

# **Health Consultation**

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**KLAU AND BUENA VISTA MINES**

**EVALUATION OF MERCURY EXPOSURES AND PHYSICAL HAZARDS**

**SAN LUIS, OBISPO COUNTY, CALIFORNIA**

**EPA FACILITY ID: CA1141190578**

**SEPTEMBER 23, 2005**

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES**  
Public Health Service  
Agency for Toxic Substances and Disease Registry  
Division of Health Assessment and Consultation  
Atlanta, Georgia 30333

## **Health Consultation: A Note of Explanation**

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

KLAU AND BUENA VISTA MINES

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EPA FACILITY ID: CA1141190578

Prepared by:

California Department of Health Services  
Under a Cooperative Agreement with the  
Agency for Toxic Substances and Disease Registry

## **Summary**

The Klau and Buena Vista Mines were proposed for the National Priorities List (NPL) on September 23, 2004 (1). The intent of this health consultation is focused on the public health hazards presented by mercury and physical hazards on the Buena Vista Mine site. This consultation is meant as an interim action and is provided to the Agency for Toxic Substance and Disease Registry (ATSDR) prior to the public health assessment (PHA) to address health risks as soon as possible as part of California Department of Health Services' (CDHS') cooperative agreement with ATSDR.

On May 10, 2005, the Environmental Health Investigations Branch (EHIB) of CDHS visited the Klau and Buena Vista Mines in San Luis Obispo County with United States Environmental Protection Agency (USEPA) and California Regional Water Quality Control Board (RWQCB) staff. Staff from the California Department of Toxic Substance Control (DTSC) and San Luis Obispo County were also present during the site visit. EHIB toured these properties with the intent to better understand site conditions.

Based on the observation of pure (elemental) mercury and the potential physical hazards of buildings on the Buena Vista Mine, CDHS considers the Buena Vista Mine site to pose a public health hazard. These hazards were not observed at the Klau Mine site. This hazard assessment is supported in correspondence between the USEPA, DTSC and CDHS (see attached letters in Appendix A & B). These hazards pose immediate concern because they are readily accessible from county roads and there are no warnings posted at the Buena Vista Mine. The health effects posed by acid mine drainage and metals will be addressed more thoroughly in the PHA to be released in the future by CDHS.

## **Background and Statement of Issues**

The Klau and Buena Vista Mines are located in San Luis Obispo County, California, approximately 12 miles west of Paso Robles (Figures 1 & 2). Mining operations, including adit and open-pit mining, occurred at the mines between 1868 and 1970. The mines occupy approximately 250 acres in a predominantly agricultural area. The largest source on the mines consisted of the 114,053 cubic yards of tailings that were deposited in a pile on the Buena Vista Mine property (Figure 2) (2). During the operation of the Buena Vista Mine between 1868 and 1970, the mine reportedly produced 30 tons of ore per day. This ore had a high cinnabar content containing mercury and was then processed to extract mercury. While both the Klau and Buena Vista Mines have documented releases of metals to the environment, this consultation is focused on the public health risks posed by pure (elemental) mercury observed at the Buena Vista Mine site in buildings and in surface soils and the physical risks posed by the on-site dilapidated buildings. A more thorough analysis of the human health risks posed by both the Klau and Buena Vista Mines will be conducted in the near future in the PHA.

Excavated ore was brought to the Buena Vista Mine (mill works) site near the middle of the mine property and then processed using a rotary kiln to extract mercury. The Buena Vista Mine

(mill works) site consist of a large broken-down condenser building, that contains remnants of the rotary kiln and condenser gallery, and a flask shed where pure (elemental) mercury was stored after processing. Photographs of the Buena Vista Mine site can be seen in Appendix C. The total amount of mercury removed from operations at the mine site was estimated at 6.4 million pounds of elemental mercury.

During the May 10, 2005, site visit, CDHS observed relatively easy access to the Buena Vista Mine and no postings to warn trespassers of the potential health risks. While the Buena Vista Mine is fairly remote, there is a county (dirt) road that runs along the northern and western boundary of the mine (Appendix D; Figures 1 & 2). The only restrictions to site access are two locked gates. The gates would not prevent someone from walking onto the site.

CDHS toured the Buena Vista Mine site and observed buildings in very poor physical condition. The condenser building presents a potential physical hazard to people. CDHS also observed two locations at the Buena Vista Mine condenser building with visible pure (elemental) mercury pooled on the soil surface. While the volume of pure mercury observed was small (several ounces), this observation was made without any entry into the structures in the area. Evidence of trespassers was observed in the area of the mill works during the May 10, 2005, site visit (i.e., empty beer bottles).

CDHS mailed informational letters to over 200 residences and property owners within a 5 mile radius of the Klau and Buena Vista Mines to inform them about activities in the area and potential health concerns. CDHS is in the process of developing an outreach plan for communities surrounding Klau and Buena Vista Mines. This plan is to be initiated as soon as an appropriate target audience has been identified.

## **Discussion**

Exposure to pure (elemental) mercury observed on the Buena Vista Mine site on May 10, 2005, poses a public health concern at the Buena Vista Mine. CDHS is also concerned that the buildings on the Buena Vista Mine could pose a physical hazard to people. CDHS is concerned with long-term metal exposure issues related to the mines, such as mercury uptake in fish and subsequent human consumption. However, this consultation is focused on the immediate public health issues at Buena Vista Mine relating to easy access to the on-site buildings (physical hazards) and pure (elemental) mercury (inhalation and dermal contact exposure). The PHA will address the long-term exposure issues as well as short-term health concerns when it is completed in the near future. It is important to address the immediate health concerns as soon as possible in order to prevent or limit exposures to hazards on the Buena Vista Mine site that could pose immediate health risks.

As recommended in correspondence with DTSC and USEPA, two steps that could reduce exposures and risks would be to post warning signs in the area and to fence or otherwise

restrict access to the Buena Vista Mine (mill works) site. USEPA Region IX has reportedly erected a fence around the Buena Vista Mine (mill work) buildings and has posted warnings about this area (M. Dineyazhe, USEPA, personal communication, September 19, 2005).

While there are some historic surface water and soil data available to assess the long-term risks to human health and the environment, no data has been collected in the past year and there is no known data available for the area around the Buena Vista Mine (mill works) site. A total of 120 mercury fish tissue samples were collected in 1994 in waters impacted by the Klau and Buena Vista Mines (3). These data will be thoroughly discussed and analyzed in the PHA. For the purposes of this consultation there are no data to quantitatively estimate short-term health risks posed by mercury at the Buena Vista Mine (mill works) site.

Mercury occurs naturally in the environment and exists in several forms. These forms can be organized under three headings: metallic (elemental) mercury, inorganic mercury, and organic mercury. Metallic mercury is a shiny, silver-white metal that is a liquid at room temperature. At room temperature, some of the metallic mercury will evaporate and form mercury vapors. Metallic mercury is the elemental or pure form of mercury which is used in thermometers. Inorganic mercury is formed when mercury binds with other elements such as sulfur or calcium. Inorganic mercury compounds are called mercury salts. When mercury binds with carbon, the compounds formed are called organic mercury (4).

While all the three forms of mercury (elemental, inorganic, and organic) can be found on the site at varying concentrations, the focus of this health consultation is elemental mercury accumulating in the vicinity of the Buena Vista Mine mill works area. The most likely pathways that could be completed at the Buena Vista Mine mill works are inhalation of elemental mercury vapors and incidental exposure to mercury that unsuspecting trespassers may be exposed to while investigating (trespassing) around the mill work structures. More severe health impacts could be realized if an individual handled mercury or attempted to collect elemental mercury that has accumulated in the Buena Vista Mine mill works area. Individuals that collect and remove elemental mercury from the site could then expose additional people to mercury and potentially contaminate other areas or buildings. There is also the possibility that people could be physically injured if they are in or near these buildings when a structural collapse occurs. See attached letters in Appendix A & B for further discussion.

Studies have demonstrated that the human nervous system is very sensitive to all forms of mercury. In the environment, inorganic mercury can be transformed into more toxic organic mercury. Inhalation of high concentrations of inorganic mercury vapors can cause coughing, difficulty breathing, and chest pain. Inhalation of high concentrations of

inorganic mercury vapors may also cause chemical pneumonitis, renal failure, and death. Ingestion of high levels of mercury can permanently damage the central nervous system

(4).

### **Children=s Health Considerations**

CDHS and ATSDR recognize that children can be more sensitive to health effects caused by environmental contaminants, and believe that it is important to search for additional information that will increase our understanding of the contaminants, and ensure that the children=s health is protected. The most likely population of trespassers at the Buena Vista Mine millworks buildings are expected to be adolescents who might be interested in the history of mining or just curious to see what is in the buildings.

During critical periods of development before they are born, and in the early months after birth, children and fetuses are particularly sensitive to the harmful effects of mercury on the nervous system. Harmful developmental effects may occur when a pregnant woman is exposed to mercury and some of the mercury is transferred to her developing child. Exposure to organic mercury is more dangerous for young children than for adults, because methyl mercury that passes into the developing brain of young children may interfere with neurological development (4).

### **Conclusions**

CDHS concludes that there is the potential for people to come into contact with pure (elemental) mercury and physical hazards associated with the mill works area at the Buena Vista Mine site. There is also some concern that people may try to remove pure (elemental) mercury from the site and could pose toxicological risks to themselves and other people that might come into contact with the mercury. Therefore, CDHS considers the mill works area at the Buena Vista Mine site to be a public health hazard.

### **Recommendations**

DHS recommends that USEPA Region IX maintain posted warning signs near the mill works area and continue to restrict access to the Buena Vista Mine site by means suitable to USEPA. (USEPA reported to CDHS that these recommendations have been carried out.)

### **Public Health Action Plan**

#### **Actions Completed**

1. September 23, 2004: Klau and Buena Vista Mines proposed for NPL listing in the Federal Register.
2. May 10, 2005: CDHS tours Klau and Buena Vista Mines with USEPA & DTSC.

3. June 1, 2005: CDHS held conference call with USEPA to discuss health concerns relating to Buena Vista Mine mill works.
4. June 8, 2005: CDHS had telephone discussion with Mr. Richard Hume of DTSC regarding CDHS health concerns at Buena Vista Mine mill works.
5. June 9, 2005: CDHS sent letter to Mr. Michael Montgomery of USEPA formally requesting action at the Buena Vista Mine mill works (Attachment A).
6. June 9, 2005: CDHS sent letter to Mr. Richard Hume of DTSC formally requesting action at the Buena Vista Mine mill works (Attachment B).
7. June 27, 2005: USEPA release Action Memorandum addressing interim work at the Buena Vista Mine including limiting access to the mill works and posting the mine.
8. Summer 2005: USEPA erected fencing around mill buildings at Buena Vista Mine and posted warnings on fencing to limit access to hazards in the area.
9. September 7, 2005: CDHS mails informational letter to over 200 residences and property owners within a five-mile radius of the Klau and Buena Vista Mines to inform them about activities in the area and potential health concerns.

### **Actions Planned**

1. Fall 2005: CDHS/ATSDR will develop an outreach plan for communities surrounding Klau and Buena Vista Mines. This plan is to be initiated as soon as an appropriate target audience has been identified.
2. Winter 2006: CDHS/ATSDR will release the initial draft of the Public Health Assessment for Klau and Buena Vista Mines.
3. Winter 2006: CDHS will pursue funding to collect and analyze fish in Lake Nacimiento and analyze tissue for mercury.
4. Spring 2006: CDHS will conduct a field survey of anglers in Lake Nacimiento to assess angler fishing and consumption habits, knowledge of mercury fish advisories, potential health implications, and the need for re-posting fish consumption advisories.
5. Spring 2006: CDHS with other agencies to be determined will collect fish tissue samples from Lake Nacimiento and Las Tablas Creek, if possible.
6. Summer 2006: CDHS/ATSDR will release the public comment draft of the Public Health Assessment for the Klau and Buena Vista Mines.

7. Summer 2006: Re-posting of mercury fish advisories, if necessary.
8. Summer 2006: CDHS will hold public availability sessions or public meetings to discuss the Public Health Assessment and health risks associated with the Klau and Buena Vista mines.
9. Fall 2006: CDHS will conduct a field survey of anglers in Lake Nacimiento to assess angler fishing and consumption habits, knowledge of mercury fish advisories, and potential health implications.
10. Fall 2006: CDHS will release the final Public Health Assessment for the Klau and Buena Vista Mines.

## References

1. U.S. Federal Register, September 23, 2004.
2. Buena Vista /Klau Mercury Mines Preliminary Assessment/Site Inspection Report. Ecology & Environment, Inc. October 26, 2001.
3. Clean Lakes Assistance Program For Lake Nacimiento, Coastal Resources Institute California Polytechnic State University, April 1994.
4. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Mercury. U.S. Department of Health and Human Services Public Health Service, March 1999.

## **Preparers of Report**

### **Environmental and Health Effects Assessors:**

Greg Braun, R.E.H.S.  
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Environmental Health Investigations Branch  
California Department of Health Services

Marilyn C. Underwood, Ph.D.  
Staff Toxicologist  
Environmental Health Investigations Branch  
California Department of Health Services

### **ATSDR REGIONAL REPRESENTATIVES:**

Susan Muza  
Gwen Eng  
Libby Vianu  
Regional Representatives, Region IX  
Agency for Toxic Substances and Disease Registry

### **ATSDR TECHNICAL PROJECT OFFICER:**

Tammie McRae, M.S.  
Environmental Health Scientist  
Division of Health Assessment and Consultation  
Superfund Site Assessment Branch, State Programs Section

## **Certification**

This **Klau and Buena Vista Mines, San Luis Obispo, California** public health consultation was prepared by the California Department of Health Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the public health consultation was initiated. Editorial review was completed by the Cooperative Agreement partner.

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Tammie McRae, M.S.  
Technical Project Officer, Cooperative Agreement Team  
Division of Health Assessment and Consultation  
Agency for Toxic Substances and Disease Registry

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this public health consultation and concurs with the findings.

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Cooperative Agreement Team Leader  
Division of Health Assessment and Consultation  
Agency for Toxic Substances and Disease Registry



State of California—Health and Human Services Agency  
**Department of Health Services**



**SANDRA SHEWRY**  
Director

Governor

June 9, 2005

Mr. Michael Montgomery  
U.S. Environmental Protection Agency  
Region IX  
75 Hawthorne Street  
San Francisco, CA 94105

**PUBLIC HEALTH HAZARD AT BUENA VISTA MINE**

Dear Mr. Montgomery:

The Department of Health Services (DHS), Environmental Health Investigations Branch, toured the Klau and Buena Vista Mines in San Luis Obispo County on May 10, 2005, with USEPA Region IX staff. During this tour, we became aware of a potentially hazardous situation at the Buena Vista Mine (BVM).

**Site Description and History**

During the operation of the BVM, the mine reportedly produced 30 tons of ore per day. This ore was then processed in the mill works using a rotary kiln to extract 5-30 pounds of mercury per ton of ore. By 1970, the total amount of mercury removed was estimated at 6.4 million pounds of elemental mercury.

Standard rotary kiln operations consist of crushing cinnabar ore (mercuric sulfide) and heating the ore to volatilize free mercury. The mercury is then collected by condensation on condenser pipes. The remnants of the BVM condenser mill works remain at the BVM and present a public health hazard. Both as a physical hazard and from the mercury that contaminates the area.

Because over 6 million pounds of mercury were extracted in this mill building, it seems likely that a portion of the mercury escaped from the operation. The mercury vapors and particulates that may have escaped the condenser pipes would likely deposit on surfaces in and around the mill works including soils and mill work structures. Free mercury may also have been spilled in the mill works over the years. As documented on page 7-2 of the July 23, 1999 *Expanded Site Assessment for the Buena Vista Mine*, it was noted that “free metallic mercury is present beneath the condenser tubes and throughout much of the lower level of the mill building.”

During our May 10, 2005 site visit, we toured the BVM mill works area and observed the structure in very poor physical condition. Some of the structure is falling in on itself. The condenser building presents a potential physical hazard to trespassers. We also observed two locations at the BVM condenser building with visible liquid mercury pooled on the soil surface. While the volume of liquid mercury observed was small (several ounces), this was made without any penetration into the structures in the area. We were very cautious not to disturb the area because of concerns about having limited protection from exposure and the condition of the structure.

### **Characterization of Health Risks**

Studies have demonstrated that the human nervous system is very sensitive to all forms of mercury. In the environment, inorganic mercury can be transformed into more toxic organic mercury. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetuses.

The most likely pathways that could be completed at the BVM mill works are inhalation of mercury vapors and incidental exposure to mercury that unsuspecting trespassers may be exposed to while investigating around the mill work structures. More severe health impacts could be realized if an individual handled mercury or attempted to collect free mercury from the area. During our May 10 visit, we heard of an incident where free metallic mercury was collected by individuals who were on a previous site visit. It is unknown how people who took the mercury might be handling it. This un-posted and accessible source of mercury could result in an exposure event similar to the Las Vegas residential mercury exposure that USEPA managed in 2004.

According to the caretaker of the property, there are occasional trespassers, mostly kids. During our site visit the caretaker reported that people will sometimes cut his lock off the gate and replace his lock with their own lock.

### **Conclusions and Recommendations**

DHS concludes that there is the potential for trespassers to come into contact with high levels of mercury and physical hazards associated with the mill works structures at BVM. There is also some concern that trespassers may try to remove liquid mercury from the site without appropriate protective measures. Therefore, DHS requests that USEPA Region IX post warnings near the mill works and restrict access to this area by means suitable to your capabilities and resources as soon as possible. Due to the remoteness of the area, removal of the mill works may provide the best approach to preventing additional exposures to mercury.

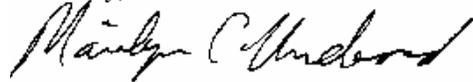
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Mr. Michael Montgomery  
Page 3  
June 9, 2005

Because this site is currently a State of California lead site, we are sending an original of this letter to Mr. Richard Hume at the Department of Toxic Substances Control. Please contact Marilyn Underwood at (510) 622-4415 ([munderwo@dhs.ca.gov](mailto:munderwo@dhs.ca.gov)) or Greg Braun at (510) 622-4493 ([gbraun@dhs.ca.gov](mailto:gbraun@dhs.ca.gov)) with any questions.

Sincerely,



Marilyn Underwood, Ph.D.  
Acting Chief, Site Assessment Section  
Environmental Health Investigations Branch

Greg Braun  
Site Assessment Section  
Environmental Health Investigations Branch

cc: Mr. Gerhardt Hubner  
Regional Water Quality Control Board  
Central Coast Region  
895 Arrow Vista Place, Suite 101  
San Luis Obispo, CA 93401

Mr. Richard Hume  
Department of Toxic Substances Control  
Statewide Cleanup Operations/NPL Unit  
8800 Cal Center Drive  
Sacramento, CA 95826

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State of California—Health and Human Services Agency  
**Department of Health Services**



**SANDRA SHEWRY**  
Director

Governor

June 9, 2005

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Department of Toxic Substances Control  
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8800 Cal Center Drive  
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Mr. Richard Hume  
Page 3  
June 9, 2005

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Sincerely,



Marilyn Underwood, Ph.D.  
Acting Chief, Site Assessment Section  
Environmental Health Investigations Branch

Greg Braun  
Site Assessment Section  
Environmental Health Investigations Branch

cc: Mr. Michael Montgomery  
U.S. Environmental Protection Agency  
Region IX  
75 Hawthorne Street  
San Francisco, CA 94105

Mr. Gerhardt Hubner  
Regional Water Quality Control Board  
Central Coast Region  
895 Arrow Vista Place, Suite 101  
San Luis Obispo, CA 93401

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1. Buena Vista Mine Mill Works Buildings



2. Buena Vista Mine Mill Works Distillation Building



3. Buena Vista Mine Mercury Flask Shed Interior



4. Free elemental mercury under debris and water at the mill works building.

## Klau and Buena Vista Mine Sites Figures 1 & 2

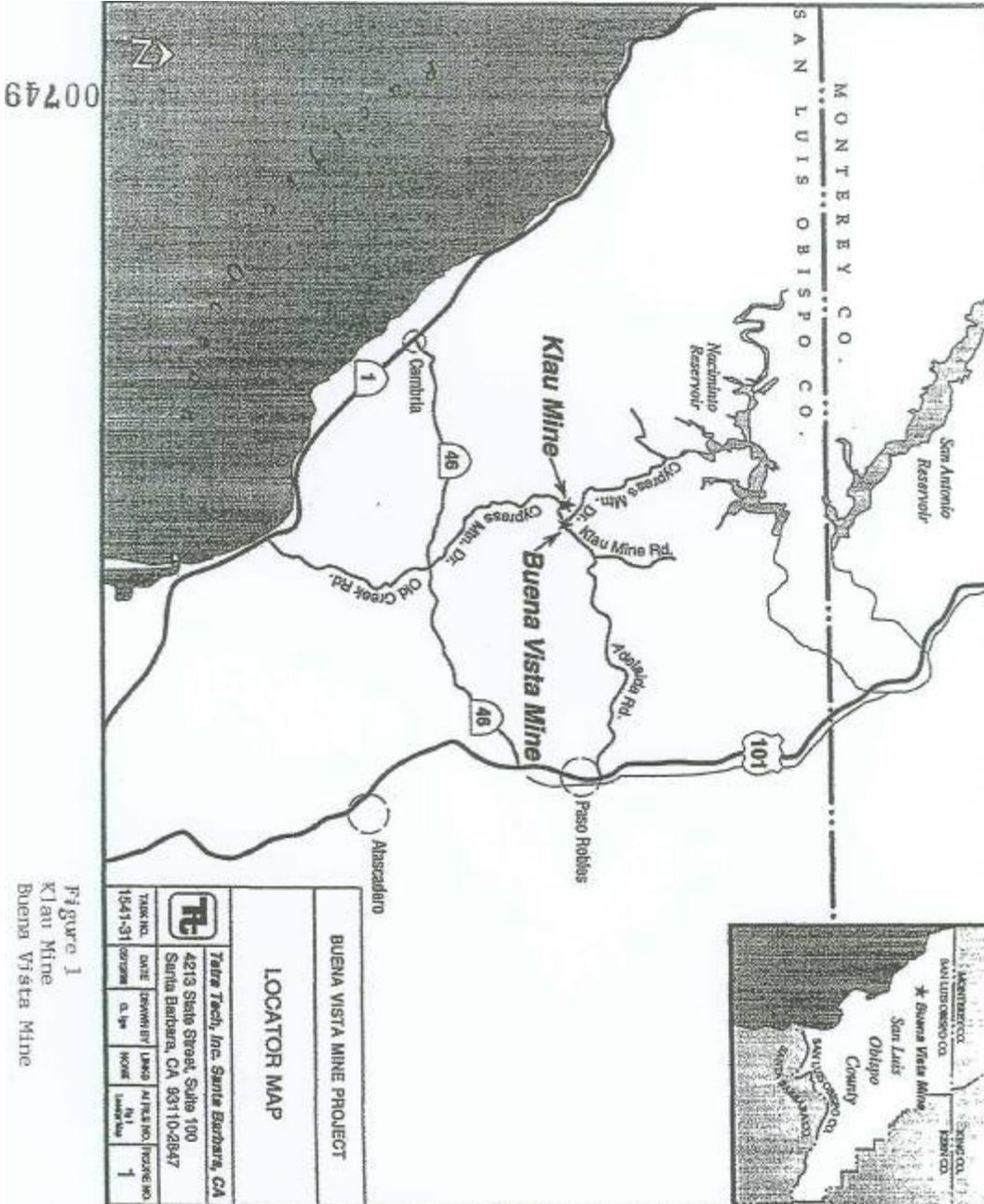
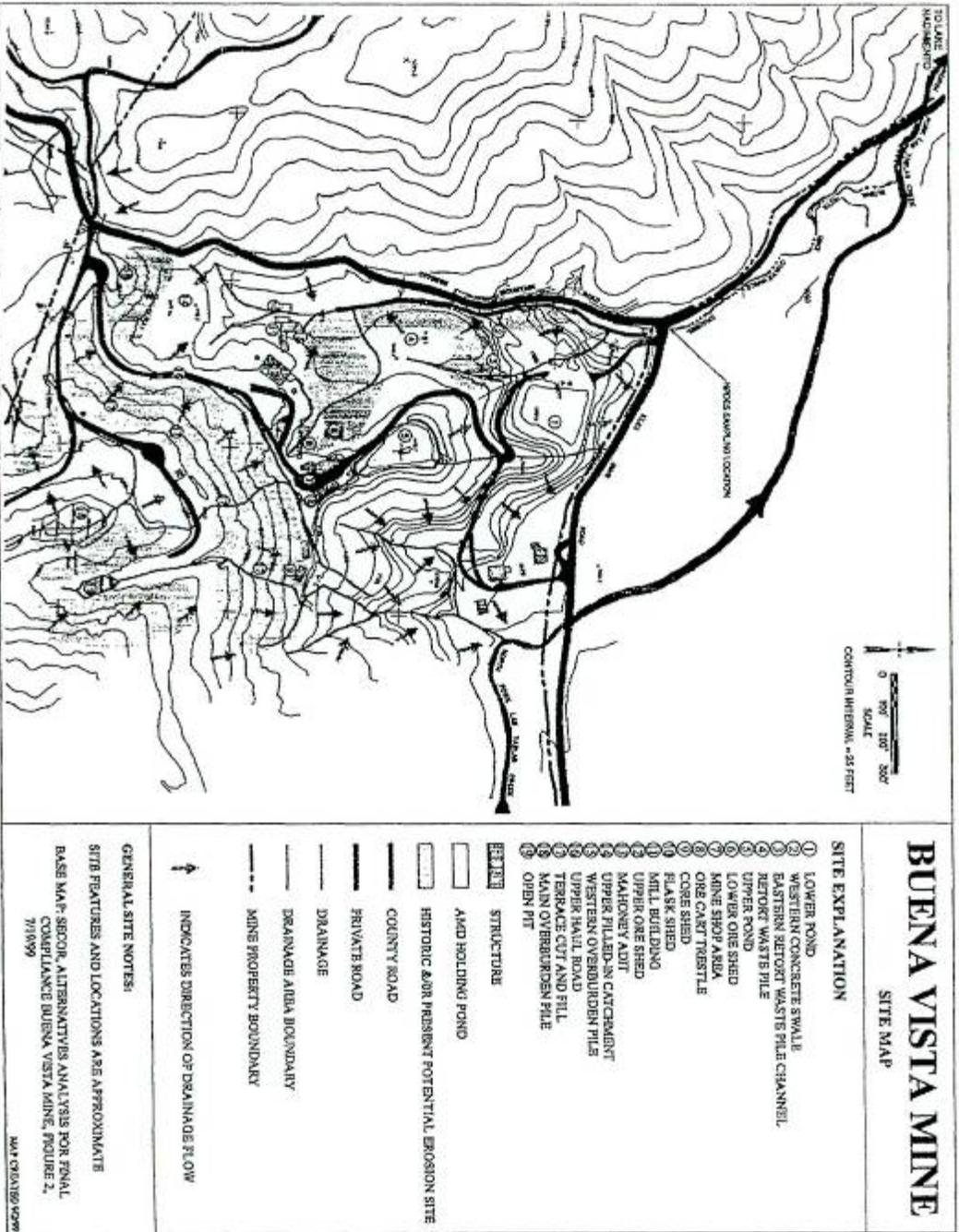


Figure 1  
Klau Mine  
Buena Vista Mine

00749

# Buena Vista Mine Site Map



007497

Figure 2  
Buena Vista Mine Site