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INTERIM RECORD OF DECISION

LAVA CAP MINE SUPERFUND SITE
GROUNDWATER OPERABLE UNIT (OU2)

NEVADA COUNTY, CALIFORNIA

September 2008

United States Environmental Protection Agency
Region IX - San Francisco, California

Contents

Tables

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Acronyms and Abbreviations

AQMD	Air Quality Management District
ARARs	Applicable or Relevant and Appropriate Requirements
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COCs	contaminants of concern
ft^3/sec	cubic feet per second
cy	cubic yards
CWA	Clean Water Act
DTSC	State of California Department of Toxic Substances Control
ELCR	excess lifetime cancer risk
ERA	Ecological Risk Assessment
ESA	Endangered Species Act
ESD	Explanation of Significant Differences
FS	Feasibility Study
gpm	gallons per minute
HDPE	high-density polyethylene
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	hazard quotient
IRIS	Integrated Risk Information System
IROD	Interim Record of Decision
MCL	maximum contaminant level
$\mu g/L$	micrograms per liter (equivalent to parts per billion)
NCP	National Contingency Plan
NHPA	National Historic Preservation Act
NID	Nevada Irrigation District
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPV	Net present value
NRHP	National Register of Historic Places
O&M	operations and maintenance
OU	Operable Unit
POU	point-of-use
ppb	parts per billion
PRP	Potentially Responsible Party
RA	remedial action
RAGS	Risk Assessment Guidance for Superfund
RAOs	remedial action objectives
RCRA	Resource Conservation and Recovery Act
RfD	reference dose

RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	reasonable maximum exposure
RO	reverse osmosis
ROD	Record of Decision
RWQCB	State of California Regional Water Quality Control Board
SDWA	Safe Drinking Water Act
STLC	soluble threshold limit concentration
TAG	Technical Assistance Grant
TBC	to be considered
TCLP	toxicity characteristic leaching procedure
TTLC	total threshold limit concentration
UCL	upper confidence limit
USC	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

Part I
Declaration

Part I - Declaration

1.1 Site Name and Location

The Lava Cap Mine Superfund Site (CERCLIS ID No. CAD983618893) (the Site) is located in the Sierra Nevada foothills approximately 6 miles east of Grass Valley, Nevada County, California. The Site has been divided into four Operable Units (OUs). This Interim Record of Decision (IROD) pertains to the Groundwater Operable Unit or OU2. The Site comprises a large geographic area and therefore has been divided into different operable units as follows: the Mine Area Operable Unit (OU1), which contains the original source area; the Groundwater Operable Unit (OU2), which underlies the entire Site; and the Lost Lake/Deposition Area Operable Unit (OU3), located over 1 1/2 miles downstream from OU1, where mine tailings have traveled downstream and spread over an area approximately 7-acres in size.

1.2 Statement of Basis and Purpose

This decision document presents the Selected Interim Remedy for the Groundwater Operable Unit of the Site, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, and to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record for the Site. The State of California concurs with the Selected Interim Remedy.

1.3 Assessment of the Site

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

1.4 Description of the Selected Remedy

The Lava Cap Mine was historically operated as a hardrock gold and silver mine up until 1943. The processing of ore to extract gold and silver at the Mine Area OU produced finely ground tailings containing naturally-occurring arsenic and trace metals. The United States Environmental Protection Agency (USEPA) has designated these tailings as a principal threat waste at the Site because they are highly toxic and highly mobile, and present a significant risk should exposure occur. The tailings were disposed of in the Little Clipper Creek drainage adjacent to the mine's ore processing buildings. The Groundwater OU does not directly address principal threat wastes at the Site; however, it does address arsenic (a contaminant of concern at this Site) in the drinking water. The principal threat wastes at the Site are being addressed or will be addressed by the RA for OU1 and OU3.

This IROD is focused solely on the drinking water component of OU2, and in the future EPA will issue a final ROD for OU2 to determine whether treatment is necessary for the remaining groundwater contamination.

The Selected Interim Remedy for the Groundwater Operable Unit includes the following primary components:

- Nevada Irrigation District (NID) Water Supply: A new NID water supply pipeline will be installed into the vicinity of properties where residential wells are impacted by mine-related arsenic contamination. Direct connections to the new NID pipeline would be provided for any home where residential wells produce groundwater that exceeds the arsenic drinking water standard (known as the Maximum Contaminant Level or MCL) and they are located within the modeled footprint of potential migration pathways of mine-impacted groundwater. Although the footprint of potential mine-related contaminant migration pathways extends from the Mine Area (OU1) downgradient beyond Lost Lake (OU3), there are currently no arsenic MCL exceedances in residential wells south of Greenhorn Road.
- Land Use Notification: USEPA will work with Nevada County to develop a process to notify property owners of the potential presence of arsenic contamination if they are planning to install residential wells within the footprint of potential mine-impacted groundwater migration pathways.
- Groundwater Monitoring: An expanded groundwater monitoring network and sampling program will be implemented to further define the current extent of mine-impacted groundwater contamination and to monitor for future migration.

1.5 Statutory Determinations

The Selected Interim Remedy is protective of human health and the environment in the short term and is intended to provide adequate protection until a final ROD for the Groundwater OU2 is signed; complies with federal and state requirements that are applicable or relevant and appropriate to this limited-scope remedial action, and is cost effective. This action is an interim solution only and is not intended to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable for this OU. Because the Selected Interim Remedy does not constitute the final remedy for OU2, the statutory preference for remedies that employ treatment that reduces the toxicity, mobility, or volume as a principal element will be addressed by the final remedy for OU2. Subsequent action are planned to fully address any additional threats posed to human health or the environment by mine-related arsenic contamination in groundwater.

Because this interim remedy will result in hazardous substances remaining onsite above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment. Further, because this is an Interim ROD, review of the Site and groundwater conditions will be ongoing as USEPA continues to gather data and develop alternatives for OU2.

1.6 IROD Certification Checklist

The following information is presented in the Decision Summary section of this IROD. Additional information can be found in the Administrative Record for the Groundwater Operable Unit.

- Contaminants of concern (COCs) and their respective concentrations (see Part II, Sections 5.2 and 7.2)
- Baseline risk represented by the COCs (see Part II, Section 7)
- Cleanup levels established for the COCs and the basis for these levels (see Part II, Section 8)
- How source materials constituting principal threats are addressed (see Part II, Section 11)
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater used in the baseline risk assessment and IROD (see Part II, Sections 6 and 7)
- Land and groundwater use that will be available at the Site as a result of the selected remedy (see Part II, Section 12.4)
- 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 (see Part II, Section 12.3)
- Decisive factors that led to selecting the remedy (i.e., how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria) (see Part II, Section 12.1)

Kathleen Salyer

Kathleen Salyer, Assistant Director
Superfund Division
California Site Clean-up Branch

9/30/08
Date

Part II
Decision Summary

Part II – Decision Summary

1 Site Name, Location and Description

The subject of this Interim Record of Decision (IROD) is the Groundwater Operable Unit of the Lava Cap Mine Superfund Site. The Lava Cap Mine Superfund Site (CERCLIS ID No. CAD983618893) (the Site) is located in the Sierra Nevada foothills approximately 6 miles east of Grass Valley, Nevada County, California. The geographical coordinates are latitude 39°13'41.0" north and longitude 120°58'11.5" west, Township 16 North, Range 9 East, Section 28 of the Mount Diablo baseline and meridian (See Figure 1).

The Site comprises a large geographic area and therefore has been divided into different operable units as follows: the Mine Area Operable Unit (OU1), which contains the original source area; the Groundwater Operable Unit (OU2), which underlies the entire Site from the mine property to Little Greenhorn Creek; and the Lost Lake/Deposition Area Operable Unit (OU3), located over 11/2 miles downstream from OU1, where mine tailings have traveled downstream and spread over an area approximately 7-acres in size.

The mine is no longer operational but was once an active gold and silver mine. The surface elevation of the central shaft is approximately 2,840 feet above sea level. At the mine, ore was hauled to the surface, crushed, and processed to concentrate the fractions of gold and silver present. The finished product was sent offsite for further refining to smelters located near Tacoma, Washington and San Francisco, California. The operators of the mine deposited waste tailings into the Little Clipper Creek drainage which runs through the mine property. This disposal practice resulted in the migration of a significant quantity of tailings away from the mine to downstream areas.

The portion of the Groundwater OU2 that has current arsenic impacts and may require cleanup includes: the source area/mine area downgradient to Greenhorn Road. The remainder of the groundwater beneath the site has not been impacted by arsenic, although continued monitoring is warranted to confirm that future migration does not occur.

The United States Environmental Protection Agency (USEPA) assumed lead responsibility for the Site when it was added to the Superfund National Priorities List (NPL) in January 1999. USEPA's response activities at the Site are and have been conducted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, also known as Superfund), as amended, 42 U.S.C. Section 9601 et seq. The agency with the lead supporting role is the California Department of Toxic Substances Control (DTSC). Site investigation and cleanup activities under the federal Superfund program to date have been funded by the federal government and DTSC pursuant to its 10% cost share. The State of California has also incurred additional costs from its prior non-CERCLA enforcement activities at the Site (see Section 2/Site History and Enforcement Activities).

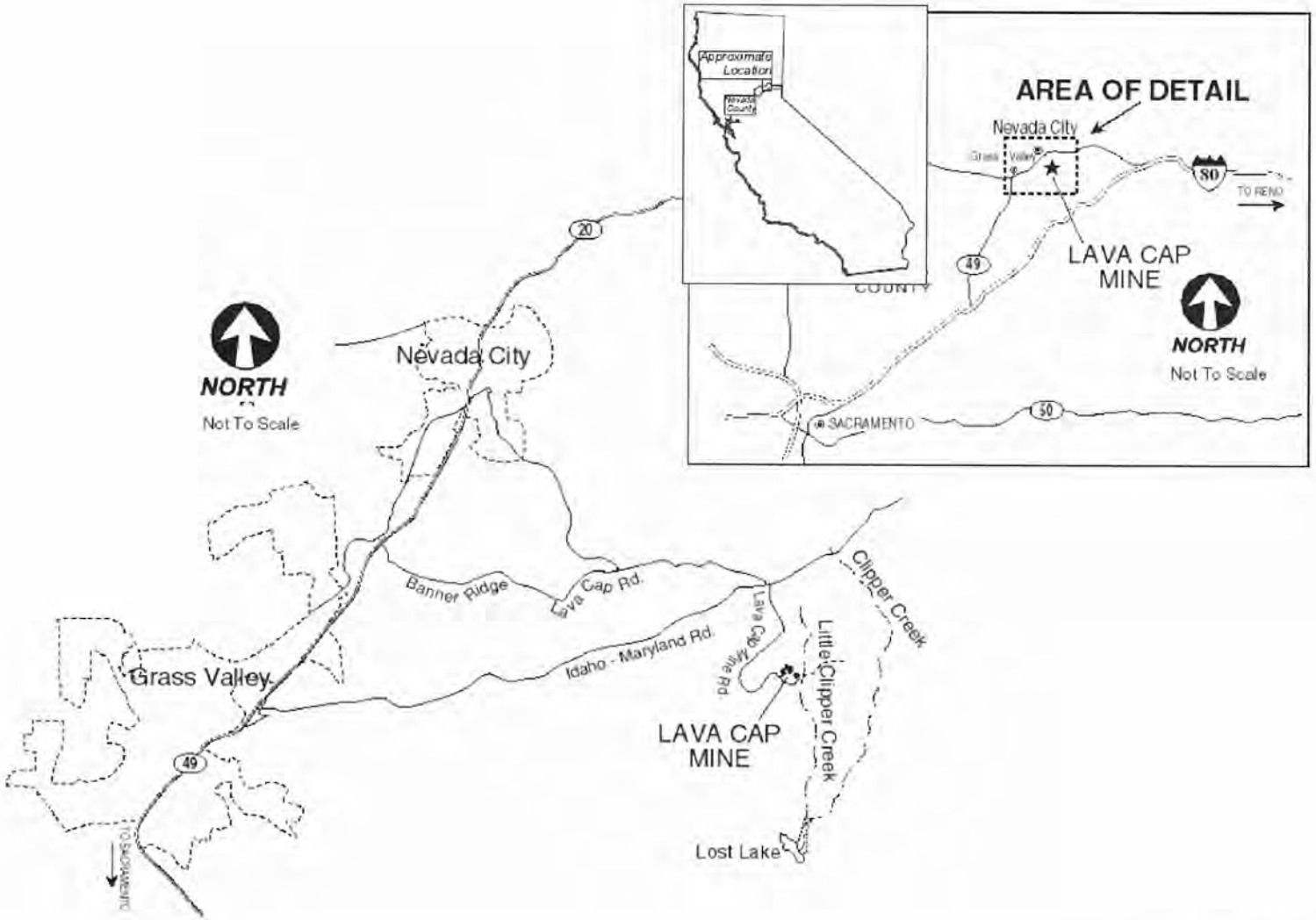

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FIGURE 1
SITE LOCATION MAP
LAVA CAP MINE
NEVADA COUNTY, CALIFORNIA

2 Site History and Enforcement Activities

Various entities operated the Lava Cap Mine during two distinct periods, from 1860-1918, and from 1934-1943. It was during the latter period when the most intensive mining occurred, with an average of 300 to 400 tons of ore processed per day. Processing operations consisted of crushing and grinding circuits to reduce the rock to flour, followed by a flotation plant to separate out the gold and silver. The resulting concentrate was sent to smelters offsite for further refining. Amalgamation processes, which utilize mercury in the recovery of silver and gold, were not extensively used at the Lava Cap Mine because of chemical interferences with the processes. During the later period of the mine's operation, a cyanide process was installed in an attempt to recover additional gold and silver from the waste tailings, but the process proved ineffective and was discontinued.

The native ore, in addition to gold and silver, contained naturally occurring arsenic and trace amounts of heavy metals such as lead. Following the processing of the ore, the arsenic and heavy metals remained in the finely ground tailings. The tailings were deposited in the Little Clipper Creek drainage on the property. During operations, two structures were built for the purpose of holding the tailings in place: a log dam placed across Little Clipper Creek on the mine property; and Lost Lake, which was constructed as a tailings impoundment approximately 1.5 miles downstream of the mine.

No mining-related activity has occurred at the Site since 1943, although attempts have been made to reopen the mine. In February 1978, Keystone Copper Corporation submitted an application for a National Pollutant Discharge Elimination System (NPDES) permit to the California Regional Water Quality Control Board (RWQCB), seeking to discharge 63 million gallons of water to Little Clipper Creek as part of a project to de-water the mine workings. High concentrations of arsenic were determined to be present in water discharging from the mine workings. RWQCB did not issue a permit and the project was abandoned.

In 1979, the log dam, which had started to decompose, released tailings into Little Clipper Creek. The RWQCB subsequently issued a Cleanup and Abatement Order to the owner (Keystone Copper Corporation) and the lessees of the mine property to take corrective action, including: removal of sediment from the streambed and installation of settling basins; diversion of surface water around the compromised log dam; and evaluation of the log dam by a licensed professional engineer or engineering geologist. Records suggest that compliance with this order was incomplete: diversion structures were not built; an investigation of the stability of the log dam was not undertaken; and improvements to the dam were not made.

Franco-Nevada Mining Corporation, Inc. (now known as Newmont Capital Limited) acquired surface and mineral rights at the Lava Cap Mine in 1983 with the goal of re-opening the mine, but this project was also abandoned when the company's proposal to re-zone the property from "residential/ agricultural" to "mineral extraction" was opposed by local property owners and rejected by Nevada County. Franco-Nevada then quit-claimed the surface and mineral rights back to Keystone Copper Corporation.

Banner Mountain Properties, Ltd., subsequently acquired the mine property and in 1991 attempted to develop it for residential use, but adjacent property owners and local homeowners associations expressed opposition, and the development plan never came to fruition.

In 1996, the current property owner, Stephen Elder, entered into a voluntary cleanup agreement with DTSC under which studies were to be undertaken to: identify Site characterization data gaps; research available alternatives for returning the Site to productive use; and make a determination on the regulatory restrictions for using mine wastes from the Site. Subsequent to USEPA taking the lead at the Site under the federal Superfund program, the voluntary cleanup agreement was terminated (in 2000) without cleanup having been undertaken.

The primary event that precipitated USEPA's involvement occurred in January 1997, when during a major winter storm, the upper half of the log dam collapsed, releasing over 10,000 cubic yards (cy) of tailings into Little Clipper Creek (see Figure 2). In May 1997, staff from DTSC, the California Department of Fish and Game, and Nevada County's Department of Environmental Health inspected the mine and downstream areas. Extensive deposits of tailings in Little Clipper Creek and downstream in Clipper Creek and Lost Lake were found.

In October 1997, the USEPA Region 9 Superfund Emergency Response Office determined that the high arsenic concentrations and the mobility of the extremely fine-grained tailings warranted a time-critical removal action under Superfund authority. During October and November 1997, USEPA removed 4,000 cy of tailings from just upstream of the damaged log dam and stockpiled this material in a more stable location closer to the mine buildings. These tailings were placed on an under-liner of high density polyethylene (HDPE) and covered with an over-liner of HDPE, a clay cap, and waste rock. The project also included: grading the tailings pile upstream of the log dam to reduce its slope; reinforcing the partially failed dam with large diameter rock; diverting the water discharging continuously from the mine adit around the tailings pile; and diverting Little Clipper Creek around the tailings pile. In 1998, USEPA stabilized another smaller tailings release and further improved drainage.

USEPA listed the Lava Cap Mine Superfund Site on the Superfund NPL in January 1999. USEPA began the in-depth investigation of the nature and extent of contamination, called the Remedial Investigation (RI), in October 1999. As part of this effort, USEPA studied the risks posed by the Lava Cap Mine site to both human and ecological health. These efforts identified arsenic as the primary contaminant of concern (COC) for human health at the Site, and arsenic and other metals as potentially harmful to plant and animal species. The Sitewide RI report was released for public comment in November 2001 (EPA, 2001a). Subsequent to release of the initial sitewide RI Report, USEPA conducted more detailed investigations of groundwater conditions at the Site. An additional RI Report focused specifically on the Groundwater OU was issued in July 2008 (EPA, 2008a). The Feasibility Study (FS) for the Groundwater OU, which evaluated several different cleanup alternatives for drinking water impacts, was also released for public comment in July 2008 (EPA, 2008b).

From April 2003 through February 2004, USEPA conducted a second removal action to reduce risks to certain individuals living on the mine property and to others whose individual water supply wells had demonstrated elevated levels of arsenic. Actions taken included the offsite relocation of the occupants of two residences and the installation of water filtration treatment units at three residences.

In August 2008, USEPA issued its Proposed Plan for cleanup of the Groundwater OU. USEPA held a public meeting to present the plan and take comments on August 12, 2008, at the Nevada County Board of Realtors Office in Grass Valley, Nevada County, California. In addition to comments taken at the meeting, comments were taken during the public comment period which closed on August 29, 2008. Following USEPA's review of comments received, this IROD was developed.

USEPA has conducted enforcement activities at the Site since its listing on the NPL in an effort to obtain participation in the cleanup from parties responsible for the contamination. In June 2001, General Notice letters were sent to the current property owners and to the corporate successors to previous owners/operators of the mine. These letters, which were issued in conjunction with USEPA's Potentially Responsible Party (PRP) search, notified the parties of the necessity for USEPA to spend federal funds on the study and cleanup of the Site, costs for which the parties are potentially liable.

USEPA also issued Special Notice Letters to current and former owners/operators in July 2003, notifying them of USEPA's intent to initiate a Groundwater OU Remedial Investigation and offering them an opportunity to conduct the work. To date, none of the PRPs identified by USEPA have offered to perform work.

Figure 2: Failed log dam c. 2003

3 Community Participation

Following USEPA's practice at federal Superfund sites, after the listing of the Lava Cap Mine Superfund Site on the NPL, USEPA developed a Community Involvement Plan that outlined the types of activities envisioned to keep the local community informed and involved in the process. The plan also summarized key community concerns going into the Superfund process, which were solicited from the public during community interviews conducted in March 1999.

Throughout its involvement at the Site, USEPA has kept State and County agencies, the business community, local non-profit organizations, and property owners near the Site informed of its activities and the results of its studies. Under the Technical Assistance Grant (TAG) program, USEPA previously funded a local organization-- the Lava Cap Mine Superfund Coalition-- to hire an independent technical advisor to help the community understand the issues and represent their concerns regarding the Site. USEPA has also held public meetings, briefed Nevada County staff, and published periodic newsletters about site activities. These newsletters are available through USEPA's web site at:

http://yosemite.epa.gov/r9/sfund/fsheet.nsf.

These newsletters and other documents referred to in this IROD are also available to the public as part of the Administrative Record (AR) for this IROD at the Region 9 Superfund Records Center located at 95 Hawthorne Street in San Francisco, California. The AR is also available for public review at the local information repositories at the Nevada County Library (980 Helling Way, Nevada City) and the Grass Valley Public Library (206 Mill Street, Grass Valley).

USEPA issued its proposed cleanup plan for the Groundwater OU on July 30, 2008 and presented the plan at a public meeting held at the Nevada County Board of Realtors office in Grass Valley the evening of August 12, 2008. (See Part III of this IROD, the Responsiveness Summary, which includes a transcript of the meeting.) The Proposed Plan specified how USEPA, in cooperation with DTSC, intends to protect people from exposure to contaminated groundwater through their drinking water supply at the Site. It described the alternatives USEPA considered, and presented a preferred alternative. In addition to taking comments at the meeting, USEPA invited the public to submit comments on the Proposed Plan over a thirty-day period from July 30 to August 29, 2008. USEPA did not receive any requests for an extension of the comment period and it closed as planned.

In the development of this IROD, USEPA carefully considered all comments submitted. Most of the comments received were favorable toward USEPA's proposed cleanup. A few concerns were raised regarding installation of the Nevada Irrigation District (NID) pipeline and suggestions offered by the commenters on potential issues related to pipeline installation, one commenter preferred a less expensive alternative, and one resident that would be connected does not want to be connected, but none rejected USEPA's overall proposal. (See the Responsiveness Summary [Part III of the IROD] for further discussion of these issues.) Consequently, this IROD carries forth and adopts the preferred alternative published in the Proposed Plan. USEPA will continue to work with the State of California and local stakeholders during the design process to ensure that any concerns regarding implementation of the remedy, should they arise, continue to be appropriately addressed.

4 Scope and Role of Operable Units

The Lava Cap Mine Superfund Site, as a whole, comprises a large geographic area. The Groundwater OU encompasses the study of all areas of potentially-impacted groundwater and underlies the entire Superfund site. This includes groundwater from beneath the Mine Area (OU1) which extends down to Greenhorn Road and the Lost Lake/Deposition Area (OU3), which extends down to the confluence of Clipper Creek and Little Greenhorn Creek (Figure 3).

The groundwater system consists of fractured bedrock penetrated by mine shafts and tunnels and overlain by mine tailings; complexities in this system have made it necessary for USEPA to make additional resources available to more fully evaluate current and potential future groundwater impacts arising from Site-related contamination. The groundwater study is further complicated by the presence of naturally-occurring arsenic within the groundwater system. USEPA is issuing this IROD for only the drinking water exposure pathways within the Groundwater OU. After additional study and evaluation, a final ROD will be developed for the Groundwater OU that evaluates the need for additional groundwater cleanup actions to supplement the drinking water actions outlined in this IROD. It is anticipated that the Interim Remedy selected in this IROD will not be inconsistent with nor preclude implementation of a final remedy for the Groundwater OU.

The Mine Area OU comprises the portion of the Site where hardrock mining operations took place, plus several contiguous land parcels, totaling an approximate 30 acres in size, 4 acres of which represent the main tailings disposal area for the mine. The boundary of the Mine Area OU also incorporates a narrow band of property along the banks of Little Clipper Creek located south or downstream of the location of the failed log dam at the mine and to the north of the intersection of Tensy Lane and Greenhorn Road. The Mine Area OU is mostly comprised of disturbed land of an abandoned industrial character that contains considerable quantities of mine wastes. With construction complete on the bulk of the OU1 remedy (all except the adit water treatment plant), the mine wastes and contaminated soils have now been controlled. Remaining features of OU1 include the capped mine wastes; the mine's process buildings (the mill building, assay building, cyanide building and other smaller co-located structures); the central mine shaft; the adit, from which contaminated mine drainage emanates as surface water flow; engineered and natural stretches of Little Clipper Creek and other surface water drainages; the rock buttress at the downgradient end of the capped tailings pile; and undisturbed forested areas. Smaller portions of OU1 are located away from the mine's disposal areas and are primarily residential in character.

Beyond the boundaries of the Mine Area OU, tailings produced at the mine have traveled a distance of over 1 ½ miles downstream, spreading over an area approximately 7 acres in size located in a low-density residential area. The complexity of cleanup issues in the downstream areas has led USEPA to separate out that part of the Site for further analysis. USEPA has designated that subject area as the Lost Lake OU (OU 3) (See Figure 3). The Lost Lake OU begins where the Mine Area OU ends, comprising: the Little Clipper Creek drainage south of Greenhorn Road; the Clipper Creek drainage downstream of its confluence with Little Clipper Creek; Lost Lake; and areas downstream of Lost Lake in Little Greenhorn Creek. USEPA is nthe process of conducting the Feasibility Study (FS) for the Lost Lake OU and EPA will prepare a separate Proposed Plan and ROD to address this OU.

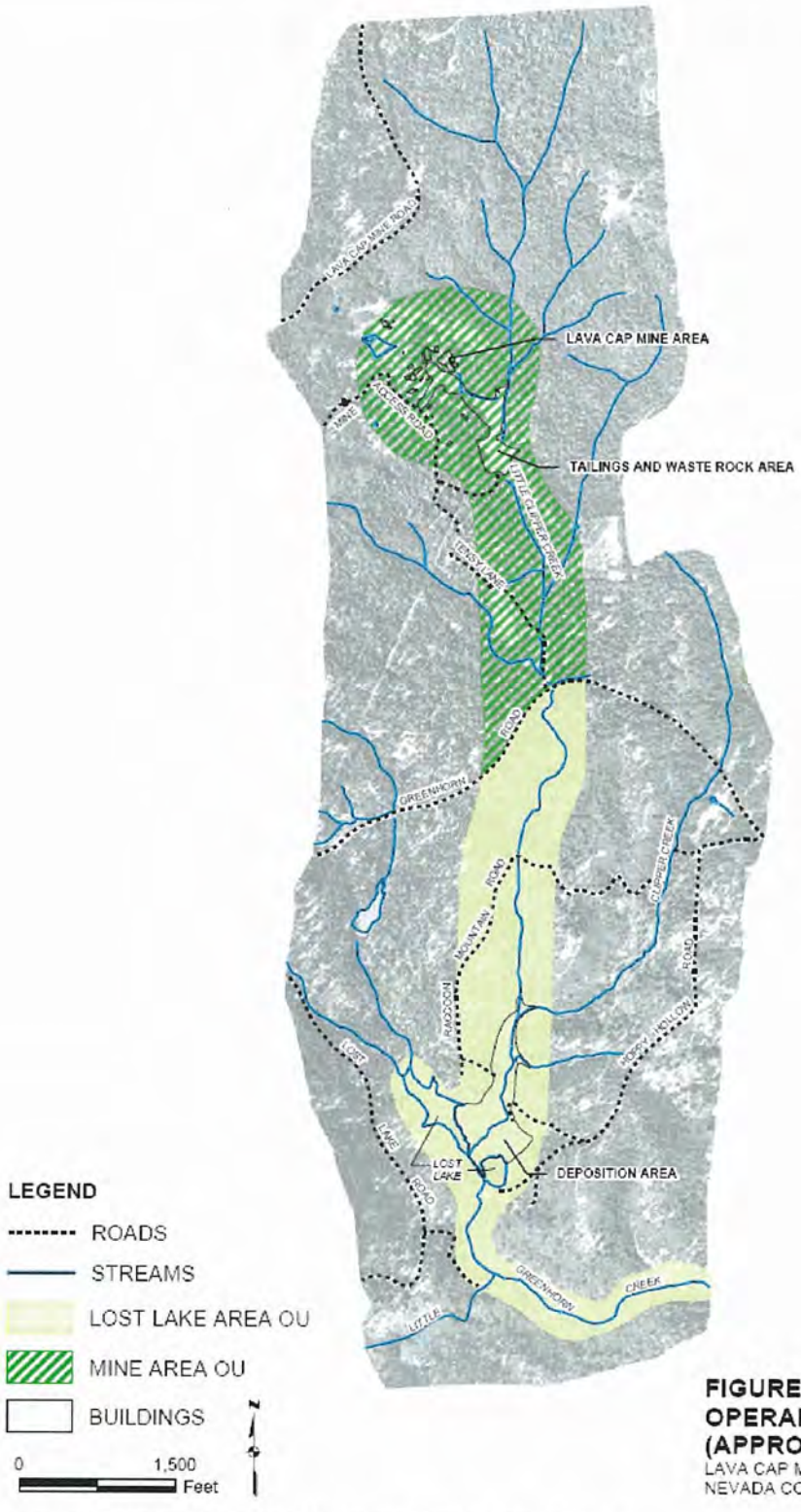

FIGURE 3
OPERABLE UNITS
(APPROXIMATE BOUNDARIES)
LAVA CAP MINE
NEVADA COUNTY, CALIFORNIA

\\LOK\PROJECTS\RODGIS\LAVA CAP MINE\FIG3 LAVA CAP SITE LETTER.MXD 08/27/2004 14:18:22

5 Site Characteristics

This section provides information from the OU2 RI report (EPA, 2008a), and includes a summary of the physical characteristics, nature and extent of contamination, and groundwater flowpaths at the Site.

5.1 Site Physical Characteristics

The Site physical characteristics are summarized as follows:

- Annual precipitation is approximately 52 inches and average temperatures range from approximately 30 degrees Fahrenheit in winter to 98 degrees Fahrenheit in summer.
- Little Clipper Creek is the main surface-water drainage leading south, away from the mine. The upper reaches of Little Clipper Creek are seasonally dry; the creek becomes perennial at the base of the Rock Buttress with flows ranging from 0.1 to 155 cubic feet per second (ft^3/sec) (45 to 70,000 gallons per minute [gpm]). Little Clipper Creek flows downstream from the Rock Buttress and merges with Clipper Creek approximately 1 mile south of the Rock Buttress. Clipper Creek flows into Lost Lake, which is contained by Lost Lake Dam. Clipper Creek continues below Lost Lake to Little Greenhorn Creek, which joins Greenhorn Creek and flows into Rollins Reservoir.
- The Site contains five main rock types, including mine deposits (waste rock and tailings overlaying basal gravel), Tertiary volcanic breccias (Tvb unit), Cretaceous igneous intrusive rocks, Jurassic to Triassic metamorphosed volcanic rocks, and Paleozoic to Upper Jurassic metamorphic rocks (Pms unit). Groundwater occurs in primary pore spaces in the saturated overburden throughout the Site and in secondary openings (e.g., fissures, faults, and joints) of the consolidated and crystalline rocks of the Pms unit, which has a low hydraulic conductivity (10^{-5} to 10^{-6} centimeters per second). Groundwater also occurs in the more permeable Tvb unit that overlies the Pms unit north of the mine. Springs occur at the contact between the Tvb and Pms units.
- Groundwater flow is primarily from high topographic elevations (e.g., ridges) toward deep drainages, including Little Clipper Creek, Clipper Creek, and Little Greenhorn Creek to the south-southeast. The regional groundwater table is a subtle expression of the land surface. Groundwater in the waste rock/tailings pile likely seeps beneath the Rock Buttress into the Pms unit and flows toward the Little Clipper Creek drainage. Groundwater flow also occurs in the basal gravel and fractured metasediment present at the contact between overburden material and bedrock throughout the Site, potentially creating a preferential flowpath along the contact. Groundwater flowing from northwest of Lost Lake likely discharges into the lake on the northwest shore of the northern lobe of the lake and seeps beneath Lost Lake Dam on the southern shore of the southern lobe of the lake.
- No long-term increasing or decreasing trends were observed in groundwater levels at the Site, suggesting that the system is in a state of dynamic equilibrium.

- Vertical hydraulic gradients are generally downward in the waste rock/tailings pile (according to pre-OU1 RA water levels) and the Deposition Area. In the Mine Area, vertical hydraulic gradients on the ridge above Little Clipper Creek alternate downward and upward at one well pair and are consistently upward at second well pair. Initial data indicate that Clipper Creek seasonally alternates as a gaining or losing stream at the upper end of the Deposition Area. These observations and groundwater flow modeling results suggest that the groundwater table is located very near the bottom of the Clipper Creek channel near the upstream end of the Deposition Area.
- Surface water discharge was estimated by using crest gauges, manual flow measurements, and stream gauges. Surface water discharge is summarized as follows:
  - Little Clipper Creek upgradient from the mine typically goes dry by the end of June and flows again by early winter. A maximum flow of 45 ft^3/sec (20,200 gpm) was observed during a large winter storm.
  - The perennial adit flow ranges from 0.1 to 4 ft^3/sec (45 to 1,800 gpm); however flows are typically less than 0.5 ft^3/sec (225 gpm). The peak discharges were likely not coming from the adit but were the result of surface runoff directed to the pond at the adit discharge (prior to construction of the OU1 RA).
  - Perennial Little Clipper Creek flow downgradient from the Rock Buttress and upgradient from the confluence with Clipper Creek ranges from 0.1 to 155 ft^3/sec (45 to 70,000 gpm).
  - Clipper Creek flow ranges from less than 0.01 to 22 ft^3/sec (5 to 9,900 gpm). This range does not include any winter storm events.
  - Little Greenhorn Creek flow ranges from 0.2 to 30 ft^3/sec (90 to 13,500 gpm). This range does not include any large winter storm events.

5.2 Nature and Extent of Contamination

The nature and extent of arsenic concentrations in Site water are summarized as follows:

- Exceedances of the arsenic MCL (10 micrograms per liter [µg/L]) occurred in the following locations:
  - Mine Area OU groundwater and surface water in the vicinity of the mine wastes
  - Downgradient Mine Area OU residential wells located between the mine and Greenhorn Road and in Little Clipper Creek surface water in this same stretch
  - Deposition Area monitoring wells completed in tailings above Lost Lake
  - One of the two bedrock monitoring wells located in the Deposition Area (additional samples are needed to confirm this exceedance)
  - Little Clipper Creek and Clipper Creek surface water between Greenhorn Road and Lost Lake (i.e., in the Lost Lake OU)

  - Lost Lake and at the base of Lost Lake Dam

- Background arsenic concentrations were low in surface water and groundwater (within the areas sampled), except in areas within the footprint of the mine workings. No discernible, steadily increasing or decreasing trend in arsenic concentrations is apparent in the data during the period of record.

- Surface water and groundwater (both monitoring wells and residential wells) arsenic concentrations in the Mine Area are significantly higher than background concentrations and were usually above the MCL. The highest arsenic concentrations (greater than 100 µg/L) occurred in water discharging from the mine adit and in groundwater samples from wells screened within waste rock, tailings, or mine workings. Arsenic concentrations were typically lower in wells screened in bedrock on the ridges to the northwest, west, and southwest of the waste rock/tailings pile (less than 100 µg/L). Arsenic concentrations detected in the different geologic units in and below the waste rock/tailings pile (e.g., waste rock, tailings, basal gravel, and underlying bedrock) typically were similar to each other. Table 1 provides a summary of the highest, lowest, and average sample concentrations in groundwater.

- Downgradient of the mine, but within the Mine Area OU, elevated arsenic concentrations (above the MCL) are detected in Little Clipper Creek surface water downstream from the mine and in groundwater samples from three downgradient residential wells.

- Concentrations of arsenic in most groundwater downgradient of the mine were less than the MCL, similar to background concentrations.

- Elevated arsenic concentrations (above the MCL) in the Lost Lake/Deposition Area were limited to one bedrock well and locations directly impacted by the tailings deposits. Additional samples are needed to confirm MCL exceedances at the bedrock monitoring well. The locations directly impacted by the tailings deposits included the surface water in Clipper Creek, groundwater within the tailings pile, surface water in Lost Lake, and surface water at the base of Lost Lake Dam. Groundwater from OU3 residential wells, which are screened in the bedrock, and from the 2nd bedrock monitoring well had low arsenic concentrations (less than 6 µg/L).

Table 1
Lava Cap Mine
Groundwater Sample Results Summary

Location	Type	Minimum Arsenic Concentration (µg/l)	Maximum Arsenic Concentration (µg/l)	Average Arsenic Concentration (µg/l)	Number of Samples	Percent Detects
Background Areas						
1B	MW	1.2	24.2	13.4	15	100
1R	MW	8.7	24	18.9	15	100
11AR	RW	0.1J	0.1J	NA	1	100
11AW	RW	0.21J	0.41J	0.24	4	75
11A3	RW	1U	1U	NA	4	0
11A5	RW	1	1	1	1	100
Source Area and Mine Area						
5A	MW	190	610	284	12	100
5D	MW	3.5	29.3	15.5	16	100
5E	MW	88.3	470	344	18	100
5I	MW	11.8	181J	53.6	17	100
5J	MW	44.6	192	99	14	100
5PZ-1	PZ	0.43J	9.4	4.27	5	80
5PZ-2	PZ	151	373J	264	5	100
5PZ-3	PZ	501	871	725	6	100
11AK	RW	1.2	1.2	1.2	2	100
11AM	RW	0.2U	2U	.046	7	71
11AN	RW	0.2U	9.8	1.32	10	50
11AO	RW	0.28	1UJ	.036	9	67
11AQ	RW	0.25U	1U	0.33	5	40
11AX1/11AX2	RW	0.54UJ	3.5[a]	1.22	7	57
11A1	RW	0.24J	1U	.042	4	50
Lost Lake/Deposition Area						
13Q	MW	63.7	235	130	17	100
13R	MW	529	2270	1338	18	100
13S	MW	2	6	3.92	17	100
13T	MW	35.4	104	69.7	2	100
11AA	RW	0.09U	1U	0.26	8	25

11AB	RW	0.2J	5U	0.68	9	67
11AC	RW	0.2U	O.2U	NA	2	0
11AD	RW	0.1U	0.6	0.27	9	78
11AE	RW	0.1U	1U	NA	9	0
11AG	RW	0.1U	1U	NA	8	0
5K-S	MW	1.4	7.1	4.83	6	100
5K-D	MW	8.2	33.8	18.1	6	100
5L-S	MW	30.8	85.4	58.1	2	100
5L-D	MW	21.3	30.2	25.8	2	100
10G	RW	7.1	41.0	24.6	21	100
10H	RW	2.5	31.7	19.0	19	95
10I	RW	377	528	453	2	100
10J	RW	41.9	56.8	49.1	5	100
10N	RW	28.9	54.7	41.2	12	100
Downgradient Area						
11AL	RW	18.7	90	37.0	22	100
11AS	RW	2.1	270	110	16	100
11AT	RW	0.2J	1U	0.24	7	43
11AU	RW	1.4	5.7	2.98	16	100
11AV	RW	3.5	890	87.9	16	100
11AY	RW	0.98J	1.5	1.2	4	100
11AZ	RW	1.4	2.4	2.05	4	100
11A4	RW	0.84U	2.1	1.63	4	75
11AF	RW	0.89J	1.9J	1.57	12	100
11AJ	RW	0.1J	1UJ	0.25	9	56
11AH	RW	0.1U	1U	NA	5	0
11AI	RW	0.1U	1U	NA	9	0
11AP	RW	0.2U	5U	0.64	7	29
11A2	RW	1U	1U	NA	4	0

[a] The 16.8 µg/l value from the October 2006 11AX sample is excluded

Notes:
Results do not include field duplicates or laboratory split samples
For average calculations, one-half the reporting limit is used for values below the detection limit.
J – estimated value
NA – not applicable
RW – residential well
U – nondetect at the specified concentration, which is equal to the reporting limit
PZ – piezometer
MW – monitoring well
µg/l – micrograms per liter

5.3 Groundwater Flowpath Evaluation

The Lava Cap Mine Groundwater Flow Model was used in the RI Report (EPA, 2008a) to estimate groundwater flowpaths from mine-related sources. Groundwater particles were started from three sets of locations as follows:

- Flowpath Set 1 – Surficial mine waste areas (tailings and waste rock piles in the Source Area and adjacent Mine Area, Lost Lake/Deposition Area, and along Little Clipper Creek and Clipper Creek)
- Flowpath Set 2 – Shallow mine workings (600 Drift Level and above)
- Flowpath Set 3 – Deep mine workings (700 Drift Level and below)

The flowpath analysis **did not** predict arsenic concentrations at specific points along the groundwater flowpaths; it only provided a model for the movement of water molecules. The figures (Figures 4 and 5) show the estimated area of groundwater flow; they do **not** represent a "plume" or designation of arsenic contamination. Groundwater flow along localized fracture zones, groundwater use (pumping), potential subsurface ore bodies containing arsenic, geochemical reactions, adsorption, dilution, and travel times can affect arsenic concentrations along the groundwater flowpaths.

Results from the Flowpath Set 1 analysis (see Figure 4) suggest that shallow groundwater flow from beneath areas that have mine waste and tailings is confined to the Source Area; Mine Area; Little Clipper Creek, downstream from the mine; Clipper Creek, downstream from the confluence with Little Clipper Creek; and the Lost Lake/Deposition Area. Shallow groundwater flow converges toward drainage channels. Shallow groundwater in the Source Area and Mine Area converges toward Little Clipper Creek; shallow groundwater in the Deposition Area converges toward Little Greenhorn Creek. The convergence of shallow groundwater flow limits the flowpath area from these source areas. Flowpaths from surficial mine waste areas are shallow and discharge to springs or directly to stream channels after short travel distances. Only a few residential wells in the Mine Area, Downgradient Area, and Lost Lake/Deposition Area appear to be within the potential area of Flowpath Set 1.

Results from the Flowpath Set 2 analysis (see Figure 4) suggest that groundwater from shallow mine workings (600 Drift Level and above) flows through portions of the subsurface beneath the Source Area, Mine Area, Little Clipper Creek, and a larger area west of these locations. Groundwater from the shallow mine workings is predicted to eventually discharge to Little Clipper Creek, Clipper Creek, and Little Greenhorn Creek, exiting the Clipper Creek watershed primarily as stream outflow in Little Greenhorn Creek. The potential area of Flowpath Set 2 includes two additional Downgradient Area residential wells that have elevated arsenic concentrations but also includes many wells that have very low arsenic concentrations. Groundwater samples collected from Monitoring Well Pairs 5K-S/5K-D and 5L-S/5L-D, located upgradient from residential Wells 11AS and 11AV, had detected arsenic concentrations above the MCL.

Results from the Flowpath Set 3 analysis (see Figure 5) suggest that groundwater from deep mine

workings (700 Drift Level and below) flows through portions of the subsurface beneath the Source Area, Mine Area, Little Clipper Creek, and Clipper Creek. Groundwater from the deep mine workings is predicted to eventually discharge to Little Greenhorn Creek and exit the Clipper Creek watershed primarily as stream outflow. The potential area of Flowpath Set 3 includes the same residential wells with elevated arsenic concentrations as Flowpath Set 2 plus several additional residential wells where low arsenic concentrations were detected. Most of the flowpaths from the deep mine workings would be much deeper than the residential wells in the area.

The combination of these three groundwater flowpath areas provides a conservative estimated geographic footprint of where groundwater could be flowing from known or potential mine-related arsenic sources. Uncertainty in these geographic areas increases with depth (i.e., the extent of the Flowpath Set 2 area has greater uncertainty than the Flowpath Set 1 area, and the Flowpath Set 3 area has greater uncertainty than the Flowpath Set 2 area) because the influence of topography on groundwater flow patterns lessens with increasing depth. Limited data are available regarding the characteristics of the deep bedrock aquifer system. Additionally, geochemical processes that impact arsenic concentrations along flowpaths are not known; therefore, the uncertainty regarding arsenic concentrations along flowpaths from source areas increases with increasing travel distance from the source areas.

5.4 Background Levels of Contamination

Results of chemical analysis for arsenic in samples obtained from the Background Area during the OU2 RI included the following:

- Surface water upstream from the Source Area and Mine Area that feed Little Clipper Creek and the portion of Clipper Creek upstream from the confluence with Little Clipper Creek had total arsenic concentrations less than 4 µg/L, with an average concentration of approximately 0.5 µg/L.
- Two monitoring wells located upgradient from the mine and the waste rock/tailings pile screened in bedrock approximately 150 feet below ground surface (bgs) within the general footprint of the Lava Cap Mine underground workings but shallower than the mine workings had dissolved arsenic concentrations between 1.2 and 24.2 µg/L. Concentrations were consistently above the MCL of 10 µg/L in samples from one of the two wells. In the 2nd well, arsenic concentrations have been below 3 µg/L since 2006.
- Residential wells located on ridges above Clipper Creek, upgradient from the confluence of Little Clipper Creek with Clipper Creek, and wells located more than 2,500 feet from Little Clipper Creek all had total arsenic concentrations equal to or less than 1 µg/L.

In summary, arsenic concentrations in groundwater and surface water samples from the Background Area have generally been below the MCL for drinking water (10 µg/L), except for wells within the footprint of, but shallower than, the mine workings. No discernible steadily increasing or decreasing trend in arsenic concentrations is apparent in the data during the period of record.

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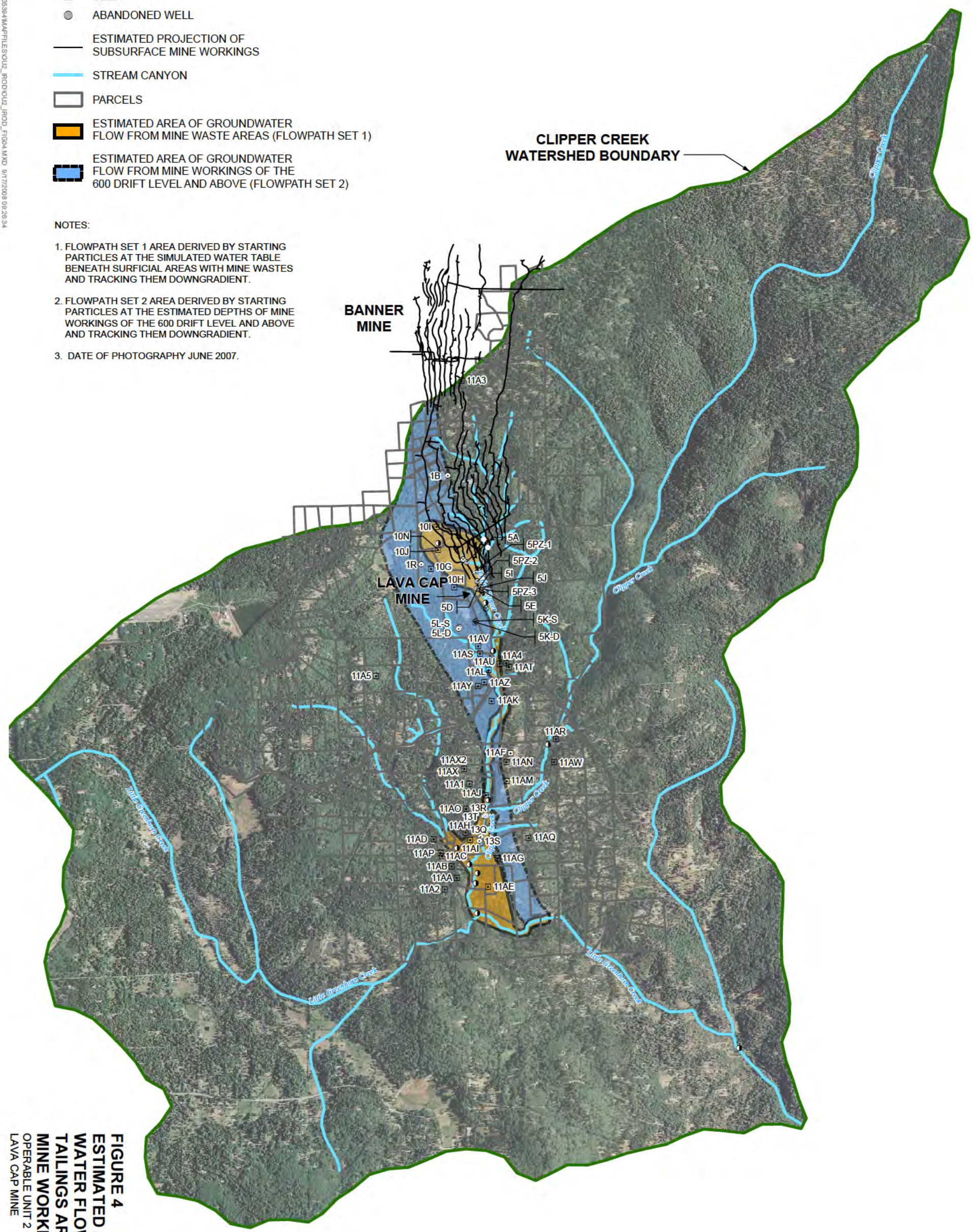
LEGEND

- MONITORING WELL
- PIEZOMETER
- RESIDENTIAL WELL
- SURFACE WATER SAMPLE LOCATION
- STREAM GAGE AND SURFACE WATER SAMPLE LOCATION
- STAFF GAGE
- SEEP
- ABANDONED WELL
- ESTIMATED PROJECTION OF SUBSURFACE MINE WORKINGS
- STREAM CANYON
- PARCELS
- ESTIMATED AREA OF GROUNDWATER FLOW FROM MINE WASTE AREAS (FLOWPATH SET 1)
- ESTIMATED AREA OF GROUNDWATER FLOW FROM MINE WORKINGS OF THE 600 DRIFT LEVEL AND ABOVE (FLOWPATH SET 2)

NOTES:

1. FLOWPATH SET 1 AREA DERIVED BY STARTING PARTICLES AT THE SIMULATED WATER TABLE BENEATH SURFICIAL AREAS WITH MINE WASTES AND TRACKING THEM DOWNGRADIENT.
2. FLOWPATH SET 2 AREA DERIVED BY STARTING PARTICLES AT THE ESTIMATED DEPTHS OF MINE WORKINGS OF THE 600 DRIFT LEVEL AND ABOVE AND TRACKING THEM DOWNGRADIENT.
3. DATE OF PHOTOGRAPHY JUNE 2007.



N

0 2,400 4,800 FEET

FIGURE 4
ESTIMATED AREA OF GROUND-WATER FLOW FROM SURFICIAL TAILINGS AREAS AND SHALLOW MINE WORKINGS
OPERABLE UNIT 2 IROD
LAVA CAP MINE

LEGEND

- ⊙ MONITORING WELL
- ◬ PIEZOMETER
- ⊡ RESIDENTIAL WELL
- ◑ SURFACE WATER SAMPLE LOCATION
- ⊗ STREAM GAGE AND SURFACE WATER SAMPLE LOCATION
- ⊠ STAFF GAGE
- □ SEEP
- ◍ ABANDONED WELL
- ESTIMATED PROJECTION OF SUBSURFACE MINE WORKINGS
- STREAM CANYON
- PARCELS
- ESTIMATED AREA OF GROUNDWATER FLOW FROM MINE WORKINGS OF THE 700 DRIFT LEVEL AND BELOW (FLOWPATH SET 3)

NOTES:

1. FLOWPATH SET 3 AREA DERIVED BY STARTING PARTICLES AT THE ESTIMATED DEPTHS OF MINE WORKINGS OF THE 700 DRIFT LEVEL AND BELOW AND TRACKING THEM DOWNGRADIENT.
2. DATE OF PHOTOGRAPHY JUNE 2007.

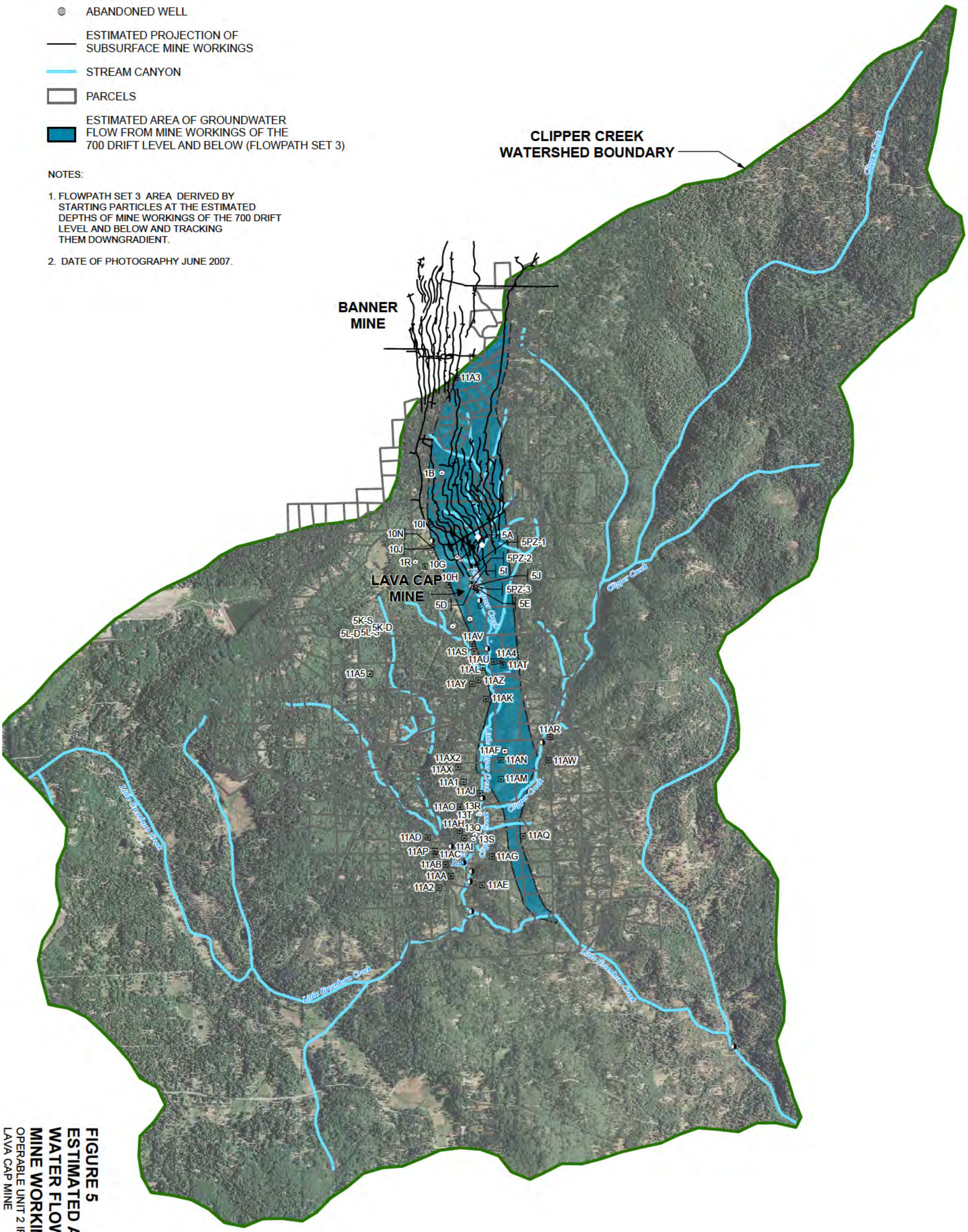


FIGURE 5
ESTIMATED AREA OF GROUND-WATER FLOW FROM DEEP MINE WORKINGS
OPERABLE UNIT 2 IROD
LAVA CAP MINE

5.5 Conceptual Site Model

The Conceptual Site Model identifies the mechanisms under which the groundwater contamination that has been described above can result in exposure to human and ecological receptors. This IROD is focused solely on the drinking water component of OU2. There are current, complete exposure pathways where mine-related arsenic contamination is being extracted by residential wells for use as drinking water. This completed exposure pathway could result in unacceptable risks to human health if Site contaminants are not addressed through remedial actions. Note that at the present time, all residential wells contaminated in excess of the MCL are equipped with some type of either wellhead or point-of-use treatment system that reduces the magnitude of current residential exposures to arsenic, treating the water to below drinking water standards, although frequent monitoring and maintenance, and consistent use of only the treated water for consumption are required for these systems to be completely effective.

6 Current and Potential Future Land and Resource Uses

6.1 Existing Land Use

The Lava Cap Mine Site encompasses abandoned industrial process areas (on the mine property) and residential areas and the Groundwater OU underlies the entire Site. The majority of the Site is comprised of low-density, rural residential properties. Typical parcel sizes range from 5 to 15 acres. All of the homes located on these parcels rely on individual residential wells for their water supply. There are currently no other options (i.e., municipal water supply) besides individual groundwater wells to supply the residential properties. As noted above, several of the wells serving individual residences at and just downgradient of the mine have consistently exceeded the MCL for arsenic of 10 ppb. Many of the residential wells barely provide enough water to meet inside and outside water demands. In addition, the general groundwater quality is suspect as many wells contain elevated iron and low pH.

6.2 Future Land Use

The USEPA expects future land use conditions at the Site to remain consistent with existing conditions. Although there will likely continue to be construction of new homes in the Site vicinity, the numbers are expected to be limited by the large parcel sizes (current zoning requires minimum parcel sizes of 5 acres), physical constraints (e.g., topography and forestation), and variability of the groundwater supply make it unlikely that extensive new development will occur. As described below in Section 12, the Selected Interim Remedy does include a notification process to inform property owners in appropriate areas of the potential presence of risks associated with arsenic-contaminated groundwater in the vicinity.

7 Summary of Site Risks

In 2001, USEPA prepared baseline risk assessments for human health and ecological risk at the Lava Cap Mine Superfund Site that included exposure to contaminated groundwater. The baseline human health risk assessment (HHRA) and ecological risk assessment (ERA) are included as Appendices E and F, respectively, to the Public Release Draft Lava Cap Mine RI Report (USEPA, 2001a).

The risk assessments estimate the human health and environmental risks that the Site could pose if no cleanup actions were taken (this is why it is referred to as a baseline risk assessment). These risks are factors that USEPA considers in deciding whether to take action at a Site. The risk assessments are also used to identify the contaminants and exposure pathways that need to be addressed by the remedial action. Although the HHRA and ERA indicate that multiple completed exposure pathways pose a significant potential risk to human and ecological receptors, this Section of the OU2 IROD is focused on the groundwater pathways.

There are currently residential properties located throughout the Site that all access local groundwater for use as residential water supply, including drinking water. The risk assessments concluded that arsenic presents the primary risk to human and ecological health at the Site. USEPA's HHRA also included lead and iron as contaminants of concern for human exposure. As demonstrated by the facts discussed below, including the Site-specific occurrence and chemical concentration data for chemicals of concern, and the risks associated with completed drinking water exposure pathways, the interim response action selected in this IROD is necessary to protect the public health from actual or threatened releases of hazardous substances into the environment.

7.1 Summary of Human Health Risk Assessment – Groundwater Component

The HHRA was prepared in accordance with USEPA guidance (USEPA Risk Assessment Guidance for Superfund, Parts A-D (RAGS) (USEPA 1989a, 1991b, 1991c, 1991d, 1998a)). The HHRA evaluated risks from groundwater at the Site to:

- residents on the mine property; and
- residents below the mine along Little Clipper Creek and around Lost Lake.

The HHRA noted that the most significant routes of exposure are through the incidental ingestion of arsenic in soil, sediment, surface water, and airborne dust. However, residents are also potentially exposed to risk from ingestion of elevated levels of arsenic in contaminated groundwater.

7.1.1 Identification of Chemicals of Concern

As discussed above, in terms of human health risk, arsenic has been identified as the main chemical of concern, along with, for the worker and mine resident scenarios, iron and lead. Table 2 presents the COCs and associated Exposure Point Concentrations. The Exposure Point Concentrations are calculated by applying statistical methods to the data set for contaminant

occurrence at the Site, and represent the highest concentration of the contaminant a person could reasonably be expected to encounter at the Site.

Arsenic is a known human carcinogen. It is one of the earth's elements and cannot be destroyed. Because it occurs naturally, it is commonly present in soil, food, and even drinking water. However, the highest levels of arsenic found at the Site by far exceed the amounts that are commonly found in food and drinking water. The most characteristic effect of long term oral exposure to arsenic is a pattern of skin changes such as darkening of the skin or the formation of warts on the palms, soles of the feet, and torso. These changes sometimes develop into cancer. According to the Agency for Toxic Substances and Disease Registry (ATSDR), ingestion of arsenic has been associated with increased risks of cancer of the liver, bladder, kidneys, prostate, and lungs.

Table 2
Contaminants of Concern and Exposure Point Concentrations
Lava Cap Mine Site - Groundwater OU2 IROD

Exposure Point	Chemical of Concern	Frequency of Detection	Units	Minimum Concentration	Maximum Concentration	Exposure Point Concentration	Statistical Measure
Mine Area Drinking Water - Current Resident							
	Arsenic	5/5	ppb	11.2	56.8	56.8	Maximum
Downgradient Drinking Water – Current Resident							
	Arsenic	18/33	ppb	0.1	1.8	0.477	95% UCL
Downgradient Drinking Water (High Arsenic Well only) - Current Resident							
	Arsenic	3/3	ppb	28.5	46.3	46.3	Maximum

Notes:
ppb = ug/L
95% UCL = 95 percent upper confidence limit

7.1.2 Exposure Assessment

Exposure refers to the potential contact of an individual (sometimes referred to as a receptor) with a chemical. Exposure assessment is the determination or estimation of the magnitude, frequency, duration, and route of potential exposure. The exposure assessment methodology used in the baseline risk assessment follows the procedures outlined in Chapter 6 of RAGS, Part A (USEPA, 1989a). This section briefly summarizes the potentially exposed populations, the exposure pathways evaluated, and the exposure quantification from the HHRA performed for groundwater. Considerably more detail on the exposure assessment can be found in Appendix E of the RI Report (USEPA, 2001a).

As discussed briefly in Section 7.1 above, the exposure assessment was divided into two components: residential exposure at parcels directly adjacent to the historic mine buildings and waste rock/tailings disposal areas; and residential exposure along Little Clipper Creek/Lost Lake downgradient of the mine.

For the residential exposure scenario at the mine, ingestion of groundwater from private wells and dermal contact with well water through showering were considered (to reduce the potential for current exposure, the former pathway has been mitigated through the installation of water filtration units on residential water supplies exceeding the MCL for arsenic).

For the residential/recreational use exposure scenario along Little Clipper Creek/Lost Lake downstream of the mine, exposure pathways included ingestion of groundwater from private wells and dermal contact with well water through showering (again, the former has been mitigated through the installation of water filtration units on residential water supplies exceeding the MCL for arsenic).

For each of these exposure scenarios, intakes were evaluated for noncarcinogenic health effects in terms of the average daily dose that would result from exposure. The intakes of chemicals evaluated for carcinogenic health effects was based on the lifetime average daily dose (the lifetime average daily dose is calculated by prorating the total cumulative dose of the chemical over an entire lifespan, assumed to be 70 years, based on scenarios such as residential exposure of 350 days/year for 30 years).

7.1.3 Toxicity Assessment

The toxicity assessment seeks to develop a reasonable appraisal of associations between the degree of exposure to a chemical and the possibility of adverse health effects. It consists of two components: hazard identification (the process of determining what adverse human health effects, if any, could result from exposure to a particular chemical); and dose-response evaluation (a quantitative examination between the level of exposure and the probability of adverse health effects in an exposed population). The toxicity assessment identifies chemical-specific toxicity factors for each COC for the purpose of determining individual and cumulative noncancer (i.e., Hazard Quotients [HQs]) and cancer (i.e., Excess Lifetime Cancer Risk [ELCR]) risk values for the HHRA.

The toxicity value used to evaluate potential noncancer (i.e., noncarcinogenic) effects is the reference dose (RfD). The RfD has been developed by USEPA based on the assumption that thresholds exist for certain toxic effects. In other words, a certain amount (i.e., dose) of the chemical is required to be ingested, inhaled or absorbed through the skin to produce an undesirable noncancer health effect. In general, the RfD is an estimate of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without a significant risk of noncancerous effects during a lifetime. RfDs for arsenic at Lava Cap Mine are presented in Table 3.

Toxicity values have also been developed for evaluating potential human carcinogenic effects from exposure to carcinogens. Potential human carcinogenic effects are evaluated using chemical-specific slope factors and an accompanying USEPA weight-of-evidence determination. Slope factors have been derived by USEPA (and are published in the Integrated Risk Information System (IRIS) (USEPA, 1998) or the Health Effects Assessment Summary Tables (HEAST) (USEPA, 1997)) based on the concept that for any exposure to a carcinogenic chemical there is always a carcinogenic response (i.e., no threshold level exists). Slope factors are used in risk assessment to estimate an upper-bound lifetime probability of an individual developing cancer as a result of a specific exposure to a carcinogen.

USEPA has identified a carcinogenic classification system that uses a weight of the evidence approach to classify the likelihood of a chemical being a human carcinogen. Arsenic has been assigned to Class A, known human carcinogen. The carcinogenic oral slope factors (toxicity values) for the Lava Cap Mine COCs are shown in Table 3.

Table 3

Cancer and Non-Cancer Toxicity Data Summary

Lava Cap Mine Site - Groundwater OU IROD

Cancer Toxicity Data Summary								
Pathway: Inhalation								
Chemical of Concern	Unit Risk	Units	Adjustment	Inhalation Cancer Slope Factor	Units	Weight of Evidence/Cance Guideline Description	Source	Date (1) (MM/DD/YY)
Arsenic	4.3E-03	(ug/cu m)-1	3,500	1.5E+01	(mg/kg/day)-1	A	IRIS	11/3/2000
Pathway: Oral/Dermal								
Chemical of Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor	Adjusted Dermal Cancer Slope Factor (2)	Units		Weight of Evidence/Cance Guideline Description	Source	Date (1) (MM/DD/YY)
Arsenic	1.5E+00	100.00%	1.5E+00	(mg/kg/day)-1		A	IRIS	11/3/2000

IRIS = Integrated Risk Information System

EPA Group:
A - Human carcinogen

(1) The date IRIS was searched.

(2) Adjusted Dermal Cancer Slope Factor = Oral Cancer Slope factor divided by the Oral-to-Dermal Adjustment factor.

Non-Cancer Toxicity Data Summary									
Pathway: Oral/Dermal									
Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty Modifying Factors	Sources of RfD: Target Organ	Dates (1) (MM/DD/YY)
Arsenic	Chronic	3.0E-04	mg/kg/day	3.0E-04	mg/kg/day	Skin	3	IRIS:NCEA	11/3/2000- IRIS 2/1/1993- NCEA

NA = Not Applicable

(1) For IRIS values, this is the date IRIS was searched. For NCEA, the date of the article is provided.

(2) Dermal RfD = Oral RfD Value x Oral-to-Dermal Adjustment factor (100% for these COCs)

7.1.4 Risk Characterization

This section presents the results of the evaluation of the potential risks to human health associated with exposure to contaminated groundwater at the Lava Cap Mine Superfund Site. By taking the exposure scenarios and applying the approach from the toxicity assessment, USEPA arrived at a characterization of potential health risks to residents at the Site from contaminated drinking water. Note that these residents may also face risks from other residential and recreational activities beyond groundwater use.

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

ELCR = Chronic Daily Intake x Slope Factor

Chronic daily intake is the amount of contaminant-specific chemical exposure averaged over 70 years and is in the units mg/kg-day. The slope factor is based on research data and is a representation of the escalation of cancer risk with increasing exposure to a specific contaminant. These risks are probabilities that usually are expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that an individual has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. Data collected by public health agencies indicate the chance of an individual developing cancer from all other causes has been estimated to be as high as 1 in 3. USEPA's generally acceptable risk range for site-related exposures is 10^{-4} to 10^{-6}. An ELCR of greater than one in ten thousand (1×10^{-4}) is the point at which action is generally required at a site (USEPA, 1991a).

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., a lifetime) with a reference dose (derived from research data) for a similar exposure period. The ratio of exposure level to the reference dose is called a hazard quotient or HQ and is represented by the following equation:

Noncancer Hazard Quotient = Chronic Daily Intake ÷ Reference Dose

An HQ less than one indicates that a receptor's dose of a single contaminant is less than the reference dose and that toxic noncarcinogenic effects from exposure to that contaminant are unlikely. HQs for all COCs that affect the same target organ (e.g., liver) are added together to generate the Hazard Index (HI). An HI less than one indicates that noncarcinogenic effects from all the contaminants are unlikely. Conversely, an HI greater than one indicates that site-related exposures may present a risk to human health.

Several assumptions used in the HHRA evaluation contribute uncertainty to the risk assessment. These uncertainties are common to the risk assessment process and are not specific to this Site. Some may result in underestimation of risk, others in overestimation of risk. The methods employed in preparing the HHRA for the Lava Cap Mine Site followed USEPA guidance. Some of the key areas of uncertainty include:

The risks calculated depend largely on the assumptions used to calculate the level of contaminant intake. For this assessment, reasonable maximum exposure (RME) values are used. The use of these RMEs makes it likely that the risk is not underestimated, and may in fact be overestimated. In addition, the amount of each of the constituents that might be absorbed into

the body may be quite different from the amount of chemical that is actually contacted (i.e., due to bioavailability). In this assessment, bioavailability of ingested and inhaled chemicals is conservatively assumed to be 100 percent. Actual chemical- and site-specific values are likely to be much less than this conservative default value.

There is uncertainty associated with the exposure pathways and exposure assumptions used in the exposure assessment. The selection of exposure pathways is a process, often based on professional judgment, that attempts to identify the most probable potentially harmful exposure scenarios. These factors may overestimate the amount of time a receptor spends in a particular pathway. However, risks are sometimes not calculated for each and every potential exposure pathway that may occur, possibly causing some underestimation of risk.

The availability and quality of toxicological data is another source of uncertainty in the risk assessment. Uncertainties associated with animal and human studies may have influenced the toxicity criteria. Carcinogenic criteria are classified according to the amount of evidence available that suggests human carcinogenicity. USEPA assigns each carcinogen a designation of A through E, dependent upon the strength of the scientific evidence for carcinogenicity (USEPA, 1989a). Arsenic has been designated as a known human carcinogen (Class A), but there is considerable uncertainty in many of the carcinogenic and non-carcinogenic factors used. This could lead to either under- or overestimation of risks, although the conservative factors used in the process make it fairly unlikely that risks will be underestimated.

7.1.5 HHRA Results

Table 4 presents the risk characterization summaries for carcinogenic and noncarcinogenic effects. The risk estimates presented in this table are based on RME and were developed by taking into account conservative assumptions about the frequency and duration of exposure, as well as the toxicity of the primary COC- arsenic (see the HHRA for more detail).

Risks due to residential exposure in the Mine Area are estimated as follows: The ELCR is estimated at 5.8×10^{-3} or one excess cancer in a population of 172 individuals (approximately 22% (1.3×10^{-3}) of this estimated total risk is from ingestion of arsenic-contaminated groundwater). This exceeds the acceptable risk range of 1×10^{-4} to 1×10^{-6} cited in the NCP. The HI is estimated at 91, with 7 of the 91 (8%) associated with exposure to contaminated groundwater.

Risks due to residential and recreational use along Little Clipper Creek are estimated as follows. The ELCR is estimated at 1.6×10^{-3} or one excess cancer in a population of 625 individuals (approximately 69% (1.1×10^{-3}) of this estimated total risk is from ingestion of arsenic-contaminated groundwater). This exceeds the acceptable risk range of 1×10^{-4} to 1×10^{-6} cited in the NCP. The HI is estimated at 16, with 33% of the HI associated with groundwater exposure. Note that this assumes the resident is using one of the few contaminated residential wells located downgradient of the mine. Most of the downgradient residential wells contain very little arsenic and would contribute much less risk to the resident.

Based on the risk characterization results shown in Table 4, which demonstrate cancer and noncancer risks to residents and future workers in the Mine Area OU, USEPA has determined that actual or threatened releases of hazardous substances at this Site, if not addressed by implementing the response action selected in this IROD, may present an imminent and substantial endangerment to public health and welfare.

Table 4

Risk Characterization Summary - Carcinogenic and Noncarcinogenic

Lava Cap Mine Site - Groundwater OU2 IROD

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
												Total Skin HI =	30
Scenario Timeframe: Current; Receptor Population: Resident; Receptor Age: Adult/Child(3)													
Groundwater	Groundwater	Mine Area residential tap water	Arsenic	1.28E-03	--	1.57E-05	1.3E-03	Arsenic	Skin	5.2	--	--	5.2
			GW Total (1)		--		1.3E-03	GW Total (1)					7.0
			Total Risk Across All Media and All Exposure Routes				5.8E-03	Total Hazard Index Across All Media and All Exposure Routes					91
												Total Skin HI =	86.5
Scenario Timeframe: Current; Receptor Population: Resident w/Recreational Activities at LCC; Receptor Age: Adult/Child(3)													
Groundwater	Groundwater	LCC residential tap water from high arsenic well	Arsenic	1.1E-03	--	2.10E-06	1.05E-03	Arsenic	Skin	4.2	--	0.02	4.2
			GW Total (1)		--		1.1E-03	GW Total (1)					5.3
			Total Risk Across All Media and All Exposure Routes				1.6.E-03	Total Hazard Index Across All Media and All Exposure Routes					16
												Total Skin HI =	14.2

(1) The total risk values include all constituents evaluated in the HHRA, not just the COCs that are listed on this table. The HHRA (Appendix E in EPA, 2001a) provides details for all constituents.

(2) Future exposure is hypothetical and not expected to actually occur. It is evaluated for risk assessment purposes only.

(3) The Adult/Child receptor age- assumes 6 years of exposure as a child followed by 24 years of exposure as an adult.

7.2 Human Health Risk Assessment Update

As part of the groundwater monitoring program that has been a continuing component of USEPA's OU2 work at the Site, additional groundwater samples have been collected since the original baseline risk assessment was completed in 2001. For the OU2 RI Report (EPA, 2008a), an update to the groundwater HHRA was prepared that evaluated potential exposure to contaminated groundwater through residential wells at the Site.

It was determined that additional risk calculations for the residential drinking water scenario were not needed for the following reasons:

- All USEPA statutory requirements for a baseline risk assessment had already been addressed in the 2001 RI HHRA (USEPA, 2001a).
- Implementation of groundwater remedial actions has already been justified based on the results of the 2001 RI HHRA.
- USEPA has already established an actionable remediation goal for groundwater at the Site using the current arsenic MCL of 10 µg/L.
- USEPA can justify action for all residential wells with groundwater arsenic concentrations greater than the MCL based on the results of the 2001 RI HHRA.

Instead of preparing actual risk calculations for the update of the HHRA, a comparison of residential well data to the arsenic drinking water MCL was conducted. The unfiltered groundwater monitoring results for arsenic (total arsenic) were compared to the MCL. Several contaminated residential wells have wellhead treatment or under-sink treatment units installed to remove arsenic from the water. For these wells, untreated results from the wellhead were used; the sample results from the under-sink treatment units were not used.

MCLs are the maximum permissible level of a contaminant in water delivered to any user of a public water system. The current arsenic MCL was adopted on January 22, 2001, and became effective on February 22, 2002. The date by which systems must comply with the new MCL is January 23, 2006.

For the OU2 RI, total arsenic concentrations in groundwater from Site residential wells from 1999 through 2007 were used to update the HHRA. Residential wells in the following five areas at the Site were included in the updated HHRA:

- Background Areas – Wells 11A3, 11AR, 11AW, and 11A5
- Source Area and Mine Area (corresponds to Exposure Unit 3 in the 2001 RI HHRA) – Wells 10G, 10H, 10I, 10J, and 10N
- Downgradient Area corresponds to Exposure Unit 4 in the 2001 RI HHRA and includes the following:
  - Below the mine and above Greenhorn Road – Wells 11AL, 11AS, 11AT, 11AU, 11AV, 11AY, 11AZ, and 11A4
  - Between Greenhorn Road and the Deposition Area – Wells 11AF, 11AJ, 11AK, 11AM, 11AN, 11AO, 11AQ, 11AX, 11AX2, and 11A1

- Lost Lake/Deposition Area (corresponds to Exposure Unit 2 in the 2001 RI HHRA) – Wells 11AA, 11AB, 11AC, 11AD, 11AE, 11AG, 11AH, 11AI, 11AP, and 11A2

Data were not available for several of these wells when the 2001 RI HHRA was prepared, including Wells 11A3, 11AW, 11A5, 10N, 11AY, 11AZ, 11A4, 11AX, 11AX2, 11A1, and 11A2.

For each well, the total number of samples, minimum arsenic concentration, and the maximum arsenic concentration were determined from the dataset (see Table 5). In addition, each sample result was compared to the MCL for arsenic and the number of exceedances at each location - was determined.

None of the groundwater samples from residential wells in the Background Areas and the Lost Lake/Deposition Area exceed the MCL for arsenic. Three residential wells (Wells 11AL, 11AS, and 11AV) in the Downgradient Area (along Little Clipper Creek, below the mine and above Greenhorn Road) had many exceedances of the arsenic MCL. For Well 11AL, all 22 samples exceeded the MCL; the maximum detected concentration was 90 µg/L. For Well 11AS, 15 of the 16 samples collected exceeded the MCL; the maximum detected concentration was 270 µg/L. Thirteen of the 16 samples collected exceeded the MCL at Well 11AV; the maximum detected concentration was 890 µg/L.

All of the residential wells (Wells 10G, 10H, 10I, 10J, and 10N) in the Source Area and Mine Area had exceedances of the MCL. Nineteen of the 21 samples collected at Well 10G exceeded the MCL; the maximum detected concentration was 41 µg/L. At Well 10H, 15 of the 19 samples collected exceeded the MCL; the maximum detected concentration was 31.7 µg/L. For Wells 10I, 10J, and 10N, all samples (2, 5, and 12, respectively) exceeded the MCL. The maximum detected concentrations at these wells were 528, 56.8, and 54.7 µg/L, respectively.

In 2003, USEPA installed in-home, under-sink treatment units to remove arsenic in the water from three of the residential wells within or near the Source Area and Mine Area (Wells 10G, 10H, and 11AL). These wells were actively used for domestic purposes and have exhibited elevated arsenic concentrations (above the MCL). Two other wells (Wells 10N and 11AV) also had elevated arsenic concentrations and had previously been equipped with treatment units by the residents. The residence supplied by Well 10H was demolished in 2006 as part of the OU1 RA, and this system is no longer in operation.

At Wells 10G and 11AL, both untreated well water (from the wellhead) and treated water (from the treatment unit discharge) samples were collected during April 2006, October 2006, and March 2007. Sample results show that the treatment unit associated with Well 11AL was operating as intended at all sampling events for the guest house, but the 1Q07 sample (from the main house) exceeded the MCL for the first time. This treatment unit was serviced and the filter replaced. The treatment unit associated with Well 10G was working as intended during all sampling events, except for September 2005. The September 2005 sample from the Well 10G treatment unit indicated the treatment system needed maintenance. The required maintenance was performed and arsenic concentrations in the treated water returned to less than 0.55 µg/L.

TABLE 5
Arsenic Concentrations in Residential Wells
Lava Cap Mine Site Groundwater OU2 IROD

Well	Total Number of Samples	Period of Years Samples Were Collected	Minimum Arsenic Concentration (µg/L)	Maximum Arsenic Concentration (µg/L)	Arsenic MCL (µg/L)	Number of Exceedances of MCL	Frequency of MCL Exceedances	Percent Exceedances of MCL
Background Areas Residential Wells								
11A3	4	2005 – 2006	1 U	1 U	10	0	0/4	0
11AR	1	2000	0.1 J	0.1 J	10	0	0/1	0
11AW	4	2003 – 2006	0.21 J	0.41 J	10	0	0/4	0
11A5	1	2006	1	1	10	0	0/1	0
Source Area and Mine Area Residential Wells								
10G	21	1999 – 2007	7.1	41.0	10	19	19/21	90
10H	19	1999 – 2006	2.5	31.7	10	15	15/19	79
10I	2	1999	377	528	10	2	2/2	100
10J	5	2000 – 2002	41.9	56.8	10	5	5/5	100
10N	12	2002 – 2006	28.9	54.7	10	12	12/12	100
Downgradient Residential Wells along Little Clipper Creek, below the mine and above Greenhorn Road								
11AL	22	1999 – 2007	18.7	90	10	22	22/22	100
11AS	16	2001 – 2007	2.1	270	10	15	15/16	94
11AT	7	2001, 2004, 2006 – 2007	0.2 J	1 U	10	0	0/7	0
11AU	16	2001 – 2007	1.4	5.7	10	0	0/18	0
11AV	16	2001 – 2007	3.5	890	10	13	13/16	81
11AY	4	2005 – 2006	0.98 J	1.5	10	0	0/4	0
11AZ	4	2005 – 2006	1.4	2.4	10	0	0/4	0
11A4	4	2006 – 2007	0.84 U	2.1	10	0	0/4	0
Downgradient Residential Wells along Little Clipper Creek, between Greenhorn Road and the Deposition Area								
11AF	12	1999 – 2004, 2006	0.89 J	1.9 J	10	0	0/12	0
11AJ	9	1999 – 2005	0.1 J	1 UJ	10	0	0/9	0
11AK	2	1999 – 2000	1.2	1.2	10	0	0/2	0

TABLE 5
Arsenic Concentrations in Residential Wells
Lava Cap Mine Site Groundwater OU2 IROD

Well	Total Number of Samples	Period of Years Samples Were Collected	Minimum Arsenic Concentration (µg/L)	Maximum Arsenic Concentration (µg/L)	Arsenic MCL (µg/L)	Number of Exceedances of MCL	Frequency of MCL Exceedances	Percent Exceedances of MCL
11AM	7	1999 – 2000, 2002, 2004, 2006	0.2 U	2 U	10	0	0/7	0
11AN	10	1999 – 2005	0.2 U	9.8	10	0	0/10	0
11AO	9	1999 – 2000, 2002-2005	0.28	1 UJ	10	0	0/9	0
11AQ	5	1999 – 2000, 2003-2004	0.25 U	1 U	10	0	0/5	0
11AX/11AX2	7	2004, 2006 – 2007	0.54 UJ	3.5[a]	10	0	0/7	0
11A1	4	2005 – 2006	0.24 J	1 U	10	0	0/4	0
Lost Lake/Deposition Area Residential Wells								
11AA	8	1999 – 2002, 2004 – 2005	0.09 UJ	1 U	10	0	0/8	0
11AB	9	1999 – 2000, 2002 – 2004, 2006	0.2 J	5 U	10	0	0/9	0
11AC	2	1999 – 2000	0.2 U	0.2 U	10	0	0/2	0
11AD	9	1999 – 2000, 2002 – 2004, 2006	0.1 U	0.6	10	0	0/9	0
11AE	9	1999 – 2005	0.1 U	1 U	10	0	0/9	0
11AG	8	1999 – 2000, 2002 – 2005	0.1 U	1 U	10	0	0/8	0
11AH	5	1999 – 2000, 2003 – 2004	0.1 U	1 U	10	0	0/5	0
11AI	9	1999 – 2005	0.1 U	1 UJ	10	0	0/9	0
11AP	7	1999 – 2004	0.2 U	5 U	10	0	0/7	0
11A2	4	2005 – 2006	1 U	1 U	10	0	0/4	0

[a]An anomalous result of 16.8, which is not considered representative of actual groundwater conditions, was excluded from this summary because it was from a stagnant water sample. The next highest arsenic concentration at this well is 3.5 µg/L.

Notes:
U = Analyte analyzed for, but not detected.

J = Estimated value.
UJ = Analyte not detected; detection limit is estimated concentration.

Summary data exclude field duplicate and split sample results.

7.3 Ecological Risk Assessment

This IROD is focused on human exposure to arsenic contamination through use of contaminated residential wells. As such no discussion of potential risks to ecological receptors is included herein. As noted above, a detailed sitewide ecological risk assessment was completed and is presented in the RI Report (EPA, 2001a). It is not yet clear if groundwater at the Site has a complete pathway for ecological exposure. There is the possibility that arsenic-contaminated groundwater discharges to Little Clipper and Clipper Creeks. Supplemental OU2 RI work that is currently being planned will provide additional detail on the significance of these potential groundwater discharge pathways. If necessary, ecological risks from these surface water expressions will be further evaluated as part of the OU3 RI/FS work.

8 Remedial Action Objectives

The goals of a Superfund cleanup are called remedial action objectives (RAOs). RAOs provide a general description of what the cleanup will accomplish and serve as the design basis for the cleanup alternatives. Specific RAOs developed for the Lava Cap Mine Site Groundwater OU are:

- Protect against residential exposure to groundwater contaminated with mine-related arsenic that presents an unacceptable risk to human health. Arsenic is the primary risk driver at the Site and USEPA has selected the arsenic MCL (10 µg/L) as the target to be used to identify residential wells where action is required to be protective of human health and the environment. This is considered an immediate objective that is possible to achieve using a variety of readily implementable technical approaches. This remedial action objective is the primary focus of the Interim Remedy selected in this IROD.

This RAO does not include numeric, chemical-specific objectives for aquifer cleanup or a time frame for restoration because this is in an interim action focused only on managing risks associated with drinking water exposures. The arsenic MCL will be used to identify wells that need to be addressed as part of this action, but has not yet been selected as an actual aquifer cleanup goal.

Additional RAOs will be developed for a final OU2 ROD that will include, as necessary and practicable, control of potential migration (and discharge to surface water) of groundwater contaminated with mine-related arsenic. The final OU2 ROD will also determine if aquifer restoration is feasible and, if so, what remedial actions are necessary to achieve this goal.

9 Description of Alternatives

USEPA prepared a Feasibility Study for the Groundwater OU2 (USEPA, 2008b) the purpose of which was to develop, screen, and evaluate cleanup alternatives to address impacts to human health and the environment from contaminated residential wells. Three active remedial alternatives were developed and evaluated, along with the required no-action alternative. A brief description of each remedial alternative is presented below.

9.1 Alternative 1 – No Action

Consideration of a no action alternative is required by the *EPA Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (EPA, 1988) as a baseline for comparison with other remedial alternatives. The No Action alternative does not include active remediation or monitoring. No cost is associated with this alternative. Although this alternative does not include any active remediation or monitoring, there are selected activities that are likely to continue regardless of whether any action is taken in OU2. The existing point-of-use (POU) and wellhead treatment units installed by USEPA and private residents would likely continue to operate (with maintenance costs borne by the homeowner), although this is not certain. Also, in the absence of an adequate OU2 monitoring program, a performance monitoring program would be required for the OU1 remedy that would involve focused surface water and shallow groundwater monitoring. Similarly, there would potentially be a surface water monitoring program associated with the OU3 remedy that USEPA may select in the future.

9.2 Alternative 2 – Point-of-use Treatment

Alternative 2 is designed to protect human receptors by minimizing ingestion of arsenic in groundwater. The components of Alternative 2 include land use notifications, monitoring of groundwater, and installation and maintenance of POU treatment systems.

9.2.1 Treatment

POU treatment is intended to minimize ingestion of mine-related arsenic-contaminated groundwater. Homes served by residential wells within the modeled footprint of potential migration pathways of mine-impacted groundwater (see Figures 4 and 5) that produce groundwater exceeding the MCL would have a POU treatment system installed. As is shown on Figures 4 and 5, the footprint of potential mine-related contamination extends from the Mine Area downgradient, beyond Lost Lake to Little Greenhorn Creek. However, as previously described, most of the potential flow paths contained within the shaded areas on the figures have only a remote possibility of transporting arsenic contamination that would impact a residential well.

The treatment system would be a commercial POU system based on reverse osmosis (RO) technology. The unit would be mounted under the kitchen sink of affected residences with a RO vessel, pre-and post-filtration vessels, interconnecting tubing, instruments, and controls in a packaged unit. The unit would be installed so that any water entering the faucet would pass through the POU unit.

There are four existing POU treatment systems and one wellhead treatment system currently installed at and immediately downgradient from the mine. Two of these POU systems were installed by USEPA (Wells 10G and 11AL at the guest house) and two were installed by the residents without consulting USEPA (Wells 10N and 11AL at the main house). The wellhead system at Well 11AV was also installed by the resident. For cost estimating, this FS assumes that up to seven additional POU treatment systems will be installed in the future. It is assumed that six of these additional systems would be installed at existing homes with residential wells that become impacted by mine-related contamination in the future, but they could potentially be installed in new homes supplied by new or existing wells within mine-impacted areas. The seventh new POU treatment system is assumed to replace the existing system currently treating water from Well 11AL. This POU treatment system is having operational difficulties and likely will require replacement in the future. The new and existing POU treatment systems require routine maintenance (including replacement of adsorption media) to provide reliable treatment of arsenic. Cost estimates assume maintenance for 10 POU systems. This maintenance would be triggered by supplier and manufacturer recommendations of membrane and filter cartridge or media replacement frequencies. Analysis of influent and effluent samples from each treatment system is included in annual maintenance costs for these systems. Disposal of spent treatment membranes or filter media is not expected to be a concern and it is assumed that residents would dispose of membranes and filter cartridges or media as municipal solid waste. The small amount of brine waste generated by the treatment units would be disposed of in the home septic system with other household wastewater.

9.2.2 Monitoring

Existing residential wells that are currently monitored by USEPA and selected existing monitoring wells will be periodically sampled to track migration of mine-related groundwater contamination towards residential wells. Continued monitoring is required to identify potential future changes in contaminant distribution that may require changes to the remedy (e.g., new releases from the Source Area or migration of contamination towards additional residential wells) and to evaluate whether remedial alternatives are adequately protecting human health.

An assumed monitoring program has been developed to prepare annual monitoring costs. This conceptual program includes semiannual monitoring at selected locations and either annual or biannual monitoring at most locations; the samples would be analyzed for arsenic as well as a few additional metals and general chemistry parameters.

9.2.3 Land Use Notifications

To limit potential human exposure to contaminated groundwater, USEPA will work with the Nevada County Environmental Health Department (NCEHD) to develop a land use notification process for parcels located within the footprint of potential flowpaths emanating from Lava Cap Mine. The specific number of parcels that would require such notifications has not been determined, but USEPA estimates it is in the range of 30 to 50 parcels. To implement this notification process, USEPA will provide NCEHD maps showing the parcels located in potentially impacted areas. It should be noted, however, that existing wells in most of these areas currently produce water that is below the MCL for arsenic. USEPA envisions that whenever a resident located on one of the potentially impacted parcels requests a well permit

from NCEHD, the NCEHD will notify USEPA and provide the resident with written information about the potential for arsenic contamination in the proposed well and the associated health risks. Cost estimates assume that a small annual cost would be incurred for providing maps and coordinating with Nevada County. Annual costs were estimated to include inspections of residential wells and updates to the notification maps and associated fact sheets if arsenic conditions change. At the issuance of the final ROD for OU2, USEPA will evaluate the effectiveness of this process and determine if additional institutional controls are necessary and feasible.

9.3 Alternative 3 – Wellhead Treatment

Alternative 3 is intended to protect human receptors by preventing contact with arsenic in groundwater. The components of Alternative 3 include installation and maintenance of wellhead treatment units, expanded monitoring of groundwater, and land use notifications.

9.3.1 Treatment

Wellhead treatment is intended to eliminate exposure to arsenic-contaminated groundwater. Where the POU treatment described for Alternative 2 would only treat water at one sink in a residence, wellhead treatment would treat all water extracted from the impacted residential well, including landscaping and irrigation water. Residential wells that produce groundwater exceeding the arsenic MCL and are within the modeled footprint of potential migration pathways of mine-impacted groundwater (see Figures 4 and 5) would be equipped with a wellhead treatment system. For costing, it is assumed that the wellhead treatment systems will use RO technology, similar to the POU treatment systems described for Alternative 2 (but capable of treating larger discharge rates).

There are currently five impacted residential wells that provide drinking water (Wells 10G, 10H, 10N, 11AL, and 11AV). Homes supplied with groundwater from Wells 10G, 10H, 10N, and 11AL are currently equipped with POU treatment; Well 11AV is equipped with wellhead treatment. In addition, there are two wells contaminated with arsenic that are not currently treated because they are used only for outdoor irrigation purposes (Wells 10I and 11AS). Cost estimates assume that these seven existing residential wells would each have a new wellhead treatment system installed. In addition to these seven systems, the cost estimate assumes that up to five additional wellhead treatment systems would be installed in the future. It is assumed that these additional systems would be installed at existing homes with residential wells that become impacted by mine-related contamination in the future, but they could potentially be installed at new wells within mine-impacted areas. These wellhead treatment systems require routine maintenance to provide reliable treatment of arsenic (including change out of adsorption media). Maintenance requirements would be based on system vendor recommendations and breakthrough of arsenic at the wellhead. Influent and effluent samples from each treatment system are included in the annual costs for system maintenance. For cost estimates, treatment residuals are expected to be non-hazardous and appropriate for disposal as municipal solid waste. Brine wastes would be disposed of in the home septic system with other household wastewater.

9.3.2 Monitoring

Monitoring would be the same as described for Alternative 2.

9.3.3 Land Use Notifications

Land use notifications would be the same as described for Alternative 2.

9.4 Alternative 4 – Nevada Irrigation District Water Supply

The intent of Alternative 4 would be to provide a reliable municipal water supply to replace well water at properties where existing wells are affected by mine-related arsenic contamination in groundwater. The local municipal water supplier would be the Nevada Irrigation District (NID). Residences with wells that are impacted by mine-related arsenic contamination would be connected to the NID treated water supply.

9.4.1 Replacement Water Supply from NID

NID does not currently have distribution pipelines along Greenhorn Road, south of the mine. However, NID operates the Elizabeth George water treatment plant located northwest of Lava Cap Mine. The NID distribution system is on the top of a ridge north of the mine, along Banner Lava Cap Road.

This alternative would provide an NID water connection to homes where residential wells produce groundwater that exceeds the arsenic MCL and are within the modeled footprint of potential migration pathways of mine-impacted groundwater (see Figures 4 and 5). Although the footprint of potential mine-related contaminant migration pathways extends from the Mine Area downgradient beyond Lost Lake to Little Greenhorn Creek, there are currently no arsenic impacts to residential well groundwater south of Greenhorn Road. Cost estimates assume that a new 8-inch-diameter ductile iron pipe would be installed from Banner Lava Cap Road (above the mine) down to Greenhorn Road (below the mine) (see Figure 6). The cost estimate for this alternative assumes that connections would be made from the new pipeline to 10 locations that correspond to existing residential wells (Wells 10I, 10J, 10N, 10H, 10G, 11AV, 11AS, 11AL, 11AZ, and 11AY) located north of Greenhorn Road.

No O&M costs are included in this alternative because it is assumed that this new pipeline will become part of the NID water supply system, and NID would provide maintenance. The residential well owners would pay NID directly for their water consumption.

9.4.2 Monitoring

Monitoring would be the same as described for Alternative 2.

9.4.3 Land Use Notifications

Land use notifications would be the same as described for Alternative 2.

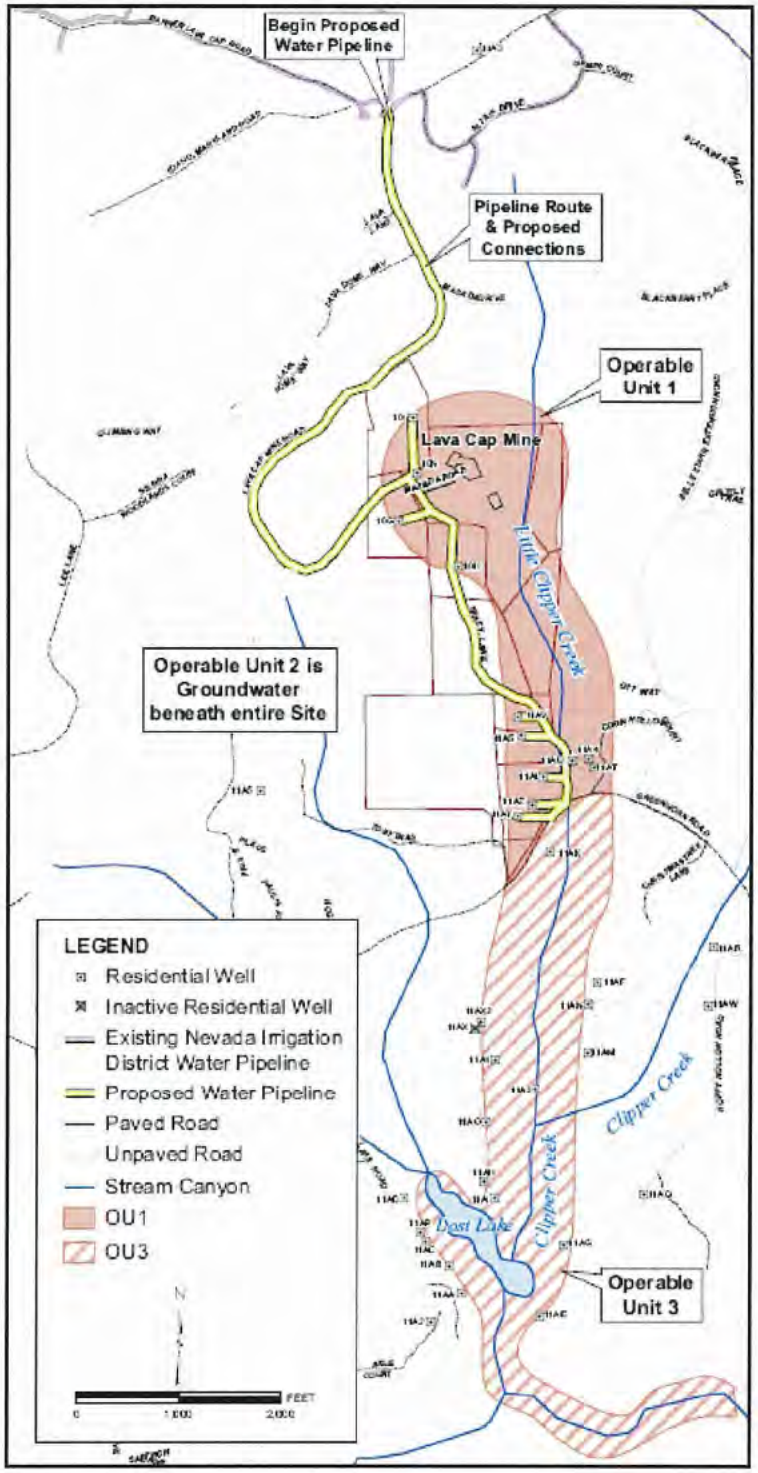


Figure 6 Proposed NID Pipeline, Lava Cap Mine, Nevada County, California

10 Comparative Analysis of Alternatives

The remedial alternatives described in Section 9 are evaluated using the nine Superfund evaluation criteria listed in 40 C.F.R. Section 300.430, which are described below. The comparative analysis provides the basis for determining which alternatives present the best balance of the criteria. The first two evaluation criteria are considered threshold criteria that the selected remedial action must meet. The five primary balancing criteria which are listed below employed in the process of comparing alternatives to achieve the best overall solution. The two modifying criteria, state and community acceptance, are also considered in remedy selection.

Threshold Criteria

- **Overall Protection of Human Health and the Environment** addresses whether an 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.

- **Compliance with ARARs** addresses the requirement of Section 121(d) of CERCLA that remedial actions 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).

Primary Balancing Criteria

- **Long-term Effectiveness and Permanence** refers to the ability of a remedy to maintain reliable protection of human health and the environment over time.

- **Reduction of Toxicity, Mobility, or Volume Through Treatment** refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

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

- **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, coordination with other governmental entities, as well as other factors, are also considered.

- **Cost** evaluates the estimated capital, O&M, and indirect costs of each alternative in comparison to other equally protective alternatives.

Modifying Criteria

- **State Acceptance** indicates whether the state agrees with, opposes, or has concerns about the preferred alternative.

- **Community Acceptance** includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose.

This section describes each threshold and primary balancing criterion, evaluates each alternative in relation to each criterion, and identifies advantages and disadvantages among the alternatives in relation to each criterion. Table 6 presents a comparative matrix in which the alternatives are ranked for each of the evaluation criterion. The details of how the rankings have been assigned for each criterion are provided below.

10.1 Overall Protection of Human Health and the Environment

The NCP requires that all alternatives be assessed to determine whether they can adequately protect human health and the environment from unacceptable risks from site contamination. These risks can be mitigated by eliminating, reducing, or controlling exposure to hazardous substances, pollutants, or contaminants.

Alternative 1 is not adequately protective of human health or the environment because it allows uncontrolled human exposure and does not provide any monitoring of potential additional migration toward residential wells. Alternatives 2 through 4 provide protection of human health by limiting or preventing exposure to arsenic in drinking water. Alternative 2 provides the lowest overall protection because contaminated water would continue to be used in residences and under-sink POU treatment is unlikely to completely eliminate exposure. Alternative 3 provides a greater level of protection by treating all water from impacted wells, further reducing potential exposure. Alternative 4 provides the highest level of human health protection by providing an alternative water supply that does not rely on the effectiveness of wellhead treatment or the associated long-term O&M. Alternative 2 through 4 monitor potential future impacts related to continued migration of mine-impacted groundwater contamination toward residential wells.

10.2 Compliance with ARARs

This evaluation criterion is used to determine if each alternative would comply with federal and state ARARs, or whether invoking waivers to specific ARARs is adequately justified. Other information, such as advisories, criteria, or guidance, is considered where appropriate during the ARARs analysis.

USEPA does not evaluate compliance with ARARs for no-action alternatives, such as Alternative 1. Alternatives 2 and 3 are expected to meet the MCL for arsenic in drinking water, although there is some potential under Alternative 2 for residential consumption of drinking water that exceeds the arsenic MCL. Because Alternative 4 provides an alternate source of drinking water and does not treat the groundwater, the MCL for arsenic is not an ARAR, although NID is required by law to provide water that meets this MCL. Alternatives 2 through 4 are expected to comply with all action- and location-specific ARARs during construction.

10.3 Long-term Effectiveness and Permanence

This evaluation criterion addresses the long-term effectiveness and permanence of maintaining the protection of human health and the environment after implementing the RA described in the remedial alternative. The primary components of this criterion are the magnitude of residual risk remaining at the Site after remedial objectives have been met and the extent and effectiveness of controls that might be required to manage the risk posed by treatment residuals and untreated wastes.

All current and future risks to human health and the environment would remain under Alternative 1. Significant groundwater contamination would remain in Alternatives 2 through 4; however, human health risks from this contamination would be controlled by minimizing or eliminating exposure to contaminated drinking water. Alternative 2 is ranked lower than Alternatives 3 and 4 because it relies on long-term, consistent use and proper maintenance of the POU treatment units. Similarly, Alternative 4 is ranked higher than Alternative 3 because of the increased reliability and adequacy of the NID supply compared with long-term, proper monitoring and O&M of wellhead treatment units at individual residences.

10.4 Reduction of Toxicity, Mobility, or Volume through Treatment

This evaluation criterion addresses the anticipated performance of the alternative's treatment technologies in permanently and significantly reducing the toxicity, mobility, and volume of hazardous materials at the Site. The NCP prefers RAs where treatment is used to reduce the principal threats at a site through destruction of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media.

Alternatives 1 and 4 would not result in a significant reduction of toxicity, mobility, or volume of arsenic in the groundwater system. However, Alternatives 2 and 3, through treatment, reduce the toxicity of arsenic in groundwater that is extracted for drinking water purposes. Although Alternative 4 does not include treatment, it does reduce toxicity by eliminating groundwater extraction from contaminated wells.

10.5 Short-term Effectiveness

This evaluation criterion considers the effect of each alternative on the protection of human health and the environment during the construction and implementation process. The short-term effectiveness evaluation only addresses protection prior to meeting the RAO.

There would be no short-term impacts for Alternative 1, but RAOs would not be achieved. Alternatives 2 and 3 involve very limited construction activities. Accordingly, the short-term impacts are minimal. Installation of the NID pipeline in Alternative 4 would create a short term risk to workers and have significant short-term nuisance impacts on the local community adjacent to the mine. Accordingly, this alternative is ranked lower than Alternatives 2 and 3.

For Alternatives 2 and 3, RAOs for the protection of human health should be achieved relatively quickly (less than 1 year) given the limited properties expected to require treatment. Alternative 4 would take longer because of the additional administrative requirements, including NID coordination and numerous agreements with private property owners, associated with

installation of the NID pipeline and connection of individual residences to the supply. Overall, Alternative 4 is ranked lowest for this criterion because the NID pipeline increases the short-term impacts to the community and extends the time until RAOs are achieved.

10.6 Implementability

This criterion evaluates the technical feasibility and administrative feasibility (i.e., the ease or difficulty) of implementing each alternative and the availability of required services and materials during its implementation.

The no-action alternative, Alternative 1, would be readily implementable. Alternatives 2 and 3 are also expected to be readily implementable because of the small number of residences involved. As previously noted, Alternative 4 requires coordination with NID, property owners, and other stakeholders. Installation of an NID water supply pipeline will provide additional administrative challenges but is feasible. This alternative is ranked lowest for this criterion.

10.7 Cost

This criterion evaluates the cost of implementing each alternative. The cost of an alternative encompasses all engineering, construction, and operation and maintenance costs incurred over the life of the project. According to CERCLA guidance, cost estimates for remedial alternatives were developed with an expected accuracy range of –30 to +50 percent.

The costs of the remedial alternatives are compared using the estimated net present value (NPV) of the alternative. The NPV allows costs for remedial alternatives to be compared by discounting all costs to the year that the alternative is implemented. In the *Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (EPA, 2000), USEPA states that the commonly used assumption of a 30-year period of analysis for estimating present value is not recommended, especially when better data is available regarding the duration of the remedy. Most of the remedial alternatives developed for this Site require long-term operation and maintenance activities, including groundwater monitoring and, potentially, groundwater treatment. A duration of 50 years was chosen as the period of analysis, rather than an assumption of 30 years. Operation and maintenance for the remedial alternatives will likely extend beyond 50 years. However, the NPV reaches an asymptotic level for increasing periods of analysis, and large uncertainties exist with regard to technological advances that could occur if longer durations are assumed for costing.

For all alternatives, the NPV was calculated using the discount rate 7.0 percent, based on the above-cited guidance. This represents a change from the Feasibility Study and Proposed Plan, where a discount rate of 3.2% was used. The revised figures are all lower than in the FS, and represent this lower discount rate. This change did not affect USEPA's analysis of the alternatives or selection of the remedy.

The estimated NPV of each alternative is shown in Table 7. Aside from the no-action alternative, Alternatives 2 and 3 are the lowest cost alternatives, with estimated NPVs of approximately

$664K and $943K, respectively. Alternative 4 is the highest cost alternative, with an estimated NPV of $3.795 million.

10.8 State Acceptance

In a letter dated September 30, 2008, the California Department of Toxic Substances Control, as lead agency for the State, concurred with the selected interim remedy for this operable unit.

10.9 Community Acceptance

USEPA received a few written comments on the Proposed Plan during the 30-day public comment period. In addition, considerable oral comments were received at the public meeting held on August 12, 2008. The oral comments that were not responded to directly at the public meeting and all of the written comments received, along with USEPA's responses to them, are presented in the Responsiveness Summary (Part III of this ROD). The full transcript for the public meeting is also included in the Responsiveness Summary.

In the development of this ROD, USEPA carefully considered all of the comments submitted. Most of the comments received were either neutral or favorable toward USEPA's proposed cleanup. A few issues were raised by commenters regarding installation of the NID pipeline and potential consequences resulting from the availability of additional municipal water supply, but none rejected USEPA's proposal. (See the Responsiveness Summary for further discussion of these issues.) Consequently, this IROD carries forth and adopts the preferred alternative published in the Proposed Plan. USEPA will continue to work with local stakeholders during the design process to ensure that any concerns regarding implementation of the remedy, should they arise, continue to be addressed.

TABLE 6
Remedial Alternatives Comparative Analysis Matrix
Lava Cap Mine Site – Groundwater OU2 IROD

		Threshold Criteria		Balancing Criteria				
Remedial Alternative	Major Components	Protection of Human Health and the Environment	Compliance with ARARs	Long-term Effectiveness and Permanence	Reduction in Toxicity, Mobility and Volume	Short-term Effectiveness	Implementability	Estimated NPV ($)
Alternative 1: No Action	None	C – RAOs would not be achieved. Health risks to residents would be above acceptable range.	C – N/A	C – Future risks to human health and the environment would not be diminished.	C – No treatment or reduction in toxicity, mobility, and volume of arsenic in drinking water.	C – No remedial action; therefore, no additional impacts to residents from implementation. RAOs would not be achieved.	A – Implementable.	0
Alternative 2: Point-of-use Treatment	Point-of-use (POU) treatment Monitoring Land-use notifications	B – Significantly reduces arsenic ingestion by residents if only treated water is consumed.	B – Would comply with SDWA if residential consumption is limited to only POU treated water.	B – Residential exposure to contaminated drinking water is controlled, though only at POU unit. Some uncertainty with long-term reliance solely on undersink POU treatment to limit exposure.	B –POU treatment would reduce toxicity in drinking water at the unit, though other water supplies in the household would not be treated.	A – Very limited construction activities; therefore, minimal additional impacts to community from implementation. RAO would be achieved rapidly.	A – Readily implementable with adequate coordination with property owners. Most existing residential wells that exceed the MCL have some form of POU treatment already installed.	664,000
Alternative 3 Wellhead Treatment	Wellhead treatment Monitoring Land-use notifications	B – Significantly reduces risks of exposure to arsenic in residential water during all use (indoor and outdoor).	A – Would comply with ARARs, including SDWA.	B – Significant reduction in risks to human health, as long as wellhead treatment units are properly maintained.	A –Wellhead treatment would reduce the toxicity of all water from the residential water.	A – Very limited construction activities; therefore, minimal impacts to community from implementation. RAO would be achieved rapidly.	A – Readily implementable with adequate coordination with property owners.	943,000
Alternative 4: NID Water Supply	Replacement water supply from NID Monitoring Land-use notifications	A – Higher level of protection of human health than Alternative 3 because exposure to contaminated groundwater is eliminated through municipal water source.	A – Complies with location-specific ARARs associated with the pipeline route. Drinking water MCLs are not ARAR for this alternative	A – Significant reduction in human health risks, with no requirement for of maintaining treatment units.	B – Although there is no treatment, this alternative eliminates the use of contaminated residential wells making the need for further treatment unnecessary.	B – Installation of the NID pipeline would create short-term risks to workers and have significant short-term nuisance impacts on the local community adjacent to the mine.	B – Implementable, but with administrative challenges associated with installation of the NID pipeline, including coordination with NID and a larger number of property owners.	3,795,000

Qualitative assessment of the results of criteria evaluation:
A = Favorable; B = Favorable with qualifiers; C = Not favorable

TABLE 7
Cost Summary of Remedial Alternatives
Lava Cap Mine Site – Groundwater OU2 IROD

	Alternative	Capital Cost ($)	Annual O&M Cost ($)	NPV for Annual O&M Cost[a] ($)	50-Year NPV[a] ($)
1	No action	0	0	0	0
2	Point-of-use treatment	12,000	47,000	653,000	664,000
3	Wellhead treatment	176,000	56,000	767,000	943,000
4	NID water supply	3,208,000	43,000	587,000	3,795,000
	Optional NID extension	1,891,000	0	0	0

[a]NPV estimates use a real discount rate of 7.0 percent.

Note: All costs are rounded to the nearest $1,000.

11 Principal Threat Wastes

EPA investigated the groundwater for contamination from various metals, arsenic, and cyanide because they are used in the mining and processing of ore. The investigation showed that arsenic is the most prevalent contaminant at the Site and presents the most significant risk to human health and the primary risk to ecosystem health. As a result, arsenic was the primary contaminant considered in developing remedial alternatives to address drinking water exposures. Both USEPA and the State of California consider arsenic a known human carcinogen. Potential non-cancer health effects from exposure to arsenic may include damage to tissues including nerves, stomach, intestines, and skin.

Arsenic was present in the ore mined at the Site, and remained in the tailings after processing. The tailings were placed, uncovered, in the adjacent Little Clipper Creek drainage and behind the Lost Lake Dam. Arsenic also occurs in water at the Site: oxidation in the underground rock or in the tailings, combined with surface and groundwater intrusion, results in the release of dissolved arsenic. Surface water flows, including those coming from the adit, can transport the dissolved arsenic downstream away from the source area. The arsenic-contaminated mine tailings present the principal contaminant source and the principal threat from the Site. USEPA considers these tailings to represent a principal threat waste to groundwater. This source material is highly toxic and highly mobile and, as USEPA's HHRA for the Site shows, presents a significant risk should exposure occur.

This IROD is focused on the drinking water component of the groundwater OU and is not intended to address the principal threat wastes at the Site. The OU1 RA addressed the tailings in the Mine Area and the adit discharge. The future OU3 RA will address the tailings in the downstream Lost Lake vicinity.

12 Selected Remedy

After considering CERCLA statutory requirements, the detailed comparison of the alternatives using the nine evaluation criteria, and public comments, USEPA, in consultation with the State of California has determined that the most appropriate interim remedy for this OU is Alternative 4: Replacement Water Supply from NID.

The interim remedy will provide a reliable municipal water supply from the local water agency, NID. Replacement water will be provided through connection to the NID water supply at residential properties where existing groundwater supply wells are affected by mine-related arsenic contamination in excess of the MCL. The general extent of potentially-impacted properties is based on the modeled footprint of potential migration pathways of mine-impacted groundwater (see Figures 4 and 5) and extends from the mine south beyond Lost Lake. However, it should be noted that none of the properties downgradient (south) of Greenhorn Road are currently impacted by elevated arsenic and the likelihood of new impacts in the future is limited.

NID does not currently have distribution pipelines along Greenhorn Road, south of the mine. However, the NID distribution system is present at the top of a ridge north of the mine, along Banner Lava Cap Road. Initially, the water supply pipeline will only be extended south as far as Greenhorn Road. The need for future pipeline extensions will be based on continued monitoring of residential wells and potential migration of mine-impacted groundwater.

The selected remedy includes implementation of a long-term groundwater monitoring program and a land-use notification process intended to minimize the potential for new wells to be installed in contaminated areas.

12.1 Summary of Rationale for the Selected Remedy

Based on the evaluation of the alternatives developed for the drinking water component of the Groundwater OU, USEPA prefers Alternative 4 because it is the only alternative that meets the two Threshold Criteria without qualification, and it provides a safe, long-term drinking water supply for residences affected by mine-related arsenic.

While Alternatives 2 and 3 both provide safe drinking water through treatment of the contaminated well water, only Alternative 4 provides a reliable long-term solution that requires no additional maintenance from EPA, the State, or the property owner. Alternatives 2 and 3 would require diligent maintenance and monitoring over the long-term from both property owners and regulatory agencies to ensure that the treatment systems operate as intended and that untreated or partially treated water is not consumed by the residents.

In the event that additional wells become impacted by mine-related arsenic, Alternative 4 allows for additional connections to the municipal water supply to reduce potential future exposure to arsenic-contaminated water. If it becomes necessary to extend the pipeline further to address these additional wells, EPA will document the decision either in a ROD Amendment or in the Final OU2 ROD, depending on the timing of the decision.

Although Alternative 4 has a higher NPV cost than Alternatives 2 and 3, it provides much greater protectiveness by permanently removing the exposure pathway plus it eliminates the requirement for long-term federal and state management of individual residents' drinking water wells.

12.2 Description of the Selected Remedy

The components of the selected remedy include the NID water supply pipeline, a groundwater monitoring program and the land-use notification process.

NID Water Supply Pipeline

The closest NID water supply pipeline to the residential wells that are currently impacted is located at the top of the ridge north of the mine, along Banner Lava Cap Road. USEPA will work closely with NID during the remedial design process to develop a water supply pipeline that meets the needs of this remedy and also is compatible with NID's current distribution system, design standards and operational requirements. The remedy cost estimates assume that a new 8-inch-diameter ductile iron pipe will be installed from Banner Lava Cap Road (above the mine) down to Greenhorn Road (below the mine) (see Figure 6). The costs assume that connections will be made from the new pipeline to 10 locations that correspond to existing residential wells (Wells 10I, 10J, 10N, 10H, 10G, 11AV, 11AS, 11AL, 11AZ, and 11AY) located north of Greenhorn Road. However, not all of these wells are currently impacted and at selected properties with multiple wells, only a single service connection will likely be made. Residences will not be connected until the presence of mine-related arsenic at or near the MCL is confirmed.

No O&M costs are included for the pipeline component of the remedy because it is assumed that this new pipeline will become part of the NID water supply system, and NID would provide routine maintenance. The residential well owners will pay NID directly for their water consumption.

Groundwater Monitoring Program

Existing residential wells that are currently monitored by USEPA and selected existing monitoring wells will be periodically sampled to track migration, if any, of mine-related groundwater contamination towards residential wells. Continued monitoring is required to identify potential future changes in contaminant distribution that may require changes to the remedy (e.g., new releases from the Source Area or migration of contamination towards additional residential wells) and to evaluate whether remedial alternatives are adequately protecting human health.

A conceptual monitoring program was developed to estimate annual monitoring costs. This conceptual program includes, on average 31 wells, with either annual or biannual monitoring at most locations; the samples would be analyzed for arsenic as well as a few additional metals and general chemistry parameters. The actual monitoring program will be developed during the remedial design phase.

Land Use Notification Process

To limit potential human exposure to contaminated groundwater, USEPA will work with the Nevada County Environmental Health Department (NCEHD) to develop a land use notification process for parcels located within the footprint of potential flowpaths emanating from Lava Cap Mine. The specific number of parcels that would require such notifications has not been determined, but USEPA estimates it is in the range of 30 to 50 parcels. To implement this notification process, USEPA will provide NCEHD maps showing the parcels located in potentially impacted areas. It should be noted, however, that existing wells in most of these areas currently produce water that is below the MCL for arsenic. USEPA envisions that whenever a resident located on one of the potentially impacted parcels requests a well permit from NCEHD, the NCEHD will notify USEPA and provide the resident with written information about the potential for arsenic contamination in the proposed well and the associated health risks. Cost estimates assume that a small annual cost would be incurred for providing maps and coordinating with Nevada County. Annual costs were estimated to include inspections of residential wells and updates to the notification maps and associated fact sheets if arsenic conditions change. At the issuance of the final ROD for OU2, USEPA will evaluate the effectiveness of this process and determine if additional institutional controls are necessary and feasible.

12.3 Summary of the Estimated Remedy Costs

A detailed breakdown of the estimated capital, O&M, and present worth costs associated with the selected remedy is included in Table 8. 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 engineering design of the selected remedy. Major changes if they were to occur would be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Differences (ESD) or a ROD Amendment.

The capital cost to construct the selected remedy is estimated at $3.2 million. Although typically a thirty-year present value cost is calculated for federal Superfund projects, USEPA calculated fifty-year present values for the Groundwater OU interim remedy, based on the assumption that this site and related contamination issues will remain far into the future. The 50-year present worth is estimated at $3.795 million. As is the practice at federal Superfund sites, these cost estimates are based on an expected accuracy range of -30 to +50 percent. The discount rate used for the fifty-year present value cost projection was 7.0 per cent based on *Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (EPA, 2000).

12.4 Expected Outcomes of the Selected Remedy

The expected outcomes of the selected remedy are as follows. After implementation of the Selected Remedy, residents who may be potentially affected by exposure to arsenic in groundwater from mine-related wastes will be supplied a municipal source of water for their residential use.

Table 8
Detailed Cost Estimate for the Selected Remedy
Lava Cap Mine Site - Groundwater OU IROD

Component	Quantity	Unit	Unit Cost ($)	Cost ($)
Capital Costs (including Engineering and Management)				
NID Water Supply Pipeline				
8-Inch Ductile Iron Pipe – under paved road	2,500	ft	$106	**$265,000**
8-Inch Ductile Iron Pipe – under unpaved road	11,700	ft	$76	**$889,000**
Fire Hydrants	28	ls.	$3,500	**$98,000**
Parcel Tie-ins	10	ls.	$2,000	**$20,000**
Pipeline Appurtenances (15 to 20% of pipeline installation)	18%	ls.	$1,272,000	**$224,000**
Contractor Overhead, Mobilization, Detail Allowance, & Profit			36%	**$541,000**
Contingency			25%	**$509,000**
NID Pipeline Capital Cost Subtotal				**$2,546,000**
Engineering and Remedial Design Investigation			20%	**$509,000**
Construction Management, Licenses/Legal			6%	**$153,000**
TOTAL ESTIMATED CAPITAL COST:				**$3,208,000**

Annual Operations & Maintenance Costs	Quantity	Units	Annual Cost ($)	Net Present Value ($)
NID Water Supply Pipeline – No O&M Required				
Land Use Notifications (Data Review, Coordination)	1	yr	$3,086	**$43,000**
Groundwater/surface water monitoring program	1	yr	$39,468	**$544,000**
TOTAL DISCOUNTED O&M COSTS:				**$587,000**
TOTAL ESTIMATED CAPITAL COST:				**$3,208,000**
ESTIMATED PRESENT WORTH COST:				**$3,795,000**

Notes:
(1) Based on a 7.0 % discount rate and 50 years of O&M
Capital cost estimates are not discounted because the construction work will be performed in the early stages of the project. O&M costs are reported as present worth estimates given a 7.0% discount rate for a duration of 50 years. Cost estimates are based on an assumed pipeline route that may be refined during remedial design. Cost estimates are expected to be within a +50 to -30% accuracy range, and rounded to the nearest $1000.
ls. = lump sum yr. = year

13 Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121(d) of CERCLA, 42 United States Code (USC) § 9621(d) requires that RAs at CERCLA sites attain (or justify the waiver of) any federal or state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements (ARAR). Federal ARARs may include requirements promulgated under any federal environmental laws. State ARARs may only include promulgated, enforceable environmental or facility-siting laws of general application that are more stringent or broader in scope than federal requirements and that are identified by the State in a timely manner.

An ARAR may be either "applicable," or "relevant and appropriate," but not both. If there is no specific federal or state ARAR for a particular chemical or RA, or if the existing ARARs are not considered sufficiently protective, then other guidance or criteria to be considered (TBC) may be identified and used to ensure the protection of public health and the environment. The NCP, 40 CFR Part 300, defines "applicable," "relevant and appropriate," and "TBC" as follows:

- **Applicable requirements** are those cleanup standards, standards of control, or 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, RA, location, or other circumstances 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, RA, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and that are more stringent than federal requirements may be relevant and appropriate.

- **TBCs** consist of advisories, criteria, or guidance that USEPA, other federal agencies, or states developed that may be useful in developing CERCLA remedies. The TBC values and guidelines may be used as USEPA deems appropriate. Once a TBC is adopted, it becomes an enforceable requirement.

ARARs are identified on a site-specific basis from information about the chemicals at the site, the RAs contemplated, the physical characteristics of the site, and other appropriate factors. ARARs include only substantive, not administrative, requirements and pertain only to onsite activities. Section 121(e) of CERCLA, USC 9621(e), states that no federal, state, or local permit is required for RAs conducted entirely onsite. Offsite activities, however, must comply with all applicable federal, state, and local laws, including both substantive and administrative requirements that are in effect when the activity takes place. There are three general categories of ARARs:

- **Chemical-specific ARARs** are health- or risk-based concentration limits, numerical values, or methodologies for various environmental media (i.e., groundwater, surface water, air, and soil) that are established for a specific chemical that may be present in a specific media at the site, or that may be discharged to the site during remedial activities. These ARARs set limits on concentrations of specific hazardous substances, pollutants, and contaminants in the environment. Examples of this type of ARAR include federal and state drinking water standards.

- **Location-specific ARARs** restrict certain types of activities based on site characteristics. Federal and state location-specific ARARs are restrictions placed on the concentration of a contaminant or the activities to be conducted because they are in a specific location. Examples of special locations possibly requiring ARARs include floodplains, wetlands, historical sites, and sensitive ecosystems or habitats.

- **Action-specific ARARs** are technology- or activity-based requirements that are triggered by the specific type of remedial activities. Examples of this type of ARAR include the Resource Conservation and Recovery Act regulations for waste treatment, storage, or disposal.

USEPA has evaluated and identified the ARARs for the selected remedy in accordance with CERCLA, the NCP, and USEPA guidance, including the CERCLA Compliance with Other Laws Manual, Part I (Interim Final), OSWER Directive 9234.1-01 (USEPA, 1988a) and CERCLA Compliance with Other Laws Manual, Part II, OSWER Directive 9234.1-02 (USEPA, 1989). Tables 9 (chemical-specific), 10 (location-specific), and 11 (action-specific) present the ARARs for the selected remedy.

13.1 Chemical-Specific ARARs

The only COC identified in groundwater at the Site was arsenic. While this interim remedy is focused on drinking water, it does not involve the treatment of the contaminated groundwater but rather the provision of an alternative source of water. Accordingly, the Safe Drinking Water Act (SDWA) and the California Safe Drinking Water Act are not ARARs for this remedy. However, the NID is required by law to provide water that meets the federal MCL for arsenic. Therefore, no specific chemical-specific ARARs were identified for this remedy.

13.2 Location-Specific ARARs

Location-specific ARARs are those requirements that relate to the geographical position or physical condition of the site. These requirements may limit the type of remedial action that can be implemented or may impose additional constraints on some remedial alternatives. The major location-specific ARARs that could affect implementation of the remedy are categorized and briefly described below. Location-specific ARARs for the Groundwater OU interim remedy are summarized in Table 9.

National Historic Preservation Act, National Historic Landmarks Program, and National Register of Historic Places

The NHPA, 16 U.S.C. §470, requires federal agencies to take into account the effect of any federally assisted undertaking or licensing on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places (NRHP). Criteria for evaluation are included in 36 CFR Part 60.4. Portions of the Lava Cap Mine site have been identified as a historic mining district that warrants inclusion in the NRHP. If the pipeline

route associated with the selected remedy encounters an eligible structure, the procedures for protection of historic properties set forth in Executive Order 11,593 entitled "Protection and Enhancement of the Cultural Environment" and in 36 CFR Part 800, 36 CFR Part 63, and 40 CFR Part 6.301(c) will be applicable.

Archaeological and Historic Preservation Act and Archaeological Resources Protection Act

The Archaeological and Historic Preservation Act, 16 U.S.C. §469, and the Archaeological Resources Protection Act, 16 U.S.C. §470, establish procedures to preserve and protect archaeological resources. The first provides for preservation of historical and archaeological data that might be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program. The second prescribes steps taken by investigators to preserve data. If remedial activities would cause irreparable loss or destruction of significant scientific, prehistoric, historical, or archaeological data, mandatory data recovery and preservation activities would be necessary. The implementing regulations [40 CFR 6.301(c) and 43 CFR 7] will be applicable if eligible structures are identified along the specific construction route to be followed for pipeline installation associated with the interim remedy.

Endangered Species Act

Section 7 of the Endangered Species Act (ESA), 16 U.S.C. §1531, et seq., requires that federal agencies consider whether their actions will jeopardize the existence of species that are listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service. USEPA has been consulting with the USFWS. However, no endangered or threatened species are known to be present in the areas impacted by implementation of the interim remedy selected for the Groundwater OU.

Fish and Wildlife Conservation Act and Fish and Wildlife Coordination Act

The Fish and Wildlife Conservation Act, 16 U.S.C. §§2901, requires federal agencies to use their authority to conserve and promote conservation of non-game fish and wildlife. The Fish and Wildlife Coordination Act, 16 U.S.C. §§661-666, requires federal agencies involved in the control or structural modification of any natural stream or body of water to take action to protect fish and wildlife resources that may be affected by the selected remedial action. The Fish and Wildlife Conservation Act and the Fish and Wildlife Coordination Act and their implementing regulations (50 CFR 83 and 40 CFR 6.302(g)) are applicable to Site remediation activities.

13.3 Action-Specific ARARs

ARARs are technology- or activity-based requirements that are triggered by the type of remedial activities selected. These ARARs generally set performance, design, or other similar action-specific controls or restrictions on particular kinds of activities. Table 10 lists the action-specific ARARs for the selected remedy.

RCRA Subtitle C Hazardous Waste Identification and Generator Requirements

The Resource Conservation and Recovery Act (RCRA) requirements for identification and listing of hazardous waste can be found in 22 CCR, Division 4.5, Chapter 11. A hazardous waste is a RCRA hazardous waste if it exhibits any of the characteristics of ignitability, corrosivity, reactivity, or toxicity identified in 22 CCR 66261.21, 66261.22(a)(1). 66261.22(a)(2), 66261.23, and 66261.24(a)(1) or if it is listed as a hazardous waste in Article 4 of Chapter 11. Under the California RCRA program, wastes can be classified as non-RCRA, state-only hazardous wastes

TABLE 9
Location-specific ARARs
Lava Cap Mine Site Groundwater OU2 IROD

Citation	Summary of Requirement	Evaluation
National Historic Preservation Act (16 USC 470 et seq.; 36 CFR 800; 40 CFR6.301(b); Executive Order 11593); National Historic Landmarks Program (36 CFR 65); National Register of Historic Places (36 CFR 60)	Federal agencies must identify possible effects of proposed remedial activities on historic properties (cultural resources). If historic properties or landmarks eligible for, or included in, the National Register of Historic Places exist within remediation areas, remediation activities must be designed to minimize the effect on such properties or landmarks.	Applicable
Archaeological and Historical Preservation Act (16 USC 469 et seq.; 40 CFR 6.301(c))	Establishes procedures to provide for preservation of historical and archeological data that might be destroyed through alteration of terrain as a result of federal construction project or a federally licensed activity or program. Presence or absence of such data on the site must be verified. If historical or archaeological artifacts are present in remediation areas, the RAs must be designed to minimize adverse effects on the artifacts.	Applicable
Archaeological Resources Protection Act of 1979 (16 USC 470aa-ii; 43 CFR 7)	Steps must be taken to protect archaeological resources and sites that are on public and Indian lands and to preserve data. Investigators of archaeological sites must fulfill professional requirements. Presence of archaeological sites along pipeline routes is to be identified.	Applicable
Endangered Species Act (ESA) (16 USC 1531)	Section 7 of the ESA requires that federal agencies consider whether their actions will jeopardize the existence of species that are listed as threatened or endangered by the USFWS or the National Marine Fisheries Service.	Applicable
Fish and Wildlife Conservation Act (16 USC 2901 et seq.; 50 CFR 83)	Federal departments and agencies required to use their statutory and administrative authority to conserve and promote conservation of nongame fish and wildlife and their habitats. Nongame fish and wildlife are defined as fish and wildlife that are not taken for food or sport, that are not endangered or threatened, and that are not domesticated.	Applicable
Fish and Wildlife Coordination Act (16 USC 661 et seq.; 40 CFR 6.302(g))	Requires consultation with USFWS (and California Department of Fish and Game) when any federal department or agency proposes or authorizes any modification of stream or other water body greater than 10 hectares; requires adequate provisions for protection of fish and wildlife resources). Certain remedies might result in the temporary or permanent modification of naturally occurring water bodies and might require the construction of mitigated wetlands in other areas.	Applicable
Fish and Game Code Section 1600 and 1603	Requirements for construction by, or on behalf of any state or local agency or public utility that will change the natural flow or use material from the beds or result in disposal into designated waters.	Applicable

Note: USFWS = U.S. Fish and Wildlife Service

TABLE 10
Action-specific ARARs
Lava Cap Mine Site Groundwater OU2 IROD

Citation	Summary of Requirement	Evaluation
Hazardous Waste Control Act, California Health and Safety Code Division 20 chapter 6.5 – 22 CCR 66261.4(b)(7) Hazardous Waste Control Act, California Health and Safety Code Division 20 chapter 6.5 – Hazardous Waste Identification and Generator Requirements (22 CCR, Division 4.5, Chapters 11 and 12)	A solid waste is hazardous if it exhibits any of the characteristics of a hazardous waste; (i.e., ignitability, corrosivity, reactivity, and toxicity) as determined by a TCLP. If a waste is deemed to be hazardous, then substantive requirements of 22 CCR 66262 (Generator Requirements) are applicable.	Applicable to any hazardous waste generated at the site during pipeline installation.
Northern Sierra AQMD Rules 205 (nuisance) and 225 (dust control).	Rule 205 prohibits discharges of air contaminants that cause a nuisance. Rule 225 states that remedial activities will be designed to take all reasonable precautions to prevent particulate matter from becoming airborne including, but not limited to, as appropriate, the use of water or chemicals as dust suppressants, the covering of trucks, and the prompt removal and handling of excavated materials.	Applicable during construction activities through the mine property.
Fish and Game Code Section 5650	Provides, among other prohibitions, that "It is unlawful to deposit in, permit into, or place into the waters of this state ...substance or material deleterious to fish, plant life, or bird life."	Applicable to pipeline construction near creeks.
Clean Water Act (Section 404) – Dredge or Fill Requirements (33 USC 1251-1376; 40 CFR 230)	Establishes requirements that limit the discharge of dredged or fill material into waters of the United States. USEPA guidelines for discharge of dredged or fill materials in 40 CFR 230 specify consideration of alternatives that have fewer adverse impacts and prohibit discharges that would result in exceedance of surface water quality standards, exceedance of toxic effluent standards, and jeopardy of threatened or endangered species. Special consideration required for "special aquatic sites" defined to include wetlands.	Applicable to pipeline construction near creeks.

Note:
AQMD = Air Quality Management District
TCLP = toxicity characteristic leaching procedure

if they exceed the soluble threshold limit concentration (STLC) or the total threshold limit concentration (TTLC) values listed in 22 CCR 66261.24(a)(2). If wastes are generated during remedy construction, it will be necessary to determine if they exhibit characteristics of a hazardous waste. If so, the requirements of Title 22 would be applicable to those wastes.

Air Quality Requirements

Implementation of the selected Mine Area OU remedy will require control of particulates. Under the Clean Air Act, the USEPA has set forth National Ambient Air Quality Standards that define levels of air quality necessary to protect public health (40 CFR Part 50). Lava Cap Mine is located within the Northern Sierra Air Quality Management District (AQMD). The District is required by state law to achieve and maintain the federal and state Ambient Air Quality Standards. Applicable air regulations to the selected remedy include: Rule 205 which prohibits discharges of air contaminants that cause a nuisance and Rule 225 which requires reasonable precautions to prevent dust emissions.

Clean Water Act (Section 404)

Section 404 of the Clean Water Act (CWA), 33 U.S.C. §1344, requires a permit for the discharge of dredged or fill material into waters of the United States. Little Clipper Creek is considered "waters of the United States."

Pipeline construction associated with the selected remedy could trigger Section 404 requirements. The *Guidelines for Specification of Disposal Sites for Dredged or Fill Material* [40 CFR Part 230, Section 404(b)(1)] define requirements that limit the discharge of dredged or fill material into the aquatic environment or aquatic ecosystems. These guidelines specify consideration of alternatives that have fewer adverse impacts and prohibit discharges that would result in exceedance of surface-water quality standards, exceedance of toxic effluent standards, and jeopardize threatened or endangered species. Actions that can be taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem are specified in Subpart H of 40 CFR 230, and include:

- Confining the discharge's effects on aquatic biota
- Avoiding disruptions of periodic water inundation patterns
- Selection of disposal site and method of discharge
- Minimizing or preventing standing pools of water

14 Statutory Determinations

Under CERCLA Section 121, USEPA must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), consider the reasonableness of cost for the Selected Remedy, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ, as a principal element, treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes. The following sections discuss how the selected interim remedy does or does not meet these statutory requirements.

14.1 Protection of Human Health and the Environment

The selected remedy will protect human health and the environment by eliminating potential current and future exposure to drinking water contaminated with mine-related arsenic in excess of the MCL. Although current drinking water exposures are being managed by residents with USEPA support, it is not certain that all drinking water currently used in residences is below the MCL at all times. The POU systems require routine monitoring and maintenance and there is likely incidental consumption of water from other sources within the residence besides the single sink equipped with the POU unit. The selected remedy will provide a safe, reliable, long-term source of clean drinking water to impacted residents.

Care will need to be taken to minimize dust emissions and construction traffic during remedy construction, but implementation of the remedy will not pose unacceptable short-term risks to local receptors.

14.2 Compliance with ARARs

The selected remedy complies with federal and state ARARs. See Tables 9, 10, and 11 for a listing of ARARs for this interim remedy for the Groundwater OU at the Lava Cap Mine Site.

14.3 Cost-Effectiveness

The fifty year net present worth cost of the selected remedy is estimated at $3.795 million. Although the selected remedy is more expensive than the other alternatives, USEPA believes the remedy has a high degree of overall effectiveness in comparison to cost and represents a reasonable value for the money to be spent. It is the only alternative that meets the threshold criteria without qualification. In addition, the lower cost alternatives require long-term O&M of treatment units on individual property owner's residential wells and there is the possibility that the cost and difficulty in coordinating with ever-changing property owners for an indefinite period may ultimately cost much more than has been currently estimated. Section 300.430(f)(ii)(D) of the NCP requires USEPA to evaluate the cost of an alternative relative to its overall effectiveness.

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

The remedy selected in this IROD is an interim remedy and, as such, is not intended to be a permanent solution for the Groundwater OU. However, USEPA has determined that the selected remedy represents the maximum extent to which permanent solutions can be utilized in a practicable manner for the drinking water component of the Groundwater OU of the Lava Cap Mine Superfund Site. USEPA has also determined that the selected remedy provides the best balance of tradeoffs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and considering State and community acceptance. Although the selected interim remedy does not include treatment, it does permanently eliminate potential current and future residential exposure to contaminated groundwater in excess of the MCL. There will be a final ROD for OU2 in the future that will determine if treatment is necessary to address remaining groundwater contamination. Presently, it is not clear if groundwater contamination is continuing to migrate away from the mine and threatening additional areas or wells.

The selected remedy does not present any short-term risks to the community that can not be mitigated with careful implementation of dust control measures and traffic control during construction. Although considerable coordination will be required with NID and local property owners to get the remedy constructed, USEPA believes that these potential implementability issues are far outweighed by the additional benefits of the permanent, reliable long-term water supply for residents near the mine.

Because there is no treatment incorporated into this interim remedy, the selected remedy does not satisfy USEPA's goal of using alternative treatment technologies to the maximum extent practicable. It should be noted that the principal threat wastes at the Site (arsenic-contaminated tailings) are being addressed as part of the remedial actions in OU1 and OU3 and are not factored into the OU2 remedy.

14.5 Preference for Treatment as a Principal Element

The preference for treatment as a principal element of remedial actions will be addressed in the final ROD for the Groundwater OU. Note that selected discharges of groundwater to surface water (e.g., the mine adit discharge and, potentially, the seep from the base of the rock buttress) are already components of the OU-1 remedy and will be treated.

14.6 Five-Year Reviews

The selected remedy is an interim remedy that focuses on drinking water supplies, ensuring a long-term, safe drinking water supply for impacted residents. This interim remedy does not actively address the source contamination present in the groundwater at the Site. As such, hazardous substances, pollutants, or contaminants will remain onsite above levels that allow for unlimited use and unrestricted exposure, and a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment. If it is determined that the remedy is not or will not be

protective of human health and the environment, then modifications to the remedy will be evaluated and implemented as necessary. Also, groundwater conditions at the Site are continuing to be evaluated as part of supplemental data collection activities called out in the OU2 RI/FS Reports (USEPA, 2008a and 2008b).

15 Documentation of Significant Changes

The Proposed Plan for the Lava Cap Mine Groundwater OU was released for public comment in July 2008. The Proposed Plan identified several alternatives for residences affected by mine-related arsenic contamination in groundwater: Alternative 2 (Point-of-use Treatment) to protect human receptors by installing a commercial POU system at one sink in residences; Alternative 3 (Wellhead Treatment) to protect human receptors by installing a wellhead treatment system to treat all water used at residences; and Alternative 4 (NID Water Supply) to provide a reliable municipal water supply for residences. USEPA has not received any comments on its proposal that warrant changing the remedy (Alternative 4) identified in the Proposed Plan. The Responsiveness Summary (Part III of this IROD) includes discussion of the issues raised by the public and other stakeholders.

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Part III
Responsiveness Summary

Part III – Responsiveness Summary

This Responsiveness Summary portion of the Record of Decision (ROD) presents the US Environmental Protection Agency (USEPA) responses to the written (letter or email) and significant oral comments received at the public meeting and during the public comment period. The section is divided into responses to written comments and responses to oral comments. Comments are expressed in *italics;* EPA's comments are in plain text.

1 Responses to Written Comments

This section provides responses to written comments received by USEPA during the public comment period. Written comments were received from the State of California Department of Toxic Substances Control and eight community members and interested parties.

1.1 Response to Comments from Stephen J. Baker, PG

1.1.1 August 18, 2008 Comments

Written Comment 1: *I am not opposed to this alternative rather encourage all water availability alternatives into areas that have low yielding water wells. Work that has been accomplished by the EPA to date has served the people of our community and your focus on protecting water supplies is recognized.*

The people on Banner Mountain recognize that large construction projects like pipe line construction carry a risk to damaging water availability of existing water wells. However, NID has not demonstrated the proper mitigation and monitoring of wells impacted in past and present projects. Unfortunately, this has caused many residences to not trust that NID will protect them from this risk.

Project risk exists for current wells in areas surrounding the possible construction of a water line through densely populated rural neighborhoods. Although shallow in depth, construction of lengthy pipelines can result in changes in the subsurface that modify unknown discrete pathways utilized by precipitation in recharging underlying fractured rock aquifers. Interrupted groundwater flow can cause well yields to increase or decrease. The latter case becomes problematic for the well owner.

EPA's Response: EPA appreciates your support for the selected remedy, and shares the residents' concerns for their drinking water wells and supplies. EPA will work with NID during the remedial design process to ensure that potential impacts to residential wells from pipeline installation are minimized, and will respond quickly in the unlikely event of a degradation of well capacity during construction. The pipeline will likely run along a paved road surface (Lava Cap Mine Road) near the populated areas on Banner Mountain, and the pipeline trench will be asphalt capped, like the roadway, to prevent a preferential path along the pipe and down the trench, and away from the typical infiltration path. Many activities can impact well capacity, including new wells, increased pumping from existing wells, and drought conditions; EPA will monitor residential wells to minimize impacts from the project on drinking water wells for the residents in the Banner Mountain area.

Written Comment 2: *A second groundwater well issue is related to blasting activities and earthmoving equipment. These activities can cause damage to wells. Most wells are not lined with casing below the sanitary seal. Due to this construction, vibration and movement from blasting and nearby construction activities could dislodge rocks and debris that are partially attached to the annulus of the boring. The*

dislodged rock would then plunge into the well bore. Pumps may become stuck in the wells resulting in loss of the pump or the well itself. Ultimately, the risk that a re-drilled well will not produce similar water quality and quantity must be managed. A Nevada County property owner is not responsible for the risks of pipeline projects.

EPA's response: EPA recognizes that construction activities can impact surrounding wells, although it should be noted that we do not anticipate the need for blasting during pipeline installation. EPA is committed to ensuring that all residents' wells are not significantly impacted during this project. EPA will meet with residents during design to discuss preferred methods of communication during the construction period, and to inform the residents of potential issues that they will need to be aware of during the implementation of the selected remedy. EPA will respond quickly to ensure that every resident is provided with drinking water in the event of an impact to a drinking water well, and will develop a process for monitoring and evaluating well performance during the remedial design, working with NID, EPA's consultant, and the residents impacted by the pipeline.

Written comment 3: *The writer provided a well monitoring and contingency plan for loss of water and/or water quality: The goal is to provide a contingency to owners of wells satisfying the criteria defined as an "Adversely Impacted Well". Interested well owners who own parcels that have groundwater well for the property's water supply that lie within 300 feet of the pipeline easement are considered the "Interested Party".*

Pre-project monitoring actions will include four steps:

1. *Collect multiple water level measurement per day (unaffected by pumping) in Interested Well Owner's domestic wells for a duration of, at least, one year prior to pipe construction (i.e., through one rainy season). This data will be used by Interested Well Owners to qualitatively identify potential adverse impact to their well.*
2. *Complete a 4-hour aquifer pumping test utilizing a data logger and pressure transducer. Measure, accurately, the sustained discharged rate at the end of the test. The aquifer pumping test must: 1) be completed before the first rain (September-October) and 2) before the pipeline project begins.*
3. *General minerals (including pH, hardness), specific metals (mercury, iron, lead, arsenic), total coliform, e-coli will be collected once in April and once in October (prior to NID pipeline project starting in the field). Analysis must be completed by a California certified laboratory. Sample collection must be completed before pipeline project begins in the field.*
4. *Responsible party is responsible for installing a four inch diameter screened casing in wells located with 250 feet of the pipeline easement (i.e. distance dependent on type of blasting and intensity). This must be completed before any blasting begins and before earth moving equipment is delivered to the project area. Casing must remain in well for the duration of the construction project.*

Criteria for defining a well as "Adversely Impacted" will satisfy, at least, one of the following conditions:

- *A sustained yield of an interested well owner's well at the end of a four hour pumping period of less than or equal to 80% of the pre-project sustained pumping rate or less than three gallons per minute constitutes an "Adversely Impacted Well".*

- *A change in water quality that creates a need to treat groundwater beyond the capacity of pre-project treatment system is considered an "Adversely Impacted Well".*

An "Adversely Impacted Well" can receive corrective actions by the Superfund project if the adverse impact occurs at any time interval during pipeline construction and two year subsequent to completion of the pipeline.

Connection to the NID treated pipeline would be completed if water availability was damaged according to the above criteria. In the even water quality issues developed a treatment system appropriate to resolve the water quality problem would be completed.

EPA's response: EPA appreciates your well-thought out and detailed plan for addressing potential impacts to drinking water wells in the Banner Mountain area. During the remedial design, EPA will work with NID, the residents, EPA quality assurance, and EPA contractors to ensure that an appropriate and thorough process is in place to address an impact to residential drinking water supplies. EPA will certainly take your comments into consideration when developing a mitigation plan.

1.2 Response to Comments from Frans Velthuijsen, Banner Mountain Homeowners Association

1.2.1 August 28 Comments

Written Comment 1: *If and when the treated water pipeline comes down Lava Cap Mine Rd, we assume it will be in the NID/utility easement extending 30 ft each side of the center of the road. This easement and the road are all on private parcels, which have been maintained carefully, by the owner occupants, reducing fire hazards and preserving the natural environment and habitat, including trees very close to the road. We would hate to loose these trees.* ***We would like the pipeline to stay in the existing roadway.***

EPA's response: EPA understands your concern for the landscape and vegetation, and will work with NID and the residents to minimize impacts to residential landscaping within the obtained easement.

Written Comment 2: *NID has a habit of spraying pipeline easements for maintenance access with herbicides. Many owners have never used any toxins and grow or intend to grow organic flowers, fruits and vegetables. They have kids and pets playing along the road.* ***We don't want herbicides or pesticides, any other toxins or other hazards along our road.***

EPA's response: EPA will work with NID while obtaining access and easements for the pipeline route, and discuss the issue of easement maintenance. EPA cannot, however, prevent the usage of approved pesticides and herbicides for landscaping needs.

Written Comment 3: *Our one lane road is a dead end road serving only Lava Cap Mine Rd, Lava Lane and Lava Dome Way. When this whole project is done we would like it to still be that way. We are concerned that other interests may push for a connection to Greenhorn Rd. Since that is where the treated water will go, it seems possible that the road may be extended to follow the pipeline to Greenhorn.*

We strongly oppose this. It would open up our road to through traffic and increase the number of daily car trips manifold. ***Please maintain the rural character of our one lane dead end road.***

EPA's response: The planned project does not include any changes to the existing roadways. EPA understands the community's concern regarding the potential for increasing development; however, EPA does not have any authority to promote or prevent the extension or development of public roads. This is a function of local and county planning agencies.

Written Comment 4: *As Steve Baker mentioned, we learned from our interactions with NID and their pipeline proposals that there is a serious possibility that any trenching may disturb ground water recharge dynamics. We should not be at risk for* ***wells running dry*** *or producing poorly due to this pipeline. To mitigate this risk it seems reasonable to ask for* ***hook-up points*** *for every* ***existing home*** *along the proposed pipeline, with pre-negotiated hook-up fees and free hook-ups in case a well fails.*

EPA's response: This concern is addressed in a previous response to Mr. Baker's letter. EPA will work with NID, the residents, EPA quality assurance, and EPA contractors to ensure that an appropriate and thorough process is in place to address potential impacts to residential drinking water supplies. EPA will certainly take your comments into consideration when developing a mitigation plan.

Written Comment 5: *Also* ***fire hydrants*** *are needed along the pipeline. We would like to see those included in the project description.*

EPA's response: EPA appreciates your comment regarding fire hydrants, and will discuss hydrants with NID and the county during remedial design to determine the requirements for their installation and spacing, the associated costs, and any impacts to pipeline design.

Written Comment 6: *Related to this is our concern that the pipeline will be overbuilt to serve new development. This would be a* ***growth inducing impact****, which we want to minimize as much as possible.*

EPA's response: The purpose of this pipeline construction is to provide a safe, reliable drinking water supply to those residents whose wells have been affected by arsenic-contaminated groundwater from the Lava Cap Mine. The pipeline design will be based on NID engineering and system requirements and the minimum requirements to provide a reliable service to the currently impacted residents, and for anticipated future connections for those residents below the mine that may become affected by migrating groundwater. While EPA cannot prevent future development in uncontaminated areas, we understand your concerns with increased growth in the area. These concerns should be raised with your local planning agency.

Written Comment 7: *As Mr. Franz Bornkamp mentioned at the Aug 12 meeting, as tax payers we don't want to subsidize and facilitate development of new homes in our neighborhood. If potential developers want this pipeline large enough to serve their development plans, they should pay for it themselves. We want to know if and when that is going to happen, because they will most likely want to use an easement on our private road for access to the new subdivisions, and we would like to be included in the planning process.*

EPA's response: As stated above, the pipeline, for EPA's purposes, will be designed to meet the requirements of those residents impacted by contamination from the Superfund Site. If NID wishes to increase the capacity of the pipeline to provide a larger community with a water supply, EPA will negotiate with them to determine the proportional costs to be born by NID for this increase. Regarding future development, EPA cannot promote nor prevent this development, as stated above.

Written Comment 8: *Finally there are of course the typical* ***concerns about the construction process****. Emergency access and traffic delays during construction, dust, noise, damage to landscaping and driveways, etc. We would like to see specific language in a pipeline project description minimizing and mitigating these impacts.*

EPA's response: EPA appreciates and shares your concern for the impacts of the construction project. We will work with residents to ensure that your concerns are known and addressed to the greatest extent practicable. EPA has worked closely with residents near the mine to mitigate the impact of the construction and will continue to do so for this next phase of the project as well.

1.3 Response to Comments from David Bowman, Grass Valley, CA

1.3.1 August 26 Comments

Written Comment 1: *What were the findings of the TAG that was overseen by SYRCL and to a small degree Greenhorn Rd assn.?*

EPA's response: The Technical Assistance Grant was provided to SYRCL by EPA to hire a consultant to provide additional assistance and explanations of technical information to the local community. The TAG consultant provided comments to the previous Proposed Plan (for Operable Unit 1). There is not a current TAG for the Lava Cap Mine Superfund Site.

Written Comment 2: *How will it be determined if additional wells are impacted? Are there any monitoring procedures for analysis of toxic substances OUTSIDE the site boundaries to ascertain whether there is transmittal, and how much toxicity moves through the various aquifers?*

EPA's response: During the remedial design phase, EPA will develop a monitoring program and install additional monitoring wells to track the movement of arsenic-contaminated groundwater from the mine site.

Written Comment 3: *Parenthetically, when this work is done, is it done by a local? Paid by the load? Is there an allocation for wear and tear on an already substandard base road? Sized to the road carrying ability?*

EPA's response: When the remedy is built, the contractor selected will be from an open bidding process, with no guarantee that a local firm will be the lowest qualified bidder. Typically, the contractor is paid by the job, with invoices submitted to document progress of the work. EPA will work with the community to ensure that the construction impacts to the

residents are minimized. The roads used are public roads used by residents and other construction projects in the area, including surrounding home-building activities.

1.4 Response to Comments from Doug Haussler, Grass Valley, CA

1.4.1 August 1 Comments via email

Written Comment 1: *As my well production has dropped to 3.3 GPM, wouldn't we be eligible for connection to NID if a new pipeline was installed per your (proposal)? This reduction in well output represents a significant reduction in property value. Also we have yet to receive any compensation for the new well pump we had to replace in the summer of 06.*

We do appreciate all that has been done to allow us to function at home but still feel a final resolution is necessary. If we were to receive permanent water from NID, this would resolve the issue.

EPA's response: Your comment and concern regarding your water supply is noted. Because your well was impacted by our previous work on Little Clipper Creek, EPA agreed to reimburse you for your well pump. Compensation for your replacement pump was delayed until we knew what the final result for cleanup would be, and that your water supply was satisfactory. Once this decision is final, we will work with you to determine a final resolution to your drinking water issues. In developing this cleanup plan, we did not include your well, since the arsenic concentrations are currently below the drinking water standard. However, due to your circumstances and EPA's recognition that your well is impacted from water leaving the mine area, during the remedial design we will evaluate connecting your home to the NID pipeline.

1.5 Response to Comments from Matt Orovitz, Grass Valley, CA

1.5.1 August 14 Comments via email

Written Comment 1: *I am one of the residents living along the upper portion of Lava Cap Mine Road. I am curious to know if you are aware of the current Nevada Irrigation project which is in process to build a new raw water pipeline to supply the Water treatment plants down the hill. As part of that process, they also performed a community out-reach program soliciting public comment on the project and route.*

One of the proposed routes was to bring the pipeline down Lava Cap Mine Road, but that option was thoroughly rejected by the local community most affected by the route and was later found to be financially unacceptable due to the engineering and constructions costs.

All of this is part of the public record at this point and should be easily accessible to you and the team responsible for the EPA project. I would not expect the local residents who would be most affected to behave or think differently in regards to this latest proposal. Especially, since this project once again does not provide any tangible benefits to those who will be impacted the most by the construction corridor and removal of existing vegetation.

EPA's response: EPA was not aware of previous efforts to extend a pipeline through your neighborhood, but was informed of this during the public meeting on August 12, 2008. EPA will work with the residents to ensure that your concerns are addressed to the extent practicable. While we will be working with NID on this project, this pipeline construction will

be overseen by EPA and its contractors, and our hope is that some benefits will be extended to your community, such as fire hydrants along the route, which should improve the safety of your community with response to fires.

Written Comment 2: *I am also very surprised that this was snuck in under the radar. I received NO formal notification of the project or public outreach. Seems to me it would have been very easy to send out a notification to the addresses along the route so that they were officially notified, so that they could attend and participate in the process. Because this did not happen the majority of the residents are unaware and will NOT be able to participate due to limited time now available for public comment.*

EPA's response: EPA recognizes that your residence was not included in our mailing list developed for this site. Your address has been placed on our list, and you should receive future updates regarding the Lava Cap Mine Superfund Site. In addition to the Fact Sheet, EPA placed a public notice in *The Union* newspaper, which also contained an article on August 5, 2008 regarding the Public Meeting and the general issues at the site. EPA will be working with residents along the proposed route during the design process to ensure that your concerns are addressed and mitigated to the extent practicable.

1.5.2 August 19 comments via email

Written Comment 1: *Can you tell me where I can find the cost analysis which was performed for the different solutions put forth. As citizen and tax payer I am finding it very difficult to believe that the suggested pipe line is the most cost effective long term solution.*

EPA's response: EPA recognizes that our preferred alternative is more expensive than the two alternatives utilizing Point-of-Use and Wellhead treatment systems. However, cost is just one of our nine criteria that are used in evaluating cleanup alternatives. Because the preferred alternative, the NID-supplied pipeline water, is the only one that meets both threshold criteria without qualification, EPA believes it is the best alternative for providing a safe, reliable, long-term water supply for the impacted residents. EPA understands and appreciates your comments regarding the cost and intrusiveness of this proposal. EPA will work with NID, the community, and our contractors to minimize the impacts to surrounding residents during the design and implementation of the remedy.

Written Comment 2: *From what I have been able to find online, the project scope only intends to only provide water to the affected households in the specific area of the mine. It seems to me that the site [residential wellhead] specific remediation would be the most cost effective and least intrusive method available.*

EPA's response: Your comment is noted.

1.6 Response to comments from Jim and Joan Dyer, Grass Valley, CA

1.6.1 August 23 comments via email

Written Comment 1: *As residents at (. . . . .) Tensy Lane, we will be greatly impacted by the Proposed Groundwater/Drinking Water Cleanup Plan. The following are our comments for your community input effort.*

We support Alternative 4, NID Water Supply. This appears to be the most cost effective solution to the problem, and the most advantageous for us personally.

EPA's response: Thank you for your support of the preferred remedy.

Written Comment 2: *A comment on Alternative 3, Wellhead Treatment. This would be costly to maintain and would not be feasible for low production wells. We have a reverse osmosis system for our household water. Treating all of the water used on the property, as proposed in Option 3, would increase the well shutdown rate, assuming the same operating efficiency. On several occasions during the summer and fall, we have had the system shut down because the well was dry and required time to recover. As you know, reverse osmosis units are highly inefficient, reclaiming only about 20% of the water for use.*

EPA's response: Your comments are noted.

Written Comment 3: *As we mentioned while you were here, adding fire hydrants would provide much needed protection. Fire protection is another subject of great concern to us and our neighbors.*

EPA's response: EPA has included fire hydrants in the cost estimate for the preferred remedy, and will work with NID and county officials to ensure that fire hydrants are installed in accordance with local policies and guidance.

1.7 Response to Comments from Lisa and Ted Cowen

1.7.1 August 26 comments via email

Written Comment 1: *I live due East of the Banner Lava Cap Mine off of Belle Starr Rd on Grizzly Trail. Our home is on a well. We are very close to the affected area, within half mile, however we have never had our wells tested by the EPA. We have concern that they should have tested our wells. I note that the public hearing held on August 12th, recommended further study to determine the underground water flow patterns. I would like to request that our well and property be considered as possibly affected and included in any further studies.*

EPA's response: Thank you for your comment. We can evaluate including your well in our monitoring program that is developed during the remedial design. We have tested wells between your home and the mine, and these wells are currently below the drinking water standard.

I also would like to voice my opinion that all wells within this area could potentially be affected in the future, even if they are not at this time. The nature of the fractured substrata is amorphous and difficult to assess, so as your study indicated this is a very complex geologic/hydrologic area. I would caution EPA to err on the side of caution and include close to source wells, such as ours, in the mitigation group to receive remediating to their well water.

EPA's response: Your comment is noted. The purpose of the monitoring program to be developed during the remedial design phase is to closely monitor the movement of any mine-

related arsenic in the groundwater and prevent drinking water supplies from being impacted. EPA shares your concern regarding potential impacts to additional wells.

Written Comment 3: *I also encourage and support the EPA's Preferred Remedy of Alternative 4 NID Water Supply.*

EPA's response: Thank you for your support.

1.8 Response to Comments from Steve Ross, CA Department of Toxic Substances Control

1.8.1 August 27 comments

Written Comment 1: *DTSC concurs with U.S. EPA's proposed selection of Alternative 4 as it best provides a safe, long term water supply for residences. The treated water delivered to the residences will provide a high level of protection to human health and the environment. In addition, any difficulty in maintaining individual point of use and wellhead treatment systems is avoided.*

EPA's response: Thank you for your concurrence with our selected remedy.

1.9 Response to Comments from Peggy Zarriello, REHS, Nevada County Department Environmental Health

1.91 August 28 comments via email

Written Comment 1: *We concur with the EPA on their preferred choice of providing treated water from NID to the area. This alternative provides a safe, reliable, long-term solution to residences affected now and in the future by mine-related contamination.*

EPA's response: Thank you for your comment.

1.10 Response to Comments from Mike Brenner, Auburn, CA

1.10.1 August 29 comments via email

Written Comment 1: *In the EPA's development of alternatives for addressing the water supply issue only one route was presented, that is using Lava Cap Mine Road. The EPA needs to evaluate other routes in terms of costs / access / impacts / etc. This was not done and needs to be discussed.*

EPA's response: In evaluating the pipeline route, EPA's main consideration was to identify an existing water supply pipeline, and the NID pipeline that exists along Banner Lava Cap Road is the closest to the impacted residents. NID may have plans to extend their supply lines down Greenhorn Road, but at the time we developed the alternative, these wasn't a source available.

During the design phase, EPA will work with the community and NID to determine the best route for the pipeline, and if alternatives to the proposed route are identified, EPA will investigate to ensure we select the most effective route to meet our needs, as well as the communities'. If an alternative route is selected, EPA will modify this Record of Decision with an Explanation of Significant Differences document.

2 Response to Oral Comments

In this section, EPA provides responses to the formal oral comments received at the public meeting held August 12, 2008, as well as comments received via phone calls during the public comment period. Most of the comments have been addressed, either in the questions answered during the public meeting, or in the response to written comments above. The full transcript of the public meeting is attached to this Responsiveness Summary.

2.1 Response to Comments from Steve Baker

2.1.1 Oral Comments received August 12 at Public Meeting

Oral Comment 1: *A pipeline of significant size was proposed and there was concern by neighbors that digging a pipeline, although somewhat shallow, 12 feet in that case, in this case probably eight to ten feet I suppose, it could create, it could change those pathways. As I was asking earlier this evening in regard to how water recharges to the ground and could take away or give a lot of extra water to a particular well that's close by or at some distance from the construction.*

So my concern for the fourth alternative is that you do not require . . . I wish that you do require that NID monitor, somehow characterize the wells that are within proximity of, I don't know how many hundred feet, of this proposed pipeline if it should go in. And assure us that by giving water to one neighborhood you don't take water from another neighborhood accidentally. We don't want that to happen. They're already doing that in one locale up on Banner Mountain and I would like to see that continue. Thank you.

EPA's response: EPA appreciates and shares your concern for drinking water supplies for these neighborhoods near the Lava Cap Mine site. This comment was also addressed in the written comments, when you provided a detailed plan for addressing potential impacts to drinking water wells in the Banner Mountain area. During the remedial design, EPA will work with NID, the residents, EPA quality assurance, and EPA contractors to ensure that an appropriate and thorough process is in place to address any potential impacts to residential drinking water supplies. EPA will certainly take your comments into consideration when developing a mitigation plan.

2.2 Response to Comments from Frans Velthuijsen

2.2.1 Oral Comments received August 12 at Public Meeting

Oral Comment 1: *So our road, this road is a private road. And of course there is like a prescriptive easement and the people who live there drive up and down. So now there is this residential development about to happen, or wanting to happen, and this pipeline is going to facilitate that.*

So I am concerned about the growth-inducing aspect of this pipeline and I think there should be some consideration for the neighborhood and for the traffic that is going to do down our road. It is now a dead-end road. Whether it is going to stay a dead-end road or if there is going to be an opening up to Greenhorn and there's going to be through traffic and all those things associated with that. That's my concern.

EPA's response: EPA understands your concerns regarding the potential for increasing development; however, EPA does not have the authority to promote or prevent the extension or development of public roads. This is a function of local and county planning agencies. That said, during the construction of the remedy, EPA will work with the community to ensure that our activities' impacts to the community are minimized.

2.3 Response to Comments from Mike Brenner

2.3.1 Oral Comments received August 14 via phone

Oral Comment 1: *Mr. Brenner lives off Lava Lane, and dealt with NID during a previous pipeline proposal that was ultimately not pursued. His main concerns discussed during the phone conversation were:*

- *Increased development following a pipeline*
- *Location of the pipeline relative to the road*
- *School bus stop located on the route the pipeline would be constructed*
- *Impacts on the road*
- *Safety and accessibility during construction*
- *Maintenance of the road*
- *Timing of the construction*

EPA's response: Mr. Brenner's comments and concerns are similar to others addressed above. EPA understands your concerns regarding the potential for increasing development; however, EPA does not have the authority to promote or prevent the extension or development of public roads. This is a function of local and county planning agencies. That said, during the construction of the remedy, EPA will work with the community to ensure that our activities' impacts to the community are minimized, especially relating to details involving school buses, road accessibility, and safety. During the design, we will discuss schedules for construction, and inform the community in a timely fashion of the schedule and any changes that may be required during the process.

2.4 Response to Comments from Robin Webb

2.4.1 Oral Comments received August 20 via phone

Oral Comment 1: *Mr. Webb phoned to discuss the Preferred Remedy, and stated that he was not in favor of receiving NID water, though his residence is one that was planned to be connected. He understands why EPA preferred the pipeline alternative, but didn't want to be connected to NID and pay them for his drinking water supply. He was also emphatic that Tensy Lane remain a private road, and not be connected to Lava Cap Mine Road and make it a connector road.*

EPA's response: EPA understands the concern regarding the private nature of the road and does not intend to make Tensy Lane a connector to Lava Cap Mine Road. However, ultimately this is a county decision over which EPA has no influence or control. EPA explained to Mr. Webb that because the pipeline would be the selected remedy, he would no longer be provided with filters for his point of use treatment system once the remedy was in place and that we would ultimately have an agreement stating his refusal of the pipeline connection.

2.5 Response to Comments from Volkert Bernbeck

2.5.1 Oral Comments received August 26 via phone

Oral Comment 1: *Dr. Bernbeck called and stated that he supported preferred remedy of an NID pipeline, but did not want to be forced to connect to it, nor did he want to have to abandon his wells (drinking and landscaping wells). He would prefer a "T" connection of some sort so that he could use his wells when he wanted to, and use the NID provided water as he chooses.*

EPA's response: EPA thanks Dr. Bernbeck for his support of the preferred alternative. As far as a requirement to abandon his wells, EPA does not intend under this IROD to require residents to abandon their private wells. However, the specifics of connection will have to be worked out with NID and each resident, since there may be restrictions on connecting to a public water supply and a private well (to prevent any back-flow into the pipeline). EPA will discuss this issue in the negotiations with NID during the remedial design.

Written Comments Received

HydroSolutions of California, Inc.

P.O. Box 922 • 13975 Wings of Morning
Nevada City, California 95959
(530) 478-1260 • FAX (530) 478-1264

August 18, 2008

Rusty Harris-Bishop
US Environmental Protection Agency
75 Hawthorne (SFD-7-2)
San Francisco, California 94105

SUBJECT: RISK CREATED BY APTERNATIVE 4
LAVA CAP MINE SUPERFUND SITE

Dear Rusty:

I attended and gave public comment at the August 12, 2008 site proposed plan public meeting for the Lava Cap Mine Superfund. Your project management team described an alternative (Alternative 4) that would utilize the Nevada Irrigation District (NID) to construct a pipeline in order to provide a safe, long-term water supply to residents with compromised water wells. I am not opposed to this alternative rather encourage all water availability alternatives into areas that have low yielding water wells. Work that has been accomplished by the EPA to date has served the people of our community and your focus on protecting water supplies is recognized.

The people on Banner Mountain recognize that large construction projects like pipe line construction carry a risk to damaging water availability of existing water wells. However, NID has not demonstrated the proper mitigation and monitoring of wells impacted in past and present projects. Unfortunately, this has caused many residences to not trust that NID will protect them from this risk.

Project risk exists for current wells in areas surrounding the possible construction of a water line through densely populated rural neighborhoods. Although shallow in depth, construction of lengthy pipelines can result in changes in the subsurface that modify unknown discrete pathways utilized by precipitation in recharging underlying fractured rock aquifers. Interrupted groundwater flow can cause well yields to increase or decrease. The later case becomes problematic for the well owner.

The driving concern for assessing these types of changes in the subsurface is the limited ability (i.e. with current scientific knowledge and available technologies) to accurately identify secondary porosity zones and maintain these disconformities while building the project. It is possible to see where groundwater discharges from the ground but not possible to see the specific zones where water infiltrates into the ground.

A second groundwater well issue is related to blasting activities and earthmoving equipment. These activities can cause damage to wells. Most wells are not lined with casing below the sanitary seal. Due to this construction, vibration and movement from blasting and nearby construction activities could dislodge rocks and debris that are partially attached to the annulus of the boring. The dislodged rock would then plunge into the well bore. Pumps may become stuck in the wells resulting in loss of the pump or the well itself. Ultimately, the risk that a re-drilled well will not produce similar water quality and quantity must be managed. A Nevada County property owner is not responsible for the risks of pipeline projects.

The following section describes a methodology for well monitoring that protects the well owners of Banner Mountain. Please consider the procedure described below.

GROUNDWATER WELL MONITORING AND CONTINGENCY PLAN FOR LOSS OF WATER AND / OR WATER QUALITY

The goal is to provide a contingency to owners of wells satisfying the criteria defined as an, "Adversely Impacted Well". Interested well owners who own parcels that have a groundwater well for the property's water supply that lie within 300 feet of the pipeline easement are considered the "Interested Party".

Pre-project monitoring actions will include four steps:

1. Collect multiple water level measurements per day (unaffected by pumping) in Interested Well Owner's domestic wells for a duration of, at least, one year prior to pipe construction (i.e. through one rainy season). This data will be used by Interested Well Owners to qualitatively identify potential adverse impact to their well.

2. Complete a 4-hour aquifer pumping test utilizing a data logger and pressure transducer. Measure, accurately, the sustained discharged rate at the end of the test. The aquifer pumping test must; 1) be completed before first rain (September-October) and 2) before the pipeline project begins.

3. General minerals (including pH, hardness), specific metals (mercury, iron, lead, arsenic), total coliform, e-coli will be collected once in April and once in October (prior to the NID pipeline project starting in the field). Analysis must be completed by a California certified laboratory. Sample collection must be completed before pipeline project begins in the field.

4. Responsible party is responsible for installing a four inch diameter screened casing in wells located within 250 feet of the pipeline easement (i.e. distance dependent on type of blasting and intensity). This must be completed before any blasting begins and before earth moving equipment is delivered to the project area. Casing must remain in well for the duration of the construction project.

Criteria for defining a well as "Adversely Impacted" will satisfy, at least, one of the following conditions:

- A sustained yield of an interested well owner's well at the end of a four hour pumping period of less than or equal to 80% of the pre-project sustained pumping rate or less than three gallons per minute constitutes an "Adversely Impacted Well".

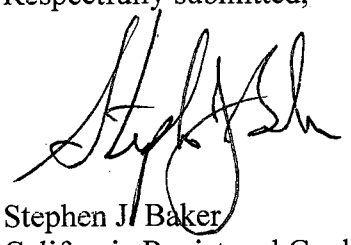
- A change in water quality that creates a need to treat groundwater beyond the capacity of pre-project treatment system is considered an "Adversely Impacted Well".

An "Adversely Impacted Well" can receive corrective actions by the Superfund project if the adverse impact occurs at any time interval during pipeline construction and two years subsequent to completion of the pipeline.

Connection to the NID treated pipeline would be completed if water availability was damaged according to the above criteria. In the event water quality issues developed, a treatment system appropriate to resolve the water quality problem would be completed.

Please take the necessary precautions seriously as the public is very concerned about the loss of groundwater recharge resulting from these types of projects. We ask that monitoring and evaluation be required by the US EPA and implemented and paid by a non-NID affiliated company. Looking forward to your detailed comments.

Respectfully submitted,



Stephen J. Baker
California Registered Geologist (No. 4354)
California Certified Hydrogeologist (No. 181)
California Environmental Assessor (No. 37)

Cc: Banner Mountain Home Owners Association
Nate Beason, Board of Supervisor
Peggy Zariello, Nevada County Environmental Health

26 AUGUST 08

Dear ~~Rusty~~ Harris - Bishop -

Re: Iron Cap Mine Superfund Site

What ~~was~~ were the findings of the T.A.G. - that was overseen by SYRCL and to a small degree Greenhorn Rd Assn.?

How will it be ~~determined~~ if additional wells are impacted?

Are there any monitoring proceedures for analysis of toxic substances OUTSIDE THE Site boundries to accertain ~~where~~ whether there is transmital, and how much toxicity moves through the various aquafers?

Parenthetically, when this work is done, is it: - done by local? paid by load? (if so drive too fast)
- allocation for ~~dam~~ ware and tear on an already substand base road?
- sized to the road carrying ability? (BIG TRUCKS!!)
Small Road

Sincerely - David J. Bowman

[redacted]

Linda S. Adams
Secretary for
Environmental Protection

Department of Toxic Substances Control

Maureen F. Gorsen, Director
8800 Cal Center Drive
Sacramento, California 95826-3200

Arnold Schwarzenegger
Governor

August 27, 2008

Mr. Rusty Harris-Bishop
Superfund Remedial Project Manager
United States Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, California 94105

CONCURRENCE ON PROPOSED PLAN FOR DRINKING WATER COMPONENT OF GROUNDWATER OPERABLE UNIT, LAVA CAP MINE, NEVADA COUNTY, CALIFORNIA

Dear Mr. Harris-Bishop:

Thank you for providing the Department of Toxic Substances Control (DTSC) an opportunity to review the United States Environmental Protection Agency's (U. S. EPA's) proposed remedy for addressing contaminated groundwater that affects drinking water wells near the Lava Cap Mine Superfund Site. The proposed remedy, Alternative 4, includes the design and installation of a pipeline distribution system which will tie into a Nevada Irrigation District local municipal water supply.

The Proposed Plan also identified three additional alternatives for residential wells impacted by arsenic contamination from the Site. Alternative 1 considers no action except for the likely continued operation of the existing point of use and wellhead treatment units already installed by individual homeowners or U. S. EPA. Alternative 2 presumes installation of seven additional point-of-unit treatment systems under kitchen sinks with operation and maintenance requirements. Alternative 3 considers replacement of the five point-of-unit treatment systems with wellhead treatment units, two wellhead treatment systems at residential wells for outdoor irrigation, and up to five additional systems in the future.

DTSC concurs with U. S. EPA's proposed selection of Alternative 4 as it best provides a safe, long term water supply for residences. The treated water delivered to the residences will provide a high level of protection to human health and the environment. In addition, any difficulty in maintaining individual point of use and wellhead treatment systems is avoided.

Printed on Recycled Paper

If you have any questions, please contact me at (916) 255-3694.

Sincerely,

Steven Ross
Hazardous Substances Engineer
Sacramento Office
Brownfields and Environmental Restoration Program

cc: Mr. David Towell
CH2M Hill
1000 Wilshire Boulevard, 21st Floor
Los Angeles, California 90017

Mr. Jeff Huggins **(sent via email)**
California Water Resources Control Engineer
Land Disposal Program
Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, California 95670

BANNER MOUNTAIN
Homeowners Association

P.O. Box 833, Nevada City, CA 95959

August 28, 2008

Rusty Harris-Bishop
US Environmental Protection Agency
756 Hawthorne (SFD-7-2)
San Francisco, CA 94105
Fax: 415-947-3528, E-mail: harris-bishop.rusty@epa.gov

Re: Concerns about proposals for water well contamination remediation at the Lava Cap Gold and Silver Mine Superfund Site.

Dear Rusty,

In addition to the concerns expressed during the Public Comment Meeting of August 12, I want to address some issues pertaining to the proposed remediation alternative 4, a treated water pipeline along Lava Cap Mine Rd to the contaminated properties below the mine near Greenhorn Rd.

If and when the treated water pipeline comes down Lava Cap Mine Rd, we assume it will be in the NID/utility easement extending 30 ft each side of the center of the road. This easement and the road are all on private parcels, which have been maintained carefully, by the owner occupants, reducing fire hazards and preserving the natural environment and habitat, including trees very close to the road. We would hate to loose these trees. **We would like the pipeline to stay in the existing roadway.**

NID has a habit of spraying pipeline easements for maintenance access with herbicides. Many owners have never used any toxins and grow or intend to grow organic flowers, fruits and vegetables. They have kids and pets playing along the road. **We don't want herbicides or pesticides, any other toxins or other hazards along our road.**

Our one lane road is a dead end road serving only Lava Cap Mine Rd, Lava Lane and Lava Dome Way. When this whole project is done we would like it to still be that way. We are concerned that other interests may push for a connection to Greenhorn Rd. Since that is where the treated water will go, it seems possible that the road may be extended to follow the pipeline to Greenhorn. We strongly oppose this. It would open up our road to through traffic and increase the number of daily car trips manifold. **Please maintain the rural character of our one lane dead end road.**

As Steve Baker mentioned, we learned from our interactions with NID and their pipeline proposals that there is a serious possibility that any trenching may disturb ground water recharge dynamics. We should not be at risk for **wells running dry** or producing poorly due

to this pipeline. To mitigate this risk it seems reasonable to ask for **hook-up points** for every

existing home along the proposed pipeline, with pre-negotiated hook-up fees and free hook-ups in case a well fails.

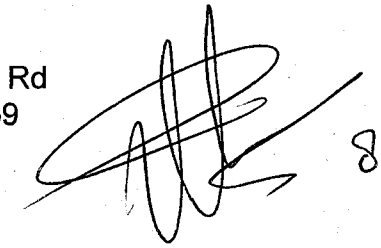
Also **fire hydrants** are needed along the pipeline. We would like to see those included in the project description.

Related to this is our concern that the pipeline will be overbuilt to serve new development. This would be a **growth inducing impact**, which we want to minimize as much as possible. As Mr. Franz Bornkamp mentioned at the Aug 12 meeting, as tax payers we don't want to subsidize and facilitate development of new homes in our neighborhood. If potential developers want this pipeline large enough to serve their development plans, they should pay for it themselves. We want to know if and when that is going to happen, because they will most likely want to use an easement on our private road for access to the new subdivisions, and we would like to be included in the planning process.

Finally there are of course the typical **concerns about the construction process**. Emergency access and traffic delays during construction, dust, noise, damage to landscaping and driveways, etc. We would like to see specific language in a pipeline project description minimizing and mitigating these impacts.

For the Banner Mountain Homeowners Association

Frans Velthuijsen
13676 Lava Cap Mine Rd
Nevada City, CA 95959
530-478-1252 h
530-478-5610 w



8-28-08

"Doug Haussler" [redacted]

08/01/2008 10:19 AM

To Rusty Harris-Bishop/R9/USEPA/US@EPA

cc

bcc

Subject Lava Cap Mine clean-up/ Haussler residence

History: This message has been replied to and forwarded.

Rusty,

CH2MHILL performed a well test at my house approx 5-6 weeks ago and we were curious as to the results,(water level,arsenic,production).As my well production has dropped to 3.3 GPM,wouldnt we be eligable for connection to NID if a new pipline was installed per your RA4? This reduction in well output represents a significant reduction in property value.Also we have yet to receieve any compensation for the new well pump we had to replace in the summer of 06.

We do appriciate all that has been done to allow us to function at home but still feel a final resolution is necessary.If we were to receive permenant water from NID, this would resolve the issue.

Thanx Doug Haussler and family

Matthew Orovitz [redacted]

08/14/2008 02:55 PM

To David Cooper/R9/USEPA/US@EPA
cc Rusty Harris-Bishop/R9/USEPA/US@EPA, shauna@go-swa.com
bcc
Subject Re: Lava Cap Mine Superfund cleanup

Hi Dave,
Thanks for the quick response! We live at [redacted]

We also subscribe to the Union which you mentioned and both my wife and I missed the notice unfortunately... I will walk the neighborhood and make sure everyone is on notice of this activity and will hand them a copy of this Document to ensure they have all the necessary info... As well as I will encourage them to submit their comments!

http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/f4f1704625e9f7348257491005bf4a0/$FILE/Lava%20Cap7_08%20638kb.pdf

Thank you,
Matt

---------- [redacted] ----------

Matt Orovitz
[redacted]

Cooper.David@epamail.epa.gov

08/14/2008 01:10 PM

To [redacted]
cc Harris-Bishop.Rusty@epamail.epa.gov
Subject Re: Lava Cap Mine Superfund cleanup

Matt --

I'm sorry that you were not aware of the community meeting for the proposed plan for the drinking water portion of the groundwater operable unit of the Lava Cap Mine superfund site.

Rust Harris-Bishop is EPA's project manager. He would be happy to talk to you about your issues and concerns about the site and about this proposed remedy for a portion of the site. Rusty's number is 415-972-3140. His e-mail is listed above.

I would like to put you on the mailing list for future fact sheets and meeting notices. We currently have about 500 people on the mailing list. We had over 20 people attend the public meeting. There was an article about the site in "The Union" last week, as well as a public notice/display ad for the meeting and the public comment period, and information on yuba.net. We want to have a broad base of media to contact for future activities. Can you tell me which paper you read? We can't necessarily place a public notice in all of them, but we can try to contact media representatives to get stories about our activities.

My phone number is 415-972-3245. Our toll-free message line is 800-231-3075.

-- Dave

Matthew Orovitz
[redacted]
08/14/2008 10:03 AM

To David Cooper/R9/USEPA/US@EPA
cc [redacted]
Subject Lava Cap Mine Superfund cleanup

Hi David,
I am one of the residents living along the upper portion of Lava Cap Mine Road. I am curious to know if you are aware of the current Nevada Irrigation project which is in process to build a new raw water pipeline to supply the
Water treatment plants down the hill.. As part of that process, they also performed a community out-reach program soliciting public comment on the project and route..

One of the proposed routes was to bring the pipeline down Lava Cap Mine Road, but that option was thoroughly rejected by the local community most affected by the route and was later found to be financially

unacceptable due to
the engineering and constructions costs.

All of this is part of the public record at this point and should be easily accessible to you and the team responsible for the EPA project. I would not expect the local residents who would be most affected to behave or think differently in regards to this latest proposal. Especially, since this project once again does not provide any tangible benefits to those who will be impacted the most by the construction corridor and removal of existing vegetation.

I am also very surprised that this was snuck in under the radar.. I recieved NO formal notification of the project or public outreach. Seems to me it would have been very easy to send out a notification to the addresses along the route
so that they were officially notified, so that they could attend and participate in the process.. Because this did not happen the majority of the residents are unaware and will NOT be able to participate due to limited time now available for public comment...

If you would like to discuss further please feel free to call me at [redacted]

Thanks, Matt

Matt Orovitz
[redacted]

Matthew Orovitz [redacted]
08/19/2008 11:46 AM

To Rusty Harris-Bishop/R9/USEPA/US@EPA
cc David Cooper/R9/USEPA/US@EPA
bcc
Subject Re: Lava Cap Mine Superfund cleanup

History: This message has been replied to.

Hi Rusty,
Can you tell me where I can find the cost analysis which was performed for the different solutions put forth. As citizen and tax payer I am finding it very difficult to believe that the suggested pipe line is the most cost
effective long term solution.

From what I have been able to find online, the project scope only intends to only provide water to the affected households in the specific area of the mine. It seems to me that the site specific remediation would be
the most cost effective and least intrusive method available.

Please let me know,
Thanks, Matt

---------- [redacted] ----------

Matt Orovitz
[redacted]

Cooper.David@epamail.epa.gov

08/14/2008 01:10 PM

To [redacted]
cc Harris-Bishop.Rusty@epamail.epa.gov
Subject Re: Lava Cap Mine Superfund cleanup

Matt --

I'm sorry that you were not aware of the community meeting for the proposed plan for the drinking water portion of the groundwater operable unit of the Lava Cap Mine superfund site.

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My phone number is 415-972-3245. Our toll-free message line is 800-231-3075.

-- Dave

Matthew Orovitz
[redacted]
08/14/2008 10:03 AM

To: David Cooper/R9/USEPA/US@EPA
cc: [redacted]
Subject: Lava Cap Mine Superfund cleanup

Hi David,
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so that they were officially notified, so that they could attend and participate in the process.. Because this did not happen the majority of the residents are unaware and will NOT be able to participate due to limited time now available for public comment...

If you would like to discuss further please feel free to call me at [redacted]

Thanks, Matt

Matt Orovitz
[redacted]

Jim & Joan Dyer
[redacted]
08/23/2008 04:41 PM

To Rusty Harris-Bishop/R9/USEPA/US@EPA
cc
bcc
Subject Comments on Proposed Ground/Drinking Water Cleanup Plan

History: This message has been replied to.

As residents at [redacted] we will be greatly impacted by the Proposed Groundwater/Drinking Water Cleanup Plan. The following are our comments for your community input effort.

We support Alternative 4, NID Water Supply. This appears to be the most cost effective solution to the problem, and the most advantageous for us personally.

A comment on Alternative 3, Wellhead Treatment. This would be costly to maintain and would not be feasible for low production wells. We have a reverse osmosis system for our household water. Treating all of the water used on the property, as proposed in Option 3, would increase the well shutdown rate, assuming the same operating efficiency. On several occasions during the summer and fall, we have had the system shut down because the well was dry and required time to recover. As you know, reverse osmosis units are highly inefficient, reclaiming only about 20% of the water for use.

As we mentioned while you were here, adding fire hydrants would provide much needed protection. Fire protection is another subject of great concern to us and our neighbors.

Thank you for sending the informative EPA booklet. We were sorry to not be able to attend the meeting on August 12th.
Jim and Joan Dyer

Lisa Cowden
[redacted]
08/26/2008 04:08 PM

To Rusty Harris-Bishop/R9/USEPA/US@EPA
cc
bcc
Subject EPA Banner Lava cap Mine

History: This message has been forwarded.

Hi Rusty,

I live due East of the Banner Lava Cap Mine off of Belle Starr Rd on Grizzly Trail. Our home is on a well.
We are very close to the affected area,within half mile, however we have never had our wells tested by the EPA.
We have concern that they should have tested our wells.
I note that the public hearing held on August 12th, recommended further study to determine the
underground water flow patterns. I would like to request that our well and property be considered as possibly affected and included in any further studies.
I also would like to voice my opinion that all wells within this area could potentially be affected in the future, even if they are not at this time. The nature of the fractured substrata is amorphous and difficult to assess, so as your study indicated this is a very complex geologic/hydrologic area. I would caution EPA to err on the side of caution and include close to source
wells, such as ours, in the mitigation group to receive remediating to their well water.
I also encourage and support the EPA's Preferred Remedy of Alternative 4 NID Water Supply.

Please let me know if we are to be considered in this study, and if not, why not.

Best Regards

Lisa and Ted Cowden
[redacted]

"Peggy Zarriello "
<Peggy.Zarriello@co.nevada.ca.us>

08/28/2008 03:07 PM

To Rusty Harris-Bishop/R9/USEPA/US@EPA
cc
bcc
Subject Lave Cap Mine Public Comment

History: This message has been replied to.

From Nevada County Department of Environmental Health:

We concur with the EPA on their preferred choice of providing treated water from NID to the area. This alternative provides a safe, reliable, long-term solution to residences affected now and in the future by mine-related contamination.

Thank for the opportunity to comment.

Peggy Zarriello, REHS
Program Manager
Nevada County Department of Environmental Health
950 Maidu Avenue, Suite 170
Nevada City, CA 95959
(530) 265-1787
(530) 265-9853 (fax)
peggy.zarriello@co.nevada.ca.us

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"Brenner, Mike - Auburn, CA" [redacted]

08/29/2008 08:39 AM

To Rusty Harris-Bishop/R9/USEPA/US@EPA
cc David Cooper/R9/USEPA/US@EPA
bcc
Subject lava cap mine comments

History: This message has been replied to.

hi rusty
thanks for discussing the project with me on aug 14th,
and recording my concerns and issues,
in regard to the potential water supply project.

since then i have formulated another question:

in the epa's development of alternatives
for addressing the water supply issue
only one route was presented,
that is using lava cap mine road.
the epa needs to evaluate other routes
in terms of costs / access / impacts / etc.
this was not done and needs to be discussed.

i appreciate the opportunity to submit these to you
for further analysis.....

thanks

Mike Brenner, P.E.
District Conservationist
NRCS - Auburn, CA
[redacted]

Transcript of Proposed Plan Public Meeting

BEFORE THE

UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

In the Matter of	)
	)
LAVA CAP MINE SUPERFUND SITE	)
	)
	)

PUBLIC HEARING

NEVADA COUNTY BOARD OF REALTORS

AUDITORIUM - FIRST FLOOR

336 CROWN POINT CIRCLE

GRASS VALLEY, CALIFORNIA

TUESDAY, AUGUST 12, 2008

6:30 P.M.

Reported by:
John Cota

APPEARANCES

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AND CONTRACTOR SUPPORT

Rusty Harris-Bishop, Remedial Project Manager

David Cooper, Community Involvement Coordinator

David Towell, CH2M HILL

OTHERS PRESENT

Steve Baker

John Bender, Banner Mountain Homeowners

Franz Borncamp

Cathy Collings

Doug Haussler

Barbara Heger

Willy Kollmeyer

Susan Levitz, YubaNet.com

Steve Ross, State of California, Department of Toxic Substances Control

Alan Stahler

Frans Velthuijsen, CR

Dave Watkinson

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PROCEEDINGS

COMMUNITY INVOLVEMENT COORDINATOR COOPER: Good evening, everyone. My name is David Cooper. I am a Community Involvement Coordinator for the US Environmental Protection Agency. I would like to welcome all of you to this meeting this evening on the drinking water portion of the groundwater operable unit for the Lava Cap Mine.

Before we start the meeting just a couple of housekeeping things. First of all, the cups that are over there next to the coffee pot are for a different meeting, not our meeting. There's drinking water around the corner but we would appreciate it if you wouldn't take their cups because they'll just get mad at me. If you need a bathroom there are bathrooms on both sides of the entrance here. The exits, of course, are just behind.

We have a couple of things that I think most of you found as you walked in. One is a copy of tonight's agenda, another is a copy of all the slides that Rusty will be showing on the computer tonight. And then most of you I think were able to pick up a copy of the fact sheet that we mailed out. I ran out. So if you find that you really want one and didn't get one you can certainly have mine after the meeting is over.

For tonight's agenda we are going to do a Welcome, which I have just done, some Introductions. Mostly myself

and Rusty Harris-Bishop who is in the back of the room who is the project manager for EPA. He will be doing the presentation and answering most of your questions. We also have contractor support as well for some of the details.

The way this meeting will work is different than some of the meetings we do when we are actually doing a comment period. Since we haven't been out to see the community in a while we decided that we would begin the meeting with some information about site activities and things like that. Normally we would just do the comment period piece and that would be it.

So we are going to do a little bit of that and then we are going to go into our formal comment period portion, which has basically three parts to it. The first is Rusty's formal presentation of the proposed plan for the drinking water portion of the groundwater operable unit.

At the end of that presentation Rusty will ask if you folks have any clarifying questions. And what we mean by that is, any jargon that we have used that you may not be familiar with, anything we have said that sounds confusing or whatever, we would be happy to clarify those things for you.

Then at the end of the clarifying questions EPA will stop talking. And we will ask that if you have any formal comments that you would like to make if you would

please come up here to this podium and state your name and give us your comment.

We will not be responding to your comments tonight. We respond to comments during a formal comment period in writing. And those responses are actually attached to the Record of Decision that happens after we have reviewed all comments and completed our process. So while Rusty and I will be up here and looking at you as you talk, we won't be saying anything.

Then when that is concluded, when we finish receiving formal comments, then we will adjourn the meeting. But Rusty and I will be available afterwards to answer any other questions that you have.

So that's how our meeting is intended to run this evening. Are there any questions about the process?

Hearing none then I will introduce Rusty Harris-Bishop, the Remedial Project Manager for the US Environmental Protection Agency.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Thanks, David. Thank you all for coming. I am really happy to see a large crowd. We were worried that we were not going to get a large audience since we haven't had a lot of activity at the site that has affected the larger community.

We have done a lot of work at the site on the mine itself over the last couple of years so we are going to talk

about that a little bit. You can also go up afterwards and talk to David Towell who has been the project manager for CH2M HILL since the site first came to the EPA's attention. So we'll be able to answer your questions about the construction on the site and some of the future activities as well.

So I will go ahead and you all can follow along. You can stop me and ask questions if I say something that you don't understand or you can hold off until the end. I don't mind answering questions anytime.

This is the agenda and I think you have a copy of it. And we'll let you know when we get to that formal comment period where, trust me, it's really hard for me to not want to answer your questions at that point. But I'm not supposed to so I'll try not to.

So I think everyone has been introduced. One person I would like to introduce is Steve Ross who is from the State of California, Department of Toxic Substances Control. He is one of two state representatives who also review all the work that EPA does and they have a role to play in this cleanup. They review our technical documents and ultimately will take over the maintenance work at the site once we complete it.

And Jeff Huggins who works for the Regional Water Quality Control Board is not here tonight.

So just for anybody who is not familiar, this is the rough location of the Lava Cap Mine. So it is kind of, you know, east and southeast of Nevada City and Grass Valley. Off of Greenhorn Road about a mile or so.

So as a background: The site operated as a gold and silver mine from 1861 to 1943. Most of the mining was done in the '30s, which is the highest amount of activity where most of the tailings were generated.

It was hard rock mining. What they would do is bring the rock to the surface, crush it finely, and through a centrifugal flotation process would get the gold and silver to settle out. The other stuff would go out the other side, the really fine, ground, uniform, sand-like consistency that they would just dump down below the mine. So over the course of the mine operations it just built up in piles of these tailings over time.

And it was held back by a log dam. They had been required to keep it from getting down into the drinking water supply. The Lost Lake Reservoir actually was created as a tailings pond to prevent tailings from getting further down into Rollins Reservoir. So that was built back in the '30s to contain any tailings that did leave the site.

So over a period of the last at least 80 years tailings have been releasing from the site and going down Little Clipper Creek to Clipper Creek to Lost Lake. But in

1997, in January, in a 75 year storm event, the log dam partially collapsed, releasing tens of thousands of cubic yards of tailings into the creek and down towards Lost Lake.

So EPA became involved and we listed it on the National Priorities List in 1999, which is the Superfund list that probably everybody has heard of but may not know exactly what that means. Basically what EPA does is evaluates the potential risk of a site to human health and the environment. And we have a very convoluted ranking scheme. If it meets our criteria we then put it on the list and make it eligible for federal funding.

We try to get the people responsible for the contamination to pay for it. But if they are not able to then EPA takes over and does it ourselves. So that's where we are at right now. It is a federally funded site at this point.

MR. BENDER: Did you get anybody on this?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: We are in negotiations with one company, the successor to one of the mines. We have sent a package of information to the Department of Justice to file a lawsuit against another company. So we may be able to recover our costs at the back end but we want to make sure that we get the site cleaned up.

MS. LEVITZ: Was that the company called Sterling?

The Canadian company called Sterling?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Yes.

So one of the things we did is after the dam broke the EPA went out under our emergency authority and did some tailing stabilization to try to keep the tailings from flowing down further into the creek.

And we started testing drinking water wells and found some of the wells nearest to the mine had elevated levels of arsenic so we installed under-sink units, reverse osmosis units, to treat the drinking water for those people who had contaminated wells so that they were not drinking contaminated water. So at this point we don't believe that anybody is drinking water above the drinking water standard for arsenic.

So in 2004 we -- So between 1999 and 2004 we were studying the whole mine site, the mine, the groundwater and all the way down to Lost Lake. In 2004 we wrote a Record of Decision for the first phase, which we called the mine area. So it's just the mine itself and the surface water around the mine area. And also we created a unit called OU-4, which was to take care of some residences that were on the site. They were highly contaminated and unable to be rehabilitated so we had to tear them down.

So the remedy concluded -- We consolidated the tailings and some of the highest arsenic. We put it under

the cap. So then the cap is -- We tried to make it into as small of an area as possible. We covered it in thick plastic then covered it with 18 inches to two feet of dirt and then planted grass and wildflowers and stuff like that on top of it. The goal being to keep it in a dome so that when water hits it, it runs off to the side and doesn't soak into the tailings, further contaminating groundwater. And we keep those tailings isolated. So that was all part of the first operable unit.

We diverted the creek that was running through the tailings pile around the tailings.

And then the last part of it, which is treating the water that comes out of the mine adit. We are still looking at some treatment options there so we haven't completed that part of it. We wanted to make sure that we knew how much water was going to flow out of there once we capped the mine. Because we might see less water coming out of the mine with the cap and the surface water diverted. So we wanted to know what that volume was before we did the final design. So we are looking to have that design probably completed by next September.

MEMBER OF THE AUDIENCE: Will they ever open that mine again?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: The lava cap mine?

MEMBER OF THE AUDIENCE: Yes.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: It's full of water and it's a Superfund site now.

COMMUNITY INVOLVEMENT COORDINATOR COOPER: Did everyone hear the question? You might want to restate it.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Okay. He asked if they would ever open the Lava Cap Mine again and I said no, it's a Superfund site and the mine is full of water. One of the things that we will require is that the cap can't be disturbed. So we wouldn't allow any construction, any activities on it that would put our remedy that we just spent a lot of time and money on to make it less stable.

MEMBER OF THE AUDIENCE: Clipper Creek and Little Clipper Creek. Where do they start and where do they end?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: On a map a little bit later I'll be able to show you a little bit -- Clipper Creek actually doesn't run on the mine site, it is down below near Lost Lake. Little Clipper Creek originates above the mine and kind of runs around the mine.

MR. VELTHUIJSEN: You say the mine is not active and full of water. I've had the thought. You know, I'm living maybe a half a mile away from it. Sometimes on Sunday morning I feel these little earthquakes and I'm thinking, another earthquake. And then I listen to the news

and I don't hear anything about an earthquake. Then dynamite comes to mind. Is there any monitoring going on? Are there any dry shafts or shallow areas?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Not on our mine. There's a lot of old mines around this area. But at the Lava Cap I don't think there's -- The adit that was the main entry point collapsed at Lava Cap Mine and I think the other two, those side units over there --

MR. TOWELL: There is still a -- There are still active shafts on the Banner Mountain side but those are all, those are all on private residential property and the entrances are controlled. There's no active access or activity associated with this mine at all.

MR. VELTHUIJSEN: I mean, people are panning for gold in the river. I mean, just for fun. On a small scale, like mom and pop kind of mining.

MR. TOWELL: I can't imagine. This is a pretty controlled area. This is not --

MR. VELTHUIJSEN: Controlled in what sense? Is there monitoring going on? Is there security on-site keeping an eye on things?

MR. TOWELL: Periodically there is monitoring and EPA's contractors are accompanied when on-site. There is also gate-controlled access to the site by the property owner.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: And he monitors his property pretty well.

MR. TOWELL: Right.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Because he knows whenever we go out there.

MR. VELTHUIJSEN: Since he is the owner of the mine he might be the one to talk to.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Well, I would doubt that he would be able to get to the mine. It's not really -- I mean, the mine is so deep and it is full of water and it's not really accessible. But there may be other areas or there may be construction. There's a lot of construction going on out here too. I don't know what dynamite is being used for but it could be something. I really don't know. Is that all the questions on that?

So we did the construction on the mine site in 2006 and 2007. Completed it -- Last December I think was the last of our construction activities.

We are still studying what to do about the discharge water from the mine.

And we are working on the feasibility study for the Lost Lake portion, which we just completed for this groundwater portion. Which basically is a study to say what is possible, what can we do. And I'll explain the feasibility study process a little bit later.

So just to explain how we broke the site up. This is kind of our schematic version of the overall Superfund site. So we've got the Operable Unit 1, which we call the Mine Area. It's up here. And that includes Little Clipper Creek which starts up above the mine. And it comes down here and runs along the mine and then through here. It crosses Greenhorn Road and then meets up with Clipper Creek and then goes down to Lost Lake.

MEMBER OF THE AUDIENCE: Could you outline Lost Lake Road there.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Lost Lake Road is not on this map. So this is Greenhorn. I think that's Hoppy Hollow. No, that's further down here.

MR. TOWELL: That's Hoppy Hollow.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: So this is Clipper Creek here and then they merge into Little -- Greenhorn Creek. This becomes Greenhorn Creek and heads down. So this is what we call Operable Unit 3, which is the Lost Lake area. So it is basically everything below Greenhorn Road. And then the groundwater is all of the groundwater underneath both of these sections. So that's what we're going to be talking about when we say Operable Unit 2, the groundwater component.

And then OU-4 were a couple of residences up here that we sampled and tried to clean around and discovered

that they were just too contaminated so we had them removed.

And you have a bigger version of this map on the last page if you want to refer to that.

So now I just wanted to show you some of our activities about what we have done over the last couple of years since we had a proposed plan meeting like this in 2004 to discuss the mine remedy.

So this is part of the construction of the cap. Excavating tailings, trying to consolidate them. And we had to replace that log dam with a rock wall dam that meets seismic codes of today. So it was a much bigger project than -- it got bigger as we were building. Bedrock where it wasn't supposed to be. It was a large construction project. We hauled out the most contaminated materials and took it to a hazardous waste facility. Most of it we consolidated on-site. But it was a lot of earthmoving and consolidation.

So this was looking, this is looking up towards -- This is the rock wall buttress right here, right. This was kind of where the base of the new dam and looking up. And those are the piles of tailings that we had, that we had to deal with. And you see -- Because that's tractors or something down there so those are pretty huge.

So this is more. You can't really see the color as well. The tailings are very grey so they look very different from soil that you see out there. But they are

very grayish and really fine and uniform. So it doesn't hold a lot of water so it's hard for plants to get a footing there and grow.

So that's why on an area that was just covered with tailings you see very sparse vegetation. It tries to hold on but there's just not a lot of nutrients or, you know, it doesn't hold water unless it ponds. It's not really, it's not very good soil because it's not really soil.

So this is part of one of the drainage ditches that we built around the tailings. One of our goals was to keep surface water from pouring onto the mine site so we diverted it around the mine. These ditches are all lined with plastic and then rock-lined as well to keep it, to stay stable in the event of a 100 year storm.

So this is right at the rock wall buttress. That's where Little Clipper Creek, when it is flowing, flows over the rock wall. It's a little ride that it gets before it heads down. Little Clipper eventually meets up with Clipper Creek.

And this is what the mine looks like right now. Well in the spring, not right now. It has been vegetated. We've got a couple of patches where it is not growing really great but we have gone out and reseeded specific areas. And this is our goal, to keep a fairly healthy patch of

vegetation on that which will keep the soil stable and keep our full remedy in place. And we will be -- There is a requirement. We will be monitoring this thing for the life of the project, which is -- We have it for 50 years but, you know, in 50 years we'll have another look. Yes, ma'am.

MS. COLLINGS: Did you have to haul in soil for that grass to grow?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: We did. Actually most of what we used was from on-site. We cleared another patch below the mine that was not contaminated. We used that clean fill, mixed it with some of the organic slash from the logging so that we'd get a high enough organic content for it to grow. But we did bring in some additional soil from outside.

MS. LEVITZ: What percent of the tailings were taken off-site for disposal and what percent were left behind and are there now?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Do you know?

MR. TOWELL: The amount taken off-site was 800 yards, cubic yards. The tailings on-site is about 50,000 yards so just a small amount was taken off-site. And that was mostly around the processing area. So right around mine buildings and inside mine buildings. Most of the tailings were just capped underneath this.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: So are there any questions on what we have been doing in the past and how we got to where we are?

So what I am going to talk about now is where we are currently at with the groundwater study that we have been conducting in conjunction with all the other work that we have been doing on the mine.

So we have sampled. We have installed monitoring wells around the mine as well as sampled drinking water wells around the mine and down. Several residences that are probably here, we sampled your wells.

And we have found elevated levels of mine-related arsenic in some of the wells nearest the mine. And it has been very inconsistent, I guess. The level of arsenic varies because of the nature of the groundwater up there. It's that fractured bedrock. So depending on the water level where your pump is pulling water from. And you probably see it if you have wells here. The water level varies with the seasons and that also affects the quality of the water.

But we have found elevated levels above the drinking water standard, which allows us to take an action. If everybody was drinking water that was not violating the drinking standards, the water standards, we wouldn't be taking action necessarily. But since they are above the

drinking water standard we are able to take an action.

And because it's so complicated there's a lot of interactions we still don't know everything about yet. We know that groundwater eventually comes to the surface somewhere. We don't know where. It's hard to tell because the water in Little Clipper Creek has elevated levels of arsenic as well.

So what we are proposing is only focusing on drinking water supplies at this point and continuing to study groundwater. How it's migrating, how the mine is affecting it. Are we going to see any differences once we put the treatment in for the water coming out of the adit. So once we see that and compare that to the drinking water standard we may see where the creek goes back up above the drinking water standard and know that that's where groundwater is impacting the creek. We just don't know right now.

But we knew enough about drinking water we wanted to go ahead and take an action on that and get that part -- and get those people who have these temporary under-sink units some kind of permanent decision. So that's why we are focusing this on the drinking water tonight. And we'll have another one of these when we get to the groundwater issues.

So what we do is we do a feasibility study. We take all these investigative data that we have collected and

look at -- we do groundwater monitorings to see where we think the arsenic is coming from and where it's going. We look at who is impacted, where those wells are. We are trying to take all that data and come to some conclusions about the extent of contamination. Then we start looking at approaches for how you can address that contamination to reduce people's risk.

MEMBER OF THE AUDIENCE: I have a question.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Yes ma'am.

MEMBER OF THE AUDIENCE: Arsenic, not knowing much about mining. Is it like a lump of arsenic somewhere? How do you -- Is it -- How come it lasts so long?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Arsenic is a naturally occurring element. So it's like gold and carbon and iron and other things that are part of the environment. So it exists naturally, you can't change it. There's always going to be arsenic. But what happens is they brought it up from below grade, below the ground surface, and crushed it and then released it.

You can go to different areas around here and find high levels of arsenic in soils just because of the nature of this area. And it is typically in rock formations so you can see where, you know, it's part of, in a large rock. And the rock is not going to do anything to you because you are

not going to be exposed to it. If you start chipping at it and eating those chips then that could impact you.

And then if water sits there in contact with that arsenic-containing rock it can leach out some arsenic into the, into the water.

COMMUNITY INVOLVEMENT COORDINATOR COOPER: Rusty, there's a question here.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Yes sir.

MEMBER OF THE AUDIENCE: I have lived on Lost Lake Road since 1942. And I lived, I just recently lived at the entrance to Lost Lake Road off of You Bet Road and I had the water tested there. One hundred percent no arsenic, it was beautiful water. I had my water tested down as you make the bend on Lost Lake Road and it has livable arsenic in it. It's passable, legally passable. But, you know, that's what, a half-mile, a quarter-mile.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Yes. We put wells in right next to each other at different depths and found arsenic in one and arsenic not in the other.

MEMBER OF THE AUDIENCE: How deep?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: How deep were our wells?

MR. TOWELL: The arsenic that we have been studying at the mine site is within the upper 200 feet below ground. The highest levels are very near the mine waste

materials. And then away from the mine waste materials there's not that much arsenic. A few wells that have elevated levels that are nearby other wells that are uncontaminated, that are low or have background levels of arsenic that are naturally occurring to the area. So there's not clear indication of a plume of contamination related to the mine but there are pockets of elevated groundwater, elevated arsenic.

MS. HEGER: I recognize a few people here from our neighborhood. I know we are quite a bit above the mine. So if you are drilling from the mine is the arsenic found below? From that point on for 200 feet down?

MR. TOWELL: Correct. That's not to say all of the water within that depth all is contaminated, it's sporadic. But we have sampled above the mine and have not found a lot of arsenic. In most of the downstream areas most of the residential wells do not have any arsenic levels but maybe trace levels where it's naturally-occurring. It's a very isolated area where we think it is mine-related arsenic.

MR. VELTHUIJSEN: I think -- I mean, it's related to what you are asking. We are in a situation -- I am also upstream but I did -- I just did a home inspection for a buyer who was about, a little bit to the west of the Lost Lake area there. We had a home built next to us, they put

in a lawn like a golf course and a swimming pool and a well that was twice as deep as ours and they started irrigating.

Our neighbor's well runs dry. They are at 185 feet. They have deepened their well to 275 feet and now they are good. Now we are at 145 feet. Now our well is running dry because -- So now we are going to drill a well. We'll show them, so we're going to drill to 300.

(Laughter)

MR. VELTHUIJSEN: But in the meantime we are drawing down this water table. So at some point we are going to draw water from an area where it didn't used to come from. What is the risk of drawing some arsenic away from the mine once you get to a point?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: I don't know that we would have any way of telling you that.

MR. VELTHUIJSEN: But it could happen.

MR. TOWELL: Well the one thing that we did evaluate in the documents, the Remedial Investigation Report looked at what we thought was a reasonable distance away from the mine in various directions that mine-related water could go. There are physical constraints. Even if you are moving water around and keeping it in the water table there are still limitations on how water flows in locations. So that is part of the area that EPA will be monitoring. This area I think has a reasonable possibility of mine-impacted

water to get to someday. It is limited.

MR. VELTHUIJSEN: Limited to the outline there? What if you're like, let's say 1,500 feet or 1,000?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: What we took of this map so it would be easier to see is the topography. This is a very steep canyon. The top of that yellow line I believe is at the ridge or close to it. So, you know, even groundwater, even though it's below ground, still behaves mostly as it does above ground so it stills roll downhill.

MR. VELTHUIJSEN: So when I'm talking of drilling down even --

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: But you are still -- There's a preponderance of the way the valleys have formed over time. It's that everything wants to come in this direction. And so when we have done our modeling and calculations we have looked at how much rain falls on this area, how much gets into this creek, how much do we see in elevation rise and in wells. And so we have a fairly good idea of where the water goes. So that is what we are going to be monitoring for this next phase of the remedy.

It is a very, very complicated thing once you start dealing with fractured bedrock but, you know, what we have also run into is it is hard to say that that's mine arsenic versus arsenic that is not coming from the mine.

Because the mine didn't do anything magical to make arsenic, arsenic was already down there. They have made it more available by crushing it and bringing it to the surface and putting it in the piles like that. It may have been exacerbated by the mines being open to the air and oxidizing the arsenic and then letting the water -- it carries it more. But the mine has been filled up since the '40s and it has been fairly stable. The amount of water that we see pouring out of the mine doesn't vary a huge amount and the levels of arsenic have stayed fairly consistent.

MR. TOWELL: Just to answer that. There is -- Your question about kind of the footprint or the extent. There is a document called the RI Report, Remedial Investigation Report, that has been released to the public. It is here in the libraries. And is it on the EPA website?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Um-hmm, it's on our website.

MR. TOWELL: In there there's maps that show the potential extent of mine-impacted water. Even though most of the wells we have monitored in there do not have any arsenic it's the, I wouldn't want to say worst-case scenario but it is our reasonable, technical evaluation, if you want to get more detail. This part is just focusing on drinking water where we know wells are impacted right now.

As Rusty will say, monitoring within that entire

footprint of wells will continue at some frequency over time. So this is, tonight's discussion is focused on where there is known drinking water impacts. But there is still groundwater monitoring and evaluation that will continue and it will be focused on a footprint that is identified. And it is -- While it is not on this map you can see that.

If you have any questions about how close your well is to that get in touch with Rusty. I'm sure we can try and get the additional answers. But it is not a simple answer that we know exactly where mine-impacted water is going to go.

MS. HEGER: So where the Lava Cap Mine starts to meander. What kind of a vertical drop is it from that point to where you are going to be testing wells? Ballpark.

MR. TOWELL: The mine adit, which is where water discharges to the surface, the former access point to the mine. That is at an elevation of around 2800. The contamination that we have found is all at a lower elevation than that.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: And the Lava Cap Mine Road up there is at 32 or I think 33.

MR. TOWELL: It is very steep topographically. As Rusty was saying the water does, the groundwater as it is making its way down through the bedrock fractures does tend to follow the general topography of the drainage of the

rock.

MEMBER OF THE AUDIENCE: Where are the contaminated wells on this map?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: The ones that we have, the ones that we have found that had some level of contamination were here, here, here and here and then these up here.

MR. WATKINSON: Do you know what the natural background level of arsenic is around the mine?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: What were we using as the background?

MR. TOWELL: We have monitoring wells that we used to estimate a background that was 18 parts per billion. But that said, that was from a couple of wells right above the mine. There's large areas where the natural occurring background was zero. The last wells that we sampled had zero arsenic. So that 18, I wouldn't say that's representative of the region but it is, there are pockets of naturally-occurring arsenic. As Rusty said, this mineralized zone contains arsenic.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: And the drinking water standard is ten parts per billion so that is what we are using in our standard. Yes sir.

MEMBER OF THE AUDIENCE: I'd like to give you a little history. When we first moved up in 1942 we were

looking for water and we dug a little hole and it was an artesian well. And the water gushed to three-quarters of an inch and stayed for years.

But I guess from here to where that guy is was the New Ponderosa, the Young Ponderosa. The Ponderosa will take three guys to go around it now and there's no water coming out of that well. So you've got the story, where did the water go? It's going up in that tree I'm sure. I think we dug a hole very close to it, maybe about ten foot away, and there's still water there. But that was ten feet further on.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: So what we do is when we're looking at how we can address this arsenic-contaminated drinking water what we are looking at is, how do we reduce human exposure. That is our first criteria that we are looking at. And preventing people from drinking contaminated water.

So we put together a list of technologies or approaches so we can monitor groundwater to see where it is going and see when it starts to become elevated near drinking water wells then warn people that their wells may become contaminated.

We can do what we call institutional controls where we can say, we can put a notice on the deed that says, if you drill a well in this area it may be contaminated with

arsenic, you may need to have it checked.

One of the really interesting things is EPA does not have the ability to tell people they cannot drink contaminated water out of their private drinking water well. That is not within our legal authority. All we can do is let you know that you may have contaminated drinking water. But we can't force people to not drink from their private well. We regulate public water supplies which the definition, I believe, is 25 connections. So we can't tell somebody that they have to stop using their well. But we can put a notification that we think that there is contamination in that area.

Other institutional controls, not necessarily for groundwater, but fences. You know, if you want to just keep people out of an area. They are not the ideal, permanent solution but they do have a role to play.

And then other ways we can treat the water. Point-of-use systems. Which like I said are those under the kitchen sink reverse osmosis units.

Wellhead treatment units where we install a larger reverse osmosis unit on the well itself so that all the water that goes into a house is treated prior to being used.

Or an alternative water supply from a public water supply pipeline.

So we looked at all of those technologies. And

then what we do is we put them into alternatives so that we put together a very specific list of alternatives and approaches so that we can cost them out and that we can compare them with one another and compare them with the nine criteria that EPA is required to do.

So what we did is we came up with four alternatives for the drinking water decision. Alternative 1 is not doing anything. We are required by law to do that, evaluate that as the baseline. If we did nothing what would the consequences be.

Point-of-use treatment. So the second alternative is point-of-use treatment. So under-sink kitchen, under the kitchen sink reverse osmosis units, monitoring of groundwater and notification that there's known arsenic contamination in the area.

Now the monitoring also includes that we are going to be installing some additional wells so that we can have a better sense of where the mine-related arsenic contaminated groundwater is. So that's part of what we will do during the next phase of this. And whatever remedy that we select you'll notice that monitoring and notification are part of all three alternatives. So we will have to do that monitoring and notification in any remedy we select. Yes sir.

MR. VELTHUIJSEN: I am a member of the Banner

Mountain Homeowners Association. At times we have had an interest in finding out about different wells in our neighborhood but we found out that that's all proprietary information that we can't have access to. So now this seems more like a public issue. Is this testing that you are doing, this monitoring, is it public-accessible information?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Yes sir. All the data that we collect is available to the public.

MR. TOWELL: But not linked to a specific property.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: It's not --

MR. TOWELL: The results are but not who the property -- what parcel that came from, whose well that was. We notified individual well owners --

MR. VELTHUIJSEN: So if I would want, I would ask, show me your results. What level of information can I get?

MR. TOWELL: The results are in reports that list a well name and sample results. And there's maps that show where that is. It doesn't list the actual person's name or a property address.

MR. VELTHUIJSEN: But you can kind of --

MR. TOWELL: But you can look. One of the figures in there has numbers on it. Those are numbers that we have assigned just based on how we assigned sampling numbers at

the site. But we don't put, you know, this is your house, this is your well.

MR. VELTHUIJSEN: Sure.

MR. TOWELL: But you can see where that data point came from.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: You can find out. And it would give you a better idea of what we have seen and how they vary over time. It explains some of the problems with certain wells.

MR. TOWELL: As Rusty said, all of the data collected by EPA is public information and it is in the recently released RI Report that I mentioned before. It has tables summarizing all the results.

MEMBER OF THE AUDIENCE: What does RI stand for?

MR. TOWELL: Remedial Investigation Report.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: And you can go to the Grass Valley Library or the Nevada City Library -- I'm sorry, Nevada County Library in Nevada City. They are available in hard copy and also on CD. You have to review them there, you can't take them home. Yes sir.

MEMBER OF THE AUDIENCE: A conceptual question about groundwater. In your models versus real life, how is the groundwater being recharged? In the models are you considering uniform percolation?

THE REPORTER: Rusty, we are having a hard time

picking this up.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Okay.

THE REPORTER: We need people to either stand up or speak up.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Okay.

MEMBER OF THE AUDIENCE: My question is related to, this conceptual question is related to groundwater, groundwater recharge. In your models, your groundwater models, is the groundwater represented by uniform percolation or are you assuming discrete effluents and you have some way of dividing that?

MR. TOWELL: There's regional application of precipitation as a percentage of what the estimate is. A portion of it falls on the ground, it doesn't run off, it actually gets down into the ground. There are also surface water/groundwater interaction springs where water comes out, or stretches of creek where it intersects the groundwater table and recharges the table.

In this type of environment where it is primarily fracture-related floating bedrock that is very hard to simulate accurately because you don't know what these fractures do. So you don't -- You have to simplify it and look at just the regional picture and know that as a region, as a drainage, this is how much water has to get out because we know what the water levels are so that they maintain this

much water. So it is very general.

MR. BAKER: So as far as just the reality. When it rains is it discrete or is it uniform, in real life? I mean, is the water finding a crack and going into it here but it is not going into the ground in another spot? Is it non-uniform? I guess that's what I am asking. I know you can't represent it.

MR. TOWELL: Yes, it is non-uniform. Most of the precip runs off, particularly in these very steep areas with mostly bedrock at or near the surface. So there's not a lot of opportunity for rainfall to infiltrate and that's why there's not a lot of water when you are trying to pump your wells. It's mostly rock and some small fractures. It's not like a gravel, a sand and gravel aquifer like out in the valleys where lots more of the precip infiltrates in really uniform. But either way, if in reality it does not infiltrate, that is how it was modeled.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Our third alternative that we looked at is wellhead treatment. The same monitoring scheme and the same notification system that are a part of Alterative 2 and Alternative 4. So the difference in this wellhead treatment is we would install larger, reverse osmosis on the wells that are contaminated above the drinking water standard so that all the water that goes into the house is treated.

Then the fourth alterative that we looked at is providing an alternative water supply separate from the drinking water well and that would be provided by the Nevada Irrigation District. So we looked at that pipeline system as well. Yes sir.

MEMBER OF THE AUDIENCE: So on the wellhead treatment would you -- who pays for that? Do you pay for that?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: We would pay for the system and the installation and we'd have to figure out how to do the maintenance. Typically the state, after everything has been installed and in place and operational the state then takes over the operation of any of our funded remedies, our federal remedies.

MEMBER OF THE AUDIENCE: On the irrigation in the water supply. I know that certain areas NID proposed a pipeline in and getting treated water to the area and they make homeowners pay so much per year. Would that happen in this situation?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: In this case if that's the remedy that we select EPA would pay for the installation of the pipeline interconnection.

MEMBER OF THE AUDIENCE: One more question. Have you tested any other areas where there has been a lot of mining done?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: There are several mine sites on the Superfund list that involve, that include drinking water contamination of wells.

MR. TOWELL: Are you asking right here?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: In the area?

MEMBER OF THE AUDIENCE: Yes, locally. Because where I live off of 49 next to (inaudible). It would be like the 49 Midtown area. When I bought my house, shortly after I bought it I found that my well was pumping out 34 parts per billion of arsenic, which is just extremely high. So I spent over $5,000 on a treatment system for my well. But I'm sure other people in that area -- You know, I have told some of my neighbors but a lot of other people may not know there's that much.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: And unfortunately we don't have the ability just to sample people's private wells. We don't have the authority to do it. We wouldn't have even sampled these wells if it weren't for the larger discharge of tailings into the creek. It is something that people -- You know, there's obviously a lot of contaminated wells because I'm sure the Calgon guy out here is pretty busy installing systems. I've seen him driving around. But it is one of those things. For a private water supply it is up to the private individual to

take care of it.

In this case because it is part of the Superfund site we can't tell people to clean up their own water when we think it is related to the mine.

MEMBER OF THE AUDIENCE: Because that area out there, it is a heavily mined area. There's still shafts that are visible even on the side of the road. When you drive by you can see the whole shaft.

MR. TOWELL: This particular project that the EPA, the federal government is involved in. The only reason they are involved is because it is on the Superfund list that the EPA mentioned earlier, that Rusty mentioned earlier. That's the only thing that they are allowed to spend money on is something related to that site that has been identified. And that site is what's coming from Lava Cap Mine.

MEMBER OF THE AUDIENCE: Because it's failed.

MR. TOWELL: Yes, because it's --

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: And what happened is --

(Several people spoke at once)

MR. TOWELL: -- the list then that might also be investigated. There aren't any other local mines that are on EPA's Superfund program. There are other cleanups that occur and some other state actions. But as far as EPA and the federal government, there's not any other program.

MEMBER OF THE AUDIENCE: And I'm sorry, I know that a lot of you people are from that area because this is really affecting you. I'm not. I just came for the information about what is going on, you know, maybe in other areas that could possibly, you know. Because our area is obviously -- you know, if you're at 18 parts per million in your test wells, in my well at my house it's testing .34, at 34 parts per billion. That's quite a bit higher.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: And that was below the drinking water standard until several years ago. The drinking water standard used to be 50 parts per billion and then we lowered it to ten.

MEMBER OF THE AUDIENCE: Yeah.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Seven to ten years ago we would have thought that that was a safe level of drinking water.

MEMBER OF THE AUDIENCE: So something devastating would have to happen to an area for it to get any attention at all.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: From the Superfund list. That's the program that I represent. There are state programs. And County Department of Health might be able to have some authority to look into it more, the localized area.

But like I said, when we did the initial study at

Lava Cap what we have to look at is the potential and actual risk posed by the site. We have to contaminate or potentially contaminate a certain number of people at a certain level before we are allowed to take an action. And we have to propose it to the Federal Register, get the state to agree to list it as a site and then we list it. So it's a long and complicated process that also doesn't work very quickly, as you can tell. We started looking at the site in '97 and here we are, 11 years later.

If it's something that people are seriously at-risk, immediately we would take an action. But it is something -- Drinking water levels that are not that much above the drinking water standard we can't really take an action. Yes sir.

MR. WATKINSON: Does the County do any mandatory testing of new wells? Because there's background of arsenic in a lot of areas of the Sierra Nevada. It is not necessarily associated with mining. So anybody that drills a well could be in an area with arsenic.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Yes.

MR. WATKINSON: There should be mandatory testing, at least of new wells. So how would you propose to get something like that implemented?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: That's part of what we are doing in the notification. I don't

think there is currently a county statute that says that new wells have to be sampled for arsenic. Now you do have to sample for biological contaminants. We make sure that you have a certain level of chlorination so that you don't have fecal coliform or other biological contaminants. But arsenic. You know, the drinking water standards are ones that are issued by the EPA and the state so the counties don't have to force you to meet those. But they do enforce those ones that are other health issues.

MR. TOWELL: The County Health Department is certainly aware of this site and other sites and I think it would be a reasonable first stop if you are looking to see if there are other groundwater problems in the area that are being tracked.

MR. WATKINSON: I mean, there's lots of places here in the Sierra Nevadas that are 10 to 20 parts per million background of arsenic in the soil. That's just the natural soil and rock that's there. So this is a common problem. It's not necessarily associated with mining.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Exactly. In its naturally occurring state it is not something that can easily go away. It's not going to go away.

MS. HEGER: Who does this pertain to? What is the size of the geography? Who are the people that (inaudible)?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: What I'll

do is -- There's a bigger map and I'll have to show you who we are proposing to -- that is affected right away and that we calculated for our costs.

MR. TOWELL: There's two things. One we were talking about earlier is the overall footprint where this mine's water potentially could end up someday. And that's where EPA would monitor the residential wells within that footprint. And there's an area where right now there's known impacts. So when it says monitoring, the monitoring is within the larger footprint of where we think it is possible the mine impact could end up someday. Earlier when I was mentioning the map that was in the RI Report. That shows the footprint of an area where monitoring will occur.

MS. HEGER: So there's a current, immediate need.

MR. TOWELL: Right.

MS. HEGER: Then there would be broader, where it could potentially --

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: So what we did for purposes of being able to compare is look at who is immediately impacted. And then we have provisions for addressing future risk. Because in reality we are never going to be able to leave the site because they have to be evaluated every five years under the law. Because we are keeping contamination there on-site under the cap. So we have to monitor to make sure the cap is in place and stays

integral, there are no problems with it. We have to make sure that we are meeting our goals for not having people with contaminated drinking water. So it will be a long-term process.

MS. HEGER: It's almost like Alternative number 3 is immediate and then 4 would be the --

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Well Alternative 4 is also, it would be -- Building the pipeline as quickly as we could.

MEMBER OF THE AUDIENCE: How big of a pipeline?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: That would be something we'd have to discuss. That's at the --

MEMBER OF THE AUDIENCE: For everybody.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Yes, it would be -- We would have to work with the Nevada Irrigation District to determine what size would have to be put in.

So these are the nine criteria that EPA is required to look at and evaluate any selective remedy or any proposed remedy.

So the first one is overall protectiveness of human health and the environment. And the second one is compliance with all applicable or relevant and appropriate laws and regulations. Those two are considered the threshold criteria. We need to meet those. Those are the two most important.

Then we look at these other seven that we call balancing criteria. They are long-term effectiveness; reduction of toxicity, mobility or volume through treatment; short-term effectiveness; implementability; cost; and then state and community acceptance.

So we try and -- You know, what we do is we take each alternative and evaluate them with these nine criteria and then also compare them to one another and see overall which alternative leaps out the preferred alternative for our remedy.

So this table, there is a similar one in the fact sheet that kind of goes over each alternative. The threshold alternative criteria are in the light blue and then the subsequent ones are for the balancing criteria. The last two criteria, state and community acceptance, we don't know how the state and community officially feels until we have the public meeting to release our plan.

So as you can see, Alternative 1 which is no action. It doesn't meet protectiveness or comply with laws and regulations. It is not long-term effective. It does not reduce toxicity, mobility or volume. It is not short-term effective but it is readily implementable. We could walk away soon. And the cost is zero.

Alternative 2, which is the point-of-use, under-sink systems. It is protective of health and the

environment, it is partially favorable. They do work but they only treat one faucet in the house. So most people get their drinking water from the kitchen sink but, you know, sometimes you drink from the bathroom sink. You're out in the front yard watering your yard and you drink from the hose. Those would not be connected to the system. So it is not completely protective.

It is compliant with laws and regulations, however, those systems do have to be maintained. The under-sink filters have to be replaced. If you don't do that on a regular basis they could fail and not be protective. So that's why we have it as partially favorable.

And the conditions for long-term effectiveness. Again, it's the maintenance mainly, that they have to be continually maintained. It does reduce the toxicity, mobility or volume of the arsenic. It is very effective in the short term. They are very easily installed. The cost that we assumed for 50 years for installing the units and maintaining them --

MR. TOWELL: A lot of that cost is the monitoring. It's 50 years of monitoring.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: The units are very inexpensive compared to 50 years of replacing filters. It's like Henry Ford said once, he would give the cars away for free if he could sell you all the spare parts

for the life of the car. Most of it is the maintenance so it's about $1.2 million.

MR. TOWELL: And again the groundwater monitoring program. Fifty years of monitoring all the wells, the drinking water wells and the monitoring costs.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Yes, the monitoring and then also the notification, which shouldn't be very expensive. But all those are included. And so those costs for the monitoring are the same in all three alternatives.

Alternative 3 is the wellhead treatment. Again it is protective of health and the environment. However they do need to be maintained so it's a long-term issue. It does meet the regulations. All the water that comes into the house would be treated. So if you are drinking water after you brush your teeth, out in the yard with the hose, all of that would be at the drinking water standard.

But in the long-term, again, not maintained properly it would be ineffective. But it is very good at reducing the toxicity. Very short-term effective and it is readily implementable, they are off-the-shelf units. And it's about $1.6 million for that alternative plus the monitoring. Yes sir.

MR. VELTHUIJSEN: I have a question about that. We have a water treatment system in our house. And because

of the treatment, it's a neutralizer, the hardness of the water and the whole thing. But it turns out that the treated water isn't very suitable for irrigation, it's not as good for plants. If you do it at the wellhead your whole irrigation system will be treated as well. How does that impact like veggies and gardens and that?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: I don't really know.

MR. TOWELL: There are different treatment processes and our water can be reconditioned after the removal of the arsenic and the solids. Typically I don't think we can know exactly. It's very dependant on the background water. If there's a lot of iron it influences how easily you can remove the arsenic. If the arsenic is at small levels and the iron is high. So the actual basic water, not just the contamination, complicates what the end product is going to be. I don't think we have a blanket answer. But if we were to install wellhead treatment systems for folks we would definitely want to make sure that the water could still be used for irrigation.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: And then the last alternative is Alternative 4, which is the Nevada Irrigation District pipeline. And it is protective because it doesn't rely on contaminated groundwater being treated. And it is compliant with laws in that Nevada Irrigation

District is a public, regulated water supply.

MR. KOLLMEYER: Does that figure just include putting in the pipeline or does that also cover the hookup charges? For example, if you want to build a new house and the pipeline is right in your street or across the road it will still cost you a $7,000 hook-up fee.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: We would cover the connection fee as well.

MR. TOWELL: If there is a contaminated well. For everyone else who is wanting to use the pipeline that Nevada Irrigation has put in that EPA has paid for and they don't have a contaminated property, that would be separate.

MR. KOLLMEYER: No, I was just wondering whether the hook-up fee was in there.

MR. TOWELL: Yes, connection for an impacted property.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Because I think we estimated connecting --

MR. TOWELL: Ten. I think it's ten.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Ten connections.

MR. TOWELL: Ten connections for the purpose of cost estimates. Right now there's not that many properties impacted.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Yes sir.

MR. BORNCAMP: When you did your cost estimation, you said it was over 50 years. Was the number of households that are currently contaminated -- I guess this figure, ten. Did you project for future growth if new homes are put in and what is the situation for those people?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: We did. What we did is we looked at the set number that we have right now so that we could make a comparison. What we did, there are -- On the mine site there are, there's potential development still up there because there are a couple of parcels that are not part of the mine and are available with, you know, accessibility issues that could be developed. There are some, from my understanding, development restrictions to five acre parcels in that area so I don't know.

One of the things that we will look at in the design is any remedy that we select, what would be the contingency for future needs for it. And then again, as I said, every five years we have to evaluate the overall protectiveness at the site. And we would identify any future needs that we have to provide additional wellhead treatments for or provide additional connections if it is determined that they are contaminated by the mine.

MR. TOWELL: Just to clarify. There's five connections of known impact. For costing we assumed five

more, that there may be five additional properties that would need it. If it goes beyond that it would not be included in this cost estimate. However, the remedy is intended to address any mine-related impacts within the footprint so that process will still need to be worked out with the Irrigation District, with the County that would be telling people who are installing new wells that that may be an impacted area. But simply for cost comparison that's what was assumed, five existing properties, five more of unknown location in the same general area.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Yes sir.

MR. VELTHUIJSEN: I see a whole fascinating, complex development taking place here. We just went through this whole thing with NID about the raw water pipeline. And then as a finally, admittedly, mitigation effort they are putting in a treated water pipeline alongside of it. And it was actually going to take this route down to the Lava Cap Mine. I don't want to -- I don't know if it's smart or shrewd but they said, if we run it down Idaho-Maryland we'd have to pay for the running of the future pipeline anyway. But if we get EPA and the feds to pay for this one, this pipeline, we get 70 miles of extra pipeline free. So that's kind of the situation --

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: We only approached them probably earlier this year with this idea.

MR. VELTHUIJSEN: But that decision was only made in the last year. But anyway. The precursor of all this, one of the things was we were talking about the cumulative impact of this pipeline and the treated water. So there's a potential development of this mine site of 26 five-acre lots there and then on the mine itself there's another potential development itself.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Is that the Banner?

MR. VELTHUIJSEN: No, one is the Sacher Family Trust Site. That's 120 acres. Anyway, it turns out to be 26 lots there. It's already on a subdivision map. And there's a monitoring well there. So now let's say this whole mine site before it was subdivided was all one place. It was mined, it was zoned as industrial, agricultural, whatever it was. So now they want to turn it into residential, so this is like the highest use or whatever the value of the property.

So you've got an industrial lot and you have a contaminated place. So now you guys are going to provide treated water so you're upgrading the property values and making it suitable for residential development. So here is this guy buying a Superfund site basically from someone, a contaminated mine, at breakdown prices. He turns it into a Superfund site, gets subsidized treated water and develops

it into a luxury home subdivision.

I mean, there's something. I call it -- What is it? It's like encouraging growth.

MEMBER OF THE AUDIENCE: Growth-inducing.

MR. VELTHUIJSEN: It's a growth-inducing impact. Is there going to be an Environmental Impact Report on this pipeline?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: I mean, that's what this process is similar to in our decision-making process. For Superfund we don't do any environmental impact study. That's what all of our design reviews are similar to.

As far as -- I am not sure. I mean, as far as -- I think there is a legal term for deriving a benefit from a federal action that we do have the ability to recover costs. If we do take an action and improve somebody's property that they have an unwarranted gain we can request that we have a lien against them. And the current property owner is a responsible party. He is liable for the contamination and we are in settlement negotiations with him as well.

MR. VELTHUIJSEN: And then the benefit to NID. So now we have the cost, the $4 million cost. That's the cost to you to pay for this pipeline. But then NID is going to have the real estate in place. And all the future customers that are tapping into it is going to be a return on

investment so NID is getting a little freebie also.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: And we are going to have to work with NID in how we implement -- If we select this remedy, how it is designed, how it is constructed, the path. How we gain access and easements and all that stuff. Still it is being negotiated.

Number one, we haven't selected any alternative. All we have done is put out initial feelers to say, is this something that is possible.

MR. VELTHUIJSEN: But it costs -- Hey, if you can get a rate of $1.5 million, why would you pay $4 million? But the $4 million is really a skewed number because you can recoup like more than half of that and so it might be very competitive resolution.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: This is all money that the EPA would spend.

MR. VELTHUIJSEN: Right, but then you get some from the property owners, from the mine people whose property value increases. And we add liability so they --

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: That's probably outside the scope of this discussion. The amount of money that we could recover from anyone is a drop in the bucket compared to what we've spent and what we anticipate spending.

MR. TOWELL: That pipeline cost is for a pipeline

big enough to serve ten residences. If it's going to be something different than that that's, that is not what is on the table right now. If NID wants to install a large supply line in this area then that would require additional discussions with EPA and potentially additional environmental --

MR. VELTHUIJSEN: That's ten pounds more.

MR. TOWELL: What's that?

MR. VELTHUIJSEN: That's ten pounds more. If the trench is already dug.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: And that all has yet to be decided.

MR. TOWELL: EPA can't fund a water supply project that is not associated specifically with replacing this contaminated water. If that's what would be proposed, and I certainly understand that that would be something that NID wants, that would require subsequent discussions and negotiations between EPA and NID and potentially additional discussions with the community.

MR. VELTHUIJSEN: And I see that. But just, you know, $4 million. Like when you consider costs I think you should look at the mitigation or whatever -- You shouldn't really present it to us like, ow wow, it's $4 million. Yes, it's a $4 million initial cost investment but you are basically reselling, or at least part of it.

MEMBER OF THE AUDIENCE: But they aren't going to recoup anything from that. Because it's federal money that is going to pay that $4 million. You think the feds are going to get any money from people tapping into NID water?

MEMBER OF THE AUDIENCE: We should pay for it.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: That's part of the same principle as we are not asking the private landowners to pay for their wellhead treatments or their under-sink units. Here we have approached NID and said, is this possible, does this fit into your future plans. Because if they say no, we are not headed in that direction, we are going the other way, that wouldn't be a possibility for us. Because we are not going to build a $20 million pipeline from a treatment plant if it has to go -- But it just turned out that there is a supply line up at the top.

MEMBER OF THE AUDIENCE: It will soon be there.

MS. HEGER: One more question. I understand Frans' question. Having been involved with this whole NID thing we have become little mini-experts on details.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: I'm sure you know way more than I do.

MS. HEGER: We spent so much time going through those details. But the question I do have is, I'm not sure but I don't think I am one of the properties that is affected, not having seen the footprint. So if piped,

treated water comes down and we would like to have part of that too, we would be in a position to negotiate with NID? Or would that be with you guys to try to get water in the near area of that?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: I would say it would probably be negotiations with NID unless you were part of that larger footprint. But I don't believe you are because you are on the other side of the mountain here north of the mine. What we are looking at is the potential. The only impacted residences today are the ones right near the mine itself. So that's our initial.

And then we assume that there may be some development in the future around the mine that are lots that could be developable and so those would need to be included as well. That's about ten right now.

MS. HEGER: So if the pipeline goes down towards the mine there's two roads, Lava Lane and Lava Dome Lane, that, you know, could potentially. So that would be a separate discussion with NID in concurrence with you guys? Since you guys will be doing the main artery going down that way, right?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: I would think it's probably something that we will have to figure out during design because that will be design consideration on the size of the pipe and NID's plans for the future.

Because, you know, for us we probably need a four-inch pipe that goes to service these ten homes.

But, you know, if we are going to dig a trench and put in a pipe we might as well probably plan for the future. But that's again something that goes down the road that we'll embark on starting in October with negotiations with NID.

MS. HEGER: Will there be a public forum for us that would be interested in that to put a request in?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: It is not typical but we do often have meetings trying to explain where we are in the process.

MR. TOWELL: And with the involvement of NID, which does have other regulatory requirements of how they operate. That's why I said earlier, if there is going to be an expanded project here that is more than just EPA gets water to these areas that have been impacted. That may have other public notification or other regulatory requirements in addition to EPA's Superfund process.

That's part of the reason why, for Rusty to get back to the slides. Why some of those are partially favorable. Because there are some details that would have to be worked out for this alternative. It's not a slam dunk. Because of all these types of concerns and easements and getting the pipeline there. This is all through private

property. There is no public easement between their current line and where the water needs to go.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: And that's why in terms of, it doesn't meet our criteria for reduction of toxicity, mobility or volume through treatment because there is no treatment of contaminated ground water. NID has their water system. And then it's short-term effectiveness. It's not as easy to install a pipeline as it is an under-sink unit. And so implementable. It is but it is going to be more challenging to implement. Getting people connected and all that, it will take more time. So it isn't as favorable as the other two issues for immediate -- that could be installed more immediately.

So this is how we kind of lay all this out and look at all these other criteria and EPA selects a preferred alternative. And we did select the Nevada Irrigation District pipeline alternative as our preferred alternative. Mainly because it does meet our threshold criteria and it is a safe, long-term water supply.

That being said, all of the alternatives are still on the table for public comment so, you know, we don't make our decision until the conclusion of the public comment period, which is August 29.

And then we write a Record of Decision that gets reviewed by the state and by EPA Headquarters and then we

publish it, sign it and it should be ready, presumably at the end of September. Yes sir.

MR. BORNCAMP: Since you said technically number 2 and 3 meet the same, particularly 3, as number 4, and the cost difference is two and a half million dollars, how are we supposed to feel good next April 15th when we pay our federal taxes if the system is no -- there doesn't seem to be any strong criteria for NID other than connecting to a municipal water supply and freeing yourself from the need to service the units. Economically you could probably buy a lot of filters for a small number of homes for 50 years.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: And that's true. And that's why we have to weigh all of the criteria, it's not just cost. It's also protectiveness, it's long-term effectiveness. So we have to weigh all of those. The main reason is, frankly, is that it is a more reliable system to have people on a public water supply than a private well.

The other issue that we have to deal with in terms of it's a private well and we have a wellhead treatment. If water levels drop do we then have to put in a new well for them because they no longer have a drinking water supply? If their well becomes fouled with iron or something like that how do we -- You know, we are committing to maintaining a water supply for people that are impacted by the mine,

essentially forever. So in terms of creating the alternative we look at just what we actually have to do in terms of wellhead treatment.

But some of the alternative scenarios that we looked at were, what happens with these wells. You know, we do see fluctuations in pumping rates, wells going dry or water levels dropping. So when we sign on to providing a water supply for people, we have brought in bottled water, cups of water to other sites in the past, so we are committed for the long term.

So this is the one that is the most reliable that we believe. But we are open to hearing all the comments of anybody who has a different opinion. Yes sir.

MEMBER OF THE AUDIENCE: Suppose you have an orchard. That price goes up, I would guess.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Well we don't -- We're not paying the water bill.

(Laughter)

MEMBER OF THE AUDIENCE: You have to negotiate.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: You know, when you connect to NID, that's connecting to the water supply then the water bill is your problem. Yes sir.

MR. HAUSSLER: Under Alternative 2 and 3 with the wellhead treatment and point-of-use. It says it includes land use notifications describing a potential for arsenic

contamination. Is that a declaration you have to make to a property owner or do you nail a sign to my tree or what?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: That's what we work with the county on in this whole area to say, there's a potential for arsenic contamination for people installing new wells. We can't actually tell you you can't drill a well. We can't tell you not to drink from it if it is contaminated. But we can ask the county to notify you that there is a potential.

No, you could install a well and it not be contaminated. We have residents out there who have one contaminated well and one not contaminated. So we can't say with certainty if you put a well in this spot it is going to be contaminated with arsenic. So that's what the implication is.

MR. TOWELL: But there's two processes. Monitoring for the existing wells that is ongoing and would continue for wells that are already in this footprint. The land use notification process would be something developed with the county for someone drilling a new well within this footprint to make sure they know there is a potential for arsenic and it should be tested and it's a property that is within this footprint.

It is not to go back to a current owner and assign something to their deed or assign to their property.

Specifically it is only for a new well within this area. They should know there is potential contamination.

MR. HAUSSLER: Thank you.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Yes ma'am.

MS. LEVITZ: If Alternative 4 is chosen, and I understand how you can't really force people not to drink contaminated water on private property from wells. In this case would the wells be capped so ensure that future property owners don't reactivate these wells, maybe used for irrigation to affect neighbors? Or would they basically be just left alone? If people wanted to use their wells, in addition to treated water.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: I think it's the latter. We would let the landowners know what the situation is. We probably are already sampling their wells. But we couldn't tell them they couldn't use them for irrigation.

MS. LEVITZ: Theoretically they could continue to drink contaminated water.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: We don't have the authority to tell them not to.

MS. COLLINGS: So if that alternative is chosen the pipeline would just go into that line area where the wells are currently identified?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Yes, this is what we based our costs on for this first -- Up at the top of the mine, that road. And it's about, a little about a mile above the mine. It's about a mile and a half by the road. And then what we are proposing is connections where we currently identified contaminated wells. So we have got one here on in this residence, here, and then several down here.

MR. TOWELL: Those are potential, that's just for costing. Only some of those are known to be impacted.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: That's true.

MR. TOWELL: The cost that was shown was for that pipeline to Greenhorn Road. We're talking about down to Greenhorn Road.

MS. COLLINGS: So my question is, what happens if wells further downstream become contaminated? Then what do we do?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: That's one of the things that we looked at. That will be part of our monitoring network. And we actually did cost out -- we took it out for these purposes just to have, kind of evaluating the same set of houses. But the pipeline can run over here along the road and come down and service these residences down here along Cripple Creek.

MS. COLLINGS: So if they develop homes you would extend the pipeline?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Yes ma'am.

MS. COLLINGS: Is that right? That would be additional cost.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: If this is the remedy that is selected then that would be the remedy that we implement. So as more people are impacted we would implement it. If we selected wellhead treatment then that would be the remedy that we would have. We would have wellhead treatment installed in the homes that were impacted by the mine.

MS. COLLINGS: So you don't have the option of doing a combination?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Wellhead and? We would select one or the other just for this. You are not required to connect to the pipeline. If you want to continue to operate -- You know, maybe you like your wellhead treatment system or you like the taste of groundwater or whatever the reason. You don't have to connect.

MR. TOWELL: To clarify. As Rusty mentioned earlier, every five years EPA is required to re-review their selected remedies to see if they are still effective or to

see if there is some other reason. So if conditions have changed and there's wells being impacted that are not readily connected to a new pipeline there is opportunity that something different could go on in another part of the site. But right now in this simplified process the expectation is that if properties are just below Greenhorn Road they are still relatively accessible, we would extend the pipeline.

But the full potential footprint of mine-impacted water, which we don't think -- Right now we think there probably always will be, with our technical evaluation, the possibility of impacts sometime in the future, whether it's ten years or 100 years. It may not be that we would put pipelines everywhere. Or maybe 50 or 60 years from now the water conditions have changed and maybe there's already pipelines everywhere because the whole area is a city. So there is a process where things get reevaluated every five years.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: So like I said, that's our preferred alternative but we are going to open it up. All the alternatives are available for commenting on. And you don't have to comment here. If you would rather do it in writing or by e-mail or by phone you can also do it that way through August 29.

I just wanted to make sure. Do we have any other

questions before we have to shut up?

COMMUNITY INVOLVEMENT COORDINATOR COOPER: Those kinds of questions would be about understanding what we are proposing to do for this particular aspect.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Yes.

MR. STAHLER: I'm not sure this relates to that but it relates to water quality. Do you have a pattern -- Referring to that last map. Do you have a pattern of where wells show high arsenic and where they show low arsenic? Does that correlate with the water quality map?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: What we have found so far is that mainly the wells closest to the mine have been contaminated. We also have monitoring wells that are not shown on here because they are not providing drinking water.

But, you know, for instance we have wells on either side here. You know, one of them is contaminated and one of them is clean. So we don't -- We have a fair pattern that we believe the closer to the mine you are the more likely you are to have a mine-impacted drinking water well. It is not necessarily the case because we do have wells that seem to be lower in arsenic.

MR. STAHLER: Creeks very often follow fault lines. It could be an impacted creek on a fault and the was interrupting the flow so the contaminated water does not

flow.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: I don't know. We looked at how the creek impacts the wells.

MR. HAUSSLER: Do you have any contaminated wells on the east side of the creek?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: On the east side? Not near the levels that we have on --

MR. TOWELL: There's no current wells on the east side of the creek that are above -- There are fewer wells on that side that we monitor. Basic answer, no, there's none on the east side of the creek.

MR. STAHLER: And other than the arsenic level do you have idea of which way the water is flowing?

MR. TOWELL: The water is basically following, it is going south following the watershed on a large scale. At a local scale, because of the fractures, it could be going in any direction. But it is generally, based on the elevations that the water goes, it is going south, north to south.

MR. VELTHUIJSEN: The monitoring wells, you said they are not on the map. But this would be public access also?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: And we propose that we will have some additional monitoring wells as part of any remedy that we select so that we can continue

to monitor and make sure --

MR. VELTHUIJSEN: Do you know by heart where they are exactly?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: I don't. But there's a map.

MR. TOWELL: They are mostly near the mine and there's also some down here, Lost Lake.

MR. VELTHUIJSEN: I'm wondering if there is one. On that map do you see that Lava Cap Mine Road coming down and then it does that loop and it goes south and it turns back north. If you go to the west side of that loop there. Is there a monitoring well there somewhere?

MR. TOWELL: No.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: No. We monitor this well.

MR. TOWELL: There's monitoring wells at the at the top of your finger there. And straight up where the road bends. If Rusty were just a few inches taller. Up by that bend we have a monitoring well.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: And then we have some down here and then down here as well. Yes ma'am.

MEMBER OF THE AUDIENCE: So just sticking to the project of your four-inch pipe. What time schedule are you looking at?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: It would have to be -- The next phase of the process, whatever selection we make is we still have the remedial design process. So we take the Record of Decision and then look at how to implement it. So if it is the wellhead treatment we would go with -- You know, that would be a fairly quick remedial design and implementation.

The pipeline, we will have to start working with additional stakeholders, NID and other people that to this date we have not had a very constant relationship with. The people that live near the mine, it's often that they have seen our trucks in the last two years. So it would be a longer process. I would hope that we would have the pipeline design completed by next summer or next September.

MR. TOWELL: The design is part of it. Then we have the easements through the properties and that can, that can take time.

MS. HEGER: Is there eminent domain?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: We don't, we don't have that ability to do that. What we would do is work with whatever the process is. The first thing that we would do is look at how NID does its process and figure out how that works into our planning process. What their design requirements are. You know, their construction requirements. And then we put all that into the remedial

design and then we put it out for bid for construction.

MR. VELTHUIJSEN: So I assume that EPA is not designing the pipeline. I'm thinking NID is designing the pipeline with their design engineers.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: We haven't figured that part out yet. I mean, typically we hire the consulting firm to do the design but that may be something that NID wants to do instead or wants a final review of or something so we'll have to figure that out. We don't know right now.

COMMUNITY INVOLVEMENT COORDINATOR COOPER: It seems like the part of the agenda where we planned to ask for clarifying questions has been covered throughout the last hour and a half.

However, we want to make sure that for all of you who are here and who are planning to make a comment now or are planning to make a comment later in writing or through the other means, that if you have any other question about the four alternatives that we have designed. Anything to clarify at this point specific to that, we'd like to, again, answer that question now. So that if you come up you will have that question already answered. Otherwise if you can do it later if you are going to do something formal.

So again, are there any other clarifying questions about any of the jargon that we have used, any of the

concepts that we talked about? Anything that you would like us to answer now? Because if not then we will shift into another mode. But please, if there are any others we will handle them now.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: We will be available afterwards.

COMMUNITY INVOLVEMENT COORDINATOR COOPER: Right. And able to talk about some of the other aspects and cleanup that we don't need to handle now.

MEMBER OF THE AUDIENCE: If you put a pipeline all the way to Lost Lake are you going to clean it up first or are you going to put the pipeline in first?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: I have no idea.

MEMBER OF THE AUDIENCE: You're talking about getting the water to people first?

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Yes, for the people who are impacted. The way the water moves I would say we would have Lost Lake completed before we needed to extend the pipeline all the way down.

COMMUNITY INVOLVEMENT COORDINATOR COOPER: Okay, then what I'm going to do is EPA is going to stop taking questions at this point, or at least stop answering questions. We are going to shift into formal, verbal receipt of comments on the proposed plan.

If you wouldn't mind coming up to here, only because the microphone happens to be here, so we can be sure that we get exactly what you are saying. And we will stand here and listen but we will not be responding to your formal comments. But you will be getting it on a record. That record will be attached as part of the final Record of Decision before any activities are actually done for any of the alternatives.

I also want to point out that those of you who have copies of the fact sheet, that the ways to provide your comments are on page seven. And if you don't have a copy of this -- we actually ran out. If you don't have a copy we can get you a copy. Rusty's phone number and my phone number are available to you. So we can make sure that you know exactly how to get your comments to us.

So would anybody like to at this point come up and make a formal, verbal comment to EPA about any of the alternatives or your preferences about a specific alternative? And I'll wait while you think about whether you really want to do that. I'm not going to count to five and say, okay, it's done.

If you could state your name that would be nice and then whatever your comment is.

MR. BAKER: Yeah, I'm Steve Baker. I live up on Banner Mountain. As you have already heard there is some

history with NID. I think there's a bit of a shtick that's developed. A pipeline of significant size was proposed and there was concern by neighbors that digging a pipeline, although somewhat shallow, 12 feet in that case, in this case probably eight to ten feet I suppose, it could create, it could change those pathways. As I was asking earlier this evening in regards to how water recharges to the ground and could take away or give a lot of extra water to a particular well that's close by or at some distance from the construction.

So my concern for the fourth alternative is that you do not require. I wish that you do require that NID monitor somehow characterize the wells that are within proximity of, I don't know how many hundred feet, of this proposed pipeline if it should go in. And assure us that by giving water to one neighborhood you don't take water from another neighborhood accidently. We don't want that to happen. They're already doing that in one locale up on Banner Mountain and I would like to see that continue. Thank you.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Thank you.

COMMUNITY INVOLVEMENT COORDINATOR COOPER: Okay, thank you.

Would anyone else like to offer a comment on any

of the remedies that are proposed?

MR. VELTHUIJSEN: I guess I should just say what I said.

COMMUNITY INVOLVEMENT COORDINATOR COOPER: Again, if you could give your name please, we'd appreciate it.

MR. VELTHUIJSEN: Yes, my name is Frans Velthuijsen and I live on Lava Cap Mine Road.

THE REPORTER: Frans, could I get you to spell your last name for us, please, on the record. Thank you.

MR. VELTHUIJSEN: Actually I wrote it down on the sheet. V-E-L-T-H-U-I-J-S-E-N.

THE REPORTER: Thank you.

MR. VELTHUIJSEN: So our road, this road is a private road. And of course there is like a prescriptive easement and the people who live there drive up and down. So now there is this residential development about to happen, or wanting to happen, and this pipeline is going to facilitate that.

So I am concerned about the growth-inducing aspect of this pipeline and I think there should be some consideration for the neighborhood and for the traffic that is going to go down our road. It is now a dead-end road. Whether it is going to stay a dead-end road or if there is going to be an opening up to Greenhorn and there's going to be through traffic and all those things associated with

that. That's my concern.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: Thank you.

COMMUNITY INVOLVEMENT COORDINATOR COOPER: Thank you very much.

You are certainly able to restate any issues or concerns that you have raised here in the informal setting in a formal way and EPA will respond to those in a formal way in that Response Summary that is attached to the Record of Decision if you would like.

Okay, folks. Unless anyone else wants to step forward what I am going to do is formally close the receipt of comments this evening.

I want to remind you that there are multiple ways to get comments to us in writing so please feel free to contact us. If you don't have a copy of this fact sheet that provides that information to you the comment period ends on the 29th of August. So that's what, about three weeks from now, something like that.

If you have further questions, if something else comes to your mind that we didn't cover this evening that would be important for you to know before you make a comment formally in writing, please contact Rusty. Almost certainly it would be of a technical nature so I wouldn't be the, I would have to hand it off to him anyway.

REMEDIAL PROJECT MANAGER HARRIS-BISHOP: I have some business cards so if you didn't get the fact sheet you can have my phone number and e-mail address on here.

COMMUNITY INVOLVEMENT COORDINATOR COOPER: Is there anybody right now who needs Rusty's business card?

Okay, then I am going to formally adjourn the meeting. Rusty, the state representative and our contractor will be available afterwards to answer other questions about other aspects of the cleanup.

But for the purposes of tonight's meeting we are adjourned. Thank you.

(Whereupon, at 8:20 p.m., the Public Hearing was adjourned.)

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CERTIFICATE OF REPORTER

I, JOHN COTA, do hereby certify that I am a disinterested person herein; that I recorded the foregoing Public Hearing on a tape recorder; that thereafter the tape recording was transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said hearing, or in any way interested in the outcome of said hearing.

IN WITNESS WHEREOF, I have hereunto set my hand this 25th day of August, 2008.