inhalation of arsenic has been linked to lung cancer in smelter workers. Ingestion of arsenic has been linked to a form of skin cancer and more recently to bladder, liver, and lung cancer.

Cadmium, when ingested, has been shown to be associated with kidney disease, bone damage, high blood pressure, anemia, and suppression of the immune system. Inhalation of cadmium has been implicated in development of emphysema and lung cancer. The doses associated with the following effects were used to calculate risks for the chemicals of concern; for lead, central nervous system effects; for arsenic, skin effects; and for cadmium, kidney effects.

Exposure Assessment

The exposure assessment (EA) develops the potential pathways by which humans may be exposed to contaminants at the site under both current and future use scenarios. This includes estimation of exposure point concentrations and development of chemical intake estimates. A variety of potential exposure pathways exist at the Sharon Steel OU1 site through which humans (particularly children) may be exposed to contamination. These include the following:

- Ingestion of contaminated soils and tailings by children who breach the security fence and play on the site. Although children have been shown to actually eat dirt, the usual method of ingestion of contaminated soil arises from eating with dirty hands, putting dirty hands into their mouths, and putting toys or other objects, which are dirty with soil, in their mouths.

- Ingestion of indoor dust. Indoor dust ingestion occurs because outdoor fugitive dust from the tailings and contaminated soils penetrates buildings, leaving contaminated dusts. Again, even children playing indoors can get dirty with these dusts and ingest the dust in the same manner as described for outdoor tailings and soils.

- Inhalation of contaminated soil and indoor dust. Contaminated soil and indoor dust can become airborne and be inhaled by the residents.

- Ingestion of contaminated produce. Home gardens are common in residential areas near this site. Vegetables planted near the site could contain contaminants and result in human exposures via consumption of produce.

The exposure pathways evaluated in detail in the RAs are summarized below. The reader should remember that the RAs were completed prior to the designation of OU1 and OU2.

Current Use Conditions

1) Direct contact with and incidental ingestion of site tailings in sandboxes by children;

2) Direct contact with and incidental ingestion of residential area soils by an individual assumed to be exposed both as a child and then as an adult (i.e., a gardener);

3) Inhalation of wind blown particulates from the site by nearby residents; and

4) Ingestion of home-grown produce by nearby residents.

Future Use Conditions

1) Direct contact and incidental ingestion of site soils by an onsite resident assumed to be exposed both as a child and an adult;

2) Inhalation of wind blown particulates from the site by an onsite resident;

3) Ingestion of home-grown produce by an onsite resident; and

4) Ingestion of groundwater by onsite and offsite residents.

Since OU1 is currently secured with an eight-foot fence and is not an active industrial facility, direct contact with soil/tailings on the property at the present time is not considered to be a complete pathway. However, tailings and soil have been used in the past by residents in sandboxes and gardens that still exist near OU1. The first current use scenario was developed to address contact via sandboxes. Exposure to contaminated soils and dust can also occur among children and adults in nearby residential areas. The second current use scenario was developed to address this exposure. Mill property (OU1) contaminants can become airborne from wind erosion of the tailings piles and subsequently transported to nearby residential or commercial areas. The third current use scenario was developed to address this potential exposure. Finally, produce grown in home-gardens may contain site contaminants. The last current use scenario was developed to address this exposure.

Since the groundwater pathway is not presently complete, exposure to contaminated groundwater under current use conditions was not evaluated. Presently, arsenic-contaminated groundwater is limited to the mill site. No drinking water wells exist in the unconfined upper sand and gravel aquifer in the area of contamination or downgradient of the mill site.

In the future, it is possible that OU1 could be redeveloped for commercial or residential purposes. Workers or residents could be exposed to OU1 contaminants. Assuming a portion of the OU1 site was redeveloped for residential use, it is likely that residents would come in direct contact with tailings/soils/dust by ingestion and dermal absorption. The first future use scenario was developed to address this exposure. The second future use scenario was developed to address exposure to air-borne contaminants, and the third scenario was developed to address exposure by ingestion of home-grown produce. Finally, the last future-use scenario was developed to address potential exposure to contaminated groundwater, both on the mill property, and just downgradient of the mill property. The mill site scenario assumes residential use of the mill property, including installation of a domestic well. This

scenario is not likely based on past and present zoning and land use. The offsite scenario assumes a domestic well is located just downgradient of the mill property and screened in the unconfined upper sand and gravel aquifer.

The exposure assumptions used in the RAs for the pathways evaluated are shown in Tables 8, 9 and 10 and 11. The values given in these tables were taken from various literature sources referenced in the soils/tailings and groundwater RAs.

Risk Characterization

The contamination which exists at the Sharon Steel/Midvale Tailings site poses carcinogenic and toxic risks to human and environmental receptors. For OU1, both human and environmental receptors are of concern. For OU2, human receptors are the primary concern. This section discusses potential risks for human receptors at OU1. Environmental risks are discussed later in this document.

For cadmium and arsenic, chemical intake estimates were combined with the health effects criteria to estimate potential human health risks for the various exposure pathways just described. For lead, estimated blood levels were compared to blood lead levels considered to be of concern to human health.

For carcinogenic effects from exposure to arsenic and cadmium (inhalation only), risks are presented as probabilities. For example, a 1×10^{-6} cancer risk represents a one in one million additional probability that an individual may develop cancer over a 70-year lifetime as a result of the exposure conditions evaluated. EPA's acceptable cancer risk range for Superfund sites is from 1×10^{-6} to 1×10^{-4}. Any risk greater than 1×10^{-4} is not an acceptable risk for a Superfund site. The estimated excess lifetime cancer risks for the exposure pathways evaluated in the soils/tailings RA are summarized in Table 12. This table shows that the total excess lifetime cancer risk across all exposure pathways combined is 5×10^{-4} and 1×10^{-3} under current and future use conditions, respectively. The higher cancer risk

TABLE 8
EXPOSURE PARAMETER VALUES FOR INHALATION OF SUSPENDED PARTICULATE MATTER

Parameter	Exposure Parameter
Duration of exposure	30 years
Age of residents	1-30 years
Frequency of exposure	300 days/year
Fraction of time spent outdoors at home	
One through 30-year-olds	0.04
Two-year-old	0.13
Fraction of time spent indoors at home	
One through 30-year-olds	0.70
Two-year old	0.83
Average body weight over exposure period	48 kg
Inhalation rate for 1-30 year period	30 m^3/day
Inhalation rate for two-year-old (for lead calculation)	5 m^3/day
Inhalation retention/absorption factors:	
Arsenic	0.23
Cadmium	0.75
Lead	0.66

Parameter values are taken from sources referenced in the Soils/Tailings RA.

TABLE 9
EXPOSURE PARAMETER VALUES FOR DIRECT SOIL AND TAILINGS CONTACT SCENARIOS

Parameter	Exposure Parameter
Children - Sandbox play:	
Frequency of exposure	214 days/year
Duration of exposure	6 years
Age of children	1-6 years
Fraction of time spent in sandbox	0.05
Average body weight over exposure period	16 kg
Ingestion rate	200 mg/day
Residents (current and future):	
Frequency of exposure	111 days/year
Duration of exposure	30 years
Age of residents	1-30 years
Fraction of time spent outdoors at home	0.04
Average body weight over exposure period	48 kg
Ingestion rate	120 mg/day
Ingestion rate for two-year-old (for lead calculation)	200 mg/day
Fraction of time spent outdoors at home by two-year-old (for lead calculation)	0.13
Oral absorption factors:	
Arsenic	0.8
Cadmium	1.0
Lead	0.5

Parameter values are taken from sources referenced in the Soils/Tailings RA.

TABLE 10

EXPOSURE PARAMETER VALUES FOR PRODUCE INGESTION PATHWAY

Parameter	Exposure Parameter
Duration of Exposure	30 years
Age of Residents	1-30 years
Frequency of Exposure	52 days/year
Average Body Weight Over Exposure Period	48 kg
Ingestion Rate for 1-30 year period	
Vine crops	151 g/day
Leafy crops	144 g/day
Root crops	114 g/day
Ingestion Rate for two-year old (for lead calculation)	
Vine crops	111 g/day
Leafy crops	102 g/day
Root crops	127 g/day

Parameter values are taken from sources in the Soils/Tailings RA.

TABLE 11
EXPOSURE ASSUMPTIONS FOR DRINKING WATER INGESTION PATHWAYS

Exposure Parameter	Drinking Water Pathway
Duration of Exposure	30 years
Frequency of Exposure	365 days/year
Average Body Weight Over Exposure Period	48 kg
Drinking Water Ingestion Rate	2 L/day
Absorption Factor	1 (unitless)

Parameter values are taken from sources referenced in the Groundwater RA.

TABLE 12
SUMMARY OF RISK CHARACTERIZATION RESULTS FOR SOILS/TAILINGS PATHWAYS

Exposure Pathway	Chronic Daily Intake Reference Dose (CDI:RfD) Ratio[a]		Excess Upperbound Lifetime Cancer Risk[b]	Blood Lead Level[c]	
	Arsenic	Cadmium		All Exposure Pathways	Selected Exposure Pathways[d]
Current Site Use:					
Tailings ingestion (sandbox)[e]	0.1	0.02	2E-05		
Soil ingestion[f]	0.003	0.0004	2E-06		
Dust ingestion[e]	2	2	4E-04		
Inhalation[f]	NA	NA	1E-05		
Produce ingestion[f]	0.1	0.3	1E-04		
Total	2	2	5E-04	> 30 µg/dL	> 30 µg/dL
Future Site Use:					
Tailings ingestion[f]	0.01	0.002	1E-05		
Dust ingestion[e]	3	2	6E-04		
Inhalation[f]	NA	NA	1E-05		
Produce ingestion[f]	0.5	2	5E-04		
Total	4	4	1E-03	> 30 µg/dL	> 30 µg/dL

(a) The CDI:RfD ratio indicates whether or not exposures may result in adverse noncarcinogenic effects. A ratio less than one indicates that adverse effects are unlikely to occur, while a ratio greater than one indicates that such effects could occur. The RfD for arsenic is 3×10^{-4} mg/kg/day. The RfD for cadmium is 1×10^{-3} mg/kg/day.

(b) The excess upperbound lifetime cancer risk represents the additional probability that an individual may develop cancer over a 70-year lifetime as a result of the exposure conditions evaluated. The EPA target cancer risk range for Superfund sites ranges from 1E-06 to 1E-04. The oral slope factor for arsenic is 1.75 $(mg/kg/day)^{-1}$, while for inhalation it is 50 $(mg/kg/day)^{-1}$. The inhalation slope factor for cadmium is 6.1 $(mg/kg/day)^{-1}$. Cadmium is not considered carcinogenic by the oral route.

(c) Blood lead levels above 30 ug/dL were not predicted since the Integrated Uptake/Biokinetic Model is not applicable at these levels. Comparison blood levels of concern range from 10 to 15 ug/dL.

(d) Does not include ingestion of lead from homegrown produce or from tailings in sandboxes.

(e) Based on a child exposed from age 1 to 6.

(f) Based on a resident exposed from age 1 to 30.

NA = Not applicable

estimates are associated with ingestion of dust and site tailings. Both current and future risks exceed EPA's acceptable risk.

Table 13 summarizes the estimated excess lifetime cancer risks for the groundwater pathway combined with the soils/tailings pathways for future scenarios based on current groundwater quality. For these scenarios, the total excess lifetime cancer risk is 5×10^{-3} for the onsite scenario and 2×10^{-3} for the offsite scenario. It is important to note that the future-use groundwater scenarios are not occurring at this time, but were developed to show future risks if the selected remedy is not implemented. Both current and future risks exceed EPA's acceptable risk.

To evaluate the potential for adverse noncarcinogenic effects to occur, the Chronic Daily Intakes (CDIs) estimated for arsenic and cadmium were compared to their Reference Doses RfDs). CDI:RfD ratios (Hazard Quotients) were calculated for arsenic and cadmium separately because these two chemicals effect different target organs (arsenic exposure can affect the skin and central nervous system while cadmium exposure can affect the kidney and immune system). A CDI:RfD ratio that exceeds one (1.0) indicates that adverse effects could occur. Table 12 also summarizes the CDI:RfD ratios calculated for each exposure pathway in the soils/tailings risk assessment, as well as the sum of the ratios across pathways (Hazard Index). As shown in this table, the ratios exceed one for both chemicals under both current and future use conditions. This indicates that adverse health effects could occur. This is primarily due to exposures via tailings and dust ingestion under current use conditions and via dust ingestion under future use conditions. Table 13 summarizes the CDI:RfD ratios for the groundwater pathway combined with the soils/tailings pathways for future scenarios based on current groundwater quality. For these scenarios, the ratios for arsenic exceed one for both the onsite and offsite residential scenarios, indicating that adverse health effects could occur.

The potential for adverse effects from exposure to lead were evaluated differently than for arsenic or cadmium. In this case, blood lead levels were estimated using the Integrated Uptake/Biokinetic (IU/BK) model and compared to the blood lead level of concern (1990

TABLE 13
SUMMARY OF RISK CHARACTERIZATION RESULTS FOR SOILS/TAILINGS PATHWAYS AND GROUNDWATER PATHWAY FOR FUTURE LAND USE SCENARIOS BASED ON CURRENT GROUNDWATER QUALITY

Exposure Scenario	CDI:RfD Ratio for Arsenic	Excess Upperbound Lifetime Cancer Risk
On-Site Residential		
Soils/Tailings Pathways	13.3	1×10^{-3}
Groundwater Pathway	8.3	4×10^{-3}
TOTAL:	21.6	5×10^{-3}
Off-Site Residential[a]		
Soils/Tailings Pathways	6.7	5×10^{-4}
Groundwater Pathway	2.3	1×10^{-3}
TOTAL:	9.0	2×10^{-3}

[a] This scenario assumes groundwater exposure to an adult to a point from a shallow domestic well near the site boundary, downgradient of the site, and soils/tailings exposure from off-site residential areas.

Center for Disease Control Ad Hoc Committee) of 10-15 micrograms per deciliter (µg/dL). As shown in Table 12, the estimated blood lead levels for all exposure pathways combined exceeded 30 µg/dL under both current and future use conditions. (The Integrated Uptake/Biokinetic model is not applicable for predicting blood lead levels above 30 µg/dL.) For the combination of pathways assumed not to include homegrown produce ingestion or tailings ingestion from sandboxes, the blood lead level was greater than 30 µg/dL. The exception was for the 500 mg/kg residential soil concentration band, for which the estimated blood lead level was 24 µg/dL. Under current use conditions, and combining all exposure pathways, reasonable maximum exposures via tailings ingestion in sandboxes, indoor dust ingestion and homegrown produce ingestion all contribute to blood lead levels exceeding the 10-15 µg/dL range. Under future use conditions, and combining all exposure pathways, blood lead levels above 10-15 µg/dL are primarily associated with tailings, indoor dust and homegrown produce ingestion. Based on these results, it can be concluded that exposures to lead via the pathways and scenarios evaluated in the soils/tailings baseline RA could potentially result in adverse health effects to young children.

It is important to keep in mind that there are uncertainties affecting this assessment. For example, the overall hazard index values for arsenic and cadmium exceeded one, indicating a potential for adverse effects to occur under the exposure conditions evaluated. However, because a safety factor of ten is incorporated into the cadmium RfD, a CDI:RfD ratio greater than one does not in itself indicate that adverse effects will occur. There is still some uncertainty surrounding this potential for a given chemical. In the case of arsenic, the overall hazard index values are within the same order of magnitude as or greater than the RfD safety factor of one. This indicates that there is a smaller degree of uncertainty surrounding the potential for noncarcinogenic effects from exposure to arsenic (calculated according to the defined exposure scenario) in comparison to cadmium. Also, input parameter values based on field data and modeling were required to estimate concentrations in various environmental media (e.g., air, soil, produce, groundwater). To estimate exposures, assumptions regarding the extent, frequency and duration of exposure and chemical bioavailability, were made. In general, the overall approach followed in the soils/tailings baseline risk assessment was to

estimate reasonable maximum exposures in order to evaluate even sensitive subpopulations. in accordance with current EPA Superfund risk assessment guidance and the policy expressed in the National Contingency Plan.

Environmental Risks

Environmental receptors which may be at risk from exposure to the contamination at OU1 include vegetation, aquatic life and wildlife. Potential risks to the receptor and higher receptors in the food chain are the primary results of exposure to contaminated soil as well as contaminated surface water and sediments.

Soil lead concentrations as low as 100 mg/kg are known to be phytotoxic (toxic to vegetation). Since soil lead exceeds this concentration on OU1, the potential for adverse effects on vegetation and receptors consuming the vegetation are significant.

Aquatic life may be exposed to contamination in both the surface water and its sediments. Of the metals detected in the Jordan River downstream of the study area. only zinc is present at unnaturally high concentrations (35 mg/l). However, because this concentration is below the Ambient Water Quality Criteria (AWQC), risk to the fish population and higher species is considered unlikely. Of greater significance are the unnaturally high concentrations of metals in the river sediments. These sediments may act as a reservoir which presents continued risk to aquatic life by supplying metals to the water column or directly affecting benthic organisms (aquatic bottom dwellers).

Wildlife in the wetlands habitat may be at risk from site-related contaminants directly through contact with contaminated surface waters or sediments. or indirectly through consumption of organisms living in the surface waters or sediments, or of larger insects or animals feeding on these organisms. Some metals are known to accumulate in animal tissues and serve as a source of exposure for large predatory birds or other terrestrial animals. Among the metals present at the study area, lead has been shown to bioconcentrate in insects, small mammals,

and songbirds which may then be consumed by larger animals. Analysis of surface waters and sediments from the wetlands adjacent to the tailings piles indicates that zinc concentrations are unnaturally high in surface water and that several metals are present at unnaturally high concentrations in sediment. It is uncertain whether wildlife in the wetlands habitat is currently being adversely affected by the metals present at the study area; however, the potential does exist for harm to wildlife populations.

Reduction of Risks to Human Health and the Environment through Implementation of the Selected Remedy

The selected remedy for OU2 will achieve the human health goals of EPA by removing contaminated soils and dust from OU2 and storing them at OU1. However, this will only be a temporary measure if the contaminated tailings and soils from OU1, which are the source of contamination, are not addressed. Without a remedy for OU1, contamination will continue to pose a threat to surrounding populations. Contaminants would continue to migrate offsite being carried by the wind, or leaching into groundwater and migrating with groundwater flow.

Either the selected remedy or the contingency alternative will remove the principal threat at OU1, potential exposure of the public to the contaminated tailings and groundwater. Under the selected remedy, exposure to the tailings will be removed by isolating the materials by means of a cap and interceptor trench. Capping the tailings in place will eliminate blowing and physical contact with the tailings. It will also reduce percolation of water through the tailings and thus reduce leaching of metals. The interceptor trench will further reduce inflow to the tailings and thus reduce leaching of metals into groundwater. The continued monitoring of the groundwater onsite and, if necessary, extraction and treatment of the groundwater in order to contain the groundwater, will mitigate the threat of contaminants entering a drinking water aquifer or the Jordan River.

Under the contingency alternative, the excavation, transport, and offsite disposal remedy will eliminate the potential for exposure to the contaminated tailings and soils by removing the

contaminated media from their current location. The potential for exposure at the new facility will need to be controlled, as the tailings will remain toxic. Continued groundwater monitoring (and treatment, if necessary) will be required at OU1 to mitigate the threat of contaminants entering a drinking water aquifer or the Jordan River as contaminants may remain in groundwater beneath the tailings.

The risks to the environment will be reduced by the selected remedy in a similar manner as the reduction of human health risks; mainly by eliminating contaminant migration and contaminant contact by organisms. Dredging the wetland area in OU1 to remove contaminated sediments and restoration of the area to its natural state will eliminate immediate wildlife contact with contaminants, and will prevent future contact by eliminating contaminant migration.

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

7. REMEDIAL ACTION OBJECTIVES

Remedial action objectives (or action levels) were developed based on evaluation of the RAs and applicable or relevant and appropriate requirements (ARARs) for the site. These objectives incorporate decisions on risk management issues and were used to guide the development of alternatives and performance standards. Objectives were developed for both soils and groundwater.

The remedial action objectives established for the OU1 site are:

1. Prevent exposure to contaminated soil/tailings on the site by either isolating (selected remedy) or removing (contingency alternative) tailings and soil exhibiting contaminant concentrations exceeding health-based remediation levels (action levels) shown in Table 14.

TABLE 14

SOIL AND GROUNDWATER ACTION LEVELS

Parameter	Action Level
Soil	
Lead	500 mg/kg[1]
Arsenic	70 mg/kg[1]
Groundwater	
Arsenic	50 µg/L (in wells on the north side of the site)[2]
	190 µg/L (in wells on the west side of the site)[3]

1. Based on risk assessment
2. Maximum Contaminant Limit (ARAR)
3. Ambient Water Quality Criteria (ARAR)

2. Prevent migration of and exposure to contaminated groundwater exhibiting arsenic concentrations greater than the action levels identified in Table 14 beyond the boundaries of the OU1 site. This will be accomplished by monitoring and containing groundwater in the unconfined upper sand and gravel aquifer beneath OU1.

3. Prevent exposure to contaminated soil/tailings, reduce inflow of water to the tailings, and reduce further contamination of the shallow groundwater by construction of a cap and interceptor trench (selected remedy) or removal of contaminated soil/tailings for offsite disposal (contingency alternative).

To meet these objectives, remediation will be required for the following areas and media:

- Tailings on OU1 and tailings on the western bank of the Jordan River which were identified during the RI.
- Soils in the mill area.
- Wetlands sediments.

For groundwater, monitoring will be conducted to ensure that contaminated groundwater is contained beneath OU1 and ARARs are not exceeded at the point of compliance established at the OU1 boundaries. Groundwater modeling conducted during the RI showed that the maximum arsenic concentration reached in the shallow groundwater near the river would be on the order of 100 µg/L, significantly less than the arsenic AWQC, which is an ARAR or action level for the site. This model scenario included a cap and interceptor trench with no groundwater containment. The results showed that even with no groundwater containment, it is not likely that arsenic concentrations discharging to the river would exceed the AWQC. Therefore, an active pump and treat system is not recommended at this time. If action levels are exceeded at the established points of compliance, groundwater will be extracted and treated. The goal of the pump and treat system would be to contain groundwater and prevent migration of contaminated groundwater away from OU1 site boundaries.

Action Levels

Action levels were developed by considering the non-carcinogenic and carcinogenic risks developed in the RA, as well as ARARs. Since the exposure assessment and risk characterization indicated that the targets for acceptable risks were exceeded for lead, arsenic, and cadmium, the IU/BK model for lead, the cancer risk assessment for arsenic, and the hazard indices for arsenic and cadmium were used to predict what soil concentrations would have to be in order to bring exposure risks to an acceptable target level. These calculations were fully described in the FS for Sharon Steel OU1 in the Recommended Health-Based Soil Action Levels for Residential Soils section (Appendix H of the FS report). These different methods of calculating action levels were used because different methods were used to evaluate risks and health effects, as described previously. The IU/BK for lead predicted that an action limit of 500 mg/kg lead in soils was necessary to achieve a target of 12.5 µg lead/dL of blood for 95% of the children 0 - 3 years of age. The cancer risk and hazard index calculations showed that an action limit of 70 mg/kg arsenic was required to reduce the exposure of residents to an acceptable level. An action limit for cadmium was not calculated since it was discovered that the distribution of all three contaminants of concern had similar patterns and clean up of lead and arsenic to their action levels would accomplish cleanup for cadmium as well. These are the same action levels that have been established by the ROD for the OU2 site.

For groundwater, points of compliance were established at the northern and western site boundaries. The western boundary corresponds to the Jordan River, into which groundwater from the unconfined upper sand and gravel aquifer discharges. A northern boundary compliance point was also established in the unconfined upper sand and gravel aquifer. For arsenic in groundwater that may migrate northward into an offsite drinking water aquifer, the action level is the MCL (ARAR) of 50 µg/L. This is a regulatory health-based limit set by the EPA. For arsenic in groundwater migrating west to the Jordan River, the action level is the AWQC (ARAR) of 190 µg/L. This is also a regulatory limit that will be protective of aquatic life in the river.

8. DESCRIPTION OF ALTERNATIVES

Five remedial alternatives out of an initial six alternatives were evaluated in detail in the OU1 FS. These were Alternatives 1, 2, 3, 4, and 6. Alternative number 5 (In Situ Vitrification) was not retained for detailed analysis due to cost and implementability concerns. Each alternative is described briefly below. A detailed discussion and analysis of the ARARs for OU1 is found in Section 2.2 of the FS report, and how each alternative complies with ARARs is found in Section 4 of the FS report.

Alternative 1 - No Further Action

This alternative provides a basis for comparison for other alternatives. The No Further Action alternative does not remedy or control the risk from any of the contaminated media at the site. Under this alternative, monitoring would be conducted semi-annually for groundwater and quarterly for air. Air particulate monitors would be located both on OU1 and on OU2, and a weather monitoring station would be established northeast of the site. Four new monitoring wells would be installed in the unconfined upper sand and gravel aquifer.

Alternative 2 - Institutional/Site Controls

This alternative would utilize institutional controls to limit human exposure to site contamination. Site access restrictions, such as installation of fences, posting of warning signs, and land use restrictions would reduce human exposure to the tailings and soil. Groundwater use would be restricted by requiring state issued permits for wells drilled on OU1 and on OU2. Remedial measures taken under this alternative would include annual dust suppressant application, site regrading to enhance stormwater runoff thereby reducing ponding and tailings erosion, and riverbank protection. Groundwater monitoring would be conducted as described for Alternative 1.

Alternative 3 - Excavation/Transport/Containment

This alternative includes excavation of contaminated materials (including OU1 tailings, wetlands sediments, and soils and debris from OU2), and transport of the contaminated materials to a State and EPA approved disposal cell. This disposal cell would be designed to comply with all ARARs. The wetlands area would be restored to its natural state, and groundwater monitoring, and, if necessary, treatment would be conducted as described below for Alternative 4.

Alternative 4 - Capping

Under this alternative, the tailings and soils exceeding action levels would be capped with a 5-foot vegetated multi-layer modified RCRA cap (or design-based equivalent). This cap includes 24-inches of vegetated soil underlain by geotextile fabric, a 12-inch sand drainage layer, and a 24-inch compacted clay barrier. The cap would be installed on a graded and compacted layer of tailings sloped at approximately three percent. Contaminated wetlands sediments, and soils from the mill building area, and contaminated OU2 residential soils would be included under the cap. Pedestrian access to the site would not be restricted; however, significant land use restrictions would be implemented.

In order to reduce the risks associated with groundwater contamination in the upper sand and gravel aquifer, OU1 use restrictions would be implemented, and groundwater would be monitored at the points of compliance (monitoring wells) established along the northern and western periphery of the OU1 tailings to establish the quality of groundwater migrating in the unconfined upper sand and gravel aquifer. The monitoring well system would be designed to also function as an extraction well system should groundwater arsenic levels exceed ARARs at the points of compliance and treatment of groundwater become necessary. Groundwater in the unconfined upper sand and gravel aquifer mainly flows west and discharges to the Jordan River, however, the possibility exists for flow to become more northward as a result of offsite pumping in the deep principle aquifer to the north. Potential offsite flow to the north would

be into a drinking water aquifer. Thus, the monitoring/extraction wells would be installed along both the western and northern edges of OU1. The exact number of wells, configuration of the system and frequency of monitoring would be determined during remedial design.

The monitoring wells would be points of compliance for the unconfined upper sand and gravel aquifer. Groundwater would be monitored to ensure that action levels are not exceeded at the points of compliance. For groundwater discharging to the river, the action level is the AWQC for arsenic. For groundwater in the upper sand and gravel aquifer, potentially migrating northward, the action level is the MCL for arsenic. These levels would function as triggers for activating a pump and treat system. If the levels were exceeded (based on statistical evaluations and evaluations by EPA and the State), groundwater would be extracted and treated for arsenic removal. The goal of treatment would be to contain the contaminated groundwater beneath the site and continue to prevent offsite migration. The treatment system would not be constructed until the pump and treat system was triggered. Treated groundwater would be discharged to the Jordan River.

The following monitoring would also be conducted:

- Monitoring of water levels and metals concentrations in the deep principal aquifer.
- Monitoring of water levels and metals concentrations at locations other than the compliance point wells in the upper sand and gravel aquifer.
- Monitoring of metals concentrations in the Jordan River.

Based on the above additional monitoring, the following observations would trigger a re-evaluation of site conditions:

- A statistically significant decrease in water levels in the deep principal aquifer (indicating a possible gradient reversal).
- A statistically significant increase in shallow water levels beneath the tailings.

- A significant increase in arsenic concentrations in the Jordan River.
- Significant increases in arsenic concentrations in the deep principal aquifer or at locations other than the compliance point wells in the upper sand and gravel aquifer.

Surface and subsurface recharge to the site would be controlled through a drainage system. An interceptor trench would be constructed along the eastern boundary of the tailings to intercept groundwater flow into the tailings from the perched terrace aquifer. This trench would be 10 feet wide and 15 feet deep and would contain perforated pipes at its base to drain intercepted clean groundwater to the Jordan River. By intercepting this source of water to the tailings, net tailings inflow would be reduced by 20 percent, in turn reducing seepage of contaminated water out of the tailings. Detailed design of the trench, including monitoring, would be established during remedial design.

Tailings would be moved 150 feet back from the Jordan River to create a buffer zone. Terraces would be constructed along the west side of the tailings pile to minimize cap instability and provide flood protection.

A technical review of the proposed remedy has been conducted by EPA Headquarters and documented in a memorandum dated November 24, 1993. As a result of the review, EPA has identified three issues which will require special attention and evaluation during design. These include:

- Potential incorporation of a flexible membrane liner (FML) into the cap to further reduce the potential for infiltration of water.
- Evaluation of additional geotechnical measures to reduce the potential for seismically-induced damage to the cap and underlying tailings.
- Evaluation of additional measures to reduce tailings slope instability along the Jordan River.

Based on the findings of evaluations performed during design, EPA will incorporate those measures which it determines are appropriate to address these issues.

Alternative 6 - Fixation

Alternative No. 6 would use fixation to reduce the risk of exposure to contaminated soils and tailings on the site. Fixation consists of mixing the soils and tailings with a chemical to immobilize the contaminants. Contaminated wetlands sediments would be excavated and fixed with the contaminated soils and tailings. Following fixation, a three foot vegetated multi-layer cap would be installed over the tailings and soil.

Fixation of the tailings and contaminated soil results in an immobilized metals waste which does not migrate to groundwater or surface water. Any existing groundwater contamination would be treated and discharged from the site. Onsite groundwater use restrictions would also be implemented. The wetlands would be restored.

9. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The NCP requires that each alternative be evaluated in terms of nine criteria which are divided into three categories.

The first category includes the threshold criteria:

1. Overall protection of human health and the environment: and
2. Compliance with ARARs.

The second category includes the primary balancing criteria:

3. Long-term effectiveness and permanence;
4. Reduction of toxicity, mobility, or volume through treatment:

5. Short-term effectiveness;
6. Implementability; and
7. Costs.

The third category includes the modifying criteria:

8. State acceptance; and
9. Community acceptance.

An evaluation of each alternative with regard to these criteria is summarized in Table 15 and described as follows:

Criterion 1: Overall Protection of Human Health and the Environment

This criterion addresses whether a remedy is protective and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

Of the five alternatives, only Alternative 1 - No Further Action does not protect human health and the environment. Alternative 3 - Excavation/Transport/Containment provides long term protection because it removes the contamination from the site. Alternative 6 - Fixation protects human health and the environment by treating the waste to reduce its toxicity and mobility. While capping, Alternative 4, also reduces the mobility of the contaminants, it does so by containment and not treatment. It provides protection by eliminating the potential for exposure. Alternative 2 - Institutional/Site Controls provides protection by separating the contamination from the public using institutional controls and by removing the air and surface water exposure routes. It does not address the potential for groundwater contamination through installation of a monitoring and pump and treat system as Alternatives 3, 4 and 6 do.

TABLE 15
INDIVIDUAL ANALYSIS OF ALTERNATIVES

Criteria	Alternative 1 No Further Action	Alternative 2 Institutional/ Site Controls	Alternative 3 Excavation/ Transport/ Containment	Alternative 4 Capping	Alternative 6 Fixation
OVERALL PROTECTIVENESS					
Human Health	Does not provide protection of human health.	Reduces inhalation risk through site access control and ingestion risk through groundwater use restrictions.	Removes direct contact, inhalation and groundwater ingestion risk.	Eliminates direct contact and inhalation risk and removes groundwater ingestion risk.	Eliminates direct contact and inhalation risk and removes groundwater ingestion risk.
Environment	Does not protect the environment.	Reduces airborne and surface water migration.	Removes airborne, surface water and groundwater migration.	Contains groundwater contamination, reduces surface water contamination and minimizes air contamination.	Minimizes surface water and air contamination, reduces groundwater contamination.
COMPLIANCE WITH ARARs	Does not meet ARARs.	Does not meet ARARs.	Meets ARARs.	Meets ARARs.	Meets ARARs.
LONG TERM EFFECTIVENESS AND PERMANENCE					
Magnitude of Residual Risk	Does not manage or reduce residual risk.	Does not reduce residual risk.	No residual risk exists from tailings.	Residual risk due to potential for cap breach.	Residual risk due to unknown long term field performance.
Adequacy of Controls	No risk controls are utilized.	Reliability of institutional controls and grading maintenance may not be adequate.	Controls for risk management at OU1 are not needed, risk must be managed at the offsite facility.	Controls for risk management are adequate.	Controls for risk management are adequate.
REDUCTION IN TOXICITY, MOBILITY AND VOLUME					
Treatment Process Used and Materials Treated	There is no treatment process utilized in this alternative.	There is no treatment process utilized in this alternative.	Ion exchange of contaminants from shallow groundwater treatment, as required only.	Ion exchange of contaminants from shallow groundwater treatment, as required only.	In-situ fixation of tailings and soils. Ion exchange of contaminants from shallow groundwater treatment, as required only.
Amount Treated or Destroyed	There is no treatment process utilized in this alternative.	There is no treatment process utilized in this alternative.	.5 MGD groundwater for 30 years (if implemented).	.5 MGD groundwater for 30 years (if implemented).	9.0 million cu yd tailings and 1.6 million cu yd of soils. .5MGD groundwater for 30 years.
Degree of Expected Reductions in Toxicity, Mobility and Volume	There are no reductions in toxicity, mobility or volume.	The mobility of surface tailings is reduced by dust suppression.	Contaminants are removed from the site. Groundwater toxicity, mobility and volume is reduced at the site, but must be controlled at the offsite disposal cell.	The mobility of surface tailings and sub surface contamination is reduced. Groundwater toxicity, mobility and volume is reduced.	Toxicity and mobility will be reduced but tailings volume will likely increase. Groundwater toxicity, mobility and volume is reduced..

TABLE 15 (cont.)

Criteria	Alternative 1 No Further Action	Alternative 2 Institutional/ Site Controls	Alternative 3 Excavation/ Transport/ Containment	Alternative 4 Capping	Alternative 6 Fixation
Degree to which Treatment is Irreversible	There is no treatment process utilized in this alternative.	There is no treatment process utilized in this alternative.	Groundwater treatment is irreversible.	Groundwater treatment is irreversible.	Irreversible treatment but long term stability has not been proven. Groundwater treatment is irreversible.
Types and Quantities of Residuals	There is no treatment process utilized in this alternative.	There is no treatment process utilized in this alternative.	10 cu. yd. of arsenic oxide per year, if groundwater treatment is required.	10 cu. yd. of arsenic oxide per year, if groundwater treatment is required.	9.0 million cu yd of fixed material; 10 cu. yd. of arsenic oxide per year, if groundwater tretment is required.
SHORT TERM EFFECTIVENESS					
Community Protection	There is no risk created during implementation of this alternative.	Moderate potential risk due to dust generation.	Moderate potential risk due to dust generation during excavation and spills during transport.	Low potential risk due to dust generation.	Low potential risks due to dust generation and chemical delivery to site.
Worker Protection	Slight risk due to dust generation during monitoring well installation.	Moderate potential risks due to dust and use of chemicals.	Significant potential risk due to dust generation; transportation and redisposal hazards.	Moderate potential risks due to dust generation.	Moderate potential risks due to dust generation and chemical use and storage.
Environmental Impacts	There are no impacts created during implementation of this alternative.	Potential surface water runoff from contaminated areas and dust generation.	Potential for surface water runoff, groundwater impacts and dust generation. Potential for releases during transportation and redisposal.	Potential surface water runoff from contaminated areas and dust generation.	Potential surface water runoff from contaminated areas and dust generation.
Time until Remedial Action Objectives are Completed	Remedial action objectives are not achieved by this alternative.	Continuously implemented.	8 years for all work, 30 years for groundwater.	2 years for cap, 30 years for groundwater.	12 years for tailings, 30 years for groundwater.
IMPLEMENTABILITY					
Ability to Construct and Operate	Construction and operation are not required for this alternative.	Dust suppression easily implemented.	Easily implemented.	Easily implemented.	Some difficulty due to variability and lack of characterization of contamination.
Reliability	There is no action taken by this alternative.	Reliability of institutional controls is moderate, dust suppression is temporarily reliable.	High.	High as long as cap is properly maintained.	Short term reliability is high, long term is not proven.
Ease of Additional Remediation	Easy to implement.	Easy to implement.	None required.	Additional tailings/soil remediation would require cap destruction.	Extremely difficult for fixed material.

TABLE 15 (cont.)

Criteria	Alternative 1 No Further Action	Alternative 2 Institutional/ Site Controls	Alternative 3 Excavation/ Transport/ Containment	Alternative 4 Capping	Alternative 6 Fixation
Ability to Monitor Effectiveness	This alternative does not include monitoring.	Air and groundwater quality easily monitored.	Groundwater treatment system easily monitored.	Cap integrity and groundwater treatment system easily monitored.	Difficult to assure complete fixation by in situ process. Groundwater treatment system easily monitored.
Ability to Coordinate and Obtain Approval from other Agencies	No approval required.	Substantial coordination required for institutional controls.	Approval needed for redisposal in offsite location.	Minimal coordination required including groundwater discharge approval.	Moderate coordination required including groundwater discharge approval.
Availability of Off-Site Treatment, Storage and Disposal Facilities	None required.	None required.	State designated location unknown.	None required	None required.
Availability of Equipment and Specialists	None required.	Readily available for dust suppression.	Available on a local basis.	Available on a local basis.	Available on a regional basis.
Availability of Technologies	None required.	None required.	Established technology.	None required.	Established technology.
COST					
Capital	$215,000	$2,960,000	$168,468,609	$49,560,000	$2,256,960,000
First Year Annual Operation and Maintenance	$85,000	$214,000	$7,000,000	$277,000	$1,173,000
Present Worth Cost	$1,580,000	$6,160,000	$224,000,000	$53,936,000	$2,271,860,000

Criterion 2: Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

This criterion addresses whether a remedy will meet all Federal and State environmental laws and/or whether there is a basis for a waiver from any of these laws. Applicable requirements must be met to the full extent required by the law. However, pursuant to Section 121 (e) of CERCLA, no permits are required for remedial actions which are to occur completely within the Sharon Steel site boundaries. On the other hand, only the relevant and appropriate portions of non-applicable requirements must be achieved and only to the degree that they are substantive, rather than procedural in nature. The ARARs are divided into chemical specific, action specific and location specific groups.

Chemical specific ARARs are those based on health or risk based values that establish an acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment. Alternatives 1 and 2 do not meet all the chemical specific ARARs identified. Alternatives 3, 4, and 6 will comply with all the chemical specific ARARs.

Action specific ARARs are technology or activity based requirements or limitations on actions taken with respect to hazardous substances. Alternatives 2, 3, 4, and 6 will comply with all action specific ARARs during implementation of the remedial action. As no remedial activity is undertaken by Alternative 1, there are no action specific ARARs for this alternative.

Location specific ARARs are limitations on the use of specific locations. Alternatives 2, 3, 4, and 6 will comply with all location specific ARARs. As no remedial activity is undertaken by Alternative 1 that would affect protected locations, there are no location specific ARARs for this alternative.

EPA has thus determined that Alternatives 3, 4, and 6 will comply with all ARARs. Table 16 identifies which ARARs are action specific, chemical specific, and location specific.

In addition to ARARs, there may be other types of information useful for designing the remedial action, or necessary for determining what is protective of public health or the environment. These may be non-promulgated, non-enforceable guidelines or criteria that provide useful information and are termed criteria "to be considered" (TBC). Best professional judgment is used to evaluate TBCs.

Utah has promulgated Groundwater Protection Rules (R317-6) using the authority of the Utah Water Pollution Control Act. This regulation governs pollutants that will or are likely to enter into groundwater, and establishes protection levels that discharges into groundwater can not exceed. Since the regulation states, however, that the protection levels in the regulation are not to be considered ARARs for CERCLA cleanups (R317-6-6.15), EPA considered the Groundwater Protection Rules as a TBC. Elements of Alternative 4 such as the cap, stormwater diversion measures and the interceptor trench will enable this alternative to meet the intent of the Groundwater Protection Rules of minimizing the discharge of contaminants to groundwater. Alternatives 3 and 6 will also comply with the intent of this TBC. Since Alternative 1 contains no measures, and Alternative 2 contains only minimal measures that will reduce discharges of contaminants to groundwater, these alternatives will not meet the intent of the Groundwater Protection Rules.

Criterion 3: Long-term Effectiveness and Permanence

This criterion refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once clean up goals have been met. The reduction and management of residual risk at the site is most effective in Alternative 3 because it removes the risk from the OU1 site and transfers it to a controlled facility (the risk must be managed at the new facility). Fixation provides moderate effectiveness at reducing and controlling residual risk through treatment. It is less effective

TABLE 16
FINAL FEDERAL AND STATE ARARs[1] FOR OU1 ALTERNATIVES

	Federal and State ARARs	Nature of ARAR
I.	SAFE DRINKING WATER ACT	
	A. National Primary Drinking Water Standards	Chemical-specific and action-specific
	B. National Secondary Drinking Water Standards	Chemical-specific and action-specific
	C. Maximum Contaminant Level Goals	TBC
II.	UTAH SAFE DRINKING WATER ACT	Chemical-specific and action-specific
III.	UTAH GROUND WATER PROTECTION RULES	TBC
IV.	CLEAN WATER ACT	
	A. Dredge or fill	Action-specific
	B. Ore mining and dressing	Chemical-specific and action-specific
V.	UTAH WATER POLLUTION CONTROL ACT	
	A. Water Quality Standards	Chemical-specific and action-specific
	B. Utah Pollution Discharge Elimination System	Action-specific
VI.	CLEAN AIR ACT	
	A. National Primary and Secondary Ambient Air Quality Standards	Chemical-specific and action-specific
VII.	UTAH AIR CONSERVATION ACT	Chemical-specific and action-specific
VIII.	SOLID WASTE DISPOSAL ACT	
	A. Criteria for Classification of Solid Waste Disposal Facilities and Practices	Action-specific
	B. Standards applicable to transporters of hazardous waste.	Action-specific

TABLE 16
FINAL FEDERAL AND STATE ARARs FOR OU1 ALTERNATIVES(continued)

	Federal and State ARARs	Nature of ARAR
	C. Standards for owners and operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	Action-specific
	1. Closure and post closure	Action-specific
	2. Waste Piles	Action-specific
	3. Landfill	Action-specific
	D. Guidelines for Land Disposal of Solid Wastes	Action-specific
IX.	TOXIC SUBSTANCE CONTROL ACT	
	A. Asbestos	Action-specific
X.	UTAH SOLID AND HAZARDOUS WASTE ACT	
	A. Solid Waste Rules	Action-specific
	B. Hazardous Waste Rules	Action-specific
	1. Closure and Post closure	Action-specific
	2. Waste piles	Action-specific
	3. Landfills	Action-specific
	4. Ground water protection	Action-specific
	C. Corrective Action Clean Up Policy	Action-specific
XI.	SURFACE MINING CONTROL AND RECLAMATION ACT	Action-specific
XII.	UTAH RECLAMATION OF LAND MINES FOR MINERALS ACT	Action-specific
XIII.	OCCUPATIONAL HEALTH AND SAFETY ACT	Action-specific
XIV.	UTAH OCCUPATIONAL HEALTH AND SAFETY ACT	Action-specific
XV.	DOT HAZARDOUS MATERIALS TRANSPORTATION ACT	Action-specific

TABLE 16
FINAL FEDERAL AND STATE ARARs FOR OU1 ALTERNATIVES(continued)

	Federal and State ARARs	Nature of ARAR
XVI.	FISH AND WILDLIFE COORDINATION ACT	Action-specific
XVII.	ENDANGERED SPECIES ACT	Action-specific
XVIII.	EXECUTIVE ORDER ON FLOODPLAIN AND WETLANDS	Location-specific
XIX.	EXECUTIVE ORDER ON THE PROTECTION OF WETLANDS	Location-specific
XX.	UTAH WATER REGULATIONS	Location-specific
XXI.	UTAH WELL DRILLING STANDARDS	Action-specific
XXII.	AGENCY FOR TOXIC SUBSTANCE AND DISEASE REGISTRY, TOXICOLOGICAL PROFILES FOR CADMIUM AND ARSENIC	TBC

Notes:

TBC = To Be Considered

1) ARAR as used in this table indicate that the requirement is either applicable or relevant and appropriate

than Excavation/Transport/Containment because there are concerns about its long-term stability. It is more effective than Alternative 4 because of the residual risk of cap breaches, however. Alternative 2 does not reduce the residual risk at the site: however, it does manage the risk. Groundwater exposure risks in Alternative 2 are addressed through institutional control mechanisms, whereas Alternatives 3, 4, and 6 utilize monitoring and, if necessary a pump and treat system. Alternative 2, therefore, has the lowest long-term effectiveness of the alternatives.

Criterion 4: Reduction of Toxicity, Mobility, or Volume through Treatment

Of the five alternatives, only Alternative 6 utilizes treatment as a remedial response action for tailings and soil. It provides reductions in toxicity and mobility, but may result in an increase in volume of contaminated material. Although Alternatives 2, 3, and 4 reduce the mobility of contamination, they are not treatment processes. Therefore, they are rated lower than Fixation. Capping provides reductions in contaminant mobility to the air, surface water, and groundwater and, therefore, is rated higher than Institutional/Site Controls.

Alternatives 3, 4, and 6 utilize the same groundwater treatment system and provide equal reductions in toxicity, mobility and volume of that media. Alternative 2 does not provide groundwater treatment and is therefore rated lowest.

Criterion 5: Short-term Effectiveness

This criterion addresses the period of time needed to achieve protection and any adverse effects on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

Alternative 2 - Institutional/Site Controls is the most effective alternative at protecting human health and the environment during implementation. It has the potential for dust generation during regrading and surface water runoff from contaminated areas, but has no impact on

groundwater quality. It may be implemented in the shortest time period, also, so that potential risks are minimized. Alternative 4 is the next most effective at short term protection. It holds the same potential for risk as Institutional/Site Controls, but takes two years to implement. The Fixation alternative is rated moderate for short term effectiveness, because it utilizes chemicals and has the potential for groundwater impacts during implementation. Excavation/Transport/Containment provides low effectiveness during implementation due to the long time period required and the risks associated with excavation, transportation, and redisposal of the contaminated material.

Criterion 6: Implementability

Implementability addresses the technical and administrative feasibility of the remedy, including availability of materials and services needed to implement a particular option.

Alternative 4 - Capping has the highest implementability. It utilizes locally available equipment and personnel and requires little regulatory agency coordination. Alternative 2 also utilizes locally available equipment and personnel, however, the maintenance required for this alternative is high. Dust suppressant application must be repeated every year in order to remain effective. Additional remediation under this alternative is easily implemented. Alternative 3 has a moderate implementability because it utilizes locally available equipment and personnel, but may place a high demand on their availability and may require specialized equipment. Fixation (Alternative 6) has low implementability compared to the other alternatives. The equipment and personnel required are available on a regional basis, but operation of the process may be difficult given the variable characteristics of the waste.

Criterion 7: Costs

Cost factors include estimated capital and operation and maintenance (O&M) costs, as well as present worth costs.

The present worth costs for implementing the five alternatives evaluated for remediation of OU1 range from $1,580,000 for Alternative 1 to $2,271,860,000 for Alternative 6. The Institutional/Site Controls, Capping, and Excavation/Transport/Containment alternatives costs lie within this range and are $6,160,000, $53,936,000, and $224,000,000 respectively.

Criterion 8: State Acceptance

This criterion indicates the State's preferences regarding the various alternatives. The State of Utah has issued Senate Concurrent Resolution 12 which indicates that the State would prefer an alternative other than Alternative 4 as the selected remedy. The State has expressed a preference for Alternative 3.

Criterion 9: Community Acceptance

This criterion addresses the public's general response to the alternatives described in the Proposed Plan. The community has not fully endorsed Alternative 4 and would prefer Alternative 3.

Of the various alternatives proposed, Alternatives 3 and 4 were the best overall in satisfying the nine remedy selection criteria of the NCP.

10. THE SELECTED REMEDY

EPA has chosen Alternative 4, Capping as the selected remedy and Alternative 3, Excavation/Transport/Containment as the contingency alternative for the Sharon Steel OU1 site. The alternatives are discussed in detail in the OU1 FS. A summary of each of these alternatives follows.

The Selected Remedy: Alternative 4 - Capping

In summary, this alternative has the following components:

- The tailings within 150 feet of the center line of the Jordan River will be excavated and placed on the tailings pile. This excavation will prevent future surface water contamination and eliminate exposure of organisms to contaminated sediments which could result if these tailings are left in their current uncontrolled state.

- Soil contaminated above action levels will be excavated to a depth of two feet (approximately 132,000 cubic yards, based on soil action levels) in the former mill area and placed on the tailings pile. The excavated soil will be replaced with clean fill, and the excavated area revegetated. This excavation will eliminate any physical contact with contaminated soils in the mill area.

- The contaminated wetlands sediments will be dredged and this soil will be placed on the pile (approximately 43,600 cubic yards as determined in the FS). The wetlands area will be reconstructed to its natural state. This excavation will also prevent surface water contamination and exposure of organisms to contaminated sediments which could result if these sediments are left in their current uncontrolled state.

- The tailings stored on the west side of the Jordan River will be excavated and placed on the pile. This excavation will eliminate exposure to contaminated tailings.

- The residential soil and debris removed during the OU2 remedial action (approximately 323,300 cubic yards) will also be added to the tailings pile before the final cap of the tailings is completed.

- A five-foot, multi-layer vegetated soil cap (or design-based equivalent) is to be constructed over the entire tailings pile. The cap will be designed to allow access to pedestrian traffic. Only those structures specified during remedial design will be permitted on the cap in order to ensure the cap's integrity. The cap will be designed to eliminate direct exposure to, and dispersion of, the tailings. It will also be designed to reduce percolation of water through the tailings and reduce the potential for leaching of metals to groundwater.

- Measures will be taken to divert stormwater runon, to protect against erosion during flood events, and to control subsurface recharge to the site. An interceptor trench will be constructed along the eastern boundary of the tailings

to intercept groundwater flow into the tailings from the perched terrace aquifer. Intercepted groundwater will be drained to the Jordan River if monitoring data confirms that this groundwater meets surface water discharge standards. Net tailings inflow will be reduced by 20 percent, which will in turn reduce seepage of contaminated water out of the tailings.

- Both the cap and interceptor trench will serve to isolate the tailings by significantly reducing inflow of water to the tailings, in turn reducing seepage of contaminated water out of the tailings. This reduction in seepage from the tailings combined with dilution will result in a decrease in groundwater contaminant concentrations in the upper sand and gravel aquifer below the tailings.

- The use of groundwater on the site will be prohibited through deed restrictions, thereby eliminating potential onsite exposure.

- A shallow groundwater monitoring system is to be installed along the northern and western peripheries of the tailings. These wells will function as points of compliance for the shallow groundwater migrating westward, to the Jordan River, and potentially northward, offsite in the upper sand and gravel aquifer. These wells will be designed to also function as extraction wells should ARARs be exceeded in them, necessitating pumping and treatment of groundwater. For groundwater discharging to the river, the action level is the AWQC for arsenic. For groundwater potentially migrating to the north, the action level is the MCL for arsenic. If these levels are exceeded at the points of compliance (based on evaluations by the State and EPA), a pump and treat system will be activated. Treated groundwater will be discharged to the Jordan River.

- This monitoring and possible treatment of the unconfined upper sand and gravel groundwater will serve to contain contaminated groundwater and prevent offsite migration in the upper sand and gravel beneath the OU1 tailings.

- Additional monitoring will be conducted of water levels and metals concentrations in the deep principal aquifer; water levels and metals concentrations at locations other than the compliance point wells in the shallow aquifer; and metals concentrations in the Jordan River. Site conditions will be reevaluated by EPA and the State if any of the following are observed:

    - A statistically significant decrease in water levels in the deep principal aquifer.

    - A statistically significant increase in shallow water levels beneath the tailings.

- A statistically significant increase in river arsenic levels.
- Statistically significant increases in arsenic levels in the deep principal aquifer or in the upper sand and gravel aquifer at locations other than the compliance point wells.
- This additional monitoring will serve to contain contaminated groundwater and prevent migration of contaminated groundwater outside the OU1 site boundaries or into the deep principal aquifer.

The hydraulic characteristics of the selected remedy are basically twofold. First, the amount of water coming into the tailings will be significantly reduced. Water presently within the tailings will drain out until an equilibrium is reached between the volume of water entering the tailings and the volume draining from the tailings. Due to the cap and interceptor trench, this volume will be minimized. The second characteristic is containment of contaminated groundwater beneath the site. This will be achieved by the monitoring/extraction well system and treatment, if necessary. If migration of contaminated groundwater is prevented, aquatic life in the river and groundwater users outside the OU1 site boundaries will be protected.

Estimated costs for the selected remedy are provided in Table 17. Figure 3 shows an approximate site layout for this alternative. The actual areal extent of the cap, location of the trench, number of monitoring wells, and frequency of monitoring will be determined during remedial design.

The Contingency Alternative: Alternative 3 - Excavation/Transport/Containment

Based upon the engineering cost estimates that it has received, EPA anticipates that the cost to implement the offsite option favored by the State for remediation of the Sharon Steel tailings OU1 site will be substantially greater than that of the selected capping remedy. The State has questioned EPA's position based upon their own studies. EPA and the State have agreed to jointly conduct the following process to resolve their difference of information on this issue.

TABLE 17

COST ESTIMATES FOR THE OU1 SELECTED REMEDY

PROJECT: SHARON STEEL/MIDVALE TAILINGS SITE (OU1)

ALTERNATIVE 4: CAPPING (Revised 4/92)

DESCRIPTION: Construction of a multi-layered soil cap,
groundwater control with extraction, treatment and Jordan River disposal.

ENR Average Construction Cost Index 4890.83

DIRECT CAPITAL COSTS
(Includes Labor, Equipment & Materials, Unless Otherwise Noted)

COST COMPONENT	UNIT	QUANTITY	UNIT COST	CAPITAL COST
1. Excavation				
a. Mill Facility Area (Excav & Spread)	CY	132000	$9	$1,226,000
b. Wetlands Remove/Restore	CY	43600	$11	$472,000
c. Tailings West of Jordan (Excav & Spread)	CY	22300	$9	$207,000
d. Settlement Analysis	LS	1	$35,000	$35,000
2. Surface Water Control				
a. Regrading (includes 1b, OU2 soils)	CY	648100	$1	$765,000
b. Regrading Jordan River	CY	1400000	$1	$2,002,000
c. Galena Canal Rehab	LF	5600	$81	$454,000
d. Slope Stabilization (Soil Cement)	LF	8600	$702	$6,038,000
3. Capping (incl mill facility area)				
a. 24" Low Permeability Layer (clay)	CY	567900	$9	$5,009,000
b. 12" Sand Drainage Layer	CY	284000	$11	$3,062,000
c. Geotextile Filter Fabric	SY	851900	$2	$1,721,000
d. 24" Vegetation Layer	CY	871200	$9	$7,928,000
e. Revegetation	AC	270	$721	$195,000
4. Groundwater				
a. Groundwater Extraction Wells	EA	11	$18,000	$198,000
b. On-site Treatment	LS	1	$885,000	$885,000
c. Pumping/Discharge to Jordan River	LS	1	$397,400	$397,000
d. Interceptor Trench	LF	5500	$69	$377,000
TOTAL DIRECT CAPITAL COSTS				$30,970,000

TABLE 17 (CONTINUED)

COST ESTIMATES FOR THE OU1 SELECTED REMEDY

PROJECT: SHARON STEEL/MIDVALE TAILINGS SITE (OU1)

ALTERNATIVE 4: CAPPING

INDIRECT CAPITAL COSTS (% of Direct Capital Costs)	
1. Engineering & Design (15%)	$4,646,000
2. Contingency Allowance (25%)	$7,743,000
3. Other Indirect Costs	
A. Legal (5%)	$1,550,000
B. Regulatory (5%)	$1,550,000
C. Mobilization/Demobilization (10%)	$3,097,000
TOTAL INDIRECT CAPITAL COSTS	$18,590,000
TOTAL CAPITAL COSTS (DIRECT + INDIRECT)	$49,560,000

TABLE 17 (CONTINUED)

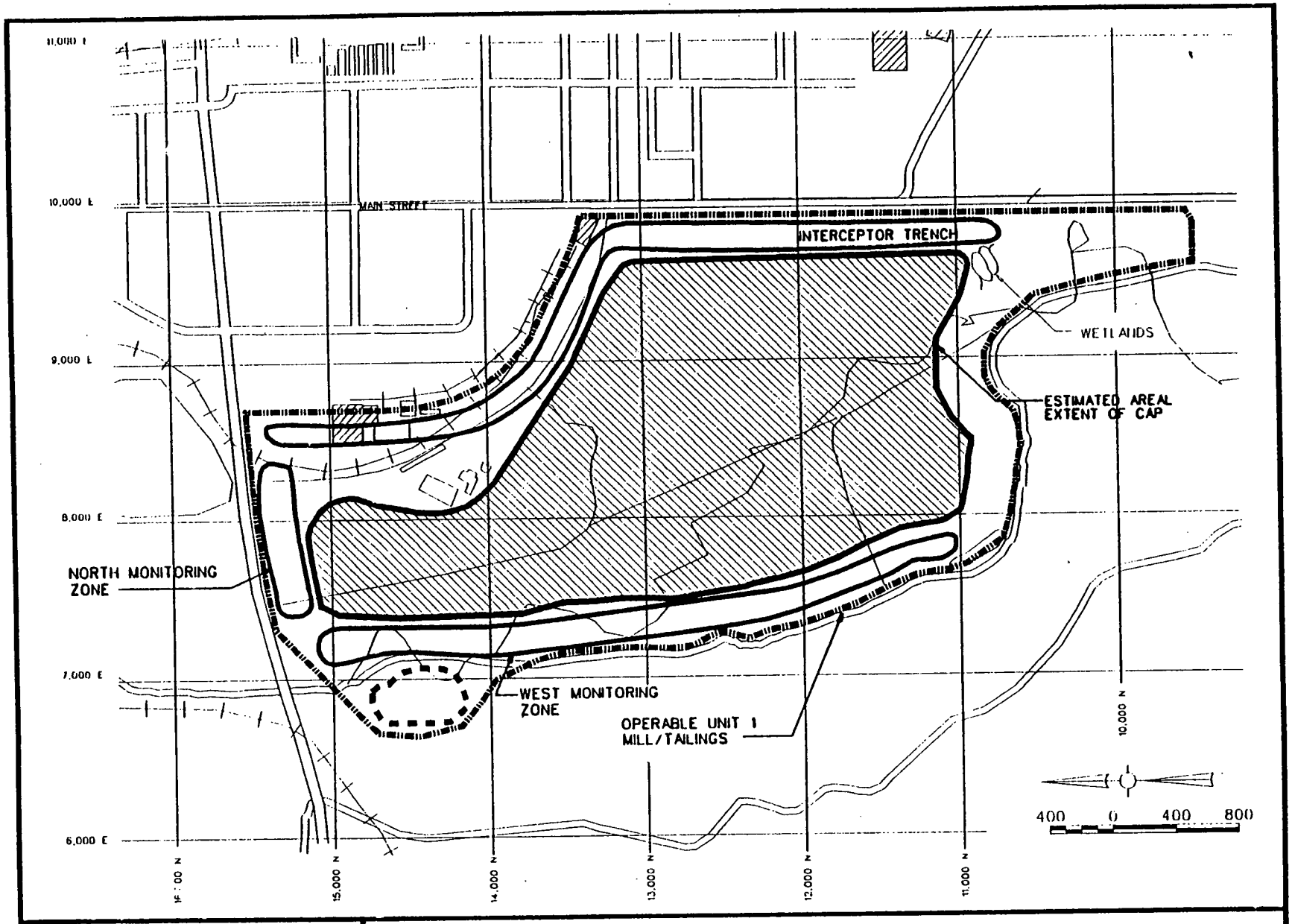
COST ESTIMATES FOR THE OU1 SELECTED REMEDY

PROJECT: SHARON STEEL/MIDVALE TAILINGS SITE (OU1)

ALTERNATIVE 4: CAPPING

Discount Rate = 9.0%

DIRECT ANNUAL/PERIODIC COSTS COST COMPONENT	UNIT	FREQUENCY	QUANTITY (PER YEAR)	UNIT COST	DIRECT ANNUAL COST	LIFE OF ITEM (YEARS)	PRESENT WORTH ANNUAL COSTS	PRESENT WORTH PERIODIC COSTS
DIRECT ANNUAL/PERIODIC COSTS								
1.Cap								
a. Inspection	EA	ANNUAL	1	$2,000	$2,000	30	$21,000	n/a
b Mowing & Revegetation	EA	ANNUAL	1	$63,500	$63,500	30	$652,000	n/a
c. Cap Repair & Maintenance	EA	ANNUAL	1	$10,000	$10,000	30	$103,000	n/a
2. Groundwater								
a. Replace Groundwater Extraction Wells	EA	ONE EVERY YEAR	1	$18,000	$18,000	30	$185,000	n/a
b. Well O&M	LS	ANNUAL	1	$40,000	$40,000	30	$411,000	n/a
c. Treatment Plant O & M	LS	ANNUAL	1	$88,500	$88,500	30	$909,000	n/a
d. Replace Treatment Plant	EA	EVERY 10 YEARS	n/a	$885,000	n/a	10	n/a	$532,000
e. Pumping/Discharge to Jordan O&M	LS	ANNUAL	1	$55,100	$55,100	30	$566,000	n/a
TOTAL DIRECT ANNUAL COSTS:					$277,000			
TOTAL PRESENT WORTH OF DIRECT COSTS:							$2,847,000	
TOTAL PRESENT WORTH OF DIRECT PERIODIC COSTS:								$532,000
TOTAL PRESENT WORTH OF DIRECT ANNUAL/PERIODIC COSTS:								$3,379,000
INDIRECT ANNUAL/PERIODIC COSTS (Percentage of Total Direct Annual Costs):								
Administration (10%)	LS	ANNUAL	1		$27,700	30	$285,000	n/a
Maintenance Reserve & Contingency Costs (25%)	LS	ANNUAL	1		$69,300	30	$712,000	n/a
TOTAL PRESENT WORTH OF INDIRECT ANNUAL/PERIODIC COSTS:								$997,000
TOTAL PRESENT WORTH (Capital & Annual/Periodic) COSTS:								$53,936,000
TOTAL PRESENT WORTH COSTS PER ACRE (BASED UPON 270 ACRES)								$199,763



CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

SHARON STEEL/MIDVALE TAILINGS SITE
COMPONENTS OF SELECTED REMEDY

FIGURE 3

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In order to gain better insight into these costs, EPA and the State of Utah will jointly fund the following process. EPA, working in partnership with the State of Utah, will lead a Request for Proposal (RFP) process to resolve the issue of whether a protective, cost-effective offsite disposal alternative exists. This process will also determine if the offsite alternative meets the nine criteria for remedy selection set forth in the National Contingency Plan (NCP), and is implementable in a timeframe and cost similar to the selected capping option.

In order for the contingency alternative process to proceed, the following schedule of activities must occur. EPA will use four of the following dates (indicated by an asterisk) as "triggers" for activities which follow. EPA will use the other dates as milestones to ensure that this evaluation process is proceeding expeditiously toward completion. If a milestone date is missed due to EPA's inability to meet that date, or if a trigger date is missed for reasons beyond the control of the State, the milestone and trigger date will be revised by EPA, if EPA agrees after a review with the State, of the reasons(s) the date was missed.

> *By January 1, 1994, the Governor of Utah will provide a letter to EPA stating his concurrence and support of this partnership approach between EPA and UDEQ that will be used to arrive at consensus on the market costs for the offsite and onsite alternatives. The Governor will also commit to working with the Legislature of the State of Utah during its 1994 legislative session to make preliminary inquiries regarding the funds the State is willing to provide to implement either the offsite or onsite remedy.

Upon receipt of this letter to EPA's Region VIII Regional Administrator, the evaluation process, as follows, will begin:

EPA will lead in the development of a dual track Request for Proposals (RFP) for both a capping alternative and an offsite disposal alternative. This process will provide for the full involvement of the State of Utah in a manner similar to the State's involvement in the

decision process for remedy selection. EPA will work with the State of Utah to ensure that the State is provided with opportunity to fully participate in the conduct of this evaluation process.

*By March 31, 1994, the Governor will provide a letter to EPA stating, on behalf of the State of Utah, his commitment to seek funding as appropriate to remediate the tailings. In the letter the Governor will provide his firm commitment to seek legislative approval for the amount of funds that the State is willing to provide in order to implement an onsite or offiste remedy.

If these forgoing triggers are met, the following milestone dates and accomplishments are expected to occur:

By September 30, 1994, EPA, in consultation with UDEQ, will complete the development of performance specifications for both a cap and the offsite option. These performance specifications will be used to request accurate information from potential vendors regarding the final cost, technology, and schedule of implementation of the capping and offsite options.

By December 31, 1994, EPA will place the performance specifications into the marketplace for bid.

Prior to the March 31, 1995 trigger date, all activities related to the receipt of bids, bid evaluation, negotiation and cost verification are to be complete.

*By March 31, 1995, EPA, in consultation with UDEQ, will complete evaluation of the bids and issue a decision on which technology to award. Pursuant to CERCLA Section 121, EPA's authority to determine the final remedy selection is preserved. In the event that the cost of offsite disposal is determined to be greater than that of capping and the State of Utah desires offsite disposal be the remedy which is implemented, the State of Utah will be required to enter into a contract (Agreement) with EPA, pursuant to CERCLA Section 104(c)(3), 42 U.S.C. § 9604(c)(3).

*By June 30, 1995, the State of Utah will sign the Agreement. This Agreement will require Utah to provide 10% of funding requested from the Superfund, as required by CERCLA Section 104 (C) (3), 42 U.S.C. § 9604 (c) (3) (Ten Percent Fund), or other amounts consistent with the Governor's March 31, 1994 letter and to identify all additional funding that will be used. If however, the amount of funding to be

provided by the State and the additional funding identified is less than the sum of the remedy cost difference and the Ten Percent Funds, EPA may proceed, after consultation with the State, to implement the selected capping remedy.

By September 30, 1995, EPA will proceed to award the contract for Remedial Design of the selected technology in consultation with UDEQ.

By September 30, 1996, it is anticipated that the final design will have been completed and a contract for Remedial Action for the lowest cost qualified bid on the selected technology shall be awarded by EPA in consultation with UDEQ.

EPA considers each of the dates with an asterisk to be "triggers" for the activities which follow. If these trigger dates are not met, then pursuant to its decision authority in CERCLA Section 121, EPA may proceed to implement the capping alternative as detailed in this ROD. If a milestone date is missed due to EPA's inability to meet that date, or if a trigger date is missed for reasons beyond the control of the State, the milestone and trigger will be revised by EPA if, after review with the State, EPA agrees with the reason(s) that the date was missed. All other dates are to be used as milestones of performance toward the expeditious finalization of this evaluation process. If however, EPA determines at any point during the above schedule of activities that the process is not leading to an expeditious cleanup of the site, EPA, after notification to and consultation with the State, may exercise its authority under CERCLA Section 121 to begin the capping alternative.

The outcome of this evaluation is intended to provide both EPA and the State of Utah with a "market analysis" of the actual costs to implement either the selected cap remedy or the contingency offsite alternative. EPA will award the final contracts for Remedial Design and Remedial Action based on contract requirements detailed in the Federal Acquisition Requirements (FAR).

In summary, the contingency alternative has the following components:

- Soil contaminated above action levels will be removed to a depth of two feet in the former mill area (approximately 132,000 cubic yards), with placement of this soil on the tailings pile, replacement of the excavated soil with clean fill,

and revegetation of the excavated area. This will eliminate any physical contact with contaminated soils in the former mill area.

- The wetlands will be dredged to remove sediments (approximately 43,600 cubic yards) and the sediment will be placed on the existing pile. The wetlands area will be restored to its natural state. This will prevent surface water contamination and exposure of organisms to contaminated sediments.

- The tailings on the west side of the Jordan River will be excavated and stockpiled on the existing pile. This excavation will eliminate exposure to the contaminated tailings.

- Excavation with subsequent transport of the existing tailings (9,022,300 cubic yards), soils (1,266,000 cubic yards), and sediments from the site, and soils and debris from OU2 (323,300 cubic yards) deposited on the site. Removal of the contaminated soils and tailings will eliminate the threat of exposure to these materials.

- A groundwater monitoring system will be installed as described for the preferred alternative. Action levels will also be the same as those described for the preferred alternative.

- The tailings and soils will be transported to a State and EPA approved disposal cell complying with EPA's offsite Disposal Rule and State landfill requirements.

- The materials will be deposited in the offsite disposal cell.

- Once removal of tailings and contaminated soils is complete, clean fill will be brought in to replace the materials removed during excavation and the site will be revegetated.

- The new disposal cell will be covered and vegetated. The cell will be maintained and the groundwater monitored as necessary, to ensure that contaminants do not migrate and adversely impact the area surrounding the cell.

- Groundwater use restrictions will be implemented to prevent the installation of groundwater wells onsite (other than those associated with this alternative). These restrictions will prevent ingestion of possibly contaminated groundwater.

Estimated costs for the contingency alternative are provided in Table 18.

TABLE 18

COST ESTIMATES FOR THE OU1 CONTINGENCY ALTERNATIVE

PROJECT: SHARON STEEL/MIDVALE TAILINGS SITE (OU1)

ALTERNATIVE 3: EXCAVATION (Revised 5/92)

ENR Average Construction Cost Index 4890.83

DESCRIPTION: Excavation of all on-site contaminated material & disposal at State designated cell within a 30 mile radius of Sharon Steel.
Groundwater control with extraction, use, and treatment.

DIRECT CAPITAL COSTS
(Includes Labor, Equipment & Materials, Unless Otherwise Noted)

COST COMPONENT	UNIT	QUANTITY	UNIT COST	TOTAL CAPITAL COST
1. Cell Development				
a. Cell Construction	LS	1	$23,245,000	$23,245,000
b. 24" Vegetation Layer	CY	323000	$9	$2,842,530
c. Vegetation	AC	100	$684	$68,437
2. Wetland Remove/Restore	CY	43600	$11	$471,752
3. Groundwater				
a. Groundwater Extraction Wells	EA	4	$18,000	$72,000
b. On-site Treatment	LS	1	$885,000	$885,000
c. Pumps/Discharge to Jordan River	LS	1	$397,400	$397,000
4. Slurry Mixing & Dewatering Facilities	LS	1	$27,700,000	$27,700,000
5. Slurry Pipeline Construction	LF	158400	$291	$46,079,000
6. Slurry/Water Pumping Stations	EA	3	$776,100	$2,328,300
7. Revegetate Site				
a. 24" Vegetation Layer	CY	871200	$9	$7,927,920
b. Revegetation	AC	270	$721	$194,670
TOTAL DIRECT CAPITAL COSTS				$112,311,609
INDIRECT CAPITAL COSTS (% of direct capital costs)				
1. Engineering & Design (15%)				$16,847,000
2. Contingincy Allowance (15%)				$16,847,000
3. Other Indirect Costs				
A. Legal (5%)				$5,616,000
B. Regulatory (5%)				$5,616,000
C. Mobilization/Demobilization (10%)				$11,231,000
TOTAL INDIRECT CAPITAL COSTS				$56,157,000
TOTAL CAPITAL COSTS (DIRECT + INDIRECT)				$168,468,609
TOTAL CAPITAL COSTS PER ACRE (BASED UPON 270 ACRES)				$623,958

COST ESTIMATES FOR THE OU1 CONTINGENCY ALTERNATIVE

PROJECT: SHARON STEEL/MIDVALE TAILINGS SITE (OU1)

ALTERNATIVE 3 : EXCAVATION

DESCRIPTION: Excavation of all on-site contaminated material & disposal at State designated cell within a 30 mile radius of Sharon Steel.
Groundwater control with extraction, use, and treatment.

DIRECT ANNUAL/PERIODIC COSTS COST COMPONENT	UNIT	FREQUENCY	QUANTITY (PER YEAR)	UNIT COST	DIRECT ANNUAL COST	LIFE OF ITEM YEARS	PRESENT WORTH ANNUAL COST	PRESENT WORTH PERIODIC COST
Discount Rate = 9%								9.00%
DIRECT ANNUAL/PERIODIC COSTS								
1. Dust Control during Excavation	LS	ANNUAL	1	$267,000	$267,000	6.5	$1,300,000	n/a
2. Air Monitoring								
a. Air Sampling/Analysis	EA	QTLY	4	$2,580	$10,000	30	$100,000	n/a
b. Air Monitor Station O&M	EA	WEEKLY	52	$420	$22,000	30	$200,000	n/a
c. Replace Air Monitoring Equipment	EA	EVERY 5 YEARS	n/a	$61,500	n/a	5	n/a	$101,000
3. Excavation/Transport/Place	CY	ANNUAL	1630770	$3	$5,185,849	6.5	$24,700,000	n/a
4. Slurry Pipeline O&M	LS	ANNUAL	1	$1,843,160	$1,843,160	6.5	$8,800,000	n/a
5. Groundwater								
a. Replace Groundwater Extraction Wells	EA	ONE EVERY YEAR	1	$16,500	$16,500	30	$200,000	n/a
b. Well O&M	LS	ANNUAL	1	$40,000	$40,000	30	$411,000	n/a
c. Treatment Plant O&M	LS	ANNUAL	1	$88,500	$88,500	30	$900,000	n/a
d. Replace Treatment Plant	EA	EVERY 10 YEARS	n/a	$885,000	n/a	10	n/a	$532,000
TOTAL DIRECT ANNUAL COSTS:					$7,000,000			
TOTAL PRESENT WORTH OF DIRECT ANNUAL COSTS:							$37,000,000	
TOTAL PRESENT WORTH OF DIRECT PERIODIC COSTS:								$1,000,000
TOTAL PRESENT WORTH OF DIRECT ANNUAL/PERIODIC COSTS:								$38,000,000

TABLE 18 (CONTINUED)

COST ESTIMATES FOR THE OU1 CONTINGENCY ALTERNATIVE

PROJECT: SHARON STEEL/MIDVALE TAILINGS SITE (OU1)

ALTERNATIVE 3 : EXCAVATION

DESCRIPTION: Excavation of all on-site contaminated material & disposal at State designated cell within a 30 mile radius of Sharon Steel.
Groundwater control with extraction, use, and treatment.

COST COMPONENT	UNIT	FREQUENCY	QUANTITY (PER YEAR)	UNIT COST	DIRECT ANNUAL COST	LIFE OF ITEM YEARS	ANNUAL COST	PERIODIC COST	Discount Rate = 9%	9 00%
INDIRECT ANNUAL/PERIODIC COSTS (% of Total Direct Annual Costs):										
Administration (10%)										
a. First 6.4 Years	LS	ANNUAL	1	$733,000	$733,000	6.4	$3,453,000			
b. Last 23.6 Years	LS	ANNUAL	1	$186,000	$186,000	23.6	$1,796,000		n/a	
Maintenance Reserve & Contingency Costs (25%)										
a. First 6.5 Years	LS	ANNUAL	1	$1,832,000	$1,832,000	6.5	$8,730,000			
b. Last 23.5 Years	LS	ANNUAL	1	$465,000	$465,000	23.5	$4,485,000		n/a	
TOTAL PRESENT WORTH OF INDIRECT ANNUAL/PERIODIC COSTS:								$18,000,000		
TOTAL PRESENT WORTH (Capital + Annual/Periodic) COSTS:								$224,000,000		
TOTAL PRESENT WORTH COSTS PER ACRE (BASED UPON 270 ACRES)								$829,630		

11. PERFORMANCE STANDARDS

The Performance Standards presented below for the selected remedy have been developed for the various components of the remedy. These standards were developed to ensure attainment of the remedial action objectives. More detailed standards addressing specific construction and operating requirements will be developed during remedial design.

Excavation

Soils and tailings excavations will be guided by:

- Volume identifications made in the FS,
- Visual observations made during excavation, and
- Verification sampling conducted during/following excavations to ensure that all soils/tailings exhibiting contaminant concentrations above action levels have been removed.

Verification sampling and analysis will be conducted according to an EPA-approved Sampling and Analysis Plan.

Capping

If the selected remedy is implemented, cap design and construction must be approved by EPA. The cap will be designed to isolate the tailings; i.e., to be a physical and hydraulic barrier. The final cap must be designed in a manner which permits pedestrian access. Potential land use options will be evaluated during design. Design, construction, maintenance and monitoring of the cap will be conducted according to strict engineering standards established during remedial design. Version 3.0 of the HELP model will be used during detailed cap design to predict leachate generation and provide comparisons with estimates made in the FS. Regular inspections and maintenance will ensure the cap's integrity.

Interceptor Trench

The interceptor trench is part of the selected remedy and will be designed to further hydraulically isolate the tailings, thereby further reducing seepage out of the tailings into the unconfined upper sand and gavel aquifer. Design, construction, maintenance and monitoring of the trench will be conducted according to strict engineering standards established during remedial design, and must be approved by EPA.

Groundwater Monitoring System

The groundwater monitoring system is identical for both the selected remedy and contingency alternatives. The purpose of the shallow groundwater monitoring system will be to ensure that ARARs are not exceeded at the points of compliance in the upper sand and gravel aquifer. This will in turn ensure that migration of contaminated groundwater is prevented beyond the OU1 boundary. If necessary, as triggered by exceedance of ARARs, extraction and treatment of groundwater will be conducted. The goal of treatment will be to contain the groundwater beneath the site and prevent migration beyond the OU1 boundary.

The compliance point for the site will be defined by shallow monitoring wells located along the western and northern boundaries of the tailings. The wells will be designed to also function as extraction wells should groundwater arsenic levels in the wells exceed ARARs. necessitating pumping and treatment of groundwater.

Specific performance standards are as follows:

- Based on monitoring at the western compliance point wells, groundwater in the unconfined upper sand and gravel aquifer exhibiting arsenic levels greater than the AWQC of 190 µg/L must not discharge to the Jordan River.
- Based on monitoring at the northern compliance point wells groundwater in the unconfined upper sand and gravel aquifer exhibiting arsenic concentrations

greater than the MCL of 50 µg/L must not migrate beyond the OU1 boundaries.

- If these levels are exceeded (based on statistical evaluations and evaluations conducted by EPA) a groundwater pump and treatment system will be activated to threat groundwater in the upper sand and gravel aquifer.

- If extraction and treatment are initiated, the goal is only to contain groundwater and meet ARARs in the compliance point wells. The system will operate as long as required to contain contaminated groundwater in the unconfined upper sand and gravel aquifer.

In the case of non-compliance with performance standards, EPA or the State may require the implementation of more aggressive remedial measures.

Additional monitoring will be conducted of water levels and metals concentrations in the deep principal aquifer, and in the unconfined upper sand and gravel aquifer at locations other than the compliance point wells. Metals concentrations in the Jordan River will also be monitored. Additional performance standards relative to this additional monitoring are as follows:

- Based on water level monitoring in the deep principal aquifer, water levels must not show a statistically significant decrease or a decrease in the average water level of greater than 20 feet (a baseline level will be established during design).

- Based on water level monitoring in the unconfined upper sand and gravel aquifer, water levels must not show a statistically significant increase beneath the tailings on OU1.

- Based on water quality sampling, arsenic concentrations in the Jordan River down gradient of the OU1 site must not show a statistically significant increase above levels upgradient of the site.

- Based on groundwater monitoring and sampling in the unconfined upper sand and gravel and deep principal aquifers (at locations other than the compliance point wells), arsenic concentrations must not show a statistically significant increase or an increase of more than 10 µg/L.

- If any of the above conditions are observed during monitoring of the site, a reevaluation of site conditions will be conducted by EPA.

The details of the monitoring system will be developed during remedial design and will include, at a minimum, the following: locations of compliance point and other monitoring wells; frequency of monitoring of compliance point and other wells, analytical parameters, sampling field methods, water level measurement frequency, analytical methods for chemical analysis, locations and methods for water level measurements, locations and methods for surface water sampling, and statistical methods for evaluating the analytical data. All monitoring will be conducted according to EPA-approved methods and procedures.

The monitoring system will be designed to provide information that can be used to evaluate the effectiveness of the remedial action with respect to the following:

- Concentrations of arsenic in compliance point wells;
- Distribution of contaminants in the unconfined upper sand and gravel aquifer and deep principle aquifer and surface water;
- Rate and direction of contaminant migration in the unconfined upper sand and gravel aquifer;
- Changes in contaminant concentrations or distribution within the aquifer system over time;
- Changes in hydraulic gradients between the unconfined upper sand and gravel and deep principle aquifer over time;
- Effects of any modifications to the original remedial action.

The groundwater at the compliance point wells will be monitored for contaminants throughout the implementation of the remedy and until there is no longer a threat of offsite migration of arsenic.

Disposal Cell

If the contingency alternative is implemented, offsite disposal must comply with all local, state, and federal regulations required as part of CERCLA response action. The landfill site must incorporate surface water runon/runoff control, leachate collection, impermeable liners and dust control to prevent contaminant migration as needed to meet design specifications. Details regarding the design, construction, maintenance, and monitoring of the cell will be established during remedial design.

Institutional Controls

- If the selected remedy is implemented, only structures determined to be suitable for placement on the cap will be permitted in order to prevent breaches in the integrity of the cap and to ensure that erosion is prevented. The determination of the type and number of structures will be finalized by EPA during design.

- No domestic wells will be permitted onsite through deed restrictions to prevent any ingestion of contaminated groundwater. This is a restriction which is regulated by the State of Utah. Utah will retain final authority to restrict or appropriate groundwater use at this site.

12. STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve protection of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for this site must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The

following sections discuss how the preferred and contingency alternatives meet these statutory requirements.

Protection of Human Health and the Environment

The selected remedy provides protection of human health and the environment by providing a barrier between the tailings and contaminated soil, and the environment. Migration of tailings particles to the air and the risk of inhalation of tailings dust by humans is therefore minimized. Because the cap also reduces infiltration through the tailings, the leaching of arsenic to the underlying groundwater aquifers will be limited. By containing and treating, if necessary, contaminated groundwater, offsite risk to humans and the environment will be minimized.

By removing the contaminated tailings and soils from the site to a State and EPA approved disposal cell, and monitoring and, if necessary, treating the groundwater, the contingency alternative provides protection of human health and the environment. Direct contact, inhalation, and groundwater ingestion risks at OU1 will be eliminated by this remedial action. In addition, the environmental migration routes of air, surface water, and groundwater would be removed at OU1 (the risks will need to managed at the new location).

Compliance with ARARs

The chemical-specific ARARs related to air, surface water and groundwater quality are satisfied by the selected remedy because it minimizes dust generation, contact of surface and subsurface infiltration and inflow with contaminated material, and leaching of arsenic to groundwater and it contains contaminated groundwater and prevents offsite migration. As a result, the health-based standards for exposure will be satisfied. Leaching of arsenic to groundwater will be minimized by the cap construction by minimizing infiltration of precipitation and rerouting of stormwater runon. Action specific ARARs which will be incorporated into the remedial design prevent discharge of contaminated materials and surface

water to the Jordan River, dust generation during site grading and cap construction, and will meet standards for surface impoundment, groundwater protection, site cleanup and OSHA requirements. The location and action specific ARARs will be addressed in the remedial design for the selected remedy. Location specific requirements include the evaluation of impacts on floodplains and preservation of wetlands.

Appendix A provides a list of the ARARs and TBCs for the selected remedy. The determination of whether State requirements are more stringent than Federal requirements has not yet been made.

The chemical specific ARARs related to air and water quality will all be satisfied by the contingency alternative because the contaminants are removed from the site (some residual contamination may remain in the groundwater beneath the excavated tailings). The health and regulatory standards at the site also will be met. The landfill site selected by the State must incorporate surface water runon/runoff control, leachate collection, impermeable liners and dust control. Disposal of the waste must comply with all local, State and Federal procedural and substantive requirements, regulations, and statutes required for disposal of mining waste as a part of a CERCLA response action. The tailings are exempted by the Bevill Amendment and thus do not require treatment before removal as specified in the Land Ban regulations. Action specific ARARs will also be incorporated into the remedial design of the contingency alternative. These include control of tailings and surface water discharge to the Jordan River, dust generation from the tailings during excavation, and national and Utah standards for landfills, groundwater protection, site cleanup and OSHA requirements. Location specific ARARs will be satisfied during the remedial design of this alternative. Preservation of the floodplain and wetlands will be incorporated into the excavation plans, and original contours and wetlands acreage will be restored.

Cost Effectiveness

Based on analysis of costs, EPA has determined that the selected remedy would be the most cost-effective, with the contingency alternative somewhat less cost-effective, but within an order of magnitude of the cost of the selected remedy.

Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies)

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for OU1 at the Sharon Steel/Midvale Tailings site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that this remedy (Alternative 4 as selected remedy and Alternative 3 as contingency alternative) 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; and cost while also considering the statutory preference for treatment as a principal element and considering State and community acceptance.

The selected remedy (Alternative 4) would be designed to be a permanent solution. Regular cap inspections, and groundwater monitoring and, if necessary, treatment would ensure the continued safety of the surrounding populations and the environment.

The contingency alternative (Alternative 3) would be a permanent measure as well since the contaminated materials would be removed from the site. The approved disposal site will satisfy all Federal, State, and local requirements, regulations, and statutes, and will be considered a permanent disposal site.

Preference for Treatment as a Principal Element

Both the selected remedy and contingency alternative will include the treatment of groundwater, if necessary, but not of contaminated soils or tailings which are the principal threat.

Of the alternatives which were evaluated for the site, only Alternative 6 meets this requirement. However, fixation would be difficult to implement due to the variable characteristics of the waste. It is also cost-prohibitive.

Because treatment of the contaminated soils and tailings was not found to be practicable, the selected remedy does not satisfy the statutory preference for treatment.

13. DOCUMENTATION OF SIGNIFICANT CHANGES

CERCLA Section 117(b) requires an explanation of any significant changes to the preferred alternative as presented in the Proposed Plan which was available for public comment. There were no significant changes.

GLOSSARY

Action Levels - Levels of contaminants in soil, air, or water at which EPA believes a remedy is necessary. Action levels vary from site to site and even within sites, based on potential exposure.

Arsenic - A metal-like substance used in the manufacture of glass, metal alloys, and wood preservatives. Arsenic also is used in insecticides and weed killers because it is highly toxic to insects and plants. Arsenic occurs naturally, and has been found in sea water, spring water, and in association with mineral deposits of silver and antimony. Ingestion of arsenic at high levels over an extended period of time may cause skin cancer.

Capital Costs - The labor, material, and equipment costs of construction associated with a remedial alternative.

Capping - Covering contaminated soil with layers of barrier materials.

Carcinogen - A substance that increases the incidence of cancer.

Chronic Daily Intake (CDI) - The average amount of a chemical in contact with an individual on a daily basis over a substantial portion of a lifetime.

Chronic Exposure - A persistent, recurring, or long-term exposure. Chronic exposure may result in health effects (such as cancer) that are delayed in onset, occurring long after exposure ceased.

Contamination - Pollution of the natural environment.

Contingency Alternative - As used in this document, the contigency alternative is the alternative to excavate, transport, and contain the tailings at an offsite location.

Dust Suppressant - A non-toxic chemical, such as a polymer coating, applied to a surface to prevent the blowing of dust.

Endangerment Assessment (EA) - A study conducted as part of a Remedial Investigation that describes the risks posed to public health and the environment at a Superfund site.

Exposure - The opportunity to receive a dose through direct contact with a chemical or medium containing a chemical.

Exposure Assessment - The process of describing, for a population at risk, the amounts of chemicals to which individuals are exposed, or the distribution of exposures within a population, or the average exposure of an entire population.

Exposure Pathway - The main route through which contamination may enter the body. Inhalation, ingestion, and direct contact are three exposure pathways.

Fixation - A process of mixing the soil and a chemical agent together to immobilize the spread of contamination.

Hazard Index (HI) - An EPA method used to assess the potential noncarcinogenic risk. The chronic daily intake (CDI, see definition above) divided by the chronic reference dose (RfD, see definition below) or other suitable toxicity value for noncarcinogens yields the hazard index (HI). If this value is less than one, then the exposure represented by the CDI is judged unlikely to produce an adverse noncarcinogenic effect. A cumulative, endpoint-specific HI can also be calculated to evaluate the risks posed by exposure to more than one chemical by summing the CDI/RfD ratios for all the chemicals of interest exert a similar effect on a particular organ.

Institutional Controls - Rules, regulations, laws, or convenants that may be necessary to ensure the effectiveness of a cleanup alternative.

Groundwater - Water contained in sand, soil, rock, or gravel particles beneath the earth's surface. Rain that does not evaporate or immediately flow to rivers, streams, and lakes, slowly seeps into the ground forming a groundwater reservoir. Typically, groundwater flows more slowly than surface water, often along routes that lead to streams, rivers, and lakes.

Leach - The removal of soluble minerals caused by the percolation of water through soil and tailings.

Lead - A metal used as a gasoline additive, in batteries, foil, solder, and construction equipment. In humans, lead is stored primarily in bones and teeth. Inhalation or ingestion of lead may damage the central nervous system and affect a child's ability to learn.

National Priorities List (NPL) - EPA's list of top priority hazardous substance sites that are eligible for an investigation and cleanup under the Federal Superfund program.

Operable Unit (OU) - A term used to describe a specific portion of a Superfund site. An operable unit may be established based on a particular type of contamination, contaminated media (e.g., soils, water), source of contamination, and/or geographical location.

Operation and Maintenance Costs - The annual costs of ensuring that a remedial alternative is protective.

Present Worth - The amount of money required in today's dollars to pay for the entire remediation, through the life of the project. Inflation is not included in the figure.

Reference Dose (RfD) - The EPA's preferred toxicity value for evaluating noncarcinogenic effects. The RfD is the dose which an individual may be exposed to for a lifetime without significant adverse health effects.

Remedial Action - Long-term cleanup of a Superfund site.

Remedial Alternative - An option for addressing site contamination.

Remedial Design - Development of detailed plans for cleaning up a hazardous waste site; Remedial Design comes after a remedy has been selected and includes all details necessary to construction of the remedy.

Remedial Investigation/Feasibility Study (RI/FS) - Long-term study and identification of cleanup alternatives at a Superfund site. The Remedial Investigation identifies the types, locations, and quantities of hazardous wastes, and the Feasibility Study develops and evaluates alternatives to clean the wastes up.

Residential Soils - Yards and other unpaved open areas within residential, business, and public properties in Midvale that were sampled during the Sharon Steel soils study.

Risk - The nature and probability of occurrence of an unwanted, adverse effect on human life or health, or on the environment.

Risk Assessment (RA) - A baseline risk assessment provides an evaluation of the potential threat to human health and the environment in the absence of any remedial action. It also provides a point of reference for determining whether or not remedial action is necessary and the justification for performing remedial actions.

Sediment - Rock, sand, soil and decomposing animals and plants that settle to the bottom of a wetland, stream, river, pond, or lake.

Superfund - A common name for the Federal program established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended in 1986. EPA administers the Superfund program to study and clean up actual or potential releases of hazardous substances from uncontrolled hazardous waste sites.

Surface Water - Standing or flowing water located on the ground surface, such as streams, rivers, ponds, or lakes.

Tailings - A fine, sandy byproduct of ore milling operations. Tailings on the Sharon Steel site contain high concentrations of finely ground metals such as lead and arsenic.

Vegetated Soil Cap - A covering for contaminated tailings and soil with layers of barrier materials that prevent water from reaching the contaminated materials. In the case of a vegetative cap, the upper surface of the cap is planted with vegetation to stabilize the surface.

Wetlands - An area of land that is continually wet, such as a swamp or marsh. Wetlands are very important habitats to many animals.

APPENDIX A

ARARs FOR THE SELECTED REMEDY

APPENDIX A
ARARs FOR THE SELECTED REMEDY

DESCRIPTION	ARAR STATUS
National Primary Drinking Water Standards	R & A
National Secondary Drinking Water Standards	R & A
National Maximum Contaminant Level Goals	TBC
Utah Safe Drinking Water Act	R & A
Utah Groundwater Protection Rules	TBC
National Clean Water Act Dredge and Fill Requirements	Applicable
National Clean Water Act Ore Mining and Dressing Requirements	R & A
Utah Standards for Water Quality	Applicable
Utah Pollution Discharge Elimination System	Applicable
National Primary and Secondary Ambient Air Quality Standards	Applicable
National Criteria for Classification of Solid Waste Disposal Facilities	Applicable
National Standards for Transportation of Hazardous Waste	R & A
National Closure and Post Closure Standards for Hazardous Waste	R & A
National Waste Piles Standards	R & A
National Landfill Standards	R & A
National Guidelines for Land Disposal of Solid Waste	R & A
National Toxic Substances Control Act - Asbestos	Applicable
Utah Closure and Post Closure Standards for Hazardous Waste	R & A
Utah Waste Pile Standards	R & A
Utah Landfill Standards	R & A
Utah Groundwater Protection Standards	R & A
Utah Corrective Action Cleanup Policy	Applicable
National Occupational Safety and Health Act	Applicable
Utah OSHA - Toxic and Hazardous Substances	Applicable
Utah OSHA - Excavations. Trenching and Shoring	Applicable
Utah OSHA - General	Applicable
DOT Hazardous Material Transportation Act	R & A
National Fish and Wildlife Coordination Act	Applicable

APPENDIX A
ARARs FOR THE SELECTED REMEDY (continued)

DESCRIPTION	ARAR STATUS
Executive Order on Floodplains Management	Applicable
Executive Order on Protection of Wetlands	Applicable
Utah Well Drilling Regulations	Applicable
Toxicological Profiles for Arsenic and Cadmium	TBC
National Surface Mining and Reclamation Act	R & A
Endangered Species Act	Applicable

Notes:

R & A = Relevant & Applicable
TBC = To Be Considered
Specific citations for these ARARs can be found in the Feasibility Study.

EPA RESPONSE TO COMMENTS DOCUMENT
FOR
OPERABLE UNIT 1 (OU1)
OF THE
SHARON STEEL MIDVALE TAILINGS
SUPERFUND SITE
MIDVALE, UTAH

December 1993

Prepared for:

U.S. Environmental Protection Agency

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EPA RESPONSE TO COMMENTS DOCUMENT

FOR OPERABLE UNIT 1 (OU1) OF THE SHARON STEEL MIDVALE TAILINGS SUPERFUND SITE

IN MIDVALE, UTAH

December 1993

TABLE OF CONTENTS

I. Introduction

This Responsiveness Summary has been prepared as part of EPA's Record of Decision (ROD) describing how contaminants at the Sharon Steel (Midvale Tailings) Superfund site (Sharon Steel site) will be remediated. This Responsiveness Summary serves several functions. It provides the public and the decision-makers with information about what the community thinks about EPA's proposed remedial action and other alternatives that were evaluated. In addition, it documents how EPA considered public comments during the decision-making process and describes how EPA has responded to major issues that have been raised at the Sharon Steel site.

This Responsiveness Summary and the associated Record of Decision culminate eleven years of study at the Sharon Steel site, which includes an abandoned milling operation and nearby residential and business properties in Midvale, Utah. In 1989 the study was divided into two separate "operable units" (OUs, or study areas) to facilitate site cleanup.

The focus of this document is OU1. OU1 includes two components, the former mill site and tailings; and soils from OU2 that will be excavated during the OU2 cleanup. OU2 consists of business and residential properties in areas that have been contaminated by materials from the mill site. The cleanup phase of OU2 is being managed by the State of Utah and is proceeding on a separate schedule from OU1.

OU1 has been the subject of three analyses by EPA to remediate the site. All three of these analyses have resulted in an EPA recommendation to cap the tailings. In general, the community and the State of Utah have opposed capping. With each successive analysis, EPA has sought to work with the State and the community to develop a viable alternative that would meet local needs and complies with the National Contingency Plan's nine criteria for selecting a remedial action.

EPA believes that the cap meets those criteria and has chosen the cap as the selected remedy. In order to provide the State and community the opportunity to enhance the remedy, a contingency alternative consisting of removal and offsite disposal has also been designated. This document describes community concerns about EPA's proposal and EPA's response to those concerns. This document includes the following sections:

- Background on Recent Community Involvement
- Background on Historical Community Involvement
- Community Concerns
- Summary of Comments Received During the Public Comment Period and Agency Responses

  Part A: Summary and Response to Local Community Concerns
  Part B: Comprehensive Response to Specific Legal and Technical Questions

- Remaining Concerns
- Attachment: Community Relations Activities

II. Background on Recent Community Involvement

The most recent of the three OU1 analyses conducted by EPA concluded in 1992 when EPA published a Proposed Plan that described both EPA's and the State's preferred alternatives to clean up to the mill site. Subsequently, EPA held a comment period and encouraged interested parties to comment.

The OU1 Proposed Plan published in June 1992 describes two protective approaches to solving the tailings problem on OU1. One approach was proposed by EPA and the other by the State.

EPA's Proposal: EPA proposed capping the tailings and treating the groundwater to prevent migration of contamination from OU1. This cap is markedly different from caps previously

proposed by EPA for the following reasons. The newly proposed cap would consist of a 5-foot soil cap (or design-based equivalent), thicker than previously proposed, that would cover the tailings. Once constructed, native plants would be grown over the cap. Pedestrian access to the site would not be restricted; however, some land use restrictions would apply. Storm water run-off would be diverted from the site through a drainage system. Arsenic concentrations in the groundwater would be monitored and treated, if necessary, to prevent migration of contaminants. In addition, contaminated sediments from wetlands near the river would be excavated and incorporated into the tailings prior to capping. Tailings would be moved 150 feet back from the centerline of the Jordan River to create a buffer zone from the river. Construction of this cap could be completed in two years.

State of Utah's Proposal: As an alternative, the State proposed to evaluate whether it could find a location outside of Midvale to which the tailings could be moved. EPA and the State agreed that if an alternative site were found it would need to meet stringent environmental and other regulatory criteria. It would also need to be acceptable to the citizens of affected communities, both Midvale and any communities near, or enroute, between the new location and Midvale. If an alternative location were found, the cleanup would consist of removing the contaminated materials from the Sharon Steel OU1 mill site and transporting them to an approved landfill that would be constructed at the new location.

Public Reaction to EPA's and the State's June 1992 Proposals: During the 1992 comment period, the community generally expressed support for having the State investigate the possibility of moving the tailings to a new location.

III. Background on Historical Community Involvement

The Sharon Steel site is located in Midvale, Utah, approximately 12 miles south of Salt Lake City. The 270-acre mill site was used by an ore refining company from 1906 to 1971. The OU1 area is generally bordered by 7800 South Street on the north, by Main Street (750) West on the east, and the Jordan River on the west and the south. During milling activities, metals

such as lead, copper, and zinc were removed from crushed ore. EPA estimates that approximately 9 million cubic yards of sand-like tailings remain on the mill site as a result of ore processing activities.

Interest in the Sharon Steel site dates to 1982 when health officials learned that some Midvale residents were using windblown tailings from the site in sandboxes and gardens. Samples of the material were analyzed and found to contain elevated levels of lead, arsenic, cadmium, and other metals. Further study showed that these materials had contaminated the soil, air, and ground water in the Midvale area. EPA prepared a Risk Assessment in which population statistics and lifestyles of individuals living in the area were analyzed to evaluate potential risks to human health. EPA and the State concluded that the site should be cleaned up to reduce risks to human health and the environment from these contaminants. In 1984 EPA proposed that the Sharon Steel (Midvale Tailings) site be added to the National Priorities List (NPL) of sites to be cleaned up.

Since 1985, EPA and the State have followed State and Federal environmental requirements and have analyzed the environmental conditions on and surrounding the site. Their findings have been presented to local officials and members of the community on a regular basis. In 1990, EPA officially listed the entire site, including neighboring properties, on the NPL.

Since 1990 EPA has proposed cleanup alternatives for OU1 to the State and the community on three separate occasions. Each time, EPA has received substantial feedback that has caused the Agency to change its course of action in response to suggestions from the community. After responding to requests from citizens to conduct more extensive evaluations of OU1 site conditions and other alternatives, EPA believes that the currently proposed five-foot cap would be protective of human health and the environment and meet local needs in a cost-effective manner. EPA also believes that it is important to get the cap built so that migration of contaminants from OU1 is curtailed as soon as possible.

IV. Community Concerns

Elected officials representing the State of Utah and the City of Midvale, in addition to Midvale citizens, the Utah Department of Environmental Quality (UDEQ), and other organizations, have repeatedly expressed opposition to the placement of a cap over the mill tailings at the Sharon Steel site.

The most frequently mentioned reasons include concerns about risks the tailings pose to human health and the environment; the ability of a cap to protect both surface water and groundwater; interest in reprocessing the tailings as a remediation method; concern about eventual cap deterioration; confusion and doubt over whether the tailings actually pose risks; and a concern about curtailing future land use options and thus, negatively impacting property values and the tax base.

In addition, there also appears to be a high degree of frustration that in the eleven years since the State first investigated health concerns associated with OU1, a solution to the tailings problem has not been identified and visibly acted upon. Nearby residents want to know whether their health, and the health of their children, is in jeopardy and if so, what protective measures should be taken, for how long, and when they will begin.

These concerns and EPA's response to them are described below.

(1) The citizens of Midvale have expressed concern that the tailings present a risk to human health and the environment.

EPA Response

Like the citizens of Midvale, EPA is concerned with protecting human health and the environment in and around Midvale from risks associated with the Sharon Steel OU1 site. Based on the results of both State and EPA studies, EPA believes there are legitimate scientific concerns about the potential risks the tailings pose to human

health and the environment. Consequently, EPA listed the site on the NPL, and has selected a cleanup method it believes will be protective of both human health and the environment. In selecting the cap, EPA believes that potential migration of contaminants from the tailings will be sufficiently restricted so that future risks to human health and the environment will be alleviated. In addition, EPA and the State have agreed in principle to a contingency plan which would allow the State to enhance the remedy and select a remedial action consisting of removal and offsite disposal, if appropriate.

(2) The citizens of Midvale and the State have expressed concern about the ability of a cap to protect both surface water and groundwater.

EPA Response

In 1989, in response to State and community concern over EPA's preferred alternative, a low permeability cap, EPA divided the Sharon Steel Superfund site into two operable units. This decision allowed EPA to study groundwater and surface water in the vicinity of OU1 in greater detail while it proceeded with study and cleanup of residential and business properties. At that time, EPA also revised the Community Relations Plan, set up a technical review committee, initiated periodic public forums to keep citizens informed, and prepared and distributed a fact sheet on lead and arsenic. These actions were taken to enable EPA to further explore and respond to the community's concerns about the level of protection a cap could provide.

(3) Area residents have expressed the desire to see the tailings reprocessed, both to reduce the volume and toxicity, and to produce additional income generating opportunities for local entrepreneurs.

EPA Response

In late 1989, EPA issued a request for proposals (RFP) for the reprocessing of tailings at the Sharon Steel site. Nine interested parties responded with proposals. EPA and

the U.S. Bureau of Mines (BOM) evaluated these proposals. but none met the criteria requested by EPA in the RFP.

(4) Area residents questioned whether the reprocessing proposals were evaluated fully and fairly.

EPA Response

In March of 1990, EPA issued a Project Status Report that briefly discussed the status of the reprocessing proposals submitted to EPA in February. In May, EPA held a public forum during which it provided a brief update on the reprocessing proposals. At that forum, EPA indicated that it had asked BOM to assist in the evaluation. EPA selected BOM to conduct the evaluation because of its extensive mining expertise, and in recognition of the importance of having a third party evaluate the reprocessing proposals. After determining that none of the proposals adequately responded to the criteria that had been laid out in the request for proposals, and in response to continuing public interest in the feasibility of reprocessing as a potential cleanup method, EPA contracted with BOM in 1991 to conduct a beneficiation study to determine whether beneficiation could refine the tailings sufficiently to be reprocessed and meet environmental requirements. In May 1992, EPA held a public forum in Midvale at which BOM presented its conclusion that beneficiation is not advisable from an environmental compliance and regulatory perspective. A copy of the BOM study and its conclusions is available for public review in each Sharon Steel information repository.

(5) Citizens have expressed the concern that a cap may eventually deteriorate and would therefore not be a permanent solution.

EPA Response

The cap will require the state of Utah to provide and assure maintenance. This assurance is statutorily required of each remedy which uses Superfund Trust Fund dollars to implement the remedy.

(6) Because no remedy has been put in place yet, and citizens have been told there may be a risk, some citizens have expressed confusion over whether human health is still at risk. They have asked what protective measures should be taken and for how long.

EPA Response

There is still risk posed by the uncontrolled tailings. Following remediation these risks will be largely removed.

(7) Midvale citizens have expressed an interest in bringing the cleanup to a final resolution and in getting the job over and done with so the community will no longer have to experience the economic stigma associated with having an NPL site in its back yard.

EPA Response

EPA, by selecting this remedy and implementing it, will be able to remove the NPL "stigma" because the site can proceed to be delisted from the NPL once the remedy is completed.

(8) Midvale citizens have expressed concern that the use of a cap will limit future land use options and will also limit the community's tax base.

EPA Response

EPA believes that the cap will provide substantial, though not unrestricted land use. The tax base is an issue outside of EPA's direct involvement at the Sharon Steel site.

The selected remedy will provide appropriate land use. There has been some interest in use of the site as a park.

V. Summary of Comments Received During the Public Comment Periods

This Responsiveness Summary was prepared in the summer of 1993 and contains comments received during three comment periods that have been conducted on OU1. Comment periods were held on the Proposed Plans that were published in July 1989, October 1990 and June 1992. During each of the three comment periods, members of the public and public officials raised issues that EPA considered before selecting the five-foot cap. Comments received during the comment periods are summarized below. **Part A. Local Community Concerns and Agency Responses,** addresses community concerns and comments that are non-technical in nature. **Part B. Legal and Technical Questions and Agency Responses,** provides responses to specific legal and technical comments. Comments in each part are categorized by topic.

Part A. Local Community Concerns and Agency Responses

1. Remedial Alternative Preferences

Comment 1

UDEQ, a number of Midvale residents, the Mayor and City Council, a representative from the Salt Lake Community Action Program, former Congressman Owens, engineers with a remediation company, and the Midvale Citizens' Group all expressed opposition to capping. The most frequently mentioned reasons were: lack of long-term solutions and permanence; concern about surface water protection; concern about groundwater quality and protection of drinking water for 450,000 valley residents; concern about strong seismic potential in the area; concern about eventual cap deterioration; future land use options; and concern about overall protection of public

health and the environment. Mayor Dahl reaffirmed the Midvale City Council's decision of June 1992, to reject a cap in any form. [June 92, August 92]

EPA Response

EPA believes that the selected capping alternative addresses the concerns raised. A properly maintained cap will permanently prevent migration of the tailings and provide overall protection of public health and the environment. Surface water will be diverted and controlled to prevent erosion of the cap, and contaminated groundwater, if found to be migrating in the future, will be prevented from migrating off-site through the use of a pump and treat system. The cap will be engineered to withstand seismic disturbances to the extent possible and several future land use options will be possible.

Comment 2

In written comment, Mayor Dahl summarized some of his concerns by saying that if the materials on the site are contaminated, then they must be removed or rendered harmless to humans or the environment. The Mayor stated his belief that capping would not accomplish this objective and thus should be discarded as a viable alternative. [August 92]

EPA Response

In the June 1992 OU1 Proposed Plan, EPA recommended the construction of a five foot thick multi-layer cap over the tailings. This cap would eliminate the potential for dispersion of contaminated tailings caused by blowing dust, as well as contact with the tailings by people, plants and animals. The selected remedy would monitor arsenic concentrations in the groundwater and prevent migration of contaminated groundwater outside of OU1 boundaries through the use of a pump and treat system, if needed. In addition, institutional controls would limit construction of drinking water wells on the OU1 site. It is EPA's opinion that the selected capping alternative would protect public health and groundwater that is used for drinking water, would permit

appropriate land use on and around the OU1 site, and would be designed to be a permanent solution. EPA is confident that the selected remedy complies with CERCLA and the regulations.

Comment 3

UDEQ expressed disagreement with EPA's characterization of groundwater contamination in the FS and stated that because of differing characterizations of groundwater, the State could not agree that capping would protect the groundwater. [June 90]

EPA Response

The purpose of capping is to limit additional recharge to the tailings and subsequent leakage to the upper sand and gravel aquifer. The upper sand and gravel aquifer would be monitored, and a groundwater pump and treat system would be implemented, if needed, to prevent migration of contaminants in groundwater outside the OU1 boundaries.

Comment 4

The General Manager of the Salt Lake County Water Conservancy District expressed his opinion that capping sufficiently addresses the problem of airborne contaminants but indicated that more could be done to reduce groundwater contamination. He stated that groundwater should be treated for lead, arsenic, and other contaminants leaching from the tailings. [November 90]

EPA Response

The proposed capping alternative includes a provision for pumping and treating the groundwater to prevent migration of contaminants in groundwater outside the OU1 boundaries if monitoring shows that contaminants will migrate offsite above cleanup standards.

Comment 5

A remediation company stated its opinion that capping is not a cure because it would not prevent metals or other contaminants from migrating to other places. [August 92]

EPA Response

One objective of the cap is to minimize additional recharge to the tailings. A groundwater pump and treat system will be used to prevent migration of contaminants above the cleanup standards away from the OU1 boundaries.

Comment 6

A remediation company stated its opinion that capping would work only if: 1) no earthquakes would ever occur that would cause a loss of the cap integrity; 2) groundwater could be prevented from moving under and through the capped material; 3) the environment under the cap would remain constant throughout eternity; 4) no further needs or changes would occur for the inundated lands; 5) the river would never undercut the tailings pile during flood stages; 6) the soil was uniform in stratigraphy assuring uniformity for capping; 7) no chemicals such as lawn or garden fertilizers could migrate with the groundwater through the site soils; and 8) EPA could assure that none of the above situations would ever occur.

EPA Response

While it is true that capping of the site will only be effective if none of the above situations occur, the same can be said for all but the most extreme alternatives, such as in-situ vitrification, which still could be affected by a severe seismic event. The capping alternative will be designed to withstand seismic activity. The capping design is predicated upon reducing the infiltration of surface water into the area of contamination. The soils used in the construction of the cap would be controlled for uniformity.

It is true that the capping alternative is based upon the assumptions that the environment under the cap will remain constant. These assumptions are made for all of the alternatives. The design of a cap would include bank stabilization, flood control along the Jordan River, and regrading of the river banks. The groundwater will be constantly monitored and contaminated groundwater would be prevented from migrating away from OU1 site boundaries through the use of a pump and treat system, if necessary.

Comment 7

A remediation company stated its opinion that simply closing the site, imposing institutional controls, and/or performing monitoring are not viable solutions, especially when other solutions are available. [August 92]

EPA Response

EPA agrees with this comment. That is why the No Further Action (Alternative #1) and Institutional/Site Controls (Alternative #2) were rejected. In addition to institutional controls and monitoring, EPA's selected remedy is to cap the site and control migration of contaminated groundwater, if necessary. This combination of actions would most successfully fulfill the nine criteria established by CERCLA, when evaluated against the other proposed alternatives.

Comment 8

Former Congressman Owens urged EPA not to select capping, limited site control measures, or no further action as the remedy for the site, citing lack of protection of human health and the environment. Mr. Owens stated his preference for excavation, transport, and containment as an alternative more protective of human health and the environment. Former Congressman Owens questioned EPA as to why chemical treatment of the tailings was not considered as a final alternative, especially since in his opinion, this process could provide a cost-effective and permanent remedy. [July 92]

EPA Response

Limited site control and no further action were not selected as remedies for the site. The proposed capping alternative, which includes possible groundwater treatment and other measures, was chosen as the selected remedy. EPA selected this alternative because, in its opinion, it provides the most effective achievement of all nine CERCLA criteria for remedy selection. The only chemical treatment of the tailings that is remotely feasible is beneficiation and subsequent reprocessing. A 1991 beneficiation study performed by the U.S. Bureau of Mines on the Sharon Steel tailings determined that this method would still leave a significant quantity of highly contaminated waste which would then require disposal.

Comment 9

After studying the FS, UDEQ commented that in its opinion the excavation, transportation, and containment alternative would be the most protective of human health and the environment and provide the highest long-term effectiveness and permanence by eliminating direct contact and migration routes of surface water to groundwater. [August 92]

EPA Response

The construction of a five foot multi-layer cap (or design-based equivalent) would effectively prevent surface water from migrating through the tailings and leaching contaminants into the groundwater. Other modifications will divert stormwater from reaching the tailings pile. Excavation, transportation, and containment is not a risk free alternative. There is a potential that an uncontrolled spill of significant magnitude could occur during transport of the tailings. Also, a repository that is reasonably located and acceptable to the public has to be found if the tailings are to be moved. If an alternate site is located, a landfill will need to be constructed before the tailings are moved to protect against contaminant migration. A cap would also be necessary. Such a landfill would require maintenance and monitoring throughout its life.

Comment 10

A remediation company stated its opinion that the work done in preparing the latest feasibility study for Alternative 3 appeared to be entirely generic, and made assumptions of methods, machinery, and costs based upon non-site-specific criteria. This company indicates that it conducted its own FS and researched and developed cost estimates for specific machinery, methods, sizes, project duration, rights-of-way, and locations. The company indicates that it employed and retained experts with local knowledge and understanding to conduct studies and research, to complete engineering feasibility investigations, to make assessments of human health and environmental impacts, to arrange for specific transportation corridors, to reserve an appropriate repository site, and to prepare detailed, item-by-item cost estimates. The company believes this higher degree of detail provides a more accurate indication of the true cost of an excavation, transportation, and placement alternative. [August 92]

EPA Response

The purpose of EPA's FS was to first identify all possible methods to remediate the contamination. The identified methods were screened and those not meeting the applicable criteria were eliminated from further consideration. The remaining methods were combined into alternatives which were then analyzed. The purpose of the analysis was to compare the ability of the alternatives to meet the nine CERCLA criteria. EPA follows federally prescribed guidelines for preparation of an FS. These guidelines do not provide for the level of detail described by the commenter. Many of the details suggested by the commenter will not be finalized until the Remedial Design stage.

Comment 11

A Midvale citizen stated that while the excavation and disposal alternative was proposed to cost $224 million and capping was proposed to cost $54 million, the health hazard posed by the tailings justified spending available money for excavation and transport. [June 92]

EPA Response

Based on the results of the FS, EPA has determined that the proposed capping alternative provides protection of human health and the environment.

Comment 12

A Murray resident and candidate for the State legislature representing the north side of Midvale stated his familiarity with moving tailings by rail at the Vitro site. He noted the time and cost effectiveness of such a process and requested that EPA reconsider a transport proposal like the Peterson/Fitzgerald alternate proposal. He stated that the 30-mile transportation and relocation limit seemed arbitrary and short-sighted, and further expressed his disapproval of capping as an alternative that would provide long-term solutions. [June 92]

EPA Response

To date, EPA has not received the Peterson/Fitzgerald alternate proposal and therefore cannot make any judgement as to its validity. Transportation of the tailings by rail may be economical if a rail line exists from the existing site to the alternate disposal site. The tailings could be loaded directly onto the existing rail line at OU1. However, costs for construction of a rail line to a new site would be very high. An alternative would be to truck the tailings from the closest point of the existing rail line to the alternate site. The cost of unloading the tailings from rail cars and loading trucks would also be significant. Because of cost and technology constraints, EPA has recommended that the State identify an alternate site within a 30 mile radius of Midvale. At this distance all three transportation options are technologically feasible and thus their costs and other variables can be compared on a relative basis. The 30 mile radius also makes sense considering the geography of the area, the Great Salt Lake to the north and mountains east and west.

Comment 13

A West Jordan resident stated that the tailings should be removed and that IRC, a remediation company, should perform the excavation and cleanup. [August 92]

EPA Response

EPA evaluated removal and disposal of the tailings at a different location and found that this remedy is not the best based on the National Contingency Plan (NCP) nine criteria. Also, it is not the purpose of the FS to select the remediation contractor.

Comment 14

Mayor Dahl noted EPA's progress in its cap design from what he described as the original "moonscape", to the cap that was proposed in June 1992 that would have more land use options such as a park or golf course. He proceeded, however, to reaffirm the Midvale City Council's decision of June 16, 1992; to reject a cap in any form; citing concerns about permanence, groundwater protection during an earthquake, and potential drinking water contamination. The Mayor was joined in this opinion by UDEQ, former Congressman Owens, the Midvale Citizens' Group, a number of Midvale residents, and a Salt Lake Community Action Program representative. Lack of provision of appropriate land use was also cited by these parties as an additional failure of the capping proposal. [June 92]

EPA Response

The capping alternative, as proposed in the FS, addresses all risks posed by OU1. The cap prevents migration of contaminants due to wind and water caused attrition of tailings from the site, thereby mitigating human health risks from ingestion and inhalation, and environmental risks to air quality, surface water, and groundwater/drinking water supplies. The installation of the cap and associated surface and subsurface water inflow controls further reduce the infiltration of water into the tailings and consequent leaching into the groundwater. If necessary, a groundwater pump and treat system would prevent contamination from migrating

outside the OU1 boundaries. Slope stabilization of the tailings along the Jordan River prevents the migration of tailings into surface water.

Land use is not one of the nine criteria the EPA must use by law, to select a remedy; however, the Agency has considered land use desires in selecting a remedy.

2. Cleanup Objectives, Permanence, and Protection

Comment 15

UDEQ reiterated the cleanup objectives stated by Governor Bangerter three years ago: permanence, appropriate land use, protection of public health, and protection of the environment (which includes groundwater issues). The Salt Lake County Board of Commissioners stated these same concerns, adding that the capping proposal did not meet these criteria. UDEQ further stressed that any solution selected must be permanent, no matter what the cost, and must be acceptable to the people of Midvale and to the State of Utah. [June 92]

EPA Response

The capping proposal does meet all three of the Governor's objectives. The cap will be designed for a 30 year life. The life of the cap can be extended by proper maintenance and repair. Within the 30 years, it is quite possible that new, more effective technology will emerge. As stated in the response to Comment 14, it is not the mandate of EPA to consider land use in the CERCLA process other than for risk assessment purposes. EPA has agreed to design a cap such that the remediated area can be used as a park or golf course and provide space for the Jordan River Parkway. The capping alternative provides protection of human health and the environment. The tailings will be isolated such that risk of contact will not be a concern. The groundwater will be protected by reduction of infiltration, and pumping and treating of contaminated groundwater, if necessary, to prevent migration of contaminated groundwater beyond the OU1 boundaries.

Comment 16

Former Congressman Owens submitted a statement at the public meeting expressing appreciation of EPA's willingness to listen and respond to concerns about the Sharon Steel site, but further expressing total dissatisfaction with EPA's selection of capping as the proposed alternative. Citing cost bias, earthquake hazards, groundwater quality, the already-contaminated Jordan River, cap deterioration, and what he believes to be an overall lack of protection of public health and the environment, Mr. Owens' stated his opinion that EPA had shirked its duties and had flagrantly ignored Congress's Superfund directive to find a permanent solution for OU1. [June 92]

Comment 17

Via written comment, former Congressman Owens reaffirmed his opposition to capping by stating that he would introduce legislation that would prevent EPA from selecting capping as a remedy for a Superfund site unless certain soil and groundwater cleanup levels had been reached. He urged Midvale residents to make their views known. [June 92]

Comment 18

A representative of the Midvale Citizens' Group stated the group's desire to be part of a cooperative solution and reiterated the Mayor's and Governor's positions in seeking a permanent solution. He stated disagreement, however, with the protective quality comparisons made between the capping and excavation and transport alternatives as noted on page 7 of the Proposed Plan. [June 92]

EPA Response to Comments 16, 17, 18

The proposed plan rates both the capping and the excavation and disposal alternatives as equally protective of human health and the environment. Overall protection of human health and the environment addresses whether or not a remedy is protective and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment engineering controls or institutional controls. Neither

alternative treats the tailings or alters them in any way such that the potential risk is eliminated. They both however, adequately reduce the risk through use of engineering controls such as capping and groundwater monitoring.

Comment 19

An OU2 commenter and a PRP stated that the approach used for setting cleanup goals for OU1 must be more clearly developed. In addition, they thought that EPA should state more clearly what significant differences distinguish off-site disposal at the Sharon Steel site from the Vitro site. [September 90]

EPA Response

Cleanup goals for OU1 were developed following EPA guidelines. A number of differences exist between the Vitro site and the Sharon Steel site. First, the Vitro tailings were radioactive and thus posed a different health risk. The on-site capping alternative for the Vitro tailings would have included the placement of a liner under the tailings. This was needed due to the radioactive nature of the tailings. Also, the integrity of the disposal cell was questionable due to the potential for differential settling below the tailings. All these factors contributed to the selection of removal as the preferred alternative at the Vitro site.

Comment 20

A commenter quoted a recent U.S. Science Advisory Board report stating that EPA should give more emphasis to permanent remediation technologies that destroy, detoxify, or recover contaminants. The commenter added that the report also stressed that once interim remedial measures were taken to mitigate immediate risks, final action should be withheld until permanent solutions were available at reasonable costs. [January 91]

EPA Response

While it is true that a CERCLA/SARA statutory emphasis towards treatment or "truly permanent remediation technologies" exists, all alternatives, whether they involve treatment, off-site disposal, containment (such as the cap proposed for this site), or any other technology, must be evaluated using the same nine NCP criteria. All of the alternatives were evaluated in this manner, and the capping alternative was selected based on its performance against these criteria. The capping alternative allows for future recovery of the waste should a permanent solution at a reasonable cost become available.

Comment 21

One individual at the 1991 public meeting maintained that the tailings issue had been around since 1986 and asked why it was taking so long to address. [September 90]

EPA Response

EPA has taken the additional time to research, study and determine that the capping proposal is a protective remedy, as requested by the public, elected officials and UDEQ. This has also provided UDEQ time to conduct its own study on offsite disposal.

3. Cost Issues

Comment 22

Noting 38-52% fluctuations in cleanup cost estimates from January 1991 to June 1992 on what the commenter believes to be basically the same proposal, a representative of a Midvale Citizens' Group expressed deep concern about the assumptions upon which EPA based its cost estimates; especially since cost was a determining factor in the selection of the final remedy. A similar concern was expressed by a remediation company which stated that in its opinion, the $168 million estimated by EPA for

excavation, transport, and containment was overstated by at least $80 million. [June 92]

EPA Response

It is true that the reported estimated costs for the proposed remediation alternatives differ between the 1990 and 1992 feasibility studies. New information was made available and changes were made that significantly affected the cost estimates. First, the U.S. Bureau of Mines completed its report on beneficiation which included a detailed analysis of the quantity of tailings stored on OU1. This new volume was significantly lower than previous estimates. Also, the demolition of the mill buildings was removed as part of the alternatives and has been performed as a separate function. A factor that caused the cost to increase was higher labor wage rates and workmen's compensation rates. Specific changes were made to the June 1992 Alternative #3 Excavation/Transportation/ Containment. They included different methods of excavation and transportation and a shorter haul distance.

Comment 23

UDEQ noted the narrowing gap between the changing price estimates for capping and excavation/removal over the last three years. UDEQ expressed the opinion that as the proposed costs become more realistic, it would probably end up being less expensive to move the tailings than to cap them. [June 92]

EPA Response

UDEQ now agrees with EPA that the cost for excavation of the tailings will never be lower than the cost for capping. Both alternatives will require some form of capping. The removal alternative will have the additional expense of excavation and transport of the contaminated soils and tailings.

Comment 24

Given the $62 million collected from the PRPs that is earning interest, Mayor Dahl commented that slurry transport of tailings (plus the slag from another Superfund site, the Midvale slag site) to Cedar Valley, for the proposed $33 million, or to the causeway in Great Salt Lake, for $68 million, should be possible without tapping into taxpayer monies. [June 92]

EPA Response

The costs quoted by the Mayor are based on proposals submitted by private groups. These are significantly below estimates prepared by EPA. Major factors that resulted in these low estimates include the fact that the cost cited by the private groups did not consider all cost items. All funds from the PRP settlement will be exhausted prior to using other monies to fund the proposed remedy.

Comment 25

The Mayor stated that since Midvale was not privy to the negotiations that allowed for a settlement whereby the PRPs only partially paid for proper remediation of the OU1 area, and did not have to remove the contaminated materials, then the parties that accepted the PRP settlement should bear the cost of total removal or of rendering the materials inert. [August 92]

EPA Response

EPA will commit the funds remaining in the PRP settlement account toward the Remedial Action. If these funds are insufficient, EPA will request funds from the Superfund Trust Fund to bring the combined total funding up to the cost estimated to implement the remedy selected in the ROD (capping) as long as Utah provides the 10 percent match of trust monies as required by CERCLA 104 (c) (3).

Comment 26

Mayor Dahl stated his opinion that studies on alternatives which EPA seemed interested in supporting or deleting outright are conveniently funded by EPA, but

studies that may prove to be more beneficial to the interests of the citizens of Midvale must be funded by the State, the City of Midvale, or private individuals. [August 92]

EPA Response on Comments 25, 26

EPA has equally funded all studies which would appear to have the ability to provide a remedy which is protective of human health and the environment.

4. Risk Assessment/Health Risks

Comment 27

A Midvale mother of five children, one of whom was in the lead study, expressed concern over health risks to and safety of her children and asked how to obtain additional information on protective measures. [June 92]

EPA Response

EPA has published numerous fact sheets on protective measures in lead contaminated areas. These are available from EPA's Office of External Affairs in Denver.

Comment 28

A 13-year resident of Midvale expressed concern about the lead in the tailings and the tailings dust and attributed Midvale cancer deaths to the tailings pile. However, a 49-year old lifetime Midvale resident acknowledged playing in the tailings pile as a youth with his friends and questioned the actual health risks posed by the tailings, since he and his friends were still healthy. [June 92]

EPA Response

It is difficult to draw any conclusions about health risks to the general population based on the experience of a few individuals. The purpose of EPA's risk assessment is to characterize both carcinogenic and noncarcinogenic risks related to OU1.

Comment 29

The Midvale District Representative from the Utah House of Representatives asked if EPA had performed lead and arsenic blood tests on Midvale children and adults and where the results of the tests could be obtained. [June 92]

EPA Response

EPA has not conducted any tests on children or adults in Midvale. On other sites, EPA has participated in such studies by helping with sampling of soil, dust and other media, but is not able itself to conduct human exposure studies. A number of Midvale children did participate in a blood lead study conducted by consultants to ARCO. ARCO may be contacted for the results of this study.

Comment 30

A PRP asserted that the risk of injury or death associated with the industrial activity and traffic that accompany remediation far exceeds the risks from the lead and arsenic in the tailings or soil. [November 90]

EPA Response

EPA does not wish to infer that by allowing the State to enhance the remedy by developing an excavation disposal alternative, it is ignoring the materials handling difficulties of the tailings. EPA agrees that any handling of the tailings would be difficult, however EPA has stated that the construction activities proposed in the excavation alternative are technically feasible, would adequately handle the tailings material, and could be done protectively.

EPA concurs that the potential for dust emissions during construction activities is high, however, EPA has stated that the emissions could be controlled with an extensive dust abatement program and have included the cost for such a program (Appendix C, May 1992 FS). In addition, it was assumed that a significant portion of the tailings would be moist or wet and would not be susceptible to migration by wind. Additionally, the

use of a slurry pipeline, if one were used, decreases the risk of injury or death associated with truck traffic.

It is not possible to absolutely eliminate all risk. The risk of injury or death is considered low for implementing the remedial action. All actions will be taken to minimize any risk associated with any construction work and risks will be mitigated by following OSHA guidelines and safe construction practices. Construction is a short-term process, whereas the risk from the lead and arsenic is long-term.

5. Remedial Design

Comment 31

A Midvale resident expressed concern about wind dispersion of the tailings, especially after OU2 materials had been added to the tailings pile, and asked what the risk was in leaving the dust free to be blown around while final OU1 decisions were deliberated. Another resident asked that more dust suppressant cover be applied while decisions were being made. [June 92]

EPA Response

EPA considers limiting wind dispersion of contaminants important during deliberations on the remedy for OU1. A dust suppressant has been applied to the surface of the tailings to limit blowing dust. EPA intends to keep this surfactant in place until a final decision on OU1 is made, and remedial action begins.

Comment 32

UDEQ commented that Utah was not sure that any cap design could meet the State's concerns, but that the State was willing to work with EPA to determine if additional design of EPA's preferred alternative could be accomplished in a way that would meet the State's requirements for remediation of the tailings. UDEQ noted this would

involve significant design changes and possibly treatment prior to disposal. [August 92]

6. Feasibility Study/Proposed Plan

Comment 33

UDEQ submitted comments on an advance draft of the Proposed Plan requesting a number of wording/grammatical changes and suggesting the rewording of statements that clarified concepts such as: 1) the BOM study prompted both EPA and UDEQ to agree that beneficiation/reprocessing should be eliminated as a potential remediation alternative; 2) UDEQ has a desire to evaluate Alternative 3 equally against Alternative 4; and 3) UDEQ recognizes that while Alternatives 3 and 4 reduce mobility of contaminants in the air and the groundwater, they do so through containment rather than treatment. [June 92]

Comment 34

UDEQ also provided comments on the Draft Feasibility Study requesting a number of wording and grammatical changes that UDEQ felt would improve the clarity of the document and further address technical concerns. UDEQ subsequently requested further wording and grammatical changes on the Final FS. Additionally, UDEQ requested correction, clarification, and/or elaboration on textual content of the FS. For full review of the UDEQ comments on the FS, please see UDEQ letters dated June 5, 1992 and August 14, 1992, which are included in the Administrative Record at the Sharon Steel site Information Repositories. [August 92]

EPA Response on Comments 32, 33, 34

Many of the changes requested by UDEQ on the Draft FS were addressed during the writing of the Final FS. Comments about material in the Final FS appear as official comments under their related subject heads throughout this Responsiveness Summary.

The Final FS was published in May, 1992. UDEQ was aware of the schedule and was given sufficient lead time to provide its comments prior to publication. The comments from UDEQ were received by EPA after the document was published and are addressed in this Responsiveness Summary.

7. Land Use

Comment 35

The Midvale Chamber of Commerce stated that in its opinion, Alternative 3 (excavation and removal) serves the best interests of Midvale City by enhancing economic development potential and protecting the environment and health of those living and working in Midvale. The Chamber stated that restricted land use under the capping proposal would have a definite adverse economic impact on the community and that neither the potential sale nor the development of the land was addressed under the capping proposal. The Chamber further noted that while health and environmental concerns are EPA priorities, issues of economic development should be included as cleanup selection criteria. These views were also shared by a West Jordan resident. UDEQ commented that land use limitations should be further addressed for appropriateness by the community of Midvale. A PRP, however, stated opposition to the suggestion in the FS that future land use would be considered as a criterion for remedy selection. The PRP said that under any guise, future land use was an inappropriate criterion for remedy selection. [November 90, October 90, June 92]

EPA Response

EPA agrees that "unrestricted" land use is not a criterion for remedy selection, nor is it the remedial goal of CERCLA/SARA, thus EPA is not selecting the remedy based on land use planning. Rather, the primary criterion for remedy selection is protection of public health and the environment. However, State and Community Acceptance are also important modifying criteria (see the National Contingency Plan, 40 CFR 300.430) to be considered in remedy selection, and were used to clarify the nature of

the remedy, as intended by EPA, in terms of future uses of the land. State and local governments may enhance the remedy to further benefit the community in terms of future land uses and development.

Comment 36

Mayor Dahl expressed opposition to capping because in his opinion, capping would prevent the State of Utah from constructing the Jordan River Parkway, a plan for uninterrupted pathways and trails along the Jordan River. [January 91]

EPA Response

The proposed capping alternative does not have to prevent the construction of the Jordan River Parkway. The capping alternative proposed a soil cement embankment along the Jordan River to stabilize the tailings and prevent migration of the tailings into the river. During the Remedial Design phase, appropriate features could be included in the design of the embankment to account for future development of the parkway.

The conceptual design of the cap, as included in the revised FS (May 1992), includes the removal of the tailings along the river to allow for the construction of the Parkway. A 150 foot buffer measured from the toe of the cap to the centerline of the river will be established. The embankment of the tailings pile along the river will be terraced and stabilized to prevent slippage of the pile.

8. Public Participation

Comment 37

The State and the Midvale Citizens' Group stated that a 30-day comment period on the Proposed Plan was inadequate, and formally requested an extension of the public comment period by at least 30 days. [June 92]

EPA Response

EPA extended the comment period an additional 30 days.

Comment 38

Several commenters noted the number of non-English-speaking people affected by OU1 and requested that EPA budget for translations of material into the "language of the people." Commenters asked if the material could be translated into Spanish and if this could be done before the end of the Proposed Plan comment period. [June 92]

EPA Response

EPA held bi-lingual meetings with interested Spanish speaking residents and provided written material in Spanish.

9. Reprocessing

Comment 39

During a 1989 public meeting, the opinion of the audience was that the reprocessing industry should be given a chance to test various reprocessing technologies on the tailings so that a reprocessor could remove the contaminants, sell the metals/minerals of value, employ Midvale residents, and allow Midvale to reclaim the OU1 site for future land use. The audience's sentiment at the time appeared to be that EPA and the State should fund such reprocessing. [1989]

EPA Response

In response to this sentiment, EPA asked the U.S. Bureau of Mines to perform testing to determine if the tailings could be reprocessed. The BOM study indicated that beneficiation does not meet the nine criteria.

10. Alternate Proposals

Comment 40

A remediation company stated it utilized a process to extract metals from tailings whereby the hazards could be treated by the toxicity characteristics leaching procedure (TCLP) to less than RCRA limits for lead, arsenic, and cadmium. A company representative stated that a Feasibility Study on this process at the Sharon Steel tailings had been prepared by them, that such a project could be performed within the budget set aside for the project (as projected in the FS), that such a process would benefit the community and protect the dedicated wetlands, and that the Feasibility Study had been favorably received by members of the Midvale City Council, an action committee, and certain Congressional aides. [August 92]

EPA Response

Upon review of this proposal, EPA determined that insufficient technical information was presented to confirm the remedial claims made.

Comment 41

A Midvale resident commented that he had presented his alternate excavation and removal proposal to the Utah County Commissioners, the City of Lehi, the town of Cedar Fort, and the town of Fairfield, and that these area councils would discuss the proposal further. His proposal includes moving the tailings by rail to an old mine site located within the 30-mile radius. [August 92]

EPA Response

Upon review of this proposal, EPA determined that insufficient technical information was presented to fully evaluate the alternative.

Comment 42

A Salt Lake City resident expressed concerns about reported plans to dump or store the Sharon Steel tailings in the Great Salt Lake or to build a causeway constructed of cement-encased tailings. She noted the potential harm to recreationalists, wildlife, lake dwellers, the brine and magnesium industries, etc., from lead and arsenic contamination, and further noted the area's unpredictable weather and tidal fluctuations. [July 92]

EPA Response

It is not the intent of EPA to place the tailings from the Sharon Steel site in the Great Salt Lake. This was a proposal by a private company. EPA studied the general alternative of excavation/removal/containment.

B. Legal and Technical Questions and Agency Responses

The purpose of this section is to respond to specific legal and technical questions raised by the community. If necessary, this part elaborates on responses with a greater level of technical detail than presented in Part A.

1. Long-Term Effectiveness

Comment 43

Former Congressman Owens stated that under the capping, no action, and site controls alternatives, approximately 10 million tons of contaminated tailings would be allowed to remain at a location that is only 1/4 mile from the residences of 1,400 people and only 1 mile from the residences of 8,000 people. He expressed his opinion that capping does not adequately address the potential for seepage of lead, arsenic, and other metal contaminants down into the deep principal aquifer that serves as a drinking water source for Midvale and Salt Lake City. He stated his opinion that the capping proposal did not require remediation to reduce levels of contaminants in groundwater

underlying OU1, nor did this proposed alternative require measures to prevent migration of existing contamination into the drinking water aquifer. Former Congressman Owens compared capping's limited long-term effectiveness to the fixation process proposed as Alternative 6 where contaminants would be immobilized and thus rendered incapable of migrating to surface waters or groundwater. [July 92, August 92]

EPA Response

The capping alternative includes a provision for a groundwater pump and treat system, if necessary, to prevent migration of contaminants beyond the OU1 boundaries. The cap will effectively reduce seepage of contaminants into underlying aquifers.

Comment 44

Mayor Dahl stressed that one of the items listed in the cleanup criteria was long-term effectiveness and permanence. He noted that the 30-year time period referenced in the proposed remedy is more like a Band-Aid than a permanent solution. [January 91]

EPA Response

EPA's interpretation of the word permanence differs from an interpretation that the word permanence means "forever." The Long-Term Effectiveness and Permanence criteria, as defined in the NCP, involve the "magnitude of residual risk . . . from untreated waste remaining at the conclusion of the remedial systems." In particular, the criterion assesses the "potential need to replace technical components of the alternative, such as a cap." (NCP, Section 300.430 e9ii(C)). The comparison rated capping as meeting the criteria. This was true for excavation and disposal, and fixation. Fixation is the most effective at long-term effectiveness. Both excavation and disposal and capping utilize containment and capping of the tailings without treatment as the primary technology. Both alternatives also include long term maintenance of the cap. With proper maintenance and repairs when needed, the

integrity of the cap should not be compromised. Therefore, on a comparative basis, they too meet the criteria for long term effectiveness.

With the operation and maintenance (O&M) resources included in this alternative, this is a permanent solution under the NCP. The alternative was costed for a period of thirty years, and the NCP presumes that O&M would continue as needed beyond the thirty-year time frame by the responsible public agencies.

Comment 45

A representative from the Salt Lake Community Action Program raised general concerns about covering up the Sharon Steel contamination by capping and presented additional concerns about the added effects that Kennecott's contaminant migration would pose to the Jordan River. She urged that the tailings be removed and suggested USPCI as a personal choice for a site. She also recommended that alternate proposals be reviewed again with diligence. [June 92]

Comment 46

Mayor Dahl said that in his opinion, the cost for slurrying the tailings to another mining district in Cedar Valley was about the same as the cost for capping, and it provided a more permanent solution by removing the tailings from the site. [January 92]

EPA Response to Comments 45, 46

The remedy selected by EPA must be protective of human health and the environment, and must comply with the applicable or relevant and appropriate requirements (ARARs) under Federal and State laws and regulations. Slurrying the tailings to another mining district may create human health and environmental risks from the transportation activities and in another location. If the tailings were transported to a new mining district, the contamination and the risks they pose would still need to be

addressed. No overall cost savings, when compared to the capping alternative, are realized by this proposal.

EPA does not believe that the cost for moving the tailings as compared to capping in place is approximately equal. EPA has not received the cost estimate for the Cedar Valley proposal. However, other cost estimates that were submitted to EPA for similar proposals failed to take into consideration all necessary requirements to perform the alternative proposed. EPA estimates show capping to be more cost effective than excavation and disposal.

2. Cost Issues

Comment 47

UDEQ commented that EPA's estimate of costs for the excavation, transportation, and containment alternative could be approximately $60 million high, lowering the estimated cost from $224 million to $164 million. UDEQ noted that EPA's estimates were based on the premises that a RCRA Subtitle C landfill be constructed as the required disposal "cell," that transportation of the tailings to the cell be via slurry line, and that the operational life of the slurry system would be 6.5 years. UDEQ suggested that the following premises are in error: 1) RCRA Subtitle C is not applicable to Bevill amended waste and thus is not applicable to a disposal site for the Sharon Steel tailings; therefore, the estimated costs for the disposal cell may be significantly high (as presented: $26 million); 2) EPA's estimated itemized costs for constructing the slurry line, including pumps and dewatering systems, is approximately $75 million; this figure is three to four times the estimates from the two slurry proposals reviewed by the State; 3) EPA proposes that the slurry line operate 8 hours/day (operational life = 6.5 years); but two slurry proposals examined by the State operate for 24 hours/day, 9 months/year (operational life = 3 years); and 4) as a consequence of lower direct costs (construction of slurry line, pumps, etc.) indirect

costs that are estimated as a percentage of the presented direct costs would be reduced appropriately. [August 92]

EPA Response

It is true that the tailings would be covered by the Bevill Amendment and therefore not classified as a RCRA C waste. It is EPA's intent that wastes from the extraction and beneficiation of ores and minerals are to be regulated under Subtitle D of RCRA, or where appropriate and relevant, under specific sections of Subtitle C.

Disposal of the mining waste must comply with all local, State, and Federal procedural and substantive requirements, regulations and statues, required as part of a CERCLA response action.

At this time, the most prudent and conservative course for costing purposes is to assume that a new disposal cell may need to meet all the requirements of Subtitle C even though the tailings themselves are classified under Subtitle D. The exact requirements cannot be determined until the exact location for the cell has been finalized.

EPA's estimate for construction of the slurry line, pumping, and dewatering was developed at a -30% to +50% level of accuracy. Furthermore, all cost saving assumptions cannot be substantiated at this time. The cost estimates were based on applicable regulations and standard design practices for the handling of hazardous wastes. This approach was true for all alternatives and therefore all alternatives were compared using a consistent cost basis and are subject to the same level of accuracy.

It may be impractical to assume that a slurry line could be operated continuously 24 hours a day for nine months out of the year. The transportation process includes excavating the tailings, conveying them to the facility for making the slurry, making the slurry, pumping to the disposal site, storing the slurry, dewatering, and final

disposal in the cell. By assuming a 24 hour operation, it is also assumed that each one of these separate stages will work in perfect synchronization. If any one of the parts fail then the whole system will have to shut down. Further a continuous operation assumes that there will not be any bottlenecks in the system. That is all material is moved to the next stage at the exact time and in the exact quantity needed. This scenario is highly unlikely.

Lowering the direct costs would subsequently lower indirect costs. EPA is confident of their original cost estimates with the specified range of accuracy and therefore are also confident of the indirect costs based on a percentage of direct costs.

Comment 48

In the opinion of a site remediation company, the cost estimate for Alternative 3 reflects a lack of knowledge and understanding of local conditions, state-of-the-art excavation methodologies, and slurry-line technology. The company stated that the use of conceptual-phase cost-estimating techniques is inappropriate at this stage of the investigation. The company questioned not only the validity of the published costs for Alternative 3, but also other alternatives. The commenter believes that Direct Capital Costs Items No. 4 and No. 5 for Alternative 3 are overstated by nearly $50,000,000 (see Appendix C of FS). In addition, the commenter believes the following costs are also overstated: 1) the engineering costs of approximately 15 percent are unrealistic and unwarranted for a project of this size by at least $10,000,000; 2) mobilization/ demobilization for this type of project should run no more than 6 percent, so this is overstated by another $10,000,000; 3) paying almost $8 million for an imported 24-inch vegetation layer in Utah is unreasonable; and 4) the inclusion of $8.7 million in contingency costs on the indirect annual/periodic costs is without merit and reflects a cavalier attitude toward what should be responsible cost estimating. [August 92]

EPA Response

EPA believes that the use of conceptual-phase cost estimating is appropriate at this stage. Without specific design criteria, a more detailed cost estimate is not justifiable. All percentages used in the estimates adhere strictly to EPA costing guidelines for this level of study. EPA guidance for performing a Feasibility Study clearly states that the level of accuracy should be in the range of -30% to + 50%. Costs were based on standard pricing guides which are accepted nationally by the construction industry. These costs were appropriately modified to Salt Lake City standards when necessary.

Comment 49

A commenter expressed difficulty in determining EPA's estimated costs for excavation because the costs are commingled with transportation and placement costs. [August 92]

EPA Response

The cost sheets included in Appendix C of the FS are summary sheets. Detailed costing with specific unit costs are available as part of the Administrative Record.

Comment 50

Mayor Dahl stated that to properly evaluate the cost of the capping alternative, the cost of loss of water supply and wetlands must also be included. The Mayor noted that such a water supply and wetlands concern is presently being adjudicated by the Utah courts in a similar case involving the contamination of a potable water supply. [August 92]

EPA Response

There will be no loss of water supply or wetlands with any of the alternatives proposed in the FS. The capping alternative includes cost for remediation and reconstruction of the existing wetland. Drilling and sampling operations during the

Remedial Investigation showed that the contamination has not reached the drinking water supply and that it is highly unlikely that it ever will.

Comment 51

A representative of the Utah Chemical Corporation posed questions about cost estimates for capping and slurrying. He noted that EPA's $168 million slurry estimate is about five times the cost of another bid and also noted that EPA's annual operation and maintenance costs for capping are $277,000, while maintenance costs for relocated material are $7 million. The speaker further added that slurry costs are estimated at three times higher than capping costs, when, in his opinion, they should be 30% less. An explanation of the estimates was requested, as was information on who prepared the estimates and where copies were available. Similar sentiment about estimates was expressed by UDEQ. [June 92]

EPA Response

It is true that the maintenance cost for the relocation alternative is inappropriately high. The reason is that construction costs for the pipeline and cell past the first year were included as operation and maintenance costs. They should have been included as part of capital costs. This actually lowers the total cost of the alternative since these costs were amortized over a 30 year period. The basis for the estimate has been further described in the responses to Comment 47.

3. Legal/Regulatory/Compliance Issues

Comment 52

Former Congressman Owens voiced concern over permanence provided by the proposed alternative. He stated that lack of treatment to destroy or permanently reduce the toxicity or volume of contaminants in OU1 media constituted non-adherence to CERCLA, because CERCLA requires the use of permanent solutions to the maximum extent possible. [July 92]

EPA Response

CERCLA does state a preference for solutions that permanently treat or destroy contamination. Pursuant to CERCLA, however, EPA must compare alternatives using the nine NCP criteria. At present EPA is not aware of any technology which can treat these materials at a cost equal to or lower than the capping cost. Based upon this comparison, capping best meets all the criteria EPA considers in selecting a remedy.

Comment 53

The FS stated that one of the disposal location options is a State-designed cell constructed according to RCRA Subtitle C requirements. UDEQ pointed out that RCRA Subtitle C was not applicable based on the Bevill Amendment. All ARARs must be considered when disposing of waste; therefore, UDEQ requested that "RCRA Subtitle C requirements" be referenced as "ARARs." Representative Jorgensen also asked for clarification as to how the Bevill Amendment affected procedures at Sharon Steel. [June 92, August 92]

EPA Response

Please see response to Comments 47 and 55.

Comment 54

A PRP noted that the FS failed to respond to PRP comments on Federal ARARs. The earlier FS did not explain why EPA applied RCRA Subtitle C or D or reclamation standards to this mining waste site. [November 90]

EPA Response

Refer to response to Comment 47.

Comment 55

In commenting on the FS, UDEQ suggested that if a RCRA Subtitle C disposal cell were required for off-site containment of the tailings, then the same requirements

would need to be applied to the proposed on-site cap. These on-site requirements would substantially increase the cost of the capping alternative. [August 92]

EPA Response

As noted earlier, the Bevill Amendment does cover the tailings. See response to Comment 47. It is important to note that Bevill does not exclude RCRA Subtitle C requirements. It simply states that they are not applicable; however, they can still be appropriate and relevant.

Comment 56

Former Congressman Owens stated his opinion that neither the no further action alternative nor the site control alternative would comply with the protective statutory requirements of CERCLA and should thus both be rejected by EPA when selecting a final remedy. [July 92]

EPA Response

EPA agrees with former Representative Owens and dropped these two alternatives from further consideration after detailed analysis. Evaluation of what is called a "No Further Action" alternative is a required component of the evaluation process and serves as a baseline against which to compare other alternatives.

Comment 57

Former Congressman Owens noted that while CERCLA mandates a preference for treatment of contaminants, in his opinion, EPA has stated that capping does not fully comply with this statutory preference. Congressman Owens does not accept EPA's justification of this deficiency that the contingency alternative also does not satisfy CERCLA's preference for treatment. [July 92]

EPA Response

CERCLA mandates a "preference" for treatment. The FS studied the ability to treat the wastes. This included an in-depth bench scale study by the U.S. Bureau of Mines on beneficiation. It was determined that there is no presently available means to technically and economically treat the wastes such that they no longer would be considered hazardous.

Comment 58

After commending the diligent team efforts of all involved, the Midvale District Representative for the Utah House of Representatives asked for clarification of federally-required distances between hazardous materials and underlying aquifers. [June 92]

EPA Response

The tailings are not classified as hazardous waste as they are exempted by the Bevill Amendment.

Comment 59

A representative of a private technical company pointed out that although EPA stated at the August 17, 1989 public hearing that there would continue to be liability on behalf of the PRPs for future contingencies, the Consent Decree indicated that all liabilities were settled. [January 91]

EPA Response

All liabilities which were settled between EPA and PRPs are subject to standard reopeners, if site conditions change or new information becomes available.

Comment 60

A PRP contended that EPA attempted to rewrite CERCLA regarding State ARARs by ignoring CERCLA's requirement that State ARARs be more stringent than Federal

standards. The PRP insisted that absent a showing that Utah environmental standards were more stringent, all State requirements identified as ARARs in the earlier FS were incorrect; those references should be deleted and State standards should not be used in selecting or designing a remedy. [November 90]

EPA Response

EPA agrees that some of the State regulations identified in the FS are not ARARs (see response to the next comment). In general CERCLA limits the scope of State ARARs to standards, requirements, criteria, or limitations under environmental or facility siting laws that are promulgated and more stringent than Federal requirements.

Comment 61

A PRP maintained that Volume II, pages 2-22 to 2-23 of the earlier FS, properly stated that neither the Utah Groundwater Protection Rules nor the Corrective Action Cleanup Standards Policy for MCLs at Hazardous Waste Sites are ARARs. However, according to Table 2.2-1, both requirements were applicable (pages 2-5 and 2-10). The PRP further stated that Table 2.2-1 should be corrected to reflect that these requirements were not ARARs for the Midvale Tailings Site. [November 90]

EPA Response

EPA agrees that neither the Utah Groundwater Protection Rules nor the Corrective Action Standards are ARARs.

Comment 62

A commenter expressed his opinion that capping was legally and technically wrong and that capping would be likely to pollute the waters of Midvale. He supported his position by referencing Federal Water Law 33 U.S. Code 1311 - ". . . the discharge of any pollutant by any person shall be unlawful." [January 91]

EPA Response

EPA disagrees that capping is legally or technically wrong. Capping has been selected at a number of Superfund sites and does not violate any Federal laws or standards. This remedy will comply with requirements of the cited statute. At this time no point discharges are anticipated.

4. Groundwater Issues

Comment 63

Mayor Dahl expressed numerous concerns about groundwater protection under the capping alternative. He reiterated that the FS acknowledged that both the upper sand and gravel aquifer and the deep principal aquifer are contaminated. Mayor Dahl stressed his opinion that with capping, some pumping and cleanup of the groundwater would be necessary for the projected 30-year period. The Mayor asked what would happen to this flow of water through the tailings after 30 years. [January 91]

EPA Response

The remedial investigation does not identify any contamination present in the deep principal aquifer. Treatment of groundwater could continue for an indefinite time into the future, if necessary. It should be noted that Superfund evaluations of the effectiveness of remedies where waste is left onsite are limited to an examination of a 30-year time frame and include 5-year reviews.

Comment 64

A commenter indicated that in his opinion capping poses a potential for contamination of the deep principal aquifer, especially under drought conditions. In the event of a drought, he believes the artesian effect, (that is, the upward pressure and flow of water from the lower aquifer to the upper aquifer caused by underground cross flow down from the mountains) would stop. The artesian effect is now keeping waters of the upper aquifer from migrating down to the lower aquifer. When stopped by reducing

the level of the water in the lower aquifer, contaminated water from the upper aquifer would flow into the lower aquifer. [January 91]

EPA Response

This hypothesized movement from the upper portion of the upper sand and gravel aquifer was examined during the remedial investigation. The time period for contaminants to travel vertically through the system (when the sorptive properties of the aquifer and confining zone separating the deep principal aquifer from the upper sand and gravel aquifer are considered) are extremely long, and it is EPA's opinion that, even if these conditions were to continue for a lengthy period, it is unlikely that any measurable degradation of the deep principal aquifer would be detected.

Comment 65

A resident, Mayor Dahl, the Salt Lake County Board of Commissioners, and a PRP noted their opinion that due to the number of wells and drill holes at OU1, and the areas where no confining clay layer exists between aquifers underlying OU1, heavy metals could migrate directly into the deep principal aquifer. The Commissioners noted that the preliminary draft report addressing the groundwater investigation suggested that the upper sand and gravel aquifer had been contaminated with heavy metals beneath the tailings. The Commissioners, Mayor Dahl, and the State of Utah expressed concern that future increased pumping for drinking water supplies may lead to a more widespread gradient reversal and increased contamination. Joined by an earlier commenter on OU2, they charged that the protection of the deep principal aquifer is a must regardless of cost because it is an important drinking water source for Salt Lake County residents. [October 90, November 90, September 90, January 91]

EPA Response

See response to Comment 64.

Comment 66

UDEQ asked for an explanation on the statement in the FS that the direction of groundwater flow beneath OU1 is different than the direction of regional groundwater flow. Mayor Dahl voiced the opinion that increased groundwater pumping could alter groundwater flow from a westerly to a northeasterly direction. [January 91, August 92]

EPA Response

The selected remedy includes a provision for pumping contaminated groundwater to prevent migration of contaminated groundwater outside the OU1 boundaries or downward into the deep principal aquifer in the event that groundwater conditions change significantly and/or contamination is detected in the deep principal aquifer.

Comment 67

The FS stated that lead concentrations greater than MCLs were found in groundwater from the northwest corner of the site. UDEQ asked from what depth (aquifer) was the sample collected? Was the extent of lead contamination defined and additional confirmation sampling conducted during the 1989 RI? Why or why not? Does data indicate the source to be from Sharon Steel or Midvale Slag? Similar concern was shared by the Midvale District Representative from the Utah House of Representatives. [June 92, August 92]

EPA Response

The upper sand and gravel aquifer was sampled during the supplemental RI investigations and no exceedances of MCLs for lead were identified.

Comment 68

The Salt Lake County Board of Commissioners commented that capping the tailings may reduce the infiltration of water from precipitation, but does not address the lateral flow of groundwater into the tailings, which could generate the subsequent leaching of heavy metals and migration of the leachate into the upper sand and gravel aquifer.

The Commissioners noted that this groundwater flow could be reduced if intercepted by a slurry wall or French drain, but that neither remedy would be permanent or free of costly maintenance and monitoring to insure permanent effectiveness. [August 92]

EPA Response

Without the leaching forces of infiltration, the addition of metals to the underflow would be greatly reduced. Migration and a small amount of leaching could occur from lateral flow. Lateral groundwater inflow control is included in EPA's June 1992 preferred alternative. Costs for capital and operation and maintenance for 30 years have been included in that alternative.

EPA's June 1992 proposed alternative includes a provision for pumping of contaminated groundwater from below the tailings, if necessary. The quantity of lateral inflow was estimated to be a small portion of the total inflow to the system.

Comment 69

A PRP reported its opinion that the data in the RI Addendum do not support EPA's conclusion that the "upper sand and gravel aquifer responds as a non-leaky system and does not show recharge boundary effects from the Jordan River." The PRP stated its opinion that the RI Addendum also does not support EPA's conclusion that the "aquifer has a hydraulic conductivity of 135 to 208 feet/day." [November 90]

EPA Response

The report addresses the question of leaky versus non-leaky response adequately for remedial investigation purposes. If pumping of contaminated groundwater becomes necessary, the hydraulic characteristics of the upper sand and gravel aquifer will be better defined during design of the system.

Comment 70

A commenter expressed concern about the slow migration of the Jordan River water through the tailings along the old river bed which could result in carrying leached contaminants downstream and contaminating downstream aquifers. [January 91]

EPA Response

The selected alternative includes a provision for preventing the migration of contaminated groundwater from below the site to areas outside OU1 boundaries, if ongoing monitoring provides information that suggests this is necessary.

5. Remedial Investigations/Feasibility Studies

Comment 71

UDEQ noted that the aquifer "in the Midvale area" has not been formally "classified" as a Class II groundwater and requested that the FS state that the referenced aquifer meets the criteria for classification as a Class II groundwater. [August 92]

EPA Response

EPA believes the existing water quality is adequately characterized in the RI report. See response to Comment 34.

Comment 72

A statement that only arsenic has migrated to groundwater is presented in the FS. UDEQ asked for an explanation about the lead concentration above MCLs encountered at the northwest corner of the site. [August 92]

EPA Response

See response to Comment 67.

Comment 73

UDEQ commented that the FS was not clear in the development of the alternatives that the treatment of groundwater would be accomplished prior to on-site discharge. UDEQ also commented that it was not clear that both on-site discharge options (injection and irrigation) were carried through to remedial action development. UDEQ further commented that the FS stated that on-site discharge (apparently reinjection only) was carried through to remedial action alternative development, though it was not listed on Table 2.8-1 of the May 1992 FS. UDEQ asked for clarification . [August 92]

EPA Response

Both on-site and off-site discharge alternatives were considered for use in the development of the alternatives. Only on-site treatment with discharge to the Jordan River was actually used as part of Alternatives 3 and 4. The selection of this groundwater treatment and discharge alternative was shown on Figure 8-1 in the May 1992 FS.

Comment 74

The FS stated that the water rights for the deep principal aquifer far exceed aquifer recharge. UDEQ asked what State agency provided this information. [August 92]

EPA Response

This statement is based on regional hydrologic reports cited in the RI report.

Comment 75

A PRP stated that the RI Addendum (RI/FS October 1990) should recognize the presence of an unsaturated or vadose zone within the tailings pile, and acknowledged that the vadose zone was a potential source of acid generation and subsequent leaching of metals. [November 90]

EPA Response

The comment is accurate. No evaluation of the vadose zone geochemistry was conducted, since it was not necessary for alternative evaluation. An assumption was made that the currently observed water quality in the saturated portion of the tailings would be representative of future quality that would result if recharge is allowed to continue. The capping alternative will address this during remedial design.

Comment 76

UDEQ noted that the Proposed National Maximum Contaminant Level Goals (MCLG) appeared to be incorrect as stated in the FS. Arsenic should be changed to 2.0, copper to 1.3, and lead to 0. [August 92]

EPA Response

The MCLG's for copper and lead were reported incorrectly in the FS. Copper should be 1.3 and lead 0. Arsenic currently does not have a MCLG. The MCL for arsenic is 50 micrograms per liter.

Comment 77

UDEQ noted that page 1-4 of the FS stated that the tailings are as deep as 56 feet, but that page 1-35 stated that tailings have been encountered at 61.6 feet below grade. UDEQ requested a consistent statement. [August 92]

EPA Response

The depth of 56 feet as noted on page 1-4 of the May 1992 FS is correct. The statement on page 1-35 is incorrect.

Comment 78

A statement was provided in the FS that no underground storage tanks (USTs) had been noted on the former mill portion of OU1 to date. In the text, however, there were statements that indicated that USTs were present on OU1. UDEQ asked for

clarification about the likelihood that USTs exist at OU1 and also noted that a dispenser and vent piping had been identified at OU1. UDEQ further noted that while the FS stated that the Mining Remedial Recovery Company (MRRC) was responsible for USTs that may be located OU1, MRRC claims that the USTs are EPA's responsibility and that MRRC has no further environmental liability for Sharon Steel. [August 92]

EPA Response

A dispenser was located at OU1 on the north side of the mill building. It was removed by an EPA Emergency Response Contractor. The remains of a large above-ground storage tank were immediately next to the dispenser. This tank could have been part of the fuel dispensing system. This tank was also removed as part of the demolition of site structures. No USTs are known to exist at OU1. EPA recognizes that MRRC would not be responsible for any USTs at OU1.

Comment 79

The FS stated that an asbestos cement pipe would need to be considered for disposal during demolition of the mill building facility. UDEQ commented that according to MRRC, there are no intentions to remove the asbestos pipe from the facility. [August 92]

EPA Response

The asbestos cement pipe that is currently at OU1 was removed by an EPA Emergency Response contractor, or their subcontractor, who performed the demolition of the mill buildings.

Comment 80

The FS stated that eight buildings were being dismantled by MRRC, but UDEQ commented that only six of the eight buildings located on OU1 are being dismantled. [August 92]

EPA Response

All existing above ground structures on the mill site have been demolished by EPA's Emergency Response contractor.

Comment 81

The FS stated that 10,000 gallons of liquid were said to be present in the thickener building on OU1. UDEQ asked if this was true, and if so, what kind of liquid was present? Why was further investigation as to the type of liquid present not conducted? [August 92]

EPA Response

The statement concerning the existence of liquid in the thickener building was true at the time of the original writing of the FS. This statement should have been removed from the May 1992 FS. There are no free liquids in any visible tank at OU1.

Comment 82

UDEQ noted that an incorrect statement was made in the FS stating that the work plan provided in Appendix K of the FS was approved by EPA and was in full compliance with all requirements to protect human health and the environment. The work plan that was approved by EPA is the June 5, 1992 version, not the draft work plan dated April 13, 1992 that is presently in Appendix K. [August 92]

EPA Response

This is correct, however, the FS was published in May 1992 prior to the approval of the final work plan. There were no substantive changes in the draft Work Plan which was included in Appendix K.

Comment 83

The FS stated that remedial action was scheduled to begin at OU2 in the summer of 1992, but UDEQ commented that remedial action is scheduled to begin in the spring of 1993. [August 92]

EPA Response

At the time that the FS was written, the OU2 schedule still called for work to begin in the summer of 1992. It began in June 1993.

Comment 84

The Midvale District Representative from the Utah House of Representatives asked for clarification about the Toxic Characteristics of Leaching Procedure (TCLP). He further asked if the TCLP had been done at the OU1 tailings site and what the results were. [June 92]

EPA Response

The Toxicity Characteristics Leaching Procedure (TCLP) has been performed at the OU1 tailings site. The results of the TCLP are included in table F-5 in Appendix F of the May 1992 Feasibility Study. Paragraph 3.3 of Appendix F states:

"None of the leachates from the EP toxicity test or the TCLP test of treated tailing samples exceeded the concentration criteria of 40 CFR 261.24 and therefore the treated tailings materials do not meet the definition of RCRA hazardous waste. This is not true of the untreated or reprocessed samples. The EP Tox leachate results from the untreated samples for the regulated metals are summarized on Table F-1." This section goes on to discuss treatment with fixation agents to reduce the amounts of metals in leachates.

Comment 85

The FS stated that at pH values of 7.5 to 7.8, metals would remain bound to the sediments. UDEQ asked if this would be true for all metals of concern at OU1. [August 92]

EPA Response

The FS stated (page 1-42) that under slightly alkaline conditions, metals would tend to remain bound to the sediments. This is an accurate general statement; other factors may also influence metals solubility. Please refer to the RI for additional information.

6. Remedial Design

Comment 86

A commenter stated that capping, fixing, and vitrification each has certain merits, but that in its opinion these procedures were not applicable to the Sharon Steel tailings. The methods are suitable for small volumes of recalcitrant contaminants not readily treated or able to be removed by other technologies or methods. [August 92]

EPA Response

EPA concurs that fixing and vitrification are not technically or economically feasible at the Sharon Steel site due to the characteristics and volume of the tailings. However, capping is amenable to this site. One of the advantages of capping is that it is protective and can cover a large land area at a reasonable cost. EPA believes that capping is an excellent choice for the tailings which are not readily treated.

Comment 87

The U.S. Fish and Wildlife Service made five points related to migratory bird protection during the tailings remediation: 1) clean up of buildings, trees, or wetland habitat should be designed so as to have minimal impact on nesting birds and nest sites; 2) due to the tendency of heavy metals to bioaccumulate in aquatic invertebrates

and plants, monitoring of aquatic life should be conducted to protect migratory birds from contamination via the food chain: 3) clean wetland sediment may need to be placed into the wetlands to retain a shallow water depth after remediation; 4) revegetation of the wetlands and upland areas of the site should be accomplished with native plant species; 5) pockets of contaminated tailings detected in the Jordan River should be removed due to their migration potential from floods, earthquakes, and construction and because of the risk of bioaccumulation in the food chain. [August 92]

EPA Response

The demolition of the buildings and remediation of the OU1 site will be performed in a manner sensitive to the fauna which exists on OU1. Once the remediation is complete, the ability for heavy metals to enter the food chain will be reduced. As part of the preferred alternative, the existing wetlands will be remediated and reconstructed to a natural state. Because of this, EPA has no plan to clean any sediments in the Jordan River as part of EPA's June 1992 preferred remediation alternative.

Comment 88

UDEQ noted that a statement is made in the May 1992 FS that two feet of clean fill would be placed at the mill site if excavation of the tailings were the selected alternative. This appears to imply that only two feet of contaminated soil would be removed during the excavation process. However, as stated on page 1-18 of Volume II, Section 1 (of the May 1992 FS), contaminated soils extend to ten feet below the tailings. UDEQ has requested a remedy for mitigation of the additional depth of contaminated soil below two feet deep and has asked for cleanup levels. [August 92]

EPA Response

Two feet of soil would be removed in the former mill area if either the excavation and disposal or capping alternatives are selected. If the excavation and disposal alternative is selected, all contaminated tailings would be excavated, and contaminated soils below the tailings would be excavated to a depth of four feet. The FS indicates that

soils with contaminant concentrations exceeding action levels do not extend beyond four feet below the tailings.

7. Alternative 4 -- Capping Issues

Comment 89

A remediation company stated that a cap would create an anaerobic and anoxic (devoid of air and oxygen) environment in the material below the cap. In the commenter's opinion, this situation could cause the generation of acids, or similar conditions, far more acidic than the EPA TCLP test used to determine the concentrations of metals reported in the survey data. The time for leaching to occur would also be considerably more extensive in duration than for the previously mentioned test method which would result in more leaching of a greater extent than is presently observed. Capping would also induce the native anaerobic bacteria to thrive in what would be an ideal environment and thereby generate biogenic toxins including organic complexes of the toxic metals. [August 92]

EPA Response

The tailings are currently under anaerobic conditions at depth. The addition of a cap is not expected to significantly impact this condition. The selected alternative includes a provision for controlling the flow of contaminated groundwater from the site, if necessary.

Comment 90

In opposition to capping, Mayor Dahl mentioned that drill logs indicate that the top few feet of tailings are dry, but deeper down, the tailings go from moist to wet to a "foul-smelling saturated gooey substance," which according to the Mayor is a formula for liquefaction. Since Miavale is in a high-risk earthquake zone, what cost and remediation has EPA planned for in the event of an earthquake that causes the tailings to move and the ground to become contaminated? Another commenter also expressed

concerns about the geologic instability of the Salt Lake City Basin and noted that OU1 could be at risk because the tailings were situated on the former geological bed of the Jordan River, and the river was diverted in the 1950s to allow addition of more tailings. [January 91]

EPA Response

Liquefaction potential of the tailings during a major earthquake, has been studied by EPA and the State. Also, geotechnical analysis of tailings has been conducted by various parties, including EPA and the U.S. Bureau of Reclamation. Horizontal and vertical contamination of ground and surface water from earthquake liquefaction cannot be easily estimated, however, and it follows that no estimate of remedial costs from such a catastrophic event has been prepared to date.

Previous studies have concluded that the tailings, as well as the elastic silts underlying them, would be subject to liquefaction under strong shaking. As the tailings drain, this susceptibility would be reduced, but would probably remain as long as some portion of the tailings or the subtailings remain saturated. The alluvium under the tailings may also be subject to liquefaction.

Should any of these materials fail, the cap could become cracked or fail as well. Proper design of the cap, combined with buttressing of side slopes, could reduce this susceptibility.

EPA Headquarters performed a technical review of the potential for seismic damage at the OU1 site. EPA concluded that seismic hazards can be mitigated using standard geotechnical engineering measures. Measures which will be considered during remedial design include densification of site soils to reduce their susceptibility to liquefaction and implementation of slope stability measures along the cut slope at the edge of the tailings pile.

Comment 91

A remediation company expressed the opinion that capping would require some sort of retaining wall to contain the nearly-fluid material presently on the site and that no deeply-rooted trees could be allowed because their roots could penetrate and hydraulically crack the cap. [August 92]

EPA Response

The exact design of the cap will be specified during the remedial design phase of the project. Under the FS, it is conceptualized that the wall of the tailings pile along the river will be terraced and utilize a retaining wall for support. Trees could be planted on OU1 without compromising the integrity of the cap by using specifically designed planter boxes that confine the roots.

Comment 92

A remediation company expressed the opinion that a solid cap or saturated soil cap over the tailings site would contribute to extreme surface water runoff which could lead to flash flooding potential for the Jordan River during "cloud burst" situations. A scenario was presented outlining the volume of water that would be channeled to lower-lying areas and the resulting inundation of all structures lying in the flood path. The company also noted that during such an event, in its opinion, the cap would also be irreparably damaged. [August 92]

EPA Response

The design of the cap would include provisions to handle a 100- year storm event without damage to the cap. Run-on would be eliminated through the design of diversion channels. Water on the cap would be collected and channelled to cause the least damage possible.

Under the June 1992 proposed capping alternative, a 24" vegetation layer would be installed over the area of the cap. The purpose of this vegetation layer would be

establish plant growth that would help stabilize the cap and protect the cap from both wind and water erosion. The plant growth would also slow down run-off from OU1 in the event of a "cloud burst", and thus reduce the flash flood potential. The cap area would drain much the same as a large park or pasture area.

This alternative also includes regrading of the tailings and the area along the Jordan River prior to placement of the cap. The river channel in area of the cap edge would be stabilized. Both of these precautions would control runoff from OU1, and greatly reduce the chances of a catastrophic disaster as predicted by the remediation company.

Comment 93

The Salt Lake County Board of Commissioners stated that the requirement of total isolation between tailings and the aquifer could only be achieved by removing the tailings from their current location or by rolling back the tailings then replacing them on a RCRA-type liner with accompanying leak detection systems. The cost estimate for capping did not include the RCRA liner approach and therefore makes that alternative invalid. Mr. Jorgensen, Midvale District Representative from the Utah House of Representatives, asked if the capping proposal also involved sealing underneath the tailings in order to prevent leaking. [June 92, August 92]

EPA Response

The capping alternative does not include a liner beneath the tailings. This technology is not required because from a hydrogeologic and engineering standpoint, a lower liner is not needed.

Comment 94

Mayor Dahl expressed concern about the potential impacts of capping after implementation has been completed, including:

a) subsequent land use and imposed restrictions;

b) wetlands and flood plain contamination;

c) zoning considerations;

d) adjacent compatible land uses and zoning;

e) relationship to Jordan River Parkway;

f) access - limited development potential;

g) institutional controls;

h) property ownership;

i) infiltration of contaminants into aquifer;

j) injury to health and welfare of valley inhabitants; and

k) monitoring and operation and maintenance costs after 30 years. [August 92]

EPA Response

Future land use is not a criterion for remedy selection under CERCLA and EPA is not selecting the remedy based on land use planning (but has considered it in the remedy selection process). The primary criteria for remedy selection are protection of public health and the environment. The selected remedy will achieve these criteria by preventing any offsite migration of contaminants and eliminating the potential for exposure.

Comment 95

Former Congressman Owens stated his opinion that capping does not adequately comply with the CERCLA mandate to protect public health and the environment. He stated that capping does not address the future hazards of ingestion, inhalation, and direct skin contact with contaminated soils and dust which could result from erosion and deterioration of the cap. Pedestrian access to the site proposed under th e alternative also creates this risk of exposure and could accelerate the deterioration of the cap. Former Congressman Owens also stated that capping would not reduce the

toxic contamination already present in the Jordan River. The Jordan River is home to cold-water game fish and supplies irrigation water in the vicinity of OU1. Capping does not eliminate pathways by which persons could be exposed to heavy metal sediment contamination. [July 92, August 92]

EPA Response

The purpose of a Superfund Clean-up is to find a remedy that is protective of human health and the environment. EPA has carefully analyzed the situation according to the requirements and guidance provided by CERCLA and the NCP and firmly believes that the cap will protect the public from the dangers raised by former Congressman Owens. Specifically, the capping alternative includes continuous maintenance and repair of the cap and a re-evaluation of the protectiveness of the remedy every five years. This will protect the surrounding population from exposure to the contaminants. The pedestrian access will be controlled and the cap will be designed for such use. Included in the alternative is a groundwater collection and treatment system, to be implemented if necessary. This will adequately protect the Jordan River from future contamination.

Comment 96

Mayor Dahl commented that in his opinion capping would not reduce the volume of contaminants at OU1, which was one of the criteria evaluated for remedy selection. Capping would only reduce air pathways of contamination. [January 91]

EPA Response

Installation of a soil cap does not reduce the toxicity or volume of contaminants within the tailings body. A soil cap would decrease the recharge to the tailings, however, and thus decrease the mobility of contaminated fluids leaking into the aquifer. EPA's June 1992 preferred alternative includes a provision controlling groundwater migration from the upper sand and gravel aquifer below the tailings, if necessary.

Comment 97

A commenter stated that covering the tailings would halt the beneficial "wicking" or evaporation of water, and would result in a saturated condition under the cap. The saturation would magnify the potential for liquefaction during an earthquake, whereby the semi-fluid soils could not be retained and would flow into the Jordan River. [January 91]

EPA Response

Evaporation of water does take place at the exposed surface of the tailings; however, the source of this water is recharge from snowmelt and rain during wetter portions of the year. Capillary tension is not a sufficient force to move significant quantities of water upward from the saturated zone within the tailings. The depth to the saturated zone within tailings is at its shallowest at well #003 about 20 feet.

Installation of a cover or soil cap on the tailings would not result in a greater degree of saturation within the tailings. The quantity of recharge would decrease from the current condition, resulting in a drop in water level. Seepage from the base of the tailings is the primary discharge path for water in the tailings.

Comment 98

In commenting on the June 1992 OU1 Proposed Plan and the May 1992 OU1 Draft Final FS, UDEQ stated that the capping alternative does not remove or provide a barrier to separate the source of potential continual groundwater contamination. UDEQ added that contaminated water in the tailings could not be feasibly removed due to geochemical characteristics of the tailings, thus suggesting a continual source for groundwater contamination. UDEQ asked how this potential source of continual groundwater contamination would be addressed and if it could be remediated when and if the upper sand and gravel aquifer is treated? [August 92]

EPA Response

The source of contamination is not removed under the capping alternative, however, the contribution of contaminants will decrease over time as recharge to the tailings is diminished. The selected remedy includes a provision for pumping of contaminated groundwater from below the tailings, if necessary.

8. Alternative 3 -- Excavation/Transportation/Containment Technologies

- **a. General Comments**
- **b. Excavation**
- **c. Transportation**
- **d. Containment**

a. General Comments

Comment 99

A PRP asserted that the FS ignored risks to public health and the environment, especially through airborne emissions, created by excavation and off-site disposal and incorrectly concluded that the alternative is implementable. [November 90]

EPA Response

EPA agrees that any handling of the tailings would be difficult, but feels that the construction activities proposed in the excavation alternative are technically feasible and would adequately handle the tailings material.

EPA concurs that the potential for dust emissions during construction activities is high, however, EPA stated that the emissions could be controlled with an extensive dust abatement program and has included the cost for such a program. In addition, it was assumed that a significant portion of the tailings would be moist or wet and would not be susceptible to migration by wind. Additionally, the use of a pipeline would decrease the risk of injury associated with truck traffic.

Comment 100

A PRP commented that EPA underestimated costs and the time it would take to excavate and remove the tailings. The PRP stated that EPA assumed that the tailings could be excavated and removed in 7.5 years, but that assumption failed to account for the receiving capacity of the disposal facility. The PRP expressed the opinion that EPA had significantly underestimated the cost of excavation and off-site disposal, and that the cost estimate for the removal and disposal option was incorrect. [November 90]

EPA Response

EPA's estimates of cost were developed at a -30% to +50% level of accuracy, and were based on applicable regulations and standard design practices. See comments and responses in Section 2, Cost Issues. Final costs for the excavation and off-site disposal alternative will depend on the location of the off-site disposal cell, as determined by the State.

Comment 101

A remediation company expressed its opinion that the environmental impacts for Alternative 3 in the June 1992 Proposed Plan appeared to be totally exaggerated. [August 92]

EPA Response

EPA believes the environmental impacts of all the alternatives were determined based on sound engineering judgement. The impacts were discussed with experts in all areas of hazardous waste remediation and risk assessment. The environmental impacts determined for Alternative 3 are consistent with the rest of the alternatives.

Comment 102

A remediation company stated that time requirements estimated for Alternative 3 were overstated, but these may have resulted from erroneous slurry line operating

assumptions. With 24-hour slurry line operations, the commenting company's estimated project completion was within 4.5 years. [August 92]

EPA Response

It is not realistic to assume that a pipeline could operate nonstop for 4.5 years. Time is needed for maintenance and repair. The material being pumped is very abrasive and can potentially require a great deal of maintenance. Further, continuous operation assumes that all facilities, both at the slurry making end and the receiving end, are perfectly designed to handle this continuous flow. It is highly unlikely that all these systems will work in complete harmony.

It maybe possible to decrease the time required for the removal of mine tailings under Alternative 3 using a 24 hour/day and 7 days per week work schedule, however because the total number of man and equipment hours would remain the same the costs for performing this work would remain approximately the same.

Comment 103

A remediation company noted that EPA appears to have downsized its estimates of volumes of tailings and underlying soils from 12,355,000 yards of tailings, 200,000 yards of OU2 soils, and 1,344,000 yards of underlying native soils to a cumulative total of 10.6 million cubic yards of tailings and soils. The company further noted that this volume change would also accordingly downsize private bids submitted for excavation and removal of the tailings. [August 92]

EPA Response

All alternatives were costed using the same volumes thus they were compared on an equal basis. The estimates preformed by private bids do not affect the alternative cost comparisons.

Comment 104

A remediation company considered the costs of treatment of contaminated groundwater to be significantly overstated. The company thought that if groundwater was used for slurry water, then discharged at the disposal site to the Class VI waters, costs of treatment at the Sharon Steel site would be eliminated for the first 4-1/2 years. This would include the 500,000 and 250,000 gallon storage tanks and operational costs of the activated alumina treatment process. Only the incremental costs of treatment prior to Class VI discharge need to be added back during the excavation phase. The company asserted that following excavation, levels of groundwater contamination could be determined and appropriate treatment could be designed and built if necessary. [August 92]

EPA Response

The assumptions made by the remediation company can not be substantiated at this level of study. It can not be assumed that groundwater can be used or is of sufficient quantity for use in making the slurry. Other water rights would have to be investigated. It can not be assumed that no treatment of water would be required if it is discharged to a Class VI water. The discharge would be highly concentrated with contaminants and would require some treatment. It would be unrealistic not to include the cost of treatment at this point. This would not provide an equitable comparison of alternatives since the potential exists for additional future costs.

Comment 105

Given the 30-mile radius criteria set by EPA, Mayor Dahl claimed that it would be very difficult to find an appropriate tailings disposal site. He noted that there were receiving locations outside of the 30-mile radius that should be evaluated, and further commented that EPA's setting of such tight parameters would make the relocation potential almost impossible. [August 92]

EPA Response

EPA is willing to consider other sites outside the 30-mile radius. The distance was used as a basis to compare the three transportation methods, pipeline, trucks, and rail. A disposal location outside the 30-mile radius may not be feasible technically if the slurry pipeline is used, and would effect the trucking or rail cars transportation methods.

Comment 106

In summarizing the post-remediation impacts effects of each of the proposed remediation alternatives on Midvale, Mayor Dahl highlighted the following post-cleanup issues about the impacts of excavation, transportation, and containment:

a) subsequent land use;

b) wetlands and flood plain issues;

c) present zone I-1;

d) adjacent land uses and zoning;

e) river reverting back to an old course;

f) extension of infrastructure into area;

g) any potential institutional controls; and

h) resultant property ownership. [August 92]

EPA Response

Future land use is not a criterion for remedy selection under CERCLA and EPA is not selecting the remedy based on land use planning (but has considered it in the remedy selection process). The primary criteria for remedy selection are protection of public health and the environment. The selected remedy will achieve these criteria by preventing any offsite migration of contaminants and eliminating the potential for exposure.

The cap will be designed to withstand a 100-year storm event without damage. Suitable engineering controls will maintain the river in its present course.

8b Excavation

Comment 107

A PRP stated that the draft FS failed to consider the impacts of dust suppression on groundwater, surface water, and wetlands by adding significant water to the tailings during excavation and handling. [November 90]

EPA Response

The amount of water used for dust suppression will be insignificant. The use of water or other dust suppressant will be a design issue and will have to be controlled.

Comment 108

UDEQ asked for an elaboration on the dragline excavation process. [August 92]

EPA Response

A dragline is basically a large crane with an excavation bucket attached to the end of the lifting cable and to a second winch on the crane. The excavation bucket is "cast" out into the area to be excavated and pulled or dragged back to the crane which fills the bucket with the excavated material. Draglines are used in the mining industry to remove overburden off of coal seams in strip mining operations. Draglines are frequently used to dredge materials that are under or saturated with water. In the FS for OU1, it was assumed that a dragline would be used to excavate tailings. The specific details of this process would be developed during remedial design.

Comment 109

A remediation company claimed that the estimated effectiveness of Alternative 3 as noted on page 3-23 of the May 1992 FS was underestimated due to the assumption

that a dragline would be used for excavation, which would produce a dust level greater than that which would be produced by specialized excavation machines. The company continued to state that the type of excavation method used was a key element in both the protection of human health during removal and the efficiency/costs of the project. The company asserted that the three removal methods evaluated did not include "Specialized Custom Excavation Equipment" specifically designed and built for such a project. As detailed in the company's proposal, Specialized Custom Excavation Equipment minimizes the working face of the excavation and minimizes dust and noise. While the draglines and heavy equipment evaluated in the FS are readily available and their capital and operating costs are easy to acquire, custom machinery built to excavate this specific site is not only safer and more economical, but it would minimize dust and noise as well. Consequently, the company believes that the risks associated with dust generation to both the community and the workers would be minimized. [August 92]

EPA Response

The consideration of specialized excavation equipment is not appropriate at this level of investigation. To make the comparisons equitable, commonly available equipment must be used in development of the alternatives.

For cost estimating purposes it was anticipated that a dragline would be used to excavate the mine tailings. The assumption was made based upon observations made during the remedial investigation for OU1 when several areas were noted to be saturated and normal equipment could not drive over these areas. It was not our intent to dictate the type of equipment that a remediation contractor would have to use on this site, but we felt that it was highly possible that this equipment would be used.

As for the issue of the generation of dust and subsequent dust control, EPA has no information as to how much dust would be generated by the excavation process proposed by the remediation company. No matter what type of excavation and dust

suppression methods used, the air will still need to be monitored to assure that the production of dust does not exceed the TLVs established for this project.

Comment 110

A PRP stated its observation that the bulk of the tailings consists of fine particles that are wet or saturated and difficult to excavate using ordinary excavation equipment. In the opinion of the PRP, EPA ignores problems associated with the stability of the tailings. The PRP believes that parts of the tailings piles would not support heavy equipment, and excavation may destabilize additional portions of OU1. Additionally, the PRP stated its belief that the draft FS incorrectly assumed that excavation could be accomplished with a dragline and conventional equipment and said that the draft FS ignored the need either to dry the tailings before excavation and transport or to provide specialized equipment to remove the tailings from equipment and rail cars. [November 90]

EPA Response

The issues raised in the above comment are too specific to the design of the excavation process for consideration in the FS. These are not insurmountable problems and can be dealt with by use of conventional methods. These issues would be addressed during detailed design.

8c Transportation

Comment 111

The operating schedule of the slurry line was stated in the FS to be 8 hours per day for 270 days per year. Other proposals have recommended operation for 24 hours per day based on ease of start-up and shut down. UDEQ asked EPA to review the standard operating parameters of slurry transportation to insure that 8 hours of operation is standard practice and could be accomplished. Additionally, a site remediation company stated that the estimated effectiveness of Alternative 3 as

outlined in the FS was not as high as it should have been because of an error in assuming the duration of the project at 6.5 years rather than a 270-day season totalling 3-5 years. This error also results in a serious overstatement of costs throughout the entire analysis. [August 92]

EPA Response

See response to Comment 102.

Comment 112

While commenting on the slurry/transport of tailings, a remediation company outlined the following: a) at least 10,850,000 tons of tailings must be transferred; b) the slurry volume must be at least twice the bulk volume of the tailings; c) a slurry plant must be built having a capacity to receive the return water while preparing slurry for output; and a retention system must equal the volumes of all fluids and the slurry; d) if a 13-inch line is used, then the static volume is 6.89 gals per linear foot or 36,379 gal per mile; a 26-mile long pipeline, not counting pump dead volumes, is 945,859 gals.; e) only 1/3 to 1/2 the volume is tailings, thus 472,929 gals or 60,631 cubic feet (2,245 yds or 2,919 tons) of tailings would be in the pipe at any instant in time; f) moving the tailings would require the transfer of 7,430 complete pipeline volumes to move the estimated tonnage of tailings at 50/50 water-to-solids slurry mixture; g) the number of days to complete this work is at present unknown to this writer; h) 8,246,000 yards of solids need to be transferred or 16,492,000 yards of slurry would need to be moved; i) if a flow rate of 10 mph for the solution could be achieved, 2.6 hours would be required to move one pipe volume, and 9.2 volumes or 26,855 tons of tailings could be transferred per 24 hour shift; requiring 404 days of operations at this level.

The company provided similar figures for a 3-inch pipeline scenario and concluded that while a 13-inch pipeline is riddled with political, technical, and logistical concerns, the commenter believes a 3-inch pipeline is simply not realistic. [August 92]

EPA Response

EPA does not concur with all of the above calculations. However, if a slurry pipeline alternative were to be built, a cost/benefit analysis would be performed during the detailed design stage to determine the most advantageous pipe size given all input parameters such as routing, pumping pressures, velocity, etc.

Comment 113

A remediation company stated its opinion that transferring tailings to another site does not resolve the problem, but merely relocates the toxins. The company pointed out a number of technical problems inherent in pipeline/slurry transfer of tailings to a site such as Cedar Valley: 1) the likelihood of using the railroad corridor is at best remote; 2) damage by seismic, natural, or human-related efforts would require constant surveillance and overwhelming security problems; 3) pumps of very large output requiring tremendous energy consumption would be required to maintain this very heavy tailings as a slurry and as a mobile fluid; 4) these same pumps or similar types would be required to prevent settling of the "heavies" at geographic depressions and irregularities; 5) the heterogeneity of the tailings would require a highly sophisticated separation technology at the origin; 6) slurrying using Jordan River water would require a volume equal to or greater in weight than the tailings; 7) there must be a return line from Cedar Valley carrying the decanted water which now must be considered hazardous; 8) repair and maintenance would likely equal the cost of constructing the pipeline. (This pipeline, which would also be considered hazardous would need to be removed after slurry transfer is complete); 9) disposition of the water after all transfers were complete would result in the establishment of a special water treatment facility; 10) the logistics of building a paired pipeline system over the existing topography is almost overwhelming; the lines must be built and pressurized to lift the slurry from the site which is very nearly at the lowest point in the region over a range of hills between Utah and Cedar Valleys and thence downward to a receiving site in Cedar Valley; 11) the slurry must be dewatered in Cedar Valley and the water returned to the point of origin; 12) the slurry is very abrasive which would require

frequent pipe section replacement and shutdown; 13) a decanting facility would be required at the point of receipt; 14) water needs and usage would be high, especially in settling ponds or tanks needing a volume equal to the constant needs to maintain a full return line; 15) weather conditions which often turn frigid could cause rupture and leakage; 16) due to the near-colloidal nature of the particles, a system of separating the settleable solids from the suspended solids would need to be devised; 17) leakage detection would be needed; 18) railway leakage near residences is a potential; 19) the pros and cons of a buried pipeline need to be assessed; 20) a leak in pipeline paralleling the Jordan River could contaminate the river, downstream irrigation waters, and railroad property. [August 92]

EPA Response

EPA concurs with many of the concerns stated above however, most if not all could be successfully overcome during detailed design.

Comment 114

A remediation company noted that the FS costs of slurry transportation were in its opinion, vastly overstated, possibly due to assumptions which betray an understandable lack of knowledge of local conditions. The company cited the example of on-site wells as the source of slurry makeup water. The least expensive source of water is the Galena Canal, owned by MRRC, followed by surplus canal water which could be leased and pumped from the adjacent Jordan River. [August 92]

EPA Response

The issue of water rights, both senior and junior, and availability would have to be addressed during detailed design of the alternative. At the FS level of study, EPA is required only to be able to state that water exists in sufficient quantity to make the alternative viable. It was assumed in the development of the slurry transport alternative that sufficient water would be available at no additional cost, except for pumping.

Comment 115

A significant mistake occurred in the estimate of slurry line construction costs, according to a remediation company. The estimated unit cost of $291 per foot is nearly three times the cost this engineering company arrived at through consultation with slurry line design and construction experts. These costs were verified by an experienced local major construction firm, using the company's specific alignment, which has several unique transportation corridor, utility, and waterway crossings. [August 92]

EPA Response

The cost of the slurry line construction costs include the costs for obtaining right of way permits; a transport pipe with a containment pipe around it; a return water pipe with containment pipe around it; a leak detection system; and the costs for burying the pipe during installation and digging up of the pipe during removal; it was assumed that a certain number of city street miles would need to be removed and replaced both during installation and removal operations. These assumptions were made because the theoretical location for the new disposal cell is not known. The costs used by the remediation company assumed that a location in the Great Salt Lake would be used and approved. EPA felt that this was a premature assumption.

When the alternative and costs were developed, no specific route was considered. The routing that is proposed by the remediation company has not undergone any legal scrutiny and EPA does not have sufficient information to know if it would be feasible. The proposed pipeline would require double wall for containment and have leak detection equipment along the entire route. This would greatly increase the unit cost of construction.

Comment 116

A remediation company was perplexed regarding how the FS could suggest a cost of $27,700,000 for slurry mixing and dewatering facilities. The company's estimated

cost was at least $20 million less, which cannot be attributed solely to the company's not requiring return flow of slurry decant and consequent treatment for discharge to Class IV water. [August 92]

EPA Response

The cost for the slurry mixing and dewatering facilities includes both the construction and the demolition of the facilities. These costs also include the purchase of the conveyor belt system, with feed hoppers that will be used in the excavation of the tailings material.

Comment 117

A remediation company thought that slurry line transportation was appropriately selected in the May 1992 FS as the most implementable and least costly removal alternative. However, the company stated that the study erroneously stated that if an acceptable disposal site was found in proximity to the existing rail line which connects with the mill site, the rail option should be evaluated. The company's study of the rail option showed that: 1) rail transport was substantially more expensive than slurry line transport (even for a short-term project), as evidenced by Kennecott's decision to abandon rail transport of copper ore/concentrate and tailings, and replace it with a slurry line; and 2) the operation of mechanical rail car loading facilities needed to efficiently move the tailings would cause an unacceptable level of noise, dust, and disruption to the residents of Midvale living near the existing rail lines. The remediation company thought that even if a disposal site were found near an existing line, rail transport would not be a viable alternative. [August 92]

EPA Response

EPA has not be given a copy of the commenter's study on the cost of a rail line transport system and therefore is not able to comment on the specifics of that document. It is however, premature to state that rail transportation would not be viable until an exact location of a disposal site is determined. The use of a slurry

pipeline in the development of Alternative 3 was based on a comparison of pipeline, rail, and trucking without a specific site in mind.

Comment 118

UDEQ requested further exploration of the possibility of railroad transport of tailings to an off-site location, noting that rail transport could be as cost effective as slurry transport based on two proposals provided to the State. [August 92]

EPA Response

EPA does not disagree with the possibility that rail transport could be as cost effective as a slurry pipeline. However, this can not be evaluated until a definite disposal location is determined. There are many factors which could totally eliminate either method based on available routes to the disposal location.

Comment 119

A remediation company noted the following legal and regulatory problems inherent with the slurry/pipeline procedure that would transport tailings to a site such as Cedar City: 1) liability insurance for such a project would be prohibitive in cost even if a carrier could be found; 2) permitting at the municipal, State, and federal levels would take many years, if such permitting could even be granted; 3) the Not In My Back Yard, (NIMBY) attitude so prevalent today would put the permitting issues in court for unduly long periods; 4) litigation would consume all private investment funds; 5) the receiving site must meet all guidelines for a hazardous waste storage site, which is extremely expensive; 6) environmental impact statements could take several to many years to develop and must be accepted during the Public Input Phase which could take even more time; 7) a decade or more could elapse just in litigation. [August 92]

EPA Response

EPA shares many of the concerns stated above. EPA has charged the State of Utah with the task of locating a disposal site that is acceptable to the surrounding

community and would be able to meet all permitting requirements. The State has the responsibility to demonstrate that the site is acceptable to all those concerned and would be available to begin construction of the cell in a timely manner.

8d Containment

Comment 120

A remediation company observed that the FS costs associated with land acquisition, excavation, double liners, and leak detection systems (commonly associated with RCRA landfills) for containment sites were based on certain assumptions. The commenter stated that at most potential locations, these costs might be valid; but at one specific site, these costs appear to be unnecessary and thus could offer a significant cost-savings potential. Commenter noted that sites at which these items are not required would provide significant cost savings potential. In a formal proposal to the State of Utah and EPA, the company identified such a disposal site that exists within the 30-mile radius. At this site, the natural soils (clays) have permeabilities equal to that required for a hazardous landfill clay liner (3-feet of 10^{-7}cm/sec clay). In addition, the local groundwater is brine - not used for consumptive purposes. If a leak were to occur, the natural chemical precipitation process of the waters would neutralize the heavy metals. Land acquisition costs are negligible, and a residential exposure scenario is nonexistent and prohibited by State regulation. Required excavation is reduced from 3,000 acre-feet to less than 1,000 acre-feet. [August 92]

EPA Response

No definite site has been approved by EPA or the State of Utah. The fact that the surrounding water is brine does not alleviate the requirement for a liner and leak monitoring equipment. It would be in violation of RCRA to design a cell that would allow leakage no matter what type condition of the immediate surrounding environment. The proposed site has not gone through the public acceptance process nor strict engineering analysis.

Comment 121

A resident of Midvale requested clarification of the 30-mile radius designated for disposal of excavated materials and stated there were adequate disposal cell sites to the west that have previously received Vitro deposits. [June 92]

EPA Response

A distance of 30 miles was used in order to retain the greatest variety of transportation technologies. At distances of greater than 30 miles the slurry line option no longer appears implementable.

9. Fixation/Chemical Treatment and Vitrification

Comment 122

Former Congressman Owens commented that EPA did not justify its exclusion of chemical treatment as a viable remediation alternative, especially when such technology had been successfully employed at another site in the area and offers a cost-effective, permanent remedy. [July 92]

EPA Response

Chemical treatment was fully evaluated in the FS. The apparent site to which former Congressman Owens is referring was extremely small in volume. The study performed by EPA concluded that due to the characteristics and gross volume of the existing tailings pile, chemical treatment would be prohibitively costly. Additionally, the capability to adequately treat the tailings to a depth of over 50 feet is questionable.

Comment 123

A patent attorney/systems engineer with a background in biological systems for mineral processing, and the president of a solid waste solidification company raised the following points about EPA's decision-making process and criteria for the fixation alternative. Why did the cost of fixation change from $116 million in the original

EPA estimate (Proposed Plan July 1989) to $2 billion in recent proposed plans? Was fixation dropped as a solution because of its high cost, even though it was the only alternative defined by EPA that permanently solved the waste problem? Did the astronomical cost estimate for fixation influence the PRPs to settle on a quick fix alternative? [December 90, January 91]

EPA Response

A more detailed study on the types of fixation chemicals was performed between publishing the original Proposed Plan and the current revised issue. The study found that the least costly fixation agents would cause the volume of the tailings to double. Given the very large volume of the existing tailings and the limited size of the OU1 site, this was unacceptable. In order to minimize the increase in volume, a more costly fixation agent would be required. Further, the process of completely mixing the agent with the tailings to a depth of over 50 feet is difficult and costly. The alternative was eliminated from consideration because of the high cost and difficulty to implement compared to the other alternatives.

Comment 124

A remediation company stated its opinion that fixation was not a reliable remediation option for the following reasons: 1) the cost is many times higher than a metals extraction procedure or capping; 2) the final bulk of the material has been calculated to be 20% greater than the present tailings or roughly equal to seven of the Great Pyramids; 3) fixing is not as effective as claimed, especially in moist and moderate to highly-saline soils as could be evidenced by metals leaching from sidewalks in both Salt Lake and Davis counties; 4) the area would be rendered useless for any future generations; and 5) the tailings would require extensive handling, which would be put to better use in a metals extraction process. [August 92]

EPA Response

Fixation was studied and it was determined that the fixation alternative did not meet the nine criteria for selecting a remedy set forth in the NCP, as well as the other alternatives. Therefore, fixation was eliminated from further consideration.

Comment 125

When commenting on vitrification, a remediation company stated its opinion that this process used tremendously high voltage and would be prohibitively expensive while inundating the site. Certain metals, such as arsenic, cadmium, lead, mercury, tin, and others vaporize at less than vitrification temperatures. This could create hazardous vapors for all residents downwind of OU1 as well as for the people on OU1. [August 92]

EPA Response

Vitrification was eliminated from consideration as a viable alternative in the screening process of the FS. It would be very difficult to effectively treat the entire tailings pile with electric current. EPA agrees with the concerns of the commenter and eliminated vitrification from consideration in the FS.

Comment 126

The president of a hazardous waste solidification company stated his opinion that leaching of contaminants into the groundwater could be stopped only at the source by chemical stabilization (fixation) of the soil to render it unleachable. He believes that capping would not obtain leach resistance, would only be effective in reducing wind-borne dust movement and would not meet the State's environmental criteria. This commenter pointed out that EPA recognizes fixation as a viable process and that the process meets CERCLA statutory requirements and remediation criteria. In conclusion, he stated that he believes private sector technology exists to permanently remediate the OU1 site at a fraction of the cost of EPA's fixation alternative. [December 90]

EPA Response

The primary reason that the cost for the fixation alternative was so high was that the proprietary fixation agent chosen resulted in little or no increase in volume of the tailings. Because OU1 contains such a large volume of contaminated soil and tailings, limited volume expansion could be tolerated. Proprietary fixation agents that result in little or no volume expansion are also the most costly.

The commenter indicated his opinion that the private sector technology is available "at a fraction of the cost of EPA's fixation estimate." This could be the case if the following assumptions are correct: 1) its product does meet the environmental criteria; 2) it attains the expected percentage volume increase of only 5 - 30%; 3) the cost per ton (which was not provided by the commenter) is in fact a fraction of the cost of EPA's fixation agent.

However, even if these assumptions hold, and cost per ton is 50% lower that the cost used in the FS ($37.50 per ton instead of $75), the cost for fixation alone is still approximately $642,000,000 for the volume of tailings at the OU1 site. When this cost is added to the costs for related remedial actions of this alternative, including indirect costs and annual/periodic costs, fixation remains a very costly alternative.

10. Reprocessing

Comment 127

UDEQ asked if the BOM study had determined that the quality of metal that could be recovered by the beneficiation process was not sufficient to be salable? And, does this mean that any metal recovered by beneficiation could not be sold? [August 92]

EPA Response

The BOM study only looked at the recovery of specific precious metals such as gold and silver. It was the conclusion of the BOM that the value of the metals that could potentially be recovered was far below the cost required to recover them.

Comment 128

Mayor Dahl expressed concern about the potential impacts of reprocessing:

a) subsequent land use;

b) wetlands and flood plain issues;

c) present zone I-1;

d) adjacent land uses and zoning;

e) river reverting back to an old course;

f) extension of infrastructure into area;

g) any potential institutional controls;

h) property ownership;

i) any resulting contamination to aquifer or wetlands; and

j) continuation of operating and maintenance costs after 30 years. [August 92]

EPA Response

Future land use is not a criterion for remedy selection under CERCLA and EPA is not selecting the remedy based on land use planning (but has considered it in the remedy selection process). The primary criteria for remedy selection are protection of public health and the environment. The selected remedy will achieve these criteria by preventing any offsite migration of contaminants and eliminating the potential for exposure.

Comment 129

Based on review of the Bureau of Mines test data, a Texas mining company submitted written comment stating its ability to economically reprocess the mine tailings and as defined by EPA standards. [July 92]

EPA Response

EPA has not received a detailed description of the process proposed by the commenter to reprocess the tailings. The BOM is the nation's recognized leading expert in this type of work with extensive research facilities which are unequaled by any private company in the mining industry. In 1989, EPA had openly requested proposals from remediation companies to describe their method of reprocessing the tailings. To date, no remediation firm has adequately responded to the criteria carefully specified by EPA. The fact that reprocessing is not viable as a remediation alternative at this site was clearly demonstrated in the BOM study.

Comment 130

The Midvale resident who proposed rail transport of the tailings to the Fitzgerald farm further revealed that his selection of the site was based on its proximity to both water and power supplies that would allow private enterprise to have access to the tailings for reprocessing. He noted the reprocessing successes of the Merker tailings and stressed the value of keeping the Sharon Steel tailings available for advances in new technologies. [June 92]

EPA Response

EPA agrees that future technology advances could provide for a suitable method to reprocess the tailings. The tailings would be available for such a process no matter whether they are capped in place or excavated and placed in a containment cell.

Comment 131

A remediation company stated its opinion that only one viable solution to remediation of the Sharon Steel tailings was currently being offered -- that of extracting the metals on site. This solution would solve the multitude of problems presented by the other methods, free the land from environmental distress, and return the land to the community as a functional and valuable tract of real estate without the "onus of the toxins." [August 92]

EPA Response

EPA contracted the U.S. Bureau of Mines (BOM) to study the potential for beneficiation of the existing tailings. Beneficiation is the first step in reprocessing. The BOM study concluded that some beneficiation could occur, however, the remaining by-product would still be considered a hazardous waste and the post-beneficiation tailings volume would still be significant. Therefore, the dilemma of having a large volume of hazardous waste to contend with would not be solved, even after incurring major costs associated with beneficiating the tailings. The minerals that could be recovered would be of insufficient quantity and quality to have any commercial value. For these reasons, beneficiation and subsequent reprocessing was eliminated from consideration.

Comment 132

The Salt Lake County Board of Commissioners recognize that while total removal of the tailings, in their opinion, is the best alternative, it is extremely costly. They appreciate that other alternatives, such as reprocessing, have merit and are less costly than the alternative of total removal. In 1990, they strongly urged EPA to further study the value of the reprocessing alternative. If reprocessing is the chosen alternative, the Commissioners expressed their opinion that it must result in unrestricted development on the tailings site. [October 90]

EPA Response

Referencing the response to Comment 132 above, after beneficiation, a large volume of hazardous material would still be present. This material would have to be stored somewhere and the Sharon Steel site would be the least costly since no transportation costs would be incurred. Thus at least parts of OU1 would remain unavailable for any development.

11. Alternate Proposals

Comment 133

A commenter at the public meeting questioned why the Sharon Steel tailings could not be deposited at a Kennecott site. [June 92]

EPA Response

Kennecott has indicated that they will not accept the wastes.

Comment 134

A remediation company stated that using the tailings to build a causeway from Antelope Island to the South Shore failed to take into account the corrosiveness of the water in the lake or the effects of wave action. According to the commenter, the salt in the water would definitely leach out toxic metals at levels that would render the lake to be regarded as a hazardous waste dump. According to the commenter, encasing the tailings in a so-called impervious coating merely exemplifies naivete. Further, the commenter stated that the waters of the lake have proven that no man-made structure could withstand the physical and chemical impacts for extended periods, let alone a narrow causeway. [August 92]

EPA Response

The proposal to utilize the tailings to construct a causeway to Antelope Island was suggested by a private company and was not initiated, or endorsed, by EPA. Before

any such proposal could be considered, an in-depth study would be required to analyze the long term effects of depositing the tailings in the Salt Lake. Many other details would need to be considered also. EPA has not included this proposal as a considered alternative.

Comment 135

The legal representative of a holder of groundwater rights adjacent to the Great Salt Lake stated objection to any plans to dump Sharon Steel tailings into the Great Salt Lake for fear of adverse effects on water and property rights. [May 92]

EPA Response

The response to Comment 134 above applies to this comment as well.

Comment 136

A new resident to Midvale, who indicated he is experienced in design and engineering of tailings removals, requested additional review of his proposal to move the Sharon Steel tailings via the Rio Grande Railroad to old mine sites on the Fitzgerald farm west of Utah Lake within the imposed 30-mile radius. This resident attested to his ability to successfully perform such a task at a cost closer to the proposed capping cost. [June 92]

EPA Response

EPA has not received a copy of this proposal.

Comment 137

During the comment period on OU2, several individuals stated that EPA should consider innovative technologies for site reclamation, such as using a waste water treatment technology developed at Pennsylvania State University, constructing a berm to protect the Jordan River, or planning a waste water spray irrigation system that would operate on a local golf course. In addition, they suggested that the old

concentrator building would be an ideal site for a science and mining museum. [September 90]

EPA Response

EPA has looked into innovative technologies for site reclamation at Sharon Steel. The use of water from the site for irrigation would be a component of the capping alternative. Certain restrictions and precautions would be necessary depending on the characteristics of the water. The buildings at the OU1 site have been demolished.

VI. Remaining Concerns

Comment 138

A Midvale citizen expressed concern about what would happen to a pioneer cemetery on Sharon Steel property. [June 92]

EPA Response

The cemetery in question is not located on the OU1 site; rather, it is to the north on the Midvale Slag site.