RECORD OF DECISION

DAVENPORT AND FLAGSTAFF SMELTERS SITE
OPERABLE UNIT 1

SANDY, UTAH

September 2002

U.S. Environmental Protection Agency
999 18th Street, Suite 300
Denver, Colorado 80202

Signature Page

Max H. Dodson
Assistant Regional Administrator
U.S. Environmental Protection Agency
Region VIII

9/30/02
Date

Dianne R. Nielson, Ph.D
Executive Director
Utah Department of Environmental Quality

10-04-02
Date

RECORD OF DECISION
RESIDENTIAL OPERABLE UNIT
DAVENPORT AND FLAGSTAFF SMELTERS SUPERFUND SITE
SALT LAKE COUNTY, UTAH

The U.S. Environmental Protection Agency (EPA), with the concurrence of the Utah Department of Environmental Quality (UDEQ), presents this Record of Decision (ROD) for the Residential Operable Unit (ROU) of the Davenport and Flagstaff Smelters Superfund Site in Salt Lake County, Utah. The ROD is based on the Administrative Record for the ROU. The ROD presents a brief summary of the Remedial Investigation/Focused Feasibility Study (RI/FFS), actual and potential risks to the environment, and a description of the selected remedy. EPA and UDEQ followed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the National Oil and Hazardous Substance Pollution Contingency Plan (NCP), and appropriate policy and guidance in preparation of the ROD. The purpose of this ROD is to:

1. Certify that the remedy selection process was carried out in accordance with CERCLA and to the extent practicable, in accordance with the NCP.
2. Provide a summary of the technical rationale and background information contained in the Administrative Record.
3. Provide information necessary for determining the conceptual engineering components, outlines the remedial action objectives and the cleanup levels for the Selected Remedy.
4. Provide the public with a consolidated source of information about the site history, site characteristics, and risk posed by the conditions of the ROU, as well as a summary of the remedial alternatives considered, their evaluation, the rationale behind the Selected Remedy, and the agencies considerations of, and responses to comments received.

The ROD is organized into three sections.

1. The Declaration functions as an abstract for the key information contained in the ROD and is the section of the ROD signed by the EPA Assistant Regional Administrator and the UDEQ Director.
2. The Decision Summary provides an overview of the ROU characteristics, the alternatives evaluated and the analysis of those alternatives. It also identifies the Selected Remedy and explains how the remedy fulfills statutory and regulatory requirements.
3. The Responsiveness Summary presents stakeholder concerns about the site and preferences regarding the remedial alternatives and explains how those concerns were addressed and factored into the remedy selection.

DECLARATION

1.0 Site Name and Location

The Davenport and Flagstaff Smelters Superfund Site (UTD988075719) is in the north-central portion of Utah, south of Salt Lake City in southeast Salt Lake County along Little Cottonwood Creek just west of the mouth of Little Cottonwood Canyon (Figure 1). The site has been divided into two operable units: A residential operable unit (ROU) that covers residential properties that have lead and arsenic contamination due to historic smelting operations and a non-residential operable unit (NROU) that covers non-residential properties that have been impacted by the smelters. This ROD addresses remedial action associated with the ROU. Investigation and possible remediation of the NROU will take place at a later date.

2.0 Statement of Basis and Purpose

This decision document presents the Selected Remedy for the ROU within the Davenport and Flagstaff Smelters Superfund Site located in Salt Lake County, Utah, which was chosen in accordance with CERCLA, as amended by SARA, and to the extent practicable, the NCP. This decision is based on the Administrative Record file for this site.

The State of Utah concurs with the Selected Remedy. The Utah Department of Environmental Quality is the lead agency for the Davenport and Flagstaff Site.

3.0 Assessment of the Site.

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

4.0 Description of the Selected Remedy

The selected remedy for the ROU is excavation and off-site disposal of leachable principal-threat waste associated with smelter activities, contaminated soil underneath non-native vegetation, and hand excavation around areas of native vegetation. The major components of the selected remedy include:

- Excavation of soils, under non-native vegetation, within the ROU exhibiting lead concentrations greater than 600 mg/kg and arsenic concentration greater than 126 mg/kg where practicable.
- Hand excavation around areas of native vegetation, within the ROU exhibiting lead concentration greater than 600 mg/kg and arsenic concentrations greater than 126 mg/kg.
- Excavation of leachable principal-threat wastes associated with smelter activities.

- Off-site landfill treatment and disposal of contaminated soil classified as hazardous waste in accordance with the Resource Conservation and Recovery Act (RCRA) subtitle C.
- Off-site landfill disposal, in accordance with RCRA subtitle D, of contaminated soil not classified as hazardous waste.
- Replacement with clean backfill, six inches of topsoil and landscaping of affected properties. Properties will be returned to as close to original condition as possible.
- Interior cleaning of affected homes to remove any contaminated dust.
- Implementation of institutional controls, if necessary, on properties containing residual contamination. Institutional controls may include, but not be limited to, easements, deed notices, local government controls such as building permits and ordinances; and education of current and potential property owners. It is anticipated that institutional controls will be implemented and enforced by Salt Lake County.

5.0 Statutory Determinations

The remedy selected for the ROU is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

This remedy also satisfies the statutory preference for treatment as a principal element of the remedy for the most contaminated soils. The preference for treatment will not be met for soils that do not require treatment prior to disposal.

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

6.0 Data Certification Checklist

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

- The Contaminants of concern (COCs) and their respective concentrations.
- Baseline risk presented by the COCs.
- Cleanup levels established for COCs and the basis for the levels.
- How source material constituting principal threats are addressed.
- Current and reasonably anticipated future land use assumptions used in the baseline risk assessment and the ROD.
- Potential land use that will be available at the site as a result of the Selected Remedy.

- Estimated capital, operation and maintenance (O&M), and total present worth costs; discount rate, and the number of years over which the remedy cost estimates are projected.
- Key factors that led to selecting the remedy.

Signature Page

Max H. Dodson
Assistant Regional Administrator
U.S. Environmental Protection Agency
Region VIII

9/30/02
Date

Dianne R. Nielson, Ph.D
Executive Director
Utah Department of Environmental Quality

10-04-02
Date

DECISION SUMMARY

DECISION SUMMARY
TABLE OF CONTENTS

DECISION SUMMARY
LIST OF TABLES

DECISION SUMMARY
LIST OF FIGURES

1.0 Site Location and Description

The Davenport and Flagstaff Smelters site (UTD988075719) is located approximately 15 miles southeast of Salt Lake City, Utah, in a residential area at the mouth of Little Cottonwood Canyon. The Davenport Smelter was located on the southern side of the canyon, near Little Cottonwood Canyon Road (See Figure 1, Davenport and Flagstaff Smelter Superfund Site Location). The Flagstaff Smelter was located north of Little Cottonwood Creek.

The area surrounding the site consists of affluent single family homes, one of Salt Lake County's premier restaurants, and nonresidential property. Due to its proximity to the canyon and the extensive natural vegetation, the area is prime for growth and residential development.

The risks posed by the site derive from smelting activity, which occurred in the 1870's. Lead and arsenic have been identified as the contaminants of concern (COCs) at the site. Lead and arsenic concentration is likely the result of settling flue ash from the smelters, windblown dust from the crushing of ore, and slag. Surface water runoff from rain and snowmelt, erosion, and wind carried contaminants beyond the original locations of the smelter.

There are currently two operable units at the site. The Residential Operable Unit (ROU) addresses soil contamination on residential properties in the areas near the locations of the former smelters. The Non-residential Operable Unit (NROU) addresses soil contamination in the undeveloped and non-residential properties surrounding the smelter sites.

This decision document is directed at reducing risk from soil contamination in the residential areas associated with the Davenport and Flagstaff smelters. This is a final record of decision (ROD) and there were no interim RODs. The Utah Department of Environmental Quality (UDEQ) is the lead agency for the Site under a cooperative agreement with the United States Environmental Protection Agency (EPA).

The Superfund trust fund will be used to cover costs associated with the selected remedial action.

2.0 Site History and Enforcement Activities.

The former Davenport and Flagstaff smelters were both constructed around 1870 at the mouth of Little Cottonwood Canyon. Both of these smelters processed lead and silver ores removed from mines located near Alta, Utah. Ore was delivered to the smelters using wagons and possibly rail cars. The ore was stockpiled near the smelters until it was processed. Smelting technology of the era was relatively basic. The ore was first crushed to a reasonable size and then was placed along with fuel, either wood or coal, into the smelter. As the fuel burned, the temperature of the ore was raised to the melting points of lead and silver. The liquid metal drained to the bottom of the smelter. A gate

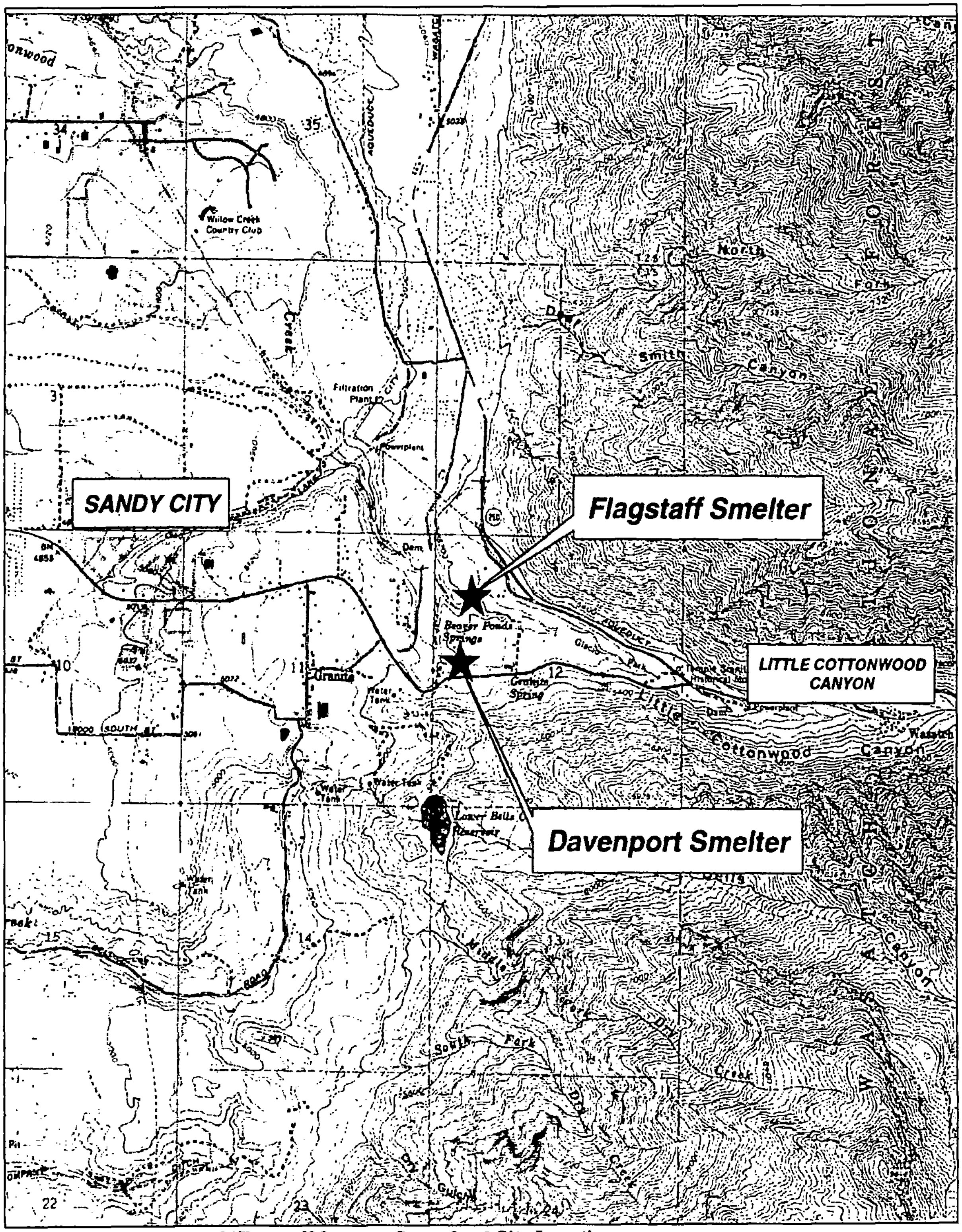


Figure 1, Davenport and Flagstaff Smelter Superfund Site Location.

was opened and the molten metal was poured into ingots and then shipped to a more advanced smelter for further processing and refining. The waste ore and fuel, or slag, was usually stockpiled somewhere out of the way. The crushing process likely generated dust contaminated with lead and arsenic. In addition, the flue ash from the smelter likely contained concentrated levels of these metals which would have settled in the vicinity of the smelters. Both smelters were decommissioned and dismantled by 1879.

The discovery of ladle casts in Little Cottonwood Creek, near the Flagstaff Smelter location in 1991, prompted a study of historical smelter sites in the Salt Lake Valley. During investigations performed in 1992 by the EPA and in 1994 by UDEQ, elevated concentrations of arsenic and lead were detected in soil at both smelter locations. Little physical evidence of the smelters remains; however, slag piles and soil contaminated with lead and arsenic remain in the area.

A Phase I Site assessment was conducted by the EPA Region VIII, Emergency Response Branch, Technical Assistance Team (TAT) in April of 1992. During this site assessment, elevated levels of arsenic and lead were detected in surface and subsurface soil near the Flagstaff Smelter site. Based on these results, the TAT performed a Phase II Site Assessment

During the Phase II investigation, the Davenport Smelter site was discovered south of the Flagstaff Smelter site. The area around the Davenport Smelter was investigated as Phase III of the Little Cottonwood Creek Smelter sites in July of 1992. The limited sampling performed during both the Phase II and Phase III assessments revealed high levels and widespread distribution of arsenic and lead contaminated soils surrounding the former smelters.

Based on the results of the 1992 sampling efforts, a Preliminary Assessment (PA) was performed in August 1992. Focused Site Inspections were performed for the Davenport and Flagstaff Smelter sites in 1994. Additional sampling activities were conducted in June 1994 near the former smelter sites in order to determine the distribution of the soil contamination dispersed away from the source area via air, surface water, or groundwater pathways. It was determined that the possibility of release was likely due to the proximity of surface water, proximity of the groundwater recharge area, and the commonly observed dispersion of windblown dust. The results of the Site Inspections are presented in Analytical Results Reports for each representative site.

A Site Characterization of the residential areas near the two smelters was performed in 1998. A total of 740 samples were collected from 32 residences near the locations of the two smelters. Surface and subsurface samples were collected in the general area of the former smelter locations in order to provide information regarding the source, nature, and extent of arsenic and lead contamination. Lead and arsenic contamination was found in surface and subsurface soils at concentrations well above risk-based screening levels established by the EPA in the residential areas surrounding both of the smelter sites. Sampling of indoor dust that was performed as part of the Site Characterization, did not

provide a correlation between concentrations of lead and arsenic in indoor dust and outdoor soils.

A Baseline Risk Assessment (BLRA) was performed for the Davenport and Flagstaff Smelter sites by the EPA as part of the Site Characterization to determine if risks to human health associated with the contamination identified in previous investigations were sufficient to warrant remediation. The action levels established for the Davenport and Flagstaff Smelters site are 600 milligrams/kilogram (mg/kg) for lead and 126 mg/kg for arsenic in the residential soils for these sites.

A Remedial Investigation (RI) was performed to further characterize contaminated soil at residential properties surrounding the two smelters. Surface and subsurface sampling was conducted in order to fill data gaps and to provide additional information to be used for evaluating remedial alternatives. Sampling was also performed to define the vertical extent of contamination and to obtain Toxicity Characteristic Leaching Procedure (TCLP) data to determine disposal options. The RI found that lead concentrations in soils ranged from 6 to 123,000 mg/kg and arsenic concentrations in soils ranged from <5 to 7,090 mg/kg. The results of the TCLP analysis indicate that the lead in the soil at the Davenport and Flagstaff Smelters is fairly leachable. A number of surface and subsurface soil samples exceeded the lead criteria for characteristic hazardous waste. The RI recommended that remediation of all residential properties with surface and/or subsurface lead and arsenic concentrations greater than the action levels established for the site be addressed in the Focused Feasibility Study.

A Focused Feasibility Study (FFS) screened different remedial technologies and developed two remedial alternatives, in addition to the "no action" alternative required by the National Oil and Hazardous Substances Pollution contingency Plan (NCP), for detailed evaluation. The alternatives selected for detailed evaluation are:

Alternative 1 – No action;
Alternative 2 – Excavation and offsite disposal; and
Alternative 3 – Excavation of contaminated soil under non-native vegetation and soil cover around native vegetation.

The two remedial alternatives also include institutional controls. The FFS estimated the costs associated with the remedial alternatives and evaluated them according to the criteria established in the NCP.

EPA initiated a potentially responsible party (PRP) search in 2000. Because over 100 years had passed since the smelters had been in operation, it was considered improbable that a viable responsible party still existed. At this time none of the companies that owned or operated the smelters exist nor could they be traced to current operating parties. EPA is continuing to search for any viable PRPs. Pursuant to policy, EPA will not take actions against a residential homeowner, unless the owner polluted the site or made existing pollution problems worse (a releaser or threat of release of hazardous substances) and forced a cleanup action by EPA at the Site.

The site was proposed for the Superfund National Priorities List (NPL) in January 2000. The areas to be cleaned up under this ROD are the residential parcels within the area impacted by the former Davenport and Flagstaff smelters.

3.0 Community Participation

The RI and FFS reports and the Proposed Plan for the Davenport and Flagstaff Smelters site were made available to the public June 10, 2002. These documents can be found in the Adminsitrative Record file, copies of which can be found at the following locations.

Sandy Library
10100 S Petunia Way
Sandy, UT 84092-3624
Hours: M-Thurs, 10 a.m. to 9 p.m.
F - Sat.,10 a.m. to 6 p.m.

UDEQ Superfund Branch
168 North 1950 West, 1st floor
Salt Lake City, UT 84116
Hours: M – F, 8 a.m. to 5 p.m.

EPA Superfund Records Center
999 18th St, Suite 300
Denver CO 80202
Hours: M – F, 8:30 a.m. to 4:30 p.m.

The notice of availability of these documents was published in the June 8 editions of the Deseret News and Salt Lake Tribune. A public comment period was held from June 10, 2002 to July 3, 2002. An extension to the public comment period was requested. As a result, the public comment period was extended to August 22, 2002. In addition, a public meeting was held on June 20, 2002 to present the Proposed Plan to a broader community audience than those that had already been involved with the site. At this meeting, representatives from UDEQ and EPA answered questions about the site and the remedial alternatives. UDEQ and EPA also used this meeting to solicit community input on the preferred alternative proposed in the Proposed Plan. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this ROD.

4.0 Scope and Role of Response Action

As with many Superfund sites, the problems at the Davenport and Flagstaff Smelters site are complex. As a result, UDEQ and EPA have organized the work into two operable units (OUs):

Residential Operable Unit (ROU): Lead and arsenic contamination associated with surface and subsurface soils on residential properties near the historic smelter locations.

Non-residential Operable Unit (NROU): Lead and arsenic contamination associated with non-residential properties that have been impacted by historic smelting activities.

The ROU is the subject of this ROD. The ROU addresses surface and subsurface soil contamination on residential properties. Ingestion of contaminated soil poses a current and potential risk to human health (Figure2 and Figure 3).

The NROU will investigate and address surface and subsurface soil contamination, surface and ground water impacts along with ecological risks associated with non-residential properties surrounding the locations of the two smelters.

5.0 Site Characteristics

The Davenport and Flagstaff Smelters site is located in the foothills of the Wasatch Mountains approximately one mile east of the Sandy City limits. The surrounding land use consists largely of subdivisions with single family homes. There are approximately 50 homes within the ROU boundaries. Typical residential lots in the area range from ¼ to 1 acre in size. Landscaping in the area is generally elaborate and well maintained. Most residential yards are predominantly grass covered with some areas of natural vegetation and exposed soils.

Three major roads are in the vicinity of the site (Figure 3). These roads include Little Cottonwood Canyon Road at the south end of the site, North Little Cottonwood Canyon Road along the north margin of the site, and Wasatch Boulevard on the west end of the site. All three roads are major thoroughfares used for commuting by local residents and for recreational access to Little Cottonwood Canyon.

The Site is situated near a transitional boundary between the bedrock of the mountains and unconsolidated valley fill. The consolidated rocks of the Wasatch Range above the site consist of Precambrian quartzite and shale, and Tertiary quartz monzonite. Glacial moraines, talus and lacustrine deposits are present along the valley margin. The site is situated within a zone of complex surface faulting associated with The Wasatch fault. The ROU is situated on relatively flat areas near the foothills of the Wasatch Range.

Native soils within the ROU are typically granular, ranging from fine to coarse sand with gravel and cobbles. However a large amount of topsoil has been imported for landscaping purposes.

The climate of the foothills of the Wasatch Mountian Range (including the Site area) varies according to the time of the year. Summer months are usually hot and dry with limited precipitation. The average annual temperature for this area is 64.1 degrees F.

Color Map(s)

The following pages contain color that does not appear in the scanned images.

To view the actual images, please contact the Superfund Records Center at (303) 312-6473.

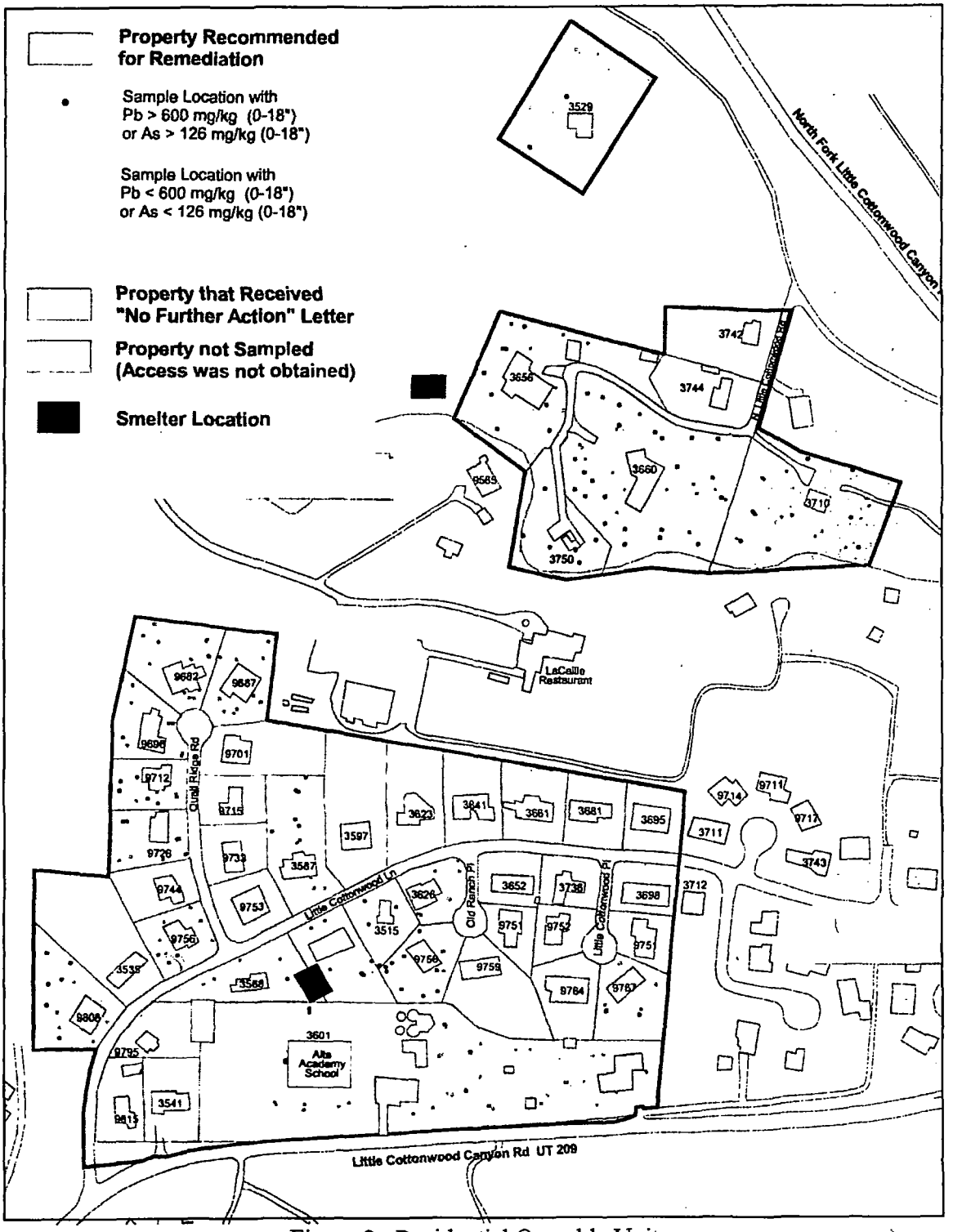
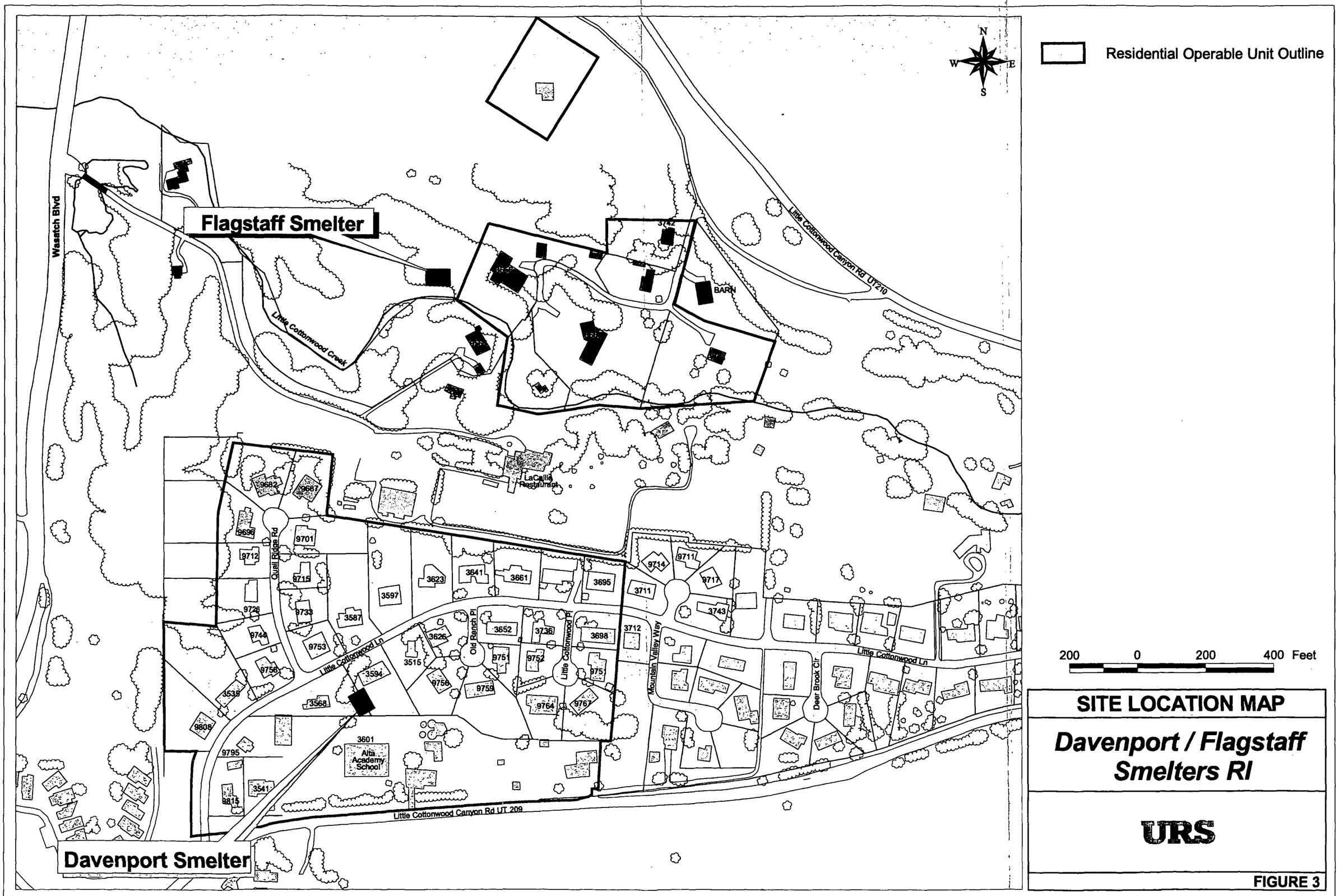


Figure 2: Residential Operable Unit



N
W E
S

Residential Operable Unit Outline

200 0 200 400 Feet

SITE LOCATION MAP

Davenport / Flagstaff Smelters RI

URS

FIGURE 3

The greatest amount of precipitation usually occurs during the spring months. Snow usually falls during the months of November through April.

The primary surface water feature near the Site is Little Cottonwood Creek. Little Cottonwood Creek is a perennial stream beginning near the town of Alta at the head of Little Cottonwood Canyon. The creek flows west through the length of the canyon and eventually discharges into the Jordan River in the Salt Lake Valley. The Little Cottonwood Creek intersects the Site near the mouth of Little Cottonwood Canyon.

Several natural springs discharge from the hillside directly west of Quail Ridge Road. A number of these springs originate in the backyards of properties included in the ROU, and are located just below an area where slag was located. The springs flow to the northwest and create a wetland area before they drain into Little Cottonwood Creek.

The ROU is located east of Wasatch Boulevard and generally slopes to the west. Drainage east of Wasatch Boulevard flows west in the direction of Little Cottonwood Creek. Water drainage from the Davenport area on the south side of the creek flows northwest while the drainage from the Flagstaff area on the north side of the creek flows southwest. Surface water springs in the hillside west of Quail Ridge Road may be associated with a shallow perched aquifer that may exist in this area. No investigation has been conducted to determine the nature and extent of potential perched aquifers in the study area. Characterization of ground water and surface water will be addressed as part of the NROU.

A variety of investigations have been performed in the Davenport and Flagstaff ROU to gather soil, dust and water analytical data. Data collection procedures are summarized in the following paragraphs.

In order to delineate the extent of contamination associated with each residential lot, the lots were divided into specific "zones" that consisted of "use areas" smaller than 5,000 square feet. The use areas generally consisted of lawns or grassy areas, flowerbeds and/or gardens, and natural vegetation and/or wooded areas. A minimum of four zones were identified for each residential lot. Sampling locations were visibly laid out to provide a reasonably symmetrical and representative coverage of the sampling site. Each location was marked with a survey flag and surveyed in using a hand held GPS. A sketch map was drawn to show site details and approximate measurements of the general site and sampling locations. A surface composite and subsurface sample were collected form each zone.

Surface composite samples were collected from a depth of 0-2 inches below ground surface (BGS). In bare areas (no grass), the top 2 inches of soil were collected. In grassy areas, a small portion of sod (2-3 inches thick) was removed and the top 2 inches of soil just below the sod was collected. Ten randomly located sample aliquots were collected for each designated zone and then homogenized.

Subsurface soil samples were taken from a location at the center of each zone. Subsurface soil samples were collected at intervals of 0-6 inches, 6-12 inches, and 12-18 inches in all zones at all sampled properties. Additional deeper samples were collected at selected properties to delineate the extent of vertical contamination. Subsurface samples were collected with a stainless steel hand auger; soil from each depth interval was placed in a stainless steel bowl and homogenized with a stainless steel spoon. A steel pry bar and a steel shovel were used at some locations to remove large rocks from the sample location area.

Samples were also collected for TCLP analysis to evaluate leaching properties and to evaluate potential disposal options for site soil. TCLP samples were collected from the same locations and depths and by the same procedures as the associated environmental samples. TCLP samples were analyzed for lead and arsenic.

The nature of the contamination at the Davenport and Flagstaff Smelters site consists of lead and arsenic in site soils. Lead and arsenic are naturally occurring elements that are present in the ores that were processed at the smelters. The contamination at the Site is most likely a result of dust and flue ash associated with the smelting process. In addition, slag (a by product of the smelting process) is also present at the Site and is known to contain elevated levels of lead and arsenic. The main distribution mechanisms for lead and arsenic contamination at this site likely were the settling of flue ash at the time of smelting, windblown dust at the time of crushing, and ongoing leaching from slag. Contaminated ash and dust have been subjected to continued erosion, transportation, and redeposition by wind, surface water run-off and infiltrating leachate.

Surface and subsurface soils throughout the residential area surrounding the two smelters, along with fine particulate matter (dust) tracked or deposited in houses are the contaminated media associated with the Site. Lead and arsenic are known to cause adverse health affects when ingested into the body. A Conceptual Site Model describing exposure routes and completed exposure pathways is included as Figure 4.

Chemical speciation analysis was performed by the Laboratory for Environmental and Geological Studies at the University of Colorado. The analysis was performed using an electron microscope. Most of the lead in the samples appears to be of the form of lead phosphate, lead arsenate, and contained in metal bearing iron and manganese oxides. Most of the arsenic was found to be in the form of lead arsenate and metal bearing iron oxides.

The results of the TCLP analyses indicate that some soil from both smelters contained over 5 mg/L lead in the collected leachate and will have to be disposed of as hazardous waste. TCLP analysis did not detect arsenic in the collected leachate from either area. Lead over 5 mg/l in leachate, was detected in both surface and subsurface soil samples and TCLP concentrations appeared to decrease with depth at the 12-18" interval. The TCLP concentrations did not correlate in a predictable way to total metal results in associated environmental samples.

The known extent of contaminated soil is depicted in Figures 5 through 12.

The horizontal extent of soil contamination at the surface, 0-6", 6-12", and 12-18" interval depths is well defined and is presented in Figure 4 through Figure 8 for lead and Figure 9 through 13 for arsenic. However, the vertical extent of the contamination has not been defined. Some zones have extremely high lead concentrations and these zones appear to be randomly distributed across the residential area. In general, concentrations appear to decrease with increased distance away from the former smelter locations.

The lead and arsenic contaminated soils are present in the immediate vicinity of the old smelters. In some areas, imported clean topsoil covers the contaminated soil. Contamination is present to at least 36 inches below ground surface on some properties. The vertical extent below 36 inches has not been determined. The vertical extent of contamination has not been fully defined because investigations that have taken place to date have been limited to the uppermost three feet of soil within the ROU.

Approximately 43,000 tons of lead and arsenic contaminated soil are located at the Site. This contaminated soil will require some type of remediation. Since a correlation has not been found between total lead concentrations and TCLP results for the contaminated soil, it is expected that a majority of the soil requiring remediation is classified as a RCRA characteristic hazardous waste and will require treatment prior to disposal.

6.0 Current and Future Land and Resource Uses

Current land use in the ROU is primarily residential. Future land use for the entire operable unit is residential. This decision was based on current zoning and conversations with local officials and residents.

Impact to ground water and surface water will be addressed under the NROU.

7.0 Summary of Site Risks

The contaminants of concern (COCs) identified by UDEQ and EPA for the ROU are arsenic and lead. While other heavy metals are present at elevated levels in site soils, the levels of these metals were not considered harmful to human health. Human toxicity information is available for both COCs in the HBRA.

Based on the conceptual site model (Figure-4), EPA and UDEQ agree that ingestion of arsenic and lead contaminated soils presents the primary health-threatening exposure pathway and presents an unacceptable risk to current and future residents of the site.

Adverse health effects of exposure to lead in adults can include high blood pressure and inability to absorb vitamin D. Young children are the most susceptible to lead exposure because they have higher contact rates with soil or dust and absorb lead more readily than adults. Exposure to lead may damage the nervous system in young children. Other

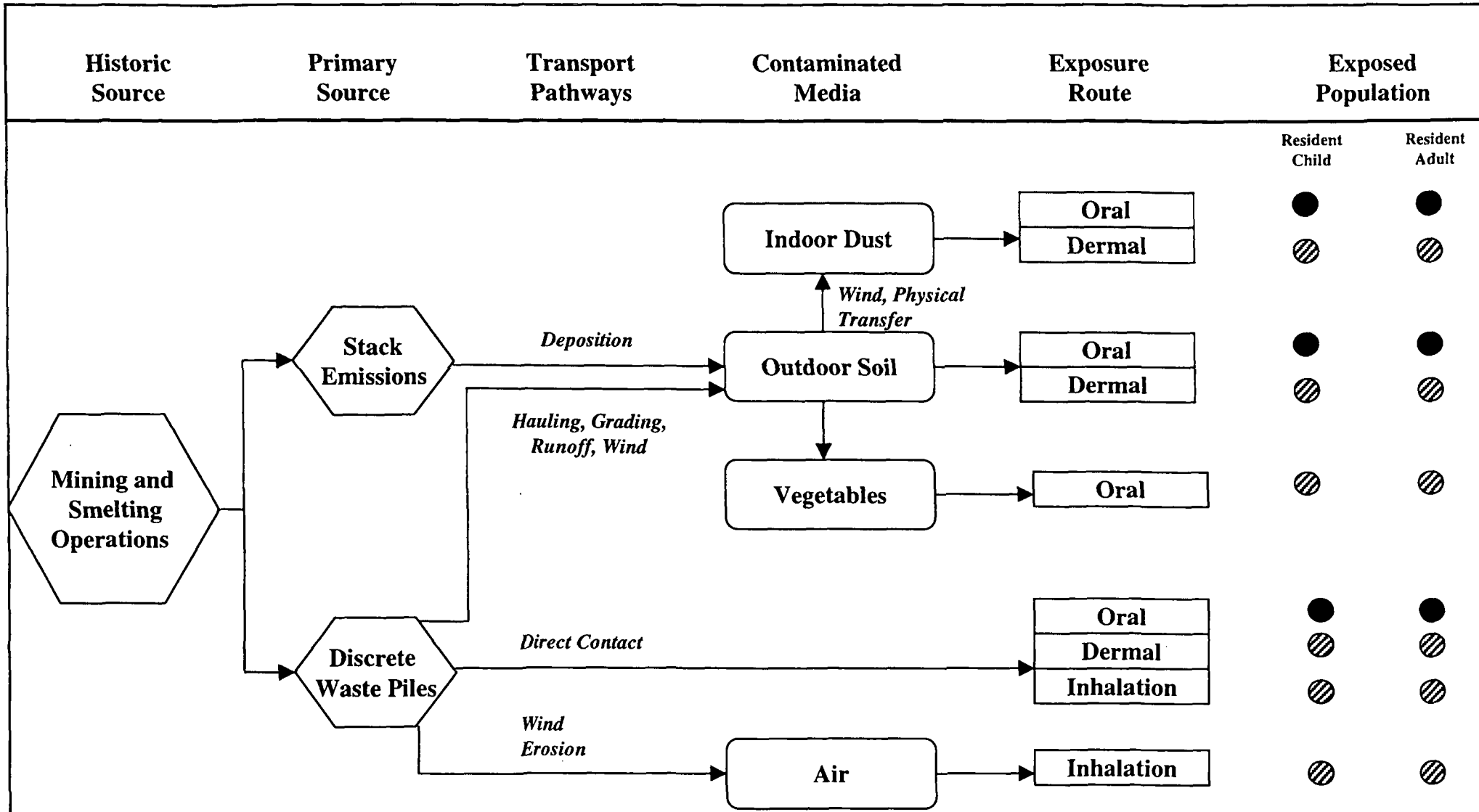
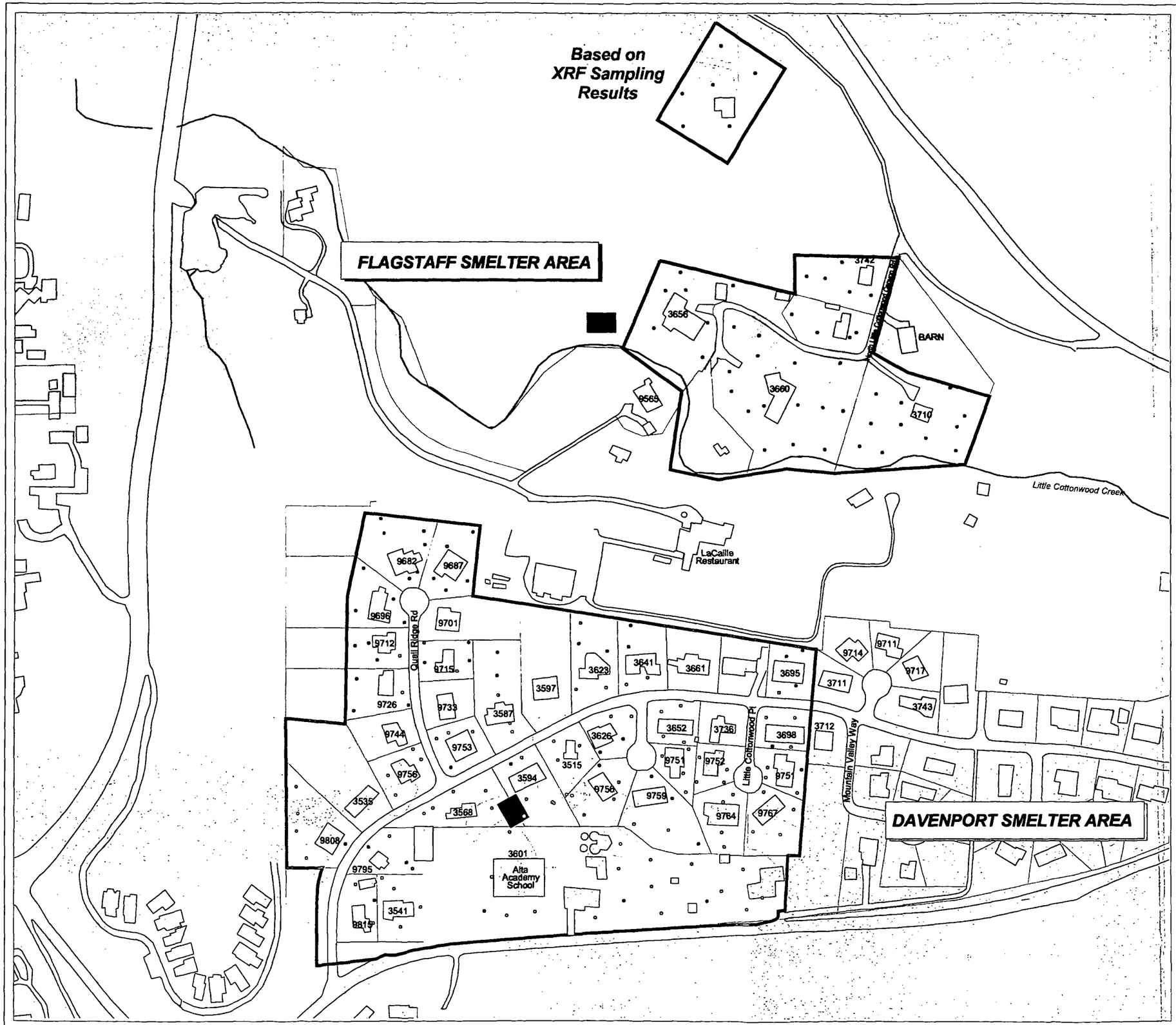


Figure 4. Conceptual Site Model for Residential Exposure to Arsenic

Color Map(s)

The following pages contain color that does not appear in the scanned images.

To view the actual images, please contact the Superfund Records Center at (303) 312-6473.



Lead Concentrations (ppm) (Surface)

- 0 - 600
- 601 - 1000
- 1001 - 8000
- > 8000

- Smelter Location
- Sampling Location

N
W E
S

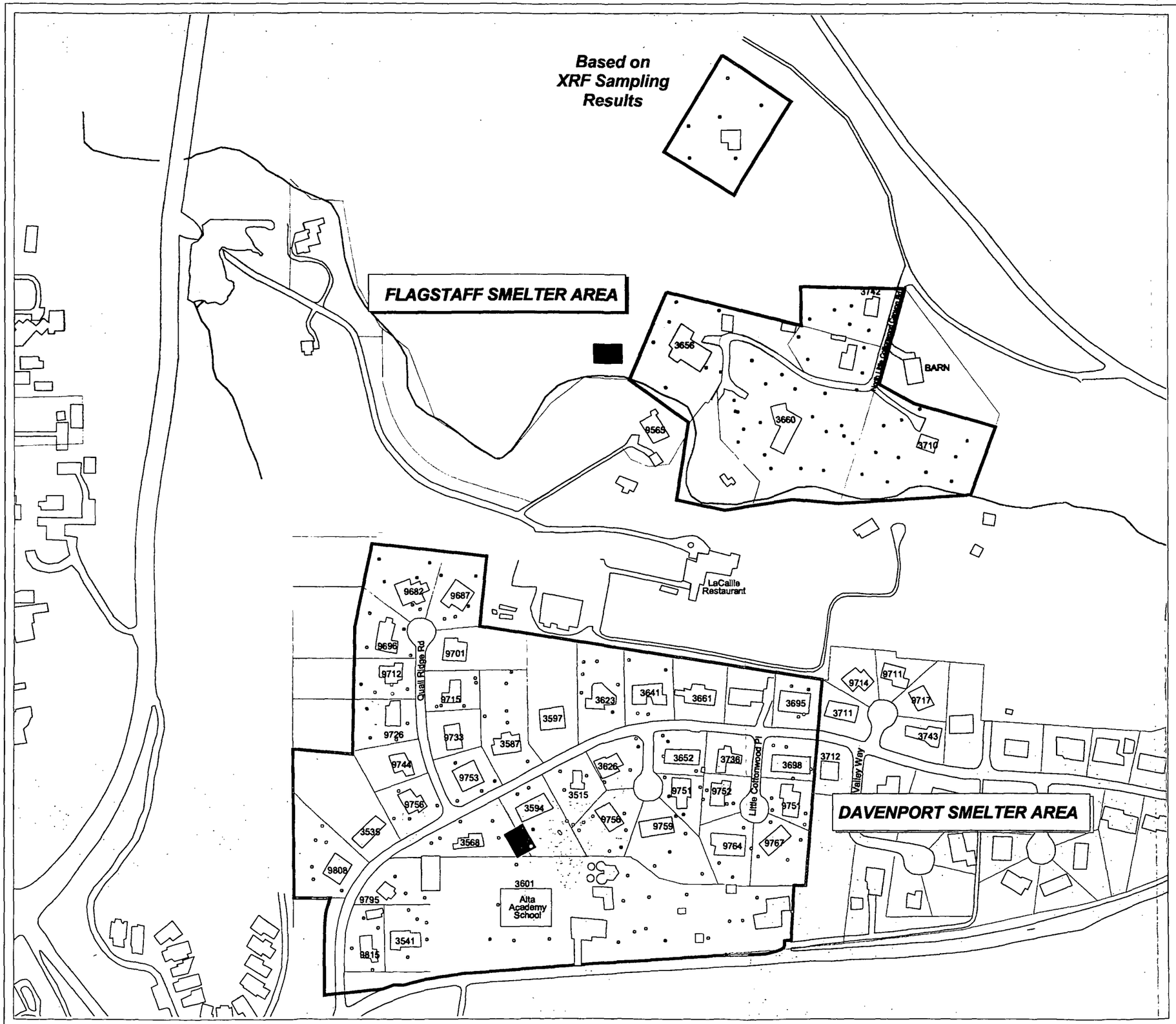
100 0 100 200 Feet

SURFACE LEAD CONCENTRATIONS

Davenport / Flagstaff Smelters RI

URS

FIGURE 5



Lead Concentrations (ppm)
(0 - 6" depth)

- 0 - 600
- 601 - 1000
- 1001 - 8000
- > 8000

- Smelter Location
- Sampling Location

N
W E
S

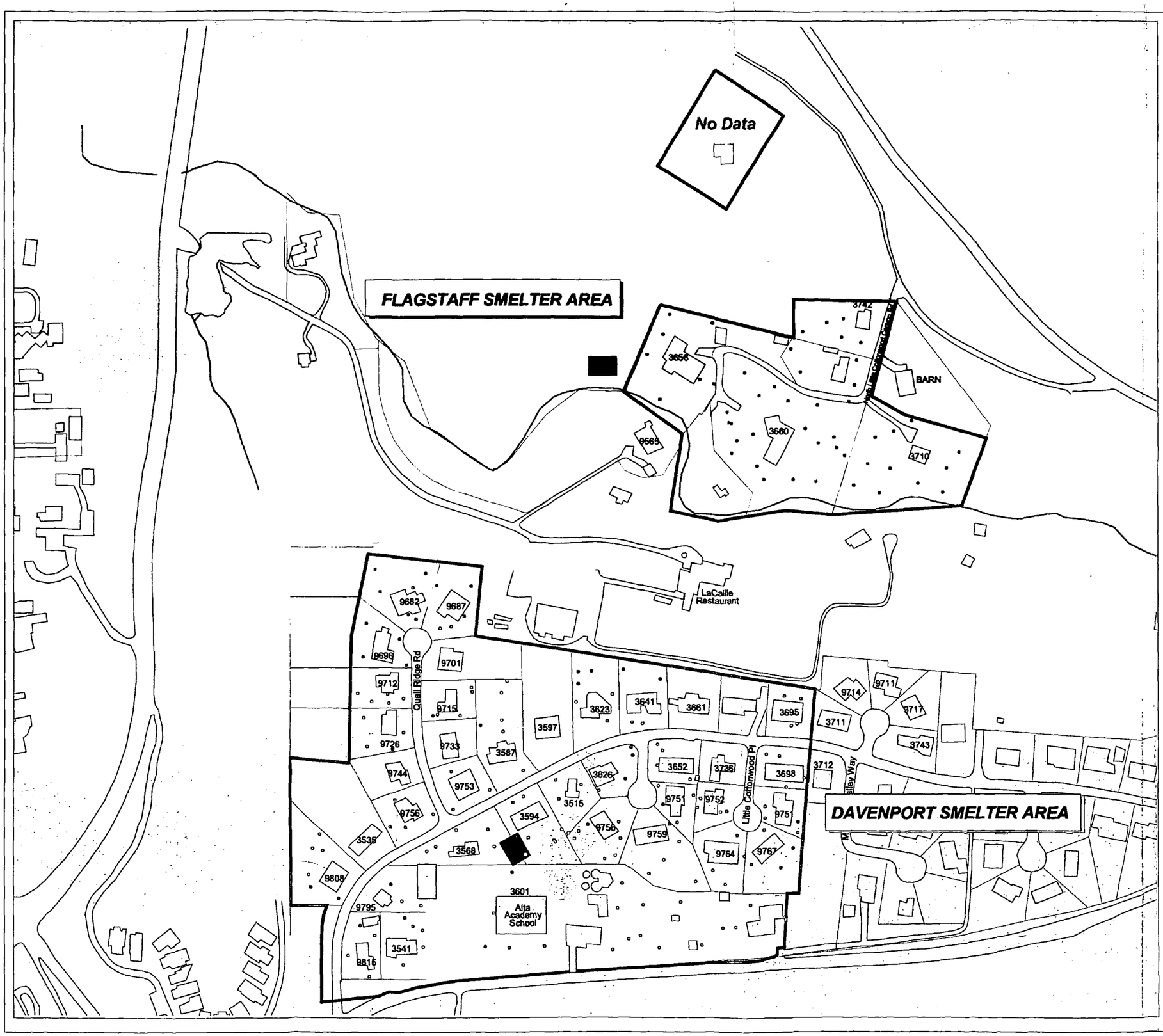
100 0 100 200 Feet

0 - 6" SUBSURFACE LEAD CONCENTRATIONS

Davenport / Flagstaff Smelters RI

URS

FIGURE 6



Lead Concentrations (ppm)
(6 - 12" depth)

- 0 - 600
- 601 - 1000
- 1001 - 8000
- > 8000

- Smelter Location
- Sampling Location

N
W E
S

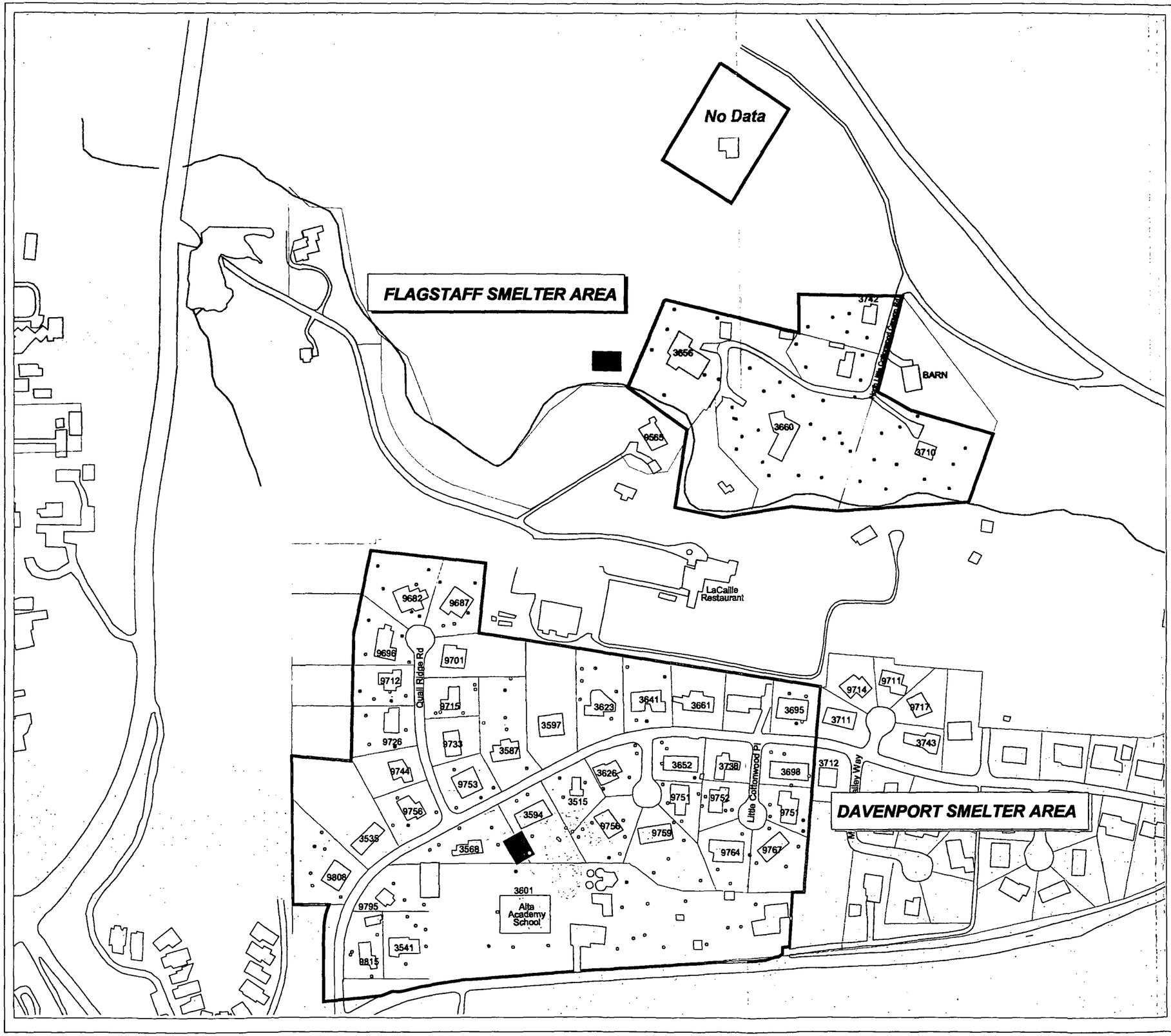
100 0 100 200 Feet

6-12" SUBSURFACE LEAD CONCENTRATIONS

Davenport / Flagstaff Smelters RI

URS

FIGURE 7



Lead Concentrations (ppm)
(12 - 18" depth)

- 0 - 600
- 601 - 1000
- 1001 - 8000
- > 8000

- Smelter Location
- Sampling Location

N
W E
S

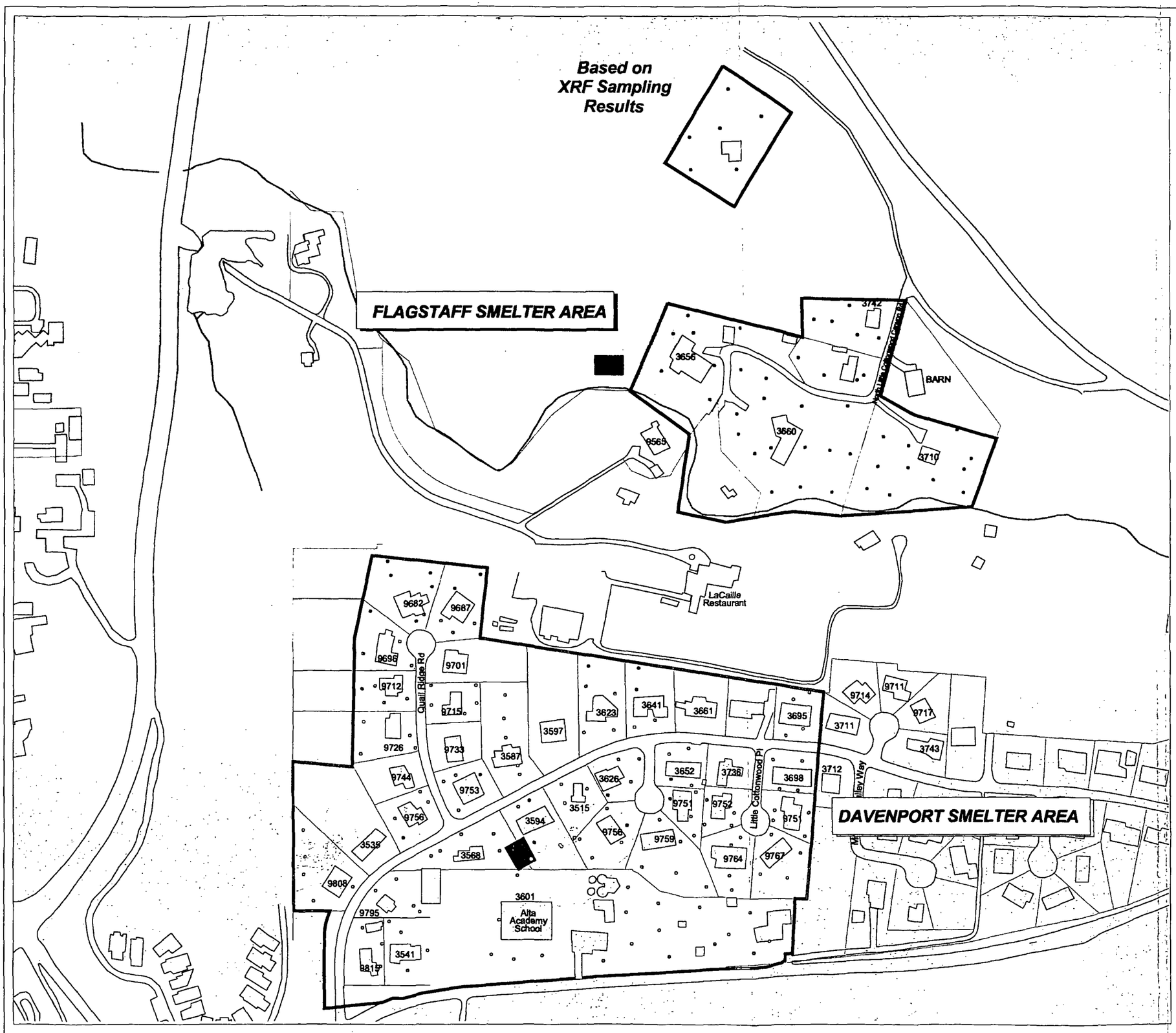
100 0 100 200 Feet

12-18" SUBSURFACE LEAD CONCENTRATIONS

Davenport / Flagstaff Smelters RI

URS

FIGURE 8



Arsenic Concentrations (ppm) (Surface)

- 0 - 50
- 51 - 126
- 126 - 200
- > 200

- Smelter Location
- Sampling Location

SURFACE ARSENIC CONCENTRATIONS

Davenport / Flagstaff Smelters RI

URS

FIGURE 9

Based on XRF Sampling Results

FLAGSTAFF SMELTER AREA

3742
3656
BARN
3660
9568
3710

LaCaille Restaurant

9682
9687
9696
Quail Ridge Rd
9701
9712
9715
9726
9733
3587
3597
3623
3641
3661
3695
9714
9711
9717
3711
3743
9744
9753
3626
3652
3736
3698
3712
9751
9752
Little Cottonwood Pl
9751
9756
3515
3594
9759
Mountain Valley Way
3535
3568
9764
9767
9808
3601
Alta Academy School
9795
3541
9815

DAVENPORT SMELTER AREA

Arsenic Concentrations (ppm)
(0 - 6" depth)

- 0 - 50
- 51 - 126
- 126 - 200
- > 200

- Smelter Location
- Sampling Location

N
W E
S

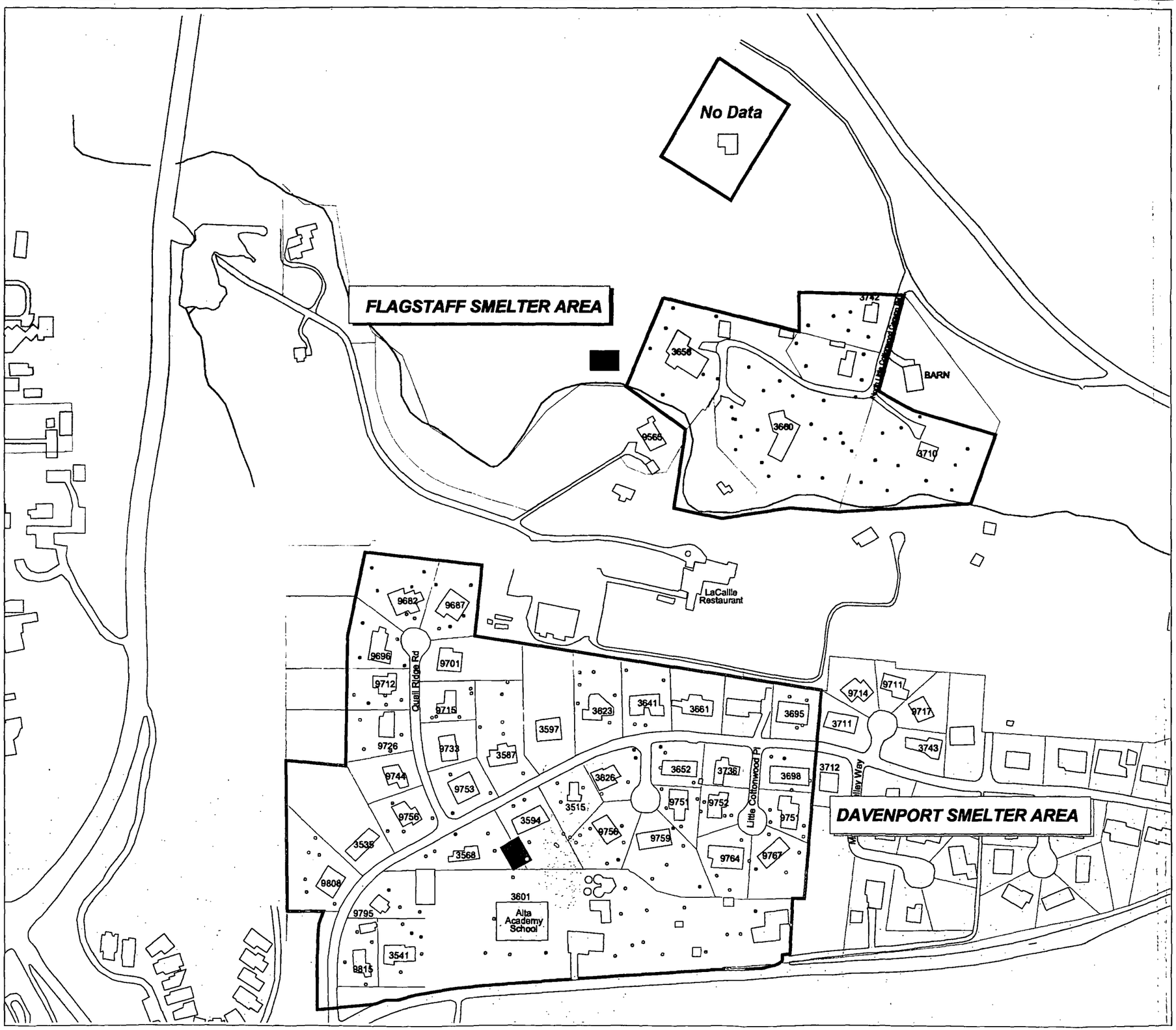
100 0 100 200 Feet

0- 6" SUBSURFACE ARSENIC CONCENTRATIONS

Davenport / Flagstaff Smelters RI

URS

FIGURE 10



Arsenic Concentrations (ppm)
(6 - 12" depth)

- 0 - 50
- 51 - 126
- 126 - 200
- > 200

- Smelter Location
- Sampling Location

N
W E
S

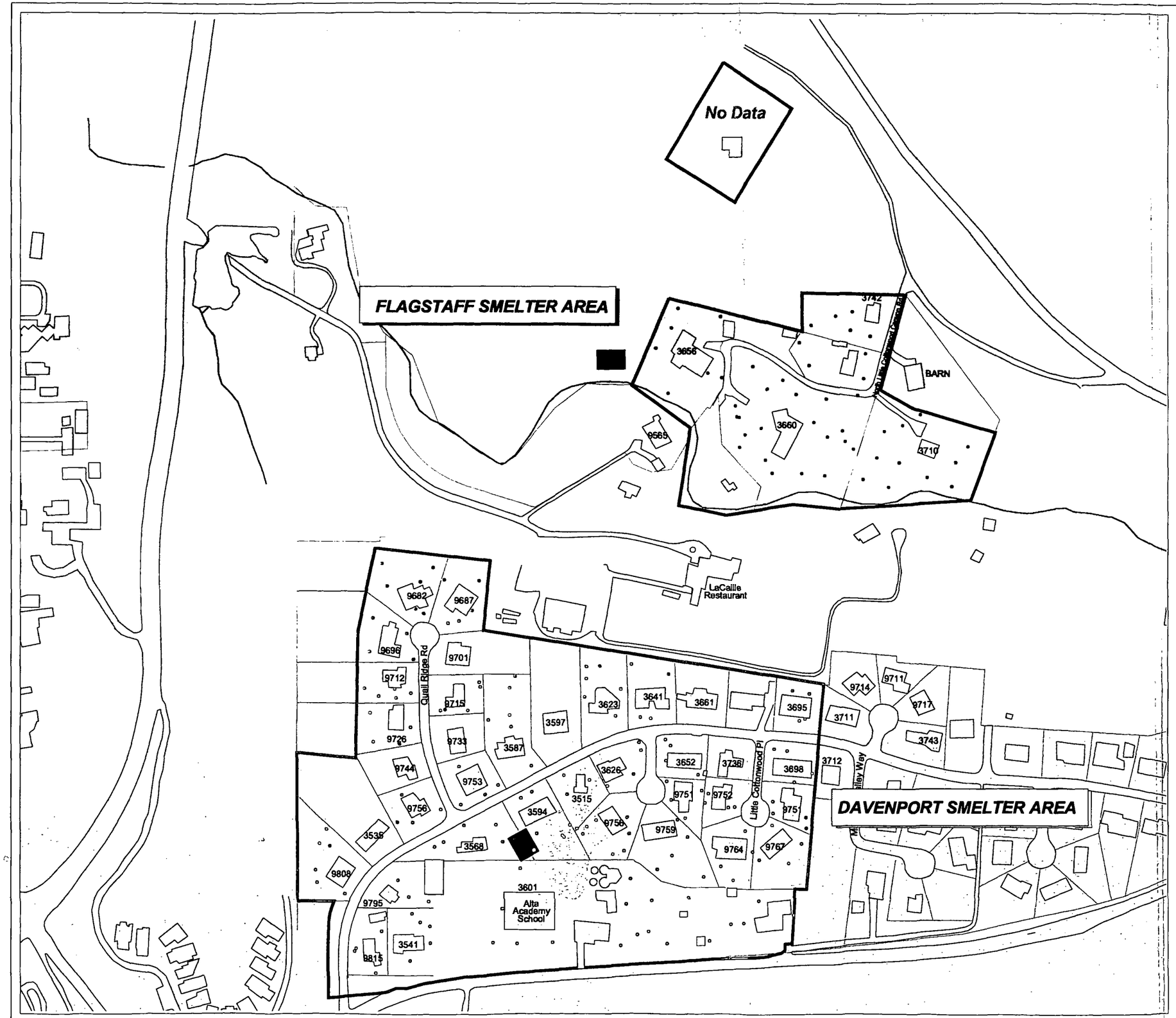
100 0 100 200 Feet

6-12" SUBSURFACE ARSENIC CONCENTRATIONS

Davenport / Flagstaff Smelters RI

URS

FIGURE 11



Arsenic Concentrations (ppm)
(12 - 18" depth)

- 0 - 50
- 51 - 126
- 126 - 200
- > 200

- Smelter Location
- Sampling Location

N
W E
S

100 0 100 200 Feet

12-18" SUBSURFACE ARSENIC CONCENTRATIONS

Davenport / Flagstaff Smelters RI

URS

FIGURE 12

effects of exposure to lead in children can include decreased IQ and hand-eye coordination along with shortened attention spans.

Exposure to arsenic may result in skin, liver, bladder and lung cancer. Non-cancer effects due to exposure to arsenic can include thickening of the skin and formation of corns on palms and soles, as well as irritation of the gastro-intestinal tract and nausea.

Speciation tests were performed on site soils to determine which forms of arsenic and lead were present. Certain types of heavy metal compounds are more available for uptake into the human body. Most of the lead in the contaminated soil appears to be in the form of lead carbonate, lead arsenate and metal bearing iron and manganese oxides. Most of the arsenic in the contaminated soil was found to be in the form of lead arsenate. Lead carbonate and lead arsenate are considered extremely bioavailable for uptake into the human body.

The physical characteristics of the site soils also tended to increase the bioavailability of the COCs. In general, lead and arsenic were found in particles which were extremely small (less than 100 micrometers). These small particles are often assumed to be more likely to adhere to the hands and be ingested and /or be transported into the home. Smaller particles are also more readily digested in the stomach than are larger particles.

A baseline risk assessment (BLRA) was performed for the Site as part of the Site Characterization. The BLRA estimates what risks the site poses if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the BLRA for this site.

A total of 220 surface soil samples (0-2") were collected from 40 properties within the ROU. Most properties were divided into 4 zones and a composite surface soil sample was collected from each zone. Each composite sample consisted of 10 separate sample locations (aliquots) taken within the zone. The surface samples collected within each zone were dried, composited, homogenized, sieved to 250 micrometers and analyzed for lead and arsenic.

Subsurface depth profiles were also collected at depth intervals of 0-6", 6-12" and 12-18" at 220 locations within the study area. Table 1 presents a summary of data collected for the BLRA.

Table I
Summary of BLRA Data

Analyte	Depth	Avg (mg/kg)	Min (mg/kg)	Max (mg/kg)
Arsenic	0-2"	34.4	2.5	650
	0-6"	47.2	2.5	2000
	6-12"	34.9	2.5	360
	12-18"	36.1	2.5	750
Lead	0-2"	773	12	27000
	0-6"	692	13	19000
	6-12"	603	14	9500
	12-18"	569	17	12000

Risks from Lead

Excess exposure to lead can result in a wide variety of adverse health effects in humans. Chronic low-level exposure is usually of greater concern for young children than for older children or adults. For a variety of reasons, children are at risk of several neurological effects when excessively exposed to lead. These effects are subtle and are hard to detect. Common measurement endpoints include intelligence, attention span, hand-eye coordination, among other things. Most studies observe decreased performance in such tests at blood-lead levels of 20-30 micrograms per deciliter of blood (ug/dL). Some studies have reported decreased performance at blood lead levels as low as 10 ug/dL of blood. Additionally some adverse effects on pregnancy and fetal development have been associated with elevated blood-lead levels.

After a thorough review of pertinent data, EPA has identified 10 ug/dL of blood as the concentration level at which adverse health effects begin to occur which warrant avoidance. Furthermore, EPA has set a goal that there should be no more than a 5% chance that a child will have a blood lead concentration above that level. Likewise the Centers for Disease Control (CDC) has established a guideline of 10 ug/dL of blood in preschool children. This is believed to prevent or minimize cognitive deficits associate with lead.

Blood-lead levels in an exposed population of children may either be measured directly or may be calculated using a mathematical model. Since measured blood-lead concentrations were not collected at the Site, only a modeling approach was used.

Using data collected for residential properties within the ROU the Integrated Exposure, Uptake and Biokinetic Model (IEUBK) was used to model risk. All of the exposure parameters used as inputs to the IEUBK model were either site-specific concentration values or were standard EPA-recommended default values, except for a few values that are documented in the BLRA.

Based on the results of the IEUBK model the BLRA concluded that it was probable that lead levels associated with the ROU are sufficiently high in a number of locations that there is risk that 5% of children will have blood-lead levels above 10ug/dL.

Risks from Arsenic

As with lead, the primary exposure route for arsenic in soils is through incidental or direct ingestion. Excess exposure to arsenic is known to cause a variety of adverse health effects in humans. Oral exposure to high doses of arsenic produces such effects as nausea, vomiting, diarrhea, injury to blood vessels, kidney damage, and liver damage. The most diagnostic sign of chronic arsenic exposure is an unusual pattern of skin abnormalities

The health effect of chief concern for exposure to arsenic is increased risk of cancer. Because cancer is a chronic disease associated with long-term exposure, the appropriate exposure unit is the area over which a resident is exposed over the course of many years.

Risk of cancer from exposure to arsenic is described in terms of the probability that an exposed individual will develop cancer because of exposure to arsenic by the age of 70. The level of cancer risk that is of concern is a matter of individual, community, and regulatory judgment. EPA typically considers risks below one in one million to be so small as to be negligible and risks above 100 in one million to be sufficiently large that some sort of action or intervention in usually needed. Average risk estimates associated with arsenic contaminated soils in the ROU ranged from 2 to 10 in one million, and reasonable maximum exposure (RME) risk estimates range from 20 to 100 in one million. A joint risk management decision was made by UDEQ and EPA to use the level for 100 cancers in one million as the action level for arsenic at the Site.

All exposure and toxicity factors were based on standard USEPA default values for residential exposure. The relative bioavailability of arsenic was estimated on arsenic adsorption studies in animals sampled from other sites. The bioavailability value selected was 51%, which is slightly lower than the EPA default value of 80%.

Ecological Risk

Ecological risk was not specifically evaluated for the ROU due to the residential setting. In such a setting, risk to residents generally exceeds any ecological risks, and as such, any remediation required to abate human health risk will abate any ecological risks. Ecological risks for the entire site will be evaluated during the NROU.

Ground Water

Because the residents at the Site receive drinking water from a municipal system, ground water was not evaluated as a pathway for the BLRA or investigated during the RI/FFS for the ROU. However, ground water is present beneath the Site and soil contamination may

serve as a source of groundwater contamination. Therefore, ground water will be further evaluated under the NROU.

Steep Slopes

The site contains several sloped areas that are steep enough that access is naturally limited. It was determined by EPA and UFEQ that there was minimal risk of exposure to the COCs due to the steepness of these slopes. These steep slopes are not being recommended for remediation.

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

8.0 Remedial Action Objectives

The risks discussed above provide the basis for EPA's determination that the contaminated soils in the ROU present imminent and substantial endangerment to public health and that remedial action is warranted. The nature of these risks, coupled with the current and future residential land use within the ROU, led to the development of Remedial Action Objectives (RAOs). The RAOs, based on the results of the BLRA and being protective of human health are:

- Reducing risks from exposure to lead-contaminated soil such that no child under the age of seven has more than a 5 percent chance of exceeding a blood lead level of 10 micrograms of lead per deciliter of blood.
- Reducing risks from exposure to arsenic-contaminated soil such that no person has greater than a 10^{-4} increased risk of contracting cancer from contaminated soil.
- Remediating soils to levels that allow continued residential use.
- Preventing the occurrence and spread of windblown contamination.

To achieve these objectives, it is crucial to develop media specific clean-up levels which will result in the attainment of the RAOs. For the ROU, these cleanup levels were arrived at through the use of health-based goals. Based on the results of the BLRA, a risk management decision made by the UDEQ and EPA established action levels of 600 mg/kg for lead and 126 mg/kg for arsenic in residential surface soils for properties within the ROU. The 600 mg/kg action level for lead was based on a target such that no child under the age of seven has more than a 5 percent chance of exceeding a blood lead concentration of 10 micrograms of lead per deciliter of blood. The 126 mg/kg action level for arsenic was derived from a target cancer risk level of 10^{-4}. The action levels for the COCs associated with the ROU are summarized in Table II.

Table II
Action Levels for ROU

Action level for:	Concentration (mg/kg)
Soil contaminated with arsenic	126
Soil contaminated with lead	600

As stated in the BLRA, the human health exposure pathways associated with soil contamination below a depth of 18 inches are considered to be incomplete and present no direct risk. Therefore, a preliminary limit of 18 inches will be set for the remediation of soils. Any residual exposure risk below 18 inches may be addressed with institutional controls. Characteristically hazardous soils will be removed regardless of depth.

Within the ROU, 19 properties received "no further action" letters from EPA and will not be addressed under this ROD. Of the remaining properties, only those with sampling data indicating that soil concentrations exceed the action levels for lead and arsenic have been evaluated for remediation.

Lead and arsenic contamination is known to extend to at least 18 inches below ground surface in some areas of the ROU. Limited data have been collected to characterize the vertical extent of contamination below 18" below ground surface. Based on the sampling data that was summarized in the RI/FFS, the properties included in the ROU are listed in Table 3 and shown on Figure 2. It is estimated that 20 lots have soil contaminated with lead and arsenic concentrations above the clean up levels. This equates to approximately 42,945 tons of contaminated soil. As shown on Figure 2, six properties have not been sampled and have not received "no further action" letters. Since sampling data does not exist for these properties, they are not currently recommended for remediation. If future investigations show concentrations of the COCs in excess of the action levels established for this site, the same remedy could be implemented. In addition, the Site contains several sloped areas that are steep enough that access is naturally limited. It was determined by EPA and UDEQ that there was minimal risk due to the steepness of these slopes. These steep slopes are not being recommended for remediation either.

Table III
Davenport and Flagstaff Smelters ROU Properties

Address			Recommended	NFA Letter	Not Sampled
Davenport Smelter Area	3541	Little Cottonwood Canyon Road		X	
	3601	Little Cottonwood Canyon Road	X		
	3515	Little Cottonwood Lane	X		
	3535	Little Cottonwood Lane			X
	3568	Little Cottonwood Lane	X		
	3587	Little Cottonwood Lane	X		
	3594	Little Cottonwood Lane	X		
	3597	Little Cottonwood Lane			X
	3623	Little Cottonwood Lane		X	

Davenport Smelter Area Continued	3626	Little Cottonwood Lane	X		
	3641	Little Cottonwood Lane		X	
	3652	Little Cottonwood Lane		X	
	3661	Little Cottonwood Lane		X	
	3681	Little Cottonwood Lane			X
	3695	Little Cottonwood Lane		X	
	3698	Little Cottonwood Lane		X	
	3736	Little Cottonwood Lane		X	
	9795	Little Cottonwood Lane		X	
	9808	Little Cottonwood Lane	X		
	9815	Little Cottonwood Lane		X	
	9751	Little Cottonwood Lane		X	
	9752	Little Cottonwood Lane		X	
	9764	Little Cottonwood Lane		X	
	9767	Little Cottonwood Lane	X		
	9751	Old Ranch Place		X	
	9756	Old Ranch Place	X		
	9759	Old Ranch Place		X	
	9682	Quail Ridge Road	X		
	9687	Quail Ridge Road	X		
	9696	Quail Ridge Road	X		
	9701	Quail Ridge Road			X
	9712	Quail Ridge Road	X		
	9715	Quail Ridge Road		X	
	9726	Quail Ridge Road	X		
	9733	Quail Ridge Road			X
	9744	Quail Ridge Road			X
	9753	Quail Ridge Road		X	
	9756	Quail Ridge Road	X		
Flagstaff Smelter Area	3750	North Little Cottonwood Canyon Road	X		
	3656	North Little Cottonwood Road	X		
	3660	North Little Cottonwood Road	X		
	3710	North Little Cottonwood Road	X		
	3742	North Little Cottonwood Road		X	
	3744	North Little Cottonwood Road		X	
	3529	North Little Cottonwood Road	X		
Total Number of Properties (45)			20	19	6

9.0 Description of Alternatives

This section of the ROD describes the remedial alternatives developed for the Site. These alternatives were arrived at through a systematic screening process during the RI/FFS. In the FFS, many remedial alternatives were screened and those that were the most reasonable were retained and investigated in detail. The no action alternative, required by the NCP, was also evaluated. Using this systematic comparison, the ROD continues the evaluation and documents the decision making process. The numbering

system for the alternatives discussed in this ROD is taken from the numbering of alternatives in the FFS.

The alternatives are:

Alternative 1: No Action

The NCP requires that EPA evaluate the consequences of taking no action. This evaluation is intended to provide decision-makers and the public a basis upon which all of the remedy alternatives may be compared. Alternative 1 would not include any remedial action; any institutional controls on land-use or other actions that would incur costs.

Alternative 2: Excavation and Off-Site Disposal

The second alternative – excavation to a maximum depth of 18 inches, removal, and off-site disposal – involves a major remedial action to meet ARARs for surface soils and decrease human health risks at the ROU. Alternative 2 consists of excavating an estimated 42,945 tons of contaminated soil from all of the properties that have total soil-lead concentrations exceeding 600 mg/kg and total arsenic concentrations exceeding 126 mg/kg. Contaminated soil around areas containing native vegetation (i.e., Scrub oak and other native trees) will be hand excavated in order to diminish the impact on the vegetation. All excavated soils with less than 5 mg/l extractable lead (as determined using TCLP analysis) will be disposed of at a suitable Class I or Subtitle C landfill. Excavated soils with more than 5 mg/L extractable lead will be stabilized and disposed of at a Subtitle C landfill. A layer of clean imported soil, up to 12 inches thick will be placed as backfill. A 6-inch topsoil layer will be placed over all excavated surfaces. Non-native vegetation will be removed and replanted. The interiors of all buildings located on remediated properties will be cleaned to remove any interior dust to remove any contaminated dust that may have entered the building during clean-up activities. Institutional controls may be used to restrict access and exposure to any contaminated soil left in place.

Alternative 3: Excavation of Soil Under Non-Native Vegetation and Soil Cover Around Native Vegetation and Off-site Disposal

The third alternative involves a major remedial action to meet ARARs for surface soils and decrease human health risks at the ROU. Alternative 3 consists of excavating to a maximum depth of 18 inches, an estimated 30,964 tons of contaminated soil from all properties, containing non-native vegetation, that have total soil-lead concentrations greater than 600 mg/kg and total arsenic concentrations greater than 126 mg/kg. All excavated soils with less than 5 mg/L extractable lead will be stabilized and disposed of at a suitable Class I or Subtitle C landfill. Excavated soils with more than 5 mg/L extractable lead will be stabilized and disposed of at a Subtitle C landfill. A layer of clean, imported soil, up to 12 inches thick will be placed as backfill. A 6-inch topsoil layer will be placed over all excavated surfaces. Non-native vegetation will be removed

and replanted. Contaminated soil around areas of natural vegetation will be covered with a six-inch layer of clean top soil to prevent exposure. The six-inch layer of clean top soil will be applied in two-inch lifts over a period of time to diminish the impact on the vegetation. The interiors of all buildings located on remediated properties will be cleaned to remove any interior dust. Institutional controls will be used to restrict access and exposure to contaminated soil left in-place. A program to monitor the soil cover and compliance with institutional controls would also be implemented.

10.0 Summary of Comparative Analysis of Alternatives

To facilitate a complete and systematic comparison, each of the three alternatives discussed in this ROD is evaluated against the nine criteria as set forth is the NCP. Of these nine criteria, the first two are considered "threshold factors" which must be satisfactorily met in order for a remedy to be considered for implementation. The next five criteria are considered "primary balancing factors" and are the primary criteria upon which the analysis is based. Finally, the last two criteria (State and Community Acceptance) are considered modifying factors.

Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

Alternative 1 is not protective of human health and the environment. If this alternative is implemented, the human health risk will remain unchanged for all properties. The human health risk/hazard for the properties containing soil lead concentrations greater than 600 mg/kg and arsenic concentrations greater than 126 mg/kg will not be mitigated or eliminated. Alternative 1 does not meet the threshold criterion for protection of human health and the environment.

Alternative 2 provides for the excavation and disposal of contaminated soil from the residential properties recommended for clean-up. Excavation and disposal of contaminated soil automatically reduces the risk of direct contact, inhalation, or ingestion of the contaminated soil and therefore reduces human health risk by removing accessible contamination. Soil stabilization and landfill disposal further reduces the migration potential and the potential for future direct contact, ingestion, and inhalation of the contaminants. The clean soil backfill and vegetation layer also reduces the spread of contamination into the environment by covering residual contaminated soil. Institutional controls may be used to restrict access and exposure to any contaminated soil left in place. Alternative 2 meets the threshold criterion for protection of human health and the environment.

Alternative 3 provides for the excavation and disposal of contaminated soil from areas of non-native vegetation and a soil cover over areas of native vegetation for the properties

recommended for clean-up. The excavation and disposal of contaminated soils along with the soil cover over contaminated areas reduces the risk of direct contact, inhalation, or ingestion of the contaminated soil and therefore reduces human health risk through removal or covering of accessible contamination. Soil stabilization and landfill disposal of the excavated soils further reduces the migration potential and the potential for future direct contact, ingestion, and inhalation of the contaminants. The clean soil backfill, the vegetation layer, and the soil cover will also reduce the spread of contamination into the environment by covering the residual contaminated soil. The contaminated soil around native vegetation may be exposed if the cover is breached through excavation, erosion, or construction below the cover layer. Alternative 3 is partially dependent on institutional controls for protection of human health and the environment. Alternative 3 meets the threshold criterion for protection of human health and the environment.

Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA and NCP 300.4(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria and limitations which are collectively referred to as "ARARs", unless such ARARs are waived under CERCLA section 121(d)(4).

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

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes or provide a basis for invoking a waiver.

If Alternative 1 is implemented, all of the contaminated soil will remain in place and no measures will be implemented to prevent or reduce exposure or contaminant transport. Alternative 1 will not meet the chemical standards regarding site closure, including RCRA closure and post closure Standards (UAC R315-8-7), Cleanup and Risk Based Closure Standards (UAC R315-101) and the States Corrective Action Cleanup Standards Policy for CERCLA and UST sites (UAC R311-211). All of these standards require

approporiate management of site risks. Alternative 1 does not meet the threshold criteria of complying with ARARs.

Alternative 2 will stabilize the most highly contaminated soil and dispose of it in a regulated, RCRA-approved disposal facility. This stabilization and disposal reduces the risk of direct contact and protects individuals from ingesting soil with lead and arsenic concentrations above the action levels. Contaminated soil remaining after the excavation may require special institutional controls governing the use of some properties within the ROU. Alternative 2 meets chemical-specific air protection standards, ROU location-specific ARARs and Federal and State action-specific ARARs. Alternative 2 meets the threshold criteria of compliance with ARARs.

Alternative 3 will stabilize a majority of the contaminated soil and place a soil barrier over the contaminated soil around the native vegetation. The stabilization and disposal reduces the risk of direct contact and protects individuals from ingesting soil with lead and arsenic concentrations above the action levels. The ROU chemical specific, location specific and action specific ARARs will be met by the remedial action. Contaminated soil remaining below a depth of 18 inches in the excavated area and the possible breach of the soil cover require the imposition of institutional controls governing use of some of the properties in the remediated areas of the ROU. With institutional controls, alternative 3 meets the threshold criteria for compliance with ARARs.

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to the expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion includes the consideration of residual risk that will remain onsite following remediation and the adequacy and reliability of controls.

Alternative 1 does not remove the source of the soil contamination and does not mitigate any of the risk to human health. Alternative 1 provides no controls over the existing contamination and is both inadequate and unreliable.

The excavation and off-site disposal described in Alternative 2 is a well-proven technology. Contaminated soil is removed from the site. The threat posed by the excavated soil is permanently eliminated. Residual risk would remain from lead and arsenic-contaminated soil below the clean back-filled soil and surrounding the roots of native vegetation. Institutional controls, such as environmental easements, local ordinances and education may be used to prevent exposure to residual contamination. Since lead and arsenic above the action levels will remain on-site. A 5-year review will be required to evaluate the long-term effectiveness of the remedial action.

Under Alternative 3 residual risk would remain from lead and arsenic contaminated soil below the backfilled soil in excavated areas, and underneath the cover applied to unexcavated areas. Contaminated soil in the non-native vegetation areas is removed from

the site and therefore the threat posed by this soil is permanently eliminated. In areas of native vegetation, Alternative 3 relies on soil cover to provide a barrier between potential receptors, especially small children, and the existing lead and arsenic contaminated soil. The lead and arsenic-contaminated soil remains in place under the soil cover. Institutional controls, such as easements, local ordinances and education, may be required to prevent exposure to contamination below the clean backfill in excavated areas and the soil cover in the unexcavated areas. The soil cover could be easily breached during normal household activities such as gardening and landscaping. In addition, garden vegetables with roots extending below the clean soil might contain levels of lead and arsenic that could pose a threat to human health. Since lead and arsenic above the action levels will remain on-site, a 5-year review will be required to evaluate the long-term effectiveness of the remedial action.

Reduction of Toxicity, Mobility, or Volume through Treatment

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

In Alternative 1, no treatment process is used and, therefore, no contamination is destroyed or treated. Alternative 1 provides no reduction of toxicity, mobility or volume. Since no treatment is used, the irreversibility of the treatment process is not applicable and no treatment residuals remain. Alternative 1 does not satisfy the statutory preference for treatment.

In Alternative 2, excavated soils with a TCLP lead level greater than 5 mg/L will be stabilized off-site prior to disposal. The stabilization will reduce both mobility and the toxicity of the contaminants in the excavated soil, but may increase the volume by more than 10%. The preference for treatment will be met for those soils requiring treatment prior to disposal. Alternative 2 provides no reduction in volume of the excavated soil. Alternative 2 may also include the excavation and disposal of soils that do not require treatment prior to disposal. The preference for treatment will not be met for these soils. However, the mobility of the contaminants will be reduced by disposal in an appropriate disposal facility. Alternative 2 partly satisfies the statutory preference for treatment.

In Alternative 3, excavated soils with a TCLP lead level greater than 5 mg/l will be stabilized off-site prior to disposal. The preference for treatment will be met for those soils that will require treatment prior to disposal. Alternative 3 provides no reduction in volume of the excavated soil. Alternative 3 may also include the excavation and disposal of soils that do not require treatment prior to disposal. The preference for treatment will not be met for these soils. However, the mobility of the contaminants will be reduced by disposal in an appropriate disposal facility. Alternative 3 also includes capping contaminated soil in native vegetation area. The preference for treatment will not be met for the soils that will remain in place. The mobility of the contaminants will be reduced by the installation of the soil cover. Alternative 3 partly satisfies the statutory preference for treatment.

Short -Term Effectiveness

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

Implementing Alternative 1 does not increase the short-term risk to the community from a remedial action. Because there is no remedial action under Alternative 1, there is no risk to remediation workers. The environmental impacts under Alternative 1 remain unchanged from existing conditions. Since no remedial action occurs, the time until remedial action is complete is not applicable.

During the implementation of Alternatives 2 and 3, no residents will be relocated. House interiors will require cleaning after remediation is complete to remove any contaminated dust that may be deposited during cleanup activities. Site workers will need to comply with appropriate health and safety requirements for working on hazardous waste sites. Dust generated during construction could create an environmental impact, but State Air Quality and Occupational Safety and Health Administration (OSHA) regulations governing dust suppression will be implemented. The time required to complete the remedial action under both of these alternatives is approximately 6 months. Alternatives 2 and 3 will achieve the same level of short term effectiveness.

Implementability

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

No construction or operation is required to implement Alternative 1. Because monitoring of effectiveness is also not required, it is not necessary to obtain approval from other agencies. No equipment, specialists, materials, technologies, services, or capacities are required. Alternative 1 is very easily implemented because no change from the current status is required.

The excavation and offsite disposal approach described in Alternatives 2 and 3 is a relatively simple process with proven procedures. It is a labor-intensive practice with little potential for automation. Standard soil excavating, hauling, backfilling and grading techniques are used in excavation and disposal. The construction equipment, specialists, materials, technologies, services and capacities needed are available from several Utah vendors. Due to the prevalence of native vegetation within the ROU, the hand excavation of these areas as required in Alternative 2 may require unique consideration. Soil excavated for the planting of trees and shrubs during post remediation landscaping may require transportation, disposal and possible treatment, at a hazardous waste landfill. Significant coordination with local, state and federal agencies will be required to obtain

approval of a landfill suitable for the disposal of the lead and arsenic contaminated soil. Significant coordination among state, federal and local agencies, and property owners will be required to determine how to implement and enforce institutional controls if needed.

The 6-inch soil cover described in Alternative 3 may be difficult to implement. Placing a 6-inch layer of soil cover, all at one time, around the native vegetation, may cause the affected plants to die. The soil cover around the native vegetation must be placed 2-inches at a time with a three month waiting period between each application. Winter months, when plants cannot acclimate to the soil cover will not be considered as part of this waiting period. Adjusting the height of affected structures and paved areas adjacent to soil cover areas, especially basements, window wells, driveways, sidewalks, and patio slabs, to maintain positive drainage may be difficult to implement. Monitoring of the soil cover will be required to give notice of any failure of the remedy before significant exposure occurs. Significant coordination among federal, state and local agencies, and property owners will be required to determine how to implement and enforce institutional controls.

Cost

There are, by definition, no capital or O&M costs associated with Alternative 1. Therefore, the costs for Alternative 1 are $0.00 for capital cost and $0.00 for operation and maintenance.

Unit cost estimates for Alternative 2, excavation and disposal, range from $30 to $125 per ton depending on the nature of the hazardous materials, methods of excavation, and disposal alternative selected. All of these unit cost estimates include excavation/removal, transportation, and disposal at a RCRA permitted facility. Capital costs are estimated at $11,872,000 for Alternative 2 and $78,000, present worth, for 30 years of O&M. The annual O&M cost consists of an annual report, at $6,400 per year. The annual report will document compliance with any institutional controls associated with the remedial action. These capital and O&M costs combine for a total present worth cost of $11,950,000.

Unit cost estimates for Alternative 3, a combination of excavation and soil cover, range from $30 to $125 per ton, depending on the nature of the hazardous materials, methods of excavation, and disposal alternative selected. All of these unit cost estimates include excavation/removal, transportation, and disposal at a RCRA-permitted facility. Capital costs are estimated at $9,512,000 for Alternative 3 and $205,000, present worth, for 30 years of O&M. The annual O&M cost consists of an annual report, at $16,700 per year. The annual report will include annual monitoring, maintenance and reporting. These capital and O&M costs combine for a total present worth cost of $9,717,000.

State/Support Agency Acceptance

The State supports either Alternative 2 or 3. The State does not believe that Alternative 1 provides adequate protection of Human Health and the environment.

Community Acceptance

During the public comment period, and at the public meeting, the community expressed concerns regarding the effectiveness of institutional controls and the impact they would have on property values. The community expressed a desire to have the area remediated and a desire to have Alternative 2 implemented rather than Alternative 3. The responsiveness summary contains all of the comments received from the comment period and those made by citizens during the public meeting, along with EPA and UDEQ responses.

11.0 Principal Threat Wastes

As part of the RI, 57 samples were submitted for TCLP lead and arsenic analysis. These samples were collected from depths ranging from 0-6 inches to 30-36 inches. As summarized in Table IV, 20 of these soil samples had results that exceeded the lead TCLP Characteristic Hazardous Waste value of 5 mg/l. Of these 20, 19 were collected from a small area that covers parts of the following three properties: 3515 E. Little Cottonwood Lane, 3594 Little Cottonwood Lane and 9756 Old Ranch Place. Field notes associated with the samples taken from this area describe the soil as an "olive silty sand" visibly different from other soil samples collected from surrounding areas.

Table IV
TCLP Exceedances

Sample Location	Sample Depth	Total Lead Concentration mg/kg	TCLP Lead Concentration Mg/l
3515 E. Little Cottonwood Lane	0-6	21,900	89.9
	6-12	33,900	142.0
	12-18	99,500	247.0
3594 Little Cottonwood Lane	0-6	3,620	22.9
	0-6	123,000	196.0
	6-12	3,880	26.2
	6-12	13,400	9.0
	12-18	4,620	28.7
	12-18	19,100	137.0
	12-18	17,000	146.0
	30-36	1,330	32.0
9756 Old Ranch Place	0-6	17,400	109.0
	6-12	46,900	782.0
	12-18	1,060	12.0
	12-18	47,700	854.0
	12-18	42,700	989.0
	18-24	27,800	463.0

	24-30	19,700	220.0
	30-36	8,730	88.0
9808 Little Cottonwood Lane	6-12	1,720	15.0

Due to the visible distinctiveness, the high total lead and arsenic concentrations, and the leaching characteristics demonstrated by TCLP analysis, this material is possibly waste associated with the Davenport smelter and is considered a principal-threat waste. Principal-threat wastes are source materials that are considered highly toxic or highly mobile, that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. High lead and arsenic levels on property adjacent to the Flagstaff smelter may also be indicative of the presence of principal threat waste.

The alternatives developed in the FFS include the excavation and off-site treatment and disposal of contaminated soil to a depth of 18 inches. They do not specifically address smelter waste source material or principal threat wastes. Where visible characteristics or very high concentrations suggest the presence of source material on properties at or adjacent to the former smelters, excavation and removal of these materials will address the principal threat wastes associated with the Site.

12.0 Excavation and Disposal – The Selected Remedy

Summary of the Rationale for the Selected Remedy

The selected remedy must provide for the overall protection of human health and the environment, be cost effective and use, to the maximum extent possible, permanent solutions employing treatment and/or resource recovery technologies. These requirements are fulfilled by selecting a remedy that satisfies the threshold criteria (over all protection of human health and the environment and compliance with ARARs) provides the best balance of the five balancing criteria (long-term effectiveness; short term effectiveness; implementability; reduction in toxicity, mobility, or volume and cost) and considers the preference for treatment as a principal element of the remediation with a bias against off-site land disposal of untreated waste.

Based on these requirements EPA and UDEQ have chosen Alternative 2, Excavation and Disposal as the selected remedy for the Davenport and Flagstaff Smelters site for the following reasons:

- Excavation and disposal will satisfy all ARARs as well as provide a high level of protectiveness for human health and the environment.
- Excavation and disposal is a well proven technology. The threat posed by the excavated soil will be permanently eliminated. The residual risk form contaminated soil at the site after excavation is much less than the risk associated with the soil cover described in Alternative 3.

- The preference for treatment will be met for all soils that have a TCLP lead level greater than 5 mg/l The mobility of the contaminants in all excavated soil will greatly reduced by off-site disposal.
- Excavation and disposal is a relatively simple process with proven procedures. The construction equipment, specialists, materials, technologies, services and capacities needed are available from several Utah vendors. The soil cover described in Alternative 3 may be difficult to implement and may damage the natural vegetation.
- Excavation and disposal will require less reporting than alternative 3 and the impact of institutional controls, if required, will be much less than those associated with Alternative 3.

Designation of the Selected Remedy

Based upon the results of the systematic screening process described previously and extensive input from the impacted community, UDEQ and EPA agree that Alternative 2, Excavation and Disposal, most completely satisfies the analysis criteria and is designated as the selected remedy for the ROU. Excavation and disposal has been used successfully at a number of similar lead sites in Utah and throughout Region VIII. The remedy will be considered complete when the following key components, are accomplished.

- Excavation and off-site treatment and disposal of principal-threat wastes;
- Excavation of contaminated soil to a depth of 18" from all properties recommended for remediation that have total soil-lead levels exceeding 600 mg/kg and total arsenic levels exceeding 126 mg/kg. Properties with principal-threat wastes may be excavated to depths greater than 18";
- Hand excavation around affected areas of native vegetation;
- Transportation and disposal of all excavated soils with less than 5 mg/L extractable lead (using TCLP) at a suitable class I or Subtitle C landfill;
- Transportation, off-site treatment (to meet land disposal requirements) and disposal of characteristically hazardous soil at a suitable Subtitle C landfill;
- Placing clean, imported soil, backfill and a 6-inch topsoil layer over all excavated soil surfaces;
- Removal and replanting of affected non-native vegetation;
- Cleaning of the interiors of all buildings located on remediated properties to remove interior dust; and
- Development and implementation of institutional controls for any contamination left in place on properties recommended for remediation.

These performance standards will ensure that the RAOs are met by reducing the risk of direct contact, inhalation or ingestion of contaminated soil by excavating and disposing of contaminated soil from the residential properties recommended for remediation, and by providing controls, if necessary, to protect against exposure contaminated soil remaining after excavation.

The selected remedy will be consistent with any groundwater remedy that may be required for the NROU. The remedy may change somewhat as a result of the remedial design and construction process.

Implementation of the Remedy

The remedy will be implemented following remedial design activities. During design, affected property owners will be consulted regarding the current and post-remedial condition of their property. The agencies intend to use real time analysis to efficiently define the horizontal extent of excavation for each property recommended for remediation during design. The real time analysis will allow UDEQ and EPA to remove contaminated soil in a surgical manner that will reduce the amount of material that will be required to be excavated and reduce impact on the extensive landscaping and native vegetation that is indicative of the Site. Affected property owners will provide input on the designation of native and non-native vegetated areas.

During excavation activities, principal-threat wastes (source material) will be completely removed and excavated. Contaminated soil in native vegetation areas requiring remediation will be hand excavated, where necessary, to a maximum depth of 18 inches. Care will be taken to remove as much of the contaminated soil as possible from root systems without damaging the vegetation. All non-native vegetation in areas requiring remediation will be removed and replanted after excavation and backfilling with clean soil and topsoil. Excavation in non-native vegetation areas will be to a maximum depth of 18 inches unless principal-threat waste is found beneath 18". Properties will be left in, or returned to, as close to original condition as possible, except in the case in which the property owner desires differently and there is no appreciable increase to the government in cost or effort. Contaminated soil will not be removed from below existing concrete or asphalt structures, such as improved driveways or sidewalks. Contaminated soils will not be removed from existing homes or from crawl spaces or basements. Physical construction will be considered complete when all properties and areas identified for remediation have been addressed and returned to satisfactory condition. Property owners will receive an assurance that construction and vegetation are warrantied for a minimum of one year after construction completion.

During excavation, sampling will be conducted to evaluate whether action levels have been met. Properties where soil contamination in excess of action levels will remaining below 18 inches, below existing structures, or within the root balls of native vegetation will be identified. An evaluation of residual risk will be conducted for each property to determine what (if any) institutional controls are necessary to prevent human exposure to residual contamination left in place. These controls may include environmental easements, deed restrictions, zoning ordinances and/or community education. Property owners will be consulted before institutional controls are implemented.

Sampling will be done in coordination with the selected landfill or landfills to determine which soils are classified as a hazardous waste under RCRA Subtitle C using the Toxicity

Characteristic Leaching Procedure and guidelines established in SW-846, Update Three (USEPA 197).

Summary of Estimated Remedy Costs

The selected remedy calls for the excavation and disposal of an estimated 43,000 tons of contaminated soil from contaminated areas of the properties that have been recommended for remediation. Approximately 13,000 tons of contaminated soils would be hand excavated from contaminated areas containing native vegetation. Unit cost estimates for excavation and disposal range from $30 to $125 a ton, depending on the nature of the hazardous materials, methods of excavation, and the type of landfill required for disposal. Unit cost estimates include excavation/removal, transportation, and disposal at a Subtitle C facility. Capital costs are estimated to be $11,872,000 for the selected remedy and $78,000 (present worth) for 30 years of operation and maintenance. The operation and maintenance consists of an annual report (estimated cost of $6,400 per year) to document compliance with institutional controls associated with contamination that may remain in place after remediation. The capital and operation and maintenance costs combine for a total present worth cost of $11,950,000. Table V contains a summary of the estimated cost estimate.

The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the remedial design. Major changes may be documented in the form of a memorandum in the Administrative Record file, an explanation of significant differences (ESD), or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50% to –30% of the actual project cost.

Expected Outcomes of the Remedy

Implementation of the selected remedy will achieve the stated Remedial Action Objectives. Future health risks due to lead or arsenic in soils will be reduced to acceptable levels. Any impacts of contamination on property values are expected to be reduced or eliminated. The landscaping proposed as part of the remedy should return the properties as close to their pre-excavation state as possible. Residents should be able to conduct additional landscaping activities consistent with whatever institutional controls, if any, are placed on the property. The post excavation sampling and residual risk evaluation will allow UDEQ and EPA to place appropriate controls only on those properties where they are needed.

Table V
Cost Estimate Summary Table

	Item	Description	Quantity	Unit	Unit Cost	Cost	Notes
Residential Lots	1	Utility Coordination	20	Per lot	$3,200	$64,000	1
	2	Remove Fences	11,945	Linear foot	$4.24	$50,647	1
	3	Clear and Grub Trees	556	Each	$620	$344,720	5
	4	Excavate Contaminated Soils from Non-Native Vegetated Areas	30,694	Ton	$5.30	$162,677	1
	5	Hand Excavate Contaminated Soils from Native Vegetation Areas	12,251	Ton	$25	$306,627	2
	6	Transport Soil to Subtitle C Landfill	42,945	Ton	$25	$1,073,613	3
	7	Disposal of Contaminated Soil at Subtitle C Landfill (includes treatment)	42,945	Ton	$96.50	$4,144,145	3
	8	Haul and Place Clean Soil on Residential Lots	27,711	Ton	$16	$443,382	4
	9	Haul and Place Top Soil on Residential Lots	15,233	Ton	$20	$304,663	2
Roads	10	Remove Concrete, Rock, or Asphalt	1,211	Ton	$26	$31,484	4
	11	Transport Concrete Rock or Asphalt to Class 1 or Subtitle C Landfill	1,211	Ton	$12.5	$15,137	3,8
	12	Disposal of Concrete, Rock or Asphalt at a Class 1 or Subtitle C Landfill	1,211	Ton	$32.5	$39,355	3,8
	13	Haul and Place Road Base	431	Cubic yard	$67	$28,847	4
	14	Asphalt Paving	484	Ton	$412	$199,563	4
Landscaping	15	Replace Fences	11,945	Linear foot	$24	$286,680	4
	16	Remove and Replace Fence Gates	20	Each	$310	$6,200	4
	17	Remove and Replace Sheds	10	Each	$7,200	$72,000	4
	18	Replacement of Trees (3 inch Caliper)	556	Each	$550	$305,800	2,6
	19	Shrubs	1,115	Each	$41	$45,715	4
	20	Sod	371,719	Square foot	$.46	$170,991	2
	21	Replace Irrigation Systems	371,719	Square foot	$.77	$286,224	6
	22	Landscaping, Bedlines, Rock, mulching, etc.	20	Per lot	$15,000	$300,000	7
	23	Health and Safety Monitoring	1	Lump sum	$20,000	$20,000	2
	24	Final Site Wide Cleanup	1	Lump sum	$53,000	$53,000	1
	25	Mobilization	1	Lump sum	$875,511	$875,511	
	26	Demobilization	1	Lump sum	$262,653	$262,653	

Subtotal	$9,893,273	
Unidentified Construction Costs (10%)	$989,327	
Construction Management (10%)	$989,327	
Total	$11,871,927	

Notes
1. Jacob Smelter FFS with 3% inflation for two years
2. RSMeans Environmental Remediation Cost Data 2000
3. Safety Kleen
4. Jacob Smelter engineering design estimate
5. Salt Lake Valley Landfill
6. RSMeans Site Work & Landscape Cost Data 2001
7. Engineer estimate
8. For a conservative estimate, costs for a Subtitle C Landfill were used, Transportation and disposal at a Class I landfill will cost $13/ton less.

13.0 Statutory Determinations

The NCP and section 121 of CERCLA specify that the selected remedy must be protective of human health and the environment, comply with ARARs, be cost effective, utilize permanent solutions and alternative treatment technologies, to the maximum extent possible, and show a preference for treatment. The five-year reporting requirements for contamination left in place must also be explained.

Protection of Human Health and the Environment

The selected remedy, excavation and disposal, is a well-proven technology. Contaminated soil, to a depth of 18 inches, and principal-threat wastes will be removed from the site. The threat posed by the excavated soil will be permanently eliminated. Soil stabilization and landfill disposal of the excavated soil will reduce the migration potential of the contaminated soils along with the potential for human exposure to the contaminated soils. The clean soil backfill and vegetation layer along with any institutional controls required will further reduce exposure to any contamination left in place. The implementation of the selected remedy will not pose unacceptable short-term risks. House interiors will be cleaned after remediation is completed to remove any contaminated soil and dust tracked into the house during construction activities. The time required to complete the remedial action is approximately 6 months. The residual risk associated with contaminated soil remaining at the site after excavation is much less than the risk associated with Alternative 3. The selected remedy will also require less reporting than Alternative 3 and the impact of institutional controls, if required, will be much less than those associated with Alternative 3.

Compliance with Applicable or Relevant and Appropriate Requirements

Off-site treatment and disposal of the characteristically hazardous soils and the disposal of contaminated soils, in a regulated, RCRA-approved disposal facility reduces the risk of direct contact and protects individuals from ingesting soil with lead and arsenic concentrations above the action levels. The selected remedy meets chemical-specific air protection standards, ROU location-specific ARARs and Federal and State action-specific ARARs. Contaminated soil, which may remain after excavation, will require special institutional controls governing the use of some properties within the ROU. Appendix A contains a detailed analysis of ARARs.

Cost Effectiveness

The NCP defines a cost-effective remedy as one whose costs are proportional to its overall effectiveness. The overall effectiveness of a remedial alternative is determined by evaluating the long-term effectiveness, permanence and short-term effectiveness of the alternative, along with the reduction in toxicity, mobility and volume through treatment. The overall effectiveness is then compared to cost to determine whether a remedy is cost effective.

The Feasibility Study investigated several remedial alternatives and identified Alternatives 2 and 3 as the most cost effective and implementable.

The selected remedy will remove and treat a greater volume of contaminated soil than Alternative 3 and will greatly reduce the amount of contaminated soil that will remain in place after construction. The presence of 18 inches of clean soil over any contamination left in place will provide a more permanent barrier than the six-inch soil cover described

in Alternative 3. This will reduce the risk of exposure to contaminated soil and will minimize the impact of institutional controls required.

In addition the six-inch soil cover described in Alternative 3 may be difficult to implement, where excavation and disposal is a proven technology. Placing soil cover around the native vegetation may cause the affected plants to die. Adjusting the height of affected structures and paved areas adjacent to soil cover areas to maintain positive drainage may also be difficult to implement.

The selected remedy will require less reporting and O&M than Alternative 3 and the impact of institutional controls, if required, will be much less than those associated with Alternative 3.

Capitol costs for the selected remedy are estimated at $11,872,000 with an additional $78,000 for 30 years of O&M. The total estimated cost for the selected remedy $11,950,000 compared with $9,717,000 for Alternative 3. The additional protectiveness and ease of implementing the selected remedy over that described in Alternative 3 justifies the additional cost.

Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

Few effective treatment technologies exist for heavy metal contaminated soils and these were not considered as remedial alternatives due to cost, ineffectiveness or implementation concerns. Of the alternatives selected for detailed analysis, the selected remedy provides the most permanent solution. Excavation and disposal is a well-proven technology. Contaminated soil up to a depth of 18 inches and principal threat waste will be removed from the site and, therefore, the threat posed by this soil will be permanently eliminated. The soil cover proposed in Alternative 3 will require ongoing inspection and monitoring to ensure that it stays intact and remains protective.

Preference for Treatment as a Principle Element

The selected remedy calls for all excavated soils with a TCLP lead level greater than 5mg/L to be stabilized off-site prior to disposal. The stabilization will reduce both the mobility and the toxicity of the contaminants in the excavated soil. The preference for treatment will be met for those soils that will require treatment prior to disposal. The selected remedy may also include the excavation and disposal of soils that do not require treatment prior to disposal. The preference for treatment will not be met for these soils. However, the mobility of the contaminants will be reduces by disposal in an appropriate disposal facility. Disposal of contaminated soils in an appropriate landfill reduces the mobility of contaminants more than the soil cover described in Alternative 3.

Five-Year Review Requirements

Because there are some properties where waste may be left in place above health-based standards, five-year reviews will be required to ensure that the remedy remains protective and that any institutional controls required are functioning as intended.

14.0 Documentation of Significant Changes

The Proposed Plan was released for public comment in June 2002. It identified Alternative 3, excavation and disposal of soil in areas of non-native vegetation and soil cover around native vegetation, as the preferred alternative for soil contamination. Alternative 2, Excavation and Disposal, was also considered. During the public comment period, the community expressed strong support for Alternative 2. In addition, it was determined that the impact of soil cover on the native vegetation was unproven and would not provide as protective of a barrier as the excavation and disposal described in Alternative 2. Therefore, EPA and UDEQ have chosen excavation and disposal as the selected remedy. Comments received from the community and agency responses are included in Appendix C, Responsiveness Summary.

Appendix A
Detailed Analysis of ARARS

TABLE 2-1
Summary of Compliance with Chemical-Specific ARARs

Regulation	Citation	Compliance with ARAR
FEDERAL:		
Criteria for Identification and Listing of Hazardous Waste	40 CFR Part 261	Wastes generated during the remedial actions must be identified and listed as hazardous wastes, as appropriate. This includes soils excavated for off-site disposal.
Land Disposal Restrictions	40 CFR Part 268	Hazardous wastes generated during remedial actions and disposed of off-site must be managed in accordance with these requirements. Treatment of wastes may be necessary prior to land disposal.
Requirements for Releases from Solid Waste Management Units; Groundwater Monitoring Requirements	40 CFR Part 264, Subpart F	Groundwater will be included as part of the Undeveloped Lands OU. Compliance with this ARAR will be addressed under the activities for that OU. Removal of contaminated soil from the ROU would promote protection of groundwater.
National Ambient Air Quality Standards (NAAQS)	40 CFR Part 50	Emissions from the remedial alternatives must meet the standards of this regulation.
STATE:		
Identification and Listing of Hazardous Waste	UAC R315-2-1	Wastes generated during the remedial actions must be identified and listed as hazardous wastes, as appropriate. This includes soils excavated for off-site disposal.
Land Disposal Requirements	UAC R315-13	Hazardous wastes generated during remedial actions and disposed of off-site must be managed in accordance with these requirements. Treatment of wastes may be necessary prior to land disposal.
Groundwater Protection	UAC R315-8-6	Groundwater will be included as part of the Undeveloped Lands OU. Compliance with this ARAR will be addressed under the activities for that OU.
Ground Water Quality Protection Rule	UAC R317-6	Groundwater will be included as part of the Undeveloped Lands OU. Compliance with this ARAR will be addressed under the activities for that OU. Removal of contaminated soil from the ROU would promote protection of groundwater.
Emission Standards - Visible Emissions	UAC R307-201-1(1)	Emissions from the on-site stabilization system and excavation operations must meet the standards of this regulation. Remedial actions are not expected to cause significant visible emissions.
Davis, Salt Lake and Utah Counties, Ogden City and Any Non-Attainment Area for PM_{10}: Fugitive Emissions and Fugitive Dust	UAC R307-309	Fugitive dust must be controlled during ground disturbing activities such as stabilization, excavation, and soil covering.

TABLE 2-2
Summary of Compliance with Action-Specific ARARs

Regulation	Citation	Compliance with ARAR
FEDERAL:		
Standards Applicable to Generators of Hazardous Waste	40 CFR Part 262	All activities that generate hazardous waste must comply with this regulation. This includes excavation of soils for off-site disposal.
Standards Applicable to Transporters of Hazardous Waste	40 CFR Part 263	All activities associated with transporting hazardous wastes must comply with this regulation. This includes manifesting, record-keeping, and discharge clean-up requirements.
General Facility Standards	40 CFR Part 264, Subpart B	Hazardous waste facilities (for on-site stabilization and excavation activities) must be constructed in accordance with this regulation.
Standards of Preparedness and Prevention	40 CFR Part 264, Subpart C	Hazardous waste facilities must be designed, constructed, maintained, and operated in accordance with these requirements.
Contingency Plan and Emergency Procedures	40 CFR Part 264, Subpart D	A Contingency Plan must be developed and implemented for remedial action activities.
Manifest System, Recordkeeping, and Reporting Requirements	40 CFR Part 264, Subpart E	All hazardous wastes generated and transported off-site must be manifested in accordance with this regulation.
Requirements for Releases from Solid Waste Management Units	40 CFR Part 264, Subpart F	Groundwater will be included as part of the Undeveloped Lands OU. Therefore, compliance with this ARAR will be addressed under the activities for that OU. Removal of contaminated soil from the ROU would promote protection of groundwater.
Closure and Post-Closure Standards	40 CFR Part 264, Subpart G	If contaminated soils above PRGs will remain in place, actions must be taken to prevent dermal and ingestion exposure and contaminant transport. Groundwater will be included as part of the Undeveloped Lands OU, therefore, compliance with this ARAR as it pertains to groundwater will be addressed under the activities for that OU.
Standards for the Use and Management of Containers	40 CFR Part 264, Subpart I	All management of containers holding hazardous waste must be in accordance with this subpart. This includes containers used for handling hazardous wastes during on-site stabilization operations and storing excavated soils prior to disposal.
Staging Piles	40 CFR Part 264, Subpart S Section 264.554	Establishes requirements for waste piles to prevent contaminant migration to adjacent subsurface soil, groundwater, or surface water. Measures include installation of liners, covers, run-off/run-on controls as appropriate.
STATE:		
Air Pollution Prohibited	UAC R307-102-1	Emission of air contaminants in sufficient quantities is prohibited.
Davis, Salt Lake and Utah Counties, Ogden City and Any Non-Attainment Area for PM_{10}: Fugitive Emissions and Fugitive Dust	UAC R307-309	Fugitive dust must be controlled during ground disturbing activities such as stabilization, excavation, and soil covering.
Notice of Intent and Approval Order	UAC R307-401	Alternatives must be designed to be protective of air quality and to minimize fugitive dust and equipment emissions. Appropriate dust control measures will be implemented as

Regulation	Citation	Compliance with ARAR
		necessary for remaining contamination.
Corrective Action Cleanup Standards Policy - UST and CERCLA Sites	UAC R311-211	Initially, steps must be taken to eliminate the source of contamination either through removal or appropriate source control. Regulation also requires establishing appropriate cleanup standards for remaining contamination.
Solid and Hazardous Waste Definitions and References	UAC R315-1	Applicable definitions and references can be found in this regulation.

TABLE 2-2 (Continued)

Regulation	Citation	Compliance with ARAR
Identification and Listing of Hazardous Waste	UAC R315-2	Wastes generated during the remedial actions must be identified and listed as hazardous wastes, as appropriate. This includes soils excavated for off-site disposal.
Hazardous Waste Generator Requirements	UAC R315-5	All activities that generate hazardous waste must comply with this regulation. This includes excavation of soils for off-site disposal.
Hazardous Waste Transporter Requirements	UAC R315-6	All activities associated with transporting hazardous wastes must comply with this regulation. This includes manifesting, record-keeping, and discharge clean-up requirements.
Requirements for Hazardous Waste Facilities - General Facility Standards	UAC R315-8-2	Hazardous waste facilities (for on-site stabilization and excavation activities) must be constructed in accordance with this regulation.
Preparedness and Prevention	UAC R315-8-3	Hazardous waste facilities must be designed, constructed, maintained, and operated in accordance with these requirements.
Contingency Plan and Emergency Procedures	UAC R315-8-4	A Contingency Plan must be developed and implemented for remedial action activities.
Manifest System, Recordkeeping, and Reporting	UAC R315-8-5	All hazardous wastes generated and transported off-site must be manifested in accordance with this regulation.
Groundwater Protection	UAC R315-8-6	Groundwater will be included as part of the Undeveloped Lands OU. Therefore, compliance with this ARAR will be addressed under the activities for that OU.
Closure and Post Closure	UAC R315-8-7	If contaminated soils above PRGS will remain in place, actions must be taken to prevent dermal and ingestion exposure and contaminant transport. Groundwater will be included as part of the Undeveloped Lands OU, therefore, compliance with this ARAR as it pertains to groundwater will be addressed under the activities for that OU.
Use and Management of Containers	UAC R315-8-9	All management of containers holding hazardous waste must be in accordance with this subpart. This includes containers used for handling hazardous wastes during on-site stabilization operations and storing excavated soils prior to disposal.
Waste Piles	UAC R315-8-12	Establishes requirements for waste piles to prevent contaminant migration to adjacent subsurface soil, groundwater, or surface water. Measures include installation of appropriate liners and leachate collection systems.

Landfills	UAC R315-8-14	Where groundwater contamination is not considered a threat, placement of a permeable cover over contaminated soil, and the imposition of appropriate management controls, can be considered a hybrid landfill closure.
Cleanup and Risk-Based Closure Standard	UAC R315-101	Allows closure of facilities to risk based standards. Appropriate site management, such as corrective action, post closure care, and institutional controls, is required based on identified levels of risk.
Emergency Control Requirements	UAC R315-9	A Contingency Plan must be developed and implemented for remedial action activities.
Ground Water Quality Protection Rule	UAC R317-6	Groundwater will be included as part of the Undeveloped Lands OU. Compliance with this ARAR will be addressed under the activities for that OU. Removal of contaminated soil from the ROU would promote protection of groundwater.

TABLE 2-3
Summary of Compliance with Location-Specific ARARs

Regulation	Citation	Compliance with ARAR
FEDERAL:		
National Historic Preservation Act	36 CFR Part 800 40 CFR Part 6.301(b) 16 USC Section 470	Any undertakings on sites listed or eligible for listing on the National Register of Historic Places must comply with these requirements.
Archaeological and Historic Preservation Act	40 CFR Part 6.301(c) 16 USC Section 469	If any remedial activity will cause irreparable loss or destruction of significant cultural resources, data recovery sand preservation activities must be conducted in accordance with these requirements.
General Facility Standards - Location Standards	40 CFR Part 264.18	Hazardous waste management units must be located in accordance with this regulation. This includes on-site stabilization and excavation activities.
STATE:		
General Facility Standards - Location Standards	UAC R315-8-2.9	Hazardous waste management units must be located in accordance with this regulation. This includes on-site stabilization and excavation activities.

TABLE 2-4
Summary of To Be Considered (TBC) Regulations and Guidance

Regulation	Citation	Compliance with ARAR
Clarification to the 1994 Revised Interim Soil Lead	OSWER Directive	Office of Solid Waste and Emergency Response (OSWER) recommends that the

Guidance for CERCLA Sites and RCRA Corrective Action Facilities	#9200.4-27P August 1998	integrated exposure uptake and biokinetic (IEUBK) model be used as the primary tool to generate risk-based soil cleanup levels at lead sites for current or future residential land use. In selecting management strategies, it is OSWER's preference to seek early risk reduction with a combination of engineering controls (actions which permanently remove or treat contaminants, or create reliable barriers to mitigate the risk of exposure) and non-engineering response actions (such as education and health intervention programs). As a given project progresses, OSWER recognizes the NCP preference for permanent remedies and emphasizes selection of engineering over non-engineering remedies for long-term response actions.
Centers for Disease Control and Prevention (CDC) guidance for determining soil lead action levels	"Preventing Lead Poisoning in Young Children", CDC, October 1991	CDC recommends that there should be no more than a 5 percent chance that children aged 0 to 3 have blood lead levels higher than 10 µg/dL.

Appendix B
Detailed Cost Estimate

Attachment 2
FLAGSTAFF / DAVENPORT SMELTERS
CAPITAL COST ESTIMATE

Assumption Sheet

Residential lots

1. Residential lots which have received "no further action" letters from USEPA will not be included for remediation.
2. Only residential lots with sampling data that indicate surface and subsurface soil lead or arsenic concentrations greater than 600 and 126 mg/kg, respectively, will be included for remediation.
3. Residential lots without sampling data will not be handle on a case-by-case basis, and will not be included in this phase of the remediation.
4. Steeply sloped areas will not be remediated.
5. The fraction of sloped area, flat area with native vegetation, and flat area with non-native vegetation are based on aerial photos, topographic maps, field notes, and recollection of geologists who sampled the sites.
6. At the Alta Academy, 1/3 of the lot is paved parking lots and buildings, and only 1/4 of the soft landscape will be remediated (estimated based on sampling data).
7. Density of soil, including top soil and fill, is assumed 1.6 ton/yd^3 (average dry density with 10% moisture). Mixed grained sand ranged from 99 lb/ft^3 to 116 lb/ft^3, dry; *Fundamentals of Geotechnical Analysis*, Figure 18-1, 1980.

Roads and driveways

8. All roads and driveways at the ROU are paved.
9. All paved roads and driveways in good conditions will not be remediated.
10. All paved roads damaged during material hauling will be reconstructed with 6-inch base course and 4-inch asphalt. Assume that only North Cottonwood Rd. at the Flagstaff Smelter site will need to be reconstructed.
11. Density of concrete and asphalt is 125 lb/ft^3.

Landscaping

12. The average lot at the Davenport Smelter Site consists of a 2000 ft^2 for the house footprint and 700 ft^2 (20 ft x 35 ft) for the driveway footprint.
13. The average lot at the Flagstaff Smelter Site consists of a 3500 ft^2 for the house footprint and 2000 ft^2 (20 ft x 100 ft) for the driveway footprint.
14. All residential lots having a house have a fence which extends across the full width of the back yard, extends half way up the side yard and connects from the property line to the house (70% of the perimeter of the lot). Each fence has one gate.
15. All residential lots with a house requiring remediation will have the sod and irrigation systems replaced base on the size of the non-native vegetated area to be remediated.
16. Fifteen 3-inch caliber trees will be planted per 10,000 ft^2 of excavated land.
17. Thirty 5-gallon shrubs will be planted per 10,000 ft^2 of excavated land.
18. Half of the residential lots requiring remediation have sheds that must be removed and replaced with new structures.

Poor Quality Source Document

The following document images have been scanned from the best available source copy.

To view the actual hard copy, contact the Superfund Records Center at (303) 312-6473.

Davenport and Flagstaff Smelters

Property Size, Depth of Contamination, Area and Volume of Contaminated Soil

	Contamination								Depth to remediate (inches)	Number of Lot to Remediate	Perimeter (ft)	Area (ft^2)	House, Driveway, and Parking Lot (ft^2)	Total Area of Soft Landscape (ft^2)	Fraction Sloped	Fraction Flat, Native Vegetated	Fraction Flat, Non-Navtive Vegetated	Area Steeply Sloped (ft^2)
	Lead above 600 mg/kg (ppm)				Arsenic above 126 mg/kg (ppm)													
	Surface	0" to 6"	6" to 12"	12" to 18"	Surface	0" to 6"	6" to 12"	12" to 18"										
Davenport Smelter Area																		
9808 Little Cottonwood Lane	Y	Y	Y	Y	Y	N	N	N	18	1	789	32,900	2,700	30,200	60%	0%	40%	18,120
3535 Little Cottonwood Lane	Not sampled, access not obtained.																	
9756 Quail Ridge Road	Y	Y	Y	Y	N	N	N	N	18	1	530	18,000	2,700	15,300	0%	0%	100%	-
9744 Quail Ridge Road	Not sampled, access not obtained.																	
9726 Quail Ridge Road	Y	Y	Y	Y	N	N	Y	N	18	1	565	19,100	2,700	16,400	30%	0%	70%	4,920
9712 Quail Ridge Road	Y	Y	Y	Y	N	N	N	N	18	1	529	16,800	2,700	14,100	25%	0%	75%	3,525
9696 Quail Ridge Road	Y	Y	Y	N	N	N	Y	N	12	1	602	20,100	2,700	17,400	30%	0%	70%	5,220
9682 Quail Ridge Road	Y	Y	Y	N	N	N	N	N	12	1	677	28,700	2,700	26,000	0%	20%	80%	-
9687 Quail Ridge Road	Y	Y	Y	N	N	N	N	N	12	1	624	23,900	2,700	21,200	0%	20%	80%	-
9701 Quail Ridge Road	Not sampled, access not obtained.																	
9715 Quail Ridge Road	Letter of no further action issued.																	
9733 Quail Ridge Road	Not sampled, access not obtained.																	
9753 Quail Ridge Road	Letter of no further action issued.																	
3587 Little Cottonwood Lane	Y	Y	Y	Y	N	N	N	N	18	1	804	33,300	2,700	30,600	0%	0%	100%	-
3597 Little Cottonwood Lane	Not sampled, access not obtained.																	
3623 Little Cottonwood Lane	Letter of no further action issued.																	
3641 Little Cottonwood Lane	Letter of no further action issued.																	
3660 Little Cottonwood Lane	Letter of no further action issued.																	
3658 Little Cottonwood Lane	Not sampled, access not obtained.																	
3695 Little Cottonwood Lane	Letter of no further action issued.																	
3698 Little Cottonwood Lane	Letter of no further action issued.																	
9745 Little Cottonwood Place	Letter of no further action issued.																	
9767 Little Cottonwood Place	Y	Y	Y	N	N	N	N	N	12	1	618	24,200	2,700	21,500	0%	20%	80%	-
9764 Little Cottonwood Place	Letter of no further action issued.																	
9752 Little Cottonwood Place	Letter of no further action issued.																	
3736 Little Cottonwood Lane	Letter of no further action issued.																	
3652 Little Cottonwood Lane	Letter of no further action issued.																	
9775 Old Ranch Place	Letter of no further action issued.																	
9750 Old Ranch Place	Letter of no further action issued.																	
9756 Old Ranch Place	Y	Y	Y	Y	Y	Y	Y	Y	18	1	575	21,400	2,700	18,700	20%	40%	40%	3,740
3626 Little Cottonwood Lane	N	Y	Y	N	N	N	N	N	12	1	471	14,800	2,700	12,100	0%	0%	100%	-
3515 Little Cottonwood Lane	Y	Y	Y	Y	Y	Y	Y	Y	18	1	523	16,500	2,700	13,800	0%	30%	70%	-
3594 Little Cottonwood Lane	Y	Y	Y	Y	Y	Y	Y	Y	18	1	684	26,200	2,700	23,500	0%	15%	85%	-
3568 Little Cottonwood Lane	Y	Y	N	Y	N	N	N	N	18	1	850	27,900	2,700	25,200	0%	25%	75%	-
9795 Little Cottonwood Lane	Letter of no further action issued.																	
9815 Little Cottonwood Lane	Letter of no further action issued.																	
3541 Little Cottonwood Canyon Road	Letter of no further action issued.																	
3601 Little Cottonwood Canyon Road (Alta Academy 3601 and 3611)	Y	N	Y	Y	N	N	N	N	18	1	2,370	225,600	75,200	150,400	0%	0%	25%	-
Flagstaff Smelter Area																		
3710 North Little Cottonwood Road	Y	Y	Y	Y	N	N	N	N	18	1	1,152	73,600	5,500	68,100	25%	50%	25%	17,025
3660 North Little Cottonwood Road	Y	Y	Y	Y	Y	Y	Y	Y	18	1	1,404	106,700	5,500	101,200	35%	0%	65%	35,420
3750 North Little Cottonwood Road	Y	Y	Y	Y	Y	Y	N	N	18	1	857	35,600	5,500	30,100	50%	0%	50%	15,050
3656 North Little Cottonwood Road	Y	Y	Y	Y	Y	Y	Y	Y	18	1	1,423	67,200	5,500	61,700	33%	33%	34%	20,361
3744 North Little Cottonwood Road	Letter of no further action issued.																	
3742 North Little Cottonwood Road	Letter of no further action issued.																	
3529 North Little Cottonwood Road	Y	Y	no data	no data	N	N	no data	no data	18	1	1,015	58,300	5,500	52,800	0%	100%	0%	-
Total										**20**	**17,062**	**890,800**	**140,500**	**750,300**				**123,381**

Notes:

NV = Native Vegetated Area
NNV = Non-Native Vegetated Area
NA = Not Applicable

Density of soil, including topsoil and fill, is assumed 1.6 ton/yd^3.
Density of concrete and asphalt is 125 lb/ft^3.

Davenport and Flagstaff Smelters

Property Size, Depth of Contamination, Area and Volume of Contaminated Soil

	Area to Remediate		Alternative 2							Alternative 3						
	Flat, Native Vegetated (ft^2)	Flat, Non-Native Vegetated (ft^2)	Excavate Non-Native Vegetaed Area (ft^2)	Excavate Non-Native Vegetaed Area (ton)	Hand Excavate Native Vegetated Area (ft^2)	Hand Excavate Native Vegetated Area (ton)	Total Excavate (ton)	Topsoil 6" (ton)	Fill below 6" (ton)	Excavate Non-Native Vegetaed Area (ft^2)	Excavate Non-Native Vegetaed Area (ton)	Soil Cover Native Vegetated Area (ft^2)	Soil Cover Native Vegetated Area (ton)	Total Excavate (ton)	Topsoil 6" (ton)	Fill below 6" (ton)
Davenport Smelter Area																
9808 Little Cottonwood Lane	-	12,080	12,080	1,074	-	-	1,074	358	716	12,080	1,074	-	-	1,074	358	716
3535 Little Cottonwood Lane																
9756 Quail Ridge Road	-	15,300	15,300	1,360	-	-	1,360	453	907	15,300	1,360	-	-	1,360	453	907
9744 Quail Ridge Road																
9726 Quail Ridge Road	-	11,480	11,480	1,020	-	-	1,020	340	680	11,480	1,020	-	-	1,020	340	680
9712 Quail Ridge Road	-	10,575	10,575	940	-	-	940	313	627	10,575	940	-	-	940	313	627
9696 Quail Ridge Road	-	12,180	12,180	722	-	-	722	361	361	12,180	722	-	-	722	361	361
9682 Quail Ridge Road	5,200	20,800	20,800	1,233	5,200	308	1,541	770	770	20,800	1,233	5,200	154	1,233	770	616
9687 Quail Ridge Road	4,240	16,960	16,960	1,005	4,240	251	1,256	628	628	16,960	1,005	4,240	126	1,005	628	503
9701 Quail Ridge Road																
9715 Quail Ridge Road																
9733 Quail Ridge Road																
9753 Quail Ridge Road																
3587 Little Cottonwood Lane	-	30,600	30,600	2,720	-	-	2,720	907	1,813	30,600	2,720	-	-	2,720	907	1,813
3597 Little Cottonwood Lane																
3623 Little Cottonwood Lane																
3647 Little Cottonwood Lane																
3667 Little Cottonwood Lane																
3681 Little Cottonwood Lane																
3695 Little Cottonwood Lane																
3698 Little Cottonwood Lane																
9751 Little Cottonwood Place																
9767 Little Cottonwood Place	4,300	17,200	17,200	1,019	4,300	255	1,274	637	637	17,200	1,019	4,300	127	1,019	637	510
9764 Little Cottonwood Place																
9752 Little Cottonwood Place																
3736 Little Cottonwood Lane																
3652 Little Cottonwood Lane																
9751 Old Ranch Place																
9759 Old Ranch Place																
9756 Old Ranch Place	7,480	7,480	7,480	665	7,480	665	1,330	443	887	7,480	665	7,480	222	665	443	443
3626 Little Cottonwood Lane	-	12,100	12,100	717	-	-	717	359	359	12,100	717	-	-	717	359	359
3515 Little Cottonwood Lane	4,144	9,656	9,656	858	4,144	368	1,227	409	818	9,656	858	4,144	123	858	409	572
3594 Little Cottonwood Lane	3,525	19,975	19,975	1,776	3,525	313	2,089	696	1,393	19,975	1,776	3,525	104	1,776	696	1,184
3568 Little Cottonwood Lane	6,300	18,900	18,900	1,680	6,300	560	2,240	747	1,493	18,900	1,680	6,300	187	1,680	747	1,120
9795 Little Cottonwood Lane																
9815 Little Cottonwood Lane																
354 Little Cottonwood Canyon Road																
3601 Little Cottonwood Canyon Road (Alta Academy 3601 and 3611)	-	37,600	37,600	3,342	-	-	3,342	1,114	2,228	37,600	3,342	-	-	3,342	1,114	2,228
Flagstaff Smelter Area																
3710 North Little Cottonwood Road	34,050	17,025	17,025	1,513	34,050	3,027	4,540	1,513	3,027	17,025	1,513	34,050	1,009	1,513	1,513	1,009
3660 North Little Cottonwood Road	-	65,780	65,780	5,847	-	-	5,847	1,949	3,898	65,780	5,847	-	-	5,847	1,949	3,898
3750 North Little Cottonwood Road	-	15,050	15,050	1,338	-	-	1,338	446	892	15,050	1,338	-	-	1,338	446	892
3656 North Little Cottonwood Road	20,361	20,978	20,978	1,865	20,361	1,810	3,675	1,225	2,450	20,978	1,865	20,361	603	1,865	1,225	1,243
3744 North Little Cottonwood Road																
3742 North Little Cottonwood Road																
3529 North Little Cottonwood Road	52,800	-	-	-	52,800	4,693	4,693	1,564	3,129	-	-	52,800	1,564	-	1,564	-
Total	**142,400**	**371,719**	**371,719**	**30,694**	**142,400**	**12,251**	**42,945**	**15,233**	**27,711**	**371,719**	**30,694**	**142,400**	**4,219**	**30,694**	**15,233**	**19,680**

Davenport and Flagstaff Smelters

Property Size, Depth of Contamination, Area and Volume of Contaminated Soil

	Landscaping			
	Trees	Shrubs	Sod and irrigation syst. (ft^2)	Fencing (ft)
Davenport Smelter Area				
9808 Little Cottonwood Lane	18	36	12,080	552
3535 Little Cottonwood Lane				
9756 Quail Ridge Road	23	46	15,300	371
9744 Quail Ridge Road				
9726 Quail Ridge Road	17	34	11,480	396
9712 Quail Ridge Road	16	32	10,575	370
9696 Quail Ridge Road	18	37	12,180	421
9682 Quail Ridge Road	31	62	20,800	474
9687 Quail Ridge Road	25	51	16,960	437
9701 Quail Ridge Road				
9715 Quail Ridge Road				
9733 Quail Ridge Road				
9753 Quail Ridge Road				
3587 Little Cottonwood Lane	46	92	30,600	563
3597 Little Cottonwood Lane				
3623 Little Cottonwood Lane				
364 Little Cottonwood Lane				
366 Little Cottonwood Lane				
368 Little Cottonwood Lane				
3695 Little Cottonwood Lane				
3698 Little Cottonwood Lane				
9751 Little Cottonwood Place				
9767 Little Cottonwood Place	26	52	17,200	433
9764 Little Cottonwood Place				
9752 Little Cottonwood Place				
3736 Little Cottonwood Lane				
3652 Little Cottonwood Lane				
9754 Old Ranch Place				
9759 Old Ranch Place				
9756 Old Ranch Place	11	22	7,480	403
3626 Little Cottonwood Lane	18	36	12,100	330
3515 Little Cottonwood Lane	14	29	9,656	366
3594 Little Cottonwood Lane	30	60	19,975	479
3568 Little Cottonwood Lane	28	57	18,900	595
9795 Little Cottonwood Lane				
9815 Little Cottonwood Lane				
3541 Little Cottonwood Canyon Road				
3601 Little Cottonwood Canyon Road (Alta Academy 3601 and 3611)	56	113	37,600	1,659
Flagstaff Smelter Area				
3710 North Little Cottonwood Road	26	51	17,025	806
3660 North Little Cottonwood Road	99	197	65,780	983
3750 North Little Cottonwood Road	23	45	15,050	600
3656 North Little Cottonwood Road	31	63	20,978	996
3744 North Little Cottonwood Road				
3742 North Little Cottonwood Road				
3529 North Little Cottonwood Road	-	-	-	711
Total	**556**	**1,115**	**371,719**	**11,945**

Existing Roads

Street Names	Length *ft*	Width *ft*	Depth *in*	Removal and *Replacement*	Area *sq ft*	Volume *cu ft*	Weight *ton*	Road Base 6" *cu yd*	Asphalt 4" *ton*
Davenport Smelter Area									
Little Cottonwood Ln.	1,550	20	10	0%	-	-	-	-	-
Old Ranch Pl.	180	20	10	0%	-	-	-	-	-
Little Cottonwood Pl.	230	20	10	0%	-	-	-	-	-
Quail Ridge Rd.	540	20	10	0%	-	-	-	-	-
Flagstaff Smelter Area									
North Little Cottonwood Rd.	1,550	15	10	100%	23,250	19,375	1,211	431	484
Total					23,250	19,375	1,211	431	484

Flagstaff / Davenport Smelters
Capital Cost Estimate - Alternative 2

	Item	Description	Units	Unit Cost	Notes	Quantity Alt.2	Extension Alt.2
Residential Lots	1	Utility Coordination	Per House	$3,200	1	20	$64,000
	2	Remove Fences	ft	$4.24	1	11,945	$50,647
	3	Clear and Grub Trees	Each	$620	5	556	$344,720
	4	Excavate Soil Residential Lots, in Non-Native Vegetated Areas	Ton	$5.30	1	30,694	$162,677
	5	Hand Excavate Soil Residential Lots, in Native Vegetated Areas	Ton	$25	2	12,251	$306,267
	6	Transport Soil from Residential Lots to Subtitle C Landfill	Ton	$25	3	42,945	$1,073,613
	7	Disposal of Contaminated Soil from Residential Lots at Subtitle C landfill (include stabilization)	Ton	$96.50	3	42,945	$4,144,145
	8	Haul, Place Top Soil to Residential Lots	Ton	$20	2	15,233	$304,663
	9	Haul, Place Clean Soil to Residential Lots	Ton	$16	5	27,711	$443,382
	10	Erosion Control	Sq ft	$0.34	4	-	$0
	11	Geocomposite Liner 1/4"	Sq ft	$0.69	2	-	$0
Roads	12	Remove Concrete, Rock, Asphalt	Ton	$26	5	1,211	$31,484
	13	Transport Concrete, Rock, Asphalt to Class I or Subtitle C Landfill	Ton	$12.50	3,9	1,211	$15,137
	14	Disposal of Concrete, Rock, Asphalt at Class I or Subtitle C landfill	Ton	$32.50	3,9	1,211	$39,355
	15	Haul, Place Road Base	Cu yd	$67	5	431	$28,847
	16	Asphalt Paving	Ton	$412	5	484	$199,563
Landscaping	17	Replace Fences	ft	$24	5	11,945	$286,680
	18	Remove and Replace Fence Gates	Each	$310	5	20	$6,200
	19	Remove and Replace Sheds	Each	$7,200	5	10	$72,000
	20	Trees (3-inch caliber trees)	Each	$550	2,7	556	$305,800
	21	Shrubs	Each	$41	5	1,115	$45,715
	22	Sod	Sq ft	$0.46	2	371,719	$170,991
	23	Replace Irrigation Systems	Sq ft	$0.77	7	371,719	$286,224
	24	Landscaping, Bedlines, Rock, Mulching, etc.	Lot	$15,000	8	20	$300,000
	25	Health & Safety Ambient Air Monitoring	LS	$20,000	2	1	$20,000
	26	Final Site Wide Clean-up	LS	$53,000	1	1	$53,000

Total Cost	$8,755,108
Mobilization (10%)	$875,511
Demobilization (3%)	$262,653
Subtotal	$9,893,273
Unidentified Construction Cost (10%)	$989,327
Construction Management (10%)	$989,327
TOTAL	$11,871,927

Notes
1 Jacob Smelter FFS with 3% inflation for two years
2 RSMeans Environmental Remediation Cost Data 2000; (cost)*(0.89 cost index)*(1.03 inflation)
3 Safety Kleen
4 North American Green, VMax C350
5 Jacob Smelter engineering design estimate
6 Salt Lake Valley Landfill
7 RSMeans Site Work & Landscape Cost Data, 2001
8 Engineer estimate
9 For a conservative estimate, costs for Subtitle C Landfill were used. Transportation and disposal at a Class I landfill will cost $13/ton less (about $15,700 less for this alternative).

Unit prices include material, labor and equipment.

Flagstaff / Davenport Smelters
Capital Cost Estimate - Alternative 3

	Item	Description	Units	Unit Cost	Notes	Quantity Alt.3	Extension Alt.3
Residential Lots	1	Utility Coordination	Per House	$3,200	1	20	$64,000
	2	Remove Fences	ft	$4.24	1	11,945	$50,647
	3	Clear and Grub Trees	Each	$620	5	556	$344,720
	4	Excavate Soil Residential Lots, in Non-Native Vegetated Areas	Ton	$5.30	1	30,694	$162,677
	5	Hand Excavate Soil Residential Lots, in Native Vegetated Areas	Ton	$25	2	-	$0
	6	Transport Soil from Residential Lots to Subtitle C Landfill	Ton	$25	3	30,694	$767,346
	7	Disposal of Contaminated Soil from Residential Lots at Subtitle C landfill (include stabilization)	Ton	$96.50	3	30,694	$2,961,954
	8	Haul, Place Top Soil to Residential Lots	Ton	$20	2	19,452	$389,048
	9	Haul, Place Clean Soil to Residential Lots	Ton	$16	5	19,680	$314,879
	10	Erosion Control	Sq ft	$0.34	4	-	$0
	11	Geocomposite Liner 1/4"	Sq ft	$0.69	2	142,400	$98,256
Roads	12	Remove Concrete, Rock, Asphalt	Ton	$26	5	1,211	$31,484
	13	Transport Concrete, Rock, Asphalt to Class I or Subtitle C Landfill	Ton	$12.50	3,9	1,211	$15,137
	14	Disposal of Concrete, Rock, Asphalt at Class I or Subtitle C landfill	Ton	$32.50	3,9	1,211	$39,355
	15	Haul, Place Road Base	Cu yd	$67	5	431	$28,847
	16	Asphalt Paving	Ton	$412	5	484	$199,563
Landscaping	17	Replace Fences	ft	$24	5	11,945	$286,680
	18	Remove and Replace Fence Gates	Each	$310	5	20	$6,200
	19	Remove and Replace Sheds	Each	$7,200	5	10	$72,000
	20	Trees (3-inch caliber trees)	Each	$550	2,7	556	$305,800
	21	Shrubs	Each	$41	5	1,115	$45,715
	22	Sod	Sq ft	$0.46	2	371,719	$170,991
	23	Replace Irrigation Systems	Sq ft	$0.77	7	371,719	$286,224
	24	Landscaping, Bedlines, Rock, Mulching, etc.	Lot	$15,000	8	20	$300,000
	25	Health & Safety Ambient Air Monitoring	LS	$20,000	2	1	$20,000
	26	Final Site Wide Clean-up	LS	$53,000	1	1	$53,000

Total Cost	$7,014,523
Mobilization (10%)	$701,452
Demobilization (3%)	$210,436
Subtotal	$7,926,411
Unidentified Construction Cost (10%)	$792,641
Construction Management (10%)	$792,641
TOTAL	$9,511,693

Notes
1 Jacob Smelter FFS with 3% inflation for two years
2 RSMeans Environmental Remediation Cost Data 2000; (cost)*(0.89 cost index)*(1.03 inflation)
3 Safety Kleen
4 North American Green, VMax C350
5 Jacob Smelter engineering design estimate
6 Salt Lake Valley Landfill
7 RSMeans Site Work & Landscape Cost Data, 2001
8 Engineer estimate
9 For a conservative estimate, costs for Subtitle C Landfill were used. Transportation and disposal at a Class I landfill will cost $13/ton less (about $15,700 less for this alternative).

Unit prices include material, labor and equipment.

Table 2-A
Present Cost of Construction, Operation, Maintenance, and Monitoring
Alternative 2 - Excavation/Disposal

Year	Capital Cost	Annual Monitoring Cost	Annual Maintenance Cost	Subtotal Annual Expenditures	Discount Factor 7%	Present Worth[b]
0	$11,871,927			$11,871,927	1.000	$11,871,927
1		$6,370	$0	$6,370	0.935	$5,953
2		$6,370	$0	$6,370	0.873	$5,564
3		$6,370	$0	$6,370	0.816	$5,200
4		$6,370	$0	$6,370	0.763	$4,860
5		$6,370	$0	$6,370	0.713	$4,542
6		$6,370	$0	$6,370	0.666	$4,245
7		$6,370	$0	$6,370	0.623	$3,967
8		$6,370	$0	$6,370	0.582	$3,707
9		$6,370	$0	$6,370	0.544	$3,465
10		$6,370	$0	$6,370	0.508	$3,238
11		$6,370	$0	$6,370	0.475	$3,026
12		$6,370	$0	$6,370	0.444	$2,828
13		$6,370	$0	$6,370	0.415	$2,643
14		$6,370	$0	$6,370	0.388	$2,470
15		$6,370	$0	$6,370	0.362	$2,309
16		$6,370	$0	$6,370	0.339	$2,158
17		$6,370	$0	$6,370	0.317	$2,017
18		$6,370	$0	$6,370	0.296	$1,885
19		$6,370	$0	$6,370	0.277	$1,761
20		$6,370	$0	$6,370	0.258	$1,646
21		$6,370	$0	$6,370	0.242	$1,538
22		$6,370	$0	$6,370	0.226	$1,438
23		$6,370	$0	$6,370	0.211	$1,344
24		$6,370	$0	$6,370	0.197	$1,256
25		$6,370	$0	$6,370	0.184	$1,174
26		$6,370	$0	$6,370	0.172	$1,097
27		$6,370	$0	$6,370	0.161	$1,025
28		$6,370	$0	$6,370	0.150	$958
29		$6,370	$0	$6,370	0.141	$895

Present Worth of Capital Cost	$11,872,000
Present Worth of O&M Cost	$78,000
Total Present Worth (30 Years)	$11,950,000

Note:
[a] Discount rate of 7% and inflation rate of 0% were based on guidance from Section 4.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000. Discount factor = 1/(1+Discount Rate^(Year)).
[b] Present Worth = Annual expenditures x Inflation Factor x Discount Factor. Inflation Factor = 1.
Cost rounded to the closest $1000.
Assume that Year 0 is the year 2002.

Alternative 2
Itemized Operation and Maintenance Cost

Soil Cover:	-	sq ft	Total Annual O&M Cost:	$6,370
Excavation:	514,119	sq ft		
Institutional Control:	-	sq ft		

Table 2-B Monitoring Summary Reports - Annual

Description	Unit	Quantity per Event	Frequency (Events per Year)	Unit Cost	Total	Source	Notes
Other Direct Charges (ODC)							
Site Visit (Round Trip)	Visit	1	1	$100	$100	URS	One per visit
Per Diem	Days	2	1	$80	$160	URS	2 day per person per visit
Reproduction	Page	250	1	$0.10	$25	URS	10 copies, 25 pages per copy
Postage / Packaging	Package	3	1	$20	$60	FedEx	Express Mail / FedEx
ODC Subtotal					$345		
Labor Charges							
Project Management (PM)	Hour	12	1	$120	$1,440	URS	PM labor rate
Onsite Labor	Hour	16	1	$76	$1,212	URS	1 persons, 2 days, 8-hr/day each/geologist rate
Offsite labor	Hour	24	1	$68	$1,635	URS	1 person, 3 days, 8hr/day/chemist rate
Offsite Drafting/Graphics	Hour	16	1	$62	$991	URS	1 person, 2 days, 8hr/day/CADD operator rate
Offsite Support	Hour	16	1	$44	$712	URS	Office clerical staff rate
Labor Subtotal					$5,991		
Contingency Allowance		10%		$345	$35		
Annual Cost					$6,370		

Table 3-A
Present Cost of Construction, Operation, Maintenance, and Monitoring
Alternative 3 - Excavation/Disposal and
Soil Cover of Native Vegetated Areas

Year	Capital Cost	Annual Monitoring Cost	Annual Maintenance Cost	Subtotal Annual Expenditures	Discount Factor [a] 7%	Present Worth [b]
0	$9,511,693			$9,511,693	1.000	$9,511,693
1		$13,092	$3,615	$16,707	0.935	$15,614
2		$13,092	$3,615	$16,707	0.873	$14,592
3		$13,092	$3,615	$16,707	0.816	$13,638
4		$13,092	$3,615	$16,707	0.763	$12,746
5		$13,092	$3,615	$16,707	0.713	$11,912
6		$13,092	$3,615	$16,707	0.666	$11,132
7		$13,092	$3,615	$16,707	0.623	$10,404
8		$13,092	$3,615	$16,707	0.582	$9,724
9		$13,092	$3,615	$16,707	0.544	$9,087
10		$13,092	$3,615	$16,707	0.508	$8,493
11		$13,092	$3,615	$16,707	0.475	$7,937
12		$13,092	$3,615	$16,707	0.444	$7,418
13		$13,092	$3,615	$16,707	0.415	$6,933
14		$13,092	$3,615	$16,707	0.388	$6,479
15		$13,092	$3,615	$16,707	0.362	$6,055
16		$13,092	$3,615	$16,707	0.339	$5,659
17		$13,092	$3,615	$16,707	0.317	$5,289
18		$13,092	$3,615	$16,707	0.296	$4,943
19		$13,092	$3,615	$16,707	0.277	$4,620
20		$13,092	$3,615	$16,707	0.258	$4,317
21		$13,092	$3,615	$16,707	0.242	$4,035
22		$13,092	$3,615	$16,707	0.226	$3,771
23		$13,092	$3,615	$16,707	0.211	$3,524
24		$13,092	$3,615	$16,707	0.197	$3,294
25		$13,092	$3,615	$16,707	0.184	$3,078
26		$13,092	$3,615	$16,707	0.172	$2,877
27		$13,092	$3,615	$16,707	0.161	$2,689
28		$13,092	$3,615	$16,707	0.150	$2,513
29		$13,092	$3,615	$16,707	0.141	$2,348

Present Worth of Capital Cost	$9,512,000
Present Worth of O&M Cost	$205,000
Total Present Worth (30 Years)	$9,717,000

Note:

[a] Discount rate of 7% and inflation rate of 0% were based on guidance from Section 4.0 of "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study", EPA 2000. Discount factor = 1/(1+Discount Rate^(Year)).

[b] Present Worth = Annual expenditures x Inflation Factor x Discount Factor. Inflation Factor = 1.

Cost rounded to the closest $1000.

Assume that Year 0 is the year 2002.

Alternative 3
Itemized Operation and Maintenance Cost

Soil Cover:	142,400	sq ft	Total Annual O&M Cost:	$16,707
Excavation:	371,719	sq ft		
Institutional Control:	-	sq ft		

Table 3-B Soil Monitoring - Annual Sampling

Description	Unit	Quantity per Event	Frequency (Events per Year)	Unit Cost	Total	Source	Notes
Subcontractor Cost							
Laboratory Analysis	Each	4	1	$287	$1,148		See Notes 1 and 2
Subcontractor Subtotal					$1,148		
Other Direct Charges							
Sample Shipping	Each	1	1	$110	$110	FedEx	Per cooler, including insurance
Instrumental Rental	Week	1	1	$3,240	$3,240	Hazco	XRF analyzer
Travel (Round Trip)	Visit	1	1	$100	$100	URS	One per visit
Per Diem	Days	2	1	$80	$160	URS	1 days, 2 persons per visit
ODC Subtotal					$3,610		
Labor Charges							
Project Management (PM)	Hour	1	1	$120	$120	URS	PM labor rate
Onsite Labor	Hour	20	1	$76	$1,515	URS	2 persons, 1 days, 10-hr/day each/geologist rate
Offsite Support	Hour	4	1	$44	$178	URS	Office clerical staff rate
Labor Subtotal					$1,813		
Contingency Allowance		10%		$4,758	$476		
Annual Cost					$7,047		

Notes:
1. Analysis for total lead and arsenic by ICP and leachable lead by TCLP, including 1 field duplicate.
2. Collect 1 sample per 5000 sq ft that were soil covered; and sent 10% to the lab for analysis.
3. Collect 5 sample per hour.

Table 3-C Periodic Maintenance - Annual

Description	Unit	Quantity per Event	Frequency (Events per Year)	Unit Cost	Total	Source	Notes
Other Direct Charges (ODC)							
Repair Supplies	Lump Sum	1	1	$250	$250	Engineer estimate	Drums, clean soil, grass sod, hand tools, etc.
Repair Equipment, Rental	Lump Sum	1	1	$750	$750	Engineer estimate	Bobcat loader, fertilizer spreader, etc.
Per Diem	Days	4	1	$80	$320	URS	2 person, 2 days per person per visit
ODC Subtotal					$1,320		
Labor Charges							
Project Management (PM)	Hour	1	1	$120	$120	URS	PM labor rate
Onsite Labor	Hour	16	1	$31	$503	Means	1 person, 2 days, 8hr/day/labor rate
Onsite Supervision	Hour	20	1	$68	$1,363	URS	1 person, 2 days, 10 hr/day/geologist rate
Offsite Support	Hour	4	1	$44	$178	URS	Office clerical staff rate
Labor Subtotal					$2,163		
Contingency Allowance		10%		$1,320	$132		
Annual Cost					$3,615		

Notes:
1. Maintenance is estimated to occur annually after the first year
2. Maintenance labor will consist of on laborer supervised by a chemist/soil scientist for 2 days
3. Maintenance will include excavating contaminated soil, replacing with clean soil, and replanting sod.

Table 3-D Monitoring Summary Reports - Annual

Description	Unit	Quantity per Event	Frequency (Events per Year)	Unit Cost	Total	Source	Notes
Other Direct Charges							
Reproduction	Page	1000	1	$0.10	$100	URS	10 copies, 100 pages per copy
Postage / Packaging	Package	3	1	$20	$60	FedEx	Express Mail / FedEx
ODC Subtotal					$160		
Labor Charges							
Project Management (PM)	Hour	12	1	$120	$1,440	URS	PM labor rate
Offsite Labor	Hour	40	1	$68	$2,726	URS	1 person, 5 days, 8hr/day/chemist rate
Offsite Drafting/Graphics	Hour	16	1	$62	$991	URS	1 person, 2 days, 8hr/day/CADD operator rate
Offsite Support	Hour	16	1	$44	$712	URS	Office clerical staff rate
Labor Subtotal					$5,869		
Contingency Allowance		10%		$160	$16		
Annual Cost					$6,045		

Appendix C
Responsiveness Summary

Responsiveness Summary:

The Proposed Plan for the Davenport and Flagstaff Smelter Superfund Site, Residential Operable Unit was issued for public comment on June 10, 2002. The comment period ran through July 10, 2002. Upon request from the community, the comment period was extended until August 22, 2002. The Proposed Plan identified Alternative 3: Excavation of Soil Under Non-Native Vegetation and Soil Cover Around Native Vegetation, as the preferred alternative. Written comments received during the comment period are listed in this section along with agency responses and how the ROD addresses the comments. A public meeting for receiving comments on the proposed plan was held June 20, 2002 at the Granite Elementary School, in Sandy. All comments received during the meeting were recorded and are addressed in this section. A copy of the transcript for the meeting can be found in the Administrative Record.

Written Comments:

1. Comment received June 25, 2002

Having reviewed the Proposed Plan for the Davenport and Flagstaff Smelters Superfund Site, and having attended the public meeting of June 20 at Granite Elementary School, my wife and I are in agreement with the proposed plan (Alternative 3) and want it implemented forthwith. It is now eleven years since the soil contamination was first identified to us. By any standard, it is time to do something about it.

Our property and the adjourning home sites seem to be the center of contamination on the south side of Little Cottonwood Creek. I therefore request that cleanup begin with my property. You will find us cooperative with all reasonable efforts to cleanup our property.

Response: UDEQ and EPA recognize that the time it has taken to resolve the concerns regarding the contaminated soil associated with the Davenport and Flagstaff Smelters site has inconvenienced affected property owners. UDEQ and EPA commit to make all reasonable efforts to get this site cleaned up as soon as possible. The order in which properties will be cleaned up will be based on the construction practices necessary to complete the whole project as quickly as possible. It is likely that several properties will be undergoing remedial activities simultaneously. Every attempt will be made to remediate all affected properties as soon as possible.

2. Comment Received June 21, 2002

I have attended two meetings in the past but will be unable to attend the upcoming meeting June 10th and would appreciate a written response. It is my understanding that any action on personal property will be discussed in advance with the owner and a course of action will be agreed to prior to work commencing, true? I would like a better definition of terms relating to

1. What are considered "native plants"
2. What is involved in cleaning the inside of homes
3. The scope of future monitoring
4. What devices will be placed inside some homes

5. Identify what are "institutional controls" and when will we get a "clean bill of health" on the property?

I'm also wondering, and I guess doubting, that your organization will be able to return the property to its current condition and am wondering where, how, and for how long will the landowner be able to submit additional costs related to the project (if at all). In what forum will disputes be settled? As you are aware owners in this community have spent countless hours and money in landscape and related appearance of homes, is there a guarantee attached to your work? Are you bonded to perform? As trees and other "native vegetation" fail to prosper potentially as part of the disruption, how will these cases be handled.

Thanks for your consideration, I know from the meetings that I've attended that you genuinely care about this project and want a good outcome but success is not assured in my mind. So thanks again I'll be out of town but will find access to my email so please respond in that fashion.

Response: Prior to any remedial action UDEQ and EPA along with an environmental design contractor will meet with each property owner to go over the best way to meet the remedial action objectives for each property. Property owner input will be incorporated into the remedial design for each property. Construction activities will not commence until the property owner has had a chance to review and approve the remedial design.

In order to perform cost-estimates all areas that had been sodded or heavily landscaped were considered to be non-native vegetation. Native vegetated areas are those areas that do not contain sod, and/or contain substantial natural oak brush stands and pine trees. Property owners will have input on which areas of a property are to be considered native vegetation.

After the completion of construction activities all residences will undergo a thorough cleaning of the interior to remove any residual dust generated during the cleanup process.

During construction activities, air monitoring devices will be placed around the construction perimeter to ensure that airborne contaminants are maintained at safe levels. It is unlikely that monitoring devices will be placed in any homes. In addition to air monitoring devices, strict dust regulations will be enforced during construction activities.

After all construction activities are completed, institutional controls may be placed on areas where residual contamination remains following excavation and backfill such as in the rootballs of native vegetation and below the 18 inch excavation depth. The purpose of institutional controls is to limit exposure to contaminated soil not removed from the property. Institutional controls may consist of building restrictions, environmental easements, county ordinances, or education of property owners. The need for institutional controls will be determined on a property by property basis. Since some contamination may remain at individual properties following cleanup, EPA and UDEQ must conduct reviews every five years to ensure that the remedy remains protective of human health and the environment. After clean up activities have concluded property owners will receive a letter from EPA explaining

what remedial activities have taken place, and indicating that the remedial action is complete. It will also explain whether land use controls are necessary for the property.

A licensed, bonded environmental construction firm will be selected to perform cleanup activities. The construction firm will be expected to provide guarantees of their work. The utmost care will be taken to preserve the extensive landscaping and natural beauty associated with this area.

3. Comment received June 27, 2002

Thanks for your efforts on the proposed clean up of this site. Having two children ages 3 and 5, I would like to make the comment that I would like this cleaned up as soon as possible.

Response: Comment noted.

4. Comment received July 8, 2002

We applaud your agencies efforts to provide a safe and clean environment for our neighborhood now, and for its future generation. Identification and cleanup of toxic materials such as lead and arsenic tailings from previously contaminated sites is precisely the purpose of the Superfund. We are in agreement with your assessment and support cleanup of the affected areas.

On review of the map on page 7 of your Proposed Plan, we noticed that it is not totally inclusive of our property. Our address is XXXXXXXXX. Your map shows only the northern most portion of our property. The property continues south (on the west side of Little Cottonwood Lane) to Little Cottonwood Canyon Road. This area was tested and included in your previous maps. It was found to have significant concentrations of lead and arsenic. Therefore, we would like to have it considered for inclusion for remediation.

The alternative 2-Excavation and Disposal Plan is our preferred cleanup choice because it has the same construction timeframe, but is more comprehensive and the capital cost is only marginally higher that Alternative 3. However, we also support the Alternative 3 plan and find it acceptable.

Please contact us if you have any questions or if we can assist you in the future.

Response: The figure on page 7 of the proposed plan inaccurately reflects the property boundaries of your property. The entirety of your property that poses a risk to human health and the environment is being proposed for remedial action. Based in part on public comments on the Proposed Plan, EPA and UDEQ have decided to implement Alternative 2 rather than Alternative 3.

5. Comment received July 10, 2002

Our comments on the proposed plan for the Davenport and Flagstaff Smelters Superfund Site described in your May 2002 report follow:

1. The administrative record says that the model used to come up with the lead and arsenic action levels has in the past, over predicted the risk to children at several western mining sites, and lists the Sandy, Murray, and Bingham Smelters as examples where risk was over-estimated (other western sites were also listed).

    a. To what degree was risk over-estimated and how did it become known it was over-estimated?

Response: At many mining and smelting sites in Region 8 we have the opportunity to collect blood lead data from individual children as well as environmental data from potential lead sources which they may be exposed to. By comparing these actual blood lead levels to the blood lead levels predicted by the IEUBK model (based on the environmental data), we can evaluate the accuracy and reliability of the model results. As discussed in the Baseline Risk Assessment report, comparisons between actual and predicted blood lead levels at a number of mining and smelting sites in Utah and Colorado suggest that the IEUBK model consistently predicts higher blood lead levels than are actually observed. The degree of difference varies depending on the soil lead concentrations and the blood lead concentrations measured at the specific site.

    b. Is the model's tendency for over estimating risk due to the model being inappropriate for Utah mining sites, or because input to the model was too conservative?

Response: There may be a number of reasons for the differences between the measured and predicted blood lead results. One factor may be the geographical area within which we assume a child younger than seven years of age is exposed to contaminated media. Current EPA policy is to assume that the individual home and yard represent the area within which a child receives his or her primary exposure over this seven-year period. Therefore, the inputs to the IEUBK model are the soil, house dust, paint and water data from the child's home. However, we know that children can spend quite a bit of time away from home leading to either an increase or a decrease in exposure. It is difficult, however, to collect data, which accurately reflects a child's true environment. Another factor may be the default values used as inputs into the IEUBK model, such as the soil ingestion rate. The original inputs to the IEUBK model were developed in the 1980's when soil ingestion studies where in there infancy. Since that time, the state of science has progressed. The most recent soil ingestion studies suggest that the inputs to the IEUBK model should be lower by a factor of 2-3 (Calbrese et al, 1989; Davis et al, 1990; Calabrese et al, 1997). Behavior may also be a factor when differences between measured and predicted blood lead levels occur. Different children can be exposed to identical amounts of lead in soil, yet have markedly different blood lead levels. A limitation of the IEUBK model is that it is not able to factor behavioral differences, such as mouthing activity, into the calculations.

c. Has there been an estimate of the increased construction costs due to the over estimation of risk?

Response: A comprehensive blood-lead study was not performed, therefore any statements pertaining to over estimation of risk are speculation only.

2. Superfund is reportedly out of money, or will be by 2003. Funding is being withheld from numerous projects already on the NPL. We want to see this project get funded and completed, but we assume the higher the estimated cost, the harder it will be to get the money, particularly now that superfund is depleted. If the action levels currently proposed are too conservative, they are probably driving up the estimated cost. We know DEQ and EPA are concerned about project costs since costs were why Alternative 3 was selected over Alternative 2. To what degree are the project's remediation costs sensitive to the action levels selected (e.g., double the action levels, cut the cost in half)?

Response: The trust fund that is sometimes called Superfund was established and replenished by the Superfund tax. That tax expired in 1995 and was not renewed. However, Congress has continued to appropriate monies for Superfund clean ups using a combination of the trust fund and general revenue. Doubling the action levels at this site (i.e., the lead cleanup going from 600 mg/kg to 1200 mg/kg) would not significantly change the cost of remediation as the lead levels found at this site for those properties requiring clean up are considerably above those action levels. In addition, the main driver for the cost for the remediation is the cost of disposal of the characteristic hazardous wastes. Raising the Action level would not appreciably reduce the amount of material that will need to be disposed of as a hazardous waste.

3. The following issues pertain to whether the action levels for the Davenport-Flagstaff site have been set too low, and as a result, risk has been overestimated, because the model was not calibrated to local conditions (i.e., were assumptions, not data, used in calculations, and were the assumptions too conservative):

    a. The Proposed Plan says lead and arsenic action levels were established based on site-specific conditions. It further states human health risks were calculated by analyzing indoor dust samples. Are these statements accurate? Aside from site-specific soil concentrations, it appears most other values used in calculating the action levels were based on assumptions. Data from indoor dust sampling was actually disregarded.

Response: Indoor dust samples were collected from 11 residences within the Davenport/Flagstaff area. Because dust samples were not collected from all of the residences, a linear regression was performed between the yard soil samples and the house dust samples to quantitate a soil to dust relationship for the remaining homes. The type of regression is also used to back calculate preliminary remediation goals (PRGs). We were unable to find a significant correlation between the site-specific soil and house dust samples. This may have

been because of the small sample size, In lieu of an adequate site-specific correlation, we used the soil to dust correlation from the nearby Bingham Creek site in Utah. Both the Risk Assessment and the PRGs were developed using the soils to dust correlation from the Bingham Creek site.

b. In public meetings DEQ has said blood samples collected from neighborhood children who volunteered to be tested, as well as samples of groundwater from local perched groundwater tables from the Davenport/Flagstaff site, do not evidence elevated levels of lead or arsenic. The administrative record doesn't discuss this matter (that we could find). We believe the matter should be investigated and not just chalked up to a statistical aberration due to the small sample size. It should be possible to get the data needed to be statistically valid. Wide spread residential development has existed on the site for over 20 years. Discussion in the administrative record says the model results are more accurate if calibrated to actual conditions and experience.

Response: No blood lead studies have been conducted for children or adults residing in the Davenport/Flagstaff area. In response to community concerns, the Salt Lake Health Department has offered any concerned citizen the opportunity to have their blood tested for elevated lead concentrations. It is our understanding that none of these tests were positive. UDEQ and EPA have not received any results from these tests. Water from one of the springs located along the hillside west of Quail Ridge Road was sampled during sampling activities related to the Remedial Investigation. A local perched aquifer is believed to be the source of the spring water. The results for this sampling can be found in the Administrative Record, document number 3003. Ground water will be further evaluated as part of the non-residential operable unit.

c. The administrative record says there is a lack of correlation between lead concentrations in indoor dust and outdoor soil for samples collected and analyzed for the Davenport-Flagstaff site. The record also states "the lack of correlation may suggest that soil is not an important source of lead in indoor dust". Since this premise was considered unreasonable, the data were subsequently ignored when calculating the action levels. We don't know how sensitive the calculated action levels are to indoor dust, but if it is significant, the following should be considered.
    1) It seems to us that either the samples were collected incorrectly, or the sample size was not large enough, or, in Davenport-Flagstaff area "soil is not an important source of lead in indoor dust". Our opinion is you need to make sense of the data even if it requires additional sampling.
    2) The models calculations for the Davenport-Flagstaff site are based on there being a correlation between lead concentrations in indoor dust and outdoor soil. In fact the model used the correlation from the Bingham site because "it was the most conservative". Correlations form other Utah sites (even one in Sandy) were not used because the Bingham site had the steepest curve. To what

degree did using the Bingham data versus the other less conservative data impact action levels.

Response: We agree that the lack of correlation observed between lead concentration in house dust and outdoor soul may have been a function of the small sample size. It is unlikely that the problem was sample collection, since the methodology used is recommended by ASTM and approved by both UDEQ and EPA. We agree that the use of a surrogate soil to dust relationship introduces uncertainty into the risk estimates and PRG calculations. However, we feel that the amount of uncertainty is relatively small. For example, if the soil to dust relationship for Sandy City was used instead, a PRG of 400 mg/kg, for example, would become 500 mg/kg. However, if the soil to dust relationships for Midvale were used the PRG would drop below 400 mg/kg if one considered the high contribution of non-yard sources to the indoor dust levels. The magnitude of uncertainty should be taken into consideration when deciding whether or not additional sampling is worthwhile.

d. The administrative record presented action levels based on a second model (called the ISE model). The ISE model calculated a lead action level of 980 mg/kg versus the 600 mg/kg value recommended using the IEUBK model. Was the "Bingham dust correlation" used in the ISE model to arrive at 980 mg/kg? Why was the ISE model not used for the action levels DEQ recommended? Is using the IEUBK model, plus the "Bingham dust correlation", a case of adding conservatism to conservatism?

Response: The ISE model, which is a probabalistic version of the IEUBK model, used the same soil to dust correlation from the Bingham Creek site. At present, the ISE model has not been officially approved by the EPA and is considered an investigative tool, which is why the PRG estimated by the ISE model was not selected. The results of the ISE model were provided for perspective, to be weighed against the available information.

4. Pertaining to the statement that "institutional controls such as easements, building permit restrictions, deed restrictions, public awareness, and access restrictions will be evaluated for use at the site". Statement is too open-ended and does not really define what is intended. Please define with examples. We note that institutional controls export remediation costs to homeowners' via lowered property values.

    a. Define the specific constraints which are being considered, as well as what contaminant conditions will trigger the application of the constraints, so they can be part of the public record and review process.

Response: Institutional controls that have been used at other sites within the state have included deed notices, easements, building permit restrictions, local government ordinances, and community education programs. Every effort will be taken during the design of the project to limit the impact of institutional controls on properties and property owners. The exact form of institutional control for each property has not been determined at this time. The constraints for each property will be triggered by what contamination is left in place.

b. To what depth will detailed in-place sampling define lead and arsenic concentrations, and will that play a role in the institutional controls that are being considered?

Response: Detailed real time sampling will be used during the design phase to more closely define the horizontal and vertical extent of contamination for each property. Institutional controls will be required only on those properties where an evaluation of residual contamination after cleanup activities suggests that controls are warranted.

c. Six-inches of cover is used in Alternative #3, 18 inches in Alternative #2, will more stringent institutional controls be required in the 6-inch case versus the 18-inch case?

Response: The institutional controls would likely be the same. However, areas where material has been excavated to 18 inches would be more likely to have most, if not all, of the contaminated soil removed and would not need to be subject to institutional controls.

5. Pertaining to "areas containing native vegetation":

a. By "native" vegetation, do you mean only trees and oak brush? What about shrubs and native ground cover-type plants? Please specifically define what types of vegetation will not be replaced, if any, be they native or non-native.

Response: The Feasibility study considered all areas that had been sodded or heavily landscaped as non-native vegetation. Native vegetated areas are those areas that do not contain sod, and /or contain substantial natural oak brush stands and pine trees. Contaminated soils in native vegetation areas requiring remediation will be hand excavated, where necessary, to a maximum depth of 18 inches. All non-native vegetation in areas requiring remediation will be removed and replanted after excavation and backfilling with clean soil and topsoil. Excavation in non-native vegetation areas will be to a maximum of 18 inches unless principal threat waste is found beneath 18 inches. Contaminated soils around oak brush stands and pine trees in native vegetation areas will be hand excavated. After hand excavation the native vegetation areas will be replanted with a native seed mix. Properties will be left in, or returned to, as close to original condition as possible.

b. Won't covering the root crown of trees hurt them, even if it is just 6-inches?

Response: The soil capping described in Alternative 3 would be placed in three separate 2-inch lifts spread over a period of several months to allow the plants to adapt. However, EPA and UDEQ have decided to implement alternative 2, which involves removal of soil around native plants that will remain in place.

6. Alternatives 2 and 3 are academic to a degree in that they cannot be applied strictly as defined to our property. Certain issues can only be resolved during detailed design. Examples are:

a. We have native vegetation immediately adjacent to two sides of our house. Adding 6-inches of soil would effect drainage next to the house. May also effect the house itself by over-topping window and/or siding which would be unacceptable.
b. We have small areas of sloped hillside that may be too steep to hold 6-inches of fill (note: this is minor on our lot compared to others in the area).
c. Excavating 18-inches would require bracing small trees, or else they'd fall over, literally dozens of small trees (2-inch diameter or smaller).
d. In some areas of our property it would be acceptable, if contaminated to just add 18 inches to start with, and avoid the expense of first excavating and then replacing the 18-inches. We would expect to be able to trade some of these cost savings for added costs in other areas.
e. Because of trees, access to our back yard precludes the use of back hoes and trucks.

Response: All of these issues will be resolved with extensive property owner input during the design phase. Before construction can commence, each property owner must review and approve of the design for their property.

7. DEQ stated in the June 20, 2002 public hearing, when asked why La Montagne was not included in the ROU, that "La Montagne only had a couple of bad spots, but they agreed to fence them, and therefore, were not included in the ROU". We assume this means they will avoid institutional controls and being placed on the NPL. Is this option available to all property owners?

Response: It was determined that the amount of risk at La Montagne did not rise to the level where EPA would consider taking action. The level of contamination and the area covered were minor. The La Montagne Homeowners Association agreed to enact and enforce institutional controls on the La Montagne Condominiums. The controls they agreed to enact consisted of fencing of the contaminated area, posting signs describing the risks associated with the areas and notifying all the home owners of the risks associated with the contamination and steps to take to avoid exposure. The properties considered for clean up at the Davenport/Flagstaff site contain significantly higher levels of contamination over a much greater area than the La Montagne Condominiums

8. The administrative record contains several examples of properties that have had lead concentrations exceeding the lead action level, but which none-the-less received an "No Further Action" letter. Some of the lead sampling data dates form 1992/94 (note: the Proposed Plan only acknowledges "extensive sampling" in 1998 and 2001). Please explain the criteria used for the properties which had lead levels above the action level, but which received "No Further Action" letters.

Response: The properties, which had lead levels above the action level but which received "No Further Action" letters contained small areas of contaminated soil slightly above the action levels or far enough below ground surface that there was no significant health risk.

9. What is DEQ's course of action for properties that did not allow access for sampling?

Response: During remedial activities, property owners that did not allow UDEQ and EPA access to sample will be given an opportunity to have their properties sampled and remediated, if necessary.

10. You estimated a construction period of 6-months to clean up 20 lots. Contractors should be allowed a maximum of 3 to 4 consecutive weeks construction time per lot, start to finish. Contractor working hours should also be controlled.

Response: UDEQ will provide extensive oversight of the remedial contractor to ensure that community concerns are met during construction activities.

11. We understand funding is already in place for detailed design which will commence in September 2002 and be completed by December 2002, and will be based on comprehensive in-place sampling for lead and arsenic. We also understand detailed design will involve DEQ working closely with the property owners.

Response: Comment Noted

6. Comment Received July 8, 2002

My wife and I have been absent form the State for 3 years (June 27, 1991 to July 3, 2002). I would appreciate a 30-day extension to review the files and data, discuss the proposal with EPA/UDEQ personnel, evaluate the alternative, and prepare a response. This was not possible during our 3-year absence.

Response: Upon the request of members of the community the comment period was extended to August 22, 2002. A notice of this extension was published in the Deseret News and the Salt Lake Tribune Monday July 22,2002.

7. Comment Received July 11, 2002

The following is a response to your letter regarding the Flagstaff Smelter Superfund Site proposed plan for the property XXXXXX in Sandy, Utah. There has been co-operation with your team for approximately 10 years awaiting resolution, with the expectation of a clear title to the property with no restriction when this matter is over. At this point none of the proposed options are acceptable for this property. This property is uniquely different and thus an individually unique solution is required. We would be happy and available to meet with you regarding this as soon as possible. It is our goal to support you and to obtain a clear title in a way we both agree in a swift and timely manner. We look forward to hearing from you soon.

Response: UDEQ and EPA recognize that the majority of the properties in the Davenport Flagstaff area will require individually unique and creative remedial solutions. Every attempt will be made during the design process to minimize the impact to the natural

beauty associated with this area. UDEQ and EPA will also work closely with property owners to remediate contaminated areas with as little impact to the property as possible. Following remediation, properties will be evaluated to determine if residual contamination necessitates the use of institutional controls.

8. **Comment received August 11, 2002 (This letter contained several pages of comments. The comments are summarized below. The complete text of the letter can be found in the Administrative Record, Document # 9068).**

   Comment: EPA and UDEQ should fully cooperate with and support the XXXXX in immediately and voluntarily removing any contamination, receiving a "no further action" letter, and having their home deleted from this Proceeding.

   Response: Neither EPA nor UDEQ will prevent property owners from cleaning up contamination on their property voluntarily. In order for EPA and UDEQ to issue a "no further action" or "clean" letter, the contamination must be removed and disposed of in a manner that is protective of human health and the environment under EPA and UDEQ oversight. In order to ensure that any removal is done in a manner consistent with the superfund process the property owner must submit a remedial design and a construction completion report to EPA and UDEQ for approval. The remedial design must, at a minimum, document the extent of contamination to be excavated, describe how the contamination will be removed, staged and characterized for disposal, describe surface water run-on and run-off controls and describe how confirmation samples will be collected to ensure that the entire extent of the contaminated material has been removed. The clean up must satisfy regulatory standards for environmental remediation (e.g., management and disposal of waste material, storm water runoff control, fugitive dust controls and worker health and safety.) The construction completion report must document the remedial work that took place and contain the results of the confirmation and characterization samples along with documentation of the final disposition of the contaminated soil. Any property owner who follows the process described above to demonstrate contamination has been sufficiently removed and no longer poses a risk would be eligible for a "no further action" letter similar to those that were sent to property owners within the ROU that owned property with minimal contamination that did not pose a risk.

   Comment: The XXXXX property should be cleaned up by the excavation and removal of all contaminated soil, even if the land is designated as "native vegetation" at least with regard to the XXXXXX property, the preferred Alternative 3 is a "cover-up" not a "clean up" and is inferior to excavation and removal of contaminated soil.

   Response: Upon re-evaluating the action alternatives in accordance with the nine criteria including community acceptance, EPA and UDEQ have chosen Alternative 2, Excavation and Disposal as the selected remedy for the Davenport and Flagstaff Smelters site.

   Comment: All of the XXXXX property should be designated as non-native vegetation for purposes of the plan.

Response: Property owners will be consulted during the remedial design to determine the extent of native and non-native vegetation for each property.

Comment: If UDEQ and EPA nevertheless decide to classify portions of XXXXXX home as "native vegetation," then those areas should still be cleaned by the excavation and removal of all contaminated soil, rather than by putting a mere six-inch cap on the ground.

Response: The selection of Alternative 2, Excavation and Disposal, as the remedy for this site will allow for all properties to be excavated to a maximum depth of 18" in contaminated areas. Areas of "native vegetation" will be hand excavated in order to minimally disturb the natural landscape. Some contaminated soil may remain at depths greater than 18" and in the root balls of trees.

Comment: Alternative 3 does not adequately protect human health from the risks EPA and UDEQ have identified.

Response: Both alternatives 2 and 3 greatly reduce exposure to contaminated soil associated with the Site and both are therefore protective. The affected community has shown overwhelming support for Alternative 2. Alternative 2 has been chosen as the selected remedy for the Site.

Comment: As discussed above, Alternative 3 is less than protective of human health and the environment in the long-term and a less permanent solution than Alternative 2.

Response: EPA and UDEQ recognize that Alternative 2 is more effective, long-term, than Alternative 3. This was an important consideration in choosing Excavation and Disposal as the selected remedy.

Comment: Alternative 3 results in less reduction of mobility of contaminants than Alternative 2, is not more effective in the short term and will not be cheaper in the long term than Alternative 2..

Response: Alternative 2, Excavation and Disposal, has been chosen as the selected remedy.

Comment: The community is unlikely to support Alternative 3 once the agencies spell out the institutional controls that they will likely demand.

Response: The community has expressed greater support for Alternative 2 than Alternative 3. Alternative 2, Excavation and Disposal, has been chosen as the selected remedy. However, even under Alternative 2 institutional controls may be needed on some properties where contamination remains below 18" or in the root balls of trees in native vegetation.

Comment: After the XXXX property has been cleaned by excavation and removal of contaminated soil to a depth of eighteen inches, there will be no need for institutional controls.

Response: Under the selected remedy institutional controls may be required for properties where contaminated soil remains after construction. After construction has been completed an evaluation of residual risk will be conducted for each property to determine what (if any) institutional controls are necessary to prevent human exposure to residual contamination left in place.

Comment: The Plan's failure to define the relevant institutional controls violates CERCLA, is contrary to EPA's own policy guidance, and violates the Due Process Clause of the Fifth and Fourteenth Amendments.

Response: EPA and UDEQ complied with CERCLA, the National Contingency Plan (NCP), and EPA guidance in developing and selecting the remedy. EPA and UDEQ followed EPA guidance in the preparation of the Proposed Plan in particular, "A guide to Preparing Superfund Proposed Plans, Records of Decision and Other Remedy Selection Decision Documents, EPA 540-R-98-031" and " Institutional Controls: A Site Managers Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups EPA 540-F-00-005". In cases where contamination remains after a remedial action the NCP recognizes that institutional controls may be a necessary component of the completed remedy (40 CFR 300.430(a)(ii)(D)). As part of the selected remedy an evaluation of residual risk will be conducted for each property to determine what (if any) institutional controls are necessary to prevent human exposure to residual contamination left in place. These controls may include environmental easements, deed notices, local government ordinances and/or community education. Property owners will be consulted before institutional controls are implemented.

Comment: The Plan's failure to define "native vegetation" raises similar vagueness concerns.

Response: The Feasibility Study considered all areas that had been sodded or heavily landscaped as non-native vegetation. Native vegetated areas are those areas that do not contain sod, and /or contain substantial natural oak brush stands and pine trees. Contaminated soils in native vegetation areas requiring remediation will be hand excavated, where necessary, to a maximum depth of 18 inches. All non-native vegetation in areas requiring remediation will be removed and replanted after excavation and backfilling with clean soil and topsoil. Excavation in non-native vegetation areas will be to a maximum of 18 inches unless principal threat waste is found beneath 18 inches. Contaminated soils around oak brush stands and pine trees in native vegetation areas will be hand excavated. After hand excavation the native vegetation areas will be replanted with a native seed mix. Properties will be left in, or returned to, as close to the condition they were in proper to excavation as possible. During remedial design property owners will provide input on the extent of native and non-native vegetation on each property.

9. Comment received August 26, 2002

XXXX XXXXXX XXXXXX owns undeveloped property located immediately to the east and west of Wasatch Boulevard, adjoining certain residential properties that are listed as "Property Recommended for Remediation" on Figure 2 of the Proposed Plan. It is not clear from the Proposed Plan, the December 1, 2000 Federal Register notice proposing the Site to the NPL, or the NPL Site Narrative for Davenport and Flagstaff Smelters whether the XXXXX property is considered part of the Proposed NPL Site. The Proposed Plan seems to indicate that undeveloped properties, presumably including the XXXXX property, may be addressed as a separate operable unit of the site.

If EPA and the State do intend to address the XXXX property as part of a separable operable unit, it is improper to select a remedy for the residential portions without first determining the extent of groundwater contamination and the contribution to that contamination from the residential areas. Specifically XXXX is concerned that this approach suggests that groundwater is not impacted by materials located on the residential properties, some of which would be left in place under the preferred alternative. If ground water is found to be impacted by materials associated with smelter activity, there is a good chance that a significant portion of the groundwater contamination may have been caused by irrigation of contaminated soils located on residential/developed parcels.

Although the preferred alternative set forth in the Proposed Plan may ultimately prove to be the most appropriate remedy for the residential portions of the property, XXXXX is concerned that selection of a response plan for the residential operable unit may be premature without first characterizing the impact that the residential unit has on ground water quality, and what consequences the anticipated remediation would have on addressing that contamination. XXXXXX remains willing to allow EPA and/or the State to sample its properties, subject to execution of an appropriate access agreement between XXXX and the sampling agency.

In Closing, XXXXXXX would strongly object to any attempt to impose groundwater cleanup costs on the owners of undeveloped properties without allocating a fair share to the developed properties addressed in the Proposed Plan. This is a particularly troubling possibility since the estimated costs for this first, limited action would approach $10 million and there do not appear to be any financially viable responsible parties to fund the costs of the project. XXXXXXXX therefore takes this opportunity to remind EPA and the State that it is also an innocent land owner and as such should not be looked at as a potential "deep pocket" to fund any ground water cleanup that may be associated with this site.

Response: Since there is more potential of immediate exposure on the residential properties EPA and UDEQ have chosen to move ahead with the clean up of the properties in the ROU in order to minimize exposure to contaminated soil located on residential properties. The remedy that has been selected for the Site, Excavation and Disposal, will completely remove principal threat wastes (source material). Contaminated soil in native vegetation areas requiring remediation will be hand excavated, where necessary to a

maximum depth of 18 inches. Care will be taken to remove as much soil as possible from the root systems without damaging the vegetation. Excavation in non-native areas will be to a maximum of 18 inches unless principal threat wastes is found beneath 18 inches. A minimum of 12 inches of clean soil and 6 inches of topsoil will be placed in the excavated areas. This will remove the majority of the contaminated material that could possibly contribute to any future ground water contamination. EPA as a matter of policy does not cost recover from homeowners. Any impact of material associated with smelter activity on ground water quality will be evaluated during the NROU.

Public Meeting Comments

The following comments were received during the public meeting that took place June 20, 2002. Since the question and answer period was informal, comments have been summarized to make this document more readable. The transcript from the public meeting is found in the Administrative Record.

1. **What is the estimated time line (for completing construction), knowing that you can't control it?**

Response: UDEQ and EPA are working to have this project ready for construction next year. The biggest variable that affects the time line is when funding will be available to perform the remedial action.

2. **What does State Lead mean?**

Response: A state lead project is one in which the State manages certain phases of the project, such as the remedial design and construction. EPA provides the funding for the project and management assistance when the state has the lead.

3. **Within the 20 (NPL sites) that are unfunded how would this site be ranked? Is it in the upper half or lower half?**

Response: This site would probably be ranked in the lower half of the 20 or so sites that are currently unfunded. This site is competing with sites like Eureka, Utah where lead contamination in soil has been linked with elevated blood lead levels in five percent of the children under seven, and Libby, Montana where 200 people have died from exposure to asbestos contamination.

4. **When the plan states that native vegetation will be covered with six inches of soil, does that mean that small bushes and grass will be removed and that you are just going to leave the oak trees?**

Response: Based in part on the public comments received on the Proposed Plan EPA and UDEQ have decided to implement Alternative 2, Excavation and Disposal, rather than Alternative 3.

5. **You will leave bushes, dogwood, and things like that.**

Response: We will attempt to leave as many of the trees and shrubs in the native vegetation areas as is practicable.

6. **Pages 10 and 11 of the Proposed Plan discuss long-term effectiveness and state that the long-term effectiveness of alternatives 2 and 3 will depend on both the effectiveness of implementation and institutional controls. What is meant by institutional controls and long-term monitoring?**

Response: On some of the properties requiring remediation, the contaminated soil is at depths deeper than 18 inches. Taking the top 12 to 18 inches will still leave some contaminated soil on these properties. Institutional controls are tools used by UDEQ and EPA to ensure that a remediated property remains protective of human health and the environment. Some type of control is placed on the property that helps ensure that the remediation remains effective and that contamination left in place is not disturbed. The exact nature of the institutional controls for this site has not yet been determined. Institutional controls that have been used at other sites include easements, local government enforced building permit requirements and ordinances, deed notices and community education.

7. **So institutional controls will keep people from digging more than 18 inches. I have to dig more than 18 inches to plant rose bushes. My dog digs down more than six inches to find rocks. Institutional controls are restrictions on my property for ever and ever, because you are choosing to spend two million dollars less on the project and are going to leave contamination in place. It is my understanding that you are going to come every year and see if I have messed with your work or if I have moved anything. My septic system is lower than 18 inches. I wont even be able to repair my septic system without messing with EPA standards.**

Response: In response to public comment, Alternative 2 rather than Alternative 3 has been selected for the remedy for the Site. However, even though this alternative involves more soil removal, some residual contamination may remain beneath 18" or within the root balls of native vegetation. An evaluation of risk due to residual contamination remaining after remedial action will be done for each property to assess the need for institutional controls. The exact nature of institutional controls has not yet been determined. For those properties where institutional controls are necessary UDEQ and EPA will attempt to develop controls that will be as unobtrusive to the property owners as possible.

8. **So I would have to get permission from EPA and UDEQ to make a path through scrub oak or dig down to my septic tank, and if I move dirt I would have to prove that I'm putting it in a toxic waste dump or explain what I am doing with it?**

Response: Institutional controls that have been successful at other sites describe what safety precautions must be used while handling contaminated soil and how to properly dispose of it.

9. **I think that places really heavy burdens on the property. Half of my property would be under a six inch cover and subject to institutional controls. In essence it is like placing a conservation easement on the property. That would constitute a huge drop in property value. It would diminish the rights to do anything with the property.**

Response: UDEQ and EPA are sensitive to concerns about impacts to property values. To the extent that the Superfund status of the Site has affected property values, we expect that completion of property cleanup will improve these values. Local government ordinances have been used successfully in other areas of the state and seem to have minimal impact on property values (e.g. Prospector Square, Park City). Easements are also a type of institutional control that could be used in the Davenport-Flagstaff area. . Community education is another institutional control that may be used for this site. It has not been determined what types of institutional controls will be acceptable and protective for this site. The need for institutional controls for individual properties and which controls will work the best will be evaluated during the design stage of the project. UDEQ and EPA will work closely with individual property owners in selecting designs that will limit the impact of institutional controls on individual properties.

10. Obviously, I do not favor alternative three because I think you are leaving us a big mess by not choosing alternative two and cleaning up more. I suspect that institutional controls would be less intrusive if you selected alternative two.

Response: There are some properties where there is contamination deeper than 12 – 18 inches. These properties would most likely require some type of institutional control regardless of which of the alternatives is selected. Based on the input received during the public meeting and subsequent written comments, Alternative 2 has been chosen as the selected remedy rather than Alternative 3. We hope that this will reduce the impact of institutional controls as much as possible. Alternative 3 was proposed as the preferred alternative in order to save as much of the native vegetation as possible.

11. Will you be coming out to the individual properties to talk to us or do we need to request that?

Response: Part of the design process will be to sit down with each property owner and go over the specific actions that will be required to meet the remedial action objectives for each property.

12. Is there any evidence from this particular property group that the amount of lead and arsenic is such that it proves a hazard to the health of any of the people that have or currently live in the area.

Response: As part of the risk assessment, bioavailability and speciation tests were conducted on site soils. The results of these test showed that the lead and arsenic associated with this site is highly bioavailable, or easily absorbed into the body upon ingestion.

13. Were there any children or adults with elevated blood leads?

Response: A comprehensive blood lead study of children and adults was not conducted for this site. Residents in the area were given an opportunity to have blood tests for lead and arsenic through the Salt Lake Valley Health Department. The results from these tests

were sent to the people requesting the testing. UDEQ and EPA have not received the results of any blood testing.

14. Is there any evidence showing that anyone (in the area) has been harmed or will be harmed by leaving it (the contamination) alone and letting us have our property rights?

Response: To date, there have been no elevated blood lead levels in children or adults that UDEQ and EPA have been made aware of. The soil in areas around the two smelters contain concentrations of lead and arsenic that could potentially result in adverse health affects.

15. Are we treating a disease that does not really exist and is this purely political?

Response: The purpose of the proposed remedial action is to reduce the potential exposure to known hazardous contaminants.

16. Smoking, drinking, and driving a car are all potential hazards, is this going to be money well spent?

Response: People who drink, smoke or drive willfully accept the risks associated with these activities. However, UDEQ and EPA feel that it is important to protect people, particularly children, from inappropriate risks that are imposed on them because of soil contamination where they live and play. The purpose of this remedial action is to remove the hazard associated with the contaminated soil.

17. Would it be important to investigate the correlation between blood lead and soil concentrations further?

Response: At this point, it would not be beneficial to establish a link between elevated blood lead concentrations and the concentrations of lead and arsenic in soil. Clean up levels are based on soil concentrations that are considered safe for residential use. Currently there are concentrations of lead and arsenic in soils associated with this site that could cause adverse health effects. EPA and UDEQ generally try to remove contaminated soil before adverse health effects occur, if possible.

18. Will areas of a property that do not contain lead and arsenic above the cleanup levels be removed or capped, or will they be left alone?

Response: Part of the design process will be to identify those areas of each property that will require remediation and those that can be left as is. UDEQ has tools that can provide adequate real time soil concentration data. These tools will be used to help determine the extent of the contamination for each property. Areas that do not contain soil contamination above the clean-up levels will be left alone.

19. Is there a chance that this project will never be funded? Or is there a time line where if it isn't funded, where it will be dropped off the list?

Response: Once the site is placed on the NPL it will be eligible to receive federal funding. All NPL sites are ranked and prioritized. Even if this site has a low priority, it will eventually receive funding.

20. What is leachable and what does it mean to fail TCLP?

Response: Contaminants that are easily soluble in water are described as leachable. As surface water percolates through the contaminated soil containing leachable chemicals, it dissolves the chemicals. The water can then become contaminated and transport hazardous substances into surface water and ground water sources. TCLP is an acronym for the toxicity characteristic leaching procedure. This procedure is used to determine how soluble the contaminants in soil are in a simulated landfill environment. To perform the TCLP the contaminated soil is ground up and passed through a sieve to ensure that the particles are of the same size. Slightly acidic water is allowed to trickle through the sieved soil. The water is then collected and analyzed to see if the contaminants have stayed in the soil or if they have been dissolved. There are restrictions on what can be placed in a regular landfill based on the leaching characteristics of the soil. Any soils that exhibit a TCLP value for lead or arsenic greater than 5 mg/L are considered a hazardous waste and are subject to more stringent disposal requirements.

21. Is it possible for this contamination to enter drinking water.

Response: Data from two drinking water wells near the site show that ground water is at least 400 ft below ground surface at the site. EPA and UDEQ have done some preliminary ground water modeling and it does not appear likely that ground water has been impacted or will be impacted by contaminated soil at the site. However, potential impacts to ground water, if any, will be further evaluated under the non-residential operable unit. Also, residents should understand that drinking water supplied by municipalities and water districts in the Salt Lake Valley must meet Safe Drinking Water Act requirements and is monitored frequently to ensure that it is safe.

22. There are some property owners that have discovered ground water at depths of 4 to 5 feet. How can ground water be at a depth of 400 feet if this is the case?

Response: A thorough study of the hydrogeology of the site has not been conducted at this time. There are a number of perched aquifers that underlie the site. It does not appear that these perched aquifers are connected to the principal aquifer. A number of natural springs believed to be associated with the perched aquifers were sampled as part of the Remedial Investigation. These springs did not appear to be impacted by lead or arsenic. A more thorough investigation of ground water will be conducted under the non-residential operable unit.

23. How can the soil be leachable in the laboratory but not in my yard? Is there a possibility that contaminated water could be entering Little Cottonwood Creek?

Response: The springs that were sampled did not appear to have been impacted by site contaminants. UDEQ and EPA have not been able to sample every perched aquifer or even determine their locations. Although there is a possibility that lead and arsenic contamination could be leaching into the perched aquifers and then flowing into the creek, Little Cottonwood Creek sampling to date has not shown any impact to the creek. That sampling was not particularly detailed. A more extensive study of the creek and perched aquifers is planned for the non-residential operable unit.

24. Can you explain how this soil can be leachable and bioavailable in the laboratory, yet we do not have elevated blood lead levels in the community or lead contamination in the ground water?

Response: EPA and UDEQ have not conducted a blood lead study for children and adults in the Davenport/Flagstaff area, so we cannot correlate actual blood lead values with soil contaminants. However, the lead and arsenic concentrations associated with this site are very high. They are well above concentrations that would be considered safe based on EPA's risk assessment protocols.

25. Is this the same kind of lead as has been seen in other sites where people have elevated blood lead concentrations?

Response: The lead compounds at this site are very similar to other sites in the State, but not exactly the same. This lead comes from a completely different ore body and was refined using a much more primitive smelting process. Different lead compounds have different solubility properties. Both Sharon Steel and Bingham Creek, sites with similar lead compounds, have shown a correlation between lead contaminated soil and elevated blood lead concentrations.

26. Was the blood lead sampling that was performed done in a manner that would provide a statistically significant representation of what was there?

Response: The blood lead testing that was done in the Davenport/Flagstaff area was not part of a statistically based study. Blood lead testing was offered to concerned citizens who wanted to find out if they or their children had been exposed to lead and arsenic. It was not statistically based in any way. UDEQ and EPA were not involved in the blood lead testing and were not given any results from these tests.

27. So there could be children with elevated lead levels that have not been tested?

Response: Yes, that could be the case. We have not been informed of any children who have elevated blood-lead levels. However, the blood lead testing that has been done, to date, has not been comprehensive. UDEQ and EPA would prefer to clean up this contamination before there are children with elevated blood-lead levels.

28. The smelter site outside of Aspen, Colorado, convened a special scientific group to evaluate the EPA's findings. This group prepared a report on their findings. Would it be appropriate for the community here to have something similar to that available here?

Response: UDEQ and EPA would like the impacted community to be as informed as possible. EPA offers a grant called a Technical Assistance Grant to help communities become more informed and wade through all the technical reports so that they can make more informed decisions. UDEQ and EPA have reviewed the Aspen report that was mentioned and agree that the information contained therein is useful in evaluating lead sites. However, the conclusions made by that report may not be applicable to this site. For more information on TAG grants, feel free to contact Mr. Dave Alison at (801) 536-4479.

29. Will using a Technical Assistance Grant slow the process down or keep it off the NPL list?

Response: The community applying for and receiving a Technical Assistance Grant will not impact the timeline for getting this site listed and eligible for funding.

30. Would it be beneficial to separate the two sites since their concerns are different?

Response: No. We are going to consider all affected residential areas to be one site in order to move ahead with the project. The smelter areas are actually very similar. The contamination is the same and the approach to the design and cleanup is the same. Consolidating the two areas will reduce design and equipment mobilization costs.

31. Why has it been decided to clean up the residential properties and not the non-residential properties when they butt up against each other.

Response: Since there is more potential of immediate exposure on the residential properties, UDEQ and EPA are going to adress them first.

32. During the cleanup process dust will be created. What will be done to ensure the residential properties that have just been cleaned will not become re-contaminated.

Response: There is always the possibility of dust generation during construction activities. UDEQ and EPA have been involved in several residential cleanups in the state. Both EPA and UDEQ require intensive dust control restrictions during construction activities to minimize exposure and re-contamination due to dust dispersion. The cleanup contractor will also be required to provide storm water run-on and run-off controls for any stockpiled material to further reduce contaminant migration.

33. Could the existing sod or grass (non-native vegetation) be considered as a cap for the contamination underneath?

Response: The current non-native vegetation may be currently functioning as a cap and reducing exposure. However, if this contaminated soil is not cleaned-up, there is no guarantee that it will remain capped, nor is there any mechanism to ensure that contaminated soil does not end up being used in a way that would greatly increase exposure.

34. If I wanted to put a swimming pool in, would I be able too, or would I be prohibited because I would have to dig down further than 18 inches?

Response: Excavation to 18 inches will remove all of the contaminated soil over the majority of the site. Every attempt possible will be made during the remedial design and the cleanup to minimize the impact of institutional controls on the properties that may contain contaminated soil at depths greater than 18 inches. Institutional controls would not likely prevent the construction of a swimming pool, but there may be certain requirements dictating how the work is done and how excavated soil would need to be managed. Such projects must also comply with building permit requirements of local governments.

35. If sampling has only been conducted down to 18 inches, how is it known that the contamination is deeper than 18 inches.

Response: Sampling has been performed as deep as 46 inches on some properties. This sampling, which does not provide us with knowledge regarding the whole site, identified some areas where contamination is deeper than 18 inches.

36. How can we as land owners buy off on a plan like this without understanding what all the ramifications are going to be?

Response: The alternatives developed in the Feasibility Study and presented to the public in the Proposed Plan are general approaches to address site cleanup. The purpose of the public comment period is for the agencies to be made aware of what the public concerns are with regards to these approaches. UDEQ and EPA are responding to these concerns and comments in the Record of Decision. Specific plans for each property will be developed during the design phase of the project. Both agencies will work with the property owners during the design phase and during the clean up to accommodate concerns.

37. Aren't there restrictions already in place? If I wanted to put a pool on my property wouldn't I have to work with UDEQ and EPA since my property has already been listed for action?

Response: Institutional controls relating to environmental contaminants are not yet in place at the Site. Although a building permit from the local government may be required to install a pool, UDEQ and EPA would not prevent a property owner from obtaining one. However, such construction activities on a property could affect how the cleanup would be done. Knowing that there is lead and arsenic contamination here does make disposal of

any soil excavated from properties within this site problematic. Municipal landfills may not take it and it may have to be disposed of as a hazardous waste.

38. Did any of the remedies looked at contain a total cleanup that would have removed all of the contaminated soil so that restrictions would not be necessary?

Response: The Record of Decision allows for the removal of up to 18 inches of contaminated soil. Removal of the top 12 – 18 inches of soil and replacing with clean fill and top soil will not only remove the majority of the contamination, but also act as a barrier to any contaminated soil that remains underneath. Excavating deeper than 18 inches in localized areas where principal threat waste is identified will also be conducted.

39. Will property owners be given the option of having more material removed so that there would not be any controls, even though it might be more expensive?

Response: Except where principal threat wastes are identified, UDEQ and EPA plan to limit the removal depth to 18 inches. EPA and UDEQ will evaluate each property carefully to assess the need for institutional controls following the clean up.

40. It appears that there may still be restrictions on our property. Can property owners decide that they don't want their properties cleaned up?

Response: Property owners must give EPA and UDEQ access to their property before it can be cleaned up. EPA and UDEQ will not clean up any property until the property owner has had a chance to review and approve the remedial design.

41. What will a property owners liability be if they don't have their property clean up?

Response: Of course if property owners choose not to have their property cleaned up, risks to human health and the environment will remain. If a residential property is not cleaned up EPA and UDEQ cannot issue a letter verifying cleanup. This could have an affect on property transactions. The question of liability is a legal issue which neither UDEQ nor EPA is in a position to address. The property owner should seek the advice of his own attorney with respect to this issue.

42. Would the affect on property transactions be because prospective owners are afraid of the contamination or because EPA may force them to clean it up on their own?

Response: EPA and UDEQ cannot determine why a property owner would be hesitant. It has been our experience that once a property has been cleaned up and the property has received a "clean letter" that property transactions take place without incident.

43. If a property owner refuses to let his property be cleaned up can EPA come back and require the property owner to clean it up on their own dollar?

Response: EPA has never made a homeowner clean up contamination that someone else has put there. However, once EPA cleans up an area it is unlikely that they will come back and offer to clean up properties a second time.

44. If we provide written comments, will EPA and UDEQ provide a written response?

Response: Part of the Record of Decision is a responsiveness summary that responds to all comments.

45. Can written comments influence the alternative that is selected?

Response: All comments will be responded to in the Record of Decision. Public Input on the Proposed Plan was considered in selecting Alternative 2 for the Site rather than Alternative 3.

46. Why is La Montagne not included in the Residential Operable Unit?

Response: The sampling that was performed in the La Montagne condominiums discovered minimal contamination associated with the property. La Montagne agreed to put fences around the area that contained contaminated soil, and place signs warning property owners of the problem. The La Montagne Homeowners Association agreed to enact and enforce institutional controls on the property.

47. How about La Caille? The contamination didn't go across the creek?

Response: La Caille was sampled during the spring of 2000. Contaminated soil was found in the vicinity of the vineyard. La Caille is not considered a residential property and will be investigated further during the Non-residential Operable Unit.

48. There are homes there. How come they were not included?

Response: There are two homes on the La Caille property. The homes themselves have not been sampled. They will be addressed during the Non-residential Operable Unit.

49. Will we have to be involved with them or agree with them when the Non-residential properties are cleaned up?

Response: The Non-residential Operable Unit will have to go through the same public participation/community involvement requirements that this operable unit has gone through.

50. When will design commence?

Response: The Record of Decision will be finished by the end of September 2002. Design will commence shortly after that.

51. Can some additional sampling be conducted along with the design process?

Response: UDEQ and EPA have tools at our disposal that can give accurate real time sampling results. These tools will be incorporated into the design process to more accurately determine the location of contaminated areas.