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~~MOLYCORP INC - QUESTA~~

QUESTA NM

Chevron Mining

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3-4-13-1 FTW-01-01-032-2-014-01-003

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USDA FOREST SERVICE SOUTHWESTERN REGION

Current Status of New Mexico CERCLA Projects-December 14, 1999

Nacimiento Mine Site; Santa Fe National Forest; Cuba, New Mexico:

Mixed Land Ownership-
NM State Land Office (NMSLO), Private, and USDA FOREST SERVICE
Agencies Involved-
NM Environment Department, NMSLO, USDA FOREST SERVICE, Environmental Protection Agency Region 6, U.S. Fish and Wildlife.

Kirk Minckler, USDA Office of the General Counsel, (303) 275-5549, and Arnold Rosenthal, Department of Justice, are working on an MOU with EPA, Pam Travis, attorney. The purpose of the MOU is to establish the Forest Service as the lead agency so that the FS may conduct work on the private land. The FS does not have jurisdiction on the private land so it does not have the authority to operate outside its jurisdiction.

Kirk is also working with NM State Land Office, Kelly Brooks, attorney, to complete the Joint Powers Agreement between the FS and NMSLO. This is almost done.

These two documents must be in place before we can proceed with negotiations for an Engineering Evaluation/Cost Analysis (EE/CA).

Kirk will conduct a thorough research of the PRP study and report to the FS of the next step with the PRP issue.

On August 5, 1999, the site was split into two operable units: Surface Removal Action and Groundwater Remedial Action.

NMED Counsel is pursuing LTI/Signorello in a lawsuit due to their violation of the Discharge Permit issued in 1983.

San Mateo Uranium Mine; Cibola National Forest; Grants, New Mexico:

This is an inactive uranium mine. There is a fair amount of radioactivity at the site. The next step is the development of the ARARs and the EE/CA. This is a docketed site.

On October 21, 1999, Kirk Minckler, Bobbi Baca, and Maria McGaha met with the PRPs in Denver, CO to discuss the possibility of entering into an AOC for the performance of the EE/CA. As a result, a Technical Committee (TC) was assembled to further evaluate the risks, the ARARs, and the cleanup levels for the site. The TC is currently working on these efforts. Technical contacts have been established with EPA Region 6 and 8 in an attempt to research and determine the cleanup levels for the site. The USDA FOREST SERVICE, NMED, and the PRPs will meet on January 7, 2000 to present and discuss the

objectives and potential alternatives for cleanup of the site. The timeline for this site is as follows:

January 2000:	PRPs develop a workplan for the EE/CA
February 2000:	AOC is signed by USDA FOREST SERVICE and the PRPs.
April 2000:	Complete EE/CA, and begin the Action Memo
Fall 2000:	Begin cleanup.

Red River (Bitter & Pioneer Creeks, Hansen, Hot-n-Tot drainages; Carson NF; Taos, New Mexico:

This is a watershed approach to addressing impacts from inactive mines. A Removal Preliminary Assessment is almost done. The Sampling and Analysis was done this past summer. NMED is currently working on this site.

Silver Creek Watershed; Glenwood Ranger District; Gila National Forest:

This is an inactive gold and silver mine. The Mogollon Mining District dates back to the mid-1800's and was a significant gold and silver mining area, with several thousand people living and working there. The topography is extremely rugged and consists of steep drainages cutting through rocky canyons with some perennial streams. A large portion of the watershed consists of patented land. The largest mines are on the patented land. The Fanny Hill is by far the largest, with tailings cascading down the steep slopes into Silver Creek. A 20 plus foot high concrete dam in Silver Creek is completely silted up with tailings below the mine. Tailings are evident in Silver Creek down to the confluence with the San Francisco River, approximately 8 miles below Mogollon. The New Mexico Environment Department has done some sampling of the sediments.

A Removal Preliminary Assessment will be completed in the spring of 2000. Sampling will be done on public land, though this site is adjacent to private land parcels. If the RPA determines that there is a release or a threat of release to the environment, the FS will pursue a Non-Time Critical Removal; the FS will need EPA's Region 6 involvement at this site due to its proximity to private land.

Other Sites in which the FS will be conducting a Removal Preliminary Assessment:

Rosedale Mine, Cibola National Forest, Magdalena, New Mexico.
Black Goose Mine, Cibola National Forest, Magdalena, New Mexico.
Esperanza Mine, Carson National Forest, Taos, New Mexico
Double Jerry Uranium Mine; Cibola National Forest, Grants, New Mexico
Shuree Ponds Diesel Spill; Carson National Forest; Questa, New Mexico
Parsons Mine, Lincoln NF, Smokey Bear Ranger District

Other Issues:

-Illegal dumping on National Forest System lands

-Discuss the possibility of a broad Interagency Agreement (IAG) under which separate addums could be issued site by site. (IAG would allow for transfer of $)

-Regular 106 meetings

-Docket review meetings

2-1-05

ROC - Scott Wilson (EPA)

Telephone call to Rich Pond (NMED)

I called Rich to get locations of seeps located near Molycorp. He said that the areas upstream of Cabin Springs don't seem to flow anymore. The ~~state~~ main impact to the river is presently Copperline Canyon.

No. 5505 Engineer's Computation Pad ALVIN

numerous intermittent seeps to the Red River and travels in the shallow alluvium. The group added that the proposed permit's requirements for installing french drains at a few seeps is inadequate and will not protect water quality as it ignores subsurface flows.

RESPONSE

As explained above in Response to Issue Number 34, EPA believes water quality in the Red River will be protected by the final permit, which prohibits the discharge of pollutants from point source mining operations through a hydrologic connection to the Red River. The seepage interception system required by the permit incorporates processes commonly used at mines to capture subsurface flows, and as described in detail in the Response to Issue Number 28, utilizes methods best suited to conditions at Molycorp.

ISSUE NUMBER 36

Amigos Bravos commented that regulating discharges as they enter the Red River and after the tributary ground water is contaminated is a reflection of EPA's subscription to "conduit theory." The group stated that the Agency issued Molycorp a permit for discharges occurring from waste rock piles because there is a direct hydrologic connection through groundwater to the receiving stream. Thus, EPA perceives that tributary ground water is a conduit by which pollutants are transported to the Red River and that the ground water is not a water of the U.S. Amigos Bravos stated that EPA's approach is inconsistent with the Tenth Circuit court's analysis in a number of relevant cases and added that it is clear that tributary ground water must be protected.

Attorneys rewrote this response of the Molycorp Permit:

RESPONSE

EPA is still considering the issue of whether ground water is a water of the U.S., and will continue to investigate the issue. In the meantime, however, the Agency believes it more critical to take immediate action to protect the surface water, the Red River. Toward that end, the Agency is continuing to investigate the impact of Molycorp's mining operations on the Red River. It has been established that groundwater in the area is contaminated and that contaminated groundwater is reaching the river. ~~However, the exact~~ source of this ~~contamination is still under investigation.~~ EPA Region 6, through its Superfund Division, is currently exploring the potential impact of mine-related pollution on the river and its relationship to pollution potentially emanating from ~~erosional scars in the area~~. ~~Despite the lack of definitive answers on some issues, however~~, EPA believes that it has been established that the potential migration of pollutants from Molycorp's mining activities to the Red River via ground water that is hydrologically connected to the river poses a threat to the river, and that ~~therefore,~~ the critical issue facing the Agency ~~at this time~~ is the elimination of this threat. In order to address this issue, EPA is requiring the permittee to implement Best Management Practices consisting of french drains, and if necessary, ground water withdrawal wells to intercept any pollutants traceable to other sources in the area. Insert (A)

currently

Do we want to go ahead and use HRS language that there was a release of hazardous substances?

related to the NPDES Permit

do you have a problem with Sec A #7519

(and the Superfund action will proceed independently or something?)

point source mining operations before they reach the Red River. Although EPA believes this is a significant step toward addressing water pollution problems present in the vicinity of Molycorp's Questa, New Mexico mine, the Agency's action today in no way precludes the Agency from taking additional steps in the future as new information becomes available. Case law supports the proposition that agencies may address a problem one step at a time. See Hazardous Waste Treatment Council v. EPA, 861 F.2d 277 (D.C. Cir. 1988), cert denied, 490 U.S. 1106 (1989); United Technologies Corp. v. EPA, 821 F.2d 714, (D.C. Cir. 1987); Environmental Defense Fund v. EPA, 598 F.2d 62 (D.C. Cir. 1978).

nor does it limit the scope of EPA's Superfund investigation

EPA530-R-94-036
NTIS PB94-201829

TECHNICAL DOCUMENT

ACID MINE DRAINAGE PREDICTION

December 1994

U.S. Environmental Protection Agency
Office of Solid Waste
Special Waste Branch
401 M Street, SW
Washington, DC 20460

DISCLAIMER AND ACKNOWLEDGEMENTS

This document was prepared by the U.S. Environmental Protection Agency (EPA). The mention of company or product names in this document is not to be considered an endorsement by the U.S. Government or by the EPA.

This technical document consists of a brief review of acid forming processes at mine sites, followed by a summary of the current methods used to predict acid formation, selected state regulatory requirements, and case histories. This report was distributed for review to the U.S. Department of the Interior's Bureau of Mines and Bureau of Land Management, the U.S. Department of Agriculture's Forest Service, the Interstate Mining Compact Commission, the American Mining Congress, the Mineral Policy Center, representatives of state agencies, and public interest groups. EPA is grateful to all individuals who took the time to review this technical document.

The use of the terms "extraction," "beneficiation," and "mineral processing" in this document is not intended to classify any waste stream for the purposes of regulatory interpretation or application. Rather, these terms are used in the context of common industry terminology.

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ACID MINE DRAINAGE PREDICTION

1. INTRODUCTION

The U.S. Environmental Protection Agency (EPA), the states, and the Federal Land Management Agencies all need better tools to manage acid mine drainage at mine sites. This report examines acid generation prediction methods as they apply to non-coal mining sites. Following a brief review of acid forming processes at mine sites, the report summarizes the current methods used to predict acid formation including sampling, testing, and modeling. Selected State requirements for testing the potential of mining wastes to generate acid are summarized. Case histories from active mining sites and sites on the Superfund National Priorities List (NPL) are also presented. It is hoped that this report will assist states and the mining industry in their use of predictive methods. The Agency has not yet determined whether any one method is more accurate than another. This report also does not incorporate material presented at the Third International Conference on the Abatement of Acidic Drainage, held in Pittsburgh, Pennsylvania, in April 1994. The Agency is preparing additional reports to update this information, including a document containing extended summaries of selected papers presented at the conference.

The formation of mine acid drainage and the contaminants associated with it has been described by some as the largest environmental problem facing the U.S. mining industry (U.S. Forest Service 1993, Ferguson and Erickson 1988, Lapakko 1993b). Commonly referred to as acid rock drainage (ARD) or acid mine drainage (AMD), acid drainage from mine waste rock, tailings, and mine structures such as pits and underground workings is primarily a function of the mineralogy of the rock material and the availability of water and oxygen. Because mineralogy and other factors affecting the potential for AMD formation are highly variable from site to site, predicting the potential for AMD is currently difficult, costly, and of questionable reliability. The U.S. Forest Service sees the absence of acid prediction technology, especially in the context of new mining ventures, as a major problem facing the future of metal mining in the western United States (U.S. Forest Service 1993).

Acid mine drainage from coal and mineral mining operations is a difficult and costly problem. In the eastern U.S., more than 7,000 kilometers of streams are affected by acid drainage from coal mines (Kim et al. 1982). In the western U.S., the Forest Service estimates that between 20,000 and 50,000 mines are currently generating acid on Forest Service lands, and that drainage from these mines is impacting between 8,000 and 16,000 kilometers of streams (U.S. Forest Service 1993). In addition to the acid contribution to surface waters, AMD may cause metals such as arsenic, cadmium, copper, silver, and zinc to leach from mine wastes. According to the Forest Service, the metal load causes environmental damage, and is of greater concern than the acidity in environmental terms.

Acid mine drainage prediction tests are increasingly relied upon to assess the long-term potential of acid generation. This concern has developed because of the lag time at existing mines between waste emplacement and observation of an acid drainage problem (Univ. of California, Berkley 1988). The issue of long-term, or perpetual care of acid drainage at historic mines and some active mines has focussed attention on the need for improving prediction methods and for early assessment of the potential during the exploratory phase of mine development. In addition to many other mines, examples of three mine sites where the potential to generate acid was either not considered or not expected but later developed include: Cyprus Thompson Creek in Idaho; the Newmont Gold Company's Rain Mine in Nevada; and the LTV Dunka Mine in Minnesota. Case studies for these mines are presented in Section 4.0 of this report. Also included are short case studies of four sites on the NPL due, in part to acid drainage (U.S. EPA 1991).

Wastes that have the potential to generate acid as a result of metal mining activity include mined material such as spent ore from heap leach operations, tailings, and waste rock units, including overburden material. While not wastes or waste management units, pit walls in the case of surface mining operations, and the underground workings associated with underground mines and subgrade ore piles, also have the potential to generate ARD.

As mineralogy and size variables change, the ability to accurately predict the acid potential becomes quite difficult (Brodie, et al. 1991). Waste rock piles and subgrade ore piles, when left onsite, are both characterized by wide variation in mineralogy and particle size. Changes in these variables appear to influence drainage water quality (Doepker 1993). Coarse grain material allows air circulation; however, fine grain material exposes more surface area to oxidation (Ferguson and Erickson 1988). Drainage water quality from waste rock piles at several mines in British Columbia have demonstrated wide variability. Research at these sites focussed on variables affecting the frequency of acid effluent observed in permit-related monitoring (British Columbia AMD Task Force, 1990). The results reflect the diurnal and seasonal fluctuations in drainage quality as well as variation in mineralogy and particle size common to waste rock piles. In contrast, drainage from tailing impoundments are more likely to carry a more uniform contaminant load due to their more uniform mineralogy and texture. Table 1

Table 1. Comparison of Acid Rock Drainage Factors In Waste Rock Piles and Tailings Impoundments

Acid Generation Factors Affecting	Waste Rock Piles	Tailings Impoundment
Sulphide Source	• Variable in concentration and location. • Conditions may vary from sulphide rich to basic over short distances.	• Conditions uniform, often with very high sulphide content.
Particle Size	• Average rock size typically greater than 20 cm (but highly variable).	• Tailings may be 100% less than 0.2mm.
pH Variation	• Highly variable conditions over short distances.	• Fairly uniform conditions with a few major horizontal zones.
Initiation Of Rapid Oxidation	• Usually starts immediately after first rock is placed (in "trigger" spots).	• Usually starts after tailings placement ceases at end of mine life.
Oxygen Entry	• pid along preferential flow paths. • Seasonal variations in flow path "flushes" out stored products resulting in concentration peaks.	• Seepage slow and uniform. • Reduced flow path variation and stored product "flushing."
ARD Releases	• Large infiltration resulting in large seepage from toe and to groundwater. • Rapid release following generation, sometimes with both neutralized and acid ARD seeps.	• Large early top surface ARD runoff. • Lower infiltration. • Gradual transition in seeps from process water to neutralized ARD to low pH ARD.

(Source: Brodie et al., 1991)toS

compares acid rock drainage factors of waste rock piles and tailings impoundments. In examining this table, it is important to note that diffusion of oxygen into water is slow and, therefore, oxidation of iron sulfide is inhibited until the water level drops, which can occur periodically or seasonally in some cases.

1.1 Oxidation of Metal Sulfides

Acid is generated at mine sites when metal sulfide minerals are oxidized. Metal sulfide minerals are present in the host rock associated with most types of metal mining activity. Prior to mining, oxidation of these minerals and the formation of sulfuric acid is a function of natural weathering processes. The oxidation of undisturbed ore bodies followed by release of acid and mobilization of metals is slow. Discharge from such deposits poses little threat to receiving aquatic ecosystems.

Extraction and beneficiation operations associated with mining activity increase the rate of these same chemical reactions by exposing large volumes of sulfide rock material with increased surface area to air and water.

The oxidation of sulfide minerals consists of several reactions. Each sulfide mineral has a different oxidation rate. For example, marcasite and framboidal pyrite will oxidize quickly while crystalline pyrite will oxidize slowly. For discussion purposes, the oxidation of pyrite (FeS_2) will be examined (Manahan 1991). Other sulfide minerals are identified in Table 2.

Table 2. Partial List of Sulfide Minerals

Mineral	Composition
Pyrite	FeS_2
Marcasite	FeS_2
Chalcopyrite	$CuFeS_2$
Chalcocite	Cu_2S
Sphalerite	ZnS
Galena	PbS
Millerite	NiS
Pyrrhotite	$Fe_{1-x}S$ (where $0<x<0.2$)
Arsenopyrite	FeAsS
Cinnabar	HgS

(Source: Ferguson and Erickson 1988)

$$2FeS_2(s) + 2H_2O + 7O_2 \text{ --> } 4H^+ + 4SO_4^{2-} + 2Fe^{2+}$$

In this step, S_2^{2-} is oxidized to form hydrogen ions and sulfate, the dissociation products of sulfuric acid in solution. Soluble Fe^{2+} is also free to react further. Oxidation of the ferrous ion to ferric ion occurs more slowly at lower pH values:

$$4Fe^{2+} + O_2 + 4H^+ \rightarrow 4Fe^{3+} + 2H_2O$$

At pH levels between 3.5 and 4.5, iron oxidation is catalyzed by a variety of *Metallogenium*, a filamentous bacterium. Below a pH of 3.5 the same reaction is catalyzed by the iron bacterium *Thiobacillus ferrooxidans*. Other bacteria capable of catalyzing the reaction are presented in Table 3. If the ferric ion is formed in contact with pyrite the following reaction can occur, dissolving the pyrite:

$$2FeS_2(s) + 14Fe^{3+} + 8H_2O \rightarrow 15Fe^{2+} + 2SO_4^{2-} + 16H^+$$

This reaction generates more acid. The dissolution of pyrite by ferric iron (Fe^{3+}), in conjunction with the oxidation of the ferrous ion constitutes a cycle of dissolution of pyrite. Ferric iron precipitates as hydrated iron oxide as indicated in the following reaction:

$$Fe^{3+} + 3H_2O \leftrightarrow Fe(OH)_3(s) + 3H^+$$

$Fe(OH)_3$ precipitates and is identifiable as the deposit of amorphous, yellow, orange, or red deposit on stream bottoms ("yellow boy").

Table 3. Sulfide Ore Bacteria and Their Growth Conditions

Microorganism	pH	Temp., °C	Aerobic	Nutrition
Thiobacillus thioparus	4.5-10	10-37	+	autotrophic
T. ferrooxidans	0.5-6.0	15-25	+	"
T. thiooxidans	0.5-6.0	10-37	+	"
T. neapolitanus	3.0-8.5	8-37	+	"
T. denitrificans	4.0-9.5	10-37	+/-	"
T. novellus	5.0-9.2	25-35	+	"
T. intermedius	1.9-7.0	25-35	+	"
T. perometabolis	2.8-6.8	25-35	+	"
Sulfolobus acidocalderius	2.0-5.0	55-85	+	"
Desulfovibrio desulfuricans	5.0-9.0	10-45	-	heterotrophic

(Source: Thompson 1988)

1.2 Source of Acid and Contributing Factors

The potential for a mine to generate acid and release contaminants is dependent on many factors and is site specific. Ferguson and Erickson identified primary, secondary, and tertiary factors that control acid drainage. These factors provide a convenient structure for organizing the discussion of acid formation in the mining environment. Primary factors involve production of the acid, such as the oxidation reactions. Secondary factors act to control the products of the oxidation reaction, such as reactions with other minerals that consume acid. Secondary factors may either neutralize acid or react with other minerals. Tertiary factors refer to the physical aspects of the waste management unit (e.g., pit walls, waste rock piles, or tailings impoundments) that influence the oxidation reaction, migration of the acid, and consumption. Other downstream factors change the character of the drainage by chemical reaction or dilution (Ferguson and Erickson 1988). These downstream factors are beyond the scope of this paper and are not discussed herein.

Primary factors of acid generation include sulfide minerals, water, oxygen, ferric iron, bacteria to catalyze the oxidation reaction, and generated heat. Some sulfide minerals are more easily oxidized (e.g., framboidal pyrite, marcasite, and pyrrhotite) and hence, may have a greater impact on timing and magnitude during acid prediction analysis compared to other metal sulfides. Also important is the physical occurrence of the sulfide mineral. Well crystallized (euhedral) minerals will have smaller exposed surface areas than those that are disseminated.

Both water and oxygen are necessary to generate acid drainage. Water serves as both a reactant and a medium for bacteria in the oxidation process. Water also transports the oxidation products. A ready supply of atmospheric oxygen is required to drive the oxidation reaction. Oxygen is particularly important to maintain the rapid bacterially catalyzed oxidation at pH values below 3.5. Oxidation of sulfides is significantly reduced when the concentration of oxygen in the pore spaces of mining waste units is less than 1 or 2 percent. Different bacteria are better suited to different pH levels and other edaphic factors (edaphic factors pertain to the chemical and physical characteristics of the soil and water environments). The type of bacteria and their population sizes change as their growth conditions are optimized (Ferguson and Erickson 1988). Table 3 identifies some of the bacteria involved in catalyzing the oxidation reactions and their growth conditions.

The oxidation reaction is exothermic, with the potential to generate a large amount of heat, and therefore thermal gradients within the unit. Heat from the reaction is dissipated by thermal conduction or convection. Research by Lu and Zhang (undated) on waste rock using stability analysis indicates that convective flow can occur because of the high porosity of the material. Convection cells formed in waste rock would draw in atmospheric air and continue to drive the oxidation reaction. Convection gas flow due to oxidation of sulfide minerals depends on the maximum temperature in the waste rock. The maximum temperature depends on ambient atmospheric temperature, strength of the heat source, and the nature of the upper boundary. If the sulfide waste is concentrated in one area, as is the case with encapsulation, the heat source may be very strong.

Secondary factors act to either neutralize the acid produced by oxidation of sulfides or may change the effluent character by adding metals ions mobilized by residual acid. Neutralization of acid by the alkalinity released when acid reacts with carbonate minerals is an important means of moderating acid production. The most common neutralizing minerals are calcite and dolomite. Products from the oxidation reaction (hydrogen ions, metal ions, etc.) may also react with other non-neutralizing constituents. Possible reactions include ion exchange on clay particles, gypsum precipitation, and dissolution of other minerals. Dissolution of other minerals contributes to the contaminant load in the acid drainage. Examples of metals occurring in the dissolved load include aluminum, manganese, copper, lead, zinc, and others (Ferguson and Erickson 1988).

Some of the tertiary factors affecting acid drainage are the physical characteristics of the material, how acid generating and acid neutralizing materials are placed, waste, and the hydrologic regime in the vicinity. The physical nature of the material, such as particle size, permeability, and physical weathering characteristics, is important to the acid generation potential. Particle size is a fundamental concern since it affects the surface area exposed to weathering and oxidation. Surface area is inversely proportional to particle size. Very coarse grain material, as is found in waste dumps, exposes less surface area but may allow air and water to penetrate deeper into the unit, exposing more material to oxidation and ultimately producing more acid. Air circulation in coarse material is aided by wind, changes in barometric pressure, and possibly convective gas flow caused by heat generated by the oxidation reaction. In contrast, fine-grain material may retard air and very fine material may limit water flow; however, finer grains expose more surface area to oxidation. The relationships between particle size, surface area, and oxidation play a prominent role in acid prediction methods. As materials weather with time, particle size is reduced, exposing more surface area and changing physical characteristics of the unit. Though difficult to weigh, each of these factors influences the potential for acid generation and are therefore important considerations for the long-term (Ferguson and Erickson 1988, Lu and Zhang undated).

The hydrology of the area surrounding mine workings and waste units is also important in the analysis of acid generation potential. When acid generating material occurs below the water table, the slow diffusion of oxygen in water retards acid production. This is reflected in the portion of pits or underground workings located below the water table. Where mine walls and underground workings extend above the water table, the flow of water and oxygen in joints may be a source of acid. A similar relationship is evident with tailings, which are typically fine grained and disposed of subaqueously; the slow diffusion of oxygen inhibits formation of acid. However, since tailings are placed in either raised or valley impoundments, they are likely to remain saturated for only a limited period of time during mine operation. Following mine closure, the free water surface in the impoundment may be drawn down substantially, favoring AMD conditions.

The spatial distribution of mining wastes in units, or waste placement, affects acid generation potential. For example, the distribution of acid generating wastes with neutralizing wastes may be controlled by the stacking sequence. Calcareous material may be mixed with or placed above sulfidic wastes to buffer acid production or provide alkalinity to infiltrating solution prior to contact with acid generating wastes. An alternative to layering or mixing is encapsulation. This technique attempts to isolate acid generating wastes from oxygen

and water, thereby reducing its potential to produce acid. It is unclear if encapsulation is feasible over the long-term.

Wetting and drying cycles in any of the mine workings or other waste management units will affect the character of any acid drainage produced. Frequent wetting will tend to generate a more constant volume of acid and other contaminants as water moves through and flushes oxidation products out of the system. The build-up of contaminants in the system is proportional to the length of time between wetting cycles (Ferguson and Erickson 1988, Doepker 1993). As the length of the dry cycle increases, oxidation products will tend to accumulate in the system. A high magnitude wetting event will flush accumulated contaminants out of the system. This relationship is typical of the increase in contaminant load observed following heavy precipitation for those areas having a wet season.

2. ACID GENERATION PREDICTION

The objectives of predictive testing are to: (1) determine if a discrete volume of mining waste will generate acid and (2) predict the quality of the drainage based on the rate of acid formation measured (California Mining Association 1991). There are two important points that must be considered when evaluating the acid generation potential of a rock material. The first is how to collect samples from the field for use in analytical testing. The second is which analytic test method should be used. Both points have a profound impact on the reliability of analytical tests. Results from any analytical test are only as reliable as the samples used for the test. Once the sampling strategy is selected, an appropriate analytical method (or methods) can be selected. Methods used to predict the acid generation potential are classified as either static or kinetic. Factors affecting the selection of the sampling regime and analytical method include an existing knowledge of the geology, costs, and length of time available to conduct the test. This section will examine sample methodology and analytic tests used to predict acid generation potential.

The following list of components describes the solid phase composition and reaction environment of sulfide minerals. Potential contaminants are included to indicate their importance in the scope of acid generation. These components should be kept in mind while evaluating information on acid generation potential.

Components affecting the total capacity to generate acid are characterized by:

- Amount of acid generating (sulfide) minerals present [Note: assumes total reaction of sulfide minerals]
- Amount of acid neutralizing minerals present
- Amount and type of potential contaminants present.

Components affecting the rate of acid generation include:

- Type of sulfide mineral present (including crystal form)
- Type of carbonate mineral present (and other neutralizing minerals, as appropriate)
- Mineral surface area available for reaction
  - Occurrence of the mineral grains in the waste (i.e., included, liberated)
  - Particle size of the waste
- Available water and oxygen
- Bacteria.

Analytical tests used to assess a material's acid generation potential are either static or kinetic in nature. A static test determines both the total acid generating and total acid neutralizing potential of a sample. The

capacity of the sample to generate acidic drainage is calculated as either the difference of the values or as a ratio of the values. These tests are not intended to predict the rate of acid generation, only the potential to produce acid. Static tests can be conducted quickly and are inexpensive compared to kinetic tests. Kinetic tests are intended to mimic the processes found at mining sites, usually at an accelerated rate. These tests require more time and are considerably more expensive than static tests. Data from the tests are used to classify wastes or materials according to their acid generating potential. This information can be collected and evaluated during the economic analysis of mines in their exploratory phases. Based on this information, decisions can be made with respect to specific mitigation practices for existing mines.

In this discussion, it will be useful to keep in mind sources of information needed to assess acid potential. Some of the primary and secondary factors that affect the drainage character from waste management units are presented in Table 4. The variables identified may be appropriate when considering other than waste units, such as mine pits and underground workings.

Table 4. Sources of Information on Acid Generation Potential for New and Operating Mines

Information Type	New Mine	Operating Mine
Mine Rock Classification	• Outcrop exposures • Exploration drill samples, logs • Geological sections • Core assays	• Outcrop and excavation exposures • Drill core • Production sampling • Core assays • Specific sampling from working areas and piles
Mine Rock Distribution	• Mine planning	• Mine planning • Mine rock placement records • Pit and underground plans and exposures • Pile surveys • Pile drilling and sampling • Site personnel
Acid Generation, Leaching Potential	• Static testing • Short term leach extractions • Mineralogy • Site comparisons	• Observation of old cores • Field sampling • Static testing of distinct sub-units from working areas
Drainage Water Quality	• Kinetic testing • Background water quality	• Regular monitoring • Seep surveys • Kinetic testing • Leach extraction

(Source: Modified from Robertson and Broughton, undated)

Efforts by both the mining industry and state regulatory agencies to develop the best protocols for sampling and/or analytical methods to predict acid generation potential have demonstrated that site specific conditions (e.g., climate and geology) dictate a case-by-case approach when evaluating acid potential. This is complicated by the fact that a variety of research efforts on different methods by the Bureau of Mines, EPA,

and the Canadian Mine Environment Neutral Drainage (MEND), as well as those used by mining companies and their consultants, make comparison of data difficult. Several authors have conducted comparative evaluations of predictive tests (Lapakko 1992, Bradham and Caruccio 1990, Coastech 1989). Kim Lapakko of the Minnesota Department of Natural Resources has conducted comparative evaluations of static and kinetic test methods using a range of rock types. Bradham and Caruccio conducted a comparative study on tailings.

When evaluating the acid generation potential, a phased testing plan selects samples appropriate for the detail needed (California Mining Association 1991). This approach allows investment in acid prediction testing to be commensurate with a deposit's economic potential and saves time and expense associated with unnecessary tests. Sampling and testing should be an iterative process, collecting, testing, and evaluating a small amount of information to establish the acid generation potential. Based on the preliminary findings, subsequent sampling and testing can be selected to refine the information as needed.

The typical steps in predicting the acid forming potential, as described in summary documents on the subject, are listed below (California Mining Association 1991, British Columbia AMD Task Force 1989):

1. Define the geologic (or lithologic) units that will be encountered during mining. Describe the geology and mineralogy of these units in detail.
2. Develop a sampling plan based on understanding of geology (rock mass, etc.). Collect samples to represent ranges of compositional variation within a rock unit (see Lapakko 1988, 1990a).
3. Select static or kinetic tests and evaluate potential for acid formation.
4. Evaluate sampling criteria and conduct additional kinetic tests as required.
5. Develop a model as appropriate.
6. Based on findings, classify geologic (lithologic) units as acid, non-acid forming, or uncertain. (Note: the potential to produce acid may vary within a given geologic unit.)

2.1 Sampling

Selection of samples has important implications for subsequent acid prediction testing. The purpose of testing rock material is to allow classification and planning for waste disposal based on the predicted drainage quality from that material. Samples must be selected to characterize both the type and volume of rock materials and also account for the variability of materials that will be exposed during mining. When to collect samples for testing is an equally important consideration. Researchers agree that sampling and testing should be concurrent with resource evaluation and mine planning (Lapakko 1990a, British Columbia AMD Task Force 1989). Sampling techniques used to evaluate recoverable mineral resources (assay samples) are similar to those required for prediction of acid generation potential. Active mining operations for which

predictive tests were not conducted in advance of mining lack the advantage of front end planning; however, these mines can still use these samples and other information collected to establish the acid generating potential.

The pressure is increasing for new operations or those in the exploratory phase to accurately predict future drainage water quality. By comparison, the acid drainage potential at old mines may be well established. Examples of information needed from existing operations are the quantity of existing acid products, the potential and stage of acid generation in each of the waste units, and the acid forming potential of future wastes to be generated (see Table 4). Broughton and Robertson recommend that the first two stages of an acid prediction analysis for either new or existing mines are (1) to review the geology and mineralogy and (2) classify the rock and collect samples (Robertson and Broughton, undated; Broughton and Robertson, 1992).

Sample collection for prediction tests for both old and new mines should consider both geologic and environmental factors. Geologic factors for sample selection are primarily a good understanding of the local geology. If available, this may include information from mines, core logs, or other sources in the immediate area. The exploration geologist or mine geologist is probably the best resource for understanding and describing the mine's geology in detail. This information is important to both the sampling program and application of test results. Environmental factors include consideration of the potential environmental contaminants in the rock and climatic variables. A quality assurance/quality control program should be developed and coordinated with the mine plan for sample collection and acid generation testing.

There are many opinions concerning the number of samples to be collected in a fixed-frequency sampling program. One mining consulting firm recommends about 8 - 12 samples of each significant rock type or 1 sample for each 1 million tons, at a minimum (Schafer 1993). In this case a significant rock type represents one or two percent of the total mine rock volume. Gene Farmer of the U.S. Forest Service suggests that one sample (about 1,500 grams) be collected per 20,000 tons of waste rock, or about 50 samples for each 1 million tons (USDA Forest Service 1992). These samples would be collected by compositing from individual drill hole cuttings prior to blasting. The British Columbia AMD Task Force recommends a minimum number of samples based on the mass of the geologic unit. Their recommended minimum sample number is 25 for a 1 million ton geologic unit, or one sample for every 40,000 tons. Using the British Columbia method, as waste volume increases, the number of samples decreases. For example, for a unit of 10 million tons, the minimum sample number is 80, or one sample for every 125,000 tons (British Columbia AMD Task Force 1989).

There are reservations to prescribing a fixed number of samples for collection per volume of material. This is particularly true for existing mines when collecting samples from waste rock dumps for acid generation potential tests. Waste rock dumps are usually constructed by end-dumping of rock from trucks, creating heterogeneous deposits that are very difficult to sample with confidence. Tailings are comparatively more uniform due to milling and depositional methods used, and it is easier to characterize their variability. Fixed-frequency sampling does not encourage the use of best judgement on the part of the sample collector

(typically a mining company). It also does not provide the statistical basis to account for variability among samples. The determination of how many samples should be taken at any one time appears to be dependent on variability of the site's geology and how the mine will be developed. Due to general uncertainty regarding AMD predictive methods, it may be prudent to sample wastes or material throughout the life of the mine.

Factors to consider in a sampling program for existing or planned mines include the method of sample collection, length of time samples are to be (or have been) stored, and the sample storage environment. Each of these can affect the physical and chemical characteristics of a sample. Samples collected from cores exposed to the environment may be physically and/or chemically altered. If samples are collected from drill core, contamination may be a problem if a lubricant was used. At existing mines, tailings samples should be taken over a variety of depths to determine if oxidation of sulfide minerals is occurring. The influence of lime addition during milling may maintain alkaline conditions. Collecting samples of waste rock is difficult because of the variability inherent in these waste units. Drilling is considered to be the preferred method for collecting samples from waste rock piles (Ferguson and Morin 1991).

Since individual samples will be used to test and classify larger volumes of waste, it is important to consider how representative samples are to be collected. Compositing is a common practice used to sample large volumes of material. Typically, composite samples are collected from drill hole cuttings on benches prior to blasting. However, compositing merges information about the variation of sample that would be identified if more samples were collected and analyzed. Therefore, information about sample variability is lost (British Columbia AMD Task Force 1990, Robertson and Broughton undated). Composite sampling of tailings may be useful as a "first look" for characterizing tailings; compositing with stratification by lithology and alteration can help to avoid the problems of simple composite samples (Schafer 1993).

2.2 Static Tests

Static tests predict drainage quality by comparing the sample's maximum acid production potential (AP) with its maximum neutralization potential (NP). The AP is determined by multiplying the percent of total sulfur or sulfide sulfur (depending on the test) in the sample by a conversion factor (AP = 31.25 * %S). NP is a measure of the carbonate material available to neutralize acid. The value for NP is determined either by adding acid to a sample and back titrating to determine the amount of acid consumed or by direct acid titration of the sample; the endpoint pH is usually 3.5 (Ferguson and Morin 1991, Lapakko 1993a). Lapakko (1992) reported that using an endpoint pH of 3.5 measures a sample's acid neutralizing potential below 6.0, but noted that a drainage pH in the range of 3.5 may not be environmentally acceptable. The net neutralization potential (NNP), or acid/base account (ABA) is determined by subtracting the AP from the NP (NNP = NP - AP). A ratio of NP to AP is also used. An NNP of 0 is equivalent to an NP/AP ratio of 1 (Ferguson and Morin 1991). Units for static test results (AP, NP, and NNP) are typically expressed in mass (kg, metric ton, etc.) of calcium carbonate ($CaCO_3$) per 1000 metric tons of rock, parts per thousand.

If the difference between NP and AP is negative then the potential exists for the waste to form acid. If it is positive then there may be lower risk. Prediction of the acid potential when the NNP is between -20 and 20 is

more difficult. If ratios are used, when the ratio of a sample's neutralization potential and acid production potential is greater than 3:1, experience indicates that there is lower risk for acid drainage to develop (Brodie et al. 1991). For ratios between 3:1 and 1:1, referred to as the zone of uncertainty, additional kinetic testing is usually recommended. Those samples with a ratio of 1:1 or less are more likely to generate acid. Prediction of drainage quality for a sample based on these values requires assumptions that reaction rates are similar and that the acid consuming minerals will dissolve (Lapakko 1992). When reviewing data on static tests, an important consideration is the particle size of the sample material and how it is different from the waste or unit being characterized.

Information on these and other static acid prediction tests, including summaries of test results, is available (Coastech 1989, Lapakko 1993b). The following descriptions are excerpted from Lapakko (1993b). Lapakko (1992) has also conducted comparison tests of static methods using mine waste samples from different mines. Additional summaries of static tests have been completed by Coastech (1989) as part of the MEND Project, and the California Mining Association (1991). Five static tests will be summarized here and in Table 5.

Table 5. Summary of Static Test Methods, Costs, Advantages, and Disadvantages

Acid Base Accounting (Sobek et al, 1978)	**MODIFIED Acid Base Accounting** (Coastech, 1989)	**BC RESEARCH INITIAL** (Duncan and Bruynesteyn, 1979)	**Alkaline Production Potential: Sulfur** (Caruccio et al, 1981)	**Net Acid Production** (Coastech 1989)
ACID PRODUCTION DETERMINATION				
Acid Producing Potential = 31.25 * Total S	Acid Producing Potential = 31.25 * Total S	Total Acid Production = 31.25 * Total S	Total S used as indicator	300 mL H_2O_2 added to 5 g rock to directly oxidize sulfides present
NEUTRALIZATION POTENTIAL DETERMINATION				
-60 mesh (0.24 mm) sample	-60 mesh (0.24 mm) sample	-300 mesh (0.038 mm) sample	-0.023 mm sample	particle size not presented
add HCl as indicated by fizz test, boil one minute than cool	add HCl as indicated by fizz test agitate for 23 hours at room temperature pH 1.4 - 2.0 required after six hours agitation	titrate sample to pH 3.4 with 1.0 N H_2SO_3	20 mL 0.1 N HCl to 0.4g solid for 2 hours at room temperature	acid produced by iron sulfide oxidization dissolves buffering minerals
titration endpt pH 7.0	titration endpt pH 8.3	titration endpt not applicable	titration endpt pH 4.0	titration endpt pH 7.0
cost: 34-110	cost: 34-110	cost: 65-170	cost: 34-110	cost: 25-68
ADVANTAGES AND DISADVANTAGES				
simple and short time[1,3] no special equipment and easy interpretation[1] many samples can be tested[1]	simple, short time, no special equipment, and easy interpretation[1]	simple and fairly short time[1,3] no special equipment and easy interpretation[1] many samples can be tested[1]	simple, short time, and no special equipment[1]	simple, short time, no special equipment, and easy interpretation[1]
does not relate to kinetic[2] assumes parallel acid/ alkaline release[2,3] if APP and NP are close, hard to interpret and different particle size not reflected[1]	does not relate to kinetic[2] assumes parallel acid/ alkaline release[2,3] if AP and NP are close, hard to interpret and different particle size not reflected[1]	assumes parallel acid/ alkaline release, different particle size not reflected, and if APP and NP are close, hard to interpret[1]	moderate interpretation[1]	limited reproducibility[4] uncertain if extent of sulfide oxidation simulates that in field

1 = Coastech 1989, as referenced in Lapakko 1993
2 = Bradham and Caruccio 1990, as referenced in Lapakko 1993
3 = Ferguson 1984, as referenced in Lapakko 1993
4 = Lawrence 1991, as referenced in Lapakko 1993

(Source: Lapakko 1993b)

2.2.1 Acid-Base Accounting (ABA)

The acid-base accounting test, a form of static testing, was developed in 1974 to evaluate coal mine waste and was modified by Sobek et al. in 1978. The acid production potential (APP) is determined from the total sulfur content as follows:

$$31.25 \text{ x percent S} = \text{APP}$$

and assumes that two moles of acid will be produced for each mole of sulfur. Units for APP are tons of acidity per ton of rock. Neutralization Potential (NP) is determined first by a simple fizz test to select the acid strength to use in the next step. Based on this information, hydrochloric acid is added to the sample and the sample is boiled until the reaction stops. The resulting solution is back titrated to pH 7 with sodium hydroxide to determine the amount of acid consumed in the reaction between HCl and the sample.

The net neutralizing potential (NNP) is determined by subtracting the APP from the NP and is a measure of the difference between the neutralizing and acid forming potentials. The value for NNP may be either positive or negative. Tests conducted by Ferguson (reported by Lapakko 1993b) indicate that NNP values less than 20 (kg $CaCO_3$/ton) are likely to form acid. Those with NNP values greater than 20 were not likely to form acid. For NNP values between -20 and 20 it was difficult to determine the acid potential.

Assumptions of the test are that all the sulfur in the sample is reactive. This assumption does not take into account the presence of gypsum and other non-reactive sulfur minerals. A shortcoming of the technique is the potential to overestimate NP in one or more of the following ways: (1) use of strong acid may dissolve minerals that would not otherwise react to maintain drainage pH within an environmentally acceptable range; (2) use of boiling acid may cause an overestimation of NP by reacting with iron and manganese carbonates, which would not otherwise factor in the natural NP (this observation is problematic with samples that contain large quantities of these carbonates; (3) the NP may be underestimated by contribution from metal hydroxides that precipitate during the titration with sodium hydroxide.

2.2.2 Modified Acid Base Accounting

The Modified Acid Base Accounting method is similar to the previous method with some exceptions. It calculates APP on the sulfide sulfur content (Lawrence 1990). This is different from the total sulfur calculation used in the ABA test in that the sulfur contribution from non-sulfide sources is not included. Determination of NP uses a longer (24-hour) acid digestion at ambient temperature, rather than boiling hydrochloric acid as used in the ABA method. When back titrating with sodium hydroxide to determine the acid consumed in the digestion, an endpoint of 8.3 is used instead of 7.

This modified method assumes that sulfur present as sulfate is not acid producing, and therefore may underestimate available APP if jarosite or other acid producing sulfate minerals are present. Conducting the

acid digestion at standard temperature may reduce the contribution of iron carbonate minerals when determining the NP.

2.2.3 British Columbia Research Initial Test (BC)

The B.C. Research Initial Test, as developed by Duncan and Bruynesteyn (1979), is similar to the ABA test in that it calculates APP based on total sulfur. Consequently, similar concerns should be kept in mind for the APP values. NP (or acid consuming capability) is determined by titrating the sample with 1.0 normal sulfuric acid to pH 3.5. Coastech (1989) notes that this requires more sophisticated equipment (i.e., automatic titrator) than the ABA procedure and is more time consuming. Samples are crushed to minus 400 mesh. Data for APP and NP are compared by difference or ratio, as described above. If a sample is determined to be potentially acid generating, the B.C. Confirmation kinetic test may be conducted. This test is presented in the next section.

2.2.4 Alkaline Production Potential : Sulfur Ratio (APP:S)

The Alkaline Production Potential : Sulfur Ratio test was developed by Caruccio et al. (1981) and modified by Coastech (1989) to measure the acid forming potential of coal waste. Like the ABA and B.C. initial tests, the APP:S test uses total sulfur to determine the total acid potential. Again, similar problems exist for the APP:S test as were experienced with these other tests. A change in nomenclature should be noted here. The acid consuming potential (NP in the previous tests) is referred to as the Alkaline Production Potential. The value is determined by grinding a 500 mg sample to minus 23 micron and adding 20 mL of 0.1N HCl and allowing it to react for 2 hours at ambient temperature. The sample and solution are then titrated to pH 5 to determine the alkaline production potential.

Samples representative of the geologic variation at the site are collected as in other tests and the Alkaline Production Potential is determined. Results from the alkaline production potential test are plotted with the results for total sulfur content of the same samples. Samples of several APP:S ratios are selected for kinetic testing to determine which will be acid producing. With this calibration, the acid producing potential of future samples from the various geologic units can be projected based on the APP:S ratio, rather than depending on kinetic tests, which require more time.

Because this test uses total sulfur, similar to the ABA, to determine acid production, it also tends to overestimate potential acid production for samples containing sulfate minerals. Coastech (1989) noted the shorter exposure to less concentrated acid used in the digestion reaction would tend to underestimate Alkaline Production Potential (NP), and preclude the complete reaction of all buffering carbonates present.

2.2.5 Net Acid Production Test

In the Net Acid Production Test, hydrogen peroxide is used to accelerate the oxidation of sulfide (Lawrence et al. 1988). For the test, five grams of material are oxidized by 100 mL of 15 percent hydrogen peroxide to

oxidize the metal sulfide minerals. The reaction generates acid which in turn reacts with the buffering minerals in the sample. The reaction is allowed to continue for one hour after all visible signs of reaction have ended. The pH of the solution is determined and then titrated to pH 7. This gives a value for the Net acid or neutralizing potential of the sample. This test is different from static tests described above in that it mimics the reaction of APP and NP and determines a single value, NNP. One potential limitation of the test was noted. If the extent of oxidation in the field setting is greater than in the test, the potential exists for the test to underestimate acid production, creating the possibility that some acid producing waste may be incorrectly classified as non-acid-producing.

2.3 Kinetic Tests

Kinetic tests are distinguished from static tests in that they attempt to mimic natural oxidation reactions of the field setting. The tests typically use a larger sample volume and require a much longer time for completion than for static tests. These tests provide information on the rate of sulfide mineral oxidation and therefore acid production, as well as an indication of drainage water quality. Of the different kinetic tests used, there is no one test that is preferred. The preference for tests changes with time as experience and understanding increase. In a 1988 summary article by Ferguson and Erickson, the B.C. Research Confirmation Test was considered to be the most widely used. A similar 1991 article by Ferguson and Morin stated that the use of modified humidity cells was becoming more common. From information reviewed for this report, there does seem to be a trend toward the preference for modified humidity cell and column type tests.

Kinetic tests can be used to assess the impact of different variables on the potential to generate acid. For example, samples may be inoculated with bacteria (a requirement for some tests); temperature of the sample environment may also be controlled during the test. Most tests require the sample particle size to be less than a specified sieve size (e.g., minus 200 mesh). Larger sample volumes and test equipment may examine acid potential from coarse particles. Acid drainage control mechanisms, such as increasing alkalinity by adding lime, may also be examined using kinetic tests.

It is helpful to supplement kinetic tests with an understanding of empirical data characterizing the sample. Examples include analysis of specific surface area, mineralogy, and metals. Such information may affect the interpretation of test data and are important when making spatial and temporal comparisons between samples based on the test data. As with static tests, it is important to consider the particle size of the test sample, particularly when comparing test results with field scale applications.

Seven kinetic tests are summarized primarily from Lapakko's (1993b) review and the BC AMD Task Force, Draft Technical Guideline, Volume I (1989). Other sources are noted in the text. Brief descriptions of the kinetic tests discussed are also presented in Table 6.

2.3.1 Humidity Cell Tests

Both Standard and Modified Humidity Cell Tests are used to determine the rate of acid generation. Tests are conducted in a chamber resembling a box with ports for air input and output. The modified humidity cell uses crushed samples and resembles a column. There is no standard for either humidity cell test.

The Humidity Cell Test, as conducted by Sobek (1978), leaches a 200 g sample crushed to minus 2.38 mm in an enclosed plastic container. The test is typically run for ten weeks and follows a seven day cycle. The sample may be inoculated with bacteria. During the seven day cycle, dry air is passed through the sample container for the first three days and humidified air for the next three days. On the seventh day the sample is rinsed with 200 mL of distilled water. The solution may be analyzed for pH, acidity, alkalinity, and specific conductance; redox potential (the oxidation-reduction potential of an environment), sulfate, and dissolved metals may also be tested. The humidity cell test method is very similar to the column test described below.

Depending on the sample, the test duration may need to be extended. Monitoring sulfate and dissolved metal loads is important to track both the oxidation reaction and metal mobility. Two points are important when using this and other kinetic tests: (1) if the sample was allowed to react before testing began (e.g., in storage) there may be a build up of oxidation products in the sample—this would be flushed out in the early water rinses, and (2) neutral drainage may lead to an incorrect prediction of acid potential if the test period is not long enough.

2.3.2 Soxhelet Extraction Tests

This test simulates geochemical weathering using a soxhelet extraction apparatus to recirculate solution through the sample. The sample is placed in a thimble in the unit and solution is circulated from a reservoir. Two procedures are used—one is the standard test described by Singleton and Lavkulich (1978); the other is the modified test described by Sobek et al. (1978). In the standard test the sample is leached using a 70°C solution of acetic acid or distilled water over a period of six weeks (duration of the procedure may vary). The modified test uses only distilled water at 25°C.

Research by Coastech (1989) determined that use of acetic acid yielded unrealistic results. Soxhelet extraction test conditions are more extreme than other kinetic tests. However, it is a shorter test and may be useful in simulating long weathering trends in a relatively short test time. Drawbacks include the complex equipment required and the more complex nature of the test in general.

Table 6. Summary of Some Kinetic Test Methods, Costs, Advantages, and Disadvantages

HUMIDITY CELLS (Sobek et al., 1978)	SOXHELET EXTRACTION (Singleton and Lavkulich, 1978; Sullivan and Sobek, 1982)	COLUMN TESTS (Bruynesteyn and Hackl, 1982; Hood and Oertel, 1984)
SUMMARY OF TEST METHOD		
-2.38 mm particle size 200g of rock exposed to three days dry air, three days humidified air, and rinsed with 200 mL on day seven cost: 425-850	particle size not presented T=70°C (Singleton and Lavkulich, 1978) T=25°C (Sullivan and Sobek, 1982) water passed through sample is distilled and recycled through sample cost: 212-425	variable particle size columns containing mine waste are leached with discrete volumes or recirculating solutions cost: dependent upon scale
ADVANTAGES AND DISADVANTAGES		
models AP and NP well and models wet/dry[3] approximates field conditions and rate of acidity per unit of sample moderate to use, results take long time, and some special equipment[1] moderate ease of interpretation[1,3] large data set generated[1]	simple, results in short time, and assessment of interaction between AP and NP[3] moderate to use and need special equipment[1] moderate interpretation[1,3] in developmental stage and relationship to natural processes not clear[1]	models AP and NP, models effect of different rock types, models wet/dry, and models different grain sizes[3] difficult interpretation, not practical for large number of samples[3] large volume of sample[2] lots of data generated, long time, and potential problems: uneven leachate application, channelization[1,3]

(Source: Lapakko 1993b)

BC RESEARCH CONFIRMATION (Duncan and Walden, 1975)	BATCH REACTOR (Halbert et al., 1983)	FIELD TESTS (Edger and Lapakko, 1985)
METHOD		
-400 mesh particle size 15-30g added to bacterially active solution at pH 2.2 to 2.5, T=35°C if pH increases, sample is non acid producer if pH decreases, 1/2 original sample mass is added in each of two increments cost: 170-340	-200 mesh particle size[4] sample/water slurry is agitated 200g/500 mL[1] cost: 425-850	field scale particles 800 to 1300 metric ton test piles constructed on liners flow and water quality data collected tests began in 1977 and are ongoing cost: initial construction is expensive, subsequent costs are comparable
ADVANTAGES AND DISADVANTAGES		
simple to use, low cost, assesses potential for biological leaching[3] moderate to use, longer time needed, and some special equipment needed[1] difficult interpretation if pH change is small, does not model initial AP step, and long time for pH to stabilize[2]	able to examine many samples simultaneously and relatively simple equipment[1] subject to large sampling errors and lack of precision[4]	uses actual mine waste under environmental conditions can be used to determine drainage volume mitigation methods can be tested expensive initial construction long time

(Source: Lapakko 1993)

1 = Coastech 1989, as referenced in Lapakko 1993

2 = Bradham and Caruccio 1990, as referenced in Lapakko 1993

3 = Ferguson 1985, as referenced in Lapakko 1993

4 = Babij et al. 1980, as referenced in Lapakko 1993

2.3.3 Column Tests

Column Tests are conducted by stacking the waste or material in a cylinder or similar device. Wetting and drying cycles are created by adding water and then allowing the column to dry. Each of the cycles may occur over a period from several days to a week or more, though they typically last for three days each. Care must be taken to avoid piping along the sample-wall interface when packing the column. Water added to the column is collected and analyzed to determine the current oxidation rate, sulfate production, metal release, and other parameters.

Column test equipment, like humidity cells, is a relatively simple apparatus compared to a soxhelet extraction device. It is easily modified to test control options, such as the addition of limestone, the influence of bacteria, and water saturation (Water Resources Control Board 1990). Results from research indicate that column tests of well sorted tailings material greater than 0.5 cm in diameter accurately represents field test conditions (Bradham and Caruccio 1990). Tests of waste rock material were not reported. Some of the disadvantages of column type tests are that the long time required, the associated high costs, and as mentioned above, the potential for channeling.

2.3.4 British Columbia Research Confirmation Test

Originally developed by Duncan and Bruynesteyn (1979), this test is intended to confirm results of the B.C. Initial (static) Tests; specifically, it is intended to determine if bacteria can catalyze enough reactions to satisfy their acid demands. As described in the Draft Technical Guide, Volume I (1989), sulfuric acid is added to a sample volume to a pH of 2.5. Although not identified in the Draft Technical Guide, other researchers use sample volumes in the range of 15 to 30 g of material passing a 400 mesh screen (Lapakko 1993b). The sample is shaken for four hours and acid is added to maintain a solution pH between 2.5 and 2.8. The sample is then inoculated with *Thiobacillus ferrooxidans* and the flask weighed. The flask is plugged with cotton, incubated at 35°C, and shaken continuously. The pH and metals in solution are monitored for the first three days and the pH maintained below 2.8. Distilled water is added to maintain constant weight. When the pH is established below 2.8, monitoring for pH and the metal is performed every second day until microbiological activity stops. This occurs when pH and metal values remain constant. Additional sample material is then added to the flask and this is shaken for 24 hours. When tested, if the pH is 3.5 or higher, the test is terminated. If the pH of the solution is less than 3.5, more of the sample is added and is shaken for 24 hours. The pH is tested; if it is greater than 4 or less than 3.5, the test is terminated. If the pH is less than or equal to 4, or greater than or equal to 3.5, the sample is shaken for 48 more hours and a final pH reading is taken (British Columbia AMD Task Force 1989).

If the bacteria are sustained in the sample, there is a strong possibility that acid drainage will be generated in the waste unit being characterized (British Columbia AMD Task Force 1989). If insufficient acid is produced, the solution pH will approach the natural pH (above 3.5), and the sample is determined to be non-acid producing. If the solution remains below 3.5 then there is a strong possibility that the sample will be an acid producer.

The initial acidification of the sample in this test presents conditions significantly different than in a typical waste unit. The test does not examine mineral/bacterial reactions above a pH of 2.5 (2.8 as described above). Reactions above these levels may be a major influence in determining if acid drainage is generated (Lapakko 1993b). Other disadvantages are that the test ignores neutralization potential and sulfide oxidation rates (British Columbia AMD Task Force 1989).

2.3.5 Batch Reactor (Shake Flask) Tests

In the Batch Reactor test, like the British Columbia Confirmation test, a mine sample and water are slurried together in a flask. The solution is usually distilled water, however, nutrients may be added. Sample size and solution volume are determined by the user. Coastech (1989) conducted tests using 250 g of waste and 500 mL of distilled water. Flasks are shaken continuously during the test. Water samples are taken at regular intervals to determine water quality parameters such as pH, sulfate, and metals in solution. Sampling for water quality analysis during longer tests may require addition of water to maintain volume. This would complicate interpretation of test data. Data from the tests are used to estimate the rate of sulfide mineral oxidation and release of contaminants, such as metals.

The batch reactor is relatively simple and allows examination of multiple factors, such as pH and temperature, which can be tested simultaneously. The influence of bacteria and control measures may be used as test parameters. The primary difficulty with the method is that the duration of the test may not exceed the lag time prior to acid formation (Lapakko 1993b). Other concerns are that the water volume in the flask may inhibit acid formation and bacteria may not acclimate in the test conditions (British Columbia AMD Task Force 1989).

2.3.6 Field Scale Test

Field Scale Testing, similar to On-site Rock Piles described by B.C. AMD Task Force, use large volumes of material to construct test cells in ambient environmental conditions, typically at the mine site in question. These tests are very different from laboratory tests where the experiment is conducted under controlled conditions. Sample size varies and may be as much as 1000 metric tons or more, depending on space availability. Particle size of the test material is not usually reduced for the test to better approximate field conditions. The sample is loaded on to an impervious liner to catch solutions and a vessel is used to collect the leachate. The volume of solution is determined and an aliquot is analyzed for pH, sulfate, dissolved metals, and other parameters.

Consideration of climatic conditions is important when evaluating results from field scale tests. Climatic effects must be distinguished from the rate of sulfide oxidation, acid generation, neutralization, and metal dissolution as determined by analysis of the leach solution. This is necessary because climatic effects, especially precipitation, determine the flushing rate but do not influence either reaction rate or the subsequent chemical composition of the leachate (British Columbia AMD Task Force 1989).

Lapakko (1988) demonstrated that carefully constructed kinetic tests in the laboratory could be extrapolated to field scale tests. That research is summarized in Section 5.3 of the report.

Field scale tests have the advantage of being conducted under the same environmental conditions as the waste or other units they are simulating. They also allow monitoring of the influence of bacteria and control measures. Drawbacks to field tests are that they require long test durations. Unlike other kinetic tests, field test do not accelerate environmental conditions, which tend to assess the potential to generate acid more quickly. Consequently, field tests will provide information on acid generation potential for a mine waste unit for that amount of time that they are started before waste emplacement begins. For some operations this may be 10 years or more and test results may be used to optimize reclamation design (Lapakko 1993b).

2.4 Application of Test Results in Prediction Analysis

Results from static and kinetic tests are used to classify mine wastes on the basis of their potential to generate acid. Static tests yield information about a sample's ability to neutralize and generate acid. The difference or ratio of these values becomes the basis of the classification. As discussed, for samples with NNP values greater than 20 tons $CaCO_3$/1000 tons of waste (ratio of 3:1), the potential to generate acid is low (Smith and Barton-Bridges 1991). For NNP values between -20 and 20 (ratios between 1:1 and 3:1), the potential for acid generation remains, and uncertainty will exist. It is important to note that each of these values are generalities and can be affected by the relative availability of surface areas of iron sulfides and calcium-magnesium carbonates.

The determination of AP based on estimated or reactive sulfur content in the sample has some inherent limitations. When total sulfur is used as the basis to estimate sulfide content, this uncertainty may be attributable to possible errors in: (1) assessment of true acidity and neutralization in the sample; (2) calculated acidity based on total sulfur conversion value; and (3) analytical error. Similar errors exist for static tests that determine reactive sulfide mineral concentrations. Estimating long-term reactive sulfide based on short-term tests may result in uncertainty due to difficulties in making oxidation rate predictions (British Columbia AMD Task Force 1989).

Acid base accounting tests conducted on an iterative basis, where the initial sample set is small, are helpful when establishing boundaries between lithologic units. As data from static tests is collected and evaluated, the sampling selection can be refined. The goal of sampling is to collect representative samples that define the variability of the lithologies present. If significant variability in the acid generation or neutralization potential is identified in the initial sample test results, additional sampling to refine lithologic boundaries is necessary (California Mining Association 1991).

Kinetic tests are often conducted to confirm results of static tests and estimate when and how fast acid generation will occur. The test provides insight on the rate of acid production and the water quality potentially produced and is used to evaluate treatment and control measures. Unlike static tests, there is no standardized method for evaluating test results. Data are examined for changes through time and water

quality characteristics. Kinetic tests tend to accelerate the natural oxidation rate over those observed in the field. This may have the advantage of condensing time, and providing earlier insight into the potential for acid generation.

Generally, kinetic tests are evaluated for changes in pH, sulfate, acidity and a host of potential metals. According to the B.C. AMD Task Force (1989), samples with pH values less than 3 are considered strongly acid; between 3 and 5 the sample is acid generating and there may be some neutralization occurring; at pH values >5, the sample is not significantly acid, or an alkaline source is neutralizing the acid. Sulfate is a by-product of sulfide oxidation and can be used as a measure of the rate of oxidation and acid production. When evaluating test data it is important to examine the cumulative sulfate production curve as an indicator of sulfide oxidation, in addition to other parameters. An analysis of metals in the sample solution serves as an indicator of contaminant load but is not a good indicator of acid generation.

Based on test data, decisions with respect to the mine plan are made. Similar to static tests, kinetic tests are refined to address variability of the geology. Information collected from kinetic tests, such as oxidation rates and water quality, are more commonly being used as inputs to models, which are discussed in the following section.

2.4.1 Some Experience With Static and Kinetic Tests

Ferguson estimated that for about 50 percent of the mines it is easy to determine whether acid generation is a problem, and noted that predicting the potential for the other 50 percent is more difficult (U.S. EPA 1992a). When data collected from static and kinetic tests is inconclusive it may be necessary to extrapolate from existing data using oxidation rates and other factors and project how a sample may react. The soundness of the extrapolation is dependent on the representativeness of the sample, accuracy of the tests data, and the interpretation of the data.

Ferguson and Morin (1991) found that samples with an NP/AP ratio of less than 0.1 tended to produce acid during typical laboratory timeframes. They expected that if laboratory tests were conducted for longer time periods the NP/AP ratio would shift closer to 1 and did not speculate on what the values for NNP and NP/AP would be in the future. Extrapolating a sample's ability to generate acid was divided into short (less than one year), medium (a few years), and long-term (many years) time frames. Short term projections are based on laboratory data. Medium term projections require knowledge of the neutralization process, primarily consumption of carbonate. Long-term extrapolations of acid generation potential will require an understanding of weathering rinds and diffusion of oxygen into and reaction products out of that rind. Long-term projections were identified as being extremely problematic.

Researchers in British Columbia, Canada, have examined results of static and kinetic tests conducted on tailings and waste rock (Ferguson and Morin 1991). The results are based on a study of 20 active or abandon mines in British Columbia. Their findings indicate that for tailings, only those samples having a negative NNP produced acid. The test method was not identified and the limitations are therefore not discussed here.

According to this report, waste rock data from static tests is very limited and demonstrates the variability expected with these waste units. They observed that samples of waste rock that had weathered for one month (prior to sample collection) needed to be flushed initially to remove existing oxidation products.

Lapakko (1990b) used solid phase characterization of the sample in conjunction with acid base accounting data and the rates of acid production and consumption to extrapolate information beyond the timeframe of kinetic tests. The rates of acid production and consumption were based on kinetic test results over a 20 week period. The time required to deplete sulfide and carbonate minerals was determined using rates established from kinetic tests. Based on these observations the time required to deplete the iron sulfide content was 950 weeks and the time to deplete the carbonate content was 40 weeks. This prediction agreed with an observed drop in pH between week 36 and week 56 from 8.7 to 6; after another 20 weeks the pH dropped below 5. This research appears to indicate that kinetic tests should be run for periods of at least 20 weeks in length.

2.5 Mathematical Modeling of Acid Generation Potential

As the preceding discussion indicates, static and kinetic testing provide only a partial picture of the potential of mine wastes to produce ARD. Static testing estimates the ultimate APP and NP of waste material but is generally silent with regard to the rates of generation of acidic and alkaline flows in actual waste matrices. Kinetic testing is more helpful with regard to estimating the rates of oxidation and neutralization. As discussed above, actual waste units can be very non-homogenous and anisotropic with respect to the distributions of mineral types, particle size, hydrologic conditions and so forth. Thus, while a given kinetic test may well approximate the potential for ARD in a portion of a waste unit, the result may not be representative of the "global" potential for ARD. Equally important is the practical limitation on the duration of kinetic tests: because kinetic tests are generally short-lived with respect to the potential period of persistence of AMD, they inadequately mimic the evolutionary nature of the process of acid generation.

To overcome the uncertainties inherent in short-term testing, as well as avoid the prohibitive costs of very long-term testing, some researchers have developed mathematical models to aid in predicting the long-term effects on water quality of acid generating wastes. Predictive modelling offers the hope of providing tools for estimating the potential extent of acid generation prior to its occurrence. Ideally, such information may be compared for scenarios entailing alternative management options to identify the design, operating, and closure methods that best meet economic and environmental objectives. As a practical matter, existing AMD models fall short of the ideal. Nevertheless, these models may provide valuable information for planning purposes, and may have an important role in understanding and predicting AMD.

2.5.1 Overview of Existing Models

A number of distinct approaches to modelling ARD have emerged to date. In general, all the models attempt to describe the time-dependant behavior of one or more variables of a mine waste geochemical system in terms of observed behavior trends (empirical models) or chemical and/or physical processes that are believed to control ARD (deterministic models). Empirical models extrapolate values for the desired output variables

(e.g., acid generation) from laboratory or field data (British Columbia AMD Task Force 1989). Deterministic models simulate the changes in system values according to the causal mechanisms relating each element of the system to the others.

It is important to remember that all ARD models are simplifications of reality. Simplification is required by incomplete understanding of all factors influencing ARD. Simplification can substantially reduce the cost and time required to model the system under study. However, simplifying assumptions can lead to incorrect conclusions if they result in the omission of important causal mechanisms. For instance, failure to consider the presence of neutralizing materials in a waste pile could result in an overestimation of the rate of acid generation. Similarly, failure to consider hydrogeochemical conditions within a waste pile may preclude consideration of adsorption/precipitationreactions involving metals, thereby miscalculating the potential for metals loading in effluent streams. Because the importance of any given controlling factor may vary from site to site, the significance of a simplifying assumption for any particular modelling effort must be weighed carefully.

2.5.2 Empirical Models

As stated above, empirical models extrapolate values of sulfide oxidation from existing laboratory and field test data. The method of extrapolation typically involves determination of the "best-fit lines" through test data points (British Columbia AMD Task Force 1989). The equations so derived may then be solved to provide, for instance, the acid generation rate of a particular waste unit at some time in the future. Using the projected acid generation rate as an input to a separate hydrogeochemical model that accounts for attenuation of seepage constituents in soils and dilution in receiving waters, the estimated constituent loading rates and consequent receiving water quality at time T may be estimated (Broughton and Robertson 1991).

Empirical models generally do not explicitly consider the causal mechanisms driving oxidation of sulfides and neutralization of seepage. Rather, such models assume that the operation of such controls is accurately represented in the test data. Therefore, the accuracy of empirical models in predicting AMD depends heavily on the quality of the test data used in the models. Principle sources of uncertainty may be expected to include variations in the spatial and particle size distribution of sulfide and alkaline minerals not captured by the data due to insufficient spacial distribution of samples; changes in the distribution of particle sizes throughout the waste unit (due to weathering) not captured by the data; and failure to accurately calibrate the model to reflect the actual quantity and type of materials disposed of (British Columbia AMD Task Force 1989).

It is important to note that empirical models, by their nature, are site-specific. Because the models rely on actual trends observed at a specific site, rather than generic causal mechanisms, the best fit lines for one site can not be assumed to be representative for another site. Further, significant changes in waste unit composition, geometry, or controls over time may invalidate previous representativeness of empirical models. Nevertheless, empirical models may provide cost-effective and reasonably reliable estimations of short-term future AMD conditions for sites with sufficient spatial and temporal data.

2.5.3 Deterministic Models

Deterministic models simulate AMD by solving systems of equations that represent the various controlling factors in the waste reaction process (Broughton and Robertson 1991). The simulation approach allows the users to examine the potential sulfide oxidation rate and resulting seepage quality over periods of tens to hundreds of years in the future. The greatest promise of deterministic models is that they may allow the user to predict AMD as it evolves over time under the changing influence of rate controlling factors. Existing models have built upon earlier work on acid releases from coal mine spoils as well as work on leachate quality in metals heap leach operations (Nicholson 1992). The models may rely solely on the causal relationships described in the equations, or may include empirical data as exogenous drivers (outside the model structure) to solve for certain aspects of the system (Nicholson 1992; Broughton and Robertson 1991). The most important differences between the models lie in the particular causal mechanisms (e.g., oxygen diffusion, changing particle size, temperature variations due to exothermic reactions) addressed within each model structure.

Nicholson presents a review of AMD models. In that review, Shumate (1971)[1] is credited with first recognizing that diffusion of oxygen within mine rock limits the overall rate of oxidation of sulfides (Nicholson 1992). The first working models to incorporate this process (Morth 1972[1], Rica and Chow 1974[1]) used the acid generation rate to calculate resulting drainage water quality. Rittchie (1977)[1] added to this concept by explicitly accounting for the removal of oxidized sulfur from the store of available unreacted sulfide. Other models have included convection as a means of oxygen transport within waste piles (Lu and Zhang undated). Convection may be influenced by changes in barometric pressure or by the release of heat from the exothermic oxidation of sulfides. Some researcher's have modelled the feedback mechanisms operating between temperature and biological and chemical oxidation rates, noting that the mechanism is only significant where waste permeabilities are high enough to allow convective oxygen transport to occur (Nicholson 1992).

More recent models have addressed the hydrologic and geochemical conditions in waste unit matrices, as well as reaction product transport, to more realistically represent changes in seepage quality (Nicholson 1992). Bennett (1990)[1] and others found that water flow through the waste pile strongly influences sulfide oxidation rates by acting as a heat sink and removing heat produced by oxidation.

Jaynes et al. (1986)[1] and Schafer (1991)[1] have incorporated chemical equilibrium relationships of varying complexity to model the mobilization and attenuation of oxidation and dissolution products within the waste pile. These relationships drive the residence times of various constituents within "mixing cells" of the waste matrix, and, along with allowing for consumption of acid by alkaline materials, result in changes in effluent chemistry as conditions within the matrix evolve (Nicholson 1992).

[1]As cited in Nicholson 1992.

Model developments such as those listed above have significantly contributed to understanding of the processes controlling AMD. For instance, explicit consideration of oxygen diffusion reveals that, in instances where diffusion is restricted, fast processes such as biologically catalyzed oxidation can be unimportant to the overall rate of oxidation. Similarly, consideration of hydrologic flow within the waste matrix shows that the rate of release of oxidation products from waste piles depends strongly on the flow characteristics within the wastes (Nicholson 1992). More recent models have corroborated the proposition that waste dump geometry can be important to oxidation rates by influencing the surface area exposure and air infiltration rates (Nicholson 1992).

2.6 Conclusions

Notwithstanding the understanding that existing models have provided, AMD models to date have not found extensive applications in predicting oxidation rates and effluent quality at operating or proposed sites (Ferguson and Erickson 1988). As stated above, models are simplifications of reality, and consequently are subject to a high degree of uncertainty. Among the sources of uncertainty are incomplete or invalid model structure; natural variability of certain parameters; and lack of parameter calibration and model verification (British Columbia AMD Task Force 1989).

Among the greatest concerns facing the reliability of predictive deterministic models are model calibration and validation. Model parameters must be adjusted to match the conditions prevailing at an actual site. Therefore, reliable waste characteristics, hydrologic and geochemical data must be collected and incorporated into the model structure. Validation requires comparison of model predictions with actual field sampling results. To date, the availability of field data for validation is very limited.

CURRENT REGULATORY REQUIREMENTS

Table 7. Summary of State Regulations for Acid Generation Prediction Testing (August 1994) (Continued)

Regulations/Guidance	Sampling	Analysis
Nevada[5]		
Regulations address process components, Nevada regulations, § 445.242 Guidance documents include the Nevada Division of Environmental Protection's (NDEP's) "Waste Rock and Overburden Evaluation" document, dated September 14, 1990. This evaluation document requires the use of the Meteoric Water Mobility Test (MWMT) to determine a sample's potential to release pollutants. This test does not test for AGP, but is required as a precursor to acid generation tests. Procedural requirements for the MWMT are provided in NDEP's September 19, 1990 guidance document titled, "Meteoric Water Mobility Procedure," dated September 19, 1990.	Wasterock and overburden must be evaluated for its potential to release pollutants and its acid generation potential. (NDEP 1990) Drill core samples should be collected during initial orebody definition, and used to characterize materials. Samples should be sent to an assay lab. During active mining operations, samples can be collected from remaining, saved, assayed materials to be "representatively composited" (not defined) on a quarterly basis for on-going evaluations. Samples are also required of waste materials that were not subject to assaying. (NDEP 1990) A representative sampling program must consider lithological and mineralogical variation, the extent of "sulfide" mineralization, color variation, degree of fracturing and of oxidation, and extent of secondary mineralization. (NDEP 1990)	The Meteoric Water Mobility Procedure should be used to determine the potential release of pollutants from samples. Consult NDEP's "Meteoric Water Mobility Procedure", dated September 19, 1990 for specifics regarding the procedure requirements. Acid generation potential must be evaluated using the Static Test, Acid/Base Accounting procedure, to determine neutralization potential (NP). (NDEP 1990) Acidification potential (AP) should be determined based on two alternatives: (1) determining total sulfur content, or (2) determining peroxide oxidizable sulphur. For alternative (1), compare results to NP. If NP exceeds AP value by 20%, material is considered non-acid generating. If less than 20%, determine total sulfide sulfur content according to Standard Methods of Chemical Analyses or equivalent procedure. If NP is less than 20% greater than AP, kinetic testing must be initiated. For alternative (2), if NP value exceeds value by 100%, material is non-acid generating. If less than 100%, initiate kinetic testing. (NDEP 1990) Operating facilities with positive acid generating results from static testing, must notify the NDEP and begin kinetic testing within 10 days. Kinetic testing is required to be conducted according to procedures identified in attachment I. If kinetic testing confirms acid generating potential, containment/neutralization methods must be evaluated on site specific basis and proposed to the NDEP for approval. (NDEP 1990)

(Source: Based on phone conversations with State personnel and collected documents)

(Source: [1]Humphries, 1994)

(Source: [2]Lapakko, 1994)

(Source: [3]Schuld, 1994)

(Source: [4]Miller, 1994)

(Source: [5]Gaskin, 1994)

Regulatory programs for five states were reviewed for their requirements concerning acid generation prediction. A summary of the regulatory requirements for California, Minnesota, Idaho,

Table 7. Summary of State Regulations for Acid Generation Prediction Testing (August 1994)

Regulations/Guidance	Sampling	Analysis
California[1]		
Regulations: Waste classification under §2571C of Chapter 15, of the California Mining Code. No other requirements specified.	No specific requirements indicated. Each site is considered on a case-by-case basis.	California is considering adoption of new regulations. These new regulations require testing of rock using a procedure for predicting AMD. Neither specific static or kinetic testing procedures are identified. Test results would be analyzed and interpreted by the mining company or its contractor. The state sets a trigger level at a 3:1 ratio (NP/AP) with a 95 percent confidence interval. If samples do not meet this requirement, kinetic tests are required, or the mine has the option to develop a management plan for waste disposal.
Minnesota[2]		
Regulations: Under §6132.1000 Mine Waste Characterization:	Sample types include material generated from exploration, pre-production sampling, and process testing. An outline of chemical and mineralogical analyses and laboratory tests must be conducted and presented to the commissioner for use in evaluating mining and reclamation plans. Mine waste characterization data submitted must include laboratory tests describing acid generation and dissolved solids release from mine waste. (Minnesota §6132.100)	Based on results of analyses and tests, additional mine waste characterization may be required. May include laboratory dissolution tests to describe a material's acid-producing and acid consuming mineral content. (Minnesota §6132.100) Results of mine waste characterization data should be submitted throughout the life of the operation to regulatory agencies establishing water quality and compliance monitoring standards. (Minnesota §6132.100)
Idaho[3]		
Regulations: There are no formal policies or regulations that specifically address AMD. Under Chapter 47-1513 of Idaho's Surface Mining Act and Dredge and Placer Mining Act, reclamation and operating plans are required that are protective of Idaho's water resources. (Schuld 1993) Protocols based on BC Acid Mine Task Force Report "Acid Rock Drainage Technical Guide." Also, a proposed "Policy Guidance Memorandum" has been submitted to the DEQ, but has not been signed by Administrator as of April 1993. (Schuld 1993) Under this policy, Idaho may request Federal land managers (BLM, USFS) to determined AGP for sites on Federal lands.	Sampling should begin during exploration. The state requires that exploration plans stipulate that half the samples collected should be kept in storage. Storage should minimize potential for sample weathering. Materials selected for sampling should include waste rock, overburden, and ore/subore. Composites of core samples should be obtained as samples. The number of samples obtained for AMD prediction testing should be based on the size of probable ore reserves and overburden. Consult "Acid Rock Drainage Guide" or other technical guidance document, in addition to best professional judgement, to determine minimum number of samples. (Schuld 1993) The sampling interval is based on lithology and changes in units. Reporting should occur prior to excavation and continue after mining has commenced. Results of static tests must be reported in order to prepare permit.	Idaho does not require the use of a specific static or kinetic test, however, the state must be informed of, and approve, the test methodology selected. Tests are conducted by U.S. EPA approved CLP laboratories only. Idaho uses BMPs in place of monitoring requirements to prevent any contact of AMD with groundwater or surface waters of the State. BMPs must function to avoid AMD generation, or should collect and treat AMD until it no longer exists. Future goals for BMPs will include (1) Leachate Detection/Collection Systems, (2) Closure requirements and monitoring, and (3) Bonding. If the ratio of acid potential (AP) to neutralization potential (NP) is greater than 2:1, the State requires a kinetic test to be performed. If State waters are impacted, an NOV and/or Consent Order may be issued, and other site specific requirements may be imposed.

Montana, and Nevada is presented in Table 7

Table 7. Summary of State Regulations for Acid Generation Prediction Testing (August 1994) (Continued)

Regulations/Guidance	Sampling	Analysis
	Montana[4]	
Regulations: Under Title 82, "Metal Mine Reclamation", § 82-4-336 (7), reclamation plans are required to provide for "...reclamation of disturbed land to comparable utility and stability,...". The State interprets this to mean both chemical and physical stability. Review and approval of reclamation plans gives the State the authority to reject plans that do not adequately assess AMD potential. **Guidance:** DRAFT, "Geochemical Characterization Checklist", Montana Department of State Lands. This provides specific recommendations that are only summarized in this table.	Sample collection is preferred during the advanced exploration stage of project. This allows data to be compiled and long term leachate extraction tests to be performed before submittal for a mining permit. Information requested includes descriptions of climate, topography, hydrology, vegetation, geology, mineralogy especially iron sulfides and total element content for mineralized and unmineralized lithologies. The number of samples to collect is dependent on the variability of the lithology/alteration assemblage. The British Columbia Draft Task Force Guide (SRK, 1989) and the Saskatchewan Mine Rock Guidelines (SRK, 1992) are used as references for a rough guide as to methods and sample sizes needed to characterize mine waste. Samples should not be composited if possible. Samples should be split 4 ways. For each sample please record: sample location, sample description including mineralogy/petrology especially sulphur fractionation and carbonates, grain size and crystal form of iron sulfides, particle size distribution, paste pH, and slaking characteristics after Brodie et al, 1991. Two suites of samples should be collected. 1) Collect representative samples from each lithology for a reference suite. This suite should incorporate samples from unmineralized areas to establish regional background. The "representativeness" of each sample should be determined by the geologist who is most familiar with the site. This sample set will be biased. 2) Collect random samples over the entire deposit to limit bias. This sample set will be much larger than the representative suite. At least 8 samples should be analyzed for each lithology or alteration assemblage. A statistical analysis of the data should be compiled.	For splits from each sample provide analyses for: total element or trace element and any static test. After data is reviewed and compared to average crustal abundances and/or regional background values, a carefully picked subset of samples should be analyzed using any humidity cell test method and/or any field leachate extraction test method to help establish limits for suitable and unsuitable material. The definition of "suitable" and "unsuitable" may vary with each site depending on the regional geology. Any laboratory and/or method may be used but must be approved by the agency prior to use. Rationale must be given as to why certain methods were used. After all information has been compiled and reported for each suite, decisions are made as to what materials are suitable for reclamation purposes and which materials are unsuitable and need to be isolated. The above mentioned testing sequence will not predict whether a material will produce contaminants. It will define which lithologies/alteration assemblages are suspect with respect to contaminant production and should be segregated from the suitable waste materials. Independent interpretations of the data set can be forwarded but the agencies' interpretation will comprise the effective recommendation. Testing should be ongoing throughout mine life to better substantiate preliminary conclusions made during the permitting process. More detail and references are given in "Permitting Guidelines for Mine Rock Characterization" available from the Department of State Lands, Hard Rock Bureau, 1625 11th Ave, Helena, MT 59620. (406) 444-2074. (References: Brodie, 1991; Steffen et al, 1989; Steffen et al, 1992)

. In addition, the U.S. Forest Service is developing a protocol. In the meantime, the acid generating potential associated with mines on Forest Service land is considered on a case-by-case basis as part of their review of proposed plans of operation.

3. CASE HISTORIES

Presented below are selected case studies for mines where acid drainage from mine wastes or mine works has occurred. Both active sites and sites on the National Priorities List are described. The active sites were selected to represent sites where the potential to generate acid was either not considered, or not expected, but later developed. Case histories for the Newmont Rain facility in Nevada, Cyprus Thompson Creek in Idaho, and the LTV Steel Mining Company Dunka site in Minnesota are presented below in Sections 4.1, 4.2, and 4.3, respectively. EPA visited each of these sites to further its understanding of the mining industry. Each site has experienced acid generation problems; however, it is important to note that each is also taking corrective action to mitigate the problem. The companies are working with appropriate State and Federal agencies to determine long-term treatment needs.

The EPA (1991) has prepared National Priorities List (NPL) Site Summary Reports for the mining sites on the NPL. NPL sites were selected from these reports if acid generation was identified as a problem. Using this criteria, seven of 56 mining-related sites were selected for review. The purpose of the review was to determine if acid generation predictive tests were conducted at individual sites, and if such tests were conducted, how the data were used. The review included examination of available literature on each site and interviews with each site's Remedial Project Manager (RPM). Based on incomplete information for the seven sites studied, tests for either acid prediction or pH prediction have not been conducted at Silver Bow Creek, Eagle Mountain Mine, Tar Creek, and Whitewood Creek. Eagle Mountain Mine and Silver Bow Creek have not conducted prediction tests because acid generation is such a clear and extreme problem (Taylor 1993, Forba 1993, and Overbay 1993).

Sites that have assessed the acid generation potential include Clear Creek/Central City, California Gulch, and Iron Mountain. At Clear Creek acid/base potentials were calculated for waste materials and potential acid generation testing is being required by the City of Clear Creek for any new development that disturbs the ground. Both the RPM and State contact for Iron Mountain indicate that acid generation predictive tests have been done while mucking out tunnels. Acid generation prediction has also occurred at California Gulch. Further details on the sampling and analytical methods used to predict acid generation have not been obtained. Sections 4.4 through 4.7 provide details on acid generation prediction experiences at these three NPL sites (Fliniau 1993, Hyman 1993, and Sugarek 1993).

3.1 Newmont Rain Facility, Elko County, NV

3.1.1 Introduction

EPA visited Newmont Gold Company's Rain facility in September of 1991 (U.S. EPA 1992b). The facility is located on approximately 627 acres, 9 miles southeast of Carlin in Elko County, Nevada. The facility is a mining-milling-leaching operation for beneficiating disseminated gold ore. Ore and waste rock are mined from an open pit. Of the ore removed from the mine, over forty percent is milled and beneficiated by the carbon-in-leach method at a current rate of about 840,000 tons per year (TPY). The remaining ore (about 1,000,000 tons per year) is leached using a modified heap method referred to as a valley leach. An average of 35,000 tons of material was being removed from the mine each day as of late 1991. Of this, 5,500 tons was ore grade, 29,500 tons was waste rock. This rate varies between 7,000 and 40,000 tons per day, respectively.

Most of the ore-grade material is taken from the oxidized sediments of the Webb Formation, proximal to the Rain fault. Gold concentrations in this material range from 0.01 to 0.15 ounces of gold per ton of rock. According to Newmont, sulfide-bearing rock does not contain gold in sufficient quantity to be economically recoverable, and is therefore disposed of as waste rock.

3.1.2 Waste Rock

Projected waste rock tonnage was estimated to be 41.4 million tons by the end of 1990, and 62.5 million tons during the life of the mine. In late 1991, the waste rock dump covered 211 acres north and east of the pit. Waste rock production from the pit averaged 29,500 tons per day. Of this, 7,500 tons were sulfidic and 22,000 tons oxide. Newmont had estimated that by mine closure in 1995, there will be 62.5 million tons of waste rock; of this, 77.8 percent was expected to be mostly oxidized mixed sedimentary material of the Webb Formation (some of which will contain sulfide mineralization), 15.4 percent carbonaceous and potentially sulfidic, 4.3 percent limestone of the Devil's Gate Formation, and 2.5 percent alluvium from surface deposits.

Prior to the spring of 1990, sulfide, oxide, and calcareous waste rock were disposed of together. On May 8, 1990, acid drainage was observed flowing from the base of the waste rock dump and into the unnamed drainage above Emigrant Spring, toward Dixie Creek. Inspection of the drainage downstream of the dump revealed that approximately two miles of the channel contained a red-brown precipitate. Discharge to the drainage was estimated by Newmont to be 3 gpm. According to Newmont, snow removed from the roads was disposed of on the waste dump. As the snow melted, it infiltrated the waste rock pile, oxidizing sulfur-bearing minerals and generating acid. The solution migrated along pre-mining topography and discharged at the toe of the dump.

Surface-water samples were taken along 5 points in the drainage above and below Emigrant Spring in May, June, and July of 1990. They showed pH values ranging from 2.37 to 3.21 near the base of the waste rock at the discharge point, and from 6.5 to 8.64 about 4,000 feet downstream. Arsenic levels near the effluent point

were 46 ppm in May and 1.5 ppm in July; at the distant sampling point, arsenic levels were 0.023 ppm in May and 0.005 ppm in July. Mercury levels near the discharge point were 0.19 ppm in May and 0.0019 ppm in July; at the distant sampling point, mercury levels were <0.0001 ppm in May and 0.0003 ppm in July.

3.1.3 Acid Generation Prediction

Following detection of the acid generation in 1991, Newmont's Rain facility Water Pollution Control Permit was revised. As part of the revised Permit, Newmont is required to report quarterly on results of Meteoric Water Mobility testing and Waste Rock Analysis. The meteoric water mobility test is an extraction procedure that determines moisture content of the waste, percent of a sample passing -200 mesh, pH of deionized water, and final pH of extract (following 24-hour extraction time). Following the meteoric water mobility test, total carbon, organic-carbon, and sulfur assays are obtained on the composite waste sample by combustion-infrared analysis to measure sulfur and sulfide contents, and to estimate carbonate content. Acid neutralization potential is then measured using titration. The extracted solution is analyzed for nitrate, phosphorous, chloride, fluoride, total dissolved solids, alkalinity, sulfate, and metals. Waste rock analysis is intended to determine the net acid generation potential of the material placed in the waste rock dump during the quarter.

Data for the third and fourth quarters of 1990 and the first quarter of 1991 were examined by EPA following the site visit (U.S. EPA 1992b). Third quarter results for the waste rock analysis indicated a net acid generation potential of -10.6 tons of $CaCO_3$ for each 1,000 tons of waste. This suggests that the wastes generated during this quarter had sufficient buffering capacity to neutralize any acid solution generated by sulfidic material. Fourth quarter results showed a large shift, with an acid generating potential of 5.35 tons of $CaCO_3$ for each 1,000 tons of waste. The total acid generating potential of waste rock disposed during this quarter was equivalent to the amount of acid neutralized by 5.35 tons of $CaCO_3$ for each 1,000 tons of waste rock. For the first quarter of 1991, waste rock analysis data showed a net acid generating potential of 8.57 tons. In these circumstances, Newmont is required to perform kinetic testing according to State of Nevada protocol. Results of this analysis were not available; however, in the third Quarterly Monitoring Report for 1991, Newmont indicated that column studies were underway to fulfill this requirement.

3.1.4 Treatment

In response to the drainage, Newmont took the following actions. By May 9 (one day after the drainage was noted), a small pond was constructed to collect the flow from the dump. On May 11, an HDPE liner was installed in the pond, and on May 18, Newmont constructed a cutoff trench across the channel downstream of the collection pond to collect subsurface solution. The trench was twenty feet deep and forty feet across and included a HDPE liner. Inflow to this trench was pumped to the collection pond and then trucked to the tailings impoundment for disposal.

The State and BLM approved Newmont's long-term mitigation plan with construction beginning in November of 1990, and completed in March of 1991. The solution collection and return system consists of

surface and subsurface water collection and recovery system. Surface water is collected in a ditch and drains to a sump located at the toe of the waste rock pile. Drainage collected in the sump drains by gravity to a 200,000-gallon capacity, double-lined pond. Subsurface flow is recovered in an HDPE-lined trench and also drains to the double-lined pond. Flows average 23.8 gpm with a maximum of 183 gpm. In the event of a power failure, the pond has a capacity to retain in excess of 65 hours of inflow at the maximum projected flow rate. In addition, storm water from the surface of the waste rock dump and surrounding area is collected in a single-lined, 600,000-gallon pond located just below the double-lined pond. Solution from both ponds is pumped to the mill area and added to the tailings pipeline.

As a long-term mitigation/prevention measure, Newmont began encapsulating sulfidic waste rock within oxidized and/or calcareous waste rock that has either no net acid generating potential or some acid neutralizing potential. As of late 1991, this was being accomplished by placing a pervious layer of coarse oxidized waste rock on the native soil. On this, five feet of compacted oxidized ore was placed. Additional oxide ore was placed against the natural hillslope to act as a barrier. These layers were to act as barriers to water movement into and out of the sulfidic waste rock. Following these steps, sulfidic waste rock was placed on and in front of the oxide ore. Several lifts were expected to be added to the sulfidic waste pile. In addition, haul trucks follow random routes during construction to compact the material, thereby reducing its permeability. Eventually, the front edge and top will be covered with 15 feet of oxidized material to complete the encapsulation. Prior to encapsulation, sulfide waste rock will be mixed with oxidized material or the limited quantity of calcarious material available to buffer any acidic solution generated. The sulfidic materials are fine to coarse grain sedimentary rocks extracted primarily from the Webb Formation.

Neither the draft nor the final Environmental Assessment prepared for the Rain Facility discussed the potential for sulfidic material to generate acid drainage.

3.2 Cyprus Thompson Creek, Challis, ID

3.2.1 Introduction

EPA conducted a site visit of the Cyprus Minerals Corporation Thompson Creek (Cyprus) facility in September 1991 (U.S. EPA 1992c). Cyprus mines molybdenite (molybdenum disulfide, MoS_2) from an open pit mine near Challis in central Idaho. Cyprus staked its first mineral claims at Thompson Creek in 1967. In 1981, mining operations began and the first concentrates were produced in 1983. In late 1991, the Cyprus Thompson Creek Mine site consisted of (1) an open pit mine and two waste rock dumps; (2) a primary in-pit crusher; (3) a mill with grinding and flotation, and (4) a tailings impoundment.

Cyprus has been conducting a study to investigate the potential for the waste dumps and the tailings impoundment to generate AMD. The results of the AMD study of the waste rock and tailings were to be provided to USFS by March 1, 1992. Proposed revisions to the facility's reclamation plan were also to be submitted to the U.S. Forest Service (U.S.FS). According to USFS personnel, the revisions to the Plan of Operations were to be subjected to the environmental review requirements of National Environmental Policy

Act (NEPA). This review may include preparation of a supplemental Environmental Impact Statement (U.S. EPA 1992c). The AMD study has been requested.

3.2.2 Waste Rock

When mining began in 1981, approximately 130 million tons of overburden were initially removed as "pre-production stripping." Most of the overburden was placed in two waste rock dumps (the Buckskin and Pat Hughes dumps) located adjacent to the pit. In 1990, approximately 16.2 million cubic yards of waste rock were generated, consisting mainly of metasediment, quartz monzonite, challis volcanics, and clayey rock (i.e., decomposed volcanics).

3.2.3 Acid Generation Prediction

Both intrusive and metasedimentary rocks have high sulfur content (up to 1.13 and 1.66 percent, respectively). Therefore, in 1990, Cyprus began a study of the potential for AMD generation from the waste rock and tailings, using both static and kinetic test methods. As of late 1991, static testing had been performed on twenty intrusive rock, and 58 metasedimentary rock samples collected from both the lower and upper benches of the pit. For each sample, Cyprus calculated the neutralization potential (NP) and the acid generation potential (AP) to determine the net neutralization potential (NNP) and the NP/AP ratio. The NNP represents the neutralization potential (the tons of calcium carbonate required to neutralize 1,000 tons of waste rock) minus acid generation potential (calculated based on the total sulfur content). According to Cyprus personnel, waste rock with an NP/AP ratio in excess of 3:1 was considered non-acid generating. According to USFS personnel, a NP/AP ratio of at least 5:1 should be required before a material is determined to be non-acid forming (U.S. EPA 1992c).

Static testing of eight intrusive rock samples from the lower benches of the pit, close to the ore zone, yielded an average net neutralization potential (NNP), and neutralization ratio (NP/AP) of 0.53 and 1.88:1, respectively. These results exhibited more AMD potential than the average NNP (4.93) and average NP/AP (3.80:1) values obtained from 12 intrusive rock samples from the upper bench. They indicate a greater potential for AMD with intrusive waste rock in the vicinity of the ore zone. The AMD potential decreased with distance from the ore zone. The difference between intrusive rock samples collected from the upper and lower benches was believed to be caused by a relatively predictable pattern of mineralization and alteration zoning around the ore body.

According to Cyprus, the metasedimentary rocks did not appear to be sources of AMD. Cyprus has performed static testing on the metasedimentary rock in the lower benches and found average NNP and NP/AP values of 24.95 and 3.11:1, respectively. It should be noted that, while the metasedimentary rocks are considered non-acid forming by Cyprus (NP/AP greater than 3:1), the average NP/AP ratio is less than the minimum (5:1) ratio suggested by the USFS. Metasedimentary rock samples obtained from the upper benches showed average NNP and NP/AP values of 19.02 and 8.52:1, respectively. Though the average

NNP value did not increase in samples from the upper bench, the NP/AP ratio increased significantly, supporting the theory that AMD potential decreases with distance from the ore zone.

Kinetic testing of intrusive and metasedimentary rock was ongoing in 1991 for those static test samples showing acid generating potential. Results of these tests were to be incorporated into the AMD study as they became available.

3.2.4 Tailings

During the ongoing acid drainage study, indications of acid generation were found in the tailings. As of late 1991, the tailings impoundment covered a total of approximately 150 acres with the embankment covering about 60-70 acres and the tailings pond behind the embankment approximately 90 acres. According to Cyprus personnel, tailings oxidation to a depth of several feet had been evident for over two years (U.S. EPA 1992c).

3.2.5 Acid Generation Prediction

In October 1990, ten hollow stem auger borings were completed in the tailings embankment. Samples collected from the these borings were subjected to humidity cell testing, and showed that the average sulfur content of the tailings sands was 0.79 percent and the pH ranged from 3.5 to 7.3 s.u. (Analyses of tailings sands have shown pH levels as low as 3.0 s.u.) In addition, of eight samples tested, six produced elevated iron and sulfate concentrations, and associated increased acidity, within a 15-week test period. The kinetic tests affirm the reactive nature of the tailings found in static test results.

According to Cyprus personnel, the tailings pond and the seepage return pond were not a problem (pH > 5.7 s.u.). However, in 1991, Cyprus conducted a water quality trend analysis for six surface water quality monitoring locations in the tailings impoundment area. These locations included the main drain of the rock toe, springs located on the left and right abutments of the rock toe, the discharge from the rock toe, the sump below the seepage return pond dam, and Bruno Creek (immediately downstream of the sump). This analysis found that during the period 1981-1990, (1) pH decreased at four locations (but not at the left and right abutment springs), (2) sulfate had increased at all locations, (3) iron had increased at four locations (not at the left and right abutment springs), and (4) no trends in zinc, copper, or arsenic were recognized. The increase in sulfate concentrations was attributed to tailings oxidation and acid generation.

3.2.6 Treatment

Cyprus applied trisodium phosphate (TSP) to tailings embankment sand to address the AMD problem. Previous column testing had found that TSP addition increased the pH, and reduced iron concentrations in leachate samples. According to Cyprus's consultant, two TSP tests, humidity cell tests and large scale tests, were being conducted in 1991 to determine TSP's effectiveness in controlling AMD from the embankment, and maintaining impoundment water quality. However, because the tailings impoundment unit has no

discharge and water from the impoundment, seepage return pond, and pump back system is returned to the mill, the TSP application were expected to cause elevated phosphorus levels in the reclaim water. Cyprus personnel indicated these levels may adversely affect flotation operations and that this issue was being studied.

Cyprus' original plan for reclamation of the tailings impoundment indicates that Cyprus initially anticipated that water quality standards could be met by diluting impoundment seepage with natural runoff. No water treatment beyond sediment control was expected to be required. However, the original reclamation plan did not consider the AMD issue. According to Cyprus personnel, the AMD problem could extend well beyond the life of the mine and perpetual care/treatment may be necessary. Therefore, Cyprus was evaluating remedial alternatives (other than perpetual care) and was preparing to submit a revised tailings pond reclamation plan (as a modification to their operating plan).

Alternatives to be considered included installing an additional flotation unit to remove pyrite and/or in-place treatment of tailings with trisodium phosphate as a buffer. Preliminary flotation tests have been conducted to investigate the possibility of removing sulfides from the tailings prior to disposal in the impoundment. Test results indicated that a high percentage of pyrite may be recovered. Limited static testing performed on a whole tailings sample from which pyrite was recovered indicated a NP/AP ratio in excess of 4:1 compared to an average value of 0.84:1 for all tailings analyses.

According to Cyprus personnel, oxidation had only been found to occur in the top two to three feet of tailings (despite the results of analyses of the 1990 borehole samples that showed oxidation at all depths down to 150 feet). Therefore, an additional alternative under consideration was to encapsulate the tailings. Information on specific types of cover materials was not provided. Additionally, Cyprus was investigating the potential use of wetlands treatment.

3.3 LTV Steel Mining Company, The Dunka Site, Minnesota

3.3.1 Introduction

EPA visited the LTV's Dunka site in August 1991 (U.S. EPA 1992d). The site is located approximately 20 miles northeast of LTV Steel Mining Company's (LTV SMCo.) Hoyt Lakes facility. The site is on private, State, Bureau of Land Management, and U.S. Forest Service lands; LTV SMCo. holds surface and mineral leases for the area. The Dunka pit is part of the eastern-most extension of the Biwabik iron formation and is one of the smaller pits on the Mesabi Range at three miles in length. Although additional material may be removed from the pit for beneficiation, in 1991, plans called for no further exploration activity at the site or enlargement of the pit.

3.3.2 The Acid-Generating Duluth Complex

The taconite ore at the Dunka site contacts Duluth Complex material (DCM), which must be removed to reach portions of the taconite ore deposit. The Duluth Complex is a sulfur-containing, mafic intrusive rock unit, considered to be one of the largest known sources of copper and nickel resources. As of late 1991, LTV SMCo. had removed and placed in "gabbro" stockpiles approximately 50 million tons of Duluth Complex material containing an average of more than 0.2 mass percent copper oxides and/or 0.05 mass percent nickel oxides as gabbro stockpiles.

The remaining Duluth Complex material stockpiles were categorized as waste rock stockpiles and are made up of material containing less than 0.2 percent copper oxide and less than 0.05 percent nickel. Since these waste rock stockpiles were constructed in 1976, monitoring of drainage from the piles has revealed a decrease in pH levels, as well as an increase in trace metal concentrations. Copper and nickel concentrations as high as 1.7 and 40 mg/L, respectively, were observed in seepage/runoff from Duluth Complex waste rock stockpiles at the site. In addition, during sampling conducted by the Minnesota Department of Natural Resources between 1976 and 1980, pH values as low as 5.0 at Seep 1 were reported.

3.3.3 Acid Rock Drainage Prediction Methods

To address this drainage, the Minnesota Department of Natural Resources in conjunction with LTV SMCo., constructed full scale test piles of the Duluth Complex material to monitor its acid generation potential. The MDNR continues to monitor the test piles and study acid generation. Lapakko (1988) conducted kinetic tests of Duluth Complex material using a humidity cell. Nine samples were selected from core material and one sample from a test stockpile. This experimental method was selected based on ongoing field test results, which demonstrated a strong correlation between sulfur content, trace metal mobility, and acid production. Laboratory scale tests provided better control and simplified analysis. Sulfur content was identified as the independent variable. Samples that had variable sulfur content were selected. Part of the study was to determine the feasibility of extrapolating laboratory results to operational conditions.

Each cell was loaded with 75 gram rock samples passing 100 mesh but less than 270 mesh. Samples were rinsed with 200 ml of distilled-deionized water, which was allowed to remain in contact with the sample for five minutes. Rinse water was collected and filtered through a 45 micron filter. At the beginning of the experiment, the samples were rinsed five times to remove oxidation products generated during sample preparation. Two rinses were used each week during the remainder of the experiment. Between the weekly rinsings, the samples were stored in a box fitted with temperature and humidity controls.

The laboratory study found that drainage pH decreased as the sulfur content of the sample increased. Drainage pH also decreased as the experiment time increased. Both of these findings are consistent with field observations on pH variation correlated with sulfur content and time. Based on the data, Lapakko (1988) concluded that the small particles (<2.0 mm) have a large influence on field stockpile drainage quality. The weighted average sulfur content for particles in this fraction is 1 percent compared to 0.6 percent in the bulk

rock. Most of the sulfur occurs as pyrrhotite. The higher sulfur content combined with the higher surface area of these particles make this fraction susceptible to more intense oxidation reactions.

3.3.4 Environmental Risks

Toxicity testing of the leachate showed that copper and nickel concentrations exceeded the 48-hour lethal concentration (LC50) for *Daphnia pulicaria*; nickel concentrations also exceeded the 96-hour LC50 for fathead minnow. Concentrations of calcium, magnesium, and sulfate in the stockpile drainage were also elevated. According to LTV SMCo., there was some question whether the metals were the toxic agent.

Most of the seepage from waste rock piles at the Dunka site has historically been discharged to Unnamed Creek. Unnamed Creek flows into Bob Bay, a part of Birch Lake. In a 1976-1977 study of trace metals in Bob Bay, it was found that concentrations of copper, nickel, cobalt, and zinc in the waters of the Bay were higher than the regional average concentrations and decreased with distance from the mouth of Unnamed Creek. Elevated metal concentrations were also observed in the sediments, as well as in aquatic plant and clam tissue. In the study, it was estimated that the total discharge from the Dunka watershed into Bob Bay through Unnamed Creek was 500 million gallons per year. Unnamed Creek contributes more than 90 percent of the trace metals load to Bob's Bay. Annual loading is over one ton of nickel. Less than 40 percent of this nickel load was found to be removed from the system through natural lake processes. According to LTV SMCo., carbon dating of sediment samples from Bob Bay indicates significant metal concentrations which predate mining.

3.3.5 Treatment

As of late 1991, the State and LTV SMCo. were working to develop technologies to mitigate leachate generation and release of trace metals associated with stockpile drainage. The technologies being tested and employed included pile capping/channeling to limit infiltration, active treatment in a neutralization pond to lower pH and remove metals, and use of artificial wetlands to remove metals. The ultimate goal was a passive treatment system that would require little or no maintenance (U.S. EPA 1992d).

3.4 California Gulch

The California Gulch NPL site is located in the upper Arkansas River Valley in Lake County, Colorado. It is bounded by the Arkansas River to the west and the Mosquito Mountains to the east, and is approximately 100 miles southwest of Denver. The study area for the remedial action encompasses approximately 15 square miles, and includes California Gulch and the City of Leadville. California Gulch is a tributary of the Arkansas River. Mining for lead, zinc, and gold has occurred in the area since the late 1800's. This site was added to the NPL in 1983 (U.S. EPA, 1991).

A Remedial Investigation conducted by EPA in 1984 indicated that the area is contaminated with metals (including cadmium, copper, lead, and zinc migrating from numerous abandoned and active mining

operations). A primary source of the metals contamination in the Arkansas River is acid-mine drainage from the Yak Tunnel into California Gulch. The Yak Tunnel was built to drain the mine workings in the area of California Gulch. The acid dissolves and mobilizes cadmium, copper, iron, lead, manganese, zinc, and other metals. The tunnel and its laterals and drifts collect this metal-laden acidic water, and drain it to the tunnel portal. The tunnel drains into California Gulch and then to the Arkansas River. The Yak Tunnel's discharge contributes to the contamination of California Gulch, the Arkansas River, and the associated shallow alluvial ground-water and sediment systems. From previous investigations and sampling data, it was concluded that, as of the early 1980's, the Yak Tunnel discharged a combined total of 210 tons per year of cadmium, lead, copper, manganese, iron, and zinc into California Gulch, which is biologically sterile (U.S. EPA 1991). Results of acid generation predictive tests of tailings and waste rock samples were not available for this report.

3.5 Clear Creek/Central City

The Clear Creek/Central City NPL site is located approximately 30 miles west of Denver, Colorado, and includes the Clear Creek mainstem and the North and West Forks of Clear Creek. Active operations, which began in 1859, include gold, silver, copper, lead, molybdenum, and zinc mining. Initial investigations at the site focused on the discharges of Acid Mine Drainage (AMD) and milling and mining wastes from five mines/tunnels in the Clear Creek and North Clear Creek Drainages. The five mines/tunnels of interest are: (1) the Argo Tunnel; (2) the Big Five; (3) the National Tunnel; (4) the Gregory Incline; and (5) the Quartz Hill Tunnel. The first two are portals along Clear Creek and the last three are in the North Clear Creek Drainage. They are close to the Cities of Idaho Springs, Black Hawk, and Central City. Associated with the AMD is contamination of surface drainages by metals in solution such as cadmium, chromium (VI), lead, manganese, nickel, and silver (U.S. EPA 1991).

Acid/base potentials, similar to acid/base accounting, of waste materials were tested as part of the Remedial Investigation. The acid/base potentials (NNP) were calculated as the neutralization potential (NP) minus the potential acidity (AP). Results indicated that waste materials at the Gregory Incline, the Quartz Hill Tunnel, and the Argo Tunnel have the capacity to generate large quantities of acid leachate. The mill tailings at the Gregory Incline are especially capable of producing acid through the oxidation of large quantities of pyrite. For example, the average acid potential for the Gregory Incline mill tailings was -21.5, the waste rock was 1.7, and the alluvium was 11.6 (a negative acid/base potential indicates acid forming potential). In the waste rock and alluvium, 11 of 18 and 2 of 13 samples showed acid forming potential. Information on the types of sampling and analytical methods used was not available.

The City of Blackhawk, with guidance from EPA, is requiring, through a city ordinance, acid generation potential testing of onsite materials prior to any development activities. Central City is in the process of doing the same. The ordinance requires that, for any excavation or site development, a sample collection plan that includes chemical analysis of acid-base potential must be prepared. The ordnance requires that the tests conform to the methods outlined in EPA-670/2-74-070, *Mine Spoil Potential for Soil and Water Quality or an equivalent method*, and that sampling must be representative of the conditions at the property. If the

acid/base potential is negative, the applicant must have a mitigation plan approved by the city (Fliniau, 1993).

3.6 Iron Mountain Mine

The Iron Mountain Mine is a 4,400-acre NPL site in Shasta County, California, approximately nine miles northwest of the City of Redding. Between 1865 and 1963, the area was used for the mining and processing of copper, silver, gold, zinc, and pyrite. In 1983, Iron Mountain Mine was added to the NPL. Acid mine drainage, leaching from both the underground mine workings and from the tailings piles located at the site, is causing zinc, cadmium, and copper contamination of the Spring Creek Watershed and the Sacramento River. Environmental damage is primarily in the Sacramento River and tributaries in the Spring Creek and Flat Creek watersheds, where fishery productivity loss and periodic fish kills have been observed. Drinking water drawn from the Sacramento River for the City of Redding (population 50,000) is also threatened (U.S. EPA 1991).

In general, acid mine drainage generation is seasonal and is accelerated during periods of heavy rainfall. According to EPA, the annual average rate of acid mine drainage at the site is 100 gallons per minute (gpm) with peak flows of 300 to 600 gpm. The average loading per day to the Spring Creek Watershed from Iron Mountain Mine is 423 lbs of copper, 1,466 lbs of zinc, and 10.4 lbs of cadmium (U.S. EPA 1991, Biggs 1991).

According to the Remedial Project Manager acid generation potential tests were conducted while the tunnels were being mucked out. The procedures used are those required by California State law. Information on test results and sampling and analytical methods used was not available (Hyman 1993 and Sugarek 1993).

3.7 Silver Bow Creek/Butte Area Site

The Silver Bow Creek/Butte Area NPL site is one of four separate but contiguous Superfund Sites located along the course of the Clark Fork River in southwestern Montana. The Silver Bow Creek/Butte Area Superfund Site is the largest (450 acres) and most complex of the four sites. The site was listed on the NPL in 1983. The Silver Bow Creek/Butte Area site includes the Cities of Butte and Walkerville (population 38,000), the Berkeley Pit (a nonoperating open-pit copper mine); numerous underground mine workings; the Continental Pit (operated by Montana Resources); Silver Bow Creek; Warm Springs Ponds (mine tailings); and Rocker Timber Framing and Treating Plant.

In the early 1980s the Berkely Pit open pit mine was closed and dewatering pumps were shut down. As a result, the interconnected underground workings and the open pit began filling with water. EPA is concerned with the waters filling Berkeley Pit because they are highly acidic (the RI shows pH values ranging between 2.5 and 3.3, depending upon at what depth the samples were taken) and contain high concentrations of copper, iron, manganese, lead, arsenic, cadmium, zinc, and sulfates. If the water continues to rise in the Berkeley Pit, contaminated water may eventually flow into shallow ground water (alluvial aquifer) and into

Silver Bow Creek, creating the potential for significant environmental impacts and human health problems (U.S. EPA 1991). There have been no tests performed to predict pH changes either in Berkely Pit or the drainages that feed the Berkely Pit (Forba 1993). Total acidity has been tested for some samples collected at the Silver Bow Creek site. Information on the materials sampled, analytical methods, and results were not available.

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CROWELL & MORING LLP
1001 PENNSYLVANIA AVENUE, N.W.
WASHINGTON, D.C. 20004-2595
(202) 624-2500
FACSIMILE (202) 628-5116

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FAX TELEPHONE NUMBER: (202) 628-5116

Date: April 24, 2000

To: Renea Ryland, Esq.

Firm: U.S. EPA Region 6
Office of Regional Counsel

Facsimile Telephone Number: 214-665-2182

Total Number of Pages (*Includes Cover Sheet*): 4

From: Richard E. Schwartz, Esq. **Phone:** 202-624-2905

Message: See attached.

Hard Copy to Follow: ☐ Yes ☒ No

Recommended Changes to NPDES Language

Fact Sheet

1. The first paragraph of EPA's Fact Sheet language should be revised as follows:

> Seeps of waters in mine impacted areas to surface waters have been an issue throughout the United States. When exposed to oxygen and precipitation, ~~unconsolidated waste rock~~ sulfide minerals at mines often ~~has~~ have the potential to produce acid ~~rock~~ mine drainage. Such drainage consists of low pH water which can contain high concentrations of metals. In many cases acid ~~rock~~ mine drainage flows into ground water which is hydrologically connected to surface waters. Seep like discharges can then result which heavily impact surface waters.

(Acid mine drainage can come from any sulfide mineral, not only from waste rock. The source of the acidic drainage at Questa is currently a subject of disagreement.)

2. EPA should eliminate the reference to the LAC Minerals case. That court held that the seeps at issue were *not* point sources. LAC Minerals, 892 F. Supp. 1333, 1359 (D.N.M. 1995).

EPA should delete the discussion of the LAC settlement for two reasons. First, in that case (unlike here) the ARD at issue was actively collected by LAC. Second, the settlement does not indicate (as the language implies) that LAC agreed that the Clean Water Act applied to the ARD at issue. The settlement program did not implement the Clean Water Act at all, but rather the New Mexico Mining Act and the New Mexico Water Quality Act.

3. The next paragraph (which follows the discussion of the LAC settlement) should be revised as follows to better describe Molycorp's proposal:

> At Molycorp's Questa mine, pollutants resulting from mining activities may have the potential to be discharged to surface waters of the United States, through a direct hydrologic connection. In order to prevent this type of potential discharge, Best Management Practices (BMPs) are proposed to be required by the permit. The proposed BMPs, which are described in detail in the draft permit, consist of ~~a combination of~~ french drains and possibly ground water withdrawal wells to intercept ground water at seeps located just upstream of the mouth of Capuline Canyon and near the mouth of Goathill Gulch. The water collected by the interception systems ~~will~~ may be pre-treated to increase the pH and then pumped into the tailings pipeline

and sent to the tailings ponds located west of Questa, or could be pumped to the mine for use as process water. When installed, the seepage interception systems described in the permit will prevent the potential discharge of process related pollutants, or pollutants from natural sources, or both, to the Red River.

4. The final paragraph should be revised to more precisely describe the prohibition, and to provide for unavoidable delays.

The draft permit contains detailed descriptions of the seepage interception systems required as best management practices. It also includes corresponding language which will prohibit the discharge of ~~process related~~ pollutants traceable to point source mining operations, except in trace amounts. EPA has determined that installation and operation of the interception system will sufficiently eliminate the potential ~~to~~ for such discharges ~~mine related pollutants and will meet~~ to comply with the proposed permit's prohibition. A compliance schedule of one year has also been included in the permit to allow time to construct the seepage interception system. One year should be a sufficient amount of time to construct the system and bring it into operation. EPA recognizes, however, that the proposed interception system is not on Molycorp property, but on a state highway right-of-way and on National Forest land. Accordingly, under the proposed permit EPA may extend the one-year deadline if it cannot be met due to delays in obtaining agency approvals despite Molycorp's good faith efforts. Similarly, Molycorp may propose alternative interception measures if, despite its good faith efforts, its inability to obtain agency approval precludes installation or operation of all or part of its proposed system. Molycorp may also propose additional interception measures to EPA at any time.

Permit Language

The permit language should be modified to more precisely define the prohibition, as follows:

PART I.

The discharge of pollutants ~~from~~ traceable to point source mine operations through a hydrologic connection to the Red River shall be prohibited except in trace amounts. See PART II.A. of this permit.

PART II.

A. BEST MANAGEMENT PRACTICES

The permittee shall install the following seepage interception and management system to comply with the prohibition against ~~prevent~~ the discharge to the Red River of ~~mine related~~ pollutants traceable to point source mine operations ~~to the Red River~~ except in trace amounts. Implementation of these Best Management Practices (described below) is considered compliance with ~~this permit's~~ this prohibition (set forth in Part I). ~~of the discharge of pollutants from mine operations, including waste rock piles, through a hydrologic connection to the Red River.~~

***** Add Design Description Here *****

TABLE 2
OUTFALL 002 DATA FROM HISTORICAL DISCHARGE MONITORING REPORTS
JANUARY 6, 1998

DATE	MANGANESE (tot.)				MOLYBDENUM (tot.)				SILVER (tot.)				VANADIUM (tot.)			
	(lb/day)		(mg/l)		(lb/day)		(mg/l)		(lb/day)		(mg/l)		(lb/day)		(mg/l)	
	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.
2/1/85			1.20	1.30	9.00	12.00	2.30	2.60								
3/1/85			1.40	1.50	8.40	12.00	2.17	2.83								
4/1/85			1.38	1.48	10.80	12.10	2.42	2.63								
1/1/96	4.00	4.20	1.85	1.90	5.00	5.30	2.30	2.40	0.022	0.022	<0.01	<0.01	0.022	0.022	<0.01	<0.01
2/1/96	3.95	4.11	1.84	1.90	4.80	4.97	2.24	2.30	0.021	0.021	<.010	<.010	0.021	0.021	<.010	<.010
3/1/96	4.01	4.19	1.90	2.00	4.97	5.05	2.35	2.40	0.021	0.021	<.010	<.010	0.021	0.021	<.010	<.010
4/1/96	3.92	4.06	1.93	2.00	5.04	5.25	2.48	2.60	0.021	0.021	<.010	<.010	0.021	0.021	<.010	<.010
5/1/96	3.56	3.70	1.76	1.80	5.14	5.25	2.54	2.61	0.020	0.020	<.010	<.010	0.020	0.020	<.010	<.010
6/1/96	3.89	3.95	1.91	1.93	4.88	5.03	2.40	2.46	0.021	0.021	<.010	<.010	0.021	0.021	<.010	<.010
7/1/96	4.32	4.48	1.97	2.03	5.44	5.60	2.48	2.54	0.021	0.021	<.010	<.010	0.021	0.021	<.010	<.010
8/1/96	4.21	4.47	1.91	1.95	5.63	5.90	2.55	2.63	0	0	<.002	<.002	0.022	0.022	<.010	<.010
9/1/96	4.15	4.29	1.86	1.87	5.52	5.61	2.47	2.50	0	0	<.002	<.002	0.022	0.022	<.010	<.010
10/1/96	2.84	3.95	1.90	1.90	4.58	4.97	2.45	2.50	0	0	<.002	<.002	0.021	0.021	<.010	<.010
11/1/96	3.24	3.35	1.82	1.90	4.50	4.65	2.52	2.60	0	0	<.002	<.002	0.018	0.018	<.010	<.010
12/1/96	3.19	4.54	1.60	1.60	4.84	7.38	2.38	2.50	0	0	<.002	<.002	0.020	0.020	<.010	<.010
1/1/97	4.43	4.54	1.58	1.61	6.28	6.98	2.24	2.29	0	0	<.002	<.002	0.028	0.028	<.010	<.010
2/1/97	4.55	4.66	1.78	1.86	5.89	6.08	2.31	2.43	0	0	<.002	<.002	0.028	0.028	<.010	<.010
3/1/97	4.62	4.80	1.82	1.91	6.09	6.23	2.39	2.48	0	0	<.002	<.002	0.025	0.025	<.010	<.010
4/1/97	4.56	4.71	1.74	1.76	6.32	6.51	2.41	2.43	0	0	<.0005	<.0005	0.027	0.027	<.010	<.010
5/1/97	4.26	4.49	1.65	1.73	6.02	6.26	2.33	2.41	0	0	<.0005	<.0005	0.013	0.013	<.005	<.005
6/1/97	4.35	4.41	1.70	1.75	6.30	6.84	2.46	2.50	0	0	<.0005	<.0005	0.013	0.013	<.005	<.005
7/1/97	4.23	4.46	1.72	1.80	5.96	6.44	2.40	2.60	0	0	<.0005	<.0005	0.025	0.025	<.010	<.010
8/1/97	4.15	4.28	1.65	1.70	5.77	6.01	2.30	2.40	0	0	<.002	<.002	0.025	0.025	<.010	<.010
9/1/97	4.09	4.11	1.60	1.60	6.06	6.36	2.38	2.50	0	0	<0.002	<0.002	0.025	0.025	<0.010	<0.010
10/1/97	4.57	5.47	1.58	1.80	6.07	6.68	2.10	2.20	0	0	<0.002	<0.002	0.028	0.028	<.010	<.010

$n = 25$ $\bar{x} = 1.72$ $\bar{x} = 1.78$ $\tilde{x} = 1.71$
$s = 0.19$ 0.18
$\bar{x}_{95} = 2.05$ $x_{95} = 2.09$
$CV = 0.11$ $CV = 0.1$

Manganese (mg/l)

	$\bar{x}$	max		$(x_i - \bar{x})/s$
7-00	1.2	1.3		-1.043
6-00	1.18	1.3	n = 24	-1.13
5-00	.93	.99	t = 1.701	-2.217
4-00	.93	1.00		-2.217
3-00	1.20	1.30		-1.043
2-00				~~-0.39~~
1-00	1.35	1.40		-0.39
12-99	1.40	1.50		-0.174
11-99	1.50	1.70		0.26
10-99	1.42	1.60		-0.087
9-99	1.38	1.40		-0.26
8-99	1.38	1.39		-0.26
7-99	1.36	1.60		-0.348
6-99	1.40	1.50		-0.39
5-99	1.35	1.40		-0.39
4-99	1.22	1.27		-0.957
3-99	1.37	1.79		-0.30
2-99	1.50	1.53		0.26
1-99	1.36	1.50		-0.348
12-98				~~0.174~~
11-98	1.48	1.50		0.174
10-98	1.50	1.60		0.26
9-98	1.58	1.60		0.609
8-98	1.73	1.80		1.26
7-98	1.74	1.80		1.3
6-98	1.74	1.80		1.3
5-98	1.68	1.70		1.04
4-98	1.76	1.80		1.39
3-98	1.73	1.80		1.261
2-98	1.65	1.80		0.913
1-98	1.78	1.80		1.48

$\bar{x} = 1.44$ $\qquad$ $\bar{x} = 1.53$

$s = 0.23$ $\qquad$ $s = 0.234$

$s^2 = 0.053$ $\qquad$ $s^2 = 0.054$

$\bar{x} + t_{\alpha(2),\nu}\, s_{\bar{x}}$

$\bar{x}_{95} = 1.83$ $\qquad$ $x_{max_{95}} = 1.92$

$CV = 0.16$ $\qquad$ $CV = 0.153$

No. 5505 Engineer's Computation Pad ALVIN

		Ranked	x_{ℓ_i}	$\bar{x}_\ell$	$\bar{x}_\ell - x_{\ell_i}$	$(\bar{x}_\ell - x_{\ell_i})^2$	Rank α_i
66	~~7.38~~	2.75	1.0116	1.8492	-.8376	0.7016	96
67	~~4.75~~	2.8	1.0296		-0.8196	0.6718	93
68	~~5.5~~	3.03	1.10856		-0.7407	0.5486	90
69	~~6.9~~	3.3	1.1939		-0.6553	0.4295	87
~~70~~	~~3.68~~	3.38	1.21788		-0.6314	0.3986	84
71	~~2.75~~	3.48	1.247		-0.6022	0.3627	81
72	~~3.3~~	3.58	1.2754		-0.5738	0.3293	78
73	~~3.03~~	3.68	1.3029		-0.5463	0.2985	75
74	~~3.48~~	3.83	1.3429		-0.5063	0.2564	72
75	~~3.58~~	4.5	1.504		-0.3452	0.1192	69
76	~~4.5~~	4.58	1.5217		-0.3275	0.1073	66
77	~~3.38~~	4.75	1.558		-0.2912	0.0848	63
78	~~2.8~~	4.85	1.579		-0.2702	0.073	60
79	~~4.58~~	5.5	1.7047		-0.1445	0.021	57
80	~~4.85~~	5.7	1.74		-0.1092	0.0119	54
81	~~3.83~~	6.05	1.8		-0.0492	0.00243	51
82	~~11.05~~	6.48	1.8687		0.0195	0.000378	48
83	~~6.48~~	6.9	1.9315		0.0823	0.00677	45
84	~~7.75~~	7.38	1.9988		0.1496	0.0224	42
85	~~6.05~~	7.65	2.0347		0.1855	0.0344	39
86	~~9.35~~	7.75	2.0477		0.1985	0.0394	36
87	~~10.75~~	8.68	2.161		0.3118	0.0972	33
88	~~8.93~~	8.88	2.1838		0.3346	0.11196	30
89	~~7.85~~	8.93	2.1894		0.3402	0.1157	27
90	~~5.7~~	9.35	2.2354		0.3862	0.14915	24
91	~~12.5~~	10.75	2.375		0.5258	0.2765	21
92	~~11.25~~	11.05	2.4024		0.5532	0.306	18
93	19.75	11.25	2.4204		0.5712	0.3263	15
94	~~17.25~~	12.5	2.5257		0.6765	0.4576	12
95	~~11~~	17	2.8332		0.984	0.968	9
96	~~8.68~~	17.25	2.8478		0.9986	0.9972	6
97	~~8.88~~	19.75	2.9832		1.134	1.2859	3
						9.6115	

$s_\ell^2 = 0.3$ $\quad s_\ell = 0.548$

$\bar{x}_\ell - s = 1.3$ $\quad \bar{x}_\ell + s = 2.397$

7.05

$\bar{x} = 7.416$ $\quad s = 4.43$ $\quad \delta = 0.4712$ $\quad p = 0.464$ $\quad T = 1/p = 2.154$

$x_i = 6$ $\quad \delta = 0.167$ $\quad p = 0.57$ $\quad T = 1.75$

No. 5505 Engineer's Computation Pad
ALVIN

Nicholas Ceto

09/05/00 02:52 PM

To: Js Wilson/R6/USEPA/US@EPA

cc:

Subject: Re:

Scott, I think french drains can work under the right site specific circumstances, but there are times when they don't. I have seen french drains, sumps, ponds, open channels, and recovery wells all used with varying degrees of success. I think to come up with a good system you might want to do a bit of work to evaluate site specific soils, geology and hydrology, that way you can maximize your chances for success. Also, downgradient monitoring of surface and groundwater can be used to evaluate how successful your efforts have been. Nick

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
ALLIED BANK TOWER AT FOUNTAIN PLACE
1445 ROSS AVENUE
DALLAS, TEXAS 75202

August 4, 1987

FACT SHEET

for proposed National Pollutant Discharge Elimination System (NPDES) Permit No. NM0022306 to discharge to waters of the United States.

Issuing office: U. S. Environmental Protection Agency
Region VI
Allied Bank Tower
1445 Ross Avenue
Dallas, Texas 75202-2733

Applicant: Molycorp, Inc.
P.O. Box 469
Questa, New Mexico 87556

1. The applicant currently operates a molybdenum mining and milling operation.

2. As described in the application, the plant site is located in Taos County, New Mexico. Discharge is to the Red River in Segment No. 2-120 of the Rio Grande Basin.

3. The known uses of the receiving waters are: coldwater fishing, fish culture, livestock and wildlife watering, and secondary contact recreation.

4. Stream standards are: the general and specific stream standards are provided in "Water Quality Standards for Interstate and Intrastate Streams in New Mexico", New Mexico Water Quality Control Commission, February 15, 1985.

5. The following is a quantitative description of the discharge described in the application:

a.

Outfall	Flow Frequency	Avg/Daily (MGD)	Max/(MGD)	Min/(MGD)
001	Intermittent	3.31	4.32	N/A
002	Intermittent	N/A	0.61	N/A

b.

Outfall	Temp. °F Avg/Summer	Temp. °F Avg/Winter	Temp. °F Max	Temp. °F Min
001	N/A	N/A	N/A	N/A
002	N/A	N/A	N/A	N/A

Old Fact Sheet 88

c.

Outfall	Parameter	Effluent Characteristics Daily Avg (mg/l)	Daily Max (mg/l)
001	Chemical Oxygen Demand	30	38
001	Total Suspended Solids	11	29
001	Total Arsenic	N/A	0.56
001	Total Cadmium	<0.01	<0.01
001	Total Copper	N/A	0.04
001	Total Cyanide	0.046	0.046
001	Fluoride	2.90	2.90
001	Total Iron	0.56	0.80
001	Total Lead	N/A	0.18
001	Total Manganese	1.20	1.39
001	Total Mercury	<0.06	<0.06
001	Total Molybdenum	4.13	4.36
001	Total Zinc	0.08	0.14
001	pH	within range of 6.6 to 8.3 S.U.	
002	Chemical Oxygen Demand	8	15
002	Total Suspended Solids	7	20
002	Total Arsenic	<0.04	N.D.
002	Total Cadmium	<0.01	<0.01
002	Total Copper	<0.03	N.D.
002	Total Cyanide	0.004	0.005
002	Fluoride	2.20	2.30
002	Total Iron	0.36	0.54
002	Total Lead	N/A	0.21
002	Total Manganese	1.37	1.42
002	Total Mercury	<0.01	N.D.
002	Total Molybdenum	2.71	2.84
002.	Total Zinc	0.0	0.09
002	pH	within range of 7.1 to 7.8 S.U.	

6. On the basis of preliminary staff review, the Environmental Protection Agency, after consultation with the State of New Mexico, has made a tentative determination to issue a permit for the discharge described in the application.

7. The proposed effluent limitations for those pollutants proposed to be limited are as follows:

See attached draft permit.

8. A brief explanation follows of the express statutory or regulatory provision on which permit requirements are based, including appropriate supporting references to the Administrative Record required by 40 CFR 124.9:

a. NPDES Permit No. NM0022306 reissued to Molycorp on July 5, 1985.

b. Consolidated NPDES application No. NM0022306 received from Molycorp.

c. Ore Mining & Dressing Point Source Category Guidelines, 40 CFR Part 440, dated December 3, 1982.

d. Water Quality Standards for Interstate and Intrastate Streams in New Mexico, WQCC 85-1, dated February 15, 1985.

e. Modification request from Molycorp for reduced monitoring during the period of mill shut down, dated March 6, 1986.

9. The following is an explanation of calculations or other necessary explanation of the derivation of specific effluent limitations and conditions, including a citation to the applicable effluent limitation guideline or performance standard provisions as required under 40 CFR 122.44 and 122.45 and reasons why these are applicable:

A. Outfalls 001 and 002 - Limitations

The following limitations are continued in the permit for the flow weighted average results for Outfalls 001 and 002.

For chemical oxygen demand, limitations of 60 mg/l daily average and 90 mg/l daily maximum have been established under best professional judgment (BPJ) for best available technology economically achievable (BAT).

For total suspended solids, limitations of 20 mg/l daily average and 30 mg/l daily maximum have been applied for best practicable control technology (BPT) under 40 CFR Part 44.102(b) and under BPJ are considered equivalent to best conventional technology (BCT).

Total arsenic limitations of 0.5 mg/l daily average and 1.0 mg/l daily maximum have been applied for BAT under BPJ.

Total cadmium limitations of 0.05 mg/l daily maximum have been applied for BAT under BPJ.

Total copper limitations of 0.15 mg/l daily average and 0.30 mg/l daily maximum have been applied for BAT under Part 440.13(b).

Total cyanide limitations of 0.025 mg/l daily average and 0.05 mg/l daily maximum have been applied for BAT under BPJ.

Fluoride limitations of 3.0 mg/l daily maximum have been applied for BAT under BPJ.

Total iron limitations of 0.6 mg/l daily maximum have been applied for BAT under BPJ.

Total lead limitations of 0.3 mg/l daily average and 0.6 mg/l daily maximum have been applied under Part 440.103(b).

Total manganese limitations of 1.0 mg/l daily average and 1.5 mg/l daily maximum have been applied for BAT under BPJ.

Total mercury limitations of 0.001 mg/l daily average and 0.002 mg/l daily maximum have been applied for BAT under Part 440.103(b).

Total molybdenum limitations of 1.0 mg/l daily average and 2.0 mg/l daily maximum have been applied for BAT under BPJ. In addition, based on a combined flow of 3.0 MGD for Outfalls 001 and 002, mass limitations of 25 lbs/day daily average and 50 lbs/day daily maximum are applied; except the daily average mass limitation is the average for six months preceeding the reporting period end date.

Total zinc limitations of 0.2 mg/l daily maximum is based on BAT under BPJ.

pH limitations within the range of 6.0 to 9.0 S.U. is based on BCT under BPJ.

B. Instream Water Concentration (IWC)

Daily Average Flow

Outfall 001	3.31 MGD
Outfall 002	0.29 MGD
Total	3.60 MGD

7Q10 Stream Flow

25 cfs = 16 MGD

IWC at 7Q10

$$\frac{3.60}{16 + 3.60} = 18.4\%$$

IWC at 1/2 7Q10

$$\frac{3.60}{8 + 3.60} = 31.0\%$$

C. Instream Calculations (ISC)

Dilution Factor = $D_f = Q_r / Qe$
where Q_r = upstream river flow
= 7Q10 = 16 MGD

Qe = effluent flow = 3.60 MGD
D_f = 16/3.6 = 4.44

Instream concentration = $Cr = \frac{QrCu + (QeCe)}{Qr + Qe}$
where Ce = effluent concentration
Cu = upstream river concentration
Cr = downstream river concentration

Parameter/mg/l	Ce	Cu	Cr	MCL	Human Health	Chronic Aquatic Biota	WQS
Arsenic	0.56	N/A	0.103	0.05	N/A	0.048	N/A
Cadmium	<0.01	N/A	<0.002	0.010	0.010	0.00066	N/A
Copper	0.04	N/A	0.007	N/A	N/A	0.0065	N/A
Cyanide	0.05	N/A	0.009	N/A	0.200	0.0052	N/A
Lead	0.18	N/A	0.033	0.050	0.050	0.0013	N/A
Mercury	N.D.	N/A	N.D.	0.002	0.00014	0.0012	N/A
Zinc	0.08	N/A	0.015	N/A	N/A	0.047	N/A

N.D. - not detected

For drinking water supplies, the ISC for arsenic exceeds the MCL. For the receiving stream segment 2-120 of the Rio Grande River Basin, domestic water supply is a designated use. However, no existing water supply intakes are located at or below this point in the stream segment. None of the lower stream segments in the State of New Mexico have domestic water supply as a designated use.

The ISC's do not exceed human health criteria.

No numerical WQS criteria exist. Although the Gold Book criteria for chronic aquatic biota are exceeded by the ISC's, these will be further evaluated in the biomonitoring program.

Therefore, based on above criteria, monthly toxicity tests are required.

D. Biomonitoring

Based on information contained in the permit application, EPA has determined that there may be pollutants present in the effluent(s) which may have the potential to cause toxic conditions in the receiving stream.

Molycorp, Inc.

Questa Division
P.O. Box 469
Questa, New Mexico 87556
Telephone: (505) 586-0212

UNOCAL 76
MOLYCORP

September 13, 1988

RECEIVED
NOV 17 1988
6W-EA

Mr. Robert Layton, Jr.
Regional Administrator
Region VI - Allied Bank Tower
1445 Ross Avenue
Dallas, Texas 75202-2733

Dear Mr. Layton:

Enclosed are the Discharge Monitoring Reports for the month of August, 1988, Permit No. NM0022306. Please be advised that no flow occurred from Outfall 001 for the entire month.

Enclosed with these reports are the test results for the Chronic Bio Monitoring requirements for Outfall 002, page 3, part III, Section D, under our new NPDES permit effective 6/21/88.

On July 25, 1988, samples of the receiving water, (Red River), were submitted to ERT Test Laboratories to determine if any pre-existing instream toxicity existed. Test results of these waters indicated that it was satisfactory with less than 20% mortality. The Bio Monitoring test work for Outfall 002 was scheduled for the week of August 8, through August 14, 1988, using the receiving water as dilution water. However, on subsequent weeks following the testing of our receiving water, unusually heavy rains occurred resulting in heavy loading of silt, soils, and other debris from the surrounding highly acidic, erodable geological scars along both sides of the Red River upstream of Outfall 002. During heavy rains, these scars contribute very high contents of total suspended solids, total dissolved solids, and high concentrations of heavy metals; creating toxic conditions and high oxygen demand of the river.

As a result of this dramatic change in the quality of the river, we felt we could not use the receiving water as dilution water for the test. On August 3, 1988, Mr. Leroy Apodaca of my staff contacted Mr. Fred Humke, Permit Writer, Region VI, Environmental Protection Agency. Mr. Apodaca informed Mr. Humke about the above circumstances. Mr. Humke, upon learning about the circumstances, advised Mr. Apodaca to use reconstituted water instead of the receiving water. Molycorp proceeded with the test the following week.

If you have any questions regarding procedures used, or the waters ultimately used in the testing, please call me at the telephone number listed on first page.

Very truly yours,

David R. Shoemaker

David R. Shoemaker
Mine Manager

cc: N.M. EID Surface
Water Quality
Bureau

files

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE
DALLAS, TEXAS 75202-2733

April 30, 1997

Mr. Brian Shields
Executive Director
Amigos Bravos
P.O. Box 238
Taos, New Mexico 87671

Dear Mr. Shields:

This letter is in response to your FAX of April 21, 1997, to Dr. Oscar Ramirez, Deputy Director of the Water Quality Management Division of the EPA Region 6 office relative to Molycorp, near Questa, New Mexico. You further explained to me the specific issue in our telephone conversation of April 29, 1997.

A review of the record shows that in the permit reissuance dated September 10, 1993, EPA did not consider discharges or seepages associated with mine wasterock piles. You have indicated that these discharges are essentially discrete sources. Issue No. 9 of the associated Response to Comments was concerned with a different and more complex matter related to possible infiltration to existing groundwater sources primarily associated with the tailings areas although possibly to a much lesser extent also associated with the mine.

We hope that this clarifies the matter. If you have further questions, please contact me at (214) 665-7503.

Sincerely,

Frederick O. Humke

Frederick O. Humke, P.E.
Environmental Engineer
Permits Branch (6WQ-P)

RESPONSE TO COMMENTS
FINAL PERMIT DECISION

This is our response to comments received on the subject draft permit in accordance with regulations promulgated at 40 CFR Part 124.17.

Permit No.	NM0022306
Applicant:	Molycorp, Inc. P.O. Box 469 Questa, New Mexico 87556
Issuing Office:	U.S. Environmental Protection Agency Region 6 1445 Ross Avenue Dallas, Texas 75202-2733
Prepared By:	Fred Humke Industrial Permits Section (6W-PI) Permits Branch Water Management Division (214) 655-7180
Permit Action:	Final permit decision and response to comments received on the draft reissued permit publicly noticed on April 17, 1993.
Date Prepared:	

Unless otherwise stated, citations to 40 CFR refer to promulgated regulations listed at Title 40, Code of Federal Regulations, revised as of 7/1/92.

STATE CERTIFICATION

Dated May 27, 1993.

The following effluent limitations and/or conditions are included in the final permit in conformance with regulations listed at 40 CFR Part 122.44(d)(3):

ISSUE No. 1

As conditions of certification, the NMED has specified revised values for Cs (water quality standards based on a hardness of 132 mg/l and a TSS of 59 mg/l) and Ca (ambient stream concentration upstream of discharge based on methodolgy specified by the NMED in a new interim guidance document dated May 3, 1993) to be used in the screening for and the calculation of State water quality standard effluent limitations.

RESPONSE NO. 1

This draft permit was public noticed on April 17, 1993, prior to the revised interim guidance. All permit water quality effluent limitations, as addressed on Page 7 of 10 of the Fact Sheet, issued to Public Notice on April 17, 1993, are recalculated as follows:

$$Cd = (QaCa + QeCe')/(Qa + Qe) \text{ and}$$

and $$Ce = [Cs(Qa + Qe) - CaQa]/Qe$$

where Cd = instream waste concentration (mg/l)

Ce = allowable daily average effluent concentration (mg/l)

Ce'= reported concentration in effluent x 2.13 (mg/l)

Cs = water quality standard (mg/l)

Ca = ambient stream concentration upstream of discharge (mg/l)

Qa = critical low flow of stream = 16.7 MGD

Qe = combined daily average flow of dry weather Outfalls 001 and 002

= 4.7 MGD

and Me = Ce x 8.34 x 4.7

where Me = total daily average water quality based mass limits for combined Outfalls 001, 002, 004 and 005 (lb/day)

WQ PARAMETER	Ca	Cs	Ce'	Cd	Ce	Me
T. Arsenic	0.005	0.049	0.022	0.009(*1)	N/A	N/A
T. Cadmium	0.00	0.005	0.036	0.008	0.023	0.90
T. Copper	0.044	0.059	0.155	0.068	0.112	4.39
T. Lead	0.022	0.043	0.214	0.064	0.118	4.63
T. Zinc	0.058	0.595	0.032	0.051(*1)	N/A	N/A
T. Aluminum	2.500	0.087	0.109	1.975	0.087(*2)	3.41
T. Boron	0.00	0.750	0.214	0.047(*1)	N/A	N/A
T. Chromium	0.006	0.546	0.023	0.010(*1)	N/A	N/A
T. Cobalt	0.00	0.050	0.023	0.005(*1)	N/A	N/A
T. Selenium	0.00	0.005	0.009	0.002(*1)	N/A	N/A
T. Vanadium	0.00	0.100	0.064	0.014(*1)	N/A	N/A
Ra226 + Ra228	0.00	30	3.195	0.702(*1)	N/A	N/A
	pCi/l	pCi/l	pCi/l	pCi/l		
T. Beryllium	0.00	0.005	0.009	0.002(*1)	N/A	N/A
T. Mercury	0.00	0.000012	0.0043	0.00000094(*1)	N/A	N/A
T. Nickel	0.00	0.759	0.041	0.009(*1)	N/A	N/A
T. Silver	0.001	0.00012	0.003	0.001	0.00012(*2)	0.005
Chlordane	N/A	0.0000043	0.00009	0.00002	0.00002	0.0008
Un-ion. Amm.(as N)	N/A	0.03	0.0006	0.0001(*1)	N/A	N/A
T. Resid. Chlorine	N/A	0.002	0.023	0.005	0.009	0.35

(*1) Cd<Cs.
(*2) WQS level.

ISSUE NO. 2

As a condition of certification, the NMED specifies that combined biomonitoring should not be conducted for the four permitted outfalls which are spread over approximately 8.75 river miles; and that individual biomonitoring shall be applied at each outfall.

RESPONSE No. 2

The draft permit was based on the discharges of "periodic mine drainage, including collected stormwater" for Outfalls 004 and 005. Subsequently the permittee has specified that the discharges from Outfalls 004 and 005 be limited to stormwater only, as specified in the Form 2D applications; and that "any acid mine drainage will be diverted and retained in the underground mine, where it will be neutralized, pumped from the underground mine to a tailings line and conveyed to the tailings impoundment area." Therefore, Outfalls 004 and 005 are now designated for "periodic mine drainage consisting only of all

mine contacted surface stormwater runoff." Periodic stormwater only discharges are not subject to biomonitoring under EPA post third round policy which is applied to dry weather flows only. Outfalls 001 and 002, which are in close proximity, presently utilize composite biomonitoring under the June 21, 1988 permit as previously certified by the NMED.

However, the NMED has clarified in subsequent correspondence that they require as a condition of certification, that individual biomonitoring be conducted on Outfalls 001, 002, 004 and 005. This change is included in the permit.

ISSUE NO. 3

The NMED has specified as a condition of certification that for SUM2 the mass limitations be expressed as "DAILY MAX" instead of "DAILY AVG" to assure that numeric water quality standards for attainable and designated uses set forth in 2-119 and 3-101 of the WQS are protected at all times, including episodic events such as rainfall and snowmelt.

RESPONSE NO. 3

As specified in the Fact Sheet on Page 6 of 10, Ce has been calculated and addressed as the "allowable daily average effluent concentration." Daily average flows, daily average reported effluent concentrations and average ambient stream concentration have been applied in the development of Ce. While it is analytically correct to sum the daily average mass loads for Outfalls 001, 002, 003 and 004, there is no correlation in the occurence of daily maximum loads. However, the NMED has specified as a condition of certification that these mass limitations be applied as daily maximums at SUM2. EPA has made this change.

ISSUE NO. 4

The NMED requires as a condition of certification that chemical oxygen demand (COD) limits of 125 mg/l be applied for Outfalls 004 and 005.

RESPONSE NO. 4

EPA has applied COD limits of 125 mg/l daily average and daily maximum for Outfalls 004 and 005.

ISSUE NO. 5

The NMED and others have commented that an apparent error exists in the longitude shown for Outfall 004.

RESPONSE NO. 5

The longitude for Outfall 004 is corrected to W105°31'51".

ISSUE NO. 6

The NMED notes that "flow" monitoring for Outfalls 004 and 005 is shown as "estimate" but that a more reliable basis is needed for determining compliance with effluent limits at "SUM2".

RESPONSE NO. 6

EPA agrees. Flow monitoring for Outfalls 004 and 005 is changed to "Measure" via calibrated weir.

ISSUE No. 7

The NMED notes that the description of Outfalls 004 and 005 utilizes the phrase "including collected stormwater." NMED believes that there may be uncollected storm water which may be subject to NPDES regulation and not covered under the proposed permit.

RESPONSE NO. 7

As previously stated, the description of this discharge is changed to "periodic mine drainage consisting only of all mine contacted surface stormwater runoff."

ISSUE NO. 8

Molycorp objects to the application of the effluent limitations set forth in 40 CFR 440 for Outfalls 004 and 005, and, in particular, to the proposed discharge limitation for Total Suspended Solids. Molycorp believes that these Outfalls are subject to EPA's storm water regulations and not to those limitations which apply to process wastewater discharges.

RESPONSE NO. 8

Stormwater which comes in contact with mine products and wastes is process wastewater. This has been clarified in the recent revised description of the sources being discharged at Outfalls 004 and 005. The total suspended solids (TSS) limits required under the effluent guidelines are consistantly achievable by the mining industry when proper sedimentation and control has been applied.

ISSUE NO. 9

Various commenters have expressed concern with ground water seepage to the Red River; and suggest that this ground water may be infiltrated from the mine and tailings areas, in addition to natural sources. Some commenters believe that seepages of this type represent "point sources" under the NPDES permitting program. Several have cited case law such as Sierra Club v. Abstan Construction Co., Inc., 620 F.2d 41 (5th Cir. 1980).

RESPONSE NO. 9

While EPA understands the concern of these commenters for the possible impact of ground water seepage on the Red River, we do not agree that these are "point sources" under the NPDES permitting program. Ground water is regulated by the State through the NMED.

We are familiar with the case law citation which relates to EPA authority to require the construction and control of surface discharges (proscribed "point sources" of pollution) in instances where the operator has not applied the proper control and construction to the sources. However, the issue of seepage of groundwater which may have been infiltrated through porous soil is a different matter. We recommend that the commenters continue to pursue this issue through the NMED.

ISSUE NO. 10

Some commenters raised objections to the inclusion of a compliance schedule for Molycorp to achieve WQS at SUM2.

RESPONSE NO. 10

A compliance schedule is provided in accordance with Section 1-106.D. of Water Quality Standards for Interstate and Intrastate Streams in New Mexico. A three year schedule is considered reasonable by EPA.

ISSUE NO. 11

A commenter questioned the mass limitations allowed under SUM1, based on a daily average flow of 4.726, since Outfall 001 is not currently discharging.

RESPONSE NO. 11

Both Outfalls 001 and 002 are limited by the concentration technology limitations which are continued from the present permit. In addition, mass technology limitations are applied under SUM1. See 40 CFR 122.45(f). Mass limitations are based on the daily average flows shown in the application. The fact that a particular outfall may not be currently discharging does not negate the allowance of full technology limits under the permit.

ISSUE NO. 12

A commenter questioned the fact that certain metals are not limited under SUM2.

RESPONSE NO. 12

Subject to the screening provisions, as addressed on Page 7 of 10 of the Fact Sheet, all applicable WQS parameters are addressed under SUM2.

ISSUE NO. 13

One commenter stated that Outfalls 004 and 005 may be considered "new sources" because they are both 1.) new discharge points and 2.) "new" - as in previously unregulated-sources or mine drainage points; and that demonstration of the technical capability of the new source outfall works must be required before discharges to waters of the United States are permitted.

RESPONSE No. 13

Outfalls 004 and 005 are not new sources. The associated mines have been in operation prior to the 1982 promulgation of the associated new source performance standards. The associated storm water discharges may have been non-permitted outfalls. The facility is not required to demonstrate any technical capability before discharges; but must meet the best available technology economically achievable (BAT)/best conventional technology (BCT) without any permit compliance schedule. Any issues related to the operation and compliance of these outfalls are enforcement matters and beyond the scope of this permit reissuance process.

ISSUE NO. 14

One commenter stated that there are no concentration based limits for manganese and molybdenum associated with Outfall 001 and SUM1; and for cobalt, selenium, beryllium, silver, chlordane and chlorine. This commenter also questions the allowance of mass loads for outfall 001 because it is not currently in operation.

RESPONSE NO. 14

Technology limitations (BAT/BCT) have been established for Outfalls 001 and 002 for many years and are addressed in the present permit. Cobalt, selenium, beryllium, silver, chlordane and chlorine are not technology limitations. The Technology Based Effluent Limitations and/or Conditions are addressed on page

4 of 10, Paragraph VIII.A. of the Fact Sheet. The application daily average flow for Outfall is addressed on Page 1 of 10, Paragraph V.A. of the Fact Sheet.

ISSUE NO. 15

One commenter questions the dilutions used for biomonitoring; states that the "whole effluent toxicity testing" allows too much dilution of mixture for testing; and states that "a mixture of 36% should be used for most tests."

RESPONSE No. 15

The calculation of the critical dilution of 22% is shown on Page 6 of 10, Paragraph VIII.B.3. of the Fact Sheet. The 0.75 dilution series is applied as specified under the most recent EPA toxics policy.

This issue is in contradiction to another issue raised by commenters. The same daily average effluent flows used to calculate loading limits are used to calculate the critical dilution which constitutes the basis for biomonitoring test dilutions. In the first case the application effluent flow limits result in loading limits which are questioned for being too high; in the second case these same application effluent flow limits result in percent dilutions which are questioned for being too low.

ISSUE NO. 18

Several commenters have requested a public hearing on the draft NPDES permit.

RESPONSE NO. 18

The principal issues which are being raised by most commenters are not relevant to the NPDES permit. These issues relate primarily to a possible impact on the Red River from the seepage of ground water. Other issues have been addressed in this respose to comments. Therefore, it is the judgment of the permitting authority that a public hearing is not justified.

Molly corp 6-24-00

spring "13" just upstream of Capulin

mole - capture at Cap-line and Treat and disch.

Good Samaritan law - would it allow a disch. outside 30(d)

- Not take responsibility

- like option to treat and discharge or use in process or piping

30 gpm in spring

No. 5505 Engineer's Computation Pad ALVIN

CALCULATIONS OF NEW MEXICO WATER QUALITY-BASED EFFLUENT LIMITATIONS

Calculations Specifications: Lotus Smartsuite 97 1-2-3 Revised as 8/28/2000

Prepared By: Isaac Chen

STEP 1: REFERENCE IMPLEMENTATION PROCEDURES
INPUT FACILITY AND RECEIVING STREAM DATA
INPUT RECEIVING STREAM POLLUTANT BACKGROUND CONCENTRATION DATA
LIST SOURCE OF DATA INPUT
INPUT EFFLUENT DATA

IMPLEMENTATION PROCEDURES

The water quality standards for Interstate and Intrastate streams of the State of New Mexico are implemented in this fact sheet using procedures established in the "Implementation Guidance for State of New Mexico Standards for Interstate and Intrastate streams", February 23, 2000.

002 Flow = 0.35 MGD
001 Flow = 4.29 MGD

FACILTY	DATA INPUT	
Permittee	Permittee	
NPDES Permit No.	NM0000000	
Outfall No.(s)	001 + 002	
Plant Effluent Flow (MGD)	4.64	For industrial and federal facility, use the highest monthly average flow
Plant Effluent Flow (cfs)	7.192	for the past 24 months. For POTWs, use the design flow.

RECEIVING STREAM		DATA INPUT	
Receiving Stream Name		River	
Basin Name		Basin	
Waterbody Segment Code No.		Segment	
Is a publicly owned lake or reservoir (enter "1" if yes, "0" if no)		0	
Are acute aquatic life criteria considered (1= yes, 0=no)		1	
Are chronic aquatic life criteria considered (1= yes, 0=no)		1	
Are domestic water supply criteria considered (1= yes, 0=no)		0	
Are irrigation water supply criteria considered (1= yes, 0=no)		1	
Livestock watering and wildlife habitat criteria applied to all streams			
USGS Flow Station		USGS Stat.	
WQ Monitoring Station No.		NA	
Receiving Stream TSS (mg/l)		10	For intermittent stream, enter effluent TSS
Receiving Stream Hardness (mg/l as CaCOs)	RANGE: 0 - 400	163	For intermittent stream, enter effluent Hardness
Receiving Stream Critical Low Flow (4Q3) (cfs)		7.05	Enter "0" for intermittent stream and lake.
Avg. Water Temperature (C)		5	

pH (Avg)	7.72		
Fraction of stream allowed for mixing (F)	1	FQa=	7.05
(= 1, if stream morphology data is not available, or for intermittent stream, or pollutants have EPA human health criteria)			

SITE-SPECIFIC CRITERIA		
	Flow Limit (cfs)	100.000
	Chlorides (mg/l)	1.00E+100
	Sulfate (SO4) (mg/l)	1.00E+100
	Total Dissolved Solids	1.00E+100

DATA INPUT

Input pollutant geometric mean concentration as micro-gram per liter (ug/l or ppb) unless other unit is specified for the parameter. (Metals in "total" form)

Value below detection level which is smaller than the minimum quantification level will be counted as "0".
Value reported as "less than" but greater than MQL, the reported value is used.
Value below detection level and reported as "ND" will be counted as "0".

The following formular is used to calculate the Instream Waste Concentration (Cd)

Cd = [(F*Qa*Ca) + (Qe*2.13*Ce)] / (F*Qa + Qe)
Where:
Cd = Instream Waste Concentration
F = Fraction of stream allowed for mixing (see NM Implementation Guidance)
Ce = Reported concentration in effluent
Ca = Ambient stream concentration upstream of discharge
Qe = Plant effluent flow
Qa = Critical low flow of stream at discharge point expressed as the 4Q3

DATA SOURCES:

NPDES Application Form 2C dated 2/7/90.
Memo from Brian McGill to NPDES file dated 7/11/96
Letter from Brian McGill (Permittee) to Isaac Chen (EPA) dated 1/5/99, 1/6/99, and 1/19/99, respectively.
May enter "<" in column D or G if data was report as "less Than".

POLLUTANTS	<" Ambient Stream Conc. Ca (ug/l)	Ca > MQL?	<" Effluent Concentration Ce (ug/l)	Ce > MQL?	Instream Waste Concentration, Cd (ug/l) 2.13* Ce	100% 4Q3	F= 1 or less	MQL
Total Phenols (4AAP)	0	0	0	0	0	0	0	5
Aluminum (T)	3822	3822	70	70	149.1	1967.2397	1967.2397	100
Barium (T)	0	0	26	26	55.38	27.966083	27.966083	100

Boron (T)	0	0	0	0	0	0	0	100
Chlorine Residual (T)	0	0	0	0	0	0	0	100
Chlordane (T)	0	0	0	0	0	0	0	0.2
Cobalt (T)	2.6	2.6	0	0	0	1.2870383	1.2870383	50
Molybdenum (T)	0	0	2229	2229	4747.77	2397.5538	2397.5538	10
Nitrate (as N) (T) (mg/l)	0	0	140	140	298.2	150.5866	150.5866	0.1
Uranium (T)	0	0	0	0	0	0	0	
Radium-226+Radium 228 (pCi/l)	0	0	0.7	0.7	1.491	0.752933	0.752933	
Strontium-90 (pCi/l)	0	0	0	0	0	0	0	
Tritium (pCi/l)	0	0	0	0	0	0	0	
Gross Alpha (pCi/l)	0	0	31.7	31.7	67.521	34.097109	34.097109	
Vanadium	0	0	0	0	0	0	0	50
Antimony	0	0	2	2	4.26	2.1512372	2.1512372	60
Arsenic	0	0	1000	1000	2130	1075.6186	1075.6186	10
Beryllium	0	0	5	5	10.65	5.378093	5.378093	5
Cadmium	2	2	100	100	213	108.55189	108.55189	1
Chromium	0	0	10	10	21.3	10.756186	10.756186	10
Copper	3.5	3.5	300	300	639	324.41813	324.41813	10
Lead	0	0	600	600	1278	645.37116	645.37116	5
Mercury	0	0	0.23	0.23	0.4899	0.2473923	0.2473923	0.2
Nickel	12	12	10	10	21.3	16.696363	16.696363	5
Selenium	0	0	5	5	10.65	5.378093	5.378093	5
Selenium (SO4 >500 mg/l)	0	0	5	5	10.65	5.378093	5.378093	5
Silver	0	0	2	2	4.26	2.1512372	2.1512372	2
Thalllium	0	0	2	2	4.26	2.1512372	2.1512372	10
Zinc	146	146	200	200	426	287.39587	287.39587	20
Cyanide (Amenable to chlorination)	0	0	40	40	85.2	43.024744	43.024744	20
Cyanide (T)	0	0	40	40	85.2	43.024744	43.024744	20
Arsenic, dissolved	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	10
Chromium, dissolved	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	10
Copper, dissolved	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	10
Lead, dissolved	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	5
Nickel, dissolved	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	5
Zinc, dissolved	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	20
Total DDT and metabolites	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	
Total PCBs	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	
Chlorides (mg/l)	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	
Sulfate (mg/l)	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	
Total Dissolved Solids (mg/l)	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	

STEP 2: CALCULATE HARDNESS DEPENDENT CRITERIA

CONVERT DISSOLVED METALS TO TOTAL FORM

This step calculate hardness dependent criteria, then convert these criteria from dissolved form to total form

The following formular is used to convert dissolved metals criteria to total form

Kp = Kpo * (TSS**a) — Kp = Linear partition coefficient; Kpo and a can be found in table below
C/Ct = 1/ (1 + Kp*TSS* 1.0E-6) — TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)
Total Metal Criteria (Ct) = Cr / (C/Ct) — C/Ct = Fraction of metal dissolved; and Cr = Dissolved criteria value

	Stream Linear Partition Coefficient				Lake Linear Partition Coefficient			
Metals	Kpo	alpha (a)	Kp	C/Ct	Kpo	alpha (a)	Kp	C/Ct
Arsenic	480000	-0.73	89380.183	0.5280384	480000	-0.73	89380.183	0.5280384
Chromium	3360000	-0.93	394765.58	0.2021159	2170000	-0.27	1165359	0.079029
Copper	1040000	-0.74	189248.89	0.345723	2850000	-0.9	358793.74	0.2179629
Lead	2800000	-0.8	443770.09	0.1839013	2040000	-0.53	602046.68	0.1424407
Nickel	490000	-0.57	131885.21	0.4312479	2210000	-0.76	384053.98	0.2065885
Zinc	1250000	-0.7	249407.79	0.2861985	3340000	-0.68	697824.91	0.1253408
Silver	2400000	-1.03	223981.03	0.30866	2400000	-1.03	223981.03	0.30866

The following formular is used to calculate hardness dependent criteria

			Dissolved WQC (ug/l)	Total Stream WQC (ug/l)	Total Lake WQC (ug/l)
Cadmium (D)	Acute	e(1.128[ln(hardness)]-3.6867)*CF	7.2393424		
	Chronic	e(0.7852[ln(hardness)]-2.715)*CF	3.2106044		
Chromium (D)	Acute	e(0.819[ln(hardness)]+2.5736)	850.12331	4206.1175	10757.112
	Chronic	e(0.819[ln(hardness)]+0.534)	110.58466	547.13485	1399.293
Copper (D)	Acute	e(0.9422[ln(hardness)]-1.7408)	21.296259	61.599194	97.705905
	Chronic	e(0.8545[ln(hardness)]-1.7428)	13.596461	39.327613	62.379713
Lead (D)	Acute	e(1.273[ln(hardness)]-1.46)*CF	109.46176	595.22032	768.47267
	Chronic	e(1.273[ln(hardness)]-4.705)*CF	4.2655677	23.194882	29.946277
Nickel (D)	Acute	e(0.846[ln(hardness)]+2.253)	707.90696	1641.5315	3426.6518
	Chronic	e(0.846[ln(hardness)]+0.0554)	78.626805	182.32393	380.59618
Zinc (D)	Acute	e(0.8473[ln(hardness)]+0.8618)	177.28073	619.43269	1414.3899
	Chronic	e(0.8473[ln(hardness)]+0.8699)	178.72254	624.47047	1425.8929
Silver (D)	Acute	e(1.72[ln(hardness)]-6.6825)	7.9944723	25.900574	25.900574

STEP 3: SCAN POTENTIAL INSTREAM WASTE CONCENTRATIONS AGAINST WATER QUALITY CRITERIA AND ESTABLISH EFFLUENT LIMITATIONS FOR ALL APPLICABLE PARAMETERS

No limits are established if the receiving stream is not designated for the particular uses.
No limits are established if the potential instream waste concentrations are less than the chronic water quality criteria.
The most applicable stringent criteria are used to establish effluent limitations for a given parameter.
Water quality criteria apply at the end-of-pipe for acute aquatic life criteria and discharges to public lakes.
If background concentration exceeds the water quality criteria, water quality criteria apply. And "Need TMDL" shown to the next column of Avg. Mass
Monthly avg concentration = daily max. / 1.5.

TABLE OF NM WATER QUALITY STANDARDS
* For selenium and mercury, standards for wildlife habitat replace standards for livestock watering. Refer NMWQS for chlorine residual standards for wildlife habitat.

STREAM CRITERIA PARAMETERS	Potential Conc. ug/l (2.13*Ce)	IWC, (ug/l) 100% 4Q3 (Cd)	IWC (ug/l) F=1 or less	Livestock/ Wildlife Cr. ug/l	Irrigation Criteria ug/l	Domestic Criteria ug/l	Acute Fish Criteria ug/l	Chronic Fish Criteria ug/l
Aluminum (T)	149.1	1967.2397	1967.2397	5000	5000	1.00E+100	750	87
Barium (T)	55.38	27.966083	27.966083	1.00E+100	1.00E+100	2000	1.00E+100	1.00E+100
Boron (T)	0	0	0	5000	750	1.00E+100	1.00E+100	1.00E+100
Chlorine Residual (T)	0	0	0	11	1.00E+100	1.00E+100	19	11
Chlordane (T)	0	0	0	1.00E+100	1.00E+100	1.00E+100	2.4	0.0043
Cobalt (T)	0	1.2870383	1.2870383	1000	50	1.00E+100	1.00E+100	1.00E+100
Molydenum (T)	4747.77	2397.5538	2397.5538	1.00E+100	1000	1.00E+100	1.00E+100	1.00E+100
Nitrate (as N) (T) (mg/l)	298.2	150.5866	150.5866	1.00E+100	1.00E+100	10	1.00E+100	1.00E+100
Uranium (T)	0	0	0	1.00E+100	1.00E+100	5000	1.00E+100	1.00E+100
Radium-226+Radium 228 (pCi/l)	1.491	0.752933	0.752933	30	1.00E+100	5	1.00E+100	1.00E+100
Strontium-90 (pCi/l)	0	0	0	1.00E+100	1.00E+100	8	1.00E+100	1.00E+100
Tritium (pCi/l)	0	0	0	20000	1.00E+100	20000	1.00E+100	1.00E+100
Gross Alpha (pCi/l)	67.521	34.097109	34.097109	15	1.00E+100	15	1.00E+100	1.00E+100
Vanadium	0	0	0	100	100	1.00E+100	1.00E+100	1.00E+100
Antimony	4.26	2.1512372	2.1512372	1.00E+100	1.00E+100	6	1.00E+100	1.00E+100
Arsenic (T)	2130	1075.6186	1075.6186	378.76037	189.38018	94.690091	643.89262	284.07027
Beryllium	10.65	5.378093	5.378093	1.00E+100	1.00E+100	4	130	5.3
Cadmium	213	108.55189	108.55189	50	10	5	7.2393424	3.2106044
Chromium (T)	21.3	10.756186	10.756186	4947.6558	494.76558	494.76558	4206.1175	547.13485
Copper (T)	639	324.41813	324.41813	1446.2444	578.49778	1.00E+100	61.599194	39.327613
Lead (T)	1278	645.37116	645.37116	543.77009	27188.505	271.88505	595.22032	23.194882
Mercury	0.4899	0.2473923	0.2473923	0.77	1.00E+100	2	2.4	0.012
Nickel (T)	21.3	16.696363	16.696363	1.00E+100	1.00E+100	231.88521	1641.5315	182.32393
Selenium	10.65	5.378093	5.378093	5	130	50	20	5
Selenium (pres. of >500 mg/l SO4	10.65	5.378093	5.378093	1.00E+100	250	50	20	5

Silver	4.26	2.1512372	2.1512372	1.00E+100	1.00E+100	1.00E+100	25.900574	1.00E+100
Thalllium	4.26	2.1512372	2.1512372	1.00E+100	1.00E+100	2	1.00E+100	1.00E+100
Zinc	426	287.39587	287.39587	87351.947	6988.1558	1.00E+100	619.43269	624.47047
Cyanide (Amenable to chlorination)	85.2	43.024744	43.024744	5.2	1.00E+100	200	22	5.2
Cyanide (T)	85.2	43.024744	43.024744	5.2	1.00E+100	200	22	5.2
Arsenic, dissolved	0	0	0	200	100	50	340	150
Chromium, dissolved	0	0	0	1000	100	100	850.12331	110.58466
Copper, dissolved	0	0	0	500	200	1.00E+100	21.296259	13.596461
Lead, dissolved	0	0	0	100	5000	50	109.46176	4.2655677
Nickel, dissolved	0	0	0	1.00E+100	1.00E+100	100	707.90696	78.626805
Zinc, dissolved	0	0	0	25000	2000	1.00E+100	177.28073	178.72254
Silver, dissolved	4.26	2.1512372	2.1512372	1.00E+100	1.00E+100	1.00E+100	7.9944723	1.00E+100
Total DDT and metabolites	0	0	0	0.001	1.00E+100	1.00E+100	1.00E+100	1.00E+100
Total PCBs	0	0	0	0.014	1.00E+100	1.00E+100	1.00E+100	1.00E+100
Chlorides (mg/l)	0	0	0	1.00E+100	1.00E+100	1.00E+100	1.00E+100	1.00E+100
Sulfate (mg/l)	0	0	0	1.00E+100	1.00E+100	1.00E+100	1.00E+100	1.00E+100
Total Dissolved Solids (mg/l)	0	0	0	1.00E+100	1.00E+100	1.00E+100	1.00E+100	1.00E+100

APPLICABLE WATER QUALITY-BASED LIMITS

The following formular is used to calculate the allowable daily maximum effluent cincentration

Daily Max. Conc. = Cs + (Cs - Ca)(F*Qa/Qe)
Monthly Avg. Conc. = Daily Max. Conc. / 1.5

Where:
Cs = Applicable water quality standard
Ca = Ambient stream concentration
F = Fraction of stream allowed for mixing
Qe = Plant effluent flow
Qa = Criteria low flow (4Q3)

STREAM PARAMETERS	Livestock/ Wildlife Lim ug/l	Irrigation Limits ug/l	Domestic Limits ug/l	Acute Fish Limits ug/l	Chronic Fis Limits ug/l	Daily Max. ug/l	Daily Avg. ug/l	Max. Mass LBS/Day	Avg. Mass LBS/Day	Background Greater Than WQS
Aluminum (T)	No Limit	No Limit	No Limit	No Limit	87	87	58	3.3666912	2.2444608	Need TMDL
Barium (T)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	
Boron (T)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	
Chlorine Residual (T)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	
Chlordane (T)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	
Cobalt (T)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	

Molydenum (T)	No Limit	1980.2558	No Limit	No Limit	No Limit	1980.2558	1320.1706	76.631148	51.087432
Nitrate (as N) (T) (mg/l)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Uranium (T)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Radium-226+Radium 228 (pCi/l)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Strontium-90 (pCi/l)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Tritium (pCi/l)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Gross Alpha (pCi/l)	29.703838	No Limit	No Limit	No Limit	No Limit	29.703838	19.802558	1.1494672	0.7663115
Vanadium	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Antimony	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Arsenic	750.04242	375.02121	No Limit	643.89262	562.53182	375.02121	250.01414	14.512421	9.6749472
Beryllium	No Limit	No Limit	No Limit	No Limit	10.495356	10.495356	6.996904	0.4061451	0.2707634
Cadmium	97.05228	17.842047	No Limit	7.2393424	4.3973063	4.3973063	2.9315376	0.1701652	0.1134435
Chromium	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Copper	No Limit	No Limit	No Limit	61.599194	74.447839	61.599194	41.066129	2.383741	1.5891606
Lead	1076.8039	No Limit	No Limit	595.22032	45.9318	45.9318	30.6212	1.7774504	1.1849669
Mercury	No Limit	No Limit	No Limit	No Limit	0.0237631	0.0237631	0.015842	0.0009196	0.000613
Nickel	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Selenium	9.9012792	No Limit	No Limit	No Limit	9.9012792	9.9012792	6.6008528	0.3831557	0.2554372
Selenium (pres. of >500 mg/l SO4	No Limit	No Limit	No Limit	No Limit	9.9012792	9.9012792	6.6008528	0.3831557	0.2554372
Silver	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Thalllium	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Zinc	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Cyanide (Amenable to chlorination)	10.29733	No Limit	No Limit	22	10.29733	10.29733	6.8648869	0.398482	0.2656546
Cyanide (T)	10.29733	No Limit	No Limit	22	10.29733	10.29733	6.8648869	0.398482	0.2656546
Arsenic, dissolved	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Chromium, dissolved	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Copper, dissolved	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Lead, dissolved	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Nickel, dissolved	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Zinc, dissolved	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Total DDT and metabolites	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Total PCBs	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Chlorides (mg/l)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Sulfate (mg/l)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Total Dissolved Solids (mg/l)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit

CALCULATIONS OF NEW MEXICO WATER QUALITY-BASED EFFLUENT LIMITATIONS

Calculations Specifications: Lotus Smartsuite 97 1-2-3 Revised as 8/28/2000

Prepared By: Isaac Chen

STEP 1: REFERENCE IMPLEMENTATION PROCEDURES
INPUT FACILITY AND RECEIVING STREAM DATA
INPUT RECEIVING STREAM POLLUTANT BACKGROUND CONCENTRATION DATA
LIST SOURCE OF DATA INPUT
INPUT EFFLUENT DATA

IMPLEMENTATION PROCEDURES

The water quality standards for Interstate and Intrastate streams of the State of New Mexico are implemented in this fact sheet using procedures established in the "Implementation Guidance for State of New Mexico Standards for Interstate and Intrastate streams", February 23, 2000.

FACILTY	DATA INPUT	
Permittee	Permittee	
NPDES Permit No.	NM0000000	
Outfall No.(s)	002	
Plant Effluent Flow (MGD)	0.35	For industrial and federal facility, use the highest monthly average flow
Plant Effluent Flow (cfs)	0.5425	for the past 24 months. For POTWs, use the design flow.

RECEIVING STREAM		DATA INPUT	
Receiving Stream Name		River	
Basin Name		Basin	
Waterbody Segment Code No.		Segment	
Is a publicly owned lake or reservoir (enter "1" if yes, "0" if no)		0	
Are acute aquatic life criteria considered (1= yes, 0=no)		1	
Are chronic aquatic life criteria considered (1= yes, 0=no)		1	
Are domestic water supply criteria considered (1= yes, 0=no)		0	
Are irrigation water supply criteria considered (1= yes, 0=no)		1	
Livestock watering and wildlife habitat criteria applied to all streams			
USGS Flow Station		USGS Stat.	
WQ Monitoring Station No.		NA	
Receiving Stream TSS (mg/l)		10	For intermittent stream, enter effluent TSS
Receiving Stream Hardness (mg/l as CaCOs)	RANGE: 0 - 400	163	For intermittent stream, enter effluent Hardness
Receiving Stream Critical Low Flow (4Q3) (cfs)		7.05	Enter "0" for intermittent stream and lake.
Avg. Water Temperature (C)		5	

pH (Avg)	7.72		
Fraction of stream allowed for mixing (F)	1	FQa=	7.05
(= 1, if stream morphology data is not available, or for intermittent stream, or pollutants have EPA human health criteria)			

SITE-SPECIFIC CRITERIA		
	Flow Limit (cfs)	100.000
	Chlorides (mg/l)	1.00E+100
	Sulfate (SO4) (mg/l)	1.00E+100
	Total Dissolved Solids	1.00E+100

DATA INPUT

Input pollutant geometric mean concentration as micro-gram per liter (ug/l or ppb) unless other unit is specified for the parameter. (Metals in "total" form)

Value below detection level which is smaller than the minimum quantification level will be counted as "0".
Value reported as "less than" but greater than MQL, the reported value is used.
Value below detection level and reported as "ND" will be counted as "0".

The following formular is used to calculate the Instream Waste Concentration (Cd)

Cd = [(F*Qa*Ca) + (Qe*2.13*Ce)] / (F*Qa + Qe)
Where:
Cd = Instream Waste Concentration
F = Fraction of stream allowed for mixing (see NM Implementation Guidance)
Ce = Reported concentration in effluent
Ca = Ambient stream concentration upstream of discharge
Qe = Plant effluent flow
Qa = Critical low flow of stream at discharge point expressed as the 4Q3

DATA SOURCES:

NPDES Application Form 2C dated 2/7/90.
Memo from Brian McGill to NPDES file dated 7/11/96
Letter from Brian McGill (Permittee) to Isaac Chen (EPA) dated 1/5/99, 1/6/99, and 1/19/99, respectively.
May enter "<" in column D or G if data was report as "less Than".

POLLUTANTS	<" Ambient Stream Conc. Ca (ug/l)	Ca > MQL?	<" Effluent Concentration Ce (ug/l)	Ce > MQL?	Instream Waste Concentration, Cd (ug/l) 2.13* Ce	100% 4Q3	F= 1 or less	MQL
Total Phenols (4AAP)	0	0	0	0	0	0	0	5
Aluminum (T)	3822	3822	70	70	149.1	3559.5636	3559.5636	100
Barium (T)	0	0	26	26	55.38	3.9570168	3.9570168	100

Boron (T)	0	0	0	0	0	0	0	100
Chlorine Residual (T)	0	0	0	0	0	0	0	100
Chlordane (T)	0	0	0	0	0	0	0	0.2
Cobalt (T)	2.6	2.6	0	0	0	2.4142246	2.4142246	50
Molybdenum (T)	0	0	5030	5030	10713.9	765.53056	765.53056	10
Nitrate (as N) (T) (mg/l)	0	0	140	140	298.2	21.307014	21.307014	0.1
Uranium (T)	0	0	0	0	0	0	0	
Radium-226+Radium 228 (pCi/l)	0	0	0.01	0.01	0.0213	0.0015219	0.0015219	
Strontium-90 (pCi/l)	0	0	0	0	0	0	0	
Tritium (pCi/l)	0	0	0	0	0	0	0	
Gross Alpha (pCi/l)	0	0	0	0	0	0	0	
Vanadium	0	0	0	0	0	0	0	50
Antimony	0	0	2	2	4.26	0.3043859	0.3043859	60
Arsenic	0	0	1000	1000	2130	152.19295	152.19295	10
Beryllium	0	0	5	5	10.65	0.7609648	0.7609648	5
Cadmium	2	2	100	100	213	17.076391	17.076391	1
Chromium	0	0	10	10	21.3	1.5219295	1.5219295	10
Copper	3.5	3.5	300	300	639	48.907804	48.907804	10
Lead	0	0	600	600	1278	91.315772	91.315772	5
Mercury	0	0	0.2	0.2	0.426	0.0304386	0.0304386	0.2
Nickel	12	12	10	10	21.3	12.664504	12.664504	5
Selenium	0	0	5	5	10.65	0.7609648	0.7609648	5
Selenium (SO4 >500 mg/l)	0	0	5	5	10.65	0.7609648	0.7609648	5
Silver	0	0	2	2	4.26	0.3043859	0.3043859	2
Thalllium	0	0	2	2	4.26	0.3043859	0.3043859	10
Zinc	146	146	200	200	426	166.00659	166.00659	20
Cyanide (Amenable to chlorination)	0	0	40	40	85.2	6.0877181	6.0877181	20
Cyanide (T)	0	0	40	40	85.2	6.0877181	6.0877181	20
Arsenic, dissolved	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	10
Chromium, dissolved	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	10
Copper, dissolved	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	10
Lead, dissolved	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	5
Nickel, dissolved	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	5
Zinc, dissolved	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	20
Total DDT and metabolites	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	
Total PCBs	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	
Chlorides (mg/l)	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	
Sulfate (mg/l)	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	
Total Dissolved Solids (mg/l)	NO DATA	NO DATA	NO DATA	NO DATA	0	0	0	

STEP 2: CALCULATE HARDNESS DEPENDENT CRITERIA

CONVERT DISSOLVED METALS TO TOTAL FORM

This step calculate hardness dependent criteria, then convert these criteria from dissolved form to total form

The following formular is used to convert dissolved metals criteria to total form

Kp = Kpo * (TSS**a) — Kp = Linear partition coefficient; Kpo and a can be found in table below
C/Ct = 1/ (1 + Kp*TSS* 1.0E-6) — TSS = Total suspended solids concentration found in receiving stream (or in effluent for intermittent stream)
Total Metal Criteria (Ct) = Cr / (C/Ct) — C/Ct = Fraction of metal dissolved; and Cr = Dissolved criteria value

	Stream Linear Partition Coefficient				Lake Linear Partition Coefficient			
Metals	Kpo	alpha (a)	Kp	C/Ct	Kpo	alpha (a)	Kp	C/Ct
Arsenic	480000	-0.73	89380.183	0.5280384	480000	-0.73	89380.183	0.5280384
Chromium	3360000	-0.93	394765.58	0.2021159	2170000	-0.27	1165359	0.079029
Copper	1040000	-0.74	189248.89	0.345723	2850000	-0.9	358793.74	0.2179629
Lead	2800000	-0.8	443770.09	0.1839013	2040000	-0.53	602046.68	0.1424407
Nickel	490000	-0.57	131885.21	0.4312479	2210000	-0.76	384053.98	0.2065885
Zinc	1250000	-0.7	249407.79	0.2861985	3340000	-0.68	697824.91	0.1253408
Silver	2400000	-1.03	223981.03	0.30866	2400000	-1.03	223981.03	0.30866

The following formular is used to calculate hardness dependent criteria

			Dissolved WQC (ug/l)	Total Stream WQC (ug/l)	Total Lake WQC (ug/l)
Cadmium (D)	Acute	e(1.128[ln(hardness)]-3.6867)*CF	7.2393424		
	Chronic	e(0.7852[ln(hardness)]-2.715)*CF	3.2106044		
Chromium (D)	Acute	e(0.819[ln(hardness)]+2.5736)	850.12331	4206.1175	10757.112
	Chronic	e(0.819[ln(hardness)]+0.534)	110.58466	547.13485	1399.293
Copper (D)	Acute	e(0.9422[ln(hardness)]-1.7408)	21.296259	61.599194	97.705905
	Chronic	e(0.8545[ln(hardness)]-1.7428)	13.596461	39.327613	62.379713
Lead (D)	Acute	e(1.273[ln(hardness)]-1.46)*CF	109.46176	595.22032	768.47267
	Chronic	e(1.273[ln(hardness)]-4.705)*CF	4.2655677	23.194882	29.946277
Nickel (D)	Acute	e(0.846[ln(hardness)]+2.253)	707.90696	1641.5315	3426.6518
	Chronic	e(0.846[ln(hardness)]+0.0554)	78.626805	182.32393	380.59618
Zinc (D)	Acute	e(0.8473[ln(hardness)]+0.8618)	177.28073	619.43269	1414.3899
	Chronic	e(0.8473[ln(hardness)]+0.8699)	178.72254	624.47047	1425.8929
Silver (D)	Acute	e(1.72[ln(hardness)]-6.6825)	7.9944723	25.900574	25.900574

STEP 3: SCAN POTENTIAL INSTREAM WASTE CONCENTRATIONS AGAINST WATER QUALITY CRITERIA AND ESTABLISH EFFLUENT LIMITATIONS FOR ALL APPLICABLE PARAMETERS

No limits are established if the receiving stream is not designated for the particular uses.
No limits are established if the potential instream waste concentrations are less than the chronic water quality criteria.
The most applicable stringent criteria are used to establish effluent limitations for a given parameter.
Water quality criteria apply at the end-of-pipe for acute aquatic life criteria and discharges to public lakes.
If background concentration exceeds the water quality criteria, water quality criteria apply. And "Need TMDL" shown to the next column of Avg. Mass
Monthly avg concentration = daily max. / 1.5.

TABLE OF NM WATER QUALITY STANDARDS
* For selenium and mercury, standards for wildlife habitat replace standards for livestock watering. Refer NMWQS for chlorine residual standards for wildlife habitat.

STREAM CRITERIA PARAMETERS	Potential Conc. ug/l (2.13*Ce)	IWC, (ug/l) 100% 4Q3 (Cd)	IWC (ug/l) F=1 or less	Livestock/ Wildlife Cr. ug/l	Irrigation Criteria ug/l	Domestic Criteria ug/l	Acute Fish Criteria ug/l	Chronic Fish Criteria ug/l
Aluminum (T)	149.1	3559.5636	3559.5636	5000	5000	1.00E+100	750	87
Barium (T)	55.38	3.9570168	3.9570168	1.00E+100	1.00E+100	2000	1.00E+100	1.00E+100
Boron (T)	0	0	0	5000	750	1.00E+100	1.00E+100	1.00E+100
Chlorine Residual (T)	0	0	0	11	1.00E+100	1.00E+100	19	11
Chlordane (T)	0	0	0	1.00E+100	1.00E+100	1.00E+100	2.4	0.0043
Cobalt (T)	0	2.4142246	2.4142246	1000	50	1.00E+100	1.00E+100	1.00E+100
Molydenum (T)	10713.9	765.53056	765.53056	1.00E+100	1000	1.00E+100	1.00E+100	1.00E+100
Nitrate (as N) (T) (mg/l)	298.2	21.307014	21.307014	1.00E+100	1.00E+100	10	1.00E+100	1.00E+100
Uranium (T)	0	0	0	1.00E+100	1.00E+100	5000	1.00E+100	1.00E+100
Radium-226+Radium 228 (pCi/l)	0.0213	0.0015219	0.0015219	30	1.00E+100	5	1.00E+100	1.00E+100
Strontium-90 (pCi/l)	0	0	0	1.00E+100	1.00E+100	8	1.00E+100	1.00E+100
Tritium (pCi/l)	0	0	0	20000	1.00E+100	20000	1.00E+100	1.00E+100
Gross Alpha (pCi/l)	0	0	0	15	1.00E+100	15	1.00E+100	1.00E+100
Vanadium	0	0	0	100	100	1.00E+100	1.00E+100	1.00E+100
Antimony	4.26	0.3043859	0.3043859	1.00E+100	1.00E+100	6	1.00E+100	1.00E+100
Arsenic (T)	2130	152.19295	152.19295	378.76037	189.38018	94.690091	643.89262	284.07027
Beryllium	10.65	0.7609648	0.7609648	1.00E+100	1.00E+100	4	130	5.3
Cadmium	213	17.076391	17.076391	50	10	5	7.2393424	3.2106044
Chromium (T)	21.3	1.5219295	1.5219295	4947.6558	494.76558	494.76558	4206.1175	547.13485
Copper (T)	639	48.907804	48.907804	1446.2444	578.49778	1.00E+100	61.599194	39.327613
Lead (T)	1278	91.315772	91.315772	543.77009	27188.505	271.88505	595.22032	23.194882
Mercury	0.426	0.0304386	0.0304386	0.77	1.00E+100	2	2.4	0.012
Nickel (T)	21.3	12.664504	12.664504	1.00E+100	1.00E+100	231.88521	1641.5315	182.32393
Selenium	10.65	0.7609648	0.7609648	5	130	50	20	5
Selenium (pres. of >500 mg/l SO4	10.65	0.7609648	0.7609648	1.00E+100	250	50	20	5

Silver	4.26	0.3043859	0.3043859	1.00E+100	1.00E+100	1.00E+100	25.900574	1.00E+100
Thalllium	4.26	0.3043859	0.3043859	1.00E+100	1.00E+100	2	1.00E+100	1.00E+100
Zinc	426	166.00659	166.00659	87351.947	6988.1558	1.00E+100	619.43269	624.47047
Cyanide (Amenable to chlorination)	85.2	6.0877181	6.0877181	5.2	1.00E+100	200	22	5.2
Cyanide (T)	85.2	6.0877181	6.0877181	5.2	1.00E+100	200	22	5.2
Arsenic, dissolved	0	0	0	200	100	50	340	150
Chromium, dissolved	0	0	0	1000	100	100	850.12331	110.58466
Copper, dissolved	0	0	0	500	200	1.00E+100	21.296259	13.596461
Lead, dissolved	0	0	0	100	5000	50	109.46176	4.2655677
Nickel, dissolved	0	0	0	1.00E+100	1.00E+100	100	707.90696	78.626805
Zinc, dissolved	0	0	0	25000	2000	1.00E+100	177.28073	178.72254
Silver, dissolved	4.26	0.3043859	0.3043859	1.00E+100	1.00E+100	1.00E+100	7.9944723	1.00E+100
Total DDT and metabolites	0	0	0	0.001	1.00E+100	1.00E+100	1.00E+100	1.00E+100
Total PCBs	0	0	0	0.014	1.00E+100	1.00E+100	1.00E+100	1.00E+100
Chlorides (mg/l)	0	0	0	1.00E+100	1.00E+100	1.00E+100	1.00E+100	1.00E+100
Sulfate (mg/l)	0	0	0	1.00E+100	1.00E+100	1.00E+100	1.00E+100	1.00E+100
Total Dissolved Solids (mg/l)	0	0	0	1.00E+100	1.00E+100	1.00E+100	1.00E+100	1.00E+100

APPLICABLE WATER QUALITY-BASED LIMITS

The following formular is used to calculate the allowable daily maximum effluent cincentration

Daily Max. Conc. = Cs + (Cs - Ca)(F*Qa/Qe)
Monthly Avg. Conc. = Daily Max. Conc. / 1.5

Where:
Cs = Applicable water quality standard
Ca = Ambient stream concentration
F = Fraction of stream allowed for mixing
Qe = Plant effluent flow
Qa = Criteria low flow (4Q3)

STREAM PARAMETERS	Livestock/ Wildlife Lim ug/l	Irrigation Limits ug/l	Domestic Limits ug/l	Acute Fish Limits ug/l	Chronic Fis Limits ug/l	Daily Max. ug/l	Daily Avg. ug/l	Max. Mass LBS/Day	Avg. Mass LBS/Day	Background Greater Than WQS
Aluminum (T)	No Limit	No Limit	No Limit	No Limit	87	87	58	0.253953	0.169302	Need TMDL
Barium (T)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	
Boron (T)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	
Chlorine Residual (T)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	
Chlordane (T)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	
Cobalt (T)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	

Molydenum (T)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Nitrate (as N) (T) (mg/l)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Uranium (T)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Radium-226+Radium 228 (pCi/l)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Strontium-90 (pCi/l)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Tritium (pCi/l)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Gross Alpha (pCi/l)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Vanadium	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Antimony	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Arsenic	No Limit	No Limit	No Limit	643.89262	No Limit	643.89262	429.26175	1.8795226	1.253015
Beryllium	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Cadmium	No Limit	113.96313	No Limit	7.2393424	18.942882	7.2393424	4.8262282	0.0211316	0.0140878
Chromium	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Copper	No Limit	No Limit	No Limit	61.599194	504.92147	61.599194	41.066129	0.179808	0.119872
Lead	No Limit	No Limit	No Limit	595.22032	324.62145	324.62145	216.4143	0.94757	0.6317133
Mercury	No Limit	No Limit	No Limit	No Limit	0.1679447	0.1679447	0.1119631	0.0004902	0.0003268
Nickel	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Selenium	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Selenium (pres. of >500 mg/l SO4	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Silver	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Thalllium	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Zinc	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Cyanide (Amenable to chlorination)	72.776037	No Limit	No Limit	22	72.776037	22	14.666667	0.064218	0.042812
Cyanide (T)	72.776037	No Limit	No Limit	22	72.776037	22	14.666667	0.064218	0.042812
Arsenic, dissolved	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Chromium, dissolved	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Copper, dissolved	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Lead, dissolved	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Nickel, dissolved	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Zinc, dissolved	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Total DDT and metabolites	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Total PCBs	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Chlorides (mg/l)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Sulfate (mg/l)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
Total Dissolved Solids (mg/l)	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit

ROC 9-21-00

Scott Wilson (EPA)

To

Glenn Saums (NMED) via Phone

I called Glenn to discuss the 4Q3 for moly corp. I told him of moly corp's comments, which they didn't copy the state on. He said the 4Q3 is described in detail in the letter NMED sent us and that it is based on the most current information at the time. He also disagreed with moly corp's request to use the downstream gage at the hatchery.

No. 5505 Engineer's Computation Pad ALVIN

On Feb. 24, 2000 met with Molycorp with Jane Watson and David Abshire to discuss their permit application and seeps along the Red River.

They claimed they wanted to capture the seeps to the River even though they do not claim responsibility

After discussing other Permit Issues (see Attached) we went in the field and looked at different known seeps and discussed alternatives for their control.

Finished discussions in their offices.

They wanted to capture the seeps, treat, and discharge to the R. River at the mine.

I told them they would have trouble meeting water quality standards with a small package treatment unit and they would be better off sending the water to the tailings ponds where they could use their treatment plant if necessary or treat it with the tailings.

They mentioned State Engineer and discharge plan requirements which would be a problem

We also discussed work that would need to be done to better characterize the ground water flow.

They were going to get back with us on specific actions

Molycorp People present were Shoemaker, Geyzal, Ralph Veil, and consultant, Gary Van Riper

No. 5505 Engineer's Computation Pad
ALVIN

Molycorp's Requested Changes

Outfall 001 limits requested to be removed

- Less than MQL: arsenic
- Effluent concentration less than 50% of the permit's limits: COD, lead, and mercury
- Not used in process since 1985: cyanide

Outfall 002 limits requested to be removed

Measured as less than the MQL:

COD, Aluminum, Arsenic, Beryllium, Cadmium, Chlorine, Chlordane, Cobalt, Copper, Cyanide, Mercury, Selenium, Silver, and Zinc

Measured below 50% of the permit's concentration limits: Lead and Iron

Molybdenum Limits

- Old limits are 1 mg/l avg. and 2 mg/l max.
- Mass limits of 25 lbs/day apply to the sum of Outfall 001 and Outfall 002.

Effluent data

- Outfall 001 very limited data, no recent discharge.

  Avg. = 0.547 mg/l Max. = 0.68 mg/l (3 samples)

- Outfall 002

  Geometric Mean = 2.37 mg/l

  Calculated Reasonable Potential

  x_{90} = 3.94 mg/l x_{95} = 4.34 mg/l

Fluoride Limits

Old limits at Outfall 001 and Outfall 002 are 3 mg/l avg. and max.

Effluent data

- Outfall 001 very limited, no recent discharge.

  Avg. = 1.97 mg/l Max. = 2 mg/l (3 samples)

- Outfall 002

  Geometric Mean = 2.04 mg/l

  Calculated Reasonable Potential

  x_{90} = 3.426 mg/l

  x_{95} = 4.1 mg/l

Toxicity Testing

Reduce Whole Effluent Toxicity testing to once per year.

Conclusions

Outfall 001

- Arsenic, lead, and mercury are guideline-based and must be limited.
- Decrease monitoring frequency from expired permit for COD, arsenic, lead, and mercury.
- Are more current data available for cyanide?

Outfall 002

- Remove beryllium, chlorine, chlordane, cobalt, iron, selenium, and silver.
- Decrease monitoring frequency for COD
- Aluminum, cadmium, copper, and zinc must remain due to 303(d) listing of Red River.
- Arsenic, lead, and mercury are guideline-based and must be limited.
- Are more current data available for cyanide?

New data might say not on 303(d)

Toxicity Testing

Our most recent policy is for quarterly testing during the first year, then once per year for the minnow species and twice per year for the invertebrate species. An additional test is required during the last quarter of the permit's life.

- All five states in Region 6 agree with this policy.
- We will be implementing it in all permits for major facilities.

FAX TRANSMITTAL

OF PAGES 4 (INCLUDING COVER PAGE)

TO: Geyza Lorinczi	FROM: Scott Wilson USEPA, REGION 6
	MAIL CODE: 6WQ-P
DEPT./AGENCY/BUSINESS Molycorp	PHONE# (214) 665-7170
FAX # 505 586 0811	FAX # (214) 665-2191

Attached are the water Quality limits I calculated for a potential discharge at spring "13 S".

A discharge would also need to have technology based limits, but the water quality based limits are most likely to be more stringent.

Scott

Water Quality Standards Limits
Red River

Calculated Limits:

Pollutant	Daily Max. Limit (ug/l)	Monthly Avg. Limit (ug/l)
Aluminum	87	58
Cadmium	5.52	3.68
Copper	48.69	32.46
Nickel	1,329	886
Zinc	501	334

IMPLEMENTATION PROCEDURES

The water quality standards for Interstate and Intrastate streams of the State of New Mexico are implemented using procedures established in the "Implementation Guidance for State of New Mexico Standards for Interstate and Intrastate streams", February 23, 2000.

FACILITY	DATA INPUT
Permittee	Molycorp
NPDES Permit No.	NM0022306
Outfall No.(s)	Seeps
Plant Effluent Flow (MGD)	0.0432 (30 gpm)
Plant Effluent Flow (cfs)	0.06696

RECEIVING STREAM	DATA INPUT
Receiving Stream Name	Red River
Basin Name	Rio Grande Basin
Waterbody Segment Code No.	2119
Receiving Stream TSS (mg/l)	10
Receiving Stream Hardness (mg/l as CaCOsRANGE:	127
Receiving Stream Critical Low Flow (4Q3) (cfs)	7.05
Avg. Water Temperature (C)	5
pH (Avg)	7.72

The following formula is used to convert dissolved metals criteria to total form

C/Ct = 1/ (1 + Kp*TSS* 1.0E-6)

Kp = Kpo * (TSS**a)
Kp = Linear partition coefficient
Kpo and a can be found in table below
TSS = Total suspended solids concentration in the receiving stream

Total Metal Criteria (Ct) = Cr; C/Ct = Fraction of metal dissolved; and
Cr = Dissolved criteria value

Stream Linear Partition Coefficient

Metal	Kpo	alpha (a)	Kp	C/Ct
Arsenic	480000	-0.73	89380.18	0.528038
Chromium	3360000	-0.93	394765.6	0.202116
Copper	1040000	-0.74	189248.9	0.345723
Lead	2800000	-0.8	443770.1	0.183901
Nickel	490000	-0.57	131885.2	0.431248
Zinc	1250000	-0.7	249407.8	0.286199

The following formula is used to calculate hardness dependent criteria

Stream			Dissolved WQC (ug/l)	Total WQC (ug/l)
Cadmium	Acute	e(1.128[ln(hardness)]-3.6867)*C	5.5249	
	Chronic	e(0.7852[ln(hardness)]-2.715)*C	2.6703	
Chromium	Acute	e(0.819[ln(hardness)]+2.5736)	692.9717	3428.586
	Chronic	e(0.819[ln(hardness)]+0.534)	90.14227	445.99
Copper	Acute	e(0.9422[ln(hardness)]-1.7408)	16.83387	48.692
	Chronic	e(0.8545[ln(hardness)]-1.7428)	10.9853	31.775
Lead	Acute	e(1.273[ln(hardness)]-1.46)*CF	83.6939	455.1
	Chronic	e(1.273[ln(hardness)]-4.705)*CF	3.2614	17.735
Nickel	Acute	e(0.846[ln(hardness)]+2.253)	573.17	1329.1
	Chronic	e(0.846[ln(hardness)]+0.0554)	63.662	147.62
Zinc	Acute	e(0.8473[ln(hardness)]+0.8618)	143.4921	501.37
	Chronic	e(0.8473[ln(hardness)]+0.8699)	144.6591	505.45
Silver	Acute	e(1.72[ln(hardness)]-6.6825)	5.204386	

NM WATER QUALITY STANDARDS - IN STREAM CRITERIA

PARAMETER	Livestock & Wildlife ug/l	Irrigation ug/l	Domestic ug/l	Acute Fish ug/l	Chronic Fish ug/l
Aluminum (T)	5000	5000	****	750	87
Barium (T)	****	****	2000	****	****
Boron (T)	5000	750	****	****	****
Chlorine Residual (T)	11	****	****	19	11
Chlordane (T)	****	****	****	2.4	0.0043
Cobalt (T)	1000	50	****	****	****
Molydenum (T)	****	1000	****	****	****
Nitrate (as N) (T) (mg/l)	****	****	10	****	****
Uranium (T)	****	****	5000	****	****
Radium-226+228 (pCi/l)	30	****	5	****	****
Strontium-90 (pCi/l)	****	****	8	****	****
Tritium (pCi/l)	20000	****	20000	****	****
Gross Alpha (pCi/l)	15	****	15	****	****
Vanadium	100	100	****	****	****

Antimony	****	****	6	****	****
Arsenic (T)	378.76	189.38	94.69	643.89	284.1
Beryllium	****	****	4	130	5.3
Cadmium	50	10	5	5.525	2.67
Chromium (T)	4947.6	494.76	494.76	3428.6	445.99
Copper (T)	1446.244	578.5	****	48.69	31.78
Lead (T)	543.77	27188.5	271.885	455.1	17.74
Mercury	0.77	****	2	2.4	0.012
Nickel (T)	****	****	231.885	1329.1	147.63
Selenium	5	130	50	20	5
Silver	****	****	****	5.2044	****
Thalllium	****	****	2	****	****
Zinc	87351.95	6988.16	****	501.37	505.45
Cyanide (Amen to chlor)	5.2	****	200	22	5.2

APPLICABLE WATER QUALITY-BASED LIMITS

The following formula is used to calculate the allowable daily maximum effluent concentration

Daily Max. Conc. = Cs + (Cs - Ca)(F*Qa/Qe)
Monthly Avg. Conc. = Daily Max. Conc. / 1.5

Where:
Cs = Applicable water quality standard
Ca = Ambient stream concentration
F = Fraction of stream allowed for mixing
Qe = Plant effluent flow
Qa = Criteria low flow (4Q3)

PARAMETERS	Livestock & Wildlife ug/l	Irrigation Limits ug/l	Domestic Limits ug/l	Acute Fish Limits ug/l	Chronic Fish Limits ug/l	Dly Max Limits ug/l	Dly Avg Limits ug/l
Aluminum	No Limit	No Limit	No Limit	750	87	87	58
Cadmium	50	10	No Limit	5.525	73.242	5.252	3.68
Copper	No Limit	No Limit	No Limit	48.69	3166.7	48.69	32.46
Nickel	No Limit	No Limit	No Limit	1329	No Limit	1329	886
Zinc	No Limit	6988	No Limit	501	505	501	334

Molycorp / Red River Site Visit

J. Scott Wilson

February 28, 2000

I visited the Red River from the town of Red River to Questa on February ~~15~~ 22, 2000 to observe seeps going into the river, and the Molycorp mine area on 2-~~17~~ 24-00 as a part of our meetings with Molycorp.

No effect of drainage from the erosional scars could be seen above Cabin Springs. At Cabin Springs there was some slight whitishness to the water in pools. No flow could be observed at the historic seeps adjacent to the mine at Cabin Springs, Portal Springs, or Sulphur Gulch. The river, however, became noticeable colored a bluish-white starting about 100 yards upstream of Capuline Canyon and extending downstream about two miles past the Questa Ranger Station.

On 2-~~17~~ 24 the mine personnel pointed out another whitish area in the stream originating from a seep near the mouth of Goathill Gulch.

ROC 4-20-00 @ 3:55p.

Scott Wilson (EPA)

To Scott McKitrick (NMED Groundwater)
505 827 2895

I had heard that Scott was present when Molycorp drilled into the waste rock ~~piles~~ piles for the Robertson Report which says the core samples were dry and therefore no acid drainage.

Scott was present. He told me that the data in the Tables in the Report are good. The reports' assertion that the holes were dry isn't exactly true. There were moist layers and dry layers, but the cores weren't completely dry. The moist layers had approx 12% moisture. The bottoms of many of the holes he saw drilled were dry.

He also said that at least one hole blew a bunch of hot air when first drilled

No. 5505 Engineer's Computation Pad ALVIN

2-24-00

Meeting Molycorp / EPA NPDES Permits

Name	Org.	Phone
Scott Wilson	EPA (6WQ-PP)	214 665 7511
Geyza Lorinczi	Molycorp, Inc.	(505) 586-7626
Jane Watson	EPA	214 665 7180
CHARLES DAVID ABSHIRE	USEPA	(214) 665-7188
Ralph E. Vail	Vail Engineering	505 988 5575
Dave Shoemaker	Molycorp	(505) 586 7601
GARY VAN RIPER	MONTGOMERY WATSON	(303) 763 5140
Fred Martin	MOLYCORP	505-586-7673

No. 5505 Engineer's Computation Pad ALVIN

Record of Communication

5-17-00

Conference call with NMED staff on Molycorp

Scott Wilson - EPA Region 6

Rich Powell, Charlie De Salan, Mora Henning, and Glenn Saums - NMED

They called to discuss the Molycorp draft permit. Mora and Charlie met with Jack Ferguson and I on 5-10 when we brought the draft to NMED.

Changes they requested:

Language added to say water added to the tailings pipeline must comply with the Groundwater discharge permit. They think Molycorp will need a permit modification to add the water to the pipeline and want the permit to somehow say that.

At Spring 13 the pumping rate maybe should be 75 gpm, there are data for the Capuline waste rock piles that show the flow up there is 75 gpm.

The Fact Sheet discusses withdrawal wells as part of the seep capture system. They wanted more information on that.

They wanted reports on seep monitoring to be submitted quarterly as they are under the ground water permit.

Wanted the reopener language in PART II to be more clear.

Wanted compliance schedule report dates to be consistent with the ground water permit dates.

Wanted the term seepage interception system to be consistent throughout the permit. They said I used other similar terms in some places and thought that could be confusing.

Wanted the Texas Historical Preservation language removed.

I said I would consider the requests. Most have been made in the "final" draft permit.

1/18/05

molybdenite / superfund mtg

paste pH (1:1 mix soil and water)
scales natural 4.5 – 2 generally in the 3 range

6-10-54 Aerial Photo shows
nice foliage in Capitol Creek Canyon
- undisturbed / no scars
no. of scars upstream of mine
5 no. downstream of mine
over

Trade off of handling non point
for Point Source ??? = mysor's remarks
in NPDES Permits

Natural - 555 tons / yr sulphate

moisture samples taken in August

age of waste rock dumps vs
those at other mines which produce
acid drainage ??

carbonate dumping gpm at 7-4 mostly
quality of groundwater below EOL ??

listing timing

State of New Mexico
ENVIRONMENT DEPARTMENT
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-0187

GARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
SECRETARY

EDGAR T. THORNTON, III
DEPUTY SECRETARY

January 30, 1996

Mr. Robert Murphy
Chief, Enforcement Branch
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202-2733

Re: **Molycorp, Inc., NPDES Permit No. NM0022306**

Dear Mr. Murphy:

Recently staff of the New Mexico Environment Department Surface Water Quality Bureau (SWQB) assigned to the New Mexico Mine Act program began a review of Departmental files for the referenced facility. In this review, a September 24, 1993 report entitled *Analysis of Tailings Pond Seepage Flow to the Red River at UNOCAL 76 Molycorp, Inc. Questa Division* by Molycorp's consultant Vail Engineering, Inc. was brought to the attention of the SWQB's Point Source Regulation Section. The report had been submitted to NMED's Ground Water Quality Bureau by Molycorp in support of their discussions on ground water quality impacts and permitting. A copy of the report is enclosed with this letter.

In this report, Molycorp has quantitatively identified subsurface discharges of tailings leachate (volume & quality) to the Red River. Please see the schematic diagram at end of the enclosed report labelled "Analysis of Accretions to Red River." These discharges are not permitted under the current NPDES permit. To the best of our knowledge, Molycorp has never notified EPA of these discharges either through their NPDES permit application or other official correspondence. The current NPDES permit was issued September 10, 1993. Given the time frames, and the fact many of the sample collections were in the Spring of 1993, it appears that Molycorp was aware of these discharges at the time the permit was being processed.

We understand there has been some judicial review[1] regarding propriety of permitting situations where the pollutants move through ground water prior to entering a "water of the United

---

[1] e.g., **Sierra Club v. Colorado Refining Co.; Washington Wilderness Coalition v. Hecla Mining Co.; McClellan Ecological Seepage Situation v. Defense Department; and Oconomowoc Lake v. Dayton Hudson Corp.**

States. We further understand that the issue, in terms of these cases, may not be fully resolved. However, we believe the situation at Molycorp is clear; the permittee has a professional engineer's report which firmly identifies and quantifies the discharge *vis a vis* the potential for discharge to a water of the United States which was an issue in other cases.

The Red River is classified in the New Mexico *Standards for Interstate and Intrastate Streams* [20 NMAC 6.1, §2119] with the following uses: coldwater fishery, fish culture, irrigation, livestock watering, wildlife habitat, and secondary contact. The discharges are also only a few miles above the portion of the Red River designated as a wild and scenic river by the U.S. Congress under the **Wild and Scenic Rivers Act**. Further, the Red River is included in the New Mexico §305(b) report's list of "Waterbodies with Designated Uses Partially or Not Fully Supported or with Threatened Designated or Attainable Uses" and is a "priority 1" reach on the New Mexico 1994-96 §303(d) list.

Based on the above, the NMED Surface Water Quality Bureau requests your review of this matter and determination of appropriate action. If you have any questions, please contact Glenn Saums of my staff at (505) 827-2827.

Sincerely,

Jim Piatt

Jim Piatt, Ph.D.
Chief
Surface Water Quality Bureau

Enclosure

cc (w/o enclosure):
Jack Ferguson, P.E., USEPA (6WQ-P)
Rip Harwood, NMED OGC
Marcy Leavitt, NMED GWQB

ANALYSIS OF TAILINGS POND SEEPAGE FLOW TO RED RIVER

RECEIVED
JAN 26 1996

AT

UNOCAL 76 MOLYCORP, INC.

QUESTA DIVISION

VAIL ENGINEERING, INC.

SANTA FE, NEW MEXICO

SEPTEMBER 24, 1993

VAIL ENGINEERING, INC.

HONE: (505)
8-3575

1588 SAN MATEO LANE
SANTA FE, NEW MEXICO
87501

September 24, 1993

Mr. David Shoemaker
Mine Manager
Molycorp, Inc.
P.O. Box 469
Questa, NM 87556

Dear Sir:

Submitted herewith is our report on the stream survey and analysis of accretions to Red River in the vicinity of Molycorp's tailings ponds, Taos County, New Mexico.

Sincerely yours,
VAIL ENGINEERING, INC.

Ralph E. Vail

Chief Engineer
NMPE No. 2098

REGISTERED PROFESSIONAL ENGINEER
STATE OF
No.
2098
NEW MEXICO
RALPH EVERETT VAIL

ANALYSIS OF TAILINGS POND SEEPAGE FLOW TO RED RIVER

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VAIL ENGINEERING, INC.

ONE: (505)
3575

1588 SAN MATEO LANE
SANTA FE, NEW MEXICO
87501

ANALYSIS OF TAILINGS POND SEEPAGE FLOW TO RED RIVER

OVERVIEW

Molycorp's tailings dams are located primarily in Sections 35 (Dam Nos. 4 & 5) and 36 (Dam No. 1), of Township 29N Range 12E NMPM, one to two miles west of the Town of Questa, Taos County, New Mexico. Red River flows to the west past the tailings ponds at a distance of approximately one-half mile south of the ponds. Leachate from the tailings ponds seeps to the ground water which flows generally in a southwesterly direction and discharges to Red River.

The seepage from the ponds contains elevated concentrations of sulfates (840± mg/l), molybdenum (2± mg/l), manganese (1.4± mg/l), and total dissolved solids (1700± mg/l). Several other elements are present at moderately elevated but below significant levels. It appears that most of the molybdenum is being absorbed during seepage flow in the vadose zone and along the ground water flow path.

During the 1970's Molycorp excavated trenches and installed french drains to intercept the seepage flow south of Dam No. 1 and southeast of Dam No. 4. These seepage barriers appeared to be fairly effective for some time but recently there has been evidence that an increased amount of seepage from the tailings ponds flows past these barriers. This seepage flow is generally in the shallow alluvium and the fairly high constituent concentrations this area.

It is probable that a large percentage of the seepage from section 35 is transported by the ground water flow in the volcanic formations which underlie most of this pond area. It is believed that most of this ground water flow is discharged to Red River at the numerous springs along the Red River Gorge. The accretion to Red River from spring flow between the head of the gorge to the State fish hatchery is on the order of 18 cfs indicating a large amount of ground water flow in the volcanic formation.

In April 1993 a water quality survey was made along Red River between the State Road 3 highway bridge and the Red River Fish Hatchery. The primary purposes for this survey study were:

(1) Determination of the concentration of significant pond seepage water constituents in the ground water and spring water entering Red River.

(2) Determination of the amount of seepage water contained in the ground water and spring flows along specific reaches of Red River.

(3) Determination of the effect on Red River of the pond seepage discharge.

This study was conducted in conjunction with a ground water study, being prepared by South Pass Resources, Inc., to determine the characteristics of the ground water aquifer south of Dam No. 1 and the distribution and concentration of significant tailings pond water constituents in the ground water immediately down gradient of the pond areas.

Both studies were being conducted to determine the desirability and feasibility of further action by Molycorp to reduce the effect of seepage from the pond areas.

SURVEY OF RED RIVER

The survey was conducted on April 12, 1993 between State Highway 3 and the fish hatchery. Six water samples were collected at selected locations along Red River. Four samples were collected from springs and drainages in the fields south of Dam No. 1 and five samples were collected from springs flowing into Red River along and at the head of the Red River Gorge. Both the warm and cold water fish hatchery supplies were sampled. A sample was collected from the 002 outfall. Samples were taken from the drainage below the 002 metering manhole and from a spring along the irrigation ditch east of that point. Conductivity and temperature measurements were recorded at all of the above and at an additional nine points in Red River and nine more spring or field drainage points. All samples were analyzed for sulfates, dissolved and suspended aluminum, molybdenum and ten other elements or parameters. The flow from many of the springs and field drainages were estimated at the time of the survey.

Subsequently the USGS recorded stream flow data was obtained for April 11, 12 and 13 at Red River near Questa (Ranger Station), Red River below the fish hatchery and Cabresto Creek near Questa. The fish hatchery superintendent was interviewed relative to the amount of cold and warm spring water that was being intercepted.

The following Table No. 1 is a summary of the more significant data obtained during the survey. Table 2 presents the complete data of the laboratory analysis of the water samples collected during the survey.

Drawing No. 1 shows the significant elements of the area and the location of the stream survey stations.

DATA BASE

Flow in Red River

USGS stream flow data indicates the following mean daily flows were present at the time of the stream survey.

Station	1993		
	April 11	April 12	April 13
Red River Near Questa (Ranger Station)	37	41	46
Cabresto Creek	11	11	12
Red River Below Fish Hatchery	62	65	70

The USGS data indicated measurement conditions were good during this time period. Good conditions under the USGS classification means that about 95% of the reported daily discharges are within 10% of the true value. Historic USGS stream flow data indicates that except for Cabresto Creek, there generally is not a significant amount of gain or loss in Red River between the Ranger Station and the highway bridge when irrigation water is not being diverted and there is not a significant amount of drainage from recent precipitation. The data indicates that there may have been a small amount of irrigation diversion on the date of the stream survey.

Table 3. is a tabulation of the USGS reported daily stream flows for March and April 1993. This table also shows the indicated gain or loss between the Ranger Station (plus Cabresto Creek) and the fish hatchery. Gains in

TABLE 1

LOWER RED RIVER SURVEY 4-12-93

Summary of Survey Data

SAMPLE POINT	DESCRIPTION	RED RIVER COND	RED RIVER TEMP	RED RIVER SO 4	SPRINGS & DRAINAGE COND	SPRINGS & DRAINAGE TEMP	SPRINGS & DRAINAGE SO 4
1.	Below Hwy Bridge	345	8.3	119			
2.	Spring in field				398	10.5	92
2A.	Field Drainage				456	8.3	--
3.	Field Drainage				415	11.2	92
4.	Field Drainage				926	17.8	172
4A.	RR above 3/4	369	9.3	--			
5.	RR above 002	376	9.1	118			
6.	002				1984	9.7	840
6A.	Field Drainage				450	9.3	
6B.	Seepage @ 002				1800	9.8	
7.	Field Drainage				863	10.1	228
8.	RR above Big Spr.	418	9.8	141			
9.	Big Spring				1390	7.8	504
10.	Pipe @ Big Spr.				870	7.1	210
11.	RR below BS	412	10.3	138			
11A.	RR above Pope	410	10.4	--			
11B.	RR above Pope	409	10.5	--			
11C.	RR @ Pope	410	10.5	--			
11D.	RR below Pope	410	10.4	--			
11E.	RR below Pope	410	10.4	--			
12.	Spring				388	15.3	115
13.	RR above S12	410	10.5	128			
13A.	Spring				407	15.8	--
13B.	Seep				410	14	--
13C.	Spring				436	14.5	--
13D.	RR	410	10.5				
14.	South Side Spr.				450	16.9	126
14A.	RR above S14	410	10.9				
15.	Spring				238	16.4	20
15A.	RR				284	16.3	
15B.	RR	404	11.2				
15C.	Spring				284	16.4	
16.	RR	407	11	129			
16A.	RR @ Div.Dam	407	11				
17.	Hatchery Cold Spr.				430	8.3	80
18.	Hat-Warm Spr.				320	15.8	63
19.	Irrg. Ditch 002/003				1550	10.5	660
20.	Drain Below 002/003				1520	8.9	790

EPA not exceed 400 µmhos

TABLE NO. 6

WATER QUALITY SURVEY ALONG RED RIVER
BETWEEN STATE ROAD 522 AND FISH HATCERY
APRIL 12, 1993

SAMPLE SOURCE	PH	TOT ALK	F	TDS	SO4	TSS	MO	DIS. AL	CD	SUS. AL	FE	PB	CU	ZN	MN
				1000	600 Grade N MED		1.0	5.0	0.01	5.0	1.0	0.05	0.2	2.0	0.2
#1 R/R Below Highway Bridge	7.23	38	0.84	255	119 (not a Regulated Fr Surf Wtr.)	31	<.03	<.5	<.005	7.8	0.594	<.1	0.036	0.250	0.92
#2 Spring N. Side R/R	6.76	90	0.55	247	92	20	<.03	<.5	<.005	0.5	0.543	<.1	0.007	0.021	0.02
#3 Field Drainage to R/R 500'E. of 002	7.44	99	0.60	246	92	7	0.20	<.5	<.005	<.5	0.405	<.1	<.005	0.047	0.05
#4 Field Drainage to R/R 450'E. of 002	8.22	94	0.46	648	172	6	<.03	<.5	<.005	<.5	0.115	<.1	0.008	0.012	0.05
#5 R/R 300'E. of 002	7.60	43	0.90	240	118	22	<.03	<.5	<.005	8.0	0.569	<.1	0.028	0.222	0.88
#6 Outfall 002	7.26	152	1.90	1764	840	2.0	1.80	<.5	<.005	<.5	0.102	<.1	<.005	0.010	1.40
#7 Field Drainage 75'W of 002	7.20	165	0.80	727	228	39	0.20	<.5	<.005	2.7	1.090	<.1	0.009	0.017	0.03
#8 R/R Above Questa Spring	7.14	50	0.88	268	141	21	<.03	<.5	<.005	6.2	0.573	<.1	0.029	0.207	0.88
#9 Near Questa Springs SE of Conc.Box	7.02	158	0.38	1094	504	88	<.03	<.5	<.005	8.5	2.940	<.1	0.016	0.047	0.07
#10 Near Questa Springs End of Old Pipe	7.50	177	0.60	576	210	7	<.03	<.5	<.005	<.5	<.05	<.1	0.005	0.010	0.01
#11 R/R 500'W. of Questa Springs	7.45	54	0.90	269	138	22	<.03	<.5	<.005	3.10	0.618	<.1	0.033	0.215	0.88

TABLE NO. 2. (Cont.)

WATER QUALITY SURVEY ALONG RED RIVER
BETWEEN STATE ROAD 522 AND FISH HATCERY
APRIL 12, 1993

SAMPLE SOURCE	PH	TOT ALK	F	TDS	SO4	TSS	MO	DIS. AL	CD	SUS. AL	FE	PB	CU	ZN	MN
#12 Spring–N. Side R/R Sta. 47+20	6.94	82	0.80	271	115	47	<.03	<.5	<.005	1.70	2.36	<.1	0.011	0.046	0.13
#13 R/R Sta. 47+70 Above Hatchery	7.45	51	0.90	259	128	22	<.03	<.5	<.005	3.00	0.590	<.1	0.026	0.206	0.83
#14 Spring S. Side R/R Sta. 36+80	8.14	82	0.80	304	126	<1	<.03	<.5	<.005	<.5	<.05	<.1	<.005	0.005	0.01
#15 Spring N. Side R/R Sta. 36+40	7.26	80	1.10	145	20	<1	<.03	<.5	<.005	<.5	<.05	<.1	<.005	<.005	<.0
#16 R/R Sta.	7.80	49	0.90	247	129	24	<.03	<.5	<.005	3.10	0.527	<.1	0.024	0.191	0.781
#17 Hatchery Inlet Cold Water	7.14	43	0.64	176	80		<.03	<.5	<.005	<.5	0.138	<.1	<.005	<.005	<.0
#18 Hatchery Inlet Warm Water	7.87	77	1.10	284	63		<.03	<.5	<.005	<.5	0.181	<.1	<.005	0.010	<.0
#19 Seep Water in Irrigation Ditch Above 002 Line X @ Road	7.73	174	0.54	1304	660		<.03	<.5	<.005	<.5	0.160	<.1	<.005	0.013	0.05
#20 Molycorp Drain Below Culver Above Ditch	8.10	153	1.90	1702	790		1.70	<.5	<.005	4.00	2.4	<.1	0.016	0.010	2.00

excess of 18 cfs during the first two weeks of March indicate run-off from spring snow melt along the survey reach. During the latter part of April the net gains were generally below 18 cfs because of irrigation diversions.

The USGS data also includes the river stage (gage height) at the stations on an hourly basis. The hourly data was used for determination of the specific probable stream flow at the average time of the stream survey.

Accretions to Red River

Previous studies have established that the accretion to Red River due to natural spring flow between the highway bridge and the mouth of Red River is fairly constant and amounts to approximately 32 cfs. Of this, the data indicates that 18 cfs originates above the fish hatchery. Hydro-geological analysis indicates that the majority of the spring flow is from the north side of Red River.

At the time of the stream survey, the irrigation ditches west of the highway were dry, there were no surface stream flows to the river along the survey reach and there did not appear to be any significant amount of drainage from precipitation. It is believed, therefore, that accretions to Red River at that time consisted essentially of the natural spring flow, the discharge from 002 and 003 and seepage from the tailings pond area which was not being intercepted by the 002 and 003 collection systems.

Fish Hatchery Diversions

The New Mexico Game and Fish Department has constructed facilities which intercept a large portion of the spring flow upstream of the hatchery. The intercepted spring water is transported to the hatchery by two pipelines. One pipeline extends to the large spring complex on the north side of the river at the upper end of the Red River Gorge. Water from this spring complex has a temperature of from 8°

TABLE 3
USGS STREAM FLOW DATA - CFS

	MARCH 1993					APRIL 1993				
DAY	RANGER STATION	CABR. CREEK	RS & CAB CK	BELOW F HAT	GAIN	RANGER STATION	CABR. CREEK	RS & CAB CK	BELOW F HAT	GAIN
1	22	6.2	28.2	54	25.8	31	7.8	38.8	57	18.2
2	20	5.7	25.7	51	25.3	32	8.1	40.1	59	18.9
3	19	5.6	24.6	50	25.4	32	8.2	40.2	61	20.8
4	20	5.6	25.6	50	24.4	30	7.9	37.9	58	20.1
5	20	5.6	25.6	48	22.4	33	8.4	41.4	60	18.6
6	21	5.9	26.9	51	24.1	34	8.5	42.5	61	18.5
7	22	6.2	28.2	53	24.8	34	7.8	41.8	61	19.2
8	22	6.2	28.2	55	26.8	33	8.1	41.1	60	18.9
9	23	6.3	29.3	56	26.7	33	9.5	42.5	60	17.5
10	24	6.6	30.6	55	24.4	34	10	44	61	17
11	24	6.6	30.6	54	23.4	37	11	48	62	14
12	23	6.3	29.3	52	22.7	41	11	52	65	13
13	20	5.3	25.3	47	21.7	46	12	58	70	12
14	22	6.1	28.1	49	20.9	47	12	59	77	18
15	23	6.6	29.6	48	18.4	46	12	58	79	21
16	23	6.6	29.6	49	19.4	44	12	56	79	23
17	24	6.7	30.7	50	19.3	42	11	53	79	26
18	25	6.8	31.8	51	19.2	42	12	54	70	16
19	26	6.9	32.9	52	19.1	44	12	56	71	15
20	27	7	34	52	18	44	12	56	76	20
21	28	7.3	35.3	52	16.7	48	12	60	75	15
22	30	7.4	37.4	53	15.6	57	14	71	83	12
23	30	7.7	37.7	55	17.3	73	16	89	96	7
24	31	8	39	59	20	78	21	99	107	8
25	33	8.3	41.3	59	17.7	71	19	90	102	12
26	34	8.5	42.5	58	15.5	78	20	98	102	4
27	36	8.6	44.6	63	18.4	95	24	119	119	0
28	34	8.4	42.4	58	15.6	105	26	131	129	-2
29	34	8.3	42.3	59	16.7	115	29	144	135	-9
30	33	8.2	41.2	58	16.8	122	31	153	147	-6
31	32	7.8	39.8	57	17.2					

to 10°C and is referred to as the hatchery cold water supply. The other pipeline collects water from numerous springs west of the upper end of the gorge. Water from these springs has a nominal temperature of 16°C and is referred to as the warm water supply.

It is believed that the cold water springs are fed by ground water from the alluvial aquifer east of the Guadalupe Mountain volcanic formations which flows primarily along the frontal lobe of the volcanics and/or along the easterly most volcanic formation fault zone.

The warm water springs emanate from the volcanic formations along the Red River Gorge. The higher temperature of this spring water is attributed to heat gains from the volcanic formations.

Flow meters have been installed on both the warm and cold water supplies to the hatchery. At the time of the stream survey, however, neither meter was operating properly. The hatchery superintendent advised that the warm water supply normally ranged from 4600 to 4700 gpm (10.2 to 10.5 cfs) and the cold water supply varied from 900 to 1500 gpm (2.0 to 3.3 cfs). The flow at the time of the stream survey was estimated at 10 cfs for the warm water supply and 2.7 cfs for the cold water supply.

Ambient Ground Water Quality

Table 4 lists the water analysis for a number of springs and wells up gradient or out of the tailings pond seepage flow path. Winograd in Technical Report No. 12, indicated that the quality of water in the volcanics and in the alluvium formations was nearly the same.

TABLE 4

WATER QUALITY OF SPRINGS AND WELLS IN THE VICINITY OF GUADALUPE MOUNTAINS

WATER SOURCE	LOCATION Sec	Twp	Rng	AGENCY	DATE	SPEC. COND. umhos	TDS mg/l	pH units	SO4 mg/l	CALCIUM mg/l	MAG-NESIUM mg/l	CHLORIDE mg/l	FLOURIDE mg/l	IRON ug/l	MANGANESE ug/l	MOLY-DENUM ug/l	ZINC ug/l
Big Arsenic Springs	8	28	12	USGS	10-07-80	228	161	8.2	22.0	18.0	4.8	6.9	---	<10	2	<10	---
Big Arsenic Springs	8	28	12	USGS	08-20-82	220	159	7.9	22.0	20.0	5.1	6.8	1.2	4	3	---	13
Big Arsenic Springs	8	28	12	EID	01-13-83	226	162	7.5	23.7	18.0	5.7	8.0	---	---	<10	---	<50
Big Arsenic Springs	8	28	12	EID	07-23-84	---	160	---	24.8	16.3	5.6	6.0	---	<50	<10	<50	<50
Big Arsenic-North Springs	8	28	12	EID	01-13-83	229	163	7.5	23.7	19.4	5.4	8.0	---	---	---	<10	<50
Big Arsenic-Meadow Springs	8	28	12	EID	01-13-83	192	163	7.5	23.7	19.4	5.4	8.0	---	---	<10	---	<50
Big Arsenic-Meadow Springs	8	28	12	EID	11-08-84	---	154	---	29.6	22.4	7.8	6.3	1.2	<100	<50	<10	<50
Big Arsenic-Meadow Springs	8	28	12	EID	05-30-85	---	165	---	24.5	24.0	8.3	8.6	---	110?	<50	<10	<10
Big Arsenic-High Springs	8	28	12	EID	11-08-84	---	---	---	---	21.6	3.9	---	1.08	480?	<50	<10	---
Big Arsenic-High Springs	8	28	12	EID	05-30-85	247	170	---	24.5	11.2	20.0	6.8	---	<50	<50	<10	---
Chiflo Springs				EID	05-30-85	218	---	---	26.6	22.5	17.6	7.0	---	---	---	---	---
BLM Visito Center Well	9	28	12	USGS	08-20-82	220	156	7.9	20.0	19.0	5.0	7.0	1.2	7	3	---	48
BLM Chiflo Wells	9	28	12	USGS	08-20-82	220	158	8.0	23.0	19.0	5.2	6.9	1.3	3	10	---	97
Mottle Spring-Red River	9	28	12	USGS	08-19-82	220	---	7.5	---	---	---	---	---	3	8	6	<3
Warm Spring-Red River	9	28	12	EID	02-21-84	---	164	---	21.7	24.0	5.9	9.7	---	---	<10	---	<100
MC Guadalupe Well 4 (Average of 7 samples)	22	29	12	MC	12-87	---	167	7.5	50.1	20.5	4.9	8.7	1.1	5	2	<2	150
MC Guadalupe Well 5 (Average of 5 samples)	33	29	12	MC	11-85	---	167	---	18.8	20.4	5.4	7.6	1.1	3	14	<2	40
ALLUVIUM WELLS																	
Top of World Farm	35	1	74		1955	217	136	7.7	8.8	24	5.7	5.0	0.8	---	---	---	---
Anderson Well	16	12	30		1954	194	---	7.2	---	---	---	4.5	---	---	---	---	---
Carter Farm	24	12	30		1954	190	---	---	43	36	2	18	---	---	---	---	---
WATERS APPEARING TO BE ABOVE NATURAL AMBIENT																	
Fish Hatch. Cold Springs	1	28	12	EID	10-18-84	---	306	---	70.6	50.4	7.9	5.7	0.73	<50	<50	10	<50
Spr. Across from STP	1	28	12	EID	10-15-84	---	320	7.2	81.3	50.0	8.2	6.0	0.67	<100	<50	15	---
Fish Hatch Spr. Coll. Box	2	28	12	EID	10-16-84	---	460	---	152.	84.6	14.0	7.0	0.73	<100	<50	22	<50
Fish Hatch.Warm Springs	3	28	12	EID	10-16-84	---	158	---	43.2	19.0	6.7	10.3	---	<100	<50	14	<50

Where analysis was made all samples had concentrations of cadmium, copper and lead near or below the detection limit.

Tailings Seepage Water Quality

For the analysis and this report it was assumed that the concentrations reported in Table 2 for sampling point No. 6 (002 outfall) reflected the quality of the tailings pond seepage flow.

ANALYSIS

A large part of the analysis was based on the following selected values:

Table 5

Selected Analytical Values

Element	Flow CFS	Sulfate mg/l
Red River @ Hwy.Bridge	46.0	119
Total Natural Spring Flow	18.0	20
Hatchery Warm Water Supply	10.0	63
Hatchery Cold Water Supply	2.7	80
Tailings Pond Seepage	---	840
Red River Below Fish Hatchery	66.29	---

The selected value for the flow in Red River below the fish hatchery was based on the USGS reported hourly stage reading at the estimated average time when the flow during the survey was passing by the station. The flow at the highway bridge was derived by subtracting the assumed and calculated accretions above the hatchery from the flow in Red river at the station below the hatchery. The sum of the Red River flow at the Ranger Station plus Cabresto Creek was approximately 49 cfs at that time indicating a nominal difference in the flow measurements and/or that there may have been a small amount of irrigation diversion from the reach above the highway bridge.

The ambient concentration of sulfate for the natural ground water flow was conservatively selected at 20 mg/l which is slightly below the average of the concentrations

for the springs and wells listed in Table 5. If a higher value had been used, the calculated amount of tailings pond seepage flow would have been slightly less.

Other values for the analysis were taken from the data base set forth herein and/or laboratory data for the survey water samples.

Additional mathematical analyses, not included herein, were made using changes in water temperature, conductivity and concentrations of other constituents. These analyses in general supported the results of the analysis based on sulfates. The results, however, appeared to be less precise.

(a.) Calculations of Total Seepage Flow.

Inflow	CFS	Mg/l SO_4
RR @ Hwy	46.0	@ 119
Natural Spring Flow	18.0	@ 20
Tailing Seepage	S	@ 840

Outflow

Red River above Hatchery	+ 46.0		
(Nat.Spring Flow	+ 18.0		
(F.H. Warm Water)	- 10.0		
(F.H. Cold Water)	- 2.7		
(Seepage Flow)	+ S		
	=	(51.3+S)	@ 129
F.H. Warm Water		10	@ 63
F.H. Cold Water		2.7	@ 80

Multiplication CFS X Conc:

$$5474 + 360 + 840S = 6618 + 129S + 630 + 216$$

by Subtraction:

$$711S = 1630$$

by Division:

S = Total tailings seepage flow = 2.29 cfs.

(b.) Warm Water Spring Flow

The stream survey found several springs along the upper part of the Red River Gorge which had sulfate concentrations somewhat higher than the ambient natural ground water. It was presumed that these springs were in the flow path of and included tailings pond seepage. An SO_4 concentration of 120 mg/l was selected as being representative of these springs.

No springs with elevated SO_4 concentrations were detected downstream of sampling point 14 indicating that this was the westerly limit of the tailings pond seepage flow path. An SO_4 concentration of 20 mg/l was assumed for spring flow below Station 14. This value was also used for spring flow to Red River from the south. (Some of the springs along the south side of Red River had elevated SO_4 concentrations indicating that ground water from the north was flowing beneath Red River with discharge at fissures along the south shoreline).

Based on SO_4 concentrations of 20 mg/l for the natural ground water and 840 mg/l for seepage water, the spring water which had a concentration of 120 mg/l consisted of 87.8% of natural ground water and 12.2% seepage water.

The warm water supply to the fish hatchery is composed of both spring water from the flow path down gradient of the tailings ponds (120 mg/l) and spring water west of the flow path and from the south (20 mg/l). The laboratory analysis of the combined hatchery warm water supply

indicated a SO_4 concentration of 63 mg/l. Mathematical calculations therefore indicate that 43% of the warm water supply consisted of spring flow within the pond seepage flow path (120 mg/l) and 57% from spring flow outside the seepage path (20 mg/l).

The estimated warm water hatchery supply was 10 cfs. Calculations indicated that this consisted of 5.70 cfs of spring water from outside the seepage path (20 mg/l) and 2.27 cfs of spring flow within the seepage path (120 mg/l).

The 2.27 cfs of spring flow within the seepage path was composed of:

1.99 cfs of natural ground water flow

0.28 cfs pond seepage flow.

(c.) Hatchery Cold Water Supply

The hatchery cold water supply is obtained from the spring complex on the north side of Red River near the upper end of the Red River Gorge. The cold water supply was estimated to be 2.7 cfs at a SO_4 concentration of 80 mg/l. Based on the selected values of 20 mg/l for natural ground water flow and 840 mg/l for pond seepage water, the cold water supply consists of 2.50 cfs of natural ground water flow and 0.20 cfs of seepage flow.

(d.) Balance of Accretions to Red River

Subtraction of the determined discharges (F.H. warm and cold water supplies and discharge from 002) from the total calculated accretion (18.0 cfs spring flow plus 2.29 cfs seepage flow) leaves a balance of 6.99 cfs at an average SO_4 concentration of 133.8 mg/l to be accounted for. The assumed sources of the unaccounted for accretion were:

(1.) Warm spring flow direct to Red River from west of the pond seepage path and from the south side.

(2.) Warm spring flow within the pond seepage path direct to Red River.

(3.) Cold spring flow direct to Red River from the spring complex near the upper end of the gorge.

(4.) Field drainage and alluvial ground water flow upstream of the Red River Gorge.

It was found that there were too many variables for mathematical determination of the distribution of the remaining amount of accretion to the various sources. Calculations based on assumed allocations, however, revealed that there was a fairly narrow range of possible flows from each source which would total 6.99 cfs at an average concentration of 133.8 mg/l SO_4.

Assumptions used to arrive at the most probable allocation included:

(1.) The warm water spring flow direct to Red River probably consisted of spring water flow outside the pond seepage path approximately in the same ratio to spring flow within the seepage path as contained in the warm water supply line (i.e. 57% - 43%) and that the SO_4 concentrations were probably nearly the same.

(2.) The cold water spring flow direct to Red River probably has the same SO_4 concentration as the cold water supply to the hatchery. (Water samples from stations 9 and 10 are believed to be from field drainage and shallow alluvial ground water flow rather than from the main cold water spring flow.)

(3.) The significant increases in river water temperature indicates that a large part of the unaccounted for accretion is from warm water spring flow.

(4.) There is a significant amount of field drainage and shallow ground water flow from the alluvial formation upstream from the large spring complex at the upper end of the Red River Gorge. Such is evidenced by the fairly significant indicated increase in the

indicated SO_4 concentration in the vicinity of sampling point No. 8. The average SO_4 concentration of the field sampling points (Stations 3, 4, 7, 9 and 10) is 240 mg/l. This value was assumed to be representative of the field drainage and flow from the shallow alluvium.

(5.) Accretions with a SO_4 concentration in excess of 134 mg/l must be present to offset the accretions from the cold and warm water springs which have concentrations of less than 134 mg/l.

Based on the above assumptions and other valid considerations, the most probable distribution of the unaccounted for accretions appeared to be as follows:

(a.) Warm water spring flow from the north side of Red River west of the pond seepage path plus spring flow from the south side of Red River. ---2.81 cfs @ 20 mg/l SO_4.

(b.) Warm water spring flow direct to Red River within the seepage path of the tailings pond area --- 1.65 cfs @ 120 mg/l SO_4. (This flow would consist of about 1.45 cfs of natural ground water and 0.20 cfs of seepage water.)

(c.) Cold water spring flow direct to Red River -- 0.40 cfs @ 80 mg/l SO_4. (Composed of .37 cfs of natural ground water and 0.03 cfs seepage flow.)

(d.) Field drainage and shallow alluvial flow east of the cold water spring complex -- 2.67 cfs @ 240 mg/l SO_4. (Composed of 2.02 cfs natural ground water flow and 0.74 cfs of seepage flow).

A schematic diagram showing the above distribution of accretion flow and all of the other measured and derived spring and river flows and SO_4 concentrations is included at the end of this report.

SUMMARY AND CONCLUSIONS

At the time of the stream survey (April 12, 1993) the quality of the water in Red River (relative to constituents associated with Molycorp's operations) was better below the fish hatchery than at the State Highway bridge. The sulfate concentration was nearly the same. The concentrations of aluminum, iron, copper, zinc and manganese were all lower at the downstream point. Concentrations of molybdenum, cadmium and lead at both the upstream and downstream ends of this reach, were all below the detection limits for the laboratory methods used. Except for manganese, all constituents analyzed were below drinking water and stream water quality standards. The high manganese concentration are due to concentrations in the river upstream of the tailings pond area.

The quality of the natural ground water in the area is excellent. The average sulfate concentration is low at only slightly more than 20 mg/l.

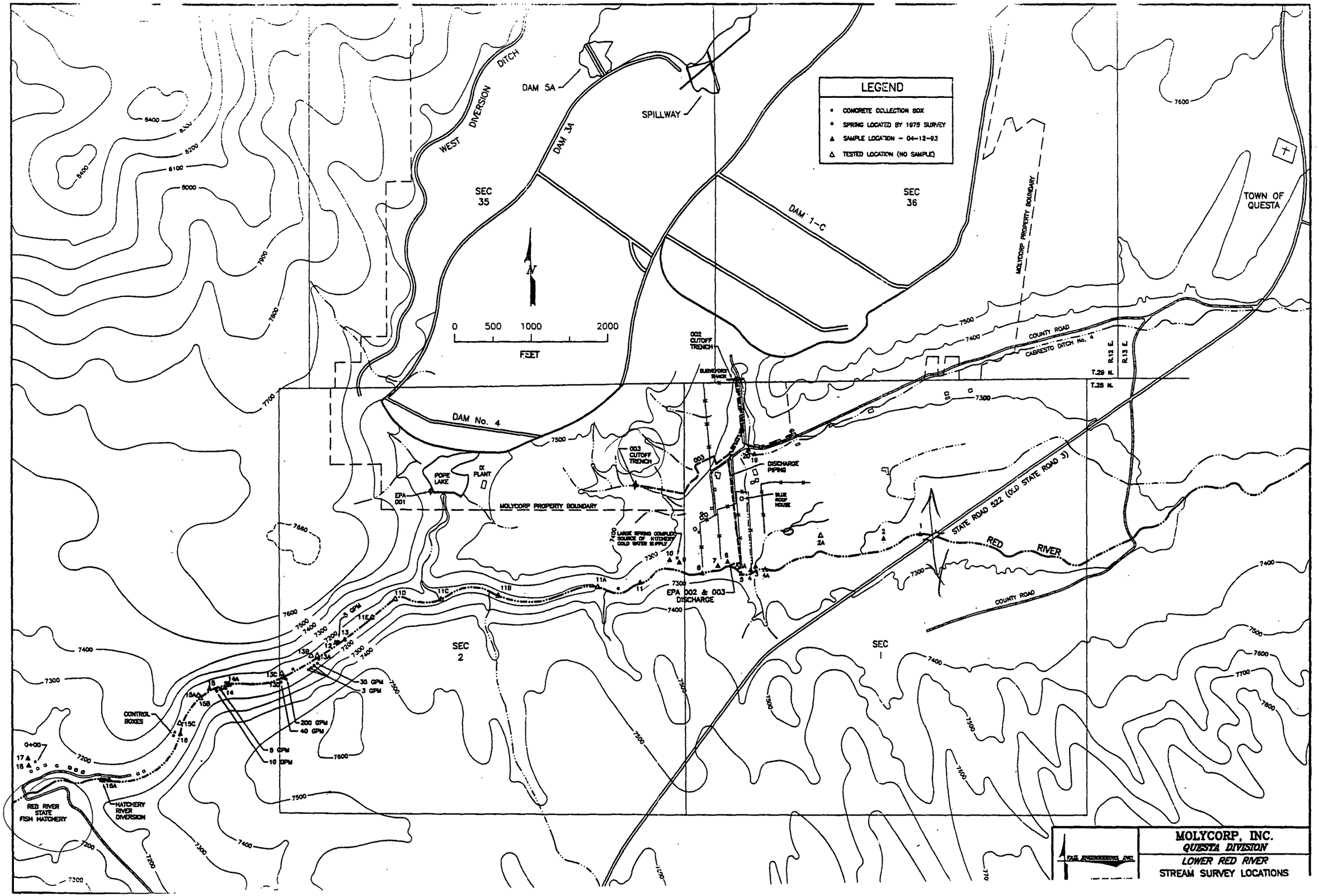
Except for TDS and SO_4; the seepage flow from the tailings ponds compares favorably with Red River water quality.

The majority of the natural spring flow along the survey reach is intercepted by the fish hatchery water supply system. Analysis of the hatchery water supply indicates a moderate increase in sulfate; however, the concentration (63 - 80 mg/l) is still far below drinking and ground water standards. The maximum SO_4 concentration found for any individual spring was 126 mg/l. (Sampling

points 9 and 10 are believed to be field drainage and shallow alluvium aquifer flow rather than spring flow.)

High concentrations of sulfate (660 - 690 mg/l) were found down gradient of the junction manhole from 002 and 003 which is located in the natural drainage channel below Dam No. 1. and about 1/4 mile north of Red River. Other data indicates elevated SO_4 concentrations in some monitor and private wells in and down gradient of this area. The highest SO_4 concentration detected near the river was 504 mg/l at Station No. 9. We believe that the field drainage below Dam No. 1 and 003 is concentrated at this location. Molycorp is presently investigating the feasibility of constructing additional seepage barriers and/or other facilities to substantially reduce the seepage flow down gradient of the tailings ponds in this area.

Data from the stream survey indicates that at that time, the total tailings pond seepage flow entering Red River (including the fish hatchery supply) was about 2.29 cfs (including discharge from 002 and 003). Of this about 0.6 cfs was flowing from 002 and 003. 0.7 cfs were in the field drainage and shallow alluvium aquifer flow east of the volcanic formations. These seepage flows are presumably from the tailings ponds in Section 36 and the easterly part of the tailings ponds in Section 35. An additional seepage flow of about one cfs was indicated to be contained in the cold spring flow at upper end of the gorge and in the warm springs along the gorge. It is believed that this seepage flow is from the west side of the pond area in Section 35 and from the pond area above Dam No. 5. Survey data indicates that the seepage path from these areas extends downstream to within about 1/2 mile east of the fish hatchery.


LEGEND
CONCRETE COLLECTION BOX
SPRING LOCATED BY 1975 SURVEY
SAMPLE LOCATION - 04-12-93
TESTED LOCATION (NO SAMPLE)
WEST DIVERSION DITCH
DAM 5A
DAM 3A
SPILLWAY
DAM 1-C
SEC 35
SEC 36
SEC 2
SEC 1
TOWN OF QUESTA
MOLYCORP PROPERTY BOUNDARY
COUNTY ROAD
CABRESTO DITCH No. 4
T.29 N.
T.28 N.
R.12 E.
R.13 E.
0 500 1000 2000
FEET
002 CUTOFF TRENCH
SURVEYORS SHACK
DAM No. 4
003 CUTOFF TRENCH
POPE LAKE
EPA 001
IX PLANT
DISCHARGE PIPING
BLUE ROOF HOUSE
LARGE SPRING COMPLEX SOURCE OF HATCHERY COLD WATER SUPPLY
EPA 002 & 003 DISCHARGE
STATE ROAD 522 (OLD STATE ROAD 3)
RED RIVER
COUNTY ROAD
CONTROL BOXES
RED RIVER STATE FISH HATCHERY
HATCHERY RIVER DIVERSION
30 GPM
3 GPM
200 GPM
40 GPM
5 GPM
10 GPM
MOLYCORP, INC.
QUESTA DIVISION
LOWER RED RIVER
STREAM SURVEY LOCATIONS

State of New Mexico
ENVIRONMENT DEPARTMENT
Surface Water Quality Bureau
1190 St. Francis Dr., P.O. Box 26110
Santa Fe, New Mexico 87502
Phone (505) 827-0187
Fax (505) 827-0160

GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
SECRETARY

June 3, 1999

RECEIVED
JUN 07 1999
6WQ-PO

Jane Watson, Ph.D.
Section Chief, Permits Section (6WQ-PP)
U.S. Environmental Protection Agency
1445 Ross Ave.
Dallas, Texas 75202

Re: **NPDES Permit NM0022306 - Molycorp, Inc.**

Dear Dr. Watson:

This letter is in response to your request for information needed to draft a revised National Pollutant Discharge Elimination System (NPDES) permit for the referenced facility.

The Surface Water Quality Bureau (SWQB) has reviewed the available stream flow information for the receiving stream associated with this facility in an effort to determine the critical low flow as described in §1105 of the State of New Mexico *Standards for Interstate and Intrastate Streams* (WQS) [20 NMAC 6.1]. We have also identified the WQS stream segment that receives the discharged effluent and other pertinent information to assist the permit writer.

Also included is information on local endangered aquatic species. This information is provided only as an advisory to the permit writer and does not replace or supersede any comments which may be provided to the EPA by the U. S. Fish and Wildlife Service or the New Mexico Game and Fish Department.

Molycorp, Inc. - NPDES Permit No. NM0022306

Receiving Stream: Red River thence to the Rio Grande.

WQS Stream Segment: This discharge enters a perennial reach of the Red River which is a tributary to the Rio Grande. The Red River and the Rio Grande are classified in segment 2119 in the WQS. The Red River is water-quality limited for aluminum, cadmium, copper, and zinc (see "TMDL Status" below). This segment has designated uses of coldwater fishery, fish culture, irrigation, livestock watering, wildlife habitat, and secondary contact.

The lower four miles of the Red River and the Rio Grande at the confluence were designated as Wild and Scenic Rivers" by Congress in 1968.[1] The antidegradation policy in the WQS (§1101) states in relevant part:

> *...[n]o degradation shall be allowed in high quality waters of designated national and state monuments, parks and wildlife refuges* ***including waters designated by the U.S. Congress under the Wild and Scenic Rivers Act****, if such degradation would impair any of the qualities which caused designation of these waters, parks and wildlife refuges. To protect the existing quality of water, the Commission under that Act will require the highest and best degree of effluent treatment practicable* (emphasis added).

Molycorp's outfall 001 is located the farthest downstream of their four outfalls. The point where outfall 001 enters the Red River is approximately 0.6 miles upstream of the four-mile segment designated as a "Wild and Scenic River."

4Q3 Critical Low Flow: The nearest flow gage is USGS Gaging Station **08265000 - Red River near Questa, NM**. A copy of the gage description is enclosed.[2] The 4Q3 critical low flow for the period record (1943-1997) at this gage is 7.05 ft^3/second (cfs).[3] This gage is:

approximately 2.3 miles downstream of outfall 004;
approximately 5.5 miles downstream of outfall 005;
approximately 3.0 miles upstream of outfall 002; and
approximately 3.8 miles upstream of outfall 001.

Upstream Water Quality: The Molycorp outfalls are spread over approximately eight river miles. Outfalls 005 and 004 (the upper outfalls) are upstream in the general vicinity of the mine, while outfalls 002 and 001 (the lower outfalls) are downstream in the vicinity of the Village of Questa and the tailings disposal area. Ambient data collected by NMED on the Red River may be accessed through STORET.[4] NMED's monitoring station upstream of all outfalls can be accessed through STORET (Station Name = **Red River above Molycorps Boundary**, Agency Code = 21NMEX, Station = URG120.028045). The distance between the upper and lower outfalls is approximately 4¾ miles (between outfall 004 to 002). To NMED's knowledge, since outfalls 004 & 005 were permitted in 1993, Molycorp has never reported a discharge from either outfall. Therefore, EPA may wish to review ambient water quality data collected from the Red River just above the lower outfalls. Ambient water quality data collected by NMED on the Red River above the lower outfalls can be accessed through two separate STORET stations (Station Name = **Lower Red River at USGS Gage**, Agency Code = 21NMEX, Station = HRG24) and Station Name = **Red River at HWY 3 Bridge**, Agency Code = 21NMEX, Station = HRG25). STORET retrieval printouts of selected water quality parameters from the NMED stations are provided with this letter.

A number of ambient water quality surveys and reports have been conducted on the Red River and its tributaries. Copies of the reports resulting from the studies have been provided to the EPA in the past. Due to the volume of these reports, copies are not included with this letter. However, all of the following reports are available upon request:

Slifer, D. 1996. Red River Groundwater Investigation. NMED/SWQ-96/1.

Smolka, L.R., and D.F. Tague. 1988. Intensive Water Quality Survey of the Middle Red River in Taos County, New Mexico, September 12 to October 25, 1988. EID/SWQ-88/8. 89 p.

Smolka, L.R., and D.F. Tague. 1986. Intensive Survey of the Red River, Taos County, New Mexico, August 18-21, 1986. EID/SWQ-86/22. 55 p.

Jacobi, G.Z., and L.R. Smolka. 1986. Water Quality Survey of the Red River, Taos County, New Mexico, April 15-17, 1985. EID/SWQ 2-120 86/11. 63 p.

Jacobi, G.Z., and L.R. Smolka. 1984. Intensive Survey of the Red River in the Vicinity of the Red River and Questa Wastewater Treatment Facilities and the Molycorp Complex, Taos County, New Mexico, January 25-27, 1984. EID/SWQ-84/1. 29 p.

Smolka, L.R. 1993. Special Water Quality Survey of the Red River, Taos County, New Mexico, February - December, 1992, p. 107-136. *In* Intensive Water Quality Stream Surveys, 1992. NMED/SWQ-93/1. 138 p.

Environmental Improvement Division. 1982. Point Source Waste Load Allocation for the Town of Red River, Taos County, New Mexico. 40 p.

Smolka, L.R. 1992. Intensive Water Quality Survey of Tributaries to the Red River: Cabresto, Columbine, Pioneer, Mallette and Goose Creeks in Taos County, New Mexico, April 1-4, 1991, p. 21-40. *In* Intensive Water Quality Stream Surveys and Lake Quality Assessment Surveys, 1991. NMED/SWQ-92/2 244 p.

Effluent Quality Data: Effluent data collected by NMED can be accessed through STORET (Station Name = **Molycorp-Questa**, Agency Code = EFNM1, Station = NM0022306. A STORET retrieval printout of selected water quality parameters from the NMED station is provided with this letter.

Aquatic Endangered Species: None known.

TMDL Status: The Consent Decree signed in resolution of the lawsuit entitled **Forest Guardians and Southwest Environmental Center v. Carol Browner** (CIV. NO. 96-0826 LH) defines and schedules "bundles" of waters for which Total Maximum Daily Loads (TMDLs) are to be developed. The Decree is based, largely but not wholly, on the 1996-1998 Clean Water Act §303(d) list for New Mexico. The Red River is not included in the TMDL development schedule established in the Decree.

The 1998-2000 Clean Water Act section §303(d) list for New Mexico was completed and approved by EPA last year.[5] The Red River from its mouth on the Rio Grande to Placer Creek was retained as a "priority 1" on the list. The NMED is currently pursuing development of a TMDL for the Red River watershed independent of the schedule developed under the aforementioned Decree. A comprehensive special stream study covering three seasons is being conducted in conjunction with the TMDL effort. The first sampling "run" took place during the week of May 9, 1999. When complete, a final report of the stream survey will be published by the SWQB. The tentative title of that report will be:

Hopkins, J.S. 2000. Special Water Quality Survey of the Red River and its Tributaries, Taos County, New Mexico, May - September, 1999. [In preparation].

The target date for completion of the Red River TMDL (including WQCC review/adoption) is December 31, 2000.

Status Under Unified Watershed Assessment: This facility is located within a watershed (USGS HUC 13020101) defined by the State's *Clean Water Action Plan - Unified Watershed Assessment* as a "Category 1." Category 1 watersheds are defined as "watersheds in need of restoration." These watersheds have been further prioritized, and the involved watershed ranks high in the watershed prioritization scheme.

NPDES Storm Water General Permit: As previously mentioned there are four outfalls permitted in the existing individual NPDES permit. In addition to the discharges covered under the individual permit, Molycorp is also currently permitted by the EPA's "NPDES Storm Water Multi-Sector General Permit for Industrial Activities" (NMR05A223) for other storm water discharges.

The Surface Water Quality Bureau recommends EPA consider incorporating storm water discharges currently

covered under the general permit into the individual permit and subsequent discontinuance of the general permit coverage for Molycorp. The following points should be reviewed in this consideration. The multi-sector general permit requires that:

1) "[a]ll metal mining facilities shall monitor for COD, TSS, NO_3+NO_2, TKN, NH_3, total Hg; in addition all permittees in the SIC code for metals mining shall monitor for any heavy metal which the permittee has reason to believe may be present in storm water runoff from the facility";[6]

2) "[s]torm water discharges associated with industrial activity that the New Mexico Environment Department (NMED)/Surface Water Quality Bureau has determined to be, or may reasonably be expected to be, contributing to a violation of a water quality standard are not authorized by this permit. Upon receipt of this determination, the NMED anticipates that the EPA will notify the general permittee within a reasonable period of time to apply for and obtain an individual NPDES permit for these discharges according to 40 CFR 122.28(b)(3)."[7]

As previously noted, the Red River is currently listed on the New Mexico §303(d) list, and is therefore by definition an impaired water not meeting water quality standards. The most efficient, and perhaps only way, for the "waste load allocation" portion of a TMDL to address all "point sources" within the watershed is for them to be under individual permits. Therefore administrative efficiency and ability to properly address all point sources in a TMDL may be gained through consolidation of general and individual permits for this facility.

Other Facility Status Information: NMED last conducted a compliance inspection of the facility on behalf of EPA on June 12, 1998. A copy of the inspection report was submitted to the EPA Region 6 Compliance Assurance and Enforcement Division.

It is our understanding Molycorp is currently being considered by EPA for listing on the National Priority List established under the Comprehensive Environmental Response Compensation and Liability Act ("Superfund"). SWQB recommends EPA coordinated internally as appropriate regarding this issue.

Comments: SWQB is concerned about known ground water seeps entering the Red River from, and in the vicinity of, Molycorp's property. The seepages in question are known to adversely impact water quality of the Red River. There are two general areas where seepages occur; near the mine in the upper canyon and below the tailings disposal area more proximal to the Village of Questa. In a January 30, 1996, letter to EPA, NMED brought to EPA's attention Molycorp's 1993 report entitled "Analysis of Tailings Pond Seepage Flow to Red River" which quantified discharges from the tailings area to the Red River. EPA never responded to NMED's letter. Additionally, EPA has reviewed SWQB's "Red River Ground Water Investigation" submitted to EPA in March, 1996 which EPA funded in part through a Clean Water Act §319 grant. EPA has further reviewed the issue through its own investigation summarized in a report by David Abshire. A citizen suit pursuant to §505 of the Clean Water Act has been filed regarding these issues and Molycorp has expressed its opinion of the seeps through their NPDES permit application. SWQB believes the EPA needs to explicitly address this issue. A complete inventory of all point source discharges is required to perform the TMDL allocation process. SWQB understands the issue of whether these seeps are NPDES point source discharges to waters of the Unites States is contentious. Resolution of this issue is critical to properly forward the TMDL and the NPDES permit reissuance efforts.

If you have any questions, please contact me at (505) 827-2827.

Sincerely,

Glenn E. Saums
Health Program Manager
Point Source Regulation Section
Surface Water Quality Bureau

cc: (w/ enclosures)
Mr. David Shoemaker, Molycorp, Inc.

cc: (w/o enclosures)
Mr. Tim Herfel, USEPA (6WQ-AT)
Ms. Sharon Parrish, USEPA (6WQ-EW)
Mr. David Hogge, NMED - SWQB

Enclosures
USGS Gage Description
STORET Retrieval (NMED Upstream Ambient Water Quality)
STORET Retrieval (NMED Effluent Water Quality)

References:

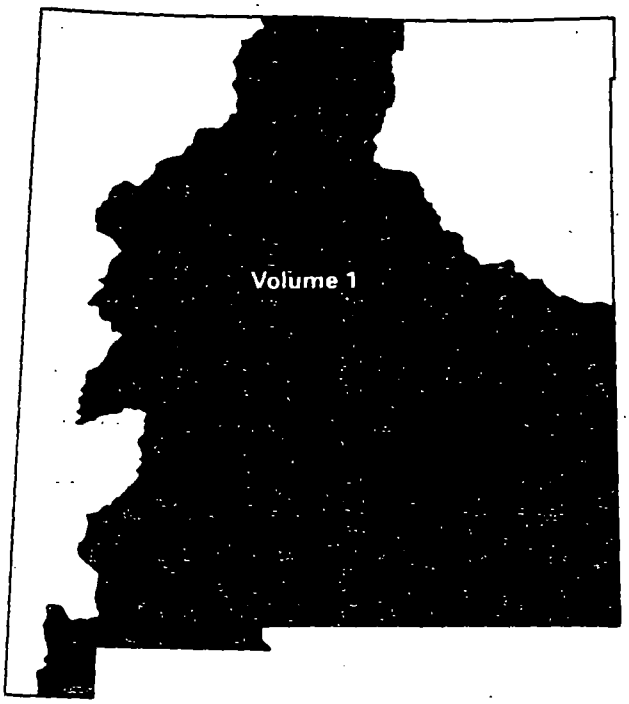
1. Wild and Scenic Rivers Act (16 U.S.C. 1271 *et seq.*)
2. Water Resources Data New Mexico Water Year 1998. U.S. Geological Survey Water-Data Report NM-98-1. Volume 1, Pages 48-49.
3. Calculated using Hydrotec©, a proprietary software developed by Science Technology Associates.
4. EPA's national water quality database.
5. Letter from William Hathaway, EPA to Mark Weidler, NMED dated June 29, 1998.
6. *Federal Register* September 29, 1995 (60 FR 51258). Final National Pollutant Discharge Elimination System Storm Water Multi-Sector General Permit for Industrial Activities. State specific requirements.
7. *Federal Register* August 7, 1998 (63 FR 42547). National Pollutant Discharge Elimination System Storm Water Multi-Sector General Permit Modification for Industrial Activities. State specific requirements.

USGS
science for a changing world

Water Resources Data New Mexico Water Year 1998

Volume 1. The Rio Grande Basin, the Mimbres River Basin, and the Tularosa Valley Basin

Water-Data Report NM-98-1



U.S. Department of the Interior
U.S. Geological Survey

Prepared in cooperation with the
State of New Mexico
and with other agencies

08265000 RED RIVER NEAR QUESTA, NM

LOCATION.--Lat 36°42'12", long 105°34'04", in NE¼SE¼ sec.32, T.29 N., R.13 E. (projected), Taos County, Hydrologic Unit 13020101, in Carson National Forest, on left bank 1.3 mi upstream from Cabresto Creek, 1.5 mi east of Questa, and at mile 9.0.

DRAINAGE AREA.--113 mi^2.

PERIOD OF RECORD.--April to October 1910 and January to September 1911 (gage heights and discharge measurements only), October 1912 to March 1924, May 1924 to September 1925, January to March 1926, September 1926 to current year. Monthly discharge only for some periods, published in WSP 1312. Published as "Rio Colorado above Questa" 1910-11, 1926-30, and as "Rio Colorado near Questa" 1912-25, 1930-48.

REVISED RECORDS.--WSP 808: 1935. WSP 1392: 1913, 1932, 1941, 1947-48. WSP 1712: Drainage area.

GAGE.--Water-stage recorder with Satellite telemetry. Wood or concrete control since Mar. 20, 1936. Datum of gage is 7,451.92 ft above National Geodetic Vertical Datum of 1929. See WSP 1923 for history of changes prior to Oct. 4, 1938.

REMARKS.--Records good except for estimated daily discharges, which are fair. Diversions for irrigation of a few hundred acres upstream from station. Figures of discharge do not include flow in South ditch which diverts from left bank 1,500 ft upstream and bypasses gage for irrigation and stock water downstream. January 1966 to December 1991 surface and ground-water diversions by Molybdenum Corp. of America (Molycorp) refinery 5.5 mi upstream bypass gage in tailings pipelines on left bank and discharge into settling pond 3 mi downstream. Effluent from this pond enters Red River as surface water and is included in discharge at Red River below Fish Hatchery, near Questa (station 08266820). Several observations of water temperature were made during year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1997 TO SEPTEMBER 1998
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	20	e9.2	13	17	13	22	65	130	60	59	39
2	22	21	e9.0	15	17	13	23	73	138	60	53	47
3	22	21	e9.3	e14	18	13	22	84	139	62	49	39
4	23	21	9.9	e13	17	14	24	95	137	62	54	37
5	22	21	8.9	e15	16	13	25	102	124	65	58	35
6	22	21	9.5	17	14	13	25	102	112	62	50	34
7	23	21	e9.6	10	13	15	25	92	107	71	46	32
8	31	22	e9.3	12	13	15	24	89	105	92	44	30
9	26	23	e9.0	16	11	15	24	82	102	78	44	29
10	24	e20	e8.9	e15	11	14	24	88	98	78	42	29
11	23	e17	e8.0	e16	11	15	25	97	96	70	43	30
12	26	e15	6.6	e14	12	17	29	99	87	65	43	29
13	23	e13	7.6	e17	14	15	29	99	84	62	44	29
14	23	e12	8.3	e17	13	14	29	100	85	61	e39	28
15	23	e10	9.4	15	12	14	29	95	82	57	e36	27
16	22	9.8	e9.2	20	12	15	29	90	80	57	e35	29
17	22	e9.6	e9.0	18	12	14	27	88	81	60	e34	28
18	23	e9.4	e9.0	18	13	16	24	93	75	53	e36	e26
19	24	e9.2	e8.9	17	12	16	21	102	70	50	34	e24
20	24	e9.0	e9.0	18	12	17	22	111	68	52	37	e22
21	23	e8.8	e9.3	15	14	18	22	132	67	50	38	e20
22	20	e9.0	e9.0	14	15	18	24	139	66	48	46	e18
23	19	e9.2	e8.9	15	13	19	34	130	65	55	43	e16
24	21	e9.4	e9.2	16	12	22	56	121	68	47	39	e15
25	19	e9.5	e8.8	17	12	22	67	118	67	43	38	e16
26	18	e9.3	8.3	18	11	23	68	115	64	52	36	17
27	19	e9.4	9.0	18	14	24	60	116	63	64	34	15
28	19	e9.2	9.5	17	15	21	55	121	62	58	32	14
29	19	e9.0	11	17	---	21	50	123	61	56	31	18
30	18	e9.3	12	18	---	22	54	129	61	55	32	27
31	18	---	12	18	---	23	---	130	---	59	33	---
TOTAL	683	417.1	284.6	493	376	524	992	3220	2644	1864	1282	799
MEAN	22.0	13.9	9.18	15.9	13.4	16.9	33.1	104	88.1	60.1	41.4	26.6
MAX	31	23	12	20	18	24	68	139	139	92	59	47
MIN	18	8.8	6.6	10	11	13	21	65	61	43	31	14
AC-FT	1350	827	565	978	746	1040	1970	6390	5240	3700	2540	1580

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1998, BY WATER YEAR (WY)

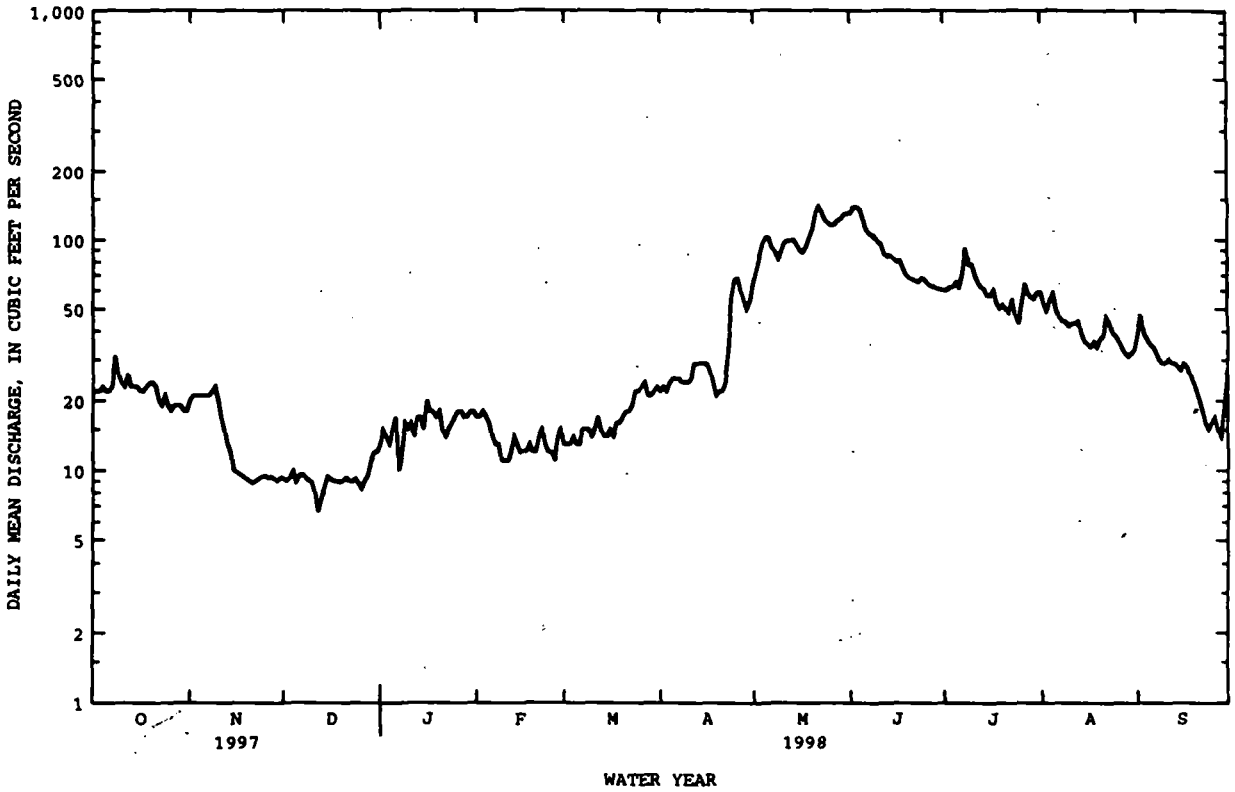
MEAN	23.0	17.0	12.2	12.3	12.7	16.0	37.1	117	140	64.3	39.9	29.1
MAX	38.1	32.8	25.3	25.2	22.8	40.0	84.1	267	405	172	70.6	62.2
(WY)	1986	1987	1994	1994	1988	1989	1985	1979	1979	1979	1966	1991
MIN	7.93	8.09	3.88	3.91	4.81	5.11	9.73	17.5	22.7	14.6	11.8	8.81
(WY)	1973	1977	1975	1973	1977	1977	1971	1971	1977	1971	1972	1978

08265000 RED RIVER NEAR QUESTA, NM--Continued

SUMMARY STATISTICS	FOR 1997 CALENDAR YEAR		FOR 1998 WATER YEAR		WATER YEARS 1966 - 1998	
ANNUAL TOTAL	19827.5		13578.7			
ANNUAL MEAN	54.3		37.2		[a]43.5	
HIGHEST ANNUAL MEAN					87.6	1979
LOWEST ANNUAL MEAN					11.8	1971
HIGHEST DAILY MEAN	347	Jun 5	139	May 22	557	Jun 9 1979
LOWEST DAILY MEAN	6.6	Dec 12	6.6	Dec 12	2.5	Jan 6 1971
ANNUAL SEVEN-DAY MINIMUM	8.2	Dec 8	8.2	Dec 8	3.1	Jan 2 1973
INSTANTANEOUS PEAK FLOW			149	May 22	[b]886	May 25 1942
INSTANTANEOUS PEAK STAGE			3.13	May 22	5.80	Jun 8 1979
INSTANTANEOUS LOW FLOW			4.1	Jan 7	.60	Jan 21 1981
ANNUAL RUNOFF (AC-FT)	39330		26930		31520	
10 PERCENT EXCEEDS	176		89		108	
50 PERCENT EXCEEDS	24		23		22	
90 PERCENT EXCEEDS	9.3		9.5		8.0	

e Estimated

[a] Average discharge for 52 years (water years 1913-25, 1927-65), 55.9 ft^3/s, 40,500 acre-ft/yr, prior to extensive upstream diversions by Molycorp.
[b] From rating curve extended above 450 ft^3/s.



URG120.028045 URG120028045
36 41 55.0 105 28 46.0 5
RED RIVER ABOVE MOLYCORPS BOUNDARY
35055 NEW MEXICO TAOS
WESTERN GULF 120900
UPPER RIO GRANDE ABOVE THE PECOS RIVER
21NMEX 881217 13020101
0000 FEET DEPTH 2490 METERS ELEVATION
21M SOUTHERN ROCKIES

/TYPA/AMBNT/STREAM/BIO

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00400 PH SU	00900 TOT HARD CACO3 MG/L	00530 RESIDUE TOT NFLT MG/L	70300 RESIDUE DISS-180 C MG/L	01106 ALUMINUM AL,DISS UG/L	01105 ALUMINUM AL,TOT UG/L	01000 ARSENIC AS,DISS UG/L	01002 ARSENIC AS,TOT UG/L	01010 BERYLIUM BE,DISS UG/L
88/03/25	1721	WATER		9.0	6.80		6	214					
88/09/13	1040	WATER		8.5	7.25	183	611	198	50	8900		12	
88/09/20	1015	WATER		5.8	7.90	188	10	144	140	600		5K	
88/09/26	0915	WATER		5.4	7.50	170	6	150	100	700		5K	
88/10/25	1300	WATER		6.0	7.80	134	3	174		1075		5K	
92/02/26	1230	WATER		2.1	8.00	166	6	232	100K	1300	5K		100.00K
92/03/25	1205	WATER		5.0	7.70	144	20	230	100K	1700	5K		100.00K
92/04/29	1145	WATER		7.2	7.50	69	206	108	100	6800	5K		100.00K
92/05/27	1215	WATER		8.5	7.70	66	16	118					
92/06/30	1205	WATER		11.0	7.70	86	7	118					
92/07/29	1200	WATER		12.0	8.10	114	6	146					
92/08/26	1145	WATER		12.0	8.10	121	9	145					
92/09/30	1015	WATER		5.3	7.60	135	8	190					
92/10/28	0905	WATER		3.9	7.30	134	8	196					
92/11/24	1155	WATER		.1	7.50	146	8	246					
92/12/16	1125	WATER		.2	7.50	141	8	204					

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36 41 55.0 105 28 46.0 5
RED RIVER ABOVE MOLYCORPS BOUNDARY
35055 NEW MEXICO TAOS
WESTERN GULF 120900
/TYPA/AMBNT/STREAM/BIO
UPPER RIO GRANDE ABOVE THE PECOS RIVER
21NMEX 881217 13020101
0000 FEET DEPTH 2490 METERS ELEVATION
21M SOUTHERN ROCKIES

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01012 BERYLIUM BE,TOT UG/L	01020 BORON B,DISS UG/L	01022 BORON B,TOT UG/L	01025 CADMIUM CD,DISS UG/L	01027 CADMIUM CD,TOT UG/L	01030 CHROMIUM CR,DISS UG/L	01034 CHROMIUM CR,TOT UG/L	01035 COBALT CO,DISS UG/L	01037 COBALT CO,TOTAL UG/L	01040 COPPER CU,DISS UG/L
88/09/13	1040	WATER					1K	1K	5K	17			50K
88/09/20	1015	WATER					1K	1K	8	5K			50K
88/09/26	0915	WATER					1K	1K	5K	5K			50K
88/10/25	1300	WATER						1K		5K			
92/02/26	1230	WATER			100K		1K		5K		50K		100K
92/03/25	1205	WATER			100K		1K		5K		50K		100K
92/04/29	1145	WATER			100K		1K		5K		50K		100K

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36 41 55.0 105 28 46.0 5
RED RIVER ABOVE MOLYCORPS BOUNDARY
35055 NEW MEXICO TAOS
WESTERN GULF 120900
UPPER RIO GRANDE ABOVE THE PECOS RIVER
21NMEX 881217 13020101
0000 FEET DEPTH 2490 METERS ELEVATION
21M SOUTHERN ROCKIES

/TYPA/AMBNT/STREAM/BIO

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01042 COPPER CU,TOT UG/L	01049 LEAD PB,DISS UG/L	01051 LEAD PB,TOT UG/L	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	01060 MOLY MO,DISS UG/L	01062 MOLY MO,TOT UG/L	01065 NICKEL NI,DISS UG/L	01067 NICKEL NI,TOTAL UG/L	01145 SELENIUM SE,DISS UG/L
88/09/13	1040	WATER		100	10K	60	.5K	.5K	10K	10	50K	50K	5K
88/09/20	1015	WATER		50K	10K	20	.5K	.5K	10K	10K	50K	50K	5K
88/09/26	0915	WATER		50K	10K	10K	.5K	.5K	10K	10K	50K	50K	5K
88/10/25	1300	WATER		50K		5K		.5K		10K			
92/02/26	1230	WATER			5K			.5K	100K		100K		5K
92/03/25	1205	WATER			5K			.5K	100K		100K		5K
92/04/29	1145	WATER			5K			.5K	100K		100K		5K

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36 41 55.0 105 28 46.0 5
RED RIVER ABOVE MOLYCORPS BOUNDARY
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21NMEX 881217 13020101
0000 FEET DEPTH 2490 METERS ELEVATION
21M SOUTHERN ROCKIES

/TYPA/AMBNT/STREAM/BIO

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01147 SELENIUM SE,TOT UG/L	01075 SILVER AG,DISS UG/L	01077 SILVER AG,TOT UG/L	01085 VANADIUM V,DISS UG/L	01087 VANADIUM V,TOT UG/L	01090 ZINC ZN,DISS UG/L	01092 ZINC ZN,TOT UG/L	00610 NH3+NH4- N TOTAL MG/L	00619 UN-IONZD NH3-NH3 MG/L	00625 TOT KJEL N MG/L
88/03/25	1721	WATER									.250	.0003$	.100
88/09/13	1040	WATER		5K	1.0K	1.0			50K	150	.350	.001$	.800
88/09/20	1015	WATER		5K	1.0K	1.0K			50K	50K	.100K	.001$	.230
88/09/26	0915	WATER		5K	1.0K	1.0K			50K	50K	.100K	.0005$	.100K
88/10/25	1300	WATER		5K		1.0K				50K			
92/02/26	1230	WATER			100.0K		100K		100K		.210	.002$	.440
92/03/25	1205	WATER			100.0K		100K		100K		.100K	.0008$	.100K
92/04/29	1145	WATER			100.0K		100K		100K		.100K	.0006$	.500
92/05/27	1215	WATER									.100K	.0010$	.390
92/06/30	1205	WATER									.100K	.001$	.100K
92/07/29	1200	WATER									.150	.005$	.410
92/08/26	1145	WATER									.270	.009$	.480
92/09/30	1015	WATER									.100K	.0006$	.100K
92/10/28	0905	WATER									.100K	.0003$	.100K
92/11/24	1155	WATER									.130	.0004$	.150
92/12/16	1125	WATER									.100K	.0003$	.100K

URG120.028045 URG120028045
36 41 55.0 105 28 46.0 5
RED RIVER ABOVE MOLYCORPS BOUNDARY
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21NMEX 881217 13020101
0000 FEET DEPTH 2490 METERS ELEVATION
21M SOUTHERN ROCKIES

/TYPA/AMBNT/STREAM/BIO

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00630 NO2&NO3 N-TOTAL MG/L	00640 T INORG. NITROGEN MG/L N	00665 PHOS-TOT MG/L P	T	00680 ORG C C MG/L	11503 RA-226 + RA-228 PC/L	39348 A-CHLRDN WHL SMPL UG/L	00720 CYANIDE CN-TOT MG/L	31616 FEC COLI MFM-FCBR /100ML
88/03/25	1721	WATER		.27	.52	.018		1.3				
88/09/13	1040	WATER		.13	.48	1.000		8.9				
88/09/20	1015	WATER		.15	.25	.310		4.5				
88/09/26	0915	WATER		.24	.34	.010		3.5				
92/02/26	1230	WATER		.29	.50	.030						
92/03/25	1205	WATER		.36	.46	.060		5.0K				
92/04/29	1145	WATER		.12	.22	.410		5.0				
92/05/27	1215	WATER		.10	.20C	.010		5.0K				
92/06/30	1205	WATER		.23	.33C	.020		1.0				
92/07/29	1200	WATER		.04K	.19C	.020		1.0				
92/08/26	1145	WATER		.19	.46C	.010		1.0				
92/09/30	1015	WATER		.25	.35C	.010		1.0				
92/10/28	0905	WATER		.23	.33C	.010		1.0				
92/11/24	1155	WATER		.36	.49C	.020		1.0				
92/12/16	1125	WATER		.41	.51C	.020		1.0K				

1THAT'S ALL FOLKS

HRG25 URG120028015 08266500
36 41 33.0 105 36 42.0 4
RED RIVER AT HWY 3 BRIDGE
35055 NEW MEXICO TAOS
NEW MEXICO 120900
WESTERN GULF RIO GRANDE
21NMEX 800607 13020101027 0006.160 ON
0003 FEET DEPTH

/TYPA/AMBNT/STREAM/BIO

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00400 PH SU	00900 TOT HARD CACO3 MG/L	00530 RESIDUE TOT NFLT MG/L	70300 RESIDUE DISS-180 C MG/L	01106 ALUMINUM AL,DISS UG/L	01105 ALUMINUM AL,TOT UG/L	01000 ARSENIC AS,DISS UG/L	01002 ARSENIC AS,TOT UG/L	01010 BERYLIUM BE,DISS UG/L
79/11/05	1715	WATER		5.0	7.20								
79/11/20	1045	WATER		2.0	7.30								
79/12/13	0800	WATER		-.5	7.20								
80/01/17	0955	WATER		1.8									
80/02/17	1545	WATER		5.3									
80/03/20	1330	WATER		9.8	7.30								
80/04/09	0845	WATER		3.0	7.30								
80/05/06	1405	WATER		10.5	7.30								
80/06/18	1600	WATER		11.9	7.40								
80/07/30	1200	WATER		14.0	7.30								
80/09/25	1600	WATER		15.2	7.30								
80/10/20	1810	WATER		8.5	7.30								
80/11/19	0915	WATER		2.0	7.30								
81/01/13	1550	WATER		2.5	7.20								
81/03/30	1250	WATER		11.0	7.30								
84/01/25	1715	WATER		.5	7.20		23						
84/01/26	0825	WATER		-.2	7.20		17						
84/01/26	1220	WATER		.0	7.00		20						
84/01/26	1615	WATER		.2	7.00		20						
84/01/26	2130	WATER		-.2	7.10		112						
84/01/27	1015	WATER		.2	7.00		22					5	
84/01/27	1215	WATER						520					
84/10/15	1420	WATER					20						
84/12/12	1450	WATER		2.8	7.30								
85/04/15	1205	WATER		8.0	7.30		65	133				5K	
85/04/16	1110	WATER		6.8	7.30		81	113				5K	
85/04/16	1510	WATER		10.1	7.30		80	110				5K	
85/04/17	1215	WATER		8.1	7.20		82	125				5K	
85/04/17	1630	WATER		8.7	7.30		80	135				5K	
86/08/18	1710	WATER		17.5	7.50		16	226		2470		5K	
86/08/19	1120	WATER		14.0	7.50		20	236		2610		5K	
86/08/19	1600	WATER		16.0	7.50		16	238					
86/08/20	0920	WATER		11.1	7.50		14	240		2540		5K	
86/08/20	1550	WATER		17.5	7.50		14	234					
88/03/25	1830	WATER		10.1	7.40		23	282					
92/02/26	1325	WATER		3.5	7.50	180	22	164	100K	4600	5K		100.00K
92/03/25	1240	WATER		7.8	7.10	167	41	270	100K	7300	5K		100.00K
92/04/29	1215	WATER		8.6	7.30	234	155	129	100K	7700	5K		100.00K
92/05/27	1250	WATER		9.0	7.60	88	48	149					
92/06/30	1240	WATER		12.8	6.70	116	10	180					
92/07/29	1240	WATER		13.5	7.60	154	10	217					

HRG25 URG120028015 08266500
36 41 33.0 105 36 42.0 4
RED RIVER AT HWY 3 BRIDGE
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21NMEX 800607 13020101027 0006.160 ON
0003 FEET DEPTH

755

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00400 PH SU	00900 TOT HARD CACO3 MG/L	00530 RESIDUE TOT NFLT MG/L	70300 RESIDUE DISS-180 C MG/L	01106 ALUMINUM AL,DISS UG/L	01105 ALUMINUM AL,TOT UG/L	01000 ARSENIC AS,DISS UG/L	01002 ARSENIC AS,TOT UG/L	01010 BERYLIUM BE,DISS UG/L
92/08/26	1225	WATER		14.5	7.70	157	16	207					
92/09/30	1100	WATER		8.3	7.30	169	17	260					
92/10/28	0935	WATER		6.5	7.30	187	12	280					
92/11/24	1245	WATER		2.3	7.00	154	16	288					
92/12/16	1215	WATER		.3	7.20	187	15	296					

HRG25 URG120028015 08266500
36 41 33.0 105 36 42.0 4
RED RIVER AT HWY 3 BRIDGE
35055 NEW MEXICO TAOS
NEW MEXICO 120900
WESTERN GULF RIO GRANDE
21NMEX 800607 13020101027 0006.160 ON
0003 FEET DEPTH

/TYPA/AMBNT/STREAM/BIO

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01012 BERYLIUM BE,TOT UG/L	01020 BORON B,DISS UG/L	01022 BORON B,TOT UG/L	01025 CADMIUM CD,DISS UG/L	01027 CADMIUM CD,TOT UG/L	01030 CHROMIUM CR,DISS UG/L	01034 CHROMIUM CR,TOT UG/L	01035 COBALT CO,DISS UG/L	01037 COBALT CO,TOTAL UG/L	01040 COPPER CU,DISS UG/L
84/01/27	1015	WATER						1					
85/04/15	1205	WATER						1		5K			
85/04/16	1110	WATER						1		47			
85/04/16	1510	WATER						1		11			
85/04/17	1215	WATER						1K		5K			
85/04/17	1630	WATER						1		10			
86/08/18	1710	WATER						1K		5K			
86/08/19	1120	WATER						1K		5K			
86/08/20	0920	WATER						1K		5K			
92/02/26	1325	WATER			100K		1		5K		50K		100K
92/03/25	1240	WATER			100K		2		5K		50K		100K
92/04/29	1215	WATER			100K		1K		5K		50K		100K

HRG25 URG120028015 08266500
36 41 33.0 105 36 42.0 4
RED RIVER AT HWY 3 BRIDGE
35055 NEW MEXICO TAOS
NEW MEXICO 120900
WESTERN GULF RIO GRANDE
21NMEX 800607 13020101027 0006.160 ON
0003 FEET DEPTH

/TYPA/AMBNT/STREAM/BIO

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01042 COPPER CU,TOT UG/L	01049 LEAD PB,DISS UG/L	01051 LEAD PB,TOT UG/L	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	01060 MOLY MO,DISS UG/L	01062 MOLY MO,TOT UG/L	01065 NICKEL NI,DISS UG/L	01067 NICKEL NI,TOTAL UG/L	01145 SELENIUM SE,DISS UG/L
84/01/27	1015	WATER				5K		.5K		10K			
85/04/15	1205	WATER		50K		10K		.5K		10K		50K	
85/04/16	1110	WATER		120		10K		.5K		10K		50K	
85/04/16	1510	WATER		50K		10K		.5K		10K		50K	
85/04/17	1215	WATER		50K		10K		.5K		10K		50K	
85/04/17	1630	WATER		50K		10K		.5K		10K		50K	
86/08/18	1710	WATER		50K		10K		.5K		10K		50K	
86/08/19	1120	WATER		50K		10K		.5K		10K		50K	
86/08/20	0920	WATER		50K		10K		.5K		10K		50K	
92/02/26	1325	WATER			5K			.5K	100K		100K		5K
92/03/25	1240	WATER			5K			.5K	100K		100K		5K
92/04/29	1215	WATER			5K			.5K	100K		100K		5K

HRG25 URG120028015 08266500
36 41 33.0 105 36 42.0 4
RED RIVER AT HWY 3 BRIDGE
35055 NEW MEXICO TAOS
NEW MEXICO 120900
WESTERN GULF RIO GRANDE
21NMEX 800607 13020101027 0006.160 ON
0003 FEET DEPTH

/TYPA/AMBNT/STREAM/BIO

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01147 SELENIUM SE,TOT UG/L	01075 SILVER AG,DISS UG/L	01077 SILVER AG,TOT UG/L	01085 VANADIUM V,DISS UG/L	01087 VANADIUM V,TOT UG/L	01090 ZINC ZN,DISS UG/L	01092 ZINC ZN,TOT UG/L	00610 NH3+NH4-N TOTAL MG/L	00619 UN-IONZD NH3-NH3 MG/L	00625 TOT KJEL N MG/L
79/11/05	1715	WATER									.012	.00003$	.260
79/11/20	1045	WATER									.016	.00004$	.140
79/12/13	0800	WATER									.020	.00003$	.030
80/01/17	0955	WATER									.054		.120
80/02/17	1545	WATER									.050		.360
80/02/25		WATER									.069		.340
80/03/20	1330	WATER									.155	.0007$	.460
80/04/04		WATER									.028		.350
80/04/09	0845	WATER									.117J	.0003$	.220
80/04/30	1515	WATER									.096		.370
80/05/06	1405	WATER									.072	.0003$	.230
80/06/04	1545	WATER									.073		.620
80/06/18	1600	WATER									.043	.0003$	.320
80/07/09	1510	WATER									.027		.370
80/07/30	1200	WATER									.054	.0003$	.210
80/08/27	1330	WATER									.134		.510
80/09/25	1600	WATER									.034	.0002$	.500
80/10/20	1810	WATER									.021	.00008$	.030
80/11/19	0915	WATER									.114	.0003$	.280
81/01/13	1550	WATER									.078	.0002$	.120
81/03/30	1250	WATER									.090	.0004$	.430
84/01/25	1715	WATER									.020	.00003$	.150
84/01/26	0825	WATER									.026	.00004$	.110
84/01/26	1220	WATER									.082	.00008$	.210
84/01/26	1615	WATER											.110
84/01/26	2130	WATER									.044	.00005$	.310
84/01/27	1015	WATER		5K						120			
84/10/15	1420	WATER									.060		.100K
84/12/12	1450	WATER									.010K	.00003$	.100
85/04/15	1205	WATER		5K		2.0K				130	.030	.0001$	.060
85/04/16	1110	WATER		5K		2.0K				120	.070	.0002$	.660
85/04/16	1510	WATER		5K		2.0K				120	.160	.0007$	.790
85/04/17	1215	WATER		5K		2.0K				120	.030	.00009$	.110
85/04/17	1630	WATER		5K		2.0K				240	.010K	.00004$	.230
86/08/18	1710	WATER		5K		1.0K				140	.140	.002$	.100
86/08/19	1120	WATER		5K		1.0K				160	.100K	.0010$	.100K
86/08/19	1600	WATER									.100K	.001$	.100K
86/08/20	0920	WATER		5K		1.0K				160	.100K	.0008$	.100K
86/08/20	1550	WATER									.100K	.001$	.100K
88/03/25	1830	WATER									.150	.0009$	.210
92/02/26	1325	WATER			100.0K		100K		300		.190	.0008$	.190

HRG25 URG120028015 08266500
36 41 33.0 105 36 42.0 4
RED RIVER AT HWY 3 BRIDGE
35055 NEW MEXICO TAOS
NEW MEXICO 120900
/TYPA/AMBNT/STREAM/BIO WESTERN GULF RIO GRANDE
21NMEX 800607 13020101027 0006.160 ON
0003 FEET DEPTH

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01147 SELENIUM SE,TOT UG/L	01075 SILVER AG,DISS UG/L	01077 SILVER AG,TOT UG/L	01085 VANADIUM V,DISS UG/L	01087 VANADIUM V,TOT UG/L	01090 ZINC ZN,DISS UG/L	01092 ZINC ZN,TOT UG/L	00610 NH3+NH4- N TOTAL MG/L	00619 UN-IONZD NH3-NH3 MG/L	00625 TOT KJEL N MG/L
92/03/25	1240	WATER			100.0K		100K		400		.100K	.0002$	.100K
92/04/29	1215	WATER			100.0K		100K		100K		.100K	.0004$	.460
92/05/27	1250	WATER									.100K	.0008$	.350
92/06/30	1240	WATER									.100K	.0001$	.150
92/07/29	1240	WATER									.100K	.001$	.100K
92/08/26	1225	WATER									.100K	.002$	.100K
92/09/30	1100	WATER									.120	.0005$	.140
92/10/28	0935	WATER									.100K	.0003$	.100K
92/11/24	1245	WATER									.100K	.0001$	.100K
92/12/16	1215	WATER									.100K	.0002$	.100K

HRG25 URG120028015 08266500
36 41 33.0 105 36 42.0 4
RED RIVER AT HWY 3 BRIDGE
35055 NEW MEXICO TAOS
NEW MEXICO 120900
WESTERN GULF RIO GRANDE
21NMEX 800607 13020101027 0006.160 ON
0003 FEET DEPTH

/TYPA/AMBNT/STREAM/BIO

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00630 NO2&NO3 N-TOTAL MG/L	00640 T INORG. NITROGEN MG/L N	00665 PHOS-TOT MG/L P	00680 T ORG C C MG/L	11503 RA-226 + RA-228 PC/L	39348 A-CHLRDN WHL SMPL UG/L	00720 CYANIDE CN-TOT MG/L	31616 FEC COLI MFM-FCBR /100ML
79/11/05	1715	WATER		.11		.040					
79/11/20	1045	WATER		.13		.010					
79/12/13	0800	WATER		.14		.020					
80/01/17	0955	WATER		.17		.030					
80/02/17	1545	WATER		.26		.030					
80/02/25		WATER		.28		.070					
80/03/20	1330	WATER		.27		.060					
80/04/04		WATER		.24		.194					
80/04/09	0845	WATER		.22		.024					
80/04/30	1515	WATER		.12		.175					
80/05/06	1405	WATER		.14		.062					
80/06/04	1545	WATER		.09		.062					
80/06/18	1600	WATER		.11		.061					
80/06/19	0930	WATER									10
80/07/09	1510	WATER		.08		.037					
80/07/29	1205	WATER									7
80/07/30	1200	WATER		.15		.053					
80/08/27	1330	WATER		.16		.170					
80/09/25	1600	WATER		.11		.020					
80/10/20	1810	WATER		.15		.068					
80/10/21	1145	WATER									10K
80/11/19	0915	WATER		.12		.006					
81/01/13	1550	WATER		.19		.012					
81/03/30	1250	WATER		.21		.027					
84/01/25	1715	WATER		.28	.30	.020					
84/01/26	0825	WATER		.39	.42	.030					
84/01/26	1220	WATER		.39	.47	.040					
84/01/26	1615	WATER		.24							
84/01/26	2130	WATER		.33	.37	.200					
84/01/27	1015	WATER		.29							
84/01/27	1215	WATER									1K
84/10/15	1420	WATER		.04K	.10K	.060					
84/12/12	1450	WATER		.24	.25C	.020					
85/04/15	1205	WATER		.12	.15C	.140					
85/04/16	1110	WATER		.13	.20C	.160					
85/04/16	1510	WATER		.14	.30C	.150					
85/04/17	1215	WATER		.09	.12C	.160				.001K	
85/04/17	1630	WATER		.01K	.02K	.160					
86/08/18	1710	WATER		.24	.38C	.020					
86/08/19	1120	WATER		.25	.35C	.020					
86/08/19	1600	WATER		.23	.33C	.020					

HRG25 URG120028015 08266500
36 41 33.0 105 36 42.0 4
RED RIVER AT HWY 3 BRIDGE
35055 NEW MEXICO TAOS
NEW MEXICO 120900
/TYPA/AMBNT/STREAM/BIO WESTERN GULF RIO GRANDE
21NMEX 800607 13020101027 0006.160 ON
0003 FEET DEPTH

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00630 NO2&NO3 N-TOTAL MG/L	00640 T INORG. NITROGEN MG/L N	00665 PHOS-TOT MG/L P	00680 T ORG C C MG/L	11503 RA-226 + RA-228 PC/L	39348 A-CHLRDN WHL SMPL UG/L	00720 CYANIDE CN-TOT MG/L	31616 FEC COLI MFM-FCBR /100ML
86/08/20	0920	WATER		.27	.37C	.020				.000U	
86/08/20	1550	WATER		.23	.33C	.020					
86/08/21	0950	WATER									20K
88/03/25	1830	WATER		.41	.56	.010K	1.0				
92/02/26	1325	WATER		.34	.53	.020					
92/03/25	1240	WATER		.32	.42	.050	5.0K				
92/04/29	1215	WATER		.16	.26	.370	4.0				
92/05/27	1250	WATER		.18	.28C	.040	5.0K				
92/06/30	1240	WATER		.29	.39C	.020	1.0				
92/07/29	1240	WATER		.31	.41C	.010K	1.0K				
92/08/26	1225	WATER		.21	.31C	.020	1.0				
92/09/30	1100	WATER		.32	.44C	.010K	2.0K				
92/10/28	0935	WATER		.34	.44C	.010	1.0K				
92/11/24	1245	WATER		.35	.45C	.020	1.0				
92/12/16	1215	WATER		.43	.53C	.010	1.0				
93/01/27	0945	WATER									9J

1THAT'S ALL FOLKS

NM0022306 NMD002899094
36 41 55.0 105 37 40.0 1
MOLYCORP-QUESTA /PO BOX 419
35055 NEW MEXICO TAOS
QUESTA 120900
/TYPA/IND/TREATD/OUTFL/NONAMB/PIPE/MINE RECVG STRM-RED R
EFNM1 850223 13020101027 0005.350 ON
0000 FEET DEPTH

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00400 PH SU	00900 TOT HARD CACO3 MG/L	00310 BOD 5 DAY MG/L	00530 RESIDUE TOT NFLT MG/L	70300 RESIDUE DISS-180 C MG/L	01106 ALUMINUM AL,DISS UG/L	01105 ALUMINUM AL,TOT UG/L	01000 ARSENIC AS,DISS UG/L	01002 ARSENIC AS,TOT UG/L
BEGIN PIPE----------> 2													
84/09/05	1507												
CP(V)-	HC	WATER		16.0	7.32	889		1					8
	ST			GR	GR	GR		GR					GR
84/09/05	1508												
85/06/17	1520												
CP(V)-	HC	WATER		15.0D									
	ST			GR									
85/06/17	1520												
85/06/17	1536												
CP(V)-	HC	WATER			7.26D								
	ST				GR								
85/06/17	1536												
85/06/17	1515												
CP(V)-	HC	WATER						1					5
	ST							CP					CP
85/06/18	0937												
86/04/15	1220												
CP(V)-	HC	WATER		11.0D	7.21D			1					5K
	ST			GR	GR			CP					CP
86/04/15	1704												

NM0022306 NMD002899094
36 41 55.0 105 37 40.0 1
MOLYCORP-QUESTA /PO BOX 419
35055 NEW MEXICO TAOS
QUESTA 120900
/TYPA/IND/TREATD/OUTFL/NONAMB/PIPE/MINE
RECVG STRM-RED R
EFNM1 850223 13020101027 0005.350 ON
0000 FEET DEPTH

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01010 BERYLIUM BE,DISS UG/L	01012 BERYLIUM BE,TOT UG/L	01020 BORON B,DISS UG/L	01022 BORON B,TOT UG/L	01025 CADMIUM CD,DISS UG/L	01027 CADMIUM CD,TOT UG/L	01030 CHROMIUM CR,DISS UG/L	01034 CHROMIUM CR,TOT UG/L	01035 COBALT CO,DISS UG/L	01037 COBALT CO,TOTAL UG/L
BEGIN PIPE----------> 2													
84/09/05	1507												
CP(V)-	HC	WATER					100K		1K		5K		
	ST						GR		GR		GR		
84/09/05	1508												
85/06/17	1515												
CP(V)-	HC	WATER							1K				
	ST								CP				
85/06/18	0937												
86/04/15	1220												
CP(V)-	HC	WATER							1K				
	ST								CP				
86/04/15	1704												

NM0022306 NMD002899094
36 41 55.0 105 37 40.0 1
MOLYCORP-QUESTA /PO BOX 419
35055 NEW MEXICO TAOS
QUESTA 120900
/TYPA/IND/TREATD/OUTFL/NONAMB/PIPE/MINE
RECVG STRM-RED R
EFNM1 850223 13020101027 0005.350 ON
0000 FEET DEPTH

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01040 COPPER CU,DISS UG/L	01042 COPPER CU,TOT UG/L	01049 LEAD PB,DISS UG/L	01051 LEAD PB,TOT UG/L	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	01060 MOLY MO,DISS UG/L	01062 MOLY MO,TOT UG/L	01065 NICKEL NI,DISS UG/L	01067 NICKEL NI,TOTAL UG/L
BEGIN PIPE----------> 2													
84/09/05	1507												
CP(V)-	HC	WATER			50K		5K		.5K		2700		100K
	ST				GR		GR		GR		GR		GR
84/09/05	1508												
85/06/17	1515												
CP(V)-	HC	WATER			10K		10K		.5K		2900		
	ST				CP		CP		CP		CP		
85/06/18	0937												
86/04/15	1220												
CP(V)-	HC	WATER			50K		10K		.5K				
	ST				CP		CP		CP				
86/04/15	1704												

NM0022306 NMD002899094
36 41 55.0 105 37 40.0 1
MOLYCORP-QUESTA /PO BOX 419
35055 NEW MEXICO TAOS
QUESTA 120900
/TYPA/IND/TREATD/OUTFL/NONAMB/PIPE/MINE RECVG STRM-RED R
EFNM1 850223 13020101027 0005.350 ON
0000 FEET DEPTH

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01145 SELENIUM SE,DISS UG/L	01147 SELENIUM SE,TOT UG/L	01075 SILVER AG,DISS UG/L	01077 SILVER AG,TOT UG/L	01085 VANADIUM V,DISS UG/L	01087 VANADIUM V,TOT UG/L	01090 ZINC ZN,DISS UG/L	01092 ZINC ZN,TOT UG/L	00610 NH3+NH4- N TOTAL MG/L	00619 UN-IONZD NH3-NH3 MG/L
BEGIN PIPE----------> 2													
84/09/05	1507												
CP(V)-	HC	WATER			5K		1.0K				50K		
	ST				GR		GR				GR		
84/09/05	1508												
85/06/17	1515												
CP(V)-	HC	WATER									10K		
	ST										CP		
85/06/18	0937												
86/04/15	1220												
CP(V)-	HC	WATER									50K		
	ST										CP		
86/04/15	1704												

NM0022306 NMD002899094
36 41 55.0 105 37 40.0 1
MOLYCORP-QUESTA /PO BOX 419
35055 NEW MEXICO TAOS
QUESTA 120900
/TYPA/IND/TREATD/OUTFL/NONAMB/PIPE/MINE
RECVG STRM-RED R
EFNM1 850223 13020101027 0005.350 ON
0000 FEET DEPTH

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00640 T INORG. NITROGEN MG/L N	00665 PHOS-TOT MG/L P	00680 T ORG C C MG/L	11503 RA-226 + RA-228 PC/L	39348 A-CHLRDN WHL SMPL UG/L	00720 CYANIDE CN-TOT MG/L	31616 FEC COLI MFM-FCBR /100ML	74055 FEC COLI PERMIT GENERAL
BEGIN PIPE----------> 2													
84/09/05	1507												
CP(V)-	HC ST	WATER									.000K GR		
84/09/05	1508												
86/04/15	1220												
CP(V)-	HC ST	WATER									.002 CP		
86/04/15	1704												

1THAT'S ALL FOLKS

HRG24 URG120028025 08265000
36 42 12.0 105 34 04.0 4
LOWER RED RIVER AT USGS GAGE
35055 NEW MEXICO TAOS
120991

/TYPA/AMBNT/STREAM/BIO

21NMEX 13020101028 0001.250 ON
0003 FEET DEPTH

TSS

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00400 PH SU	00900 TOT HARD CACO3 MG/L	00530 RESIDUE TOT NFLT MG/L	70300 RESIDUE DISS-180 C MG/L	01106 ALUMINUM AL,DISS UG/L	01105 ALUMINUM AL,TOT UG/L	01000 ARSENIC AS,DISS UG/L	01002 ARSENIC AS,TOT UG/L	01010 BERYLIUM BE,DISS UG/L
75/05/19	1015	WATER		8.0									
75/08/10	1115	WATER		12.0									
75/09/25	1304	WATER		9.0									
76/04/22	1016	WATER		5.5									
79/11/06	0800	WATER		2.0	7.30								
79/11/20	1030	WATER		1.2	7.30								
79/12/13	0745	WATER		-.5	7.20								
80/01/17	1010	WATER		1.5									
80/02/17	1415	WATER		4.2									
80/03/20	1350	WATER		8.0	7.20								
80/04/09	0945	WATER		4.3	7.30								
80/05/05	1630	WATER		10.2	7.00								
80/06/18	1500	WATER		11.5	7.50								
80/07/29	1420	WATER		17.7	7.50								
80/09/25	1445	WATER		13.8	7.50								
80/10/20	1725	WATER		5.6	7.30								
80/10/31	1100	WATER		6.4	7.30							5K	
80/11/19	1000	WATER		-.9	7.10								
81/01/13	1600	WATER		.2	6.70							5K	
81/03/30	1400	WATER		10.2	7.30								
84/01/25	1700	WATER		.2	6.80		29						
84/01/26	0915	WATER		-.2	6.90		21						
84/01/26	1240	WATER		.0	6.90		23						
84/01/26	1630	WATER		.8	6.90		22						
84/01/26	2145	WATER		.2	6.90		21						
84/01/27	1100	WATER		.5	6.90		19	162				5K	
84/12/12	1415	WATER		2.2	7.25			202				5K	
85/04/15	1105	WATER		6.2	7.00		61	130				5K	
85/04/16	1025	WATER		5.0	7.10		78	125				5K	
85/04/17	1120	WATER		6.0	7.10		64	120				5K	
86/02/27	1415	WATER		8.0	7.20			210		3400		5K	
86/08/18	1630	WATER		16.2	7.30		20	240		3340		5K	
86/08/19	1055	WATER		13.0	7.30		16	234		3260		5K	
86/08/19	1545	WATER		15.9	7.30		8	294					
86/08/20	1120	WATER		13.5	7.20		18	300		3410		5K	
86/08/20	1535	WATER		15.0	7.30		14	236					
88/03/25	1500	WATER		9.0	6.80		21	290		4600		5K	
88/09/13	1115	WATER		9.2	6.80	183	927	210	70	17000		12	
88/09/20	1100	WATER		8.2	7.60	198	17	184	50K	2000		5K	
88/09/26	0940	WATER		6.5	7.20	185	15	200	100K	2100		5K	
88/10/25	1615	WATER		8.3	7.30	154	17	230		1310		5K	

HRG24 URG120028025 08265000
36 42 12.0 105 34 04.0 4
LOWER RED RIVER AT USGS GAGE
35055 NEW MEXICO TAOS
120991

/TYPA/AMBNT/STREAM/BIO

21NMEX 13020101028 0001.250 ON
0003 FEET DEPTH

TSS

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00400 PH SU	00900 TOT HARD CACO3 MG/L	00530 RESIDUE TOT NFLT MG/L	70300 RESIDUE DISS-180 C MG/L	01106 ALUMINUM AL,DISS UG/L	01105 ALUMINUM AL,TOT UG/L	01000 ARSENIC AS,DISS UG/L	01002 ARSENIC AS,TOT UG/L	01010 BERYLIUM BE,DISS UG/L
92/02/26	1300	WATER		3.1	7.40	295	25	283	100K	5200	5K		100.00K
92/03/25	1220	WATER		7.6	6.50	208	49	322	100K	9000	5K		100.00K
92/04/29	1200	WATER		9.0	7.10	110	158	142	100K		5K		100.00K
92/05/27	1235	WATER		8.5	7.40	113	20	148					
92/06/30	1225	WATER		11.9	6.60	111	12	160					
92/07/29	1230	WATER		12.5	7.70	159	4	196					
92/08/26	1205	WATER		13.5	7.80	152	3K	186					
92/09/30	1040	WATER		7.2	7.10	168	13	256					
92/10/28	0920	WATER		5.3	7.10	193	18	280					
92/11/24	1215	WATER		.5	6.80	214	33	333					
92/12/16	1155	WATER		.3	7.00	210	24	340					

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36 42 12.0 105 34 04.0 4
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35055 NEW MEXICO TAOS
120991

/TYPA/AMBNT/STREAM/BIO

21NMEX 13020101028 0001.250 ON
0003 FEET DEPTH

0

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01012 BERYLIUM BE,TOT UG/L	01020 BORON B,DISS UG/L	01022 BORON B,TOT UG/L	01025 CADMIUM CD,DISS UG/L	01027 CADMIUM CD,TOT UG/L	01030 CHROMIUM CR,DISS UG/L	01034 CHROMIUM CR,TOT UG/L	01035 COBALT CO,DISS UG/L	01037 COBALT CO,TOTAL UG/L	01040 COPPER CU,DISS UG/L
80/10/31	1100	WATER						1K		5K			
81/01/13	1600	WATER						1					
84/01/27	1100	WATER						1					
84/12/12	1415	WATER						1		5K			
85/04/15	1105	WATER						1		5			
85/04/16	1025	WATER						1K		18			
85/04/17	1120	WATER						1		5			
86/02/27	1415	WATER						1		5K			
86/08/18	1630	WATER						1K		5K			
86/08/19	1055	WATER						1		5K			
86/08/20	1120	WATER						1		5K			
88/03/25	1500	WATER						1K		5K			
88/09/13	1115	WATER					1K	2	5K	32			50K
88/09/20	1100	WATER					1K	1K	13	5K			50K
88/09/26	0940	WATER					1K	1K	5K	5K			50K
88/10/25	1615	WATER						1K		5K			
92/02/26	1300	WATER			100K		1		5K		50K		100K
92/03/25	1220	WATER			100K		3		5K		50K		100K
92/04/29	1200	WATER			100K		1K		5K		50K		100K

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21NMEX 13020101028 0001.250 ON
0003 FEET DEPTH

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01042 COPPER CU,TOT UG/L	01049 LEAD PB,DISS UG/L	01051 LEAD PB,TOT UG/L	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L	01060 MOLY MO,DISS UG/L	01062 MOLY MO,TOT UG/L	01065 NICKEL NI,DISS UG/L	01067 NICKEL NI,TOTAL UG/L	01145 SELENIUM SE,DISS UG/L
80/10/31	1100	WATER				5K		.5K					
81/01/13	1600	WATER				5K				11			
84/01/27	1100	WATER				5K		.5K		10K			
84/12/12	1415	WATER		100K		5K		.5K		10K			
85/04/15	1105	WATER		50K		10K		.5K		10K		50K	
85/04/16	1025	WATER		50		10K		.5K		10K		50K	
85/04/17	1120	WATER		50K		10K		.5K		10K		50K	
86/02/27	1415	WATER		50K		10K		.5K		10K		50K	
86/08/18	1630	WATER		50K		10K		.5K		10K		50K	
86/08/19	1055	WATER		50K		10K		.5K		10K		50K	
86/08/20	1120	WATER		50K		10K		.5K		10K		50K	
88/03/25	1500	WATER		60		10K		.5K		10K			
88/09/13	1115	WATER		130	10K	120	.5K	.5K	10K	33	50K	50K	5K
88/09/20	1100	WATER		50K	10K	5K	.5K	.5K	10K	10K	50K	50K	5K
88/09/26	0940	WATER		50K	10K	10K	.5K	.5K	10K	10K	50K	50K	5K
88/10/25	1615	WATER		50K		5K		.5K		10K			
92/02/26	1300	WATER			5K			.5K	100K		100K		5K
92/03/25	1220	WATER			5K			.5K	100K		100K		5K
92/04/29	1200	WATER			5K			.5K	100K		100K		5K

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36 42 12.0 105 34 04.0 4
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/TYPA/AMBNT/STREAM/BIO

21NMEX 13020101028 0001.250 ON
0003 FEET DEPTH

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01147 SELENIUM SE,TOT UG/L	01075 SILVER AG,DISS UG/L	01077 SILVER AG,TOT UG/L	01085 VANADIUM V,DISS UG/L	01087 VANADIUM V,TOT UG/L	01090 ZINC ZN,DISS UG/L	01092 ZINC ZN,TOT UG/L	00610 NH3+NH4- N TOTAL MG/L	00619 UN-IONZD NH3-NH3 MG/L	00625 TOT KJEL N MG/L
75/05/19	1015	WATER									.030		
75/08/10	1115	WATER									.071		
75/09/25	1304	WATER									.019		
76/02/10	1030	WATER									.211		
76/04/22	1016	WATER									.028		
79/11/06	0800	WATER									.034	.00008$	.210
79/11/20	1030	WATER									.024	.00005$	.290
79/12/13	0745	WATER									.030	.00005$	.160
80/01/17	1010	WATER									.112		.240
80/02/17	1415	WATER									.092		.580
80/02/25		WATER									.068		.210
80/03/20	1350	WATER									.233	.0007$	.430
80/04/04		WATER									.009		.190
80/04/09	0945	WATER									.085	.0002$	.560
80/04/30	1500	WATER									.084		.330
80/05/05	1630	WATER									.078	.0002$	.240
80/06/04		WATER									.055		.390
80/06/18	1500	WATER									.067	.0005$	.760
80/07/09	1445	WATER									.066		.720
80/07/29	1420	WATER									.065	.0008$	.240
80/08/27	1400	WATER									.099		.500
80/09/25	1445	WATER									.062	.0006$	.550
80/10/20	1725	WATER									.024	.00008$	.240
80/10/31	1100	WATER		5K		1.0K							
80/11/19	1000	WATER									.147	.0002$	.270
81/01/13	1600	WATER		5K						250K	.073	.00004$	.260
81/03/30	1400	WATER									.044	.0002$	.370
84/01/25	1700	WATER									.022	.00001$	.290
84/01/26	0915	WATER									.052	.00004$	.280
84/01/26	1240	WATER									.101	.00008$	.020
84/01/26	1630	WATER									.025	.00002$	.340
84/01/26	2145	WATER									.036	.00003$	.390
84/01/27	1100	WATER		5K						280	.095	.00008$	.160
84/12/12	1415	WATER		5K		1.0K				230	.310	.0007$	.360
85/04/15	1105	WATER		5K		2.0K				300	.060	.0001$	.180
85/04/16	1025	WATER		5K		2.0K				190	.080	.0002$	.330
85/04/17	1120	WATER		5K		2.0K				150	.030	.00006$	.040
86/02/27	1415	WATER		5K		1.0K				220			
86/08/18	1630	WATER		5K		1.0K				190	.100K	.0007$	.100K
86/08/19	1055	WATER		5K		1.0K				200	.100K	.0006$	.130
86/08/19	1545	WATER									.100K	.0007$	.100K

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/TYPA/AMBNT/STREAM/BIO

21NMEX 13020101028 0001.250 ON
0003 FEET DEPTH

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01147 SELENIUM SE,TOT UG/L	01075 SILVER AG,DISS UG/L	01077 SILVER AG,TOT UG/L	01085 VANADIUM V,DISS UG/L	01087 VANADIUM V,TOT UG/L	01090 ZINC ZN,DISS UG/L	01092 ZINC ZN,TOT UG/L	00610 NH3+NH4- N TOTAL MG/L	00619 UN-IONZD NH3-NH3 MG/L	00625 TOT KJEL N MG/L
86/08/20	1120	WATER		5K		1.0K				220	.100K	.0005$	.100K
86/08/20	1535	WATER									.100K	.0007$	.100K
88/03/25	1500	WATER		5K		1.0K				260	.210	.0003$	.290
88/09/13	1115	WATER		5K	1.0K	2.0			70	300	.100K	.0001$	1.000
88/09/20	1100	WATER		5K	1.0K	1.0K			120	100	.100K	.0008$	.200
88/09/26	0940	WATER		5K	1.0K	1.0K			100	120	.100K	.0003$	.290
88/10/25	1615	WATER		5K		1.0K				130			
92/02/26	1300	WATER			100.0K		100K		300		.150	.0005$	.150
92/03/25	1220	WATER			100.0K		100K		600		.100K	.00006$	.100K
92/04/29	1200	WATER			100.0K		100K		100K		.100K	.0003$	.450
92/05/27	1235	WATER									.100K	.0005$	.310
92/06/30	1225	WATER									.110	.0001$	.200
92/07/29	1230	WATER									.170	.002$	.180
92/08/26	1205	WATER									.100K	.002$	.100
92/09/30	1040	WATER									.110	.0003$	.170
92/10/28	0920	WATER									.100K	.0002$	.100K
92/11/24	1215	WATER									.100K	.00007$	.100K
92/12/16	1155	WATER									.100K	.0001$	.100K

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36 42 12.0 105 34 04.0 4
LOWER RED RIVER AT USGS GAGE
35055 NEW MEXICO TAOS
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/TYPA/AMBNT/STREAM/BIO

21NMEX 13020101028 0001.250 ON
0003 FEET DEPTH

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00630 NO2&NO3 N-TOTAL MG/L	00640 T INORG. NITROGEN MG/L N	00665 PHOS-TOT MG/L P	00680 T ORG C C MG/L	11503 RA-226 + RA-228 PC/L	39348 A-CHLRDN WHL SMPL UG/L	00720 CYANIDE CN-TOT MG/L	31616 FEC COLI MFM-FCBR /100ML
75/05/19	1015	WATER				.008					
75/08/10	1115	WATER				.054					
75/09/25	1304	WATER				.040					
76/02/10	1030	WATER				.206					
76/04/22	1016	WATER				.035					
79/11/06	0800	WATER		.15		.030					
79/11/20	1030	WATER		.18		.020					
79/12/13	0745	WATER		.21		.010					
80/01/17	1010	WATER		.25		.050					
80/02/17	1415	WATER		.31		.050					
80/02/25		WATER		.35		.040					
80/03/20	1350	WATER		.27		.080					
80/04/04		WATER		.25		.067					
80/04/09	0945	WATER		.24		.045					
80/04/30	1500	WATER		.12		.092					
80/05/05	1630	WATER		.17		.035					
80/06/04		WATER		.10		.063					
80/06/18	1500	WATER		.10		.056					
80/06/19	0925	WATER									10K
80/07/09	1445	WATER		.10		.045					
80/07/29	1120	WATER									3
80/07/29	1420	WATER		.15		.084					
80/08/27	1400	WATER		.18		.066					
80/09/25	1445	WATER		.11		.037					
80/10/20	1725	WATER		.16		.073					
80/10/21	1137	WATER									10K
80/11/19	1000	WATER		.17		.020					
81/01/13	1600	WATER		.22		.036					
81/03/30	1400	WATER		.15		.052					
84/01/25	1700	WATER		.37	.39	.020					
84/01/26	0915	WATER		.40	.45	.010					
84/01/26	1240	WATER		.35	.45	.020					
84/01/26	1630	WATER		.34	.37	.020					
84/01/26	2145	WATER		.35	.39	.010					
84/01/27	1100	WATER		.44	.54	.020					1K
84/12/12	1415	WATER		.31	.62C	.020					
85/04/15	1105	WATER		.13	.19C	.150					
85/04/16	1025	WATER		.14	.22C	.160					
85/04/17	1120	WATER		.26	.29C	.160				.001	
86/08/18	1630	WATER		.31	.32C	.020					
86/08/19	1055	WATER		.30	.40C	.030					

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/TYPA/AMBNT/STREAM/BIO

21NMEX 13020101028 0001.250 ON
0003 FEET DEPTH

0 DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00630 NO2&NO3 N-TOTAL MG/L	00640 T INORG. NITROGEN MG/L N	00665 PHOS-TOT MG/L P	00680 T ORG C C MG/L	11503 RA-226 + RA-228 PC/L	39348 A-CHLRDN WHL SMPL UG/L	00720 CYANIDE CN-TOT MG/L	31616 FEC COLI MFM-FCBR /100ML
86/08/19	1545	WATER		.26	.36C	.040					
86/08/20	1120	WATER		.41	.51C	.030				.000U	
86/08/20	1535	WATER		.29	.39C	.010K					
86/08/21	0945	WATER									20K
88/03/25	1500	WATER		.38	.59	.010K	1.4				
88/09/13	1115	WATER		.17	.27	1.000	10.8				
88/09/20	1100	WATER		.30	.41	.330	1.5				
88/09/26	0940	WATER		.38	.48	.020	1.0K				
92/02/26	1300	WATER		.41	.56	.040					
92/03/25	1220	WATER		.42	.52	.100	5.0K				
92/04/29	1200	WATER		.14	.24	.240	4.0				
92/05/27	1235	WATER		.17	.27C	.190	5.0K				
92/06/30	1225	WATER		.30	.41C	.020	1.0				
92/07/29	1230	WATER		.35	.52C	.010	2.0				
92/08/26	1205	WATER		.25	.35C	.040	2.0				
92/09/30	1040	WATER		.48	.59C	.010	2.0K				
92/10/28	0920	WATER		.40	.50C	.010	1.0				
92/11/24	1215	WATER		.55	.65C	.020	1.0K				
92/12/16	1155	WATER		.66	.76C	.180	1.0				
93/01/27	0935	WATER									1K

1THAT'S ALL FOLKS

United States
Department of
Agriculture

Forest
Servic

Southwestern Region 3
Carson National Forest
Questa Ranger District

P. O. Box 110
Questa, New Mexico 87556
505-586-0520
FAX 505-586-0521

File Code: 2800

Date: April 24, 2000

Received
APR 2 8 2000
6WQ-PP

Dear Sir and/or Madam:

The Questa Ranger District, Carson National Forest, has received a proposal (see attached letter dated March 14, 2000 to District highway Engineer) from Molycorp, Inc. to initially conduct environmental and engineering monitoring along a section of the Red River in the area of Capulin Canyon and adjacent to State Highway 38 (see attached map). The monitoring would take place in an area where natural ground water has a very low pH (acidic) and very high mineral content, and visibly enters the Red River through a number of seeps. This situation deteriorates the quality of the water in the river and substantially adds to the milky appearance of the downstream water. Specifically, Molycorp proposes to determine the water elevation, gradient and other characteristics by open excavation of a 200 foot trench and 12 test pits. The trench and test pits will be approximately 3 feet wide and range in depth from 6 to 12 feet. A four inch perforated pipe may be installed in the trench and the test pits to allow for testing of the ground water.

Following the monitoring activities, Molycorp will prepare the final design plans and proposes to construct a permanent facility that will intercept and pump into their tailing lines the highly acidic water that now seeps into the Red River. Molycorp anticipates at this time that the facility could consist of approximately 1500 feet of trenching and the installation of a french drain type system, or several shallow wells, to intercept the ground water flow and pipe it to a point that it will be pumped into their tailings pipe for treatment and/or dispoasal in their tailing ponds west of Questa or at their mine site.

A representative of Molycorp did explain to us that the mine does not believe their mining activity is the cause of the ground water quality problems in this area. Yet, Molycorp has been in close communication with the New Mexico Environment Department in an attempt to address this situation, regardless of the cause, and would like to move ahead with the monitoring and mitigation activities as soon as possible.

We are beginning the environmental analysis process to determine the effects of Molycorp's monitoring and ground water treatment construction proposal. We are interested in knowing what concerns, issues, and/or opportunities you believe might be associated with the proposed monitoring activities and construction work. We would ask that you provide us with your comments by May 19th so they can be considered in our analysis.

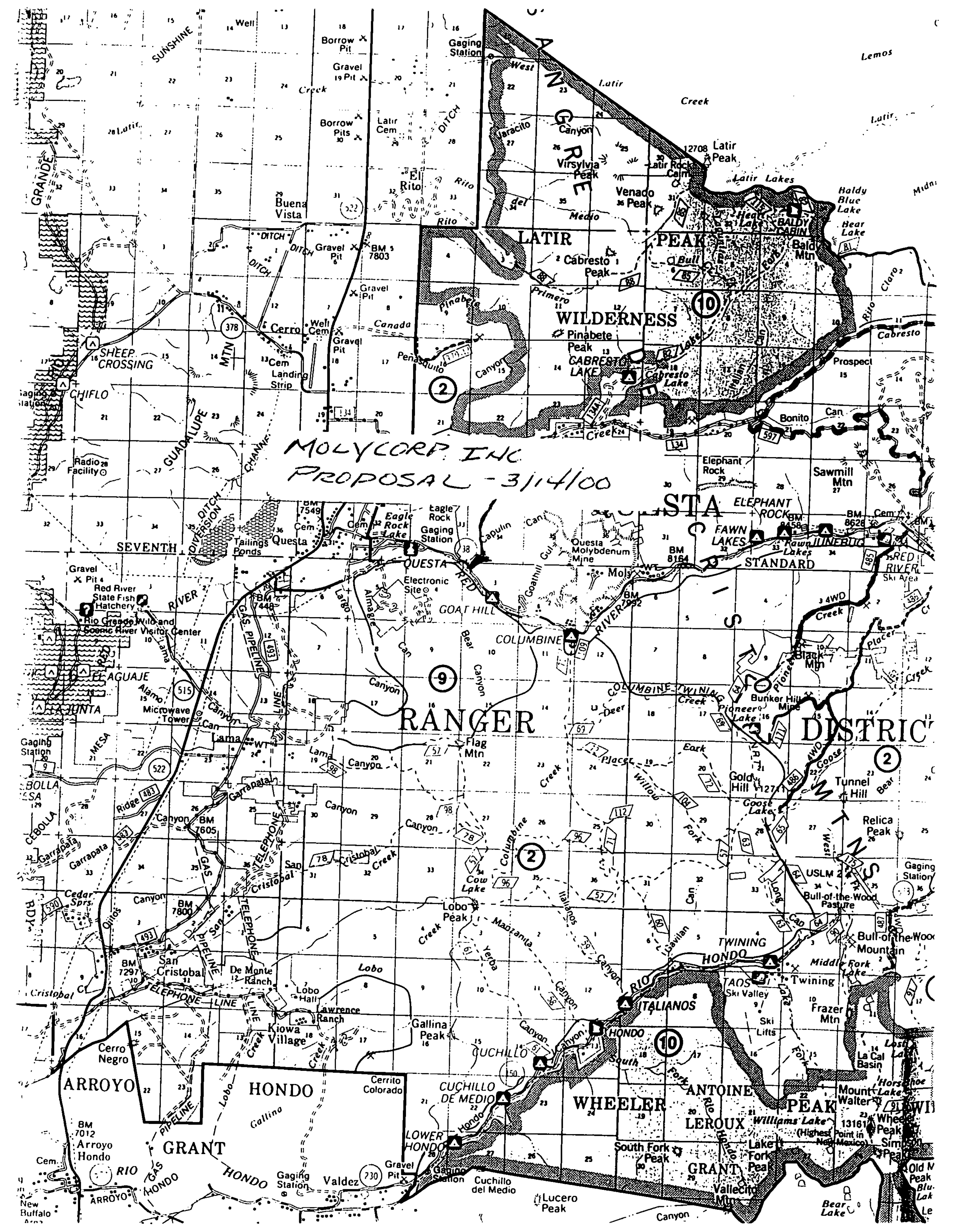
We anticipate that Molycorp, Inc. proposal will be categorically excluded from documentation in an EIS or EA, and that a Decision Memo will be prepared in accordance with rules in 7 CFR

1b.3. The category established by the Secretary that apples to this proposal is: FSH 31.2 (3) - Approval, modification, or construction of minor special uses of National Forest lands that requires less than five contiguous acres of land.

Please contact me or District Biologist George Long if you have questions or would like further information on this proposal. Thank you for your continued interest in the natural resource work being undertaken on the Questa Ranger District.

Sincerely,

RON THIBEDEAU
District Ranger


MOLYCORP INC
PROPOSAL - 3/14/00
LATIR PEAK WILDERNESS
QUESTA
RANGER DISTRICT
WHEELER PEAK
ARROYO HONDO GRANT
ANTOINE LEROUX GRANT
Latir Peak
Latir Lakes
Baldy Mtn
Cabresto Peak
Pinabete Peak
Cabresto Lake
Virsylvia Peak
Venado Peak
Questa
Tailings Ponds
Questa Molybdenum Mine
Red River State Fish Hatchery
Rio Grande Wild and Scenic River Visitor Center
Eagle Rock Lake
Goat Hill
Columbine
Elephant Rock
Fawn Lakes
Junebug
Standard
Sawmill Mtn
Flag Mtn
Lama
Cerro
Sheep Crossing
Chiflo
El Aguaje
La Junta
San Cristobal
Lobo Peak
Gallina Peak
Kiowa Village
Lawrence Ranch
Valdez
Arroyo Hondo
Cerro Negro
Lucero Peak
Taos Ski Valley
Twining
Frazer Mtn
Gold Hill
Tunnel Hill
Relica Peak
Bull-of-the-Woods Mountain
Mount Walter
Wheeler Peak
Williams Lake
Lake Fork Peak
South Fork Peak
Vallecito Mtn
Bear Lake
Italianos
Cuchillo de Medio
Lower Hondo
Red River Ski Area

VAIL ENGINEERING, INC.

PHONE: (505)
988-5575

1588 SAN MATEO LANE
SANTA FE, NEW MEXICO
87505

March 14, 2000

District Highway Engineer
P.O. Box 4127
Santa Fe, New Mexico 87502-4127

Attention: Mr. James Sullivan

Dear Sir:

Attached is an application on behalf of Molycorp, Inc., Questa, NM for the making of temporary excavations along a section of State Highway 38 in Taos County, New Mexico.

There is a section along Red River adjacent to State Highway 38 where natural ground water that has a very low pH (3.2 $\pm$) and very high mineral content is seeping into the river. This deteriorates the quality of the water in the river and during very low flow periods adds substantially to the milky appearance of the river water downstream.

A few years ago the State Highway Department cooperated with the New Mexico Environmental Department and Molycorp in excavating a trench in this area along the south shoulder of the highway near the river, the placement of lime stone in the trench and backfilling the trench. It was hoped that the limestone would neutralize the low pH of the ground water and the metals would precipitate out before reaching the river. Unfortunately this anoxic alkaline drain treatment has not significantly reduced the effect of the ground water seepage on the river.

Recently, at the request of the U.S. Environmental Protection Agency, Molycorp agreed to try to intercept this ground water seepage to the river and treat or dispose of this water even though this water appears to be natural and not resulting from or related to Molycorp's mining operations.

In order to design an effective system to intercept such ground water it will be necessary to determine the quantity and direction of flow and the hydrological characteristics of the aquifer.

It appears that the ground water lies at a fairly shallow depth for some distance back away from the river. Molycorp therefore proposes to determine the water table elevation, gradient and other characteristics by open excavation with a back hoe. The excavation pits will generally be not over 36 inches wide and only as long as required to reach to a depth of a few feet below the water table. It is anticipated that the depth of the pits will range from about 6 feet up to a maximum of 12 feet.

It appears that the highway right-of-way extends to near the river on the south side and generally to a steep hillside on the north. It will be necessary therefore to excavate the pits in the right-of-way, however there is sufficient room to make the excavations at a substantial distance

from the paved roadway. At this location the highway has two 12 foot wide traffic lanes and a paved shoulder of about six feet. The proposed location of the pit closest to the highway is at a distance of 32 feet from the highway centerline. At this location the pit will be behind a guard rail. Otherwise the pits will be about 40 or more feet from the highway centerline. It is anticipated that the excavations will be backfilled with suitable compacted material and the areas restored within 48 hours after the excavation is made. At most locations a four inch perforated vertical pipe may be inserted for future monitoring of the water table levels. The pipe will be suitably capped and will be completed flush with the surface in possible traffic or parking areas. All open excavations will be barricaded and the Highway Department's regulations regarding traffic safety will be complied with.

In addition to the individual pits, it may be desirable to excavate a trench parallel to the highway for a distance of about 200 feet and at a distance of not less than 40 feet from the highway centerline. If the ditch is located on the north side it will be behind the guard rail near Station 150+00. If the ditch is on the south side it probably will be down off the roadway embankment. A 4 inch drain line may be installed in this trench. After engineering data is obtained the trench will be filled and the area restored.

We anticipate that approximately 12 small pits will be required in addition to the temporary trench.

This application is for temporary excavations only. After the data is obtained and a final design is complete; Molycorp will submit an application for a permanent facility with detailed drawings for your consideration. It is anticipated that the proposed facility will consist of a french drain type system or several small wells which will be located near your right-of-way limits.

We are aware that there are existing underground telephone and gas lines and possibly an electric cable in this area and Molycorp will work with the utility companies to insure protection of such.

Molycorp has promised to develop an effective ground water catchment system at an early date and therefore requests your favorable consideration and approval of this application at your earliest convenience. We are including herewith a sketch showing the general location and details of the proposed excavations. We have also reviewed, on site, the proposed work with Mr. Steve Sanchez of your Questa office.

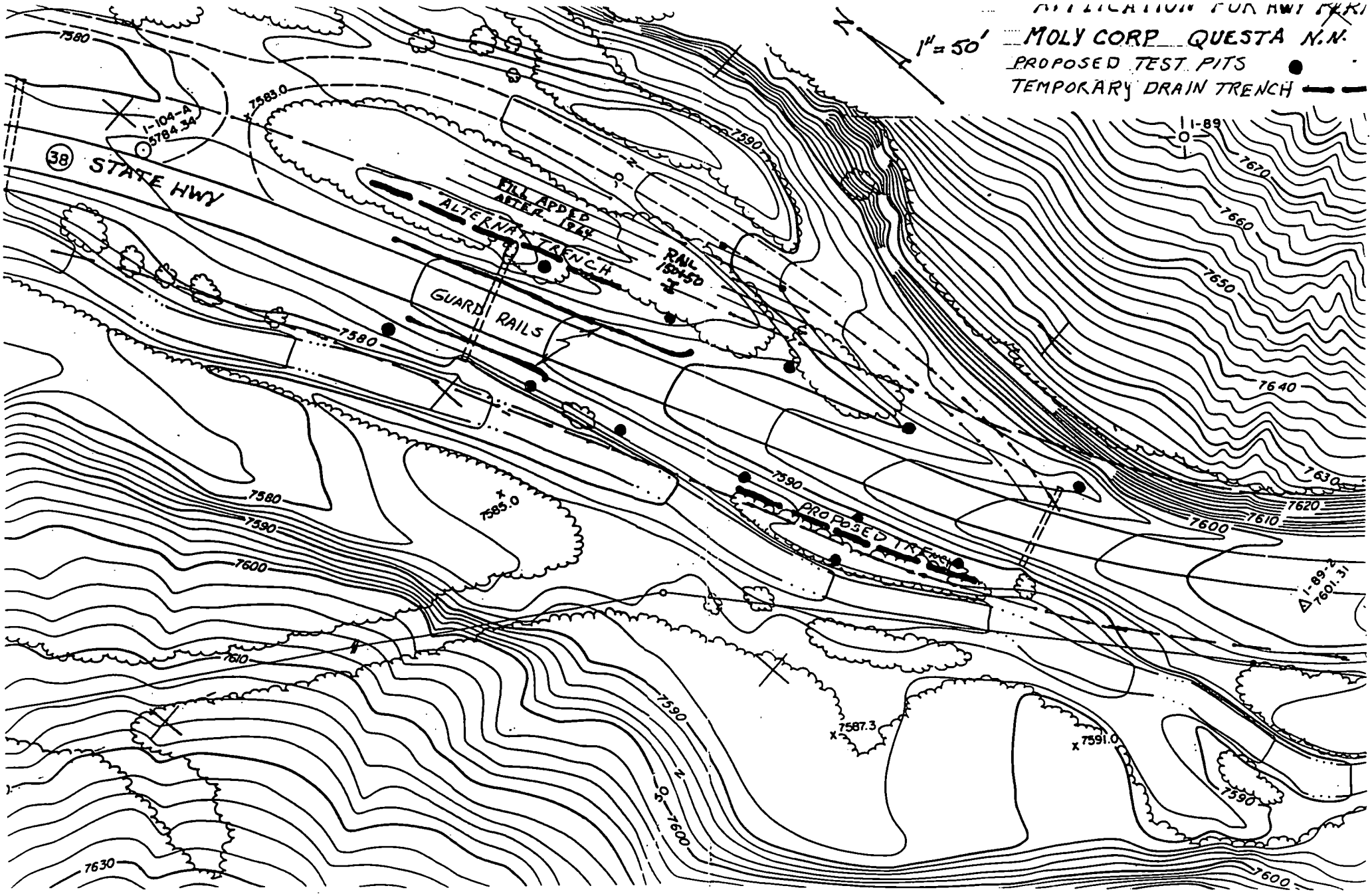
Please contact the undersigned Ralph E. Vail at (505)988-5575 if you have any questions or need further information.

Respectfully Submitted
VAIL ENGINEERING, INC.

Ralph E. Vail

Chief Engineer
NM PE & LS 2098

cc: Mr. Geyza Lorinci
Molycorp, Questa


APPLICATION FOR HWY PERM
1" = 50'
MOLY CORP QUESTA N.M.
PROPOSED TEST PITS
TEMPORARY DRAIN TRENCH
38 STATE HWY
I-104-A
5784.34
7583.0
7590
FILL APPLIED AFTER 1964
ALTERNAT TRENCH
RAIL 1964-50
GUARD RAILS
7580
7585.0
7590
7600
7610
7630
PROPOSED TRENCH
7587.3
7591.0
7600
I-89
7670
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7650
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7630
7620
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I-89-2
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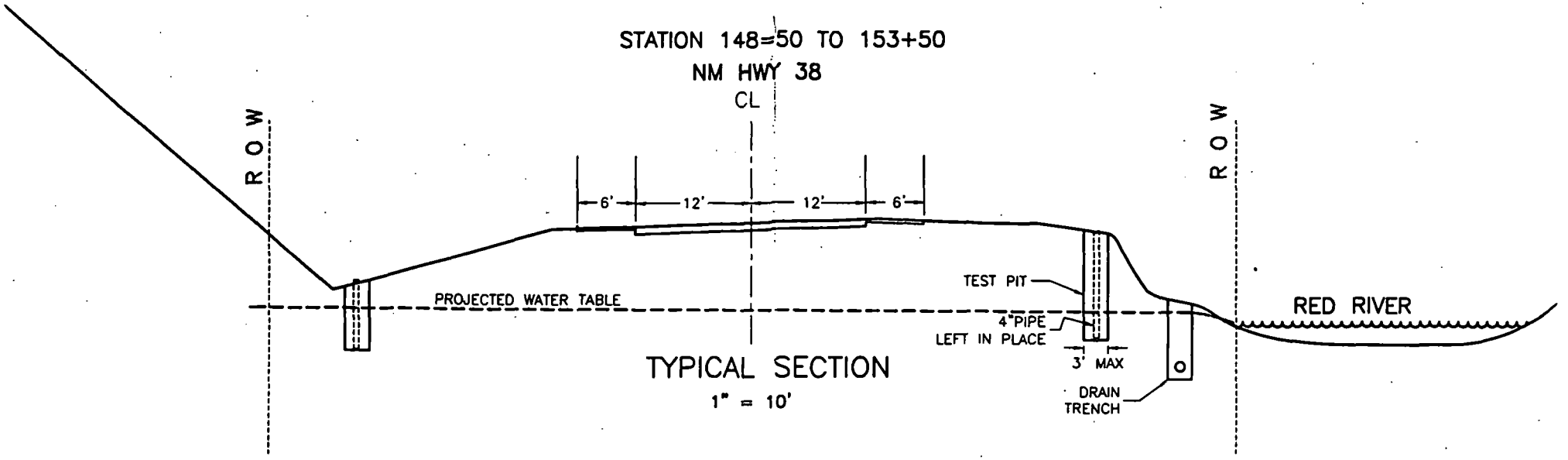

APPLICATION FOR PERMIT
MOLYCORP INC.
QUESTA NM

ewinter@newmex.com

05/08/00 08:31 AM
Please respond to ewinter

To: Js Wilson/R6/USEPA/US@EPA

cc:

Subject: Re:

Yeah, maybe. (To meet, that is.) I'm late turning in some grant revisions which really should have been done last week. That is, our department's salaries for next year! BTW, perhaps you could ask Amigos if we could be in the same meeting.

Overall, we're facing a dilemma in dealing with Molycorp. There are concerns about downstream pollution effects. And there's some traditional cultural activities which have some effect. However, there's not much interest in public disclosure of those activities. More generally, tangling with Molycorp seems to require a full time commitment -- it's hard to do it occasionally, on the side. For that reason, there's reticence about getting involved, since it's such a bottomless pit. My personal experience is that Molycorp does this intentionally -- turn out such a volume of material that hardly anyone can afford the time, energy, money to deal with it.

Like I said, it's a dilemma. Anyhow, we have a "river clean-up" with the school kids on Wednesday afternoon. So that's out of the question, unless we go late in the afternoon -- 4pm or so. Thursday morning might be possible. We'll be out of the office a lot this week, as it's "Environmental Week" at the Taos Pueblo Day School. So, try to call, but e-mail might be a better way to communicate.

Elizabeth Winter
Taos, New Mexico
ewinter@newmex.com

Vegetarian: An Indian word meaning "lousy hunter".
(The source of this remark - a Native - emphatically insists on remaining anonymous.)

Scott this is a
control assigned to
SF - but we may
have input and
probably want to
see the final
letter or concur -?

Paulette.

03/08/00

DATE 3/07/2000

ROUTING AND TRANSMITTAL SLIP

TO: (Name, office symbol, room number, building, Agency/Post)	Assigned To	Initials	Date
1. Granado	last		
2. 6WQ-A ~~1st~~	XX	JB	3/7/00
3. 6WQ-C			
4. 6WQ-D 2nd	XX		
5. 6WQ-E 3rd	XX		
6. 6WQ-P ~~4th~~ 1st	XX		
7. 6WQ-S			
8. Rodriguez (Last)			

RE: R6-0000085
Request -R6 Obtain Assistance From R8 Regarding MolyCorp.
due: 3/20/99 to 6SF Lead.

This is <u>an informational copy of a Control</u>. Please contact the Lead Division if you have any input.
(cc: or e-mail Dina/Dora to clear records)

PLEASE PASS QUICKLY

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances and similar actions

FROM: (Name, org. symbol, Agency/Post)		Room No. - Bldg.
Dora Rodriguez		Phone No X 8339

RECEIVED
MAR 07 2000
Assistance Programs Branch

SOUTHWEST RESEARCH AND INFORMATION CENTER
P.O. Box 4524 Albuquerque, NM 87106 505-262-1862 FAX: 505-262-1864

From = Lynsay Taylor
Santa Fe: 505 986 1454

March 3, 2000

Gregg A. Cooke
Regional Administrator
U.S. EPA, Region 6
1445 Ross Avenue
Suite 1200
Dallas, TX 75202

Dear Gregg:

I am writing to ask your help with a longstanding environmental problem in Northern New Mexico — the Molycorp molybdenum mine. Specifically, we would like Region VI to request assistance from Region VIII regarding this mine so that several EPA employees with substantial experience with mine reclamation can participate in current discussions over how the site should be cleaned up.

The mine has contributed to the demise of the Red River, once a nationally famous cold-water fishery, and has created an impressively large surface mess that has to be cleaned up. The site is now being considered for Superfund listing. Region VI staff have participated in two meetings with Molycorp, state regulators and interested representatives of the public and Native-American tribes regarding current site characterization efforts pursuant to state law. However, unless and until the site is listed and the remedial investigation can move forward, the state participants are limited by lack of technical support.

While the participating Region VI staff are skilled and have been very helpful, they have not had extensive experience with mine remediation issues such as those posed by this site. In particular, the hydrologic issues are complex and the company is trying to avoid much active cleanup based on questionable hydrologic assertions. Jim Kuipers of the Center for Science in Public Participation, a technical advisor working with Paul Robinson of my office and Amigos Bravos from Taos is urging that we get several EPA Region VIII employees involved in the process of determining how the site should be characterized and, ultimately, cleaned up. One of the Region VIII employees in question is Mike Wireman, a hydrologist with extensive experience at mine sites with complex cleanup issues. We understand that the state regulators would welcome such involvement as would the public interest groups and tribes.

Apparently, if Region VI were to request assistance from Region VIII on this matter, Mr.

Wireman and others could add their technical skills to solving the considerable problems at this mine. Even if the site is listed, Mr. Wireman and other mining experts from Region VIII could play a positive role in the RI/FS for the site.

If you have any questions regarding the details of this issue, feel free to contact Paul Robinson at my office (505-262-1862) or Doug Wolf of the Environmental Law Center who is representing us in this matter (505-989-9022).

Thank you for your willingness to help on this important matter.

Sincerely,

Lynda Taylor

PS. Sorry we didn't have a chance to catch up more in Dallas. It was a whirlwind, but productive series of meetings. Hope to see you the end of the month in El Paso.

Permit file NM 22306

Western Environmental Law Center

1216 Lincoln Street • Eugene, Oregon 97401
503-485-2471 • FAX: 503-485-2457 • EMAIL: westernlaw@igc.org

Attorneys
Michael D. Axline*
John E. Bonine*
Marianne Dugan*
Deborah N. Mallander*
Charles M. Tebbutt†
* admitted in Oregon
† admitted in New York

Staff Scientist
Michael Wach

Development Director
Bonnie Souza

Office Manager
Kathy Cannon

Legal Assistant
Kari Kytola

TAOS OFFICE:
P.O. Box 1507
Taos, New Mexico 87571
505-751-0351
FAX: 505-751-1775
EMAIL: santafelaw@igc.org

Attorneys
Grove T. Burnett
Eric Ames
David Gomez
admitted in New Mexico

Office Manager
Linda M. Velarde

BY CERTIFIED MAIL

RECEIVED
SEP 19 1995
SURFACE WATER QUALITY BUREAU

September 15, 1995

David R. Shoemaker
Vice President and Questa Mine Manager
Molycorp, Inc.
P.O. Box 469
Questa, New Mexico 87556

Re: Notice of Intent to File Citizen Suit

Our firm represents Amigos Bravos (c/o Brian Shields, Program Director, P.O. Box 238, Taos, NM 87571 (tel. 505-758-3874)), and New Mexico Citizens for Clean Air and Water (c/o Dr. John Bartlit, State Chairman, 113 Monte Rey Drive, Los Alamos, NM 87544 (tel. 505-672-9792)("the plaintiffs"). On their behalf, we hereby give you notice that the plaintiffs intend to file a citizen suit against Molycorp, Inc.("Molycorp"), pursuant to Section 505 of the Clean Water Act, 33 U.S.C. §1365.

The citizen suit will allege that Molycorp has violated and continues to violate the Clean Water Act by discharging acidic water and heavy metals, including but not limited to aluminum, cadmium, copper, chromium, cobalt, iron, molybdenum, manganese, nickel, lead, and zinc, from mine waste piles at the Questa Mine, either directly or indirectly through ground water, fissures and seeps, into the Red River. Molycorp has violated and continues to violate Section 301(a) of the Clean Water Act, 42 U.S.C. §1311(a), by not obtaining a permit for such discharges pursuant to Section 402 of the Clean Water Act, 42 U.S.C. §1342.

Be advised that the plaintiffs intend to initiate legal action against you at the close of the sixty day notice period to obtain prompt and complete enforcement of the Clean Water Act, as well as civil penalties to the statutory maximum of $25,000 per day of violation,

"Hear within ourselves the sound of the Earth crying." Vietnamese Zen Master Thich Nhat Hanh

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attorney and expert witness fees, costs, and such other relief as may be appropriate. This letter constitutes notice to you as required by Section 505(b) of the Clean Water Act, 33 U.S.C. §1365(b), to commence civil action authorized by Section 505 of the Clean Water Act, 33 U.S.C. §1365.

During the sixty day notice period, we will be available to discuss an amicable resolution of this matter. The plaintiffs seek a long-term solution to the discharge of acidic water and heavy metals from the mine waste piles. The Plaintiffs believe that such a solution, perhaps coupled with alternative environmental projects, would be preferrable to civil penalties.

Sincerely,

WESTERN ENVIRONMENTAL LAW CENTER

Grove T. Burnett
Eric Ames
P.O. Box 1507
Taos, New Mexico 87571
(505) 751-0351

Attorneys for Plaintiffs

cc by certified mail:

CT Corporation
Registered Agent for Molycorp, Inc.
119 East Marcy Street
Santa Fe, NM 87501

Carol Browner, Administrator
U.S. Environmental Protection Agency
401 M Street
Washington, D.C. 20460

Jane Sagimaw, Regional Administrator, Region VI
U.S. Environmental Protection Agency
1445 Ross Avenue
Suite 1200
Dallas, Texas 75202-2733

Janet Reno
Attorney General of the United States
U.S. Department of Justice
Washington, D.C. 20460

Mark Weidler, Secretary
Department of Environment
P.O. Box 26110
Santa Fe, New Mexico 87502

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

MAY 24 2000

Wilson
OWS-AP

MEMORANDUM

SUBJECT: Request for a Hearing Officer

FROM: William B. Hathaway, Director
Water Quality Protection Division (6WQ)

TO: Lawrence E. Starfield
Regional Counsel (6RC)

This memorandum requests the presence of a Hearing Officer at a Public Hearing for the proposed NPDES Permit No. NM0022306 for Molycorp Inc.

The hearing is scheduled for Thursday, July 13, 2000, in Questa, New Mexico.

For additional information regarding the hearing, please contact Evelyn Rosborough of my staff at x7515 or Scott Wilson at x7511.

cc: George Malone
Evan Pearson

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bcc: Reading Files (6WQ-C) (6WQ-P)
Wilson (6WQ-PP)

erosborough:Officer:5/23/2000

CONCURRENCES					
Fontenot 6WQ-C	Watson 6WQ-PM	Ferguson 6WQ-P			

NOV 2 3 1998

Ernest Atencio
Projects Director
Amigos Bravos
P.O. Box 238
Taos, NM 87571

Dear Mr. Atencio:

Thank you for meeting with me on October 28, 1998 to discuss the upcoming renewal of the National Pollutant Discharge Elimination Systems (NPDES) permit for Molycorp.

As we discussed, I plan to address mine discharges that constitute point source discharges to the Red River, which EPA has the authority to regulate under the NPDES permit for the facility. That includes point source discharges which may be attributed to Molycorp's waste rock piles. Many complex issues are associated with those discharges which will involve a great deal of work to create a strong administrative record prior to proposing the permit. In that regard I appreciate your offer of information and technical contacts.

Again, thank you for meeting with me and for your support in our efforts to protect the environment.

Sincerely,

original Signed by

J. Scott Wilson
Environmental Scientist

Scott

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

TELEFAX COVERSHEET CONTINUATION

To: Aisling
FAX: (214) 665-6660

To: Mike Bishop
FAX: (406) 441-4425

To: Daniel COZZA
FAX: 312-886-0168

To: Mark Doolan
FAX: 913 551-7063

To: Stephen Hoffman
FAX: 703-308-8686

To: Andy LenSink
FAX: 303-312-6953

To: Ellen Mangès
FAX: 415-744-2180

To: Diana Sienz
FAX: 202-501-0461

FROM: Cami Russell R8 Phone:

Comments: Please send corrections + or comments by COB Monday Nov to (303) 312-6897

Sent: Date: Initials:

from Kathleen to R6 mining W.G. members & friends of the workgroup.

Please send any comments directly to Cami.

Questions - me or Steve Hoffman.

Thanks. Kij

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

TELEFAX COVERSHEET CONTINUATION

To: Loren Setlow

FAX: 202-565-2065

To: Elaine Suriano

FAX: 202-564-0072

To: Jo Tieger

FAX: 202-501-0269

To: Dave Tomten

FAX: 208-378-5744

To: _____

FAX: _____

To: _____

FAX: _____

To: _____

FAX: _____

To: _____

FAX: _____

FROM: _____ Phone: _____

Comments: _____

_____

Sent: _____ Date: _____ Initials: _____

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Patricia Kellogg
Research Staff
1145 17th Street, NW
Washington, DC 20036-4688
202-857-7212
Fax: 202-828-6605
E-mail: pkellogg@ngs.org

National Geographic Magazine

Fax

To:	Carol Russell	From:	Pat Kellogg
Fax:	303-312-6897	Pages:	Cover + 7
Phone:		Date:	October 26, 1999
Re:		CC:	

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

Carol,

Thank you so much for rising from your sick-bed to help us with this story. I am sending the final portion of the text and a couple of extra picture captions for review--only the parts that relate to EPA's work and standards.

As you read through the text you will see that I have noted some questions in margins of the pages. Please feel free, however, to point out anything that seems incorrect or misleading, although it may not have been questioned. If you have any questions or find anything unclear, don't hesitate to telephone.

It would be great to hear from you by next Tuesday. All of my various numbers and addresses are at the top of this page and I will be happy to take your comments in any fashion you find convenient.

Again, thank you for your help and I will look forward to hearing from you. Rest well.

Best regards,

Pat Kellogg

man didn't have much of a chance. Doesn't now. The mining is gone for the little man. It's all for the companies now."

I don't have an EPA contact for Region 0 so I have quite few questions

On a half dozen occasions over the past three years I set out through the West on my own prospecting trip to discover firsthand what some of the legacies of the General Mining Law of 1872 might be. My first sortie brought me to a quiet room in the U.S. Fish and Wildlife Service (USFWS) office in Spokane, Washington. On a stainless steel table lay several carcasses—two tundra swans, a goldeneye, a couple of wood ducks, a mallard. Their eyes were glazed by death, necks and wings frozen into ugly contortions. The freezers contained dozens more like them. "We've found 311 dead birds so far this spring," Dan Audet, a field manager for the USFWS, told me. "More than ever before. And what bothers us is that it's getting easier and easier to find them."

What was killing the birds? Mostly lead, and it was happening throughout much of the Coeur d'Alene River Basin. It was here, not ten years after passage of the General Mining Law, that the Bunker Hill and the Sullivan on the South Fork of the Coeur d'Alene ~~River~~ in Idaho became the richest silver mines in the world. The river and its tributaries were deemed valuable mainly as sewers to carry away the waste tailings laced with lead, cadmium, and other naturally occurring minerals. The South Fork alone became known as the River of ~~Milk~~ Muck in the Valley of Death. In all, some 72 million tons of tailings have been dumped into the South Fork in the century that mining has been pursued here.

Are lead & cadmium the biggest problem?

Correct weight?

The river runs cleaner these days, partly because some remedial measures have been taken but mostly because falling silver prices forced most of the mines, mills, and smelters to shut down entirely. Still, the river and many of its tributaries remain badly contaminated. When streams flood, then recede, they leave poisoned sediments behind, raising soil contamination to dangerous levels. Much of what doesn't get spread around on floodplains ends up in the area's recreational treasure, Coeur d'Alene Lake. There are now an estimated 165 billion pounds of contaminated sediments spread over the lake bottom to a depth of 15 inches.

Do we have the "partly" & "mostly" right?

Part of the region lies within the Coeur d'Alene Indian Reservation. In 1991 the tribe filed suit against nine companies for damages to the land and water, as provided for in the Comprehensive Environmental Response Compensation and Liability Act of 1980—a mouthful more conveniently known as the Superfund Act. The lawsuit is pending.

Across the mountains in Montana, I found the law's legacy of contamination continuing at the point where the Blackfoot River joins the Clark Fork River just above Missoula. Here begins the Upper Clark Fork Basin Superfund complex, the largest Superfund cleanup effort in America. The site runs about 140 miles along the river and its tributaries from Milltown to Butte—all of it the legacy of the Anaconda Mining Company, which staked out its

Charlie Coleman is looking at the Clark Fork section.

HARD LABOR

When gold prices slumped in 1998, operations at the Gold Road Mine near Oatman, Arizona, were suspended indefinitely, sending Mike Gleghorn (left) and 120 other workers into a layoff limbo as gruelingly familiar to miners as the job's physical demands. Underground work sites "smell like a fresh head-on two car collision," writes mine veteran Ralph Pray. "There's no level place to stand on. Everything is wet, grimy, or hot, and nothing is soft."

Correct?

mining claims on federal land and began mining copper here in the 1880s.

ARCO bought the Anaconda operation in 1977, but after copper prices slipped, it sold off some of its holdings and shut down the rest. Still, it was ARCO that the Environmental Protection Agency (EPA) now expected to pay for the cleanup. A big job. According to one estimate, as many as 200 million cubic meters of tailings deposits alone could contain 9,000 metric tons of arsenic, 200 tons of cadmium, 90,000 tons of copper, 20,000 tons of lead, 200 tons of silver, and 50,000 tons of zinc.

Three of the four Superfund sites in the basin were designated in 1983, the fourth in 1987. By the 1990s ARCO was digging things up and moving earth around with beaverlike industry—buying out homeowners where necessary, removing or capping and revegetating old tailings piles in Butte, Anaconda, and other towns. The work continues, as it will for years to come, and at some considerable cost. "At this point," Sandra Stash, ARCO's Montana facilities manager, told me, "we are 300 million dollars into the cleanup and expect it will be a couple of hundred million more by the time we're done." More than that, actually. ARCO ultimately settled a lawsuit against it by the state of Montana for some 218 million dollars and still has to continue its cleanup and restoration efforts until they are completed to the EPA's satisfaction.

This why I asked for a list of mining sites. related to

What I saw in Spokane and Anaconda is not unique. But no less deadly consequences of the General Mining Law of 1872 can be found all over the West. There are 52 other hardrock mining sites that have made the EPA's priorities list, virtually all of them on General Mining Law claims, and no one I talked with suggested that the reclamation work done, being done, or about to be done at these sites is ever likely to be truly complete.

Even more sobering is the fact that the EPA's priorities list does not include upwards of a quarter million abandoned mining sites—again, all but a fraction of them on General Mining Law claims—where spades may or may not get turned in the name of reclamation. If spades ever do get turned, the cleanup cost will be astronomical.

There are said to be 557,000 abandoning mining sites. Any thoughts on that high number?

These and similar problems continue to drive demands for reform. One aim of the effort is to give the Bureau of Land Management and the Forest Service the power to bar mining on environmentally sensitive lands. Another is

I have read that about 29,000 are thought ~~to need~~ have the potential for harm. Comments?

to establish national standards for environmental protection and site reclamation, and to set up a Hardrock Abandoned Mine Reclamation Program to begin the task of cleaning up those quarter million historic mistakes.

In order to pay for effective reclamation, reformers would establish a royalty system similar to that which has been in effect for coal, oil, and gas resources on the public lands for nearly 80 years. Many environmental groups, such as the Mineral Policy Center, favor an 8 percent royalty on the "net smelter value"—the value of the mineral after milling and processing (the royalty for coal, oil, and gas ranges from 12.5 percent to 16 percent). Under such a royalty system, the 3.4 billion dollars in gold and silver produced in 1998, for instance, would have garnered taxpayers somewhere around 272 million dollars, instead of—well—nothing. Other reformers, like Interior Secretary Babbitt, would accept a royalty of 5 percent. All say an additional mining fee should be instituted to help pay for cleanup efforts and that the current moratorium on patents should be made permanent. Too many patents, they say, turn out to be windfalls, and while it may be an extreme example, they cite the 60 acres of patented land outside the city of Phoenix that cost the "miner" who purchased them from the government a total of $170. The property is now a golf resort worth an estimated 60 million dollars.

Most miners say such reforms would be misguided overkill. Indeed, the Sixteen to One's Mike Miller thinks giving government agencies the power to prevent exploration in sensitive areas would be a death knell to the industry. "You can't mine except where God and nature put the minerals," Miller said. "You can't go out and run a gold mine anywhere but where there is an economical gold deposit." Miller also insisted that any kind of royalty would "kill the little guys."

Defenders of the industry also insist that new reclamation standards are not needed. Today's miner is not the bad guy of the past, they say. He is environmentally aware, not least because a plethora of federal laws, from the Clean Water Act to the Endangered Species Act, as well as many state laws and regulations, make it impossible for him *not* to be aware.

Homestake's McLaughlin gold mine near ~~Tokum~~ Lower Lake, California, is often cited to demonstrate the extent to which miners have mended their ways—so much so that the place is used in TV ads to improve the industry's

TOXIC WASTE

Water filling Montana's mile-wide Berkeley Pit (left) is so polluted that a flock of migrating swans died within hours of landing on its surface. In Kellogg, Idaho, lead emissions from the Bunker Hill smelter poisoned children living miles away. Directed by the U.S. Environmental Protection Agency, cleanup crews (right) continue to strip contaminated topsoil from playgrounds and yards.

BUNKER HILL . . . . AFFECTS 5,000 PEOPLE. IT IS ONE OF THE LARGEST AND MOST COMPLEX ABANDONED HAZARDOUS WASTE SITES IN THE NATION.

—U.S. Environmental Protection Agency

image. This is gold mining today, the ads proclaim—beautiful hills, waving fields of grass, prancing mule deer, a glimmering lake. The hills are real and so are the grasses, the deer, and the lake. I saw them all during a tour of the mine in the company of Raymond Krause, the mine's environmental manager. I saw waste-rock piles shaped into eye-pleasing mounds, the milling operation that recycles and contains all processed water, and the huge tailings pond that, over time, will become a 600-acre wetland. I saw the sophisticated monitoring system for the early detection of contamination in the groundwater. I even saw the gate placed over the mouth of a tunnel to protect the maternity roost for a local population of threatened Townsend's big-eared bats.

Clearly it is state-of-the-art reclamation, the McClaughlin, and kudos for it have included a commendation from the Sierra Club. What he was doing here, Krause told me, made perfect business sense too. "When you look at the total environmental cost, it is roughly 2 percent of our capital cost for the whole project. We want to protect our stockholders' investment. Creating an environmental liability doesn't serve their interests or ours."

"The McClaughlin is pretty good," concedes Steve D'Esposito, executive director of the Mineral Policy Center. "But it isn't perfect and it's hardly typical. While many mines do perform a lot of reclamation work, I don't know of a single operation that goes as far as the McClaughlin. Some mines ignore or subvert the law. Some are just incompetent."

As evidence, reformers point to a number of dramatic modern blowouts: The Phelps Dodge Corporation's Chino Copper Mine near Santa Rita, New Mexico, for example, where spills, leaks, and other unlawful discharges have dumped more than 180 million gallons of contaminated wastewater into Whitewater Creek since 1987. Or the Ray Mine in Arizona, where in 1990 rainwater flushed some 324,000 gallons of wastewater loaded with copper sulfates into the Gila River. Or, the Summitville Gold Mine in southern Colorado, owned (as most American gold mines are) by a Canadian corporation. Touted from the beginning as a model for what modern mining could do, it had hardly opened for business in 1986 before it began leaking cyanide, acid, and heavy metals into the Alamosa River, poisoning some 17 miles of the stream. The company declared bankruptcy in 1992, the EPA took the mine over as yet another Superfund site, and the U.S.

All of the spills were illegal, not legal through holes in the law?

17 miles correct?

Justice Department has had no luck getting reimbursement through Canadian courts for the hundred million dollars the agency already has had to spend to try to clean up the mess.

Like Summitville many problem mines are capable of producing gold that can be seen only with a microscope. The process involves extracting ore containing as little as .07 ounces of gold to the ton, milling it, then piling it onto the land in enormous pads, some of them two or three hundred feet high. A cyanide solution is sprayed over the top of the pad and leaches through it, picking up gold along the way. The solution is then collected from beneath the pad and piped off to a refinery for final processing.

If there is a center for the open-pit, heap-leach gold mining industry, it would be northern Nevada. Since 1990 Nevada has disgorged nearly 24 billion dollars in gold, producing 70 percent of U.S. output and ranking Nevada—if it were a separate nation—third in worldwide production. The bulk of it has come out of the northern portion of the state, where mining is to many towns what gambling is to Las Vegas.

Nowhere is this more true than in Winnemucca, a town of 8,800 people strung out along I-80 and the Humboldt River. Mining is not the only industry in the region, but it is far and away the biggest. There are 19 operating mines in the Winnemucca area, and 12 of them are producing gold (two also produce silver). Mining accounts for more than 3,500 jobs. "Our town has just about doubled in population over the past 12 years or so, primarily because of the mining industry," Winnemucca's city manager, Steve West, told me last summer. "As a result we've been able to do a lot of nice things for our community—our infrastructure, our parks, our water system."

West is no fan of mining reform. "It could cost us all of our jobs. What it would do is push the industry overseas or to South America. There's no doubt about it." Besides, he added, "I don't think these mines are having a major impact on the environment."

While no more in favor of drastic reform measures than West (he would support a net proceeds royalty, however), John Milton, chairman of the Humboldt County Board of Commissioners and a member of the Humboldt River Basin Water Authority, was less certain about the absence of major environmental impact. Ordinarily, the Humboldt River is reduced to a trickle by the end of the summer,

OLD BURDENS

Signature stains of acid mine drainage marked the mouth of Colorado's Joker Tunnel (left) for more than 90 years. Recent reclamation efforts block the exposure of sulfur-rich rocks to air and water, preventing future acid formation. Old mine diggings can fascinate, as a father and son on Nevada's Round Mountain learn (right), but unmarked and unstable they can ~~also~~ become deadly traps.

AS THE WEST'S POPULATION EXPANDS, MORE PEOPLE ARE AT RISK OF COMING INTO CONTACT WITH ABANDONED MINES SCATTERED ABOUT THE REGION.

—National Mining Association

he said. "But now, so much water is being discharged into the river from mining operations that the river runs high into October. Farmers can't get to their irrigation works to repair and maintain them in the fall, like they used to. And upstream some alfalfa fields are getting saturated." Still, he emphasized, "I don't want to see any more mines close down in Humboldt County. Planned shutdowns because of declining ore resources are one thing, but if someone passes a law that makes mining unprofitable all of a sudden, that's hard on an economy like ours."

There were other hits to worry about, he admitted, hits having more to do with the boom-and-bust nature of the business than anything environmentalists have been trying to impose. Largely because central banks in several nations had been selling much of their gold reserves in profit-taking moves, the price of gold has dropped precipitously over the years. In 1980 it stood at $612 an ounce, but by the summer of 1999 it had plummeted to $253. "The hope is always there that the mines will remain viable and the price of gold will go back up," Milton said. "Most people don't think past that. But in reality the life of mines is shorter now than two years ago, all because of the drop in prices."

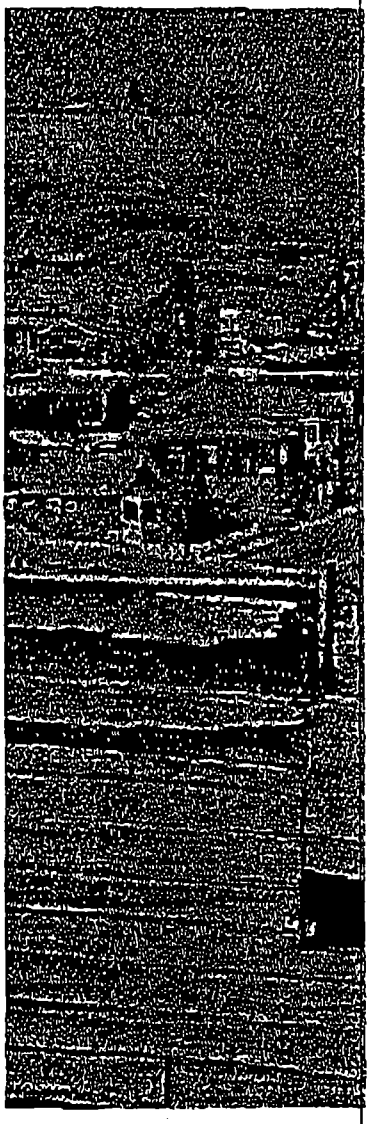
That very afternoon, as it happened, Placer Dome, a Canadian company that had purchased two Humboldt County mines on May 27, 1999, called a press conference to announce that because of declining gold prices, it was suspending all production at one mine and milling operations for both—this less than two months after the company had taken over. Two hundred full-time employees out of 600 would be laid off immediately.

Thirty years ago I wrote a history of gold and silver mining in the American West. There was much in that book that celebrated mining's importance to the opening of the West and its colorful history and folklore. Driving out of Winnemucca the day after Placer Dome's layoffs, I wondered if I had said enough in that history about the transient nature of the business, the folly of trying to build an economy on the exploitation of finite precious metals whose value is entirely abstract and dependent on the whims of nations. And while I was wondering about that, I recalled the day in 1997 when I hired a plane to fly over the Carlin Trend, a geological formation that provides the ore for much of the state's gold production. The desert below was marked by open pit after open pit, heap-leach pad after heap-leach pad, tailings pond after tailings pond. What I saw from the air that day gave weight to the critics' claim that hardrock mining probably produces more solid waste annually than the amount that spills out of America's cities. That was a legacy I might have anticipated in that history book 30 years ago, but didn't.

After the flight I had coffee in the Elko airport with my fellow observer Glen Miller, a professor of environmental and resource

BALANCING THE BOOKS

Copper was king in Butte, Montana, a century ago. Local mines still boast a 25-million-dollar payroll. But that sum is dwarfed by the hundreds of millions of dollars the EPA estimates it will cost to fix the ~~120~~ 140-mile-long expanse of eyesores, safety hazards, toxic dumps, and poisoned water that hardrock mines left in the Clark Fork River Basin between Butte and Missoula. Heavily invested in new, more environmentally sound operations, the mine industry claims it's already a cleaner, safer neighbor. Across the West, experience counsels caution and vigorous oversight.



sciences at the University of Nevada, Reno, and founder of Minewatch, a grassroots organization devoted to monitoring the effects of mine development. "The mines down there," he said, "are going to have tremendous impact on the groundwater system in the Humboldt River Basin because of the amount of water they're pumping out of the pits in order to keep them dry. Over the next ten years we figure it will create a groundwater deficit in the Humboldt River Basin equal to 20 years of the total flow of the Humboldt River at Winnemucca. And once the cost of mining and pumping the water exceeds the value of the ore, the companies will say 'That's it' and stop the pumps. That means groundwater will flow into the pits and create lakes—the largest man-made lakes in Nevada. They'll be dead lakes, too polluted for use by either humans or wildlife."

Is this a certainty?

Leaving Nevada I thought about those dead lakes shining in the desert sun, the dead birds I had seen in Spokane, the hundreds and thousands of abandoned mines still leaking poisons into the West's water, the sprawling chemical filth of the flats below the Anaconda smelter stack, the blowouts that still corrupt rivers and water tables. At what ultimate cost, I finally wondered, have we held so fiercely to this ancient law, dreaming the long dream of treasure that I once saluted with such enthusiasm? □

For more about hardrock mining go to *ngnews.com/hardrockmining*.

Watson

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

MAY 17 2000

CERTIFIED MAIL: RETURN RECEIPT REQUESTED (P 005 015 653)

Received
MAY 18 2000
6WQ-PP

Mr. Nelson Lopez
Superintendent
Questa School District
P.O. Box 440
1 Mile North Highway 522
Questa, New Mexico 87446

Re: Request for use of School Auditorium

Dear Mr. Lopez:

The Environmental Protection Agency (EPA) requests your approval for the use of one of your School Auditorium to conduct a workshop and a public hearing. The purpose of the workshop will be to answer any questions and explain the conditions of a proposed National Pollutant Discharge Elimination System (NPDES) permit Molycorp, Inc., a proposed Industrial Mine facility. The hearing will be held to consider all comments on the proposed permit.

We would like to schedule the workshop/hearing for Thursday, July 13, 2000. The workshop would begin at 2:00 p.m. and last until all questions have been answered. Approximately 50 people are expected to attend. The public hearing will begin at 7:00 p.m, with approximately 100 or more attendees.

Your immediate attention to this request would be greatly appreciated. Upon receipt of this letter, please contact me at (214) 665-7515. Thank you for your cooperation in this matter. If you have any questions or need additional information, do not hesitate to contact me.

Sincerely,

Evelyn Rosborough
Environmental Protection Specialist
Customer Service Branch (6WQ-CA)

cc: NMED

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a:erosborough:51700:molycorphearing.wpd

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

Wilson

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Evelyn Rosborough
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cc: NMED

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rosborough

a:erosborough:51700:molycorphearing.wpd

This version discussed 5/10, 5/11, 00 w/ NMED, Molycorp, and citizens groups in NM

Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

NPDES Permit No. NM0022306

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended, (33 U.S.C. 1251 et. seq; the "Act"),

Molycorp, Inc.
P.O. Box 469
Questa, New Mexico 87556

Revised after this

is authorized to discharge from a facility located near Questa in Taos County,

to receiving waters named the Red River, Waterbody Segment Code No. 2119 of the Rio Grande Basin,

in accordance with this cover page and the effluent limitations, monitoring requirements, and other conditions set forth in Parts I [Requirements for NPDES Permits - 17 pages], II [Other Conditions - 12 pages], and III [Standard Conditions for NPDES Permits - 8 pages] hereof.

This permit supersedes and replaces NPDES Permit No. NM0022306 issued September 10, 1993

This permit shall become effective on

This permit and the authorization to discharge shall expire at midnight,

Issued on

Prepared by

William B. Hathaway
Director
Water Quality Protection Division (6WQ)

J. Scott Wilson
Environmental Scientist
NPDES Permits Branch (6WQ-P)

PART I - REQUIREMENTS FOR NPDES PERMITS

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 001
Discharge Type: Intermittent
Latitude 36°41'49"N, Longitude 105°37'53"W

During the period beginning the effective date of the permit and lasting through the expiration date of the permit (unless otherwise noted),

the permittee is authorized to discharge process water from milling operations and tailings disposal, including mine de-watering and interceptor wells, to the Red River in Segment No. 2119 of the Rio Grande Basin.

Such discharges shall be limited and monitored by the permittee as specified below:

pH RANGE

PARAMETERS/STORET CODES	DISCHARGE LIMITATIONS/REPORTING REQUIREMENTS	
	QUALITY (UNITS AS STATED)	
	MINIMUM	MAXIMUM
pH (Standard Units) STORET: 00400	6.0	9.0

PARAMETERS/STORET CODES	MONITORING REQUIREMENTS	
	FREQUENCY OF ANALYSIS	SAMPLE TYPE
pH (Standard Units) STORET: 00400	1/Week	Grab

CHEMICAL/PHYSICAL/BIOCHEMICAL

PARAMETERS/STORET CODES	DISCHARGE LIMITATIONS/REPORTING REQUIREMENTS			
	QUANTITY/LOADING (LBS/DAY UNLESS STATED)		QUALITY/CONCENTRATION (mg/L UNLESS STATED)	
	MONTHLY AVG	DAILY MAX	MONTHLY AVG	DAILY MAX
Flow STORET: 50050	Report MGD	Report MGD	****	****
Chemical Oxygen Demand STORET: 00340	350	525	60	90
Total Suspended Solids STORET: 00530	117	175	20	30
Total Arsenic	2.9	5.8	0.5	1.0

STORET: 01002				
Total Cadmium (*1)	0.29	0.29	0.05	0.05
STORET: 01027				
Total Cadmium (*2)	0.02	0.032	0.0037	0.0055
STORET: 01027				
Total Copper (*1)	0.875	1.75	0.15	0.3
STORET: 01042				
Total Copper (*2)	0.186	0.284	0.032	0.0487
STORET: 01042				
Total Cyanide (*1)	0.146	0.29	0.025	0.05
STORET: 00720				
Total Cyanide (*2)	0.0858	0.128	0.0147	0.022
STORET: 00720				
Fluoride	17.5	17.5	3.0	3.0
STORET: 00951				
Total Iron	3.5	3.5	0.6	0.6
STORET: 01045				
Total Lead (*1)	1.75	3.5	0.3	0.6
STORET: 01051				
Total Lead (*2)	0.373	0.552	0.063	0.095
STORET: 01051				
Total Manganese	5.8	8.76	1.0	1.5
STORET: 01055				
Total Mercury (*1)	0.0058	0.0117	0.001	0.002
STORET: 71900				
Total Mercury (*2)	0.00025	0.00037	0.000043	0.000064
STORET: 71900				
Total Molybdenum	5.8	11.7	1.0	2.0
STORET: 01062				
Total Zinc	1.17	1.17	0.2	0.2
STORET: 01092				
Total Aluminum (*1)	2.6	3.93	Report	Report
STORET: 01105				
Total Aluminum (*2)	0.339	0.508	0.058	0.087
STORET: 01105				

PARAMETERS/STORET CODES	MONITORING REQUIREMENTS	
	FREQUENCY OF ANALYSIS	SAMPLE TYPE
Flow	Continuous	Record
STORET: 50050		
Chemical Oxygen Demand	1/Month	24-Hr. Composite (*4)
STORET: 00340		
Total Suspended Solids	1/Month	24-Hr. Composite (*4)
STORET: 00530		
Total Arsenic	1/Month	24-Hr. Composite (*4)
STORET: 01002		
Total Cadmium	1/Week	24-Hr. Composite (*4)
STORET: 01027		
Total Copper	1/Week	24-Hr. Composite (*4)
STORET: 01042		
Total Cyanide	1/Month	24-Hr. Composite (*4)

STORET: 00720		
Fluoride	1/Month	24-Hr. Composite (*4)
STORET: 00951		
Total Iron	1/Month	24-Hr. Composite (*4)
STORET: 01045		
Total Lead	1/Week	24-Hr. Composite (*4)
STORET: 01051		
Total Manganese	1/Month	24-Hr. Composite (*4)
STORET: 01055		
Total Mercury	1/Week	24-Hr. Composite (*4)
STORET: 71900		
Total Molybdenum	1/Month	24-Hr. Composite (*4)
STORET: 01062		
Total Zinc	1/Month	24-Hr. Composite (*4)
STORET: 01092		
Total Aluminum (*1)	1/Month	24-Hr. Composite (*4)
STORET: 01105		
Total Aluminum (*2)	1/Week	24-Hr. Composite (*4)
STORET: 01105		

WHOLE EFFLUENT TOXICITY TESTING

PARAMETERS/STORET CODES	DISCHARGE LIMITATIONS/REPORTING REQUIREMENTS	
	QUALITY (PERCENT % UNLESS STATED)	
	MONTHLY AVG MINIMUM	7-DAY MINIMUM
Whole Effluent Toxicity Testing (*5)		
(7-Day Static Renewal)		
Pimephales promelas		
STORET: TLP6C	****	Report
STORET: TOP6C	****	Report
STORET: TPP6C	****	Report
Ceriodaphnia dubia		
STORET: TLP3B	****	Report
STORET: TOP3B	****	Report
STORET: TPP3B	****	Report

Species Quality Reporting Units: Pass = 0, Fail = 1

PARAMETERS/STORET CODES	MONITORING REQUIREMENTS	
	FREQUENCY OF ANALYSIS	SAMPLE TYPE
Whole Effluent Toxicity Testing		
(7-Day Static Renewal)		
Pimephales promelas		
STORET: TLP6C	1/year	24-Hr. Composite (*4)
STORET: TOP6C	1/year	24-Hr. Composite (*4)
STORET: TPP6C	1/year	24-Hr. Composite (*4)

Ceriodaphnia dubia		
STORET: TLP3B	1/six months	24-Hr. Composite (*4)
STORET: TOP3B	1/six months	24-Hr. Composite (*4)
STORET: TPP3B	1/six months	24-Hr. Composite (*4)

SAMPLING LOCATION(S) AND OTHER REQUIREMENTS

SAMPLING LOCATION(S)
Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): after final treatment and prior to discharge to the Red River.

DEFINITIONS
The term "runoff" shall mean the flow of storm water resulting from precipitation or snow/ice melt coming into contact with the industrial facility property.

The term "uncontaminated runoff" shall mean runoff which does not come into contact (other than incidental) with any raw material, intermediate product, finished product, by-product, or waste product located on the industrial facility property.

NO DISCHARGE REPORTING
If there is no discharge event at this outfall during the sampling month, place an "X" in the NO DISCHARGE box located in the upper right corner of the preprinted Discharge Monitoring Report.

FLOATING SOLIDS OR VISIBLE FOAM
There shall be no discharge of floating solids or visible foam in other than trace amounts.

FLOW MEASUREMENTS
"Estimate" flow measurements shall not be subject to the accuracy provisions established at Part III.C.6. The daily flow value may be estimated using best engineering judgment.

FOOTNOTES

*1 Requirements for this parameter are effective during the period beginning the effective date of the permit and lasting through one (1) day prior to two (2) years from the effective date of the permit.

*2 Requirements for this parameter are effective during the period beginning two (2) years from the effective date of the permit and lasting through the expiration date of the permit.

*3 Requirements for this parameter are effective only during the period beginning the effective date of the permit and lasting through one (1) year from the effective date of the permit.

*4 See Part II.C.

*5 See Part II.G.

OUTFALL 002
Discharge Type: Continuous
Latitude 36°41'29"N, Longitude 105°37'53"W

During the period beginning the effective date of the permit and lasting until commencement of discharge at Outfall 001(unless otherwise noted),

the permittee is authorized to discharge seepage from the tailings impoundment to the Red River in Segment No. 2119 of the Rio Grande Basin.

Such discharges shall be limited and monitored by the permittee as specified below:

pH RANGE

PARAMETERS/STORET CODES	DISCHARGE LIMITATIONS/REPORTING REQUIREMENTS	
	QUALITY (UNITS AS STATED)	
	MINIMUM	MAXIMUM
pH (Standard Units) STORET: 00400	6.0	9.0

PARAMETERS/STORET CODES	MONITORING REQUIREMENTS	
	FREQUENCY OF ANALYSIS	SAMPLE TYPE
pH (Standard Units) STORET: 00400	1/Week	Grab

CHEMICAL/PHYSICAL/BIOCHEMICAL

PARAMETERS/STORET CODES	DISCHARGE LIMITATIONS/REPORTING REQUIREMENTS			
	QUANTITY/LOADING (LBS/DAY UNLESS STATED)		QUALITY/CONCENTRATION (mg/L UNLESS STATED)	
	MONTHLY AVG	DAILY MAX	MONTHLY AVG	DAILY MAX
Flow STORET: 50050	Report MGD	Report MGD	****	****
Chemical Oxygen Demand STORET: 00340	175	263	60	90
Total Suspended Solids STORET: 00530	58	87.6	20	30
Total Arsenic STORET: 01002	1.46	2.9	0.5	1.0
Total Cadmium (*1) STORET: 01027	0.146	0.146	0.05	0.05
Total Cadmium (*2) STORET: 01027	0.011	0.016	0.0037	0.0055
Total Copper (*1) STORET: 01042	0.438	0.876	0.15	0.3
Total Copper (*2) STORET: 01042	0.095	0.142	0.0325	0.0487

Total Cyanide (*1) STORET: 00720	0.073	0.146	0.025	0.05
Total Cyanide (*2) STORET: 00720	0.0429	0.064	0.0147	0.022
Fluoride STORET: 00951	8.75	8.75	3.0	3.0
Total Iron STORET: 01045	1.75	1.75	0.6	0.6
Total Lead (*1) STORET: 01051	0.876	1.75	0.3	0.6
Total Lead (*2) STORET: 01051	0.48	0.72	0.165	0.248
Total Manganese STORET: 01055	2.9	4.38	1.0	1.5
Total Mercury (*1) STORET: 71900	0.0029	0.0058	0.001	0.002
Total Mercury (*1) STORET: 71900	0.000327	0.00049	0.00011	0.00017
Total Molybdenum STORET: 01062	9.6	14.7	3.3	5.03
Total Zinc STORET: 01092	0.58	0.58	0.2	0.2
Total Aluminum (*1) STORET: 01105	0.25	0.376	Report	Report
Total Aluminum (*2) STORET: 01105	0.169	0.25	0.058	0.087

PARAMETERS/STORET CODES	MONITORING REQUIREMENTS	
	FREQUENCY OF ANALYSIS	SAMPLE TYPE
Flow STORET: 50050	Continuous	Record
Chemical Oxygen Demand STORET: 00340	1/Month	24-Hr. Composite (*4)
Total Suspended Solids STORET: 00530	1/Month	24-Hr. Composite (*4)
Total Arsenic STORET: 01002	1/Month	24-Hr. Composite (*4)
Total Cadmium STORET: 01027	1/Month	24-Hr. Composite (*4)
Total Copper STORET: 01042	1/Month	24-Hr. Composite (*4)
Total Cyanide STORET: 00720	1/Month	24-Hr. Composite (*4)
Fluoride STORET: 00951	1/Month	24-Hr. Composite (*4)
Total Iron STORET: 01045	1/Month	24-Hr. Composite (*4)
Total Lead STORET: 01051	1/Month	24-Hr. Composite (*4)
Total Manganese	1/Month	24-Hr. Composite (*4)

STORET: 01055		
Total Mercury	1/Month	24-Hr. Composite (*4)
STORET: 71900		
Total Molybdenum	1/Month	24-Hr. Composite (*4)
STORET: 01062		
Total Zinc	1/Month	24-Hr. Composite (*4)
STORET: 01092		
Total Aluminum	1/Month	24-Hr. Composite (*4)
STORET: 01105		

WHOLE EFFLUENT TOXICITY TESTING

PARAMETERS/STORET CODES	DISCHARGE LIMITATIONS/REPORTING REQUIREMENTS	
	QUALITY (PERCENT % UNLESS STATED)	
	MONTHLY AVG MINIMUM	7-DAY MINIMUM
Whole Effluent Toxicity Testing (*5)		
(7-Day Static Renewal)		
Pimephales promelas		
STORET: TLP6C	****	Report
STORET: TOP6C	****	Report
STORET: TPP6C	****	Report
Ceriodaphnia dubia		
STORET: TLP3B	****	Report
STORET: TOP3B	****	Report
STORET: TPP3B	****	Report

Species Quality Reporting Units: Pass = 0, Fail = 1

PARAMETERS/STORET CODES	MONITORING REQUIREMENTS	
	FREQUENCY OF ANALYSIS	SAMPLE TYPE
Whole Effluent Toxicity Testing		
(7-Day Static Renewal)		
Pimephales promelas		
STORET: TLP6C	1/year	24-Hr. Composite (*4)
STORET: TOP6C	1/year	24-Hr. Composite (*4)
STORET: TPP6C	1/year	24-Hr. Composite (*4)
Ceriodaphnia dubia		
STORET: TLP3B	1/six months	24-Hr. Composite (*4)
STORET: TOP3B	1/six months	24-Hr. Composite (*4)
STORET: TPP3B	1/six months	24-Hr. Composite (*4)

SAMPLING LOCATION(S) AND OTHER REQUIREMENTS

SAMPLING LOCATION(S)

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): After collection of the combined seepage from the tailings impoundment and prior to discharge to the Red River.

DEFINITIONS

The term "runoff" shall mean the flow of storm water resulting from precipitation or snow/ice melt coming into contact with the industrial facility property.

The term "uncontaminated runoff" shall mean runoff which does not come into contact (other than incidental) with any raw material, intermediate product, finished product, by-product, or waste product located on the industrial facility property.

NO DISCHARGE REPORTING

If there is no discharge event at this outfall during the sampling month, place an "X" in the NO DISCHARGE box located in the upper right corner of the preprinted Discharge Monitoring Report.

FLOATING SOLIDS OR VISIBLE FOAM

There shall be no discharge of floating solids or visible foam in other than trace amounts.

FLOW MEASUREMENTS

"Estimate" flow measurements shall not be subject to the accuracy provisions established at Part III.C.6. The daily flow value may be estimated using best engineering judgment.

FOOTNOTES

*1 Requirements for this parameter are effective during the period beginning the effective date of the permit and lasting through one (1) day prior to two (2) years from the effective date of the permit.

*2 Requirements for this parameter are effective during the period beginning two (2) years from the effective date of the permit and lasting through the expiration date of the permit.

*3 Requirements for this parameter are effective only during the period beginning the effective date of the permit and lasting through one (1) year from the effective date of the permit.

*4 See Part II.D.

*5 See Part II.I.

OUTFALL 002
Discharge Type: Continuous
Latitude 36°41'29"N, Longitude 105°37'53"W

During the period beginning after commencement of discharge at Outfall 001 and lasting through the expiration date of the permit (unless otherwise noted),

the permittee is authorized to discharge seepage from the tailings impoundment to the Red River in Segment No. 2119 of the Rio Grande Basin.

Such discharges shall be limited and monitored by the permittee as specified below:

pH RANGE

PARAMETERS/STORET CODES	DISCHARGE LIMITATIONS/REPORTING REQUIREMENTS	
	QUALITY (UNITS AS STATED)	
	MINIMUM	MAXIMUM
pH (Standard Units) STORET: 00400	6.0	9.0

PARAMETERS/STORET CODES	MONITORING REQUIREMENTS	
	FREQUENCY OF ANALYSIS	SAMPLE TYPE
pH (Standard Units) STORET: 00400	1/Week	Grab

CHEMICAL/PHYSICAL/BIOCHEMICAL

PARAMETERS/STORET CODES	DISCHARGE LIMITATIONS/REPORTING REQUIREMENTS			
	QUANTITY/LOADING (LBS/DAY UNLESS STATED)		QUALITY/CONCENTRATION (mg/L UNLESS STATED)	
	MONTHLY AVG	DAILY MAX	MONTHLY AVG	DAILY MAX
Flow STORET: 50050	Report MGD	Report MGD	****	****
Chemical Oxygen Demand STORET: 00340	175	263	60	90
Total Suspended Solids STORET: 00530	58	87.6	20	30
Total Arsenic STORET: 01002	1.46	2.9	0.5	1.0
Total Cadmium (*1) STORET: 01027	0.146	0.146	0.05	0.05
Total Cadmium (*2) STORET: 01027	0.01	0.016	0.0037	0.0055
Total Copper (*1) STORET: 01042	0.438	0.876	0.15	0.3
Total Copper (*2) STORET: 01042	0.095	0.142	0.0325	0.0487

Total Cyanide (*1) STORET: 00720	0.073	0.146	0.025	0.05
Total Cyanide (*2) STORET: 00720	0.0429	0.064	0.0147	0.022
Fluoride STORET: 00951	8.75	8.75	3.0	3.0
Total Iron STORET: 01045	1.75	1.75	0.6	0.6
Total Lead (*1) STORET: 01051	0.876	1.75	0.3	0.6
Total Lead (*2) STORET: 01051	0.184	0.276	0.063	0.0946
Total Manganese STORET: 01055	2.9	4.38	1.0	1.5
Total Mercury (*1) STORET: 71900	0.0029	0.0058	0.001	0.002
Total Mercury (*1) STORET: 71900	0.000126	0.00019	0.000043	0.000064
Total Molybdenum STORET: 01062	9.6	14.7	3.3	5.03
Total Zinc STORET: 01092	0.58	0.58	0.2	0.2
Total Aluminum (*1) STORET: 01105	0.25	0.376	Report	Report
Total Aluminum (*2) STORET: 01105	0.169	0.25	0.058	0.087

PARAMETERS/STORET CODES	MONITORING REQUIREMENTS	
	FREQUENCY OF ANALYSIS	SAMPLE TYPE
Flow STORET: 50050	Continuous	Record
Chemical Oxygen Demand STORET: 00340	1/Month	24-Hr. Composite (*4)
Total Suspended Solids STORET: 00530	1/Month	24-Hr. Composite (*4)
Total Arsenic STORET: 01002	1/Month	24-Hr. Composite (*4)
Total Cadmium STORET: 01027	1/Month	24-Hr. Composite (*4)
Total Copper STORET: 01042	1/Month	24-Hr. Composite (*4)
Total Cyanide STORET: 00720	1/Month	24-Hr. Composite (*4)
Fluoride STORET: 00951	1/Month	24-Hr. Composite (*4)
Total Iron STORET: 01045	1/Month	24-Hr. Composite (*4)
Total Lead STORET: 01051	1/Month	24-Hr. Composite (*4)
Total Manganese	1/Month	24-Hr. Composite (*4)

STORET: 01055		
Total Mercury	1/Month	24-Hr. Composite (*4)
STORET: 71900		
Total Molybdenum	1/Month	24-Hr. Composite (*4)
STORET: 01062		
Total Zinc	1/Month	24-Hr. Composite (*4)
STORET: 01092		
Total Aluminum	1/Month	24-Hr. Composite (*4)
STORET: 01105		

WHOLE EFFLUENT TOXICITY TESTING

PARAMETERS/STORET CODES	DISCHARGE LIMITATIONS/REPORTING REQUIREMENTS	
	QUALITY (PERCENT % UNLESS STATED)	
	MONTHLY AVG MINIMUM	7-DAY MINIMUM
Whole Effluent Toxicity Testing (*5)		
(7-Day Static Renewal)		
Pimephales promelas		
STORET: TLP6C	****	Report
STORET: TOP6C	****	Report
STORET: TPP6C	****	Report
Ceriodaphnia dubia		
STORET: TLP3B	****	Report
STORET: TOP3B	****	Report
STORET: TPP3B	****	Report

Species Quality Reporting Units: Pass = 0, Fail = 1

PARAMETERS/STORET CODES	MONITORING REQUIREMENTS	
	FREQUENCY OF ANALYSIS	SAMPLE TYPE
Whole Effluent Toxicity Testing		
(7-Day Static Renewal)		
Pimephales promelas		
STORET: TLP6C	1/year	24-Hr. Composite (*4)
STORET: TOP6C	1/year	24-Hr. Composite (*4)
STORET: TPP6C	1/year	24-Hr. Composite (*4)
Ceriodaphnia dubia		
STORET: TLP3B	1/six months	24-Hr. Composite (*4)
STORET: TOP3B	1/six months	24-Hr. Composite (*4)
STORET: TPP3B	1/six months	24-Hr. Composite (*4)

SAMPLING LOCATION(S) AND OTHER REQUIREMENTS

SAMPLING LOCATION(S)

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): After collection of the combined seepage from the tailings impoundment and prior to discharge to the Red River.

DEFINITIONS

The term "runoff" shall mean the flow of storm water resulting from precipitation or snow/ice melt coming into contact with the industrial facility property.

The term "uncontaminated runoff" shall mean runoff which does not come into contact (other than incidental) with any raw material, intermediate product, finished product, by-product, or waste product located on the industrial facility property.

NO DISCHARGE REPORTING

If there is no discharge event at this outfall during the sampling month, place an "X" in the NO DISCHARGE box located in the upper right corner of the preprinted Discharge Monitoring Report.

FLOATING SOLIDS OR VISIBLE FOAM

There shall be no discharge of floating solids or visible foam in other than trace amounts.

FLOW MEASUREMENTS

"Estimate" flow measurements shall not be subject to the accuracy provisions established at Part III.C.6. The daily flow value may be estimated using best engineering judgment.

FOOTNOTES

*1 Requirements for this parameter are effective during the period beginning the effective date of the permit and lasting through one (1) day prior to two (2) years from the effective date of the permit.

*2 Requirements for this parameter are effective during the period beginning two (2) years from the effective date of the permit and lasting through the expiration date of the permit.

*3 Requirements for this parameter are effective only during the period beginning the effective date of the permit and lasting through one (1) year from the effective date of the permit.

*4 See Part II.D.

*5 See Part II.I.

OUTFALL 004 and 005
Discharge Type: Intermittent
Outfall 004: Latitude 36°41'08"N, Longitude 105°31'51"W
Outfall 005: Latitude 36°41'41"N, Longitude 105°31'48"W

During the period beginning the effective date of the permit and lasting through the expiration date of the permit (unless otherwise noted),

the permittee is authorized to discharge periodic mine drainage consisting only of mine contacted surface storm water runoff to the Red River in Segment No. 2119 of the Rio Grande Basin.

Such discharges shall be limited and monitored by the permittee as specified below:

pH RANGE

PARAMETERS/STORET CODES	DISCHARGE LIMITATIONS/REPORTING REQUIREMENTS	
	QUALITY (UNITS AS STATED)	
	MINIMUM	MAXIMUM
pH (Standard Units) STORET: 00400	6.0	9.0

PARAMETERS/STORET CODES	MONITORING REQUIREMENTS	
	FREQUENCY OF ANALYSIS	SAMPLE TYPE
pH (Standard Units) STORET: 00400	1/Day (*1)	Grab

CHEMICAL/PHYSICAL/BIOCHEMICAL

PARAMETERS/STORET CODES	DISCHARGE LIMITATIONS/REPORTING REQUIREMENTS			
	QUANTITY/LOADING (LBS/DAY UNLESS STATED)		QUALITY/CONCENTRATION (mg/L UNLESS STATED)	
	MONTHLY AVG	DAILY MAX	MONTHLY AVG	DAILY MAX
Flow STORET: 50050	Report MGD	Report MGD	****	****
Chemical Oxygen Demand STORET: 00340	****	****	125	125
Total Suspended Solids STORET: 00530	****	****	20	30
Total Arsenic STORET: 01002	****	****	0.5	1.0
Total Cadmium STORET: 01027	****	****	0.0034	0.0051
Total Copper STORET: 01042	****	****	0.043	0.064
Total Lead STORET: 01051	****	****	0.083	0.125
Total Mercury	****	****	0.000043	0.000064

STORET: 71900				
Total Zinc	****	****	0.2	0.2
STORET: 01092				
Total Aluminum	****	****	0.058	0.087
STORET: 01105				
Total Silver	****	****	0.004	0.006
STORET: 01077				
Chlordane	****	****	0.000015	0.000023
STORET: 39350				
Total Residual Chlorine	****	****	0.0127	0.019
STORET: 50060				

PARAMETERS/STORET CODES	MONITORING REQUIREMENTS	
	FREQUENCY OF ANALYSIS	SAMPLE TYPE
Flow	1/Day (*1)	Measure (*3)(*2)
STORET: 50050		
Chemical Oxygen Demand	1/Day (*1)	24-Hr. Composite (*2)
STORET: 00340		
Total Suspended Solids	1/Day (*1)	24-Hr. Composite (*2)
STORET: 00530		
Total Arsenic	1/Day (*1)	24-Hr. Composite (*2)
STORET: 01002		
Total Cadmium	1/Day (*1)	24-Hr. Composite (*2)
STORET: 01027		
Total Copper	1/Day (*1)	24-Hr. Composite (*2)
STORET: 01042		
Total Lead	1/Day (*1)	24-Hr. Composite (*2)
STORET: 01051		
Total Mercury	1/Day (*1)	24-Hr. Composite (*2)
STORET: 71900		
Total Zinc	1/Day (*1)	24-Hr. Composite (*2)
STORET: 01092		
Total Aluminum	1/Month (*1)	24-Hr. Composite (*2)
STORET: 01105		
Total Silver	1/Month (*1)	24-Hr. Composite (*2)
STORET: 01077		
Chlordane	1/Month (*1)	24-Hr. Composite (*2)
STORET: 39350		
Total Residual Chlorine	1/Month (*1)	24-Hr. Composite (*2)
STORET: 50060		

SAMPLING LOCATION(S) AND OTHER REQUIREMENTS

SAMPLING LOCATION(S)

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Prior to discharge from the settling basins.

DEFINITIONS

The term "runoff" shall mean the flow of storm water resulting from precipitation or snow/ice melt coming into contact with the industrial facility property.

The term "uncontaminated runoff" shall mean runoff which does not come into contact (other than incidental) with any raw material, intermediate product, finished product, by-product, or waste product located on the industrial facility property.

NO DISCHARGE REPORTING

If there is no discharge event at this outfall during the sampling month, place an "X" in the NO DISCHARGE box located in the upper right corner of the preprinted Discharge Monitoring Report.

FLOATING SOLIDS OR VISIBLE FOAM

There shall be no discharge of floating solids or visible foam in other than trace amounts.

FLOW MEASUREMENTS

"Estimate" flow measurements shall not be subject to the accuracy provisions established at Part III.C.6. The daily flow value may be estimated using best engineering judgment.

FOOTNOTES

*1 When discharging

*2 See Part II.C.

*3 By calibrated weir.

B. PROHIBITIONS

The discharge of pollutants traceable to point source mine operations through a hydrologic connection to the Red River shall be prohibited except in trace amounts. Implementation of the Best Management Practices required by PART II.A. of this permit will constitute compliance with this prohibition at Spring 13 and Spring 39. Compliance with this prohibition shall be accomplished as soon as practicable but in no case later than two years after the effective date of this permit.

C. SCHEDULE OF COMPLIANCE

The permittee shall comply with the following schedule of activities for the attainment of state water quality standards-based final effluent limitations for total cadmium, total copper, total cyanide, total lead, total mercury, total aluminum, total silver, chlordane, and total residual chlorine at Outfall 001 and total cadmium, total copper, total cyanide, total lead, total mercury, and total aluminum at Outfall 002:

a. Determine exceedance cause(s);
b. Develop control options;
c. Evaluate and select control mechanisms;
d. Implement corrective action; and
e. Attain final effluent limitations no later than two (2) years from the effective date of the permit.

The permittee shall submit quarterly progress reports in accordance with the following schedule. The requirement to submit quarterly progress reports shall expire two (2) years from the effective date of the permit.

PROGRESS REPORT DATE
January 1 31
April 1
July 1
October 1

The quarterly progress reports shall include a discussion of the interim requirements that have been completed at the time of the report and shall address the progress towards attaining the state water quality standards-based final effluent limitations for total cadmium, total copper, total cyanide, total lead, total mercury, total aluminum, total silver, chlordane, and total residual chlorine at Outfall 001 and total cadmium, total copper, total cyanide, total lead, total mercury, total aluminum, and chlordane at Outfall 002 no later than two (2) years from the effective date of the permit.

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than fourteen (14) days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

D. REPORTING OF MONITORING RESULTS

Monitoring information shall be on Discharge Monitoring Report Form(s) EPA 3320-1 as specified in Part III.D.4 of this permit and shall be submitted monthly.

1. Reporting periods shall end on the last day of the month.

2. The permittee is required to submit regular monthly reports as described above postmarked no later than the following day of the month following each reporting period.

STATE	DAY
New Mexico Permits	15th

PART II - OTHER CONDITIONS

A. BEST MANAGEMENT PRACTICES

The permittee shall install the following seepage interception and management system to comply with the prohibition against the discharge to the Red River of pollutants traceable to point source mine operations except in trace amounts. Implementation of these Best Management Practices (described below) is considered compliance with this prohibition.

The permittee shall install french drain collection systems to prevent discharges of process related ground water to the Red River at Spring 13 and Spring 39.

Spring 13 is defined as the seepage zone located on the north side of the Red River at the southwest base of Goathill just east of Capulin Canyon.

Spring 39 is defined as the seepage zone located on the north side of the Red River approximately 500 feet downstream of Thunder Bridge.

The Spring 13 drainage system shall consist of a 400 foot long french drain designed and operated for a pumping rate of at least 50 gallons per minute. The french drain shall be placed at a depth at least two feet below the low water river surface and a minimum of ten feet north of the river channel. An additional french drain shall be installed which extends 800 feet downstream from the Spring 13 french drain and is designed, constructed, and operated to capture shallow seepage flow along the river reach of the mouth of Capulin Canyon. Orifices in the french drains shall be evenly spaced at a distance of 2 to 3 feet apart. Water pumped from these french drains shall be pre-treated as necessary to ensure the integrity of the tailings pipeline and pumped into the pipeline.

The Spring 39 drainage system shall consist of a 400 foot long french drain which is centered around the spring and is designed and operated for a 35 gallon per minute pumping rate. The french drain shall be placed at a depth of at least two feet below the low water river surface and a minimum of ten feet outside of the stream channel. Orifices in the french drain shall be evenly spaced at a distance of 2 to 3 feet apart. Water pumped from the drains shall be pre-treated as necessary and pumped into either the tailings pipeline or the water supply line from Columbine Park to the mill.

The permittee shall conduct a field investigation to determine available alterations in the seep collection system design listed above which will potentially enhance its collection efficiency. The field investigation must at a minimum include:

a. Determination of the groundwater elevation, direction of flow, and gradient in the vicinity of springs 13 and 39.

b. Determination of the hydrological characteristics of the shallow ground water aquifer.

c. Pilot testing of a 100 foot long collection system located at Spring 13 and determination of necessary changes to the french drain orifice size and spacing, pipe depth, and distance from river.

Field investigations conducted to determine changes to the ~~above~~ seepage interception system design criteria shall be submitted to EPA Region 6 prior to implementation of those changes. Any changes must be made only after written approval from the Agency. Progress reports on field investigation and construction of the seepage interception system shall be submitted quarterly to EPA Region 6 and the New Mexico Environment Division (NMED).

Upon completion of the seepage interception system, the permittee shall evaluate the system to determine its effectiveness. The evaluation shall include a determination of the ground water yield relative to the volume and flow rate observed in the field investigation described above and a visual examination of the Red River and its northern bank in the vicinity of Spring 13 and Spring 39. A report of that evaluation shall be submitted to EPA Region 6 and NMED within three months after completion of the interception system. Should the seepage interception system prove ineffective at capturing discharges of pollutants traceable to mine operations, the permittee shall make any necessary alterations to the system which are required to capture such discharges. The permit may be reopened to address such discharges.

The permittee shall conduct monthly visual inspections of the Red River and its banks in the vicinity of the facility, to identify any significant discharge or seepage which may be directly from or hydrologically connected to the permittee's mining operations. A report summarizing the monthly inspections shall be submitted annually on January 15th to EPA Region 6 and NMED. In the event that such a discharge or seepage is found it shall be reported to the Agencies within fourteen days of detection of any significant discharge or seepage. This fourteen day reporting requirement applies to Spring 13 and Spring 39 only after installation of the seepage interception system. This permit may be reopened if any significant discharge or seepage occurs.

B. MINIMUM QUANTIFICATION LEVEL (MQL)

If any individual analytical test result is less than the minimum quantification level listed below, a value of zero (0) may be used for that individual result for the Discharge Monitoring Report (DMR) calculations and reporting requirements.

	MQL (ug/L)
Aluminum	100
Chlorine (Total Residual)	100
Arsenic (Total)	10

Cadmium (Total)	1
Chromium (Total)	10
Copper (Total)	10
Lead (Total)	5
Mercury (Total)	0.2
Nickel (Total)	5
Silver (Total)	2
Zinc (Total)	20
Cyanide (Total)	20
Cyanide (Amenable)	20
Chlordane	0.2

more on

The permittee may develop an effluent specific method detection limit (MDL) in accordance with Appendix B to 40CFR136. For any pollutant for which the permittee determines an effluent specific MDL, the permittee shall send to the EPA Region 6 NPDES Permits Branch (6WQ-P) a report containing QA/QC documentation, analytical results, and calculations necessary to demonstrate that the effluent specific MDL was correctly calculated. An effluent specific minimum quantification level (MQL) shall be determined in accordance with the following calculation:

$$MQL = 3.3 \times MDL$$

Upon written approval by the EPA Region 6 NPDES Permits Branch (6WQ-P), the effluent specific MQL may be utilized by the permittee for all future Discharge Monitoring Report (DMR) calculations and reporting requirements.

C. 24-HOUR ORAL REPORTING: DAILY MAXIMUM LIMITATION VIOLATIONS

Under the provisions of Part III.D.7.b.(3) of this permit, violations of daily maximum limitations for the following pollutants shall be reported orally to EPA Region 6, Compliance and Assurance Division, Water Enforcement Branch (6EN-W), Dallas, Texas, within 24 hours from the time the permittee becomes aware of the violation followed by a written report in five days.

D. COMPOSITE SAMPLING (24-HOUR)

Unless otherwise specified in this permit, the term "24-hour composite sample" means a sample consisting of a minimum of three (3) aliquots of effluent collected at regular intervals over a normal 24-hour operating period and combined in proportion to flow or a sample continuously collected in proportion to flow over a normal 24-hour operating period.

E. CYANIDE EFFLUENT TEST PROCEDURES

To comply with the sampling and analysis requirements for total cyanide and cyanide amenable to chlorination, the permittee shall use an approved test procedure at 40CFR136. If the analysis of cyanide amenable to chlorination is subject to matrix interferences, the weak acid dissociable cyanide method (Method 4500 CN I - Standard Methods, latest edition approved in 40CFR136)

may be substituted for this parameter. The permittee may use ion chromatographic separation - amperometric detection (IC method) as a substitute for the colorimetric detection steps in any of the above cyanide methods. No other modifications of the above methods are authorized by this provision unless such modifications are approved in writing by the permitting authority.

Heading?

F. The Molycorp thiocyanate colorimetric method is approved for the analysis of molybdenum unless subsequently determined to be inappropriate by the NMED or EPA.

Heading?

G. As soon as practicable after the arrival of Molycorp's environmental staff at the site of a tailings spill that reaches the Red River, but no later than two (2) hours after arrival at the site, water quality sampling shall commence. Samples shall be taken at three sites:

(1) Approximately 100 feet above the point where tailings enter the river;

(2) Approximately 100 feet below the point where tailings enter the river; and

(3) Approximately one-half mile below the point where tailings enter the river.

All samples shall be properly preserved and analyzed for:

Chemical Oxygen Demand
Total Suspended Solids
Total Arsenic
Total Cadmium
Total Copper
Total Cyanide
Fluoride
Total Iron
Total Lead
Total Manganese
Total Mercury
Total Molybdenum
Total Zinc
Total Aluminum
Total Boron
Total Chromium
Total Cobalt
Total Selenium
Total Vanadium
Total Beryllium
Total Nickel
Total Silver
Un-ionized Ammonia (as N)

Total Residual Chlorine
Temperature
pH

The results of the analysis shall be submitted to the EPA and the NMED within 30 days following a tailings spill.

Consistent with the procedures described in the Preventative Maintenance and Surveillance Plan and the Contingency Action and Reporting Plan (June 1975), a written report containing the following information will be sent to the EPA and the NMED within ten (10) days following any spill:

(1) Date of Spill.

(2) Time when the spill was observed and time when tailings flow into the river was stopped.

(3) Location (pipe or coupling number).

(4) Estimated amount of tailings that entered the river.

(5) Sketch and dimension of size of hole or failure that caused the spill.

(6) Position of failure in the pipe or coupling.

(7) Copy of the latest computer printout covering the pipe or coupling which failed.

(8) Comments, if required for clarification.

H. REOPENER CLAUSE

The permit may be modified or revoked and reissued if ~~one~~ any of the following events occurs:

1. The effluent limitations in this permit are consistent with, or more stringent than, the State of New Mexico Standards for Interstate and Intrastate Surface Waters or the limits established for dischargers in the same water body in the 1985 State Water Quality Management Plan (WQMP). The State is presently reevaluating and updating the final effluent limitations necessary to protect water quality standards. When final effluent limitations are established in an approved WQMP and if they are more stringent than those listed in this permit, or controls a pollutant not listed in this permit, then the permit may be modified or revoked and reissued to conform with the approved WQMP final effluent limitations. OR

2. Effluent monitoring requirements for the following parameter(s) have been established in this permit based on an exceedance of the EPA water quality criteria for the protection of human health from consumption of contaminated fish and shellfish:

PARAMETER	STORET
Arsenic	01002

Should the State adopt a State water quality standard, this permit may be reopened for modification or revocation and reissuance to established effluent limitations for the parameter(s) to be consistent with that approved State standard in accordance with 40CFR122.44(d). Modification or revocation and reissuance of the permit shall follow regulations listed at 40CFR124.5. OR

3. If EPA determines that the reissuance of this permit may affect federally listed endangered or threatened species or modify the critical habitats of those species, EPA would initiate an consultation with the US Fish and Wildlife Service (FWS), in accordance with the Endangered Species Act (ESA.) The permit may be modified or revoked and reissued if EPA finds, during the ESA consultation with the FWS, that more stringent conditions are warrant for the protection of those species and/or their critical habitats.

4. Should the seepage collection system field investigation show that substantial changes to the seepage collection system design are necessary, this permit may be modified or revoked and reissued to incorporate relevant changes to the design of the system.

I. WHOLE EFFLUENT TOXICITY TESTING (7-DAY CHRONIC NOEC FRESHWATER)

1. SCOPE AND METHODOLOGY

a. The permittee shall test the effluent for toxicity in accordance with the provisions in this section.

APPLICABLE TO FINAL OUTFALL(S): 001 and 002 combined
REPORTED ON DMR AS FINAL OUTFALL:
TXS

CRITICAL DILUTION (%):	21
EFFLUENT DILUTION SERIES (%):	9, 12, 16, 21, and 28
COMPOSITE SAMPLE TYPE:	Defined at PART I
TEST SPECIES/METHODS:	40CFR136

Ceriodaphnia dubia chronic static renewal survival and reproduction test, Method 1002.0, EPA/600/4-91/002 or the most recent update thereof. This test should be terminated when 60% of the surviving adults in the control produce three broods.

Pimephales promelas (Fathead minnow) chronic static renewal 7-day larval survival and growth test, Method 1000.0, EPA/600/4-91/002, or the most recent update thereof. A minimum of five (5) replicates with eight (8) organisms per replicate must be used in the control and in each effluent dilution of this test.

b. The NOEC (No Observed Effect Concentration) is defined as the greatest effluent dilution which does not result in lethality that is statistically different from the control (0% effluent) at the 95% confidence level.

c. This permit may be reopened to require whole effluent toxicity limits, chemical specific effluent limits, additional testing, and/or other appropriate actions to address toxicity.

2. PERSISTENT LETHALITY

The requirements of this subsection apply only when a toxicity test demonstrates significant lethal effects at the critical dilution. Significant lethal effects are herein defined as a statistically significant difference at the 95% confidence level between the survival of the appropriate test organism in a specified effluent dilution and the control (0% effluent).

a. PART I TESTING FREQUENCY OTHER THAN MONTHLY

i. The permittee shall conduct a total of two (2) additional tests for any species that demonstrates significant lethal effects at the critical dilution. The two additional tests shall be conducted monthly during the next two consecutive months. The permittee shall not substitute either of the two additional tests in lieu of routine toxicity testing. The full report shall be prepared for each test required by this section in accordance with procedures outlined in Item 4 of this section.

ii. If one or both of the two additional tests demonstrates significant lethal effects at the critical dilution, the permittee shall initiate Toxicity Reduction Evaluation (TRE) requirements as specified in Item 5 of this section. The permittee shall notify EPA in writing within 5 days of the failure of any retest, and the TRE initiation date will be the test completion date of the first failed retest.

iii. If one or both of the two additional tests demonstrates significant lethal effects at the critical dilution, the permittee shall henceforth increase the frequency of testing for this species to once per quarter for the life of the permit.

iv. The provisions of Item 2.a are suspended upon submittal of the TRE Action Plan.

b. PART I TESTING FREQUENCY OF MONTHLY

The permittee shall initiate the Toxicity Reduction Evaluation (TRE) requirements as specified in Item 5 of this section when any two of three consecutive monthly toxicity tests exhibit significant lethal effects at the critical dilution.

3. REQUIRED TOXICITY TESTING CONDITIONS

a. TEST ACCEPTANCE

The permittee shall repeat a test, including the control and all effluent dilutions, if the procedures and quality assurance requirements defined in the test methods or in this permit are not satisfied, including the following additional criteria:

i. The toxicity test control (0% effluent) must have survival equal to or greater than 80%.

ii. The mean number of Ceriodaphnia dubia neonates produced per surviving adult in the control (0% effluent) must be 15 or more.

iii. The mean dry weight of surviving Fathead minnow larvae at the end of the 7 days in the control (0% effluent) must be 0.25 mg per larva or greater.

iv. The percent coefficient of variation between replicates shall be 40% or less in the control (0% effluent) for: the young of surviving

adults in the Ceriodaphnia dubia reproduction test; the growth and survival endpoints of the Fathead minnow test.

v. The percent coefficient of variation between replicates shall be 40% or less in the critical dilution, unless significant lethal or nonlethal effects are exhibited for: the young of surviving adults in the Ceriodaphnia dubia reproduction test; the growth and survival endpoints of the Fathead minnow test.

Test failure may not be construed or reported as invalid due to a coefficient of variation value of greater than 40%. A repeat test shall be conducted within the required reporting period of any test determined to be invalid.

b. STATISTICAL INTERPRETATION

i. For the Ceriodaphnia dubia survival test, the statistical analyses used to determine if there is a significant difference between the control and the critical dilution shall be Fisher's Exact Test as described in EPA/600/4-91/002 or the most recent update thereof.

If the conditions of Test Acceptability are met in Item 3.a above and the percent survival of the test organism is equal to or greater than 80% in the critical dilution concentration and all lower dilution concentrations, the test shall be considered to be a passing test, and the permittee shall report an NOEC of not less than the critical dilution for the DMR reporting requirements found in Item 4 below.

ii. For the Ceriodaphnia dubia reproduction test and the Fathead minnow larval survival and growth test, the statistical analyses used to determine if there is a significant difference between the control and the critical dilution shall be in accordance with the methods for determining the No Observed Effect Concentration (NOEC) as described in EPA/600/4-91/002 or the most recent update thereof.

c. DILUTION WATER

i. Dilution water used in the toxicity tests will be receiving water collected as close to the point of discharge as possible but unaffected by the discharge. The permittee shall substitute

synthetic dilution water of similar pH, hardness, and alkalinity to the closest downstream perennial water for;

(A) toxicity tests conducted on effluent discharges to receiving water classified as intermittent streams; and

(B) toxicity tests conducted on effluent discharges where no receiving water is available due to zero flow conditions.

ii. If the receiving water is unsatisfactory as a result of instream toxicity (fails to fulfill the test acceptance criteria of Item 3.a), the permittee may substitute synthetic dilution water for the receiving water in all subsequent tests provided the unacceptable receiving water test met the following stipulations:

(A) a synthetic dilution water control which fulfills the test acceptance requirements of Item 3.a was run concurrently with the receiving water control;

(B) the test indicating receiving water toxicity has been carried out to completion (i.e., 7 days);

(C) the permittee includes all test results indicating receiving water toxicity with the full report and information required by Item 4 below; and

(D) the synthetic dilution water shall have a pH, hardness, and alkalinity similar to that of the receiving water or closest downstream perennial water not adversely affected by the discharge, provided the magnitude of these parameters will not cause toxicity in the synthetic dilution water.

d. SAMPLES AND COMPOSITES

i. The permittee shall collect a minimum of three flow-weighted composite samples from the outfall(s) listed at Item 1.a above.

ii. The permittee shall collect second and third composite samples for use during 24-hour renewals of each dilution concentration for each test. The permittee must collect the composite samples such that the effluent samples are representative of any periodic episode of chlorination, biocide usage or other potentially toxic substance discharged on an intermittent basis.

iii. The permittee must collect the composite samples so that the maximum holding time for any effluent sample shall not exceed 72 hours. The permittee must have initiated the toxicity test within 36 hours after the collection of the last portion of the first composite sample. Samples shall be chilled to 4 degrees Centigrade during collection, shipping, and/or storage.

iv. If the flow from the outfall(s) being tested ceases during the collection of effluent samples, the requirements for the minimum number of effluent samples, the minimum number of effluent portions and the sample holding time are waived during that sampling period. However, the permittee must collect an effluent composite sample volume during the period of discharge that is sufficient to complete the required toxicity tests with daily renewal of effluent. When possible, the effluent samples used for the toxicity tests shall be collected on separate days if the discharge occurs over multiple days. The effluent composite sample collection duration and the static renewal protocol associated with the abbreviated sample collection must be documented in the full report required in Item 4 of this section.

v. MULTIPLE OUTFALLS: If the provisions of this section are applicable to multiple outfalls, the permittee shall combine the composite effluent samples in proportion to the average flow from the outfalls listed in Item 1.a above for the day the sample was collected. The permittee shall perform the toxicity test on the flow-weighted composite of the outfall samples.

4. REPORTING

a. The permittee shall prepare a full report of the results of all tests conducted pursuant to this section in accordance with the Report Preparation Section of EPA/600/4-91/002, or the most current publication, for every valid or invalid toxicity test initiated whether carried to completion or not. The permittee shall retain each full report pursuant to the provisions of PART III.C.3 of this permit. The permittee shall submit full reports only upon the specific request of the Agency.

b. A valid test for each species must be reported on the DMR during each reporting period specified in PART I of this permit unless the permittee is performing a TRE which may increase the frequency of testing and reporting. Only ONE set of biomonitoring data for each species is to be recorded on the DMR for each reporting period. The data submitted

should reflect the LOWEST Survival results for each species during the reporting period. All invalid tests, repeat tests (for invalid tests), and retests (for tests previously failed) performed during the reporting period must be attached to the DMR for EPA review.

c. The permittee shall submit the results of each valid toxicity test on the subsequent monthly DMR for that reporting period in accordance with PART III.D.4 of this permit, as follows below. Submit retest information clearly marked as such with the following month's DMR. Only results of valid tests are to be reported on the DMR.

i. Pimephales promelas (Fathead Minnow)

(A) If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter No. TLP6C.

(B) Report the NOEC value for survival, Parameter No. TOP6C.

(C) Report the NOEC value for growth, Parameter No. TPP6C.

ii. Ceriodaphnia dubia

(A) If the NOEC for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter No. TLP3B.

(B) Report the NOEC value for survival, Parameter No. TOP3B.

(C) Report the NOEC value for reproduction, Parameter No. TPP3B.

5. TOXICITY REDUCTION EVALUATION (TRE)

a. Within ninety (90) days of confirming lethality in the retests, the permittee shall submit a Toxicity Reduction Evaluation (TRE) Action Plan and Schedule for conducting a TRE. The TRE Action Plan shall specify the approach and methodology to be used in performing the TRE. A Toxicity Reduction Evaluation is an investigation intended to determine those actions necessary to achieve compliance with water quality-based effluent limits by reducing an effluent's toxicity to an acceptable level. A TRE is

defined as a step-wise process which combines toxicity testing and analyses of the physical and chemical characteristics of a toxic effluent to identify the constituents causing effluent toxicity and/or treatment methods which will reduce the effluent toxicity. The TRE Action Plan shall lead to the successful elimination of effluent toxicity at the critical dilution and include the following:

i. Specific Activities. The plan shall detail the specific approach the permittee intends to utilize in conducting the TRE. The approach may include toxicity characterizations, identifications and confirmation activities, source evaluation, treatability studies, or alternative approaches. When the permittee conducts Toxicity Characterization Procedures the permittee shall perform multiple characterizations and follow the procedures specified in the documents "Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures" (EPA-600/6-91/003) and "Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents, Phase I" (EPA-600/6-91/005F), or alternate procedures. When the permittee conducts Toxicity Identification Evaluations and Confirmations, the permittee shall perform multiple identifications and follow the methods specified in the documents "Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/080) and "Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/081), as appropriate.

The documents referenced above may be obtained through the National Technical Information Service (NTIS) by phone at (703) 487-4650, or by writing:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

ii. Sampling Plan (e.g., locations, methods, holding times, chain of custody, preservation, etc.). The effluent sample volume collected for all tests shall be adequate to perform the toxicity test, toxicity characterization, identification and confirmation procedures, and

conduct chemical specific analyses when a probable toxicant has been identified;

Where the permittee has identified or suspects specific pollutant(s) and/or source(s) of effluent toxicity, the permittee shall conduct, concurrent with toxicity testing, chemical specific analyses for the identified and/or suspected pollutant(s) and/or source(s) of effluent toxicity. Where lethality was demonstrated within 48 hours of test initiation, each composite sample shall be analyzed independently. Otherwise the permittee may substitute a composite sample, comprised of equal portions of the individual composite samples, for the chemical specific analysis;

iii. Quality Assurance Plan (e.g., QA/QC implementation, corrective actions, etc.); and

iv. Project Organization (e.g., project staff, project manager, consulting services, etc.).

b. The permittee shall initiate the TRE Action Plan within thirty (30) days of plan and schedule submittal. The permittee shall assume all risks for failure to achieve the required toxicity reduction.

c. The permittee shall submit a quarterly TRE Activities Report, with the Discharge Monitoring Report in the months of January, April, July and October, containing information on toxicity reduction evaluation activities including:

i. any data and/or substantiating documentation which identifies the pollutant(s) and/or source(s) of effluent toxicity;

ii. any studies/evaluations and results on the treatability of the facility's effluent toxicity; and

iii. any data which identifies effluent toxicity control mechanisms that will reduce effluent toxicity to the level necessary to meet no significant lethality at the critical dilution.

A copy of the TRE Activities Report shall also be submitted to the state agency.

d. The permittee shall submit a Final Report on Toxicity Reduction Evaluation Activities no later than twenty-eight (28) months from confirming

lethality in the retests, which provides information pertaining to the specific control mechanism selected that will, when implemented, result in reduction of effluent toxicity to no significant lethality at the critical dilution. The report will also provide a specific corrective action schedule for implementing the selected control mechanism.

A copy of the Final Report on Toxicity Reduction Evaluation Activities shall also be submitted to the state agency.

I. PERMIT REOPENER CLAUSE [EPA HUMAN HEALTH CRITERIA]

Arsenic has been shown to have the potential to exceed the EPA water quality criteria for the protection of human health from consumption of contaminated fish and shellfish. Should the State adopt a State water quality standard, this permit may be reopened for modification or revocation and reissuance to established effluent limitations for the parameter(s) to be consistent with that approved State standard in accordance with 40CFR122.44(d). Modification or revocation and reissuance of the permit shall follow regulations listed at 40CFR124.5.

PART III - STANDARD CONDITIONS FOR NPDES PERMITS

A. GENERAL CONDITIONS

1. INTRODUCTION
In accordance with the provisions of 40 CFR Part 122.41, et. seq., this permit incorporates by reference ALL conditions and requirements applicable to NPDES Permits set forth in the Clean Water Act, as amended, (hereinafter known as the "Act") as well as ALL applicable regulations.

2. DUTY TO COMPLY
The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

3. TOXIC POLLUTANTS

a. Notwithstanding Part III.A.5, if any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this permit, this permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition.

b. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Act for toxic pollutants within the time provided in the regulations that established those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

4. DUTY TO REAPPLY
If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The application shall be submitted at least 180 days before the expiration date of this permit. The Director may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date. Continuation of expiring permits shall be governed by regulations promulgated at 40 CFR Part 122.6 and any subsequent amendments.

5. PERMIT FLEXIBILITY
This permit may be modified, revoked and reissued, or terminated for cause in accordance with 40 CFR 122.62-64. The filing of a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

6. PROPERTY RIGHTS
This permit does not convey any property rights of any sort, or any exclusive privilege.

7. DUTY TO PROVIDE INFORMATION
The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

8. CRIMINAL AND CIVIL LIABILITY
Except as provided in permit conditions on "Bypassing" and "Upsets", nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Any false or materially misleading representation or concealment of information required to be reported by the provisions of the permit, the Act, or applicable regulations, which avoids or effectively defeats the regulatory purpose of the Permit may subject the Permittee to criminal enforcement pursuant to 18 U.S.C. Section 1001.

9. OIL AND HAZARDOUS SUBSTANCE LIABILITY
Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

10. STATE LAWS
Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

11. SEVERABILITY
The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

B. PROPER OPERATION AND MAINTENANCE

1. NEED TO HALT OR REDUCE NOT A DEFENSE
It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. The permittee is responsible for maintaining adequate safeguards to prevent the discharge of untreated or inadequately treated wastes during electrical power failure either by means of alternate power sources, standby generators or retention of inadequately treated effluent.

2. DUTY TO MITIGATE
The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

3. PROPER OPERATION AND MAINTENANCE

a. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by permittee as efficiently as possible and in a manner which will minimize upsets and discharges of excessive pollutants and will achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of this permit.

b. The permittee shall provide an adequate operating staff which is duly qualified to carry out operation, maintenance and testing functions required to insure compliance with the conditions of this permit.

4. BYPASS OF TREATMENT FACILITIES

a. BYPASS NOT EXCEEDING LIMITATIONS
The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Parts III.B.4.b. and 4.c.

b. NOTICE

(1) ANTICIPATED BYPASS

If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.

(2) UNANTICIPATED BYPASS
The permittee shall, within 24 hours, submit notice of an unanticipated bypass as required in Part III.D.7.

c. PROHIBITION OF BYPASS

(1) Bypass is prohibited, and the Director may take enforcement action against a permittee for bypass, unless:

(a) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and,

(c) The permittee submitted notices as required by Part III.B.4.b.

(2) The Director may allow an anticipated bypass after considering its adverse effects, if the Director determines that it will meet the three conditions listed at Part III.B.4.c(1).

5. UPSET CONDITIONS

a. EFFECT OF AN UPSET
An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Part III.B.5.b. are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

b. CONDITIONS NECESSARY FOR A DEMONSTRATION OF UPSET
A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the cause(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required by Part III.D.7; and,

(4) The permittee complied with any remedial measures required by Part III.B.2.

c. BURDEN OF PROOF
In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

6. REMOVED SUBSTANCES
Unless otherwise authorized, solids, sewage sludges, filter backwash, or other pollutants removed in the course of treatment or wastewater control shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

7. PERCENT REMOVAL (PUBLICLY OWNED TREATMENT WORKS)
For publicly owned treatment works, the 30-day average (or Monthly Average) percent removal for Biochemical Oxygen Demand and Total Suspended Solids shall not be less than 85 percent unless otherwise authorized by the permitting authority in accordance with 40 CFR 133.103.

C. MONITORING AND RECORDS

1. INSPECTION AND ENTRY
The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by the law to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this permit; and

d. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.

2. REPRESENTATIVE SAMPLING
Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

3. RETENTION OF RECORDS
The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report, or application. This period may be extended by request of the Director at any time.

4. RECORD CONTENTS
Records of monitoring information shall include:

a. The date, exact place, and time of sampling or measurements;

b. The individual(s) who performed the sampling or measurements;

c. The date(s) and time(s) analyses were performed;

d. The individual(s) who performed the analyses; and lab

e. The analytical techniques or methods used; and

f. The results of such analyses.

5. MONITORING PROCEDURES

a. Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit or approved by the Regional Administrator.

b. The permittee shall calibrate and perform maintenance procedures on all monitoring and analytical instruments at intervals frequent enough to insure accuracy of measurements and shall maintain appropriate records of such activities.

c. An adequate analytical quality control program, including the analyses of sufficient standards, spikes, and duplicate samples to insure the accuracy of all required analytical results shall be maintained by the permittee or designated commercial laboratory.

6. FLOW MEASUREMENTS
Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated, and maintained to insure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than 10% from true discharge rates throughout the range of expected discharge volumes.

D. REPORTING REQUIREMENTS

1. PLANNED CHANGES

a. INDUSTRIAL PERMITS
The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR Part 122.29(b); or,

(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements listed at Part III.D.10.a.

b. MUNICIPAL PERMITS Example?
Any change in the facility discharge (including the introduction of any new source or significant discharge or significant changes in the quantity or quality of existing discharges of pollutants) must be reported to the permitting authority. In no case are any new connections, increased flows, or significant changes in influent quality permitted that will cause violation of the effluent limitations specified herein.

2. ANTICIPATED NONCOMPLIANCE
The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

3. TRANSFERS
This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Act.

4. DISCHARGE MONITORING REPORTS AND OTHER REPORTS
Monitoring results must be reported on Discharge Monitoring Report (DMR) Form EPA No. 3320-1 in accordance with the "General Instructions" provided on the form. The permittee shall submit the original DMR signed and certified as required by Part III.D.11 and all other reports required by Part III.D. to the EPA at the address below. Duplicate copies of DMR's and all other reports shall be submitted to the appropriate State agency(ies) at the following address(es):

EPA:
Compliance Assurance and Enforcement Division
Water Enforcement Branch (6EN-W)
U.S. Environmental Protection Agency, Region 6
1445 Ross Avenue
Dallas, TX 75202-2733

New Mexico:
Program Manager
Surface Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
1190 Saint Francis Drive
Santa Fe, NM 87502

5. ADDITIONAL MONITORING BY THE PERMITTEE
If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR Part 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report (DMR). Such increased monitoring frequency shall also be indicated on the DMR.

6. AVERAGING OF MEASUREMENTS
Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

7. TWENTY-FOUR HOUR REPORTING

a. The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall be provided within 5 days of the time the permittee becomes aware of the circumstances. The report shall contain the following information:

(1) A description of the noncompliance and its cause;

(2) The period of noncompliance including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and,

(3) Steps being taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

b. The following shall be included as information which must be reported within 24 hours:

(1) Any unanticipated bypass which exceeds any effluent limitation in the permit;

(2) Any upset which exceeds any effluent limitation in the permit; and,

(3) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in Part II (industrial permits only) of the permit to be reported within 24 hours.

c. The Director may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

8. OTHER NONCOMPLIANCE
The permittee shall report all instances of noncompliance not reported under Parts III.D.4 and D.7 and Part I.B (for industrial permits only) at the time monitoring reports are submitted. The reports shall contain the information listed at Part III.D.7.

9. OTHER INFORMATION
Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

10. CHANGES IN DISCHARGES OF TOXIC SUBSTANCES
All existing manufacturing, commercial, mining, and silvacultural permittees shall notify the Director as soon as it knows or has reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant listed at 40 CFR Part 122, Appendix D, Tables II and III (excluding Total Phenols) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) One hundred micrograms per liter (100 µg/L);
(2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,4-dinitro-phenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;
(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application; or
(4) The level established by the Director.

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 µg/L);
(2) One milligram per liter (1 mg/L) for antimony;
(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application; or
(4) The level established by the Director.

11. SIGNATORY REQUIREMENTS
All applications, reports, or information submitted to the Director shall be signed and certified.

a. ALL PERMIT APPLICATIONS shall be signed as follows:

(1) FOR A CORPORATION - by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

(a) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation; or,

(b) The manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

(2) FOR A PARTNERSHIP OR SOLE PROPRIETORSHIP - by a general partner or the proprietor, respectively.

(3) FOR A MUNICIPALITY, STATE, FEDERAL, OR OTHER PUBLIC AGENCY - by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:

(a) The chief executive officer of the agency, or

(b) A senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency.

b. ALL REPORTS required by the permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described above;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. A duly authorized representative may thus be either a named individual or an individual occupying a named position; and,

(3) The written authorization is submitted to the Director.

c. CERTIFICATION
Any person signing a document under this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

12. AVAILABILITY OF REPORTS
Except for applications, effluent data, permits, and other data specified in 40 CFR 122.7, any information submitted pursuant to this permit may be claimed as confidential by the submitter. If no claim is made at the time of submission, information may be made available to the public without further notice.

13. ARCHEOLOGICAL/HISTORICAL SITES (TEXAS PERMITS ONLY)
If during the life of this permit, new construction or land acquisition or any construction related activity where previously undisturbed ground is proposed for disturbance by the permittee which is related to an activity authorized by this permit, the permittee shall send the following items to the Texas State Historic Preservation Officer (SHPO): (1) a description of the new construction and the potential impact that this activity may have upon the ground (including sludge application methods, if applicable), and (2) a copy of a USGS topographic map outlining the location of the project and associated sludge disposal areas or other ancillary impact areas. The address of the Texas SHPO is:

Texas State Historic Preservation Officer
Department of Antiquities Protection
Texas Historical Commission
P.O. Box 12276
Austin, Texas 78711

This information will be used by the Texas SHPO and EPA to consult according to the requirements of 36 CFR Part 800.4-800.6 on methods to minimize harm to historical properties. The applicant will be contacted within 30 days about further actions that may be needed to meet the requirements of 36 CFR Part 800.

E. PENALTIES FOR VIOLATIONS OF PERMIT CONDITIONS

1. CRIMINAL

a. NEGLIGENT VIOLATIONS
The Act provides that any person who negligently violates permit conditions implementing Section 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 year, or both.

b. KNOWING VIOLATIONS
The Act provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or both.

c. KNOWING ENDANGERMENT
The Act provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 303, 306, 307, 308, 318, or 405 of the Act and who knows at that time that he is placing another person in imminent danger of death or serious bodily injury is subject to a fine of not more than $250,000, or by imprisonment for not more than 15 years, or both.

d. FALSE STATEMENTS
The Act provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the Act, shall upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or by both. (See Section 309.c.4 of the Clean Water Act)

2. CIVIL PENALTIES
The Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a civil penalty not to exceed $27,500 per day for each violation.

3. ADMINISTRATIVE PENALTIES
The Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to an administrative penalty, as follows:

a. CLASS I PENALTY
Not to exceed $11,000 per violation nor shall the maximum amount exceed $27,500.

b. CLASS II PENALTY
Not to exceed $11,000 per day for each day during which the violation continues nor shall the maximum amount exceed $137,500.

F. DEFINITIONS
All definitions contained in Section 502 of the Act shall apply to this permit and are incorporated herein by reference. Unless otherwise specified in this permit, additional definitions of words or phrases used in this permit are as follows:

1. ACT means the Clean Water Act (33 U.S.C. 1251 et. seq.), as amended.

2. ADMINISTRATOR means the Administrator of the U.S. Environmental Protection Agency.

3. APPLICABLE EFFLUENT STANDARDS AND LIMITATIONS means all state and Federal effluent standards and limitations to

which a discharge is subject under the Act, including, but not limited to, effluent limitations, standards or performance, toxic effluent standards and prohibitions, and pretreatment standards.

4. APPLICABLE WATER QUALITY STANDARDS means all water quality standards to which a discharge is subject under the Act.

5. BYPASS means the intentional diversion of waste streams from any portion of a treatment facility.

6. DAILY DISCHARGE means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in terms of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the sampling day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the sampling day. "Daily discharge" determination of concentration made using a composite sample shall be the concentration of the composite sample. When grab samples are used, the "daily discharge" determination of concentration shall be arithmetic average (weighted by flow value) of all samples collected during that sampling day.

7. DAILY MAXIMUM discharge limitation means the highest allowable "daily discharge" during the calendar month.

8. DIRECTOR means the U.S. Environmental Protection Agency Regional Administrator or an authorized representative.

9. ENVIRONMENTAL PROTECTION AGENCY means the U.S. Environmental Protection Agency.

10. GRAB SAMPLE means an individual sample collected in less than 15 minutes.

11. INDUSTRIAL USER means a nondomestic discharger, as identified in 40 CFR 403, introducing pollutants to a publicly owned treatment works.

12. MONTHLY AVERAGE (also known as DAILY AVERAGE) discharge limitations means the highest allowable average of "daily discharge(s)" over a calendar month, calculated as the sum of all "daily discharge(s)" measured during a calendar month divided by the number of "daily discharge(s)" measured during that month. When the permit establishes daily average concentration effluent limitations or conditions, the daily average concentration means the arithmetic average (weighted by flow) of all "daily discharge(s)" of concentration determined during the calendar month where C = daily concentration, F = daily flow, and n = number of daily samples; daily average discharge =

$$\frac{C_1F_1 + C_2F_2 + \ldots + C_nF_n}{F_1 + F_2 + \ldots + F_n}$$

13. NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the Act.

14. SEVERE PROPERTY DAMAGE means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

15. SEWAGE SLUDGE means the solids, residues, and precipitates separated from or created in sewage by the unit processes of a publicly owned treatment works. Sewage as used in this definition means any wastes, including wastes from humans, households, commercial establishments, industries, and storm water runoff, that are discharged to or otherwise enter a publicly owned treatment works.

16. TREATMENT WORKS means any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage and industrial wastes of a liquid nature to implement Section 201 of the Act, or necessary to recycle or reuse water at the most economical cost over the estimated life of the works, including intercepting sewers, sewage collection systems, pumping, power and other equipment, and their appurtenances, extension, improvement, remodeling, additions, and alterations thereof.

17. UPSET means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

18. FOR FECAL COLIFORM BACTERIA, a sample consists of one effluent grab portion collected during a 24-hour period at peak loads.

19. The term "MGD" shall mean million gallons per day.

20. The term "mg/L" shall mean milligrams per liter or parts per million (ppm).

21. The term "µg/L" shall mean micrograms per liter or parts per billion (ppb).

22. MUNICIPAL TERMS

a. 7-DAY AVERAGE or WEEKLY AVERAGE, other than for fecal coliform bacteria, is the arithmetic mean of the daily values for all effluent samples collected during a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The 7-day average for fecal coliform bacteria is the geometric mean of the values for all effluent samples collected during a calendar week.

b. 30-DAY AVERAGE or MONTHLY AVERAGE, other than for fecal coliform bacteria, is the arithmetic mean of the daily values for all effluent samples collected during a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month. The 30-day average for fecal coliform bacteria is the geometric mean of the values for all effluent samples collected during a calendar month.

c. 24-HOUR COMPOSITE SAMPLE consists of a minimum of 12 effluent portions collected at equal time intervals over the 24-hour period and combined proportional to flow or a sample collected at frequent intervals proportional to flow over the 24-hour period.

d. 12-HOUR COMPOSITE SAMPLE consists of 12 effluent portions collected no closer together than one hour and composited according to flow. The daily sampling intervals shall include the highest flow periods.

e. 6-HOUR COMPOSITE SAMPLE consists of six effluent portions collected no closer together than one hour (with the first portion collected no earlier than 10:00 a.m.) and composited according to flow.

f. 3-HOUR COMPOSITE SAMPLE consists of three effluent portions collected no closer together than one hour (with the first portion collected no earlier than 10:00 a.m.) and composited according to flow.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

OMB No. 2040-0004
Expires 2-29-84

(Facility Name/Location if different)

NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556
FACILITY
LOCATION
CONTACT: ROBERT SACRISON GENERAL MGR

(2-16) PERMIT NUMBER: NM0022306

(17-19) DISCHARGE NUMBER: 001 N

F - FINAL LIMITS
PROCESS WTR FROM MILL OPER.

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	85 (20-21)	10 (22-23)	01 (24-25)	TO	85 (26-27)	10 (28-29)	31 (30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	.68	3.9	*	******	******	******	******	0		
0050 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	****** 30DA AVG	****** DAILY MX	MGD	******	******	******	******		CONTINUOUS	TOTAL
MERCURY, TOTAL (AS HG)	SAMPLE MEASUREMENT	******	******	******	******	<.0002	<.0002		0		
1900 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	******	******	0.001 DAILY AV	0.002 DAILY MX	MG/L		WEEKLY	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

*Flow occurred on 6 days only. All data refer to those days only.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)*

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 505 NUMBER 586-0212

DATE: YEAR 85 MO 11 DAY 06

LIST AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

ame/Location if different)

ME MOLYCORP INC. QUESTA DIV.

DRESS P. O. BOX 469

QUESTA NM 87556

ILITY

CATION

N: ROBERT SACRISON GENERAL MGR

DISCHARGE MONITORING REPORT (DMR)

OMB No. 2040-0004
Expires 2-29-84

(2-16) PERMIT NUMBER	(17-19) DISCHARGE NUMBER
NM0022306	001 N

F - FINAL LIMITS
PROCESS WTR FROM MILL OPER.

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	85	02	01	TO	85	02	28
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
OW, IN CONDUIT OR	SAMPLE MEASUREMENT	3.1	4.1		******	******	******	******	0		
RU TREATMENT PLANT 050 1 0 FLUENT GROSS VALUE	PERMIT REQUIREMENT	****** 30DA AVG	****** DAILY MX	MGD	******	******	******	******		CONTINUOUS	TOTALIZ
RCURY, TOTAL (AS HG)	SAMPLE MEASUREMENT	******	******	******	******	<.0002	<.0002		0		
900 1 0 FLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	******	******	0.001 DAILY AV	0.002 DAILY MX	MG/L		WEEKLY	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

IE/TITLE PRINCIPAL EXECUTIVE OFFICER

C. R. Sacrison
General Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 USC § 1319. *(Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)*

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
505	586-0212	85	03	13
AREA CODE	NUMBER	YEAR	MO	DAY

MENT AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

Form Approved
OMB No. 2040-0004
Expires 2-29-84

Facility Name/Location (if different)

NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY
LOCATION

ATTN: ROBERT SACRISON GENERAL MGR

(2-16) PERMIT NUMBER: NM0022306

(17-19) DISCHARGE NUMBER: 001 N

F - FINAL LIMITS
PROCESS WTR FROM MILL OPER.

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	85	03	01	TO	85	03	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	(54-61) AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	1.69	3.31		******	******	******	******	0		
50050 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	****** 30DA AVG	****** DAILY MX	MGD	******	******	******	******		CONTINUOUS	TOTAL
MERCURY, TOTAL (AS HG)	SAMPLE MEASUREMENT	******	******	******	******	0.0001	0.0002		0		
71900 1 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	******	******	0.001 DAILY AV	0.002 DAILY MX	MG/L		WEEKLY	COMPO
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

C. R. Sacrison
General Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC. § 1001 AND 33 USC § 1319. *(Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)*

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
505	586-0212	85	04	04
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

Molycorp, Inc.

Questa Division
P. O. Box 469
Questa, New Mexico 87556
Telephone: (505) 586-0212

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

union 76
MOLYCORP

May 15, 1984

Mr. Dick Whittington
Regional Administrator
U.S. EPA
Region VI
1201 Elm Street
Dallas, TX 75270

RE: NPDES Permit - NM 0022306

Dear Mr. Whittington:

Enclosed is the Discharge Monitoring Report for the month of April, 1984.

Conditions of the new permit which have been included in Molycorp's Request For Evidentiary Hearing, submitted to your agency on August 26, 1983, have not been addressed in this report. Those permit conditions include:

1. Molybdenum concentration limitations
2. Total arsenic
3. Definition of composite
4. Biomonitoring
5. Temperature

Under Part II D(8)b of our NPDES Permit, Molycorp is required to notify the Director of changes in discharges which were not reported in the permit application. (Note: pages 15 and 16 of the final permit are misnumbered). Molycorp is currently testing a mill reagent with the trade name Orfom D8 manufactured by Phillips Chemical Company. The product has performed satisfactorily in preliminary mill tests and Molycorp is considering using the product full time. A Material Safety Data Sheet about the product is enclosed for your information. The EPA will be notified if a decision is made to use this reagent full time.

If you have any questions about this information, please contact me.

Sincerely,

C. R. Sacrison
General Manager

CRS/lm

xc: EID-Steve Asher - Santa Fe

DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER	(17-19) DISCHARGE NUMBER
NM 0022306	001

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	84	04	01	TO	84	04	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
FLOW	SAMPLE MEASUREMENT	1.4 (5477)	2.9 (11200)	MGD (M^3D)	Flow occurred only on All data refers to those		26 days. days.		0	Cont. tot.	
	PERMIT REQUIREMENT										
C.O.D.	SAMPLE MEASUREMENT					22	25	MG/L	0	weekly	comp.
	PERMIT REQUIREMENT					60	90				
T.S.S.	SAMPLE MEASUREMENT					11	19	MG/L	0	weekly	comp.
	PERMIT REQUIREMENT					20	30				
TOTAL CYANIDE	SAMPLE MEASUREMENT					.003	.008	MG/L	0	weekly	comp.
	PERMIT REQUIREMENT					.025	.05				
FLUORIDE	SAMPLE MEASUREMENT					1.8	1.9	MG/L	0	weekly	comp.
	PERMIT REQUIREMENT						3.0				
TOTAL CADMIUM	SAMPLE MEASUREMENT					<.01	<.01	MG/L	0	weekly	comp.
	PERMIT REQUIREMENT						.05				
TOTAL IRON	SAMPLE MEASUREMENT					.14	.26	MG/L	0	weekly	comp.
	PERMIT REQUIREMENT						.6				

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

G. R. Sacrison
General Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)*

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 505 NUMBER 586-0212

DATE: YEAR 84 MO 5 DAY 14

COMMENT AND EXPLANATION OF ANY VIOLATIONS (*Reference all attachments here*)

Molycorp, Inc.
A Unocal Company
Questa Division
P.O. Box 469
Questa, New Mexico 87556
Telephone: (505) 586-0212

UNOCAL 76
MOLYCORP

August 1, 1990

Enforcement Branch (6W-E)
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202-2733

Dear Sirs:

Enclosed are composite average results for the Discharge Monitoring Reports for the months of May and June, 1990, Permit No. NM0022306, Outfalls 001 and 002. We regret the delay in submitting these reports. This reporting requirement has not applied to the facility since 1985. Consequently, the current staff was unfamiliar with the requirement. The misunderstanding has been corrected and future reports will be complete when submitted.

Flow occurred in Outfall 001 for one week beginning May 31 and one week beginning June 23. Consequently, one sample was collected from 001 (except for cyanide) for each month. As a result, the calculated maximums and averages are the same.

Exceedences of permit levels for molybdenum occurred for the average composite concentration for each month, although the maximum values were in compliance, and concentrations at 001 were in compliance. In the future, the final treatment facility above 001 will be operated at a higher flow rate. This will lower the composite concentration while still remaining within permit levels for Mo mass discharge.

Very truly yours,

David R. Shoemaker
Mine Manager

Enclosure: DMR Report
cc: NM EID Program Manager

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME MOLYCORP INC. QUESTA DIV.

ADDRESS P. O. BOX 469

QUESTA NM 87556

FACILITY

LOCATION

ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved.
OMB No. 2040-0004
Approval expires 6-30-91

(2-16) NM0022306 PERMIT NUMBER

(17-19) 001 A DISCHARGE NUMBER

F - FINAL
PROCESS WATER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	90	06	01	TO	90	06	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		QUANTITY OR LOADING (3 Card Only) (46-53) AVERAGE	QUANTITY OR LOADING (54-61) MAXIMUM	UNITS	QUALITY OR CONCENTRATION (4 Card Only) (38-45) MINIMUM	QUALITY OR CONCENTRATION (46-53) AVERAGE	QUALITY OR CONCENTRATION (54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
OXYGEN DEMAND, CHEM. (HIGH LEVEL) (COD)	SAMPLE MEASUREMENT	******	******		******	8.0	8.0		0	1/wk	compos
00340 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	60 DAILY AV	90 DAILY MX	MG/L		WEEKLY	COMPOS
PH	SAMPLE MEASUREMENT	******	******		7.5	******	7.5		0	1/wk	grab
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	6.0 MINIMUM	******	9.0 MAXIMUM	SU		WEEKLY	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	******	******		******	2.0	2.0		0	1/wk	compos
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	20 DAILY AV	30 DAILY MX	MG/L		WEEKLY	COMPOS
CYANIDE, TOTAL (AS CN)	SAMPLE MEASUREMENT	******	******		******	less than .001	less than .001		0	2/wk	compos
00720 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	0.025 DAILY AV	0.05 DAILY MX	MG/L		TWICE/WEEK	COMPOS
FLUORIDE, TOTAL (AS F)	SAMPLE MEASUREMENT	******	******		******	******	2.4		0	1/wk	compos
00951 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	******	3.0 DAILY MX	MG/L		WEEKLY	COMPOS
ARSENIC, TOTAL (AS AS)	SAMPLE MEASUREMENT	******	******		******	less than .01	less than .01		0	1/wk	compos
01002 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	0.5 DAILY AV	1.0 DAILY MX	MG/L		WEEKLY	COMPOS
CADMIUM, TOTAL (AS CD)	SAMPLE MEASUREMENT	******	******		******	******	.02		0	1/wk	compos
01027 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	******	0.05 DAILY MX	MG/L		WEEKLY	COMPOS

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

David R. Shoemaker
Mine Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*

David R Shoemaker

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
505	586-0212	90	07	12
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
NAME HOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556
FACILITY
LOCATION
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER	(17-19) DISCHARGE NUMBER
NM0022306	001 A

MONITORING PERIOD

	YEAR (20-21)	MO (22-23)	DAY (24-25)		YEAR (26-27)	MO (28-29)	DAY (30-31)
FROM	90	06	01	TO	90	06	30

F - FINAL
PROCESS WATER

MAJOR

Form Approved.
OMB No. 2040-0004
Approval expires 6-30-91

NOTE: Read Instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
COPPER, TOTAL (AS CU)	SAMPLE MEASUREMENT	******	******		******	.05	.05		0	1/wk	compos
01042 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	0.15 DAILY AV	0.30 DAILY MX	MG/L		WEEKLY	COMPOS
IRON, TOTAL (AS FE)	SAMPLE MEASUREMENT	******	******		******	******	.10		0	1/wk	compos
01045 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	******	0.6 DAILY MX	MG/L		WEEKLY	COMPOS
LEAD, TOTAL (AS PB)	SAMPLE MEASUREMENT	******	******		******	.10	.10		0	1/wk	compos
01051 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	0.3 DAILY AV	0.6 DAILY MX	MG/L		WEEKLY	COMPOS
MANGANESE, TOTAL (AS MN)	SAMPLE MEASUREMENT	******	******		******	.04	.04		0	1/wk	compos
01055 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	1.0 DAILY AV	1.5 DAILY MX	MG/L		WEEKLY	COMPOS
MOLYBDENUM, TOTAL (AS MO)	SAMPLE MEASUREMENT	******	******		******	.63	.63		0	1/wk	compos
01062 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	1.0 DAILY AV	2.0 DAILY MX	MG/L			
ZINC, TOTAL (AS ZN)	SAMPLE MEASUREMENT	******	******		******	******	.01		0	1/wk	compos
01092 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	******	0.2 DAILY MX	MG/L		WEEKLY	COMPOS
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	.688	4.29		******	******	******		0	contin	totalz
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	MGD	******	******	******	**** ****		CONTINUOUS	TOTALZ

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
David R. Shoemaker
Mine Manager
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE AREA CODE	NUMBER	DATE YEAR	MO	DAY
505	586-0212	90	07	12

COMMENT AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME MOLYCORP INC. QUESTA DIV.

ADDRESS P. O. BOX 469

QUESTA NM 87556

FACILITY

LOCATION

ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) NM0022306 PERMIT NUMBER

(17-19) SUM A DISCHARGE NUMBER

F - FINAL
SUM TOTAL FOR 001 & 002

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	90	06	01	TO	90	06	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		QUANTITY OR LOADING (3 Card Only) (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	QUALITY OR CONCENTRATION (4 Card Only) (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
MOLYBDENUM, TOTAL (AS MO)	SAMPLE MEASUREMENT				******	******	******				
01062 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	25 DAILY AV	50 DAILY MX	LBS/DY	******	******	******	**** ****		WEEKLY	COMPOS
	SAMPLE MEASUREMENT	9.83	15.39								
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

David R. Shoemaker
Mine Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*

David R. Shoemaker

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
505	586 0212	90	07	12
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

MOLYBDENUM - AVG 6 MONTHS PRECEEDING.
MOLYBDENUM - MAX CURRENT MONTH ONLY.

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY
LOCATION
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved.
OMB No. 2040-0004
Approval expires 6-30-91

(2-16) NM0022306 — PERMIT NUMBER
(17-19) 002 A — DISCHARGE NUMBER

F - FINAL
SEEPAGE TAILING IMPOUNDMENT

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	90	06	01	TO	90	06	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
OXYGEN DEMAND, CHEM. (HIGH LEVEL) (COD)	SAMPLE MEASUREMENT	******	******		******	8.0	11.0		0	1/wk	compo
00340 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	60 DAILY AV	90 DAILY MX	MG/L		ONCE/ MONTH	COMPOS
PH	SAMPLE MEASUREMENT	******	******		7.1	******	7.4		0	1/wk	grab
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	6.0 MINIMUM	******	9.0 MAXIMUM	SU		ONCE/ MONTH	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	******	******		******	4.0	6.0		0	1/wk	compos
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	20 DAILY AV	30 DAILY MX	MG/L		ONCE/ MONTH	COMPOS
CYANIDE, TOTAL (AS CN)	SAMPLE MEASUREMENT	******	******		******	.0016	.0019		0	1/wk	compos
00720 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	0.025 DAILY AV	0.05 DAILY MX	MG/L		ONCE/ MONTH	COMPOS
FLUORIDE, TOTAL (AS F)	SAMPLE MEASUREMENT	******	******		******	******	2.1		0	1/wk	compos
00951 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	******	3.0 DAILY MX	MG/L		ONCE/ MONTH	COMPOS
ARSENIC, TOTAL (AS AS)	SAMPLE MEASUREMENT	******	******		******	.01	.01		0	1/wk	compos
01002 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	0.5 DAILY AV	1.0 DAILY MX	MG/L		ONCE/ MONTH	COMPOS
CADMIUM, TOTAL (AS CD)	SAMPLE MEASUREMENT	******	******		******	******	.02		0	1/wk	compos
01027 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	******	0.05 DAILY MX	MG/L		ONCE/ MONTH	COMPOS

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
David R. Shoemaker
Mine Manager
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
505	586-0212	90	07	12
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

SEE PERMIT PART III FOR FURTHER REQUIREMENTS

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY
LOCATION
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved.
OMB No. 2040-0004
Approval expires 6-30-91

(2-16) NM0022306 — PERMIT NUMBER
(17-19) 002 A — DISCHARGE NUMBER

F - FINAL
SEEPAGE TAILING IMPOUNDMENT

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	90	06	01	TO	90	06	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR
NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
COPPER, TOTAL (AS CU)	SAMPLE MEASUREMENT	******	******		******	.03	.09		0	1/wk	compo
01042 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	0.15 DAILY AV	0.30 DAILY MX	MG/L		ONCE/ MONTH	COMPOS
IRON, TOTAL (AS FE)	SAMPLE MEASUREMENT	******	******		******	******	.23		0	1/wk	compo
01045 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	******	0.6 DAILY MX	MG/L		WEEKLY	COMPOS
LEAD, TOTAL (AS PB)	SAMPLE MEASUREMENT	******	******		******	.09	.13		0	1/wk	compos
01051 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	0.3 DAILY AV	0.6 DAILY MX	MG/L		ONCE/ MONTH	COMPOS
MANGANESE, TOTAL (AS MN)	SAMPLE MEASUREMENT	******	******		******	1.71	1.79		0	1/wk	compos
01055 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	1.0 DAILY AV	1.5 DAILY MX	MG/L		ONCE/ MONTH	COMPOS
MOLYBDENUM, TOTAL (AS MO)	SAMPLE MEASUREMENT	******	******		******	2.50	2.68		0	1/wk	compos
01062 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	1.0 DAILY AV	2.0 DAILY MX	MG/L		ONCE/ MONTH	COMPOS
ZINC, TOTAL (AS ZN)	SAMPLE MEASUREMENT	******	******		******	******	.02		0	1/wk	compos
01092 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	******	0.2 DAILY MX	MG/L		ONCE/ MONTH	COMPOS
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	.415	.415		******	******	******		0	daily	est.
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	MGD	******	******	******	**** ****		DAILY	ESTIMA

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
David R. Shoemaker
Mine Manager
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
505	586-0212	90	07	12
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

SEE PERMIT PART III FOR FURTHER REQUIREMENTS.
THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM EXCEPT IN TRACE AMOUNTS.
DISCHARGE FROM SEEP # 1.

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY
LOCATION
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved.
OMB No. 2040-0004
Approval expires 6-30-91

(2-16) NM0022306 — PERMIT NUMBER
(17-19) 002 A — DISCHARGE NUMBER

F - FINAL
SEEPAGE TAILING IMPOUNDMENT

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	90	06	01	TO	90	06	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
MERCURY, TOTAL (AS HG) 71900 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	.0002	.00026		0	1/wk	compos
	PERMIT REQUIREMENT	******	******	**** ****	******	0.001 DAILY AV	0.002 DAILY MX	MG/L		ONCE/ MONTH	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
David R. Shoemaker
Mine Manager
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
505	586-0212	90-	07	12
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

SEE PERMIT PART III FOR FURTHER REQUIREMENTS.
THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM EXCEPT IN TRACE AMOUNTS.
~~DISCHARGE FROM SEEP # 1.~~

(REPLACES EPA FORM 7 40 WHICH MAY NOT BE USED)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
NAME MOLICORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556
FACILITY
LOCATION
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved.
OMB No. 2040-0004
Approval Expires 6-3

(2-16) NM0022306 PERMIT NUMBER
(17-19) DISCHARGE NUMBER

F - FINAL
SEEPAGE TAILING IMPOUNDMENT
COMPOSITE 001+002

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	90	06	01	TO	90	06	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR
NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAM TY (69-
OXYGEN DEMAND, CHEM. (HIGH LEVEL) (COD)	SAMPLE MEASUREMENT	******	******		******	8.0	8.0		0	1/wk	com
00340 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	60 DAILY AV	90 DAILY MX	MG/L		ONCE/ MONTH	COM
PH 00400 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		7.4	******	7.4		0	1/wk	gra
	PERMIT REQUIREMENT	******	******	**** ****	6.0 MINIMUM	******	9.0 MAXIMUM	SU		ONCE/ MONTH	GRA
SOLIDS, TOTAL SUSPENDED 00530 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	2.0	2.0		0	1/wk	gra
	PERMIT REQUIREMENT	******	******	**** ****	******	20 DAILY AV	30 DAILY MX	MG/L		ONCE/ MONTH	COM
CYANIDE, TOTAL (AS CN) 00720 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	.001	.001		0	1/wk	com
	PERMIT REQUIREMENT	******	******	**** ****	******	0.025 DAILY AV	0.05 DAILY MX	MG/L		ONCE/ MONTH	COM
FLUORIDE, TOTAL (AS F) 00951 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	******	2.3		0	1/wk	comp
	PERMIT REQUIREMENT	******	******	**** ****	******	******	3.0 DAILY MX	MG/L		ONCE/ MONTH	COMP
ARSENIC, TOTAL (AS AS) 01002 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	.01	.01		0	1/wk	comp
	PERMIT REQUIREMENT	******	******	**** ****	******	0.5 DAILY AV	1.0 DAILY MX	MG/L		ONCE/ MONTH	COMP
CADMIUM, TOTAL (AS CD) 01027 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	******	.01		0	1/wk	comp
	PERMIT REQUIREMENT	******	******	**** ****	******	******	0.05 DAILY MX	MG/L		ONCE/ MONTH	COMP

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
David R. Shoemaker
Mine Manager
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 505 NUMBER 586 0212

DATE: YEAR MO

COMMENT AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

SEE PERMIT PART III FOR FURTHER REQUIREMENTS.
THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM EXCEPT IN TRACE AMOUNTS.
DISCHARGE FROM SEEP # 1.

ERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
AME MOLYCORP INC. QUESTA DIV.
DDRESS P. O. BOX 469
QUESTA NM 87556
ACILITY
OCATION
TTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) NM0022306 PERMIT NUMBER

(17-19) DISCHARGE NUMBER

F - FINAL
PROCESS WATER
COMPOSITE 001+002

Form Approved.
OMB No. 2040-0004
Approval expires 6-30-

MONITORING PERIOD

	YEAR	MO.	DAY		YEAR	MO.	DAY
FROM	90	06	01	TO	90	06	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
COPPER, TOTAL (AS CU) 01042 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	.05	.05		0	1/wk	comp
	PERMIT REQUIREMENT	******	******	**** ****	******	0.15 DAILY AV	0.30 DAILY MX	MG/L		WEEKLY	COMPO
IRON, TOTAL (AS FE) 01045 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	******	.10		0	1/wk	comp
	PERMIT REQUIREMENT	******	******	**** ****	******	******	0.6 DAILY MX	MG/L		WEEKLY	COMPO
LEAD, TOTAL (AS PB) 01051 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	.11	.11		0	1/wk	comp
	PERMIT REQUIREMENT	******	******	**** ****	******	0.3 DAILY AV	0.6 DAILY MX	MG/L		WEEKLY	COMPO
MANGANESE, TOTAL (AS MN) 01055 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	.46	.46		0	1/wk	compos
	PERMIT REQUIREMENT	******	******	**** ****	******	1.0 DAILY AV	1.5 DAILY MX	MG/L		WEEKLY	COMPO
MOLYBDENUM, TOTAL (AS MO) 01062 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	1.05	1.05		1	1/wk	compos
	PERMIT REQUIREMENT	******	******	**** ****	******	1.0 DAILY AV	2.0 DAILY MX	MG/L			
ZINC, TOTAL (AS ZN) 01092 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	******	.01		0	1/wk	compos
	PERMIT REQUIREMENT	******	******	**** ****	******	******	0.2 DAILY MX	MG/L		WEEKLY	COMPO
FLOW, IN CONDUIT OR THRU TREATMENT PLANT 00050 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	1.640	1.640		******	****** combined flow 001 + 002	******		0		
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	MGD	******	******	******	**** ****		CONTINUOUS	TOTAL

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
David R. Shoemaker
Mine Manager
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 505 NUMBER 686 0212

DATE: YEAR MO DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

Facility Name/Location if different)
NAME HOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556
FACILITY
LOCATION
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16)	(17-19)
NM0022306	
PERMIT NUMBER	DISCHARGE NUMBER

F - FINAL
SEEPAGE TAILING IMPOUNDMENT
COMPOSITE 001+002

Form Approved.
OMB No. 2040-0
Approval Expires

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	90	06	01	TO	90	06	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR
NOTE: Read Instructions before completing this form

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	(54-61) AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-69)	SA T
MERCURY, TOTAL (AS HG) 71900 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	.0002	.0002		0	1/wk	con
	PERMIT REQUIREMENT	******	******	**** ****	******	0.001 DAILY AV	0.002 DAILY MX	MG/L		ONCE/ MONTH	CO
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
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	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		TELEPHONE		DATE	
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505	586 0212		
TYPED OR PRINTED			AREA CODE	NUMBER	YEAR	MO

COMMENT AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

SEE PERMIT PART III FOR FURTHER REQUIREMENTS.
THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM EXCEPT IN TRACE AMOUNTS.
DISCHARGE FROM SEEP # 1.

(If different)

[illegible] INC

[illegible] DIV

[illegible] NM 8755[illegible]

FACILITY

LOCATION

DISCHARGE MONITORING REPORT (DMR)

Form Approved. OMB No. 158-[illegible]

(2-16) NM 0022306 — PERMIT NUMBER

(17-19) 001 N — DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	84	08	01	TO	84	08	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read Instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
Flow	SAMPLE MEASUREMENT	.06	.88	MGD	Flow occurred on [illegible] 3 days only. All data refer to those days.				✓		
	PERMIT REQUIREMENT										
Total Mercury	SAMPLE MEASUREMENT					<.0002	<.0002		0		
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
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	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPED OR PRINTED

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SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
AREA CODE	NUMBER	YEAR	MO	DAY
505	586-0212	84	09	1[illegible]

COMMENT AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

Molycorp, Inc.

Questa Division
P.O. Box 469
Questa, New Mexico 87556
Telephone: (505) 586-0212

union 76
MOLYCORP

May 7, 1985

Mr. Dick Whittington
Regional Administrator
U. S. Environmental Protection Agency
Region VI
1201 Elm Street
Dallas, TX 75270

Dear Mr. Whittington:

Enclosed is the Discharge Monitoring Report for the month of April, 1985, NPDES Permit # NM 0022306.

Please be advised that flow from outfall 001 occurred on only three days, April 1, 2 and 3. All data refer to those days.

Sincerely yours,

C. R. Sacrison
General Manager

CRS:pcr
cc: Myron Knudson, Water Management Division
Charles Nylander, NM EID
Fred Humke, Water Management Division

ERMITTEE NAME/ADDRESS (Include City Name/Location if different)

ME MOLYCORP INC. QUESTA DIV.

DDRESS P. O. BOX 469

QUESTA NM 87556

CILITY

CATION

IN: RUBERT SACRISON GENERAL MGR

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved
OMB No. 2040-0004
Expires 2-29-84

(2-16) NM0022306 — PERMIT NUMBER

(17-19) 001 N — DISCHARGE NUMBER

F - FINAL LIMITS
PROCESS WTR FROM MILL OPER.

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	85	04	01	TO	85	04	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

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LOW, IN CONDUIT OR	SAMPLE MEASUREMENT	0.14	0.14		******	******	******	******	0		
0050 1 0	PERMIT REQUIREMENT	****** 30DA AVG	****** DAILY MX	MGD	******	******	******	******		CONTINUOUS	TOTALE
ERCURY, TOTAL (AS HG)	SAMPLE MEASUREMENT	******	******	******	******	0.0002	0.0002		0		
1900 1 0	PERMIT REQUIREMENT	******	******	******	******	0.001 DAILY AV	0.002 DAILY MX	MG/L		WEEKLY	COMPO
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

ME/TITLE PRINCIPAL EXECUTIVE OFFICER

C. R. Sacrison
General Manager

TYPED OR PRINTED

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SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
505	586-0212	85	05	07
AREA CODE	NUMBER	YEAR	MO	DAY

MMENT AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

DEC 22 1993

Ref: 8WM-C

Dan Fraser, Chief
Water Quality Bureau
Montana Department of Health
& Environmental Sciences
Cogswell Building
Helena, Montana 57620

Re: NPDES Permit Issues
Hard Rock Mines

Dear Mr. Fraser:

This letter is in response to your request that EPA clarify its position on several key issues relating to the permitting of hard rock mines under Section 402 of the Clean Water Act (CWA). The following paragraphs explain EPA Region VIII's policy on the following issues: (1) point sources at hard rock mines; (1.a) historic mine adits; (1.b) ground water hydrologically connected to surface water; (2) regulation of historic mining areas; (3) storm water vs. traditional NPDES; and (4) maintaining water quality after mining.

1. **Point Sources at Hard Rock Mines**

1.a **Historic Adits**

Mine adits are quite clearly point sources as defined under Section 502(14) of the CWA, 33 U.S.C. § 1362(14). The CWA defines the term "point source" as any discernable confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel or other floating craft from which pollutants are or may be discharged. Following this definition, discharges from mine adits at historic or active mines are point sources and are required to have an NPDES permit if pollutants are being discharged to waters of the United States. However, as discussed in paragraph 2 below, abandoned or long-term inactive mines have not been a top priority for permitting.

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1.b <u>Ground Water Hydrologically Connected to Surface Water (including seeps)</u>

For the past several years EPA, Region VIII, has been more closely evaluating NPDES compliance at mines. Although we found that substantial progress has been made in controlling surface water pollution from obvious discharge points, we still found serious water quality problems at some mines. Environmental data collected around these mining sites confirmed that the CWA goals of fishable and swimmable surface water were still not being achieved. In searching for this source of surface water pollution, EPA and the States found that pollutants from some mining sites are moving into the ground water and then into nearby surface water.

Upon determining that significant pollutants were being discharged from mines via ground water or less obvious points sources, EPA and the States began reevaluating mines. We found some mines had seeps or other ground water discharges to surface water which were not authorized in the facility's NPDES permit. There were also some mines without an NPDES permit which had claimed to be "non-discharging". However, upon inspection, these facilities were found to be discharging through seeps and water control structures. These facilities are now being required to obtain NPDES permits covering all outfalls including ground water discharges determined to be hydrologically connected to surface water.

As a result of these permit and enforcement actions, EPA has been reevaluating the definition of "point source" to require NPDES discharge permits for seeps and other less obvious discharges. It is therefore, EPA's position that seeps and other ground water discharges hydrologically connected to surface water from mines, either active or abandoned, are discharges from point sources and are subject to regulation through an NPDES permit. Current EPA policy, as augmented by several lawsuits, indicates that it is more the mine or the facility itself that is subject to NPDES regulations. Therefore, any seeps coming from identifiable sources of pollution (i.e., mine workings, land application sites, ponds, pits, etc.,) would need to be regulated by discharge permits. One important case is <u>United States v. Earth Sciences, Inc.</u>, 599 F.2d 368 (10th Cir. 1979). This case concluded that the facility from which the contamination came was itself a point source. Another important court case is <u>McClellan Ecological Seepage Situation v. Weinberger</u>, 707 F.Supp. 1182 (E.D. Cal. 1988) where the court found that Congress intended to limit discharges of pollutants that could affect surface water and that NPDES permits could be required, where the ground water

is hydrologically connected to the surface water. Additionally, the preamble to the November 16, 1990 Storm Water Regulations states that EPA "intends to embrace the broadest possible definition of point source consistent with the legislative intent of the CWA." (55 Federal Register 47990, 47997/1, November 16, 1990.) The preamble also states that the requirements for point source dischargers are not applicable to the discharges to ground water unless there is a hydrological connection between the ground water and a nearby surface water. (See 55 Federal Register 47990, 47997/3.)

2. **Historic Mining**

Clearly, as discussed in 1.a above, discharges from abandoned mine adits are point sources which require a traditional (rather than a storm water) NPDES permit. However, Region VIII has not made these permits a high priority because of limited EPA and State resources. EPA's current permit writing practices and priorities incorporate historic mine drainage into NPDES permits for active mines if the active mine influences the pollution discharged from the historic area. In addition, if the active mine owns or has control over an adjacent historic mining area, the active mine must also apply for an NPDES permit to control the discharge from the inactive area. Factors which increase our priority for requiring NPDES permits at abandoned mines are: active exploration, construction, plans for re-mining, viable ownership, and water quality impacts. The enclosed table outlines the Region's priorities for writing permits and the basis for effluent limitations.

In Region VIII, there are several active mines which have permits for historic discharges. One example is Cripple Creek and Victor Gold (CCVG), which maintains the permit for the Carlton Tunnel (CO-0024562) in Colorado. This historic tunnel drains most of the Cripple Creek and Victor Mining District. CCVG is currently mining only on the surface. Although the company's operations do not seem to be affecting historic mine drainage, the Company must continue to comply with NPDES requirements because CCVG and its affiliates own or control most of the historic area. Further, the potential for connections between current and historic workings also necessitate a permit.

Region VIII has several permits that exclusively regulate drainage from abandoned mines, such as the Leadville Mine Drainage Tunnel owned by the Bureau of Reclamation (CO-0021717) and the site of the former Climax Urad Mine and Mill (CO-0041467). The Leadville Tunnel drains part of historic Leadville Mining District. The Urad site is a

previously reclaimed tailings area that Climax is remediating to collect ground water seeps and provide treatment to meet water quality based limits.

3. **Storm Water v. "Traditional" NPDES**

It is our position that any point source discharge of pollutants to waters of the United States, not directly associated with a precipitation or snow melt event, (i.e., dry weather flows), must be permitted under a "traditional" NPDES permit. This means that any dry weather flow from mine adits, seeps, french drains and culverts are mine drainage or process wastewater, and cannot be covered by a storm water permit. A "traditional" permit must be written for these discharges including both technology based and water quality standard based requirements where applicable. [Water diverted around the mine without contacting any disturbed area, and does not mix with mine or process water may not require an NPDES permit.] Also during wet weather flows, most of the areas at an active mine must be covered by "traditional" NPDES requirements because storm water was included in developing the effluent guidelines regulations. Only wet weather surface runoff from some ancillary areas of active mines and inactive areas would fall under the storm water program. It is also important to note that these discharges can be covered by storm water requirements only if they do not combine with "traditional" sources prior to discharge. Therefore, we recommend that the State combine both the storm water and traditional NPDES requirements into one permit at all active mines. There is too much overlap between storm water and dry weather flow, and active and inactive portions of the mine to write separate permits. We have attached the most recent version of the table (September 13, 1993) describing the applicability of storm water at mining sites.

4. **Maintaining Water Quality (Financial Guarantee)**

It is of increasing importance to financially guarantee compliance with environmental performance at all phases of the mining operation including post-closure. This has been mentioned by both Region VIII and EPA Headquarters' staff during discussions of environmental impact statements and NPDES permits for new mines. Clearly, the public's financial costs of Summitville is also a strong argument for financial guarantees. We think that this is an area where the State, through its mining program, has substantial regulatory ability. We will continue to look into this issue on a federal level, but we hope that the State will be able to resolve this problem through its authorities by requiring post-closure financial assurance.

If you wish to request a conference call to further discuss these issues or if you have any other comments please contact me.

Sincerely,

Max H. Dodson, Director
Water Management Division

Enclosure

cc: Kevin Keenan, MT
Tom Reed, MT
Crown Butte
Zortman
Greater Yellowstone Coalition
Fred Pehrson, UT
Sheila McClenathan, ND
Bob Shukle, CO
John Wagner, WY
Tim Tollefsrud, SD

NPDES Priorities at Historic Mines and Applicable Effluent Limits

Priority	Situation	Basis of NPDES Limits		Storm Water Permit
		Technology	WQS	
High	Historic sources influenced by active mining.	ELG - 40 CFR 440 BPT, BAT or NSPS	Yes[1]	Yes, combine with trad. permit
High	Historic sources influenced by current activities (**significant** exploration, construction etc.)	BPJ - usually equivalent to BAT	Yes[1]	Yes[4]
High	Historic sources influenced by current activities (**minor** exploration, construction etc.)	BPJ	Yes[1]	Yes[4]
Medium	Inactive sources created since 1972 owned by current operator.	BPJ	Yes[1]	Yes[4]
Medium	Historic sources owned by operator with nearby active mining operations.	BPJ	Yes[1]	Yes[4]
Medium	Inactive sources owned by someone with activity[3] in an area, but not mining.	BPJ[2]	Yes[1]	Yes[4]
Low	Inactive sources owned by someone with no activity in the area.	BPJ[2]	Yes[1]	Yes[4]

1 Permit must include WQS based limits for all WQS enacted by the State for receiving waters. The applicable WQS vary greatly from state to state and stream to stream. Possible WQS range from no applicable WQS to no degradation of water quality. The most common WQS based effluent limits are for protecting aquatic life.

2 BPJ - The cost and feasibility of treatment (i.e., availability of electricity, site access, personnel on site) become increasingly important factors in determining the appropriate BPJ limits. At some sites (without significant WQS issues), passive treatment or BMP performance levels may be determined to be BPJ limits.

3 Activity - i.e., land development, industrial, business activity.

4 We strongly recommend that the storm water and "traditional" NPDES permits be combined at active mines. It may also be advantageous to combine storm water and "traditional" permits at inactive mines if the mine is complex or if the storm water and "traditional" permits cover the same area.

BAT - Best Available Technology from ELG

BPT - Best Practicable Control Technology from ELG

NSPS - New Source Performance Standards Technology from ELG

ELG - Effluent Guidelines for Ore Mining and Dressing 40 CFR 440

BPJ - Best Professional Judgement 40 CFR 125

BMP - Best Management Practices

EPA REGION 8 - SEPTEMBER 13, 1993

Applicability of 40 CFR Part 440 Effluent Limitations Guidelines to Storm Water Runoff from Active Ore (Metal) Mining and Dressing Sites		
Discharge/Source of discharge	Applicable ELG, if any (see key)	Note/comment
Land application area run-off	MD	PW-if Process fluids present
Crusher area	MD	PW-if Process fluids present
Piles (seepage and/or runoff)		
Spent ore	MD	PW-if Process fluids present
Surge/Ore	MD	PW-if Process fluids present
Waste rock/overburden	MD	
Topsoil	SW	
Drainage		
Pit drainage (unpumped)	MD	
Pit drainage (removed by pumping)	MD	
Mine water from underground mines (unpumped), adit discharges	MD	
Mine water from underground mines (pumped)	MD	
Seeps/French drains	MD	PW-if Process fluids present
Roads constructed of waste rock or spent c		
On-site haul roads	MD	
Off-site haul/access roads	SW	(if off Active Area)
Roads not constructed of waste rock or spent ore		
On-site haul roads	SW	MD-if dust control with MD water
Off-site haul/access roads	SW	
Milling/concentrating		
Tailings impoundment/pile	PW	
Run-off from tailings dams/dikes when constructed of waste rock/tailings	MD	PW-if Process fluids present
Run-off from tailings dams/dikes when not constructed of waste rock/tailings	SW	PW-if Process fluids present
Heap leach pile runoff/seepage	PW	

Applicability of 40 CFR Part 440 Effluent Limitations Guidelines to Storm Water Runoff from Active Ore (Metal) Mining and Dressing Sites		
Discharge/Source of discharge	Applicable ELG, if any (see key)	Note/Comment
Pregnant pond (barren and surge ponds also)	PW	
Polishing pond	PW	
Concentration building	SW	If storm water only, and no contact with piles
Concentrate pile (product storage)	PW	
Mill site	SW	Same as concentration bldg.
Ancillary areas		
Office/administrative building and housing	UC	Unless mixed with SW from industrial area, then SW
Chemical storage area	SW	
Docking facility	SW	Excessive contact with waste product could constitute MD
Explosive storage	SW	
Fuel storage (oil tanks/coal piles)	SW	
Vehicle/equipment maintenance area/building	SW	
Parking lots	SW	UC if only employee and visitor type parking
Power plant	SW	
Truck wash area	SW	Excessive contact with waste product could constitute MD
Reclamation-related areas		
Any disturbed area (unreclaimed)	MD	SW if inactive area
Reclaimed areas released from reclamation bonds after Dec. 17 1990	UC	
Reclaimed areas released from reclamation bonds prior to Dec. 17 1990	SW	
Partially/inadequately reclaimed areas or areas not released from reclamation bond	SW	

KEY: UC - Unclassified: Not Subject to Storm Water Program or 40 CFR Part 440 Effluent Limitations Guidelines (ELG)

MD - Subject to 40 CFR Part 440 ELG for mine drainage

PW - Subject to 40 CFR Part 440 ELG for mill discharge or process (including zero discharge ELG).

SW - Storm water runoff from these sources are subject to the Storm Water Program, but are not subject to 40 CFR Part 440 ELG unless mixed with discharges subject to the 40 CFR Part 440 ELG that are not regulated by another permit prior to mixing. Non-storm water discharges from these sources are subject to NPDES permitting requirements and may be subject to the 40 CFR Part 440 ELG.

MAR 20 2000

Mr. Ron Thibedeau
District Ranger
Carson National Forest
Questa Ranger District
P.O. Box 110
Questa, New Mexico 87556

RE: Requested Permit for Field Work by Molycorp, Inc.

Dear Mr. Thibedeau:

Thank you for informing us of Molycorp's plans to conduct field work at various locations on and adjacent to the Red River and for supplying an opportunity to comment on the proposed action.

Molycorp's plan deals solely with contaminant loadings from hydrothermal scar areas located upstream of the mine and pathways through the alluvial aquifer. It does not address loadings to the river adjacent to the mine, specifically in the area of Capuline Canyon, Cabin Springs, and Goathill Gulch. While those potential sources of contaminants were most likely omitted because they are located on mine property instead of National Forest lands, they are equally important to understanding impacts to water quality in the Red River. Could you please supply us with Molycorp's complete plans for monitoring, including monitoring planned to be conducted on mine property?

We plan to provide comments on the field work proposal by the March 27, 2000 deadline. Your timely submittal of Molycorp's complete plan will assist us in that effort. Should you have any questions concerning this request, please feel free to contact Scott Wilson of my staff at (214) 665-7511.

Sincerely yours,

Original signed by
Jack Ferguson

Jack V. Ferguson, P.E.
Chief
NPDES Permits Branch

cc: Mr. David R. Shoemaker, Mine Manager
Molycorp, Inc.
P.O. Box 469
Questa, NM 87556

United States
Department of
Agriculture

Forest
Service

Southwestern Region 3
Carson National Forest
Questa Ranger District

P. O. Box 110
Questa, New Mexico 87556
505-586-0520
FAX 505-586-0521

File Code: 2800

Date: March 6, 2000

Received
MAR 1 0 2000
6WQ-PP

Molycorp, Inc.
Attn: Geyza Lorinczi
P.O. Box 469
Questa, NM 87556-0469

Dear Mr. Lorinczi:

We have initiated the environmental analysis process required to evaluate and approve the environmental monitoring work outlined in the package you submitted by cover letter dated February 21, 2000. We did send you a copy of our recent scoping letter.

There are a couple of items we need to bring to your attention. First, we are not in a position to accomplish the required archeological surveys in the areas of work that will involve surface disturbance. Molycorp, Inc. will have to retain a private contract archeologist to complete the specific field surveys. As we discussed today, we would encourage Molycorp to inventory a large enough area that should the final work site locations need to be adjusted, the work will still fall within an area that was surveyed. Secondly, at this time, we are prepared to complete the environmental analysis (NEPA) necessary to evaluate and approve your February 21st monitoring proposal. However, as I mentioned to you, should some substantive resource issue(s) surface during the public scoping phase that we are not staffed to address, we may have to call on Molycorp to retain the private resource specialist support needed to address and mitigate the identified issue(s). This situation will be clearer following the public comment period.

As I mentioned to you today, we are not staffed at a level that will allow us to process in a timely manner on-going monitoring requests involving National Forest lands from Molycorp and/or the State and Federal agencies responsible for water quality in the Red River. We would encourage Molycorp and/or State and Federal agencies that have an interest in establishing monitoring points on the Forest be prepared in the future to contract the required NEPA work after the Forest Service had a chance to review any forth coming proposals. This situation is just a "heads-up" at this time, should we reach this point down the road.

We strongly support Molycorp's and the responsible State and Federal agencies efforts to better understand and improve the quality of the water in the Red River. Be assured we will do what we reasonably can to facilitate this monitoring effort when it involves National Forest lands.

Sincerely,

RON THIBEDEAU
District Ranger

cc: NMED, Surface Water Quality
EPA, Region 6
NM Mining and Minerals Division

Questa Ranger District
P.O. Box 110
2 Miles East of Questa on St. 38
Questa, New Mexico 87556
OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

QUESTA
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GWQ

US EPA
ATTN: J. SCOTT WILSON
1445 ROSS AVE., SUITE 1200
DALLAS, TX 75202-2733

115

75202-2733 54

United States
Department of
Agriculture

Forest
Servic

Southwestern Region 3
Carson National Forest
Questa Ranger District

P. O. Box 110
Questa, New Mexico 87556
505-586-0520
FAX 505-586-0521

File Code: 2800

Date: March 3, 2000

Dear Sir and/or Madam:

The Questa Ranger District, Carson National Forest, has received a proposal (copy enclosed) from Molycorp, Inc. to conduct environmental monitoring activities on National Forest lands in Red. River Canyon. The field work outlined in their proposal is a integral part of their environmental study program that will lead to the finalization of a Closeout Plan for the Molycorp mine. A Closeout Plan is required of Molycorp by the New Mexico Mining Act.

We are beginning the environmental analysis process to determine the effects of Molycorp's monitoring proposal. We are interested in knowing what concerns, issues, and/or opportunities you believe might be associated with the proposed field installation and monitoring work. We would ask that you provide us with your comments by March 27th so they can be considered in the analysis.

We anticipate that Molycorp, Inc. environmental monitoring proposal will be categorically excluded from documentation in EIS or EA, and that a Decision Memo will be prepared in accordance with rules in 7 CFR 1b.3. The category established by the Secretary that apples to this proposal is: FSH 31.1a (3) - Inventories, research activities, and studies, such as resources inventories and routine data collection when such actions are clearly limited in context and intensity.

Please contact me if you have questions or would like further information on this proposal. Thank you for your continued interest in the natural resource work being undertaken on the Questa Ranger District.

Sincerely,

RON THIBEDEAU
District Ranger

Received
MAR 09 2000
6WQ-PP

Robertson GeoConsultants Inc.

Suite 902, 580 Hornby St., Vancouver, B.C., V6C 3B6
Phone: (604) 684-8072 · Fax: (604) 681-4166

Memorandum

DATE: February 18th, 2000

TO: Geyza Lorinczi, Molycorp (505-586-0811)

FROM: Christoph Wels, Robertson GeoConsultants Inc.

RE: Permit for Field Work on U.S. Forest Service Land near Questa, New Mexico

Geyza:

As requested here is a description of the proposed field installation & monitoring work that would have to be carried out on U.S. Forest Service land. The proposed work is part of a study program to support the development of a closeout plan for the Questa Mine, Taos County, New Mexico.

A. Field Work in Hanson Creek, Straight Creek and Hottentot Creek watersheds

A.1. Installation of V-notch weirs

Figure 1 shows the proposed locations for surface water monitoring stations in the Hanson Creek, Straight and Hottentot watersheds. V-notches are proposed for the four primary stations (i.e. one each at the mouth of the prominent scar area and a second just upstream of the highway in Straight creek. The V-notch weir will consist of a 2'by 4' large and ½" thick plastic sheet with a V cut into the center supported by a small concrete abutments. The V-notch weir would be constructed by digging a cutoff trench about 1' deep and ~1' wide across the streambed (using hand tools), placing the V-notch plate and lumber support for the abutment and pouring the concrete. The total width of the final structure would be about 8-10' depending on the stream channel geometry. During construction of the weir the stream water would be captured upstream and guided across the site using a pipe. Construction of the weirs is planned for early spring 2000 (i.e. base flow conditions prior to snowmelt). For those sites where there is no road access (upper Straight and Hottentot) all materials would be walked in by foot or pack horse.

A.2. Test Pitting in Alluvial Fan

It is proposed to dig approximately five test pits each in the alluvial fan area of Hanson Creek, Straight Creek and Hottentot Creek watersheds. The test pits would be dug in areas with sparse vegetation and away from trees to avoid impacting their root structure. The test pits would be excavated using a small rubber-tired backhoe with a small (12" or 24" size) bucket. Only those locations would be selected which are easily accessible (not requiring clearing or road building), minimize disturbance of undergrowth and do not damage root structures of trees. The test pit dimensions would be 1m wide by 1-2m long with a maximum depth of 2m. The test pits would be logged and selected grab samples taken for lab testing. Mass infiltration tests would be performed in selected test pits (if feasible) by filling the test pit with water and observing the drawdown. All test pits would be backfilled after sampling and testing is completed (i.e. typically within the same

Suite 902, 580 Hornby St., Vancouver, B.C., V6C 3B6
Phone: (604) 684-8072 · Fax: (604) 681-4166

day). In case sampling and testing can not be completed within a day the test pit would be clearly marked with flagging tape and fenced.

A.3. Scar Survey and Sampling

It is proposed to survey all major scar areas in the three background watersheds (Hanson Creek, Straight Creek and Hottentot Creek). The survey will be done by walking the scar areas and performing indicator tests on surface samples. Selected surface samples will be collected in bags and shipped to the laboratory for testing. At selected locations scar material may be taken from below the surface by digging with hand tools (shovel, hand auger) to a maximum depth of 1m.

A.4. Geophysical Survey

Geophysical surveys (seismic and EM methods) are being proposed for the alluvial fan area of the three background watershed (Hanson Creek, Straight Creek and Hottentot Creek). Figure 2 shows the approximate locations of the survey lines. The surveys are non-intrusive (above ground) and will be performed by one or two people carrying the required transmitters and sensors along the survey lines.

A.5. Drilling and Monitor Well Installation

Figure 2 shows preliminary locations for the proposed groundwater monitoring wells in Hanson, Straight and Hottentot Creek watersheds (to be confirmed after a reconnaissance survey). Two monitoring wells will be drilled as close as possible to the mouth of the prominent scar area of each watershed. The exact locations will depend on local access and topography. One well will be completed in the alluvial soils (if present) and one in the underlying bedrock. (If no alluvium is present both wells will be completed in bedrock). The shallow well will be screened across the water table and the deep well(s) will be screened into bedrock (maximum depth likely less than 10-15ft). Except for Hanson Creek there is no road access to these upland drill sites and the wells will have to be drilled with a hand auger and/or a portable gasoline powered drill.

In the fan area of each watershed a fence of 3-5 shallow monitoring wells, oriented roughly parallel to the Red River, will be completed (Figure 2). These shallow wells will be drilled down to bedrock or 15ft below the groundwater table, whichever comes first. At the central location of each fence of wells, a second, deeper borehole will be completed to monitor groundwater flow within bedrock. These deep wells will be drilled at least 30ft into bedrock but no more than 150ft total depth.

It is anticipated that a medium sized all-terrain drilling rig (CME 750 or equivalent) would be used for drilling these fan area wells. This rig is 8ft long by 25ft wide and has a foot print pressure of 5 PSI. The support vehicles would be a trailer-mounted air compressor and a F250 pick-up truck. It is anticipated that the rig and support vehicle would be able to access the drill sites w/o special clearing or road building.

The installation of the monitoring wells will be done in accordance with the NMED guidelines for the construction of monitor wells, and supervised by a qualified geologist and/or hydrogeologist. All monitoring wells will be single installations (one screen per hole) using 2-inch diameter PVC

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Phone: (604) 684-8072 · Fax: (604) 681-4166

casing (Schedule 40) and 20ft screen lengths (longer screens might be used in areas where larger variations in water levels are anticipated). All wells will be completed using appropriate filter pack material, bentonite seals and cement-grouting of the annulus to surface and will be developed (purged) prior to initial sampling.

The drilling and installation work would proceed as soon as permission is granted (weather permitting). Ideally the wells should be installed prior to the onset of snowmelt runoff to take advantage of the frozen ground (minimal impact of traffic on ground surface). Once the study is completed (likely 1-2 years of monitoring) these monitoring wells will be decommissioned according to standard protocols.

A.6. Monitoring

An all-weather rain gauge (with data acquisition system) will be installed at the two primary stations of the Straight Creek watershed. The precipitation data from these two stations will be complemented with a survey of snow depth and water equivalent in the Straight Creek watershed just prior to snowmelt runoff. The snow course will consist of 10 points each across the alluvial fan and barren scar area, respectively.

All three background watersheds (Hanson, Straight and Hottentot Creek) will be visited frequently to monitor surface flow and stream and groundwater quality. The monitoring period will stretch from March 2000 to the summer of 2001 with emphasis on the periods of high flow. Stream water samples will be taken at regular intervals (ranging from daily to monthly) from the primary and secondary stations. Groundwater samples from the monitoring wells will be taken quarterly. The monitoring sites will be accessed by 4 wheel drive or skidoo (where a road or easy access is present) and/or by foot or skidoo (where no road or easy access is present).

B. Field Work in Red River Valley

B.1. Geophysical Survey

It is proposed to determine the depth to bedrock across the Red River valley using geophysical methods (seismic survey). A trial run will be completed in vicinity of existing wells where the geophysical test results can be verified against observed depth to bedrock (from drilling) (on Molycorp property). If deemed successful geophysical surveys will be run across the Red River valley at selected locations to determine the bedrock profile and cross-sectional area of the alluvial aquifer (at least in part on U.S. Forest Service land). The surveys are non-intrusive (above ground) and will be performed by one or two people carrying the required transmitters and sensors along the survey lines. To the extent possible the surveyors would use existing bridges to cross the Red River. If this is not feasible they may have to ford the river to complete the survey (provided this can be done safely).

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Phone: (604) 684-8072 · Fax: (604) 681-4166

B.2. Drilling and Well Installation

Figure 3 shows preliminary locations for the proposed monitoring wells in the Red River alluvium. At each location a cluster of five monitoring wells (three wells across the valley and two additional wells about 750ft upstream and downstream of the well fence) will be drilled perpendicular to the Red River to assess the expected variability of groundwater flow and quality in the Red River alluvium. These drill locations will be finalized after review of the results of the seismic surveys and a site reconnaissance (to determine access for a drill rig). All three clusters of wells will be located on U.S. Forest Service land.

The three center wells will be completed as pumping wells (using large diameter casing of at least 12") while the adjacent wells (towards the sides and up and down the valley will be completed as monitoring wells (2" diameter). Consideration is being given to either installing 2-3 additional mini-piezometers per monitoring well and/or to install nested (2") piezometers in each monitoring well. (to allow water quality sampling at various depths). The mini-piezometers would consist of 1/4" polyethylene tubing leading from the sampling point to surface, with the end perforated and wrapped in filtercloth (for sampling). The string of 2-3 mini-piezometers would be tied either directly to the outside of the 2" PVC casing or to an additional (smaller) PVC rod which would be lowered down the same borehole as the 2" PVC casing. The mini-piezometers would be sampled by applying suction to the tubing at surface.

It is anticipated that an AP1000 dual tube percussion rig (8ft wide by 36ft long weighing 70,000 lbs) would be used for drilling of the monitoring and pumping wells in the Red River alluvium. This rig would be supported by a pipe truck rig (8ft wide by 31ft long weighing 45,000 lbs) and an F450 pickup. The rig and support vehicles would require road and bridge access to the drill site. All drill sites will be selected as to minimize surface disturbance and vegetation clearing and will be located a minimum distance of 10m from the active streambed. Wherever possible bridge crossings and roads will be utilized to access the site. With the present (preliminary) selection of drill sites only those wells to be drilled south of Goathill Gulch would have to be accessed by fording the Red River. All other sites can be accessed from the highway or by crossing a bridge.

The installation of the monitoring wells will be supervised by a qualified geologist and/or hydrogeologist. First, the three borehole of the well fence will be drilled to bedrock to determine the total depth of the aquifer. During drilling the water quality of the return water will be monitored for field parameters (pH and EC). Where a significant change in water quality is observed drilling will be interrupted and a water quality sample taken (to the extent practical) for more detailed laboratory analysis. If used, the bundle of mini-piezometers would then be inserted into the borehole and the casing pulled back to about 35ft below the water table (allowing caving of the borehole) and completed with a 40 ft screen and riser pipe. All monitoring wells will be completed using appropriate filter pack material, bentonite seals and cement-grouting of the annulus to surface and will be developed (purged) prior to initial sampling.

The two boreholes upstream and downstream of the well fence would be drilled to a depth of about 25ft below the water table (used for water level monitoring only).

Robertson GeoConsultants Inc.

Suite 902, 580 Hornby St., Vancouver, B.C., V6C 3B6
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B.2. Pump Tests

It is proposed to perform constant-rate pump tests at each centre well (anticipated pumping rates in the order of 1000-2000GPM over a period of 3-4 days) using the appropriate neighbouring wells as observations wells. The pump would be operated using a generator. The pumped groundwater would be either discharged into the Red River (provided a discharge permit can be obtained) or pumped to the mill for use as process water.

B.3. Monitoring

The new monitoring wells (and mini-piezometers, if installed) will be sampled for water quality on a quarterly basis. The monitoring sites will be accessed by 4 wheel drive or skidoo (where a road or easy access is present) and/or by foot or skidoo (where no road or easy access is present).

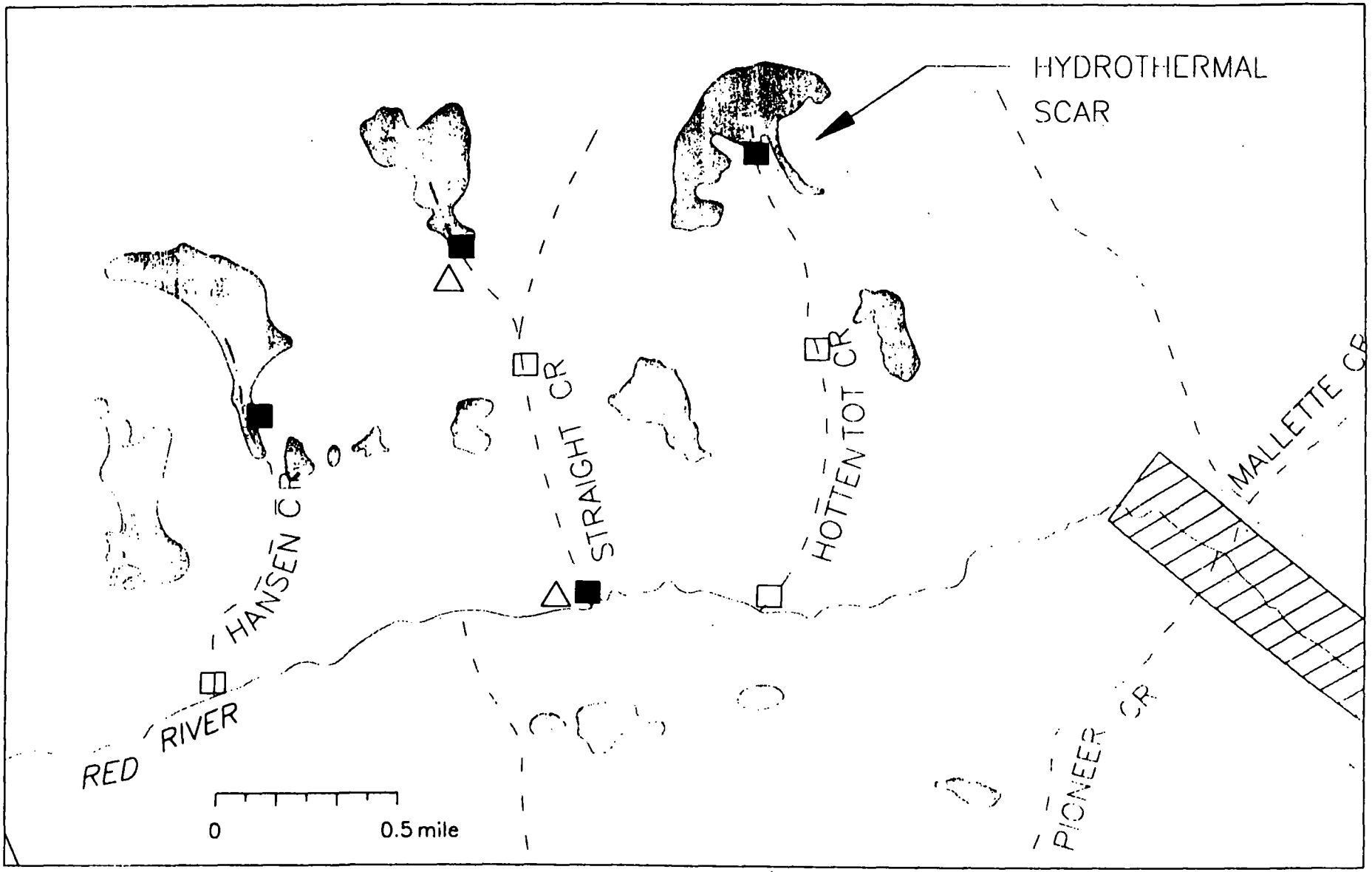
Closure

For more details about the proposed field work please refer to the detailed work scopes for the Background Study (RGC Report 052008/1) and Load Balance Study (RGC Report 052008/2) submitted to the New Mexico Mineral and Mining Division (MMD) on January 31, 2000.

Please contact the undersigned if you have any further questions,

ROBERTSON GEOCONSULTANTS INC.

Christoph Wels, Ph.D.
Senior Hydrogeologist



Legend

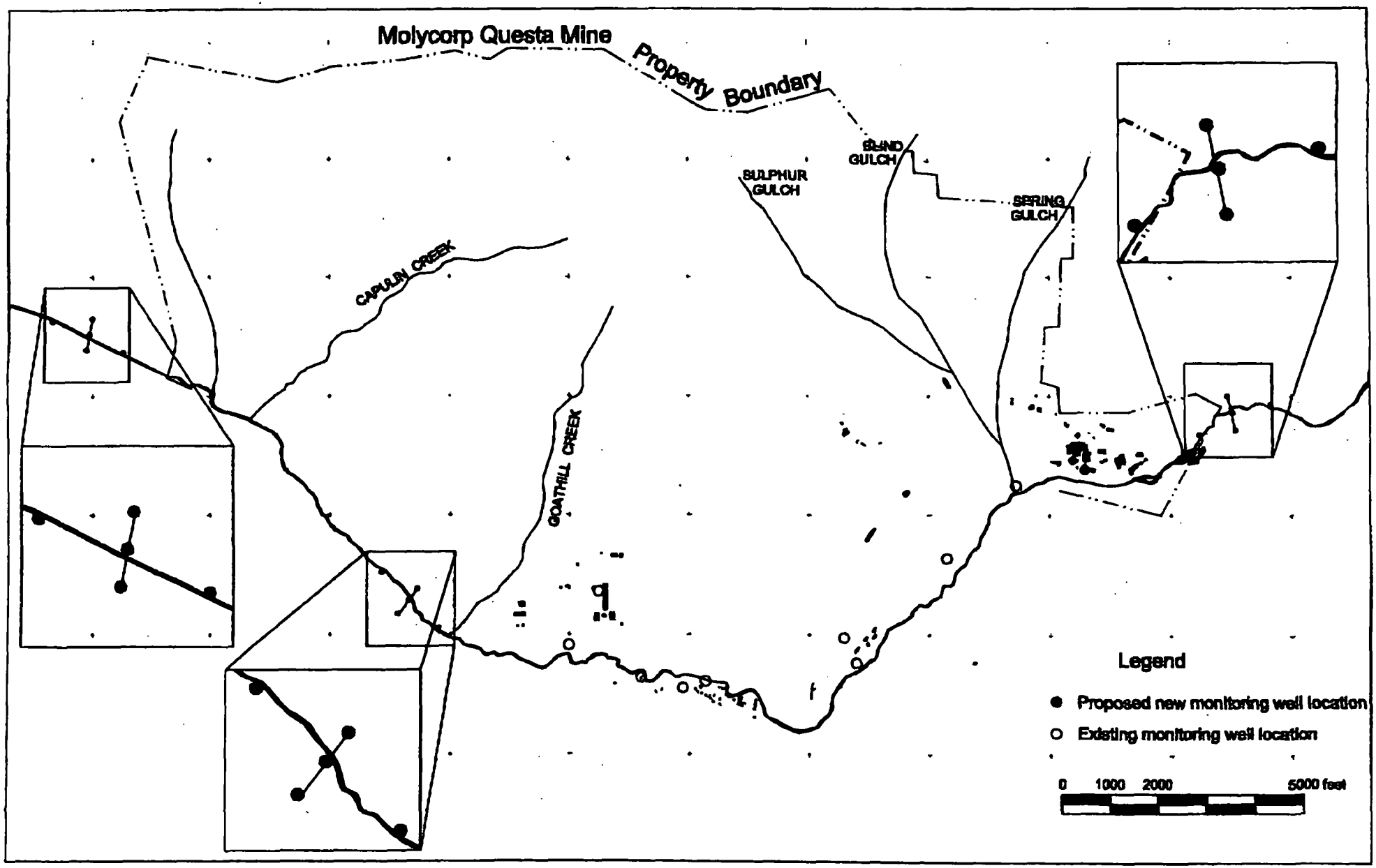
- ■ Primary Surface Water Monitoring Station
- □ Secondary Surface Water Monitoring Station
- △ Rain Gauge

CLIENT:	MOLYCORP, INC.
PROJECT No:	052008
PROJECT:	QUESTA CLOSEOUT PLAN
LOCATION:	QUESTA MINE NEW MEXICO, USA

ROBERTSON GEOCONSULTANTS INC.
Consulting Geotechnical and Environmental Engineers

Proposed Locations for Surface Water Monitoring Stations

DATE:	DRAWN BY:	FIGURE:
Jan. 2000	JG	~~12~~ 1



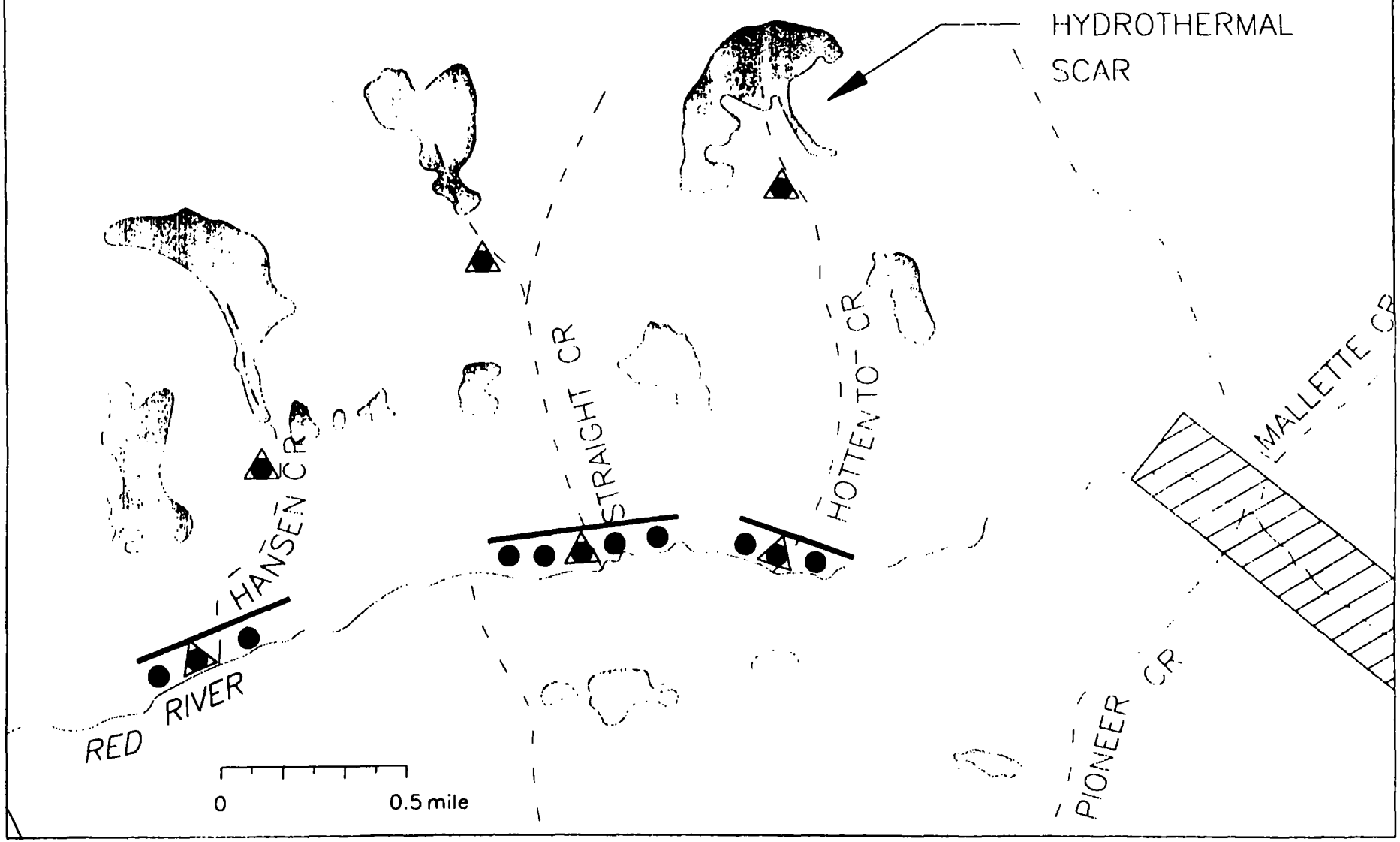
CLIENT:	MOLYCORP, INC.
PROJECT No:	052008
PROJECT:	QUESTA CLOSEOUT PLAN
LOCATION:	QUESTA MINE NEW MEXICO, USA

ROBERTSON GEOCONSULTANTS INC.
Consulting Geotechnical and Environmental Engineers

Proposed New Monitoring Well Locations

DATE:	DRAWN BY:	FIGURE:
Jan. 2000	JG	3

604-684-8073 RGC 091 P02 FEB 18 '99 13:29



Legend

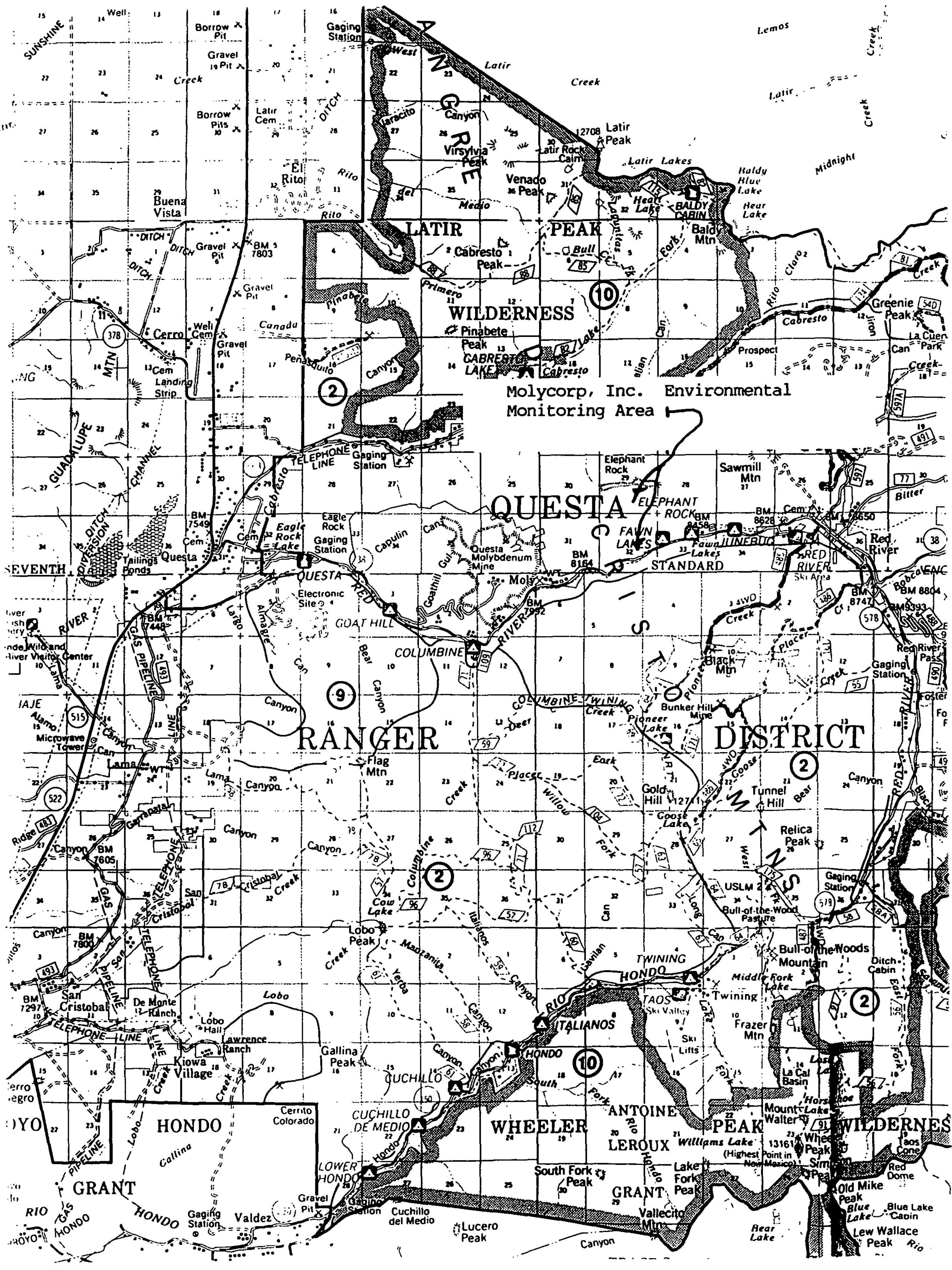
- ● Shallow well (completed in alluvium)
- △ Deep well (completed in bedrock)
- ▬ Geophysical Survey Lines

CLIENT:	MOLYCORP, INC.
PROJECT No:	052008
PROJECT:	QUESTA CLOSEOUT PLAN
LOCATION:	QUESTA MINE NEW MEXICO, USA

ROBERTSON GEOCONSULTANTS INC.
Consulting Geotechnical and Environmental Engineers

Proposed Locations for Groundwater Monitoring Wells

DATE:	DRAWN BY:	FIGURE:
Jan. 2000	JG	2



Molycorp, Inc. Environmental Monitoring Area
LATIR PEAK WILDERNESS
QUESTA RANGER DISTRICT
WHEELER PEAK WILDERNESS
SANGRE DE CRISTO MTNS
Latir Peak
Latir Lakes
Baldy Mtn
Cabresto Peak
Cabresto Lake
Pinabete Peak
Venado Peak
Virsylvia Peak
El Rito
Buena Vista
Cerro
Questa
Questa Molybdenum Mine
Tailings Ponds
Elephant Rock
Eagle Rock Lake
Fawn Lakes
Junebug
Red River
Columbine
Goat Hill
Flag Mtn
Gold Hill
Goose Lake
Tunnel Hill
Relica Peak
Bull-of-the-Woods Mountain
Twining
Taos Ski Valley
Italianos
Hondo
Cuchillo
Lobo Peak
Gallina Peak
Lama
San Cristobal
Kiowa Village
Lawrence Ranch
Frazer Mtn
Wheeler Peak
Old Mike Peak
Lew Wallace Peak
Blue Lake
Vallecito Mtn
Lucero Peak
Valdez
Hondo Grant
Antoine Leroux Grant
Gaging Station

Domenici Efforts in Mine Cleanup Prove Futile

2/25/00

ABQ Journal

BY IAN HOFFMAN

Journal Staff Writer

Talks aimed at bringing Molycorp's Questa mine under a state cleanup have failed despite the intervention of U.S. Sen. Pete Domenici, leaving to Gov. Gary Johnson the prospect of the mine's becoming a Superfund site.

"I told both parties I've done my work," Domenici, R-N.M., said Thursday. "I just said, 'Look, I've done what I can to try to get conversation going and get a better exchange of views and information, and I can't do any more.' "

Today state Environment Secretary Pete Maggiore is expected to repeat his recommendation to Johnson's staff that the governor clear federal regulators to propose the mine for a Superfund listing.

"I'm disappointed that we haven't been able to bring resolution to this," Maggiore said Thursday. "I think the state's position is appropriate and reasonable."

A Superfund listing would put Molycorp and perhaps its parent company, Unocal Corp. of Califor-

See **DOMENICI** *on* **PAGE 3**

Domenici Efforts in Mine Cleanup Prove Futile

from **PAGE 1**

nia, on the financial hook for intensive studies and possibly a cleanup of water and waste rock at the molybdenum mine.

EPA is not required by law to get Johnson's approval for a Superfund listing, but the agency generally waits for that approval as a matter of courtesy unless a site poses a dire threat to human health.

It's not altogether clear what Johnson will do, however. Johnson chief of staff Lou Gallegos had said the collapse of the state-Molycorp negotiations would leave the governor with "no reason to hold off" on giving his assent to the U.S. Environmental Protection Agency to propose the mine as a Superfund site.

But Gallegos stepped back from that position Thursday.

"Nothing is definite until we run that by the governor one more time, and we don't have a timetable on that right now," he said.

"I would not say it's a foregone conclusion. I think we have to look at exactly what the (state) Environment Department has put on the table and what Molycorp has put on the table and figure out why this is not closer. Those kinds of reasons have to be known before you make the call."

Negotiators for Molycorp and the state failed to reach agreement on the details of an administrative order of consent. The order would obligate Molycorp to a cleanup if studies showed the mine was responsible for toxic metals in area ground water and the Red River, which Molycorp emphatically denies.

Negotiators could not agree on two essential points — the amount of bond Molycorp would be required to post against the possibility of a future cleanup and the legal standard Molycorp would face if it went to court over a state order to clean up the mine.

"The short and long of it is we don't feel what's been put on the table has been reasonable," said mine manager David Shoemaker. "So we're waiting" for the state to soften its position.

State officials persuaded Domenici's staff that they had negotiated with Molycorp in good faith.

"I told Molycorp it was back in their lap and if there was anything further they could do, they should do it," Domenici said.

Domenici had pressed Johnson to hold off on clearing the mine for possible Superfund listing, fearing the expense and stigma of the federal designation could ultimately cost jobs in northern New Mexico. A state cleanup would likely be faster and cheaper.

Scott -

FYI. This concerns the prior citizens suit filed by Amigos Bravos against Molycor, which was dismissed by the Court. We will argue that the suit against us (if filed) should be dismissed on similar grounds.

Thanks
Renee

CROWELL & MORING LLP
1001 PENNSYLVANIA AVENUE, N.W.
WASHINGTON, D.C. 20004-2595
(202) 624-2500
FACSIMILE (202) 628-5116

RICHARD E. SCHWARTZ
(202) 624-2905
rschwartz@cromor.com

SUITE 1200
2010 MAIN STREET
IRVINE, CALIFORNIA 92614
(714) 263-8400
FACSIMILE (714) 263-8414

180 FLEET STREET
LONDON EC4A 2HD
44-171-413-0011
FACSIMILE 44-171-413-0333

November 17, 1998

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1563829

Renea Ryla[redacted] Esq.
Assistant Regional Counsel
U.S. Environmental Protection Agency, Region 6
1445 Ross Avenue (6RC-C)
Dallas, Texas 75202-2733

Re: **Amigos Bravos v. Molycorp, Inc. (10th Cir. No. 97-2327)**

Dear Renea:

Enclosed is a copy of the Tenth Circuit's "Order and Judgment" affirming the dismissal of the above-captioned case. The panel found that EPA had considered the issue raised by Amigos Bravos in Molycorp's 1993 permit renewal proceeding. The Court held that Amigos Bravos could not use a Clean Water Act citizen suit to litigate the same issue.

Please call if you would like to discuss this matter.

Sincerely,

Richard E. Schwartz

Enclosure

cc: John H. Pugh, Esq.
Mr. Geyza I. Lorinczi
Mr. David R. Shoemaker

UNITED STATES COURT OF APPEALS
TENTH CIRCUIT
OFFICE OF THE CLERK
BYRON WHITE UNITED STATES COURTHOUSE
1823 STOUT STREET
DENVER, COLORADO 80257
(303) 844-3157

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CROWELL & MORING

PATRICK FISHER
CLERK

ELISABETH A. SHUMAKER
CHIEF DEPUTY CLERK

November 13, 1998

Mr. John W. Sither
Mr. R. Timothy McCrum
Mr. Richard E. Schwartz
Crowell & Moring
1001 Pennsylvania Ave, SW
Washington, DC 20004-2595

Ms. Amanda J. Ashford
Ashford & Thomas
P.O. Box 2205
Albuquerque, NM 87103

Mr. David Gomez
Mr. Grove T. Burnett
Western Environmental Law Center
P.O. Box 1507
Taos, NM 87571

Re: 97-2327, Amigos Bravos v. Molycorp, Inc.
Dist/Ag docket: CIV-95-1497-JP

Dear Counsel:

Enclosed is a copy of the order and judgment of the court in the captioned case.

Please contact this office if you have questions.

Sincerely,

PATRICK FISHER
Clerk

By: Nil Parker
Deputy Clerk

PF:nak

cc:
James A. Parker, District Judge

FILED
United States Court of Appeals
Tenth Circuit

NOV 13 1998

PATRICK FISHER
Clerk

UNITED STATES COURT OF APPEALS

FOR THE TENTH CIRCUIT

AMIGOS BRAVOS, a nonprofit corporation; NEW MEXICO CITIZENS FOR CLEAN AIR AND WATER, a nonprofit corporation, Plaintiffs-Appellants, v. MOLYCORP, INC., Defendant-Appellee.	No. 97-2327 (D.C. No. CIV-95-1497-JP) (D. N.M.)

ORDER AND JUDGMENT*

Before **ANDERSON**, **BARRETT**, and **TACHA**, Circuit Judges.

After examining the briefs and appellate record, this panel has determined unanimously to grant the parties' request for a decision on the briefs without oral

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* This order and judgment is not binding precedent, except under the doctrines of law of the case, res judicata, and collateral estoppel. The court generally disfavors the citation of orders and judgments; nevertheless, an order and judgment may be cited under the terms and conditions of 10th Cir. R. 36.3.

argument. See Fed. R. App. P. 34(f); 10th Cir. R. 34.1.9. The case is therefore ordered submitted without oral argument.

I.

Defendant Molycorp Inc. operates a molybdenum mine in New Mexico that discharges pollutants into the Red River. Under the Clean Water Act (CWA), the discharge of pollutants from a point source[1] into the navigable waters of the United States is prohibited unless authorized by a National Pollution Discharge Elimination System (NPDES) permit. See 33 U.S.C. §§ 1311(a), 1342. Molycorp was issued an NPDES permit in 1977 covering discharges from three point sources. Because NPDES permits are valid only for a prescribed period of time, Molycorp applied to the Administrator of the United States Environmental Protection Agency (EPA) in December 1992 for renewal of its permit. The EPA renewed Molycorp's NPDES permit in September 1993 after adding two more point sources to those previously regulated under Molycorp's permit. The September 1993 permit expired at midnight on October 14, 1998.

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[1] A point source is "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged." 33 U.S.C. § 1362(14).

Plaintiffs are two non-profit corporations whose members are interested in protecting New Mexico's water resources. Plaintiffs brought suit against defendant under the citizen suit provisions of the CWA, alleging that pollutants were being leached from waste rock piles at defendant's mine and discharged into the Red River through ground water flow, seeps, and springs, and that the discharge of these pollutants was not authorized by an NPDES permit. See 33 U.S.C. § 1365(a) (authorizing suits by citizens against any person alleged to be in violation of an effluent limitation or standard or a federal or state order concerning such limitation or standard). Plaintiffs sought several forms of relief, including an order declaring that defendant was violating the CWA by failing to obtain an NPDES permit for these discharges, an order enjoining defendant from not complying with the CWA, and an order imposing maximum civil penalties against defendant for violating the CWA.

The district court concluded that it did not have subject matter jurisdiction over plaintiffs' claims because they should have been brought before the court of appeals in connection with the renewal of Molycorp's NPDES permit in 1993. See 33 U.S.C. § 1369(b)(1)(F) (providing for exclusive jurisdiction in the court of appeals for review of the EPA Administrator's action in issuing or denying any NPDES permit). We review the district court's dismissal for lack of subject

matter jurisdiction de novo. Chemical Weapons Working Group, Inc. v. United States Dep't of Army, 111 F.3d 1485, 1491 (10th Cir. 1997).

II.

A.

To understand the issues before us, we must first examine the permit renewal process. An applicant seeking to renew an existing NPDES permit must submit an application to the EPA Regional Administrator[2] before the existing permit expires. See 40 C.F.R. § 122.21(d)(2). Once the application is complete, the Regional Administrator makes a tentative decision either to issue or to deny a draft permit. See id. § 124.6(a). If the Regional Director decides to prepare a draft permit, the EPA will issue the draft permit and an explanatory fact sheet. See id. §§ 124.6, 124.8, 124.56. The Regional Administrator also must give public notice that a draft permit has been prepared and must allow at least thirty days for public comment. See id. § 124.10(a)(1)(ii),(b). During the public comment period, any interested person may submit comments on the draft permit and may request a public hearing if no hearing has been scheduled. See id.

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[2] When, as here, the permitting process is administered by the EPA rather than the state, the Regional Administrator stands as the "Director" referred to in the regulations. See 40 C.F.R. § 124.2(a).

§ 124.11. Anyone who believes that any condition of a draft permit is inappropriate must raise all reasonably ascertainable issues and arguments in support of his position before the end of the comment period. See id. § 124.13.

After the close of the public comment period, the Regional Administrator makes a final decision either to issue, deny, modify, revoke and reissue, or terminate a permit. See id. § 124.15. This decision must be based upon the administrative record, which must be complete by the date the final permit is issued. See id. § 124.18. The Regional Administrator must consider all public comments in making his final decision and must issue a response to all significant comments at the time the final permit decision is issued. See id. §§124.11, 124.17(a)(2).

The procedural regulations governing the public comment period "are intended to alert the EPA to potential problems with the draft permit and to ensure it has an opportunity to address those problems before the permit becomes final." Adams v. United States EPA, 38 F.3d 43, 51 (1st Cir. 1994). In promulgating the regulations, the EPA "anticipated that most policy and technical issues would be decided as part of the public comment period, which is the most open, accessible forum possible and which comes at a stage where the Agency has the greatest ability to modify a draft permit." Id.

Within thirty days of the final permit decision, any interested person may request an evidentiary hearing to reconsider or contest that decision. See 40 C.F.R. § 124.74(a). The Regional Administrator will then decide whether to grant a hearing. See id. § 124.75(a). If the Regional Administrator denies a hearing, an appeal may be taken to the Environmental Appeals Board. See id. §§ 124.75(b), 124.91. If the Appeals Board denies review, the Regional Administrator's previous decision becomes final. See id. §§ 124.60(c)(5), 124.91(f)(1). Once an NPDES permit decision has become final, any interested person may petition the United States Court of Appeals for review of the decision.[3] See 33 U.S.C. § 1369(b)(1).

B.

During the period of public comment on Molycorp's draft permit, the EPA received numerous comments about Molycorp's discharge of pollutants into the Red River via ground water and seeps, and the need to regulate these discharges under the NPDES permit program. Several commenters requested that the EPA hold a public hearing on the draft permit. The most comprehensive comment was

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[3] Although an issue must be raised during the public comment period to be preserved for review, the person petitioning for judicial review need not be the same person who raised the issue during the comment period. See Adams v. 8 F.3d at 52 n.7.

submitted by the Land and Water Fund, which specifically argued that seeps draining from the waste rock piles should be regulated under the NPDES permit program. The Land and Water Fund also expressed concerns about water draining from the waste rock piles into the mine's upper underground workings, which might then discharge into the Red River without ever reaching the surface.

The EPA issued Molycorp's final NPDES permit without holding a public hearing and without including in the permit the discharges at issue here. In its response to comments, the EPA explained its position as follows:

> Response No. 9:
>
> While EPA understands the concern of these commenters for the possible impact of ground water seepage on the Red River, we do not agree that these are "point sources" under the NPDES permitting program. Ground water is regulated by the State through the [New Mexico Environment Department].
>
> We are familiar with the case law citation[4] which relates to EPA authority to require construction and control of surface discharges (proscribed "point sources" of pollution) in instances where the operator has not applied the proper control and construction to the sources. However, the issue of seepage of groundwater which may have infiltrated through porous soil is a different matter. We recommend that the commenters continue to pursue this issue through the [New Mexico Environment Department].

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[4] Some of the comments cited Sierra Club v. Abston Construction Co., 620 F.2d 41 (5th Cir. 1980), as support for the contention that seepage from mining pits and collection ponds is subject to regulation under the NPDES permitting program.

Appellant's App., Vol. I at 110. None of the commenters sought further administrative or judicial review of the EPA's final permit decision.

C.

The district court examined the issues raised in the permitting process to decide whether it had jurisdiction over the present action. The court determined that, "[w]ithout question, the EPA made a decision that Molycorp did not need a permit for any ground water seepage into the Red River, regardless of whether Molycorp's operations polluted the ground water and, eventually, the river. Because of this determination, the permit that the EPA reissued to Molycorp contained no regulation of ground water seepage." Id. at 34. The court also concluded that, "[a]t its core, plaintiffs' complaint attacks the EPA's decision to reissue Molycorp's NPDES permit without regulating ground water seepage into the Red River." Id. Therefore, the court held that plaintiffs should have been brought their claims in a petition for review under 33 U.S.C. § 1369(b)(1)(F), and could not now litigate their claims in the district court under the citizen suit provisions.

III.

On appeal, plaintiffs contend that the 1993 permitting process would not have provided them a proper basis for seeking judicial review of their claim that Molycorp is violating the CWA by discharging pollutants from its waste rock piles without an NPDES permit. Plaintiffs focus primarily on the language of 33 U.S.C. § 1369(b)(1)(F), which provides for "[r]eview of the Administrator's action . . . in issuing or denying any [NPDES] permit," and advance several arguments in support of their theory.[5]

First, plaintiffs argue that the EPA could not have taken any "action" on the waste rock pile discharges during the permit renewal process because the agency did not follow all the procedures necessary to include these discharges in the final NPDES permit. The EPA's failure to include the waste rock pile discharges in the initial draft permit or accompanying fact sheet did not preclude the agency from making a decision about the propriety of regulating these discharges, however. That the regulations provide for public comment and subsequent modification of the draft permit, if necessary, reflects an expectation that the

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[5] In the district court, plaintiffs argued that it would be unjust to prohibit them from pursuing the present suit because they did not actually participate in the public comment process in 1993. The district court rejected this argument, and plaintiffs' opening brief does not challenge this aspect of the district court's ruling. Therefore, we will deem the issue waived. See State Farm Fire & Cas. Co. v. Mhoon, 31 F.3d 979, 984 n.7 (10th Cir. 1994).

initial draft permit and fact sheet may not consider everything that will ultimately be included in the final permit. See id. §§ 124.14(b), 124.15. Further, if plaintiffs are correct that the public comments raised "substantial new questions" that should have prompted the EPA to take further action under 40 C.F.R. § 124.14(4)(b), plaintiffs could have challenged the agency's failure to take such action had they sought administrative and judicial review of the final permit decision. See, e.g., Webb v. Gorsuch, 699 F.2d 157, 158-59 (4th Cir. 1983) (reviewing challenges to EPA's response to comments and its failure to hold public hearing).

Next, plaintiffs argue that Response No. 9 concerned on ground water issues other than discharges from the waste rock piles and, therefore, the agency did not actually consider the discharges at issue here. Our examination of the public comments and the EPA's response thereto shows otherwise. Moreover, because the issue of waste rock pile drainage was raised in the public comments, plaintiffs could have challenged any failure to adequately address this issue had they sought review of the final permit decision. See Adams, 38 F.3d at 52 (discussing EPA's duty to respond to public comments).

Third, plaintiffs argue that the EPA did not take any "action" on the waste rock pile discharges because Response No. 9 neither issued, denied, nor required an NPDES permit for these discharges, nor threaten any such action. Plaintiffs

also contend that judicial review of the decision stated in Response No. 9 would not have been appropriate because "[n]one of the specific clauses enumerated in 33 U.S.C. § 1369(b)(1) actually describe EPA's issuance of responses to comments." Appellant's Opening Br. at 24.

Again, plaintiffs misunderstand the procedural scheme. Once the EPA took final action by issuing the NPDES permit, the decisions the EPA made about the issues raised in the public comments became reviewable under 33 U.S.C. § 1369(b). See Webb, 699 F.2d at 161-62 (reviewing EPA's response to comments); cf. 5 U.S.C. § 704 ("A preliminary, procedural, or intermediate agency action or ruling not directly reviewable is subject to review on the review of the final agency action."); Citizens for Clean Air v. United States EPA, 959 F.2d 839, 846 (9th Cir. 1992) (reviewing adequacy of EPA's response to petitioner's comments). The cases plaintiffs cite to establish that judicial review under § 1369(b) would have been premature are inapposite; they involve no final agency action whatsoever. See, e.g., Appalachian Energy Group v. EPA, 33 F.3d 319, 321-22 (4th Cir. 1994) (declining to exercise jurisdiction over petition seeking review of internal EPA memorandum that did not involve or relate to any decision to issue or deny a permit).

Finally, plaintiffs argue that Response No. 9 did not correctly state the EPA's actual position on ground water discharges that are hydrologically

connected to surface water. The accuracy of the statements in Response No. 9 is irrelevant to the jurisdictional question at issue here. If the position the EPA stated in Response No. 9 conflicted with the position it had stated elsewhere, plaintiffs could have challenged this discrepancy through administrative and judicial review of the final permit decision.

IV.

In sum, we agree with the district court that plaintiffs should have pursued their present claims during the 1993 permit renewal process. Having failed to do so, plaintiffs may not now use the vehicle of the CWA's citizen suit provisions to challenge Molycorp's discharge of pollutants from its rock waste piles without an NPDES permit.

The judgment of the United States District Court for the District of New Mexico is AFFIRMED. Defendant's motion to strike Volume II of Appellants' Appendix is DENIED as moot.

Entered for the Court

James E. Barrett
Senior Circuit Judge

Appeals Panel Finds For Molycorp

Scott — Bob Joe

By Ian Hoffman
Journal Staff Writer

Environmentalists chalked up a second loss in their legal fight to prove Molycorp's mining-waste piles near Questa are pouring toxins into the Red River.

A three-judge panel of the U.S. 10th Circuit Court of Appeals has upheld dismissal of a 1995 lawsuit against Molycorp by two environmental groups.

A federal judge in Albuquerque had ruled he had no jurisdiction to force Molycorp to tighten its grip on water contaminants.

The ruling, issued Nov. 10, could be moot, however. State and federal water regulators are eyeing mounting evidence that Molycorp's waste rock is indeed a source of contamination for underground water and the Red River.

And those regulators are edging toward imposing the same pollution caps on Molycorp's waste-rock drainage as sought in the environmentalists' lawsuit.

State ground-water regulators warned Molycorp on Nov. 13 that the firm is in violation of New Mexico's Water Quality Act.

The law requires industries that send pollutants into ground water to propose a "ground-water discharge plan" that brings those pollutants within water-quality standards. The plan must also detail an industry's strategies for monitoring and ultimately ending the flow of contamination — in Molycorp's case, by reclaiming the waste piles.

Molycorp argues the presence of toxic metals and acids in the Red River are due to natural erosion of volcanic formations near the mine, not seepage from the mine's 328 million tons of waste rock. As a result, the firm contends, it has no duty to submit a discharge plan.

State regulators rejected that argument in their Nov. 13 letter, saying Molycorp's studies plus their own show the waste rock is a likely source of contamination.

Molycorp submitted discharge plans in 1995 and again this summer, but state regulators found both plans lacking, especially in proposals for barring the escape of contamination from the piles after they are no longer in use.

The state's violation notice gives Molycorp until Dec. 10 to submit a more complete plan. Molycorp could be subject to fines of up to $15,000 a day, dating back to September 1995, if it fails to meet the

Appeals Panel Finds for Molycorp

on PAGE 1

adline.

This is on the road to compli-
ce," said Nathan Wade,
okesman for the New Mexico
vironment Department. "We've
en on this road since 1995."

If regulators find a strong connection between the waste piles and contamination of the Red River, Molycorp could face either a potentially costly cleanup or a bill from the state for damage to its natural resources.

Those efforts are moving too slowly for river advocates.

"Everyone knows there's pollution" from the waste piles, said Brian Shields, executive director of Taos-based Amigos Bravos, a plaintiff in the 1995 lawsuit.

"The federal government knows there's pollution. The mine knows there's pollution. The state kno there's pollution," he said. "And the pollution is allowed to contin today."

Executives at Molycorp, a su sidiary of Union Oil Co. of Calif nia, could not be reached for co ment Friday.

DAILY NEWS DIGEST

November 24, 1998

These news summaries are provided by the EPA Region 6 Office of External Affairs for limited agency readership and not for public dissemination. Hard copies of the summarized articles are provided to each division.

The office of External Affairs is able to do an electronic search for work-related articles by request. To request an article, please provide the source of the article, topic, date, and other information to the Office of External Affairs.

Environmentalists Ask Bush to Tighten Clean-Air Measure
The Dallas Morning News, 11/24/98
Bush Urged to Force Old Plants to Obey Laws
Fort Worth Star-Telegram, 11/24/98
Several environmental groups joined forces to deliver 15,000 postcards to Gov. George Bush asking that he require the hundreds of grandfathered plants to meet current clean air regulations. The older plants are exempt from the 1971 Texas Clean Air Act and emit almost 900,000 tons of NOx each year. More than 50 of these plants have pledged to reduce their emissions under TNRCC's voluntary program.

Cloud Seeding to Begin Next Spring
Laredo Monitor, 11/24/98
Webb County will join five surrounding counties in a cloud seeding project next spring. A TNRCC grant will pay for about half of the $200,000 project. Area ranchers were told they could expect between a 20 percent and 40 percent increase in rainfall.

Tailpipe Troubles
Fort Worth Star-Telegram, 11/23/98
EPA is expected to issue new air emission standards that will require pickup trucks and sport utility vehicles to run as clean as cars. Automakers predict prices will rise from $300 to $1,500 per vehicle, depending upon its size. Extremely popular in Texas, the emissions from these models can no longer be ignored when plans are developed to clean our air. Some are predicting that any price increase will erode demand and cause manufactures to cease production. Others say the demand is too strong to be hurt by across-the-industry price increases.

Citizens Groups Ally in Bid to Influence Arkansas Issues
Arkansas Democrat-Gazette, 11/23/98
Forty-three groups have formed the Arkansas Citizens First Congress to increase the influence of "ordinary citizens" with the Legislature, state boards and commissions and Arkansas' media. The new coalition will lobbying on a variety of issues.

Appeals Panel Finds for Molycorp
Albuquerque Journal, 11/21/98
The U.S. 10th Circuit Court of Appeals upheld the dismissal of a 1995 suit alleging Molycorp's

Diane Scott

mining-waste piles are polluting the Red River. Meanwhile, state and federal regulators are taking a closer look at the company's waste piles. Evidence is mounting that the piles are the source of contamination for underground water and the Red River. Molycorp has until Dec. 10 to resubmit a plan to prevent discharges from the piles or face fines of up to $15,000 a day dating back more than three years.

Clinton Faces Rough Road on Trade, Emissions Issues
The Dallas Morning News, 11/23/98
Business columnist Jim Landers predicts that the Senate will not approve the Kyoto protocol calling for the U.S. to reduce greenhouse gas emissions 7 percent below 1990 levels by 2012. Opponents are watching for any regulatory actions to implement the protocol without congressional approval. There also appears little room for compromise on the President's fast-track trade initiative.

what's this?

Theory Says Climate Change Depends on Solar Wind, Cosmic Rays
The Dallas Morning News, 11/23/98
Global warming may be caused by high-energy particles from outer space according to a new theory. Using satellite photos from the last two decades, scientists found changes in our planet's cloud cover coincided with the sun's cycles. Researchers are seeking funding for experiments to prove their theory.

Arizona Ranchers Resent Wolf Project
The Dallas Morning News, 11/22/98
Ranchers who graze cattle in the Apache National Forest are opposed to the reintroduction of Mexican gray wolves begun by the Interior Dept. last January.

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Joan 14.

Name	Affiliation	Phone #
BRENDA COOK	EPA	214-665-7436
Charlie de Saillan	Environmt Dept. - OGC	505-827-2985
PAUL R RITZMA	NMED	505-827-2855
Mike Boydston	EPA (Office of Regional Counsel)	214 665 7376
Ragan Broyles	EPA - LA/NM Br	214 665-8125
Rich Schwartz	Crowell & Moring	202/624-2905
David Shoemaker	Molycorp	505/586/760
Dan Wall	USFWS	214-665-8467
Roger Lee	USGS-WRD	214 665-6484
Scott Wilson	EPA - Water Permitting	214 665 7511
CHARLES DAVID ABSHIRE	EPA (GRD WTR Center)	(214) 665-7188
Don Williams	EPA - Superfund	(214) 665-2197
MYRON KNUDSON	EPA SUPERFUND	214 665-6701
Susan Webster	EPA Superfund	214.665.6784
Maura Hanning	NMED Supufund Oversight	505 827-2922
Linda Rodriguez	EPA Superfund	214-665-2138
Gerpa Lorincz	Molycorp, Inc	(505) 586-7626
Andy Robertson	Robertson GeoConsultants	(604) 684 8072

Allen et. al, wq-Tables

Table A1. Analytical results, water-quality samples.

Location 01	Sample Date												
Constituent	06/10/97	07/17/97	08/14/97	09/18/97	10/23/97	11/20/97	12/19/97	01/14/98	02/20/98	03/19/98	04/30/98	06/04/98	07/16/98
Alk (as $CaCO_3$)	47.5	45.5	62.0	48.5	49.5	42.8	26.0	39.5	32.8	42.0	51.5	56.5	39.0
HCO_3 (mg/L)	57.9	55.5	75.6	59.1	60.4	52.1	31.7	48.2	39.9	51.2	62.8	68.9	47.5
pH (su)	7.44	7.62	7.76	7.55	7.62	7.60	7.18	7.47	7.15	7.57	7.78	7.71	7.71
T (deg C)	10.7	10.8	10.5	14.3	9.7	2.6	1	1	4.6	8.8	9.8	13.1	15.6
EC (umhos/cm)	40	132	50	95	99	234	477	400	60	268	80	178	45
DO (mg/L)	8.1	12.9	8.0	7.6	8.9	10.1	10.2	10.9	9.8	9.1	9.0	8.7	6.4
NFR (mg/L)	**	8	11	21	10	27	15	10	18	20	22	19	11
Eh (mV)	402	**	346	471	362	535	379	**	335	275	423	380	393
Discharge (cfs)*	283	53	43	22	19	9	9	17	12	16	54	137	57
F (mg/L)	0.3	0.7	0.7	0.8	0.8	0.7	3.1	1.6	1.0	0.7	0.5	0.3	0.7
Cl (mg/L)	1.1	2.0	2.3	3.2	2.9	4.4	4.2	4.5	4.7	5.5	5.2	1.2	2.6
NO_3 (mg/L)	0.8	0.4	0.9	1.4	0.8	1.2	2.5	2.3	2.6	1.3	1.7	**	0.3
SO_4 (mg/L)	34.9	70.8	83.6	126.1	109.2	112.6	177.1	140.9	166.3	135.6	68.9	36.8	67.4
Ca (mg/L)	23.1	35.3	39.7	49.8	47.1	47.5	65.3	51.5	56.2	55.8	30.4	23.9	32.4
K (mg/L)	0.9	1.3	1.2	1.3	1.2	1.2	1.4	1.3	1.2	1.2	0.9	0.6	0.9
Na (mg/L)	2.8	3.9	3.9	5.1	4.6	4.7	5.8	5.7	6.7	6.4	4.0	2.4	3.4
Mg (mg/L)	4.0	7.5	8.2	10.9	9.9	10.4	14.6	11.9	13.9	12.4	6.3	4.2	6.2
Fe (ug/L)	< 200	< 200	< 200	< 200	217	< 200	295	< 200	217	< 200	< 200	< 200	< 200
Fe tot (ug/L)		< 200			758			< 200			383		290
Mn (ug/L)	143	504	525	676	570	603	953	481	581	453	162	137	195
Mn tot (ug/L)		315			440			493			187		211
Ni (ug/L)	<2	7	16	27	17	16	37	39	59	32	10	6	4
Ni tot (ug/L)		11			15			17			11		9
Co (ug/L)	1	3	5	8	5	5	11	6	8	5	2	1	2
Co tot (ug/L)		3			4			5			2		1
Cu (ug/L)	1	1	<1	<1	<1	<1	<1	<1	<1	<1	14	2	2
Cu tot (ug/L)	<1	5			11			9			15		<1
Zn (ug/L)	30	78	197	180	64	72	413	233	288	181	25	38	37
Zn tot (ug/L)		75			97			114			74		54
Cd (ug/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Cd tot (ug/L)	<2	<2			<2			<2			<2		<2
Al (ug/L)	340	230	250	230	190	200	<150	<150	<150	200	<150	260	270
AL tot (ug/L)		1000			2400			2100			1500		1100

* Mean daily discharge at USGS gage near Questa.
** Not measured.

Table A1, continued.

Location S3	Sample Date				
Constituent	08/14/97	11/20/97	02/20/98	04/30/98	07/16/98
Alk (mg/L $CaCO_3$)	68.5	59.8	68.8	53.0	61.0
HCO_3 (mg/L)	81.1	72.9	83.9	64.6	74.4
pH (su)	8.22	8.23	8.30	8.21	8.32
T (deg C)	11.6	3.0	2.0	1.9	11.8
EC (umhos/cm)	75	153	60	32	25
DO (mg/L)	7.5	10.0	10.7	12.9	7.6
NFR (mg/L)	**	3	2	4	<2
Eh (mV)	416	495	**	424	383
Discharge (cfs)*	43	9	12	54	57
F (mg/L)	0.2	0.3	0.4	0.3	0.2
Cl (mg/L)	0.8	0.4	1.3	0.5	0.1
NO_3 (mg/L)	0.4	0.6	1.7	0.5	0.4
SO_4 (mg/L)	6.5	7.8	10.6	6.8	6.7
Ca (mg/L)	24.7	26.1	23.6	19.3	23.2
K (mg/L)	0.9	0.9	0.6	0.7	0.6
Na (mg/L)	2.1	2.1	2.1	1.9	1.7
Mg (mg/L)	2.1	2.4	2.9	2.0	2.2
Fe (mg/L)	<200	<200	<200	<200	<200
Fe tot (mg/L)				<200	<200
Mn (mg/L)	<100	<100	<100	<100	<100
Mn tot (mg/L)				<100	<100
Ni (ug/L)	<2	<2	<2	<2	<2
Ni tot (ug/L)				<2	<2
Co (ug/L)	<1	<1	<1	<1	<1
Co tot (ug/L)				<1	<1
Cu (ug/L)	<1	<1	<1	<1	<1
Cu tot (ug/L)				<1	<1
Zn (ug/L)	<1	<1	<1	<1	<1
Zn tot (ug/L)				3	<1
Cd (ug/L)	<2	<2	<2	<2	<2
Cd tot (ug/L)				<2	<2
Al (ug/L)	<150	<150	<150	<150	<150
AL tot (ug/L)				200	200

Table A1, continued.

Location 02	Sample Date												
Constituent	06/10/97	07/17/97	08/14/97	09/18/97	10/23/97	11/20/97	12/19/97	01/14/98	02/20/98	03/19/98	04/30/98	06/04/98	07/16/98
Alk (mg/L $CaCO_3$)	60.5	55.5	60.0	58.5	54.7	62.5	45.0	55.8	42.0	57.0	50.0	58.5	54.3
HCO_3 (mg/L)	73.8	73.8	67.7	73.2	71.3	66.7	76.2	54.9	68.0	51.2	69.5	61.0	71.3
pH (su)	7.96	8.37	8.20	7.93	7.79	7.99	7.85	7.95	8.03	7.70	7.94	7.69	7.88
T (deg C)	12.7	12.8	13.4	15.9	6.7	3.0	1.4	1.5	3.0	1.9	10.1	11.9	15.4
EC (umhos/cm)	33	**	50	251	32	286	78	321	60	52	54	45	**
DO (mg/L)	9.3	8.3	7.7	7.5	9.0	9.9	10.3	10.6	10.0	10.2	8.2	9.5	6.3
NFR (mg/L)	**	4	8	17	10	36	8	8	6	15	28	17	11
Eh (mV)	371	**	400	485	390	499	421	**	356	354	394	390	423
Discharge (cfs)*	283	53	43	22	19	9	9	17	12	16	54	137	57
F (mg/L)	0.1	0.2	0.2	**	0.5	0.3	**	1.3	0.7	0.5	1.1	0.1	0.5
Cl (mg/L)	1.3	1.7	2.0	2.7	2.3	2.5	3.4	4.1	3.7	6.4	5.6	1.0	2.5
NO_3 (mg/L)	0.8	0.1	0.7	1.5	0.7	0.9	2.5	1.7	2.0	2.0	1.4	**	0.5
SO_4 (mg/L)	22.6	53.3	51.7	75.6	76.8	76.6	84.0	96.9	103.1	92.8	53.1	26.1	43.1
Ca (mg/L)	19.5	30.5	31.3	37.8	39.1	38.6	42.5	37.8	43.4	43.4	25.7	22.3	27.7
K (mg/L)	0.6	1.1	1.1	1.3	1.3	1.1	1.2	0.8	1.1	1.4	1.0	0.6	0.8
Na (mg/L)	2.3	3.6	3.8	4.8	4.4	4.5	5.2	4.4	6.3	7.2	4.4	2.3	3.4
Mg (mg/L)	3.3	5.7	5.9	7.7	10.8	8.2	10.1	9.4	12.2	10.6	5.9	4.0	5.3
Fe (ug/L)	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
Fe tot (ug/L)					<200			2355			1046		802
Mn (ug/L)	<100	109	135	135	170	170	210	153	216	203	<100	<100	<100
Mn tot (ug/L)		<100			131			245			<100		<100
Ni (ug/L)	<2	3	5	7	9	18	10	10	16	13	7	2	<2
Ni tot (ug/L)		5			8			12			10		4
Co (ug/L)	<1	1	2	2	3	4	3	3	3	3	1	<1	1
Co tot (ug/L)		1			3			5			1		<1
Cu (ug/L)	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2
Cu tot (ug/L)		1			2			6			17		1
Zn (ug/L)	18	12	18	23	19	48	56	50	46	46	23	9	6
Zn tot (ug/L)		13			31			69			43		25
Cd (ug/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Cd tot (ug/L)		<2			<2			<2			<2		<2
Al (ug/L)	<150	190	230	150	170	<150	<150	170	<150	<150	<150	<150	<150
AL tot (ug/L)		300			780			1600			1500		630

Table A1, continued.

Location 03	Sample Date												
Constituent	06/10/97	07/17/97	08/14/97	09/18/97	10/23/97	11/20/97	12/19/97	01/14/98	02/20/98	03/19/98	04/30/98	06/04/98	07/16/98
Alk (mg/L $CaCO_3$)	48.0	57.0	66.0	77.0	61.0	67.5	66.0	64.0	75.0	67.5	48.5	50.5	49.5
HCO_3 (mg/L)	58.5	69.5	80.5	93.9	74.4	82.3	80.5	78.0	91.4	82.3	59.1	61.6	60.4
pH (su)	7.57	7.74	7.88	7.74	7.74	7.78	7.48	7.51	7.76	7.81	7.84	7.90	7.62
T (deg C)	10.6	13.6	14.1	13.5	2.6	0.4	1.9	0.9	3.2	3.4	10.7	11.8	16.3
EC (umhos/cm)	20	19	43	171	49	266	49	285	30	39	40	28	38
DO (mg/L)	8.8	8.4	7.4	7.6	9.8	10.6	9.9	10.0	9.6	9.4	8.1	8.9	6.2
NFR (mg/L)	**	6	3	12	5	12	<2	7.00	3	27	16	15	10
Eh (mV)	383	**	358	474	319	395	379	**	325	248	371	495	404
Discharge (cfs)*	283	53	43	22	19	9	9	17	12	16	54	137	57
F (mg/L)	0.1	0.2	0.2	0.2	0.4	0.3	0.3	1.3	0.6	0.3	0.3	0.1	0.4
Cl (mg/L)	0.9	1.4	1.7	2.4	1.9	2.1	3.6	3.8	3.5	8.0	3.8	0.8	1.2
NO_3 (mg/L)	0.6	0.2	0.2	0.2	0.4	0.6	**	**	1.4	0.3	0.3	**	**
SO_4 (mg/L)	15.3	34.2	37.1	57.0	49.7	60.3	50.9	69.5	46.5	62.1	42.7	18.9	29.2
Ca (mg/L)	18.5	25.6	29.1	36.0	33.8	37.4	38.0	42.2	36.2	40.3	25.2	20.4	24.6
K (mg/L)	0.7	1.0	0.9	1.3	1.0	1.1	1.2	0.8	0.7	0.9	1.0	0.5	1.0
Na (mg/L)	2.0	2.8	3.1	4.0	3.9	4.3	3.9	4.4	5.1	7.5	4.1	1.8	2.3
Mg (mg/L)	3.1	4.5	7.0	6.5	6.7	7.6	7.9	8.6	8.5	9.8	5.1	3.0	4.4
Fe (ug/L)	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
Fe tot (ug/L)		604			250			383			919		301
Mn (ug/L)	<100	150	<100	124	180	210	170	116	123	145	<100	<100	<100
Mn tot (ug/L)		<100			180			120			<100		<100
Ni (ug/L)	<2	<2	4	8	6	7	7	8	6	5	5	<2	<2
Ni tot (ug/L)		5			5			7			8		2
Co (ug/L)	<1	1	1	2	1	2	2	2	2	2	1	<1	<1
Co tot (ug/L)		2			1			1			1		<1
Cu (ug/L)	<1	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1
Cu tot (ug/L)		5			3			10			15		<1
Zn (ug/L)	2	31	16	42	18	19	39	38	37	39	24	2	4
Zn tot (ug/L)		49			23			55			30		11
Cd (ug/L)	<2	<2	<2	<2	<2	<2	<2	2	<2	<2	<2	<2	<2
Cd tot (ug/L)		<2			<2			<2			<2		<2
Al (ug/L)	150	<150	<150	<150	170	<150	<150	<150	<150	<150	<150	<150	150
AL tot (ug/L)		450			250			350			1200		350

Table A1, continued.

Location S10	Sample Date				
Constituent	09/18/97	11/20/97	02/20/98	04/30/98	07/16/98
Alk (mg/L $CaCO_3$)	84.5	84.0	91.5	77.5	56.5
HCO_3 (mg/L)	103.0	102.4	111.6	94.5	68.9
pH (su)	8.36	8.33	8.15	8.67	8.56
T (deg C)	14.2	0.1	0.3	7.6	10.8
EC (umhos/cm)	85	205	30	48	32
DO (mg/L)	7.6	10.4	10.3	9.3	8.7
NFR (mg/L)	4	5	<2	8	4
Eh (mV)	531	432	400	404	411
Discharge (cfs)*	22	9	12	54	57
F (mg/L)	**	0.2	0.1	0.1	0.0
Cl (mg/L)	1.2	1.2	1.1	2.1	0.5
NO_3 (mg/L)	0.1	0.6	0.7	0.3	0.1
SO_4 (mg/L)	14.1	13.8	12.1	10.5	13.0
Ca (mg/L)	32.3	33.6	29.9	22.9	22.0
K (mg/L)	0.9	0.7	0.7	0.6	0.5
Na (mg/L)	2.5	2.9	3.3	2.7	1.6
Mg (mg/L)	3.9	4.4	5.5	3.9	3.2
Fe (mg/L)	<200	<200	<200	<200	<200
Fe tot (mg/L)				<200	<200
Mn (mg/L)	<100	<100	<100	<100	<100
Mn tot (mg/L)				<100	<100
Ni (ug/L)	<2	<2	<2	<2	<2
Ni tot (ug/L)				2	2
Co (ug/L)	<1	<1	<1	<1	<1
Co tot (ug/L)				<1	<1
Cu (ug/L)	<1	<1	<1	<1	<1
Cu tot (ug/L)				<1	<1
Zn (ug/L)	<1	<1	<1	<1	<1
Zn tot (ug/L)				2	<1
Cd (ug/L)	<2	<2	<2	<2	<2
Cd tot (ug/L)				<2	<2
Al (ug/L)	<150	<150	<150	<150	<150
AL tot (ug/L)				400	150

Ore Mining + Dressing Dev. Document

TABLE VIII-59. HISTORICAL DATA SUMMARY FOR MOLYBDENUM MINE 6101 (TREATED EFFLUENT)

Climax Corp

PARAMETER*	MONITORING PERIOD	FREQUENCY OF OBSERVATION	NUMBER OF OBSERVATIONS	MEAN (mg/l)	STANDARD DEVIATION (mg/l)	RANGE (mg/l)
pH	Jan. 75 - Dec. 76	0-5/mo.	47	7.57 (daily ave.)	0.38	6.5 – 9.0
TSS	Jan. 75 - Dec. 76	0-5/mo.	50	7.6 (daily ave.)	7.5	1 – 34
COD	Jan. 75 - Dec. 76	0-5/mo	33	28.5 (daily ave.)	12	8 – 52
Cd	Jan. 75 - Dec. 76	0-5/mo	44	< 0.02 (daily ave.)	na	< 0.01 – < 0.02
Cu	1972	0-5/mo.	4	< 0.02 (daily ave.)	0.01	< 0.02 – 0.03
CN	Jan. 75 - Dec. 76	0-5/mo.	51	< 0.02 (daily ave.)	0.021	< 0.02 – 0.083
Mo	Jan. 75 - Dec. 76	0-5/mo	43	1.84 (daily ave.)	0.38	1.1 – 2.9
Se	1972	0-5/mo.	4	< 0.005 (daily ave.)	na	none
Zn	Jan. 75 - Dec. 76	0-5/mo.	48	0.077 (daily ave.)	0.18	< 0.01 – 0.90

*All metals expressed as total metals unless otherwise specified.
na = not applicable

Molycorp 1-18-00 Presentation to Superfund

Questa Mine Operations

- *Employs 150 to 350*
- *Paid $14 million in payroll for 1998*
- *Paid $1.6 million in taxes in 1998*
- *Working with state & federal agencies to protect the environment*
- *Voluntary reclamation started in the 1970s*
- *Planted over 150,000 seedlings since 1990*
- *River conditions have improved since 1994 as a result of resuming mining operations*

Molycorp operates an underground molybdenum mine in Northern New Mexico. Molycorp began mining molybdenum in Taos County in 1921. Molycorp is still a major employer in Taos County.

Currently Molycorp employs 150 people. We have employed as many as 1,000 and more recently about 350 were employed with an annual payroll of $14 million. In 1998, Molycorp paid $1.6 million in taxes and $21 million in purchases of goods and services in New Mexico. Currently, Molycorp is developing the D ore body with future mining targeted for the F2 ore zone followed by the deep Northeast ore zone (see attached site map). Molycorp is committed to continuing the mining operation in Taos county and has mineable reserves for the next 25 to 30 years.

In spite of the current depressed conditions in the industry, mining and development continues. If molybdenum prices improve employment levels are expected to increase.

UNDERGROUND OPERATIONS AT MOLYCORP

Molycorp Environmental Activities

Over the last 8 years through 1999, Molycorp has spent $20 million on environmental activities in and around the mine and tailings sites.

At the tailings facility -

Remediation Projects:

- Voluntary dust cover and revegetation
- 26 ground water monitor wells
- Ground water extraction well and seepage interceptor system
- Site assessments and characterization programs

Reclamation Activities:

- Cottonwood & juniper plantings established in 1998
- Monitoring & evaluation of interim vegetation establishment on the soil cover
- Closure plan based on 25 years of research & experience at the site

TAILINGS FACILITY AT QUESTA WITH INTERIM REVEGETATION.

Molycorp Environmental Activities

At the mine site -

Remediation Projects:

- Voluntary revegetation began in the 1970s with over 30,000 trees planted and over 400 acres seeded
- Expanded revegetation program began in 1996 with over 130,000 trees planted since 1996
- Installed 16 ground water monitor wells
- Interim remediation including the Capulin canyon borehole and seepage collection system
- Storm water management system
- Site assessments

Current Revegetation Program Activities:

- Cooperative research with researchers at NMSU Mora Research Center and the NRCS Los Lunas Plant Materials Center
- Goal is to establish a forest ecosystem on the mine site using seedlings of native trees, shrubs and grasses
- Current seedling survival rate is 80%
- Received the 1997 "Excellence in Mine Reclamation Award" from the NM Energy, Minerals and Natural Resources Department for the innovative and voluntary reclamation program

Ongoing studies by Chadwick Ecological Consultants (aquatic biologists) show biological conditions in the Red River are as good as they were pre-open pit mining.

REVEGETATION ON THE OVERBURDEN PILES

1999 ACTIVITIES

- After several years of efforts to refine the scope of the site assessment, a final proposal was submitted to NMED in 1998. Approval was received in July 1999 and the first phase drilling began at the end of July.
- Drilling program includes a total of 9 holes in four mine overburden piles with instrumentation in each hole to test and monitor the physical and chemical characteristics - have completed the holes and placement of instruments.
- Preliminary results show no apparent signs of acid generation at the base of the overburden piles.
- Monitoring instrumentation installed in each borehole will lead to the determination of potential acid generation of the piles.
- An additional 16 ground water monitoring wells were installed.
- Under the NM Mining Act and Water Quality Act, we have submitted a proposal for a comprehensive site assessment which will allow for determination of final closure.
- Proposal includes not only agency input but public involvement as well. The proposed Technical Review Committee includes MMD, NMED, environmental groups, and Molycorp. The proposal has also been sent to the EPA and they have been invited to participate.
- The site assessment includes waste rock characterization including further drilling and monitoring, sampling, baseline determination, and hydrologic balance modeling.
- NMED (mistakenly, we believe) attributes natural Red River conditions to Molycorp, and has been pressuring EPA to list Molycorp operations as a Superfund site. After mining resumed in 1996, river conditions appear to be the same as pre-mining conditions and that determination is part of the proposal. The initial drilling appears to indicate there is no acid generation at the base of the piles. The proposed program also includes drilling of additional holes and monitor wells and continued monitoring and sampling to determine actual conditions and allow for development of a closure plan for the mine that is protective of the environment.
- Molycorp has been doing business in New Mexico for the past 78 years and has always been a good citizen, paid taxes and complied with state and federal regulations and hopes to be in business in New Mexico for another 50 years. We feel that our submittal under current New Mexico regulations will be a quicker, more cost efficient, and better approach than Superfund.

2000 - 2001 ACTIVITIES

At the mine site:

- Abatement of existing ground and surface water contamination if/when found
- By January 31, 2001 submit a revised closeout plan and subsequently financial assurance for the closeout plan
- Waste rock characterization program including the drilling of the overburden piles, sampling and testing program
- Surface and ground water quality monitoring
- Background characterization study (determining conditions pre-mining)
- Water balance determination of the waste rock piles (ratio of infiltration of water compared to evaporation and seepage)
- Comprehensive hydrological balance of the mine site
- Contingency Plan — submittal of revisions
- Revegetation program implementation and testing
- Develop a post-closure hydrologic model of the site based on data collected to predict what happens to the water (ground and surface) upon closure.
- Studies on: surface erosion and stability analysis, rooting zone and cover evaluation, wildlife impact, borrow materials, open pit and subsidence areas
- Evaluation of alternative control measures using Multiple Accounts Analysis process
- Participation of a Technical Review Committee made up of representatives of regulatory agencies, interested agencies and citizens groups - a minimum of 3 meetings to be held
- Preliminary hearing on DP 1055 scheduled for April 3, 2000 and interim financial assurance proposal due by January 14, 2000.
- Final approval of the Closeout Plan, including determination by NMED and financial assurance in place by December 31, 2001.

At the tailings site:

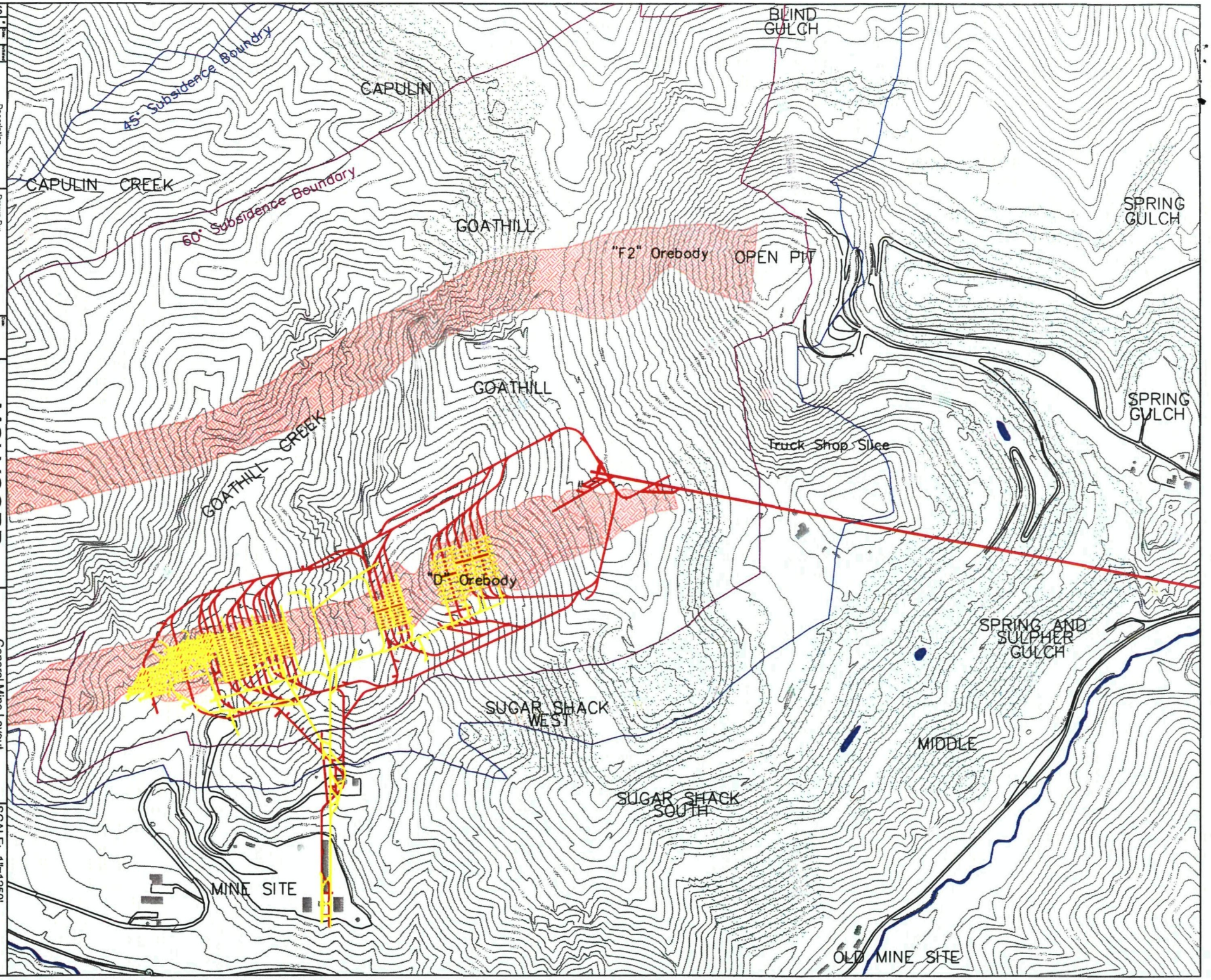
- Comprehensive hydrological balance (surface and groundwater characterization models, and geochemical load balance).
- Tailings revegetation investigation and report.
- Tailings cover test plot study.
- Studies on surface erosion and stability analysis, borrow materials, and wildlife impact.
- Public hearings on tailings closure and closeout plan projected for July 31, 2000 and August 1, 2000.
- Final approval of Closeout Plan, including determination by NMED and financial assurance in place by December 29, 2000.

Drilling of the overburden holes, July 1999

Reclamation at the Mine site

Successful reclamation at Questa - major program began in 1996 which is a continuation of the program begun in the 1970s.

Reclamation program at Questa: Vegetation growing on the low pH - high elevation (~10,000 ft) overburden piles.



REVISIONS

Date	Description	Drawn By:	Date
		Checked By:	Date
		Approved:	Date

MOLYCORP
QUESTA DIVISION
Questa, New Mexico

General Mine Layout

SCALE: 1"=1250'

Dwg No.:

Cad File: ...\General Mine Layout.dwg

WESTERN ENVIRONMENTAL LAW CENTER
Grove Burnett
P.O. Box 1507
Taos, New Mexico 87571
(505) 751-1776
(505) 751-1775 Fax

Attorneys for Plaintiffs

UNITED STATES DISTRICT COURT

DISTRICT OF NEW MEXICO

AMIGOS BRAVOS, a nonprofit corporation, and NEW MEXICO CITIZENS FOR CLEAN AIR AND WATER, a nonprofit corporation, Plaintiffs, vs. MOLYCORP, INC. Defendant.	PLAINTIFFS RULE 26 (a) (2) (B) EXPERT REPORT OF BARBARA C. WILLIAMS, Ph.D., P.E.

I, Barbara C. Williams, provide the following report as required by Fed. R. Civ. Pro. 26 (a) (2) (B) and the Court's March 17, 1997 disclosures.

A. SUMMARY OF QUALIFICATIONS

1. Qualifications of Witness

- Research scientist at the University of Idaho, performs research on mine waste management.
- Former research civil engineer with the US Bureau of Mines, with 10 years of mine waste research experience.
- Areas of expertise include groundwater hydrology, aqueous geochemistry, hydrogeology, multivariate statistics.
- Licensed Professional Engineer (PE); Civil.

- M.S. degree in Civil and Environmental Engineering. Ph.D. degree in Agricultural Engineering with concentration in Hydrology. Ph.D. dissertation topic: Aqueous Geochemistry of Ground Water in Mine Wastes.

2. List of Publications within past 10 years.

1. Williams, B.C., J.A. Riley, J.R. Montgomery, and J.A. Robinson. 1996. Hydrologic and Geophysical Studies at Midnite Mine, Wellpinit, WA: Summary of 1995 Field Season. US Bureau of Mines RI 9607. 34 pp.

2. Williams, B.C. and J.A. Riley. 1996. Hydraulic Characterization of Midnite Mine, Wellpinit, WA: Summary of 1994 Field Season. US Bureau of Mines RI 9606. 33 pp.

3. Stewart B.M., B.C. Williams, and R.H. Lambeth. 1995. Investigation of Acid Production, Leaching, and Transport of Dissolved Metals at an Abandoned Sulfide Tailings Impoundment: Monitoring and Physical Properties. US Bureau of Mines RI 9577. 82 pp.

4. Williams, B.C. and J.A. Riley. 1993. Midnite Uranium Mine - Hydrologic Research and Characterization *in* The Challenge of Integrating Diverse Perspectives in Reclamation, Proceedings, 10th National Meeting of Amer. Soc. of Surface Mining and Reclamation, Spokane, WA, May 1993, v. II, pp. 455-466.

5. Stewart, B.M., R.H. Lambeth and B.C. Williams. 1993. Factors Controlling the Release and Attenuation of Contaminants in a Sulfidic Tailings Impoundment *in* The Challenge of Integrating Diverse Perspectives in Reclamation, Proceedings, 10th National Meeting of Amer. Soc. of Surface Mining and Reclamation, Spokane, WA, May 1993, v. I, pp. 218-235.

6. Williams, B.C. 1992. Comparison of Multivariate Statistics and the Geochemical Code WATEQ4F for Water Quality Interpretation in Acidic Tailings. Ph.D. Dissertation, Univ. of Idaho, 164 pp.

7. Williams, B.C. 1992. Multivariate Statistical Analysis of Vadose and Saturated Zone Pore Waters of Sulfidic Mine Waste Tailings, *in* Emerging Process Technologies for a Cleaner Environment, Ed. S. Chander, Soc. for Min., Metall., and Explor., Chap. 10, pp. 63-70.

8. Williams, B.C. 1991. Statistical and Geochemical Analyses of Vadose and Saturated Pore Waters in Sulfidic Mine Waste Tailings *in* Proceedings, 4th International Mine Water Assoc. Congress, Ljubljana, Slovenia, v. 2, pp. 305-316.

9. Lambeth, R.H., B.M Stewart and B.C. Williams. 1991. An Investigation of Hydrogeochemical Mechanisms in an Abandoned Sulfide Tailings Impoundment and Underlying Aquifer *in* Proceedings, 2nd International Conference on the Abatement of Acidic Drainage, Tome [volume] 3, pp. 43-59.

10. Lambeth, R.H. and B.C. Williams. 1990. Linking Biological and Hydrogeochemical Mechanisms of Sediment Leaching *in* Biological Remediation of Contaminated Sediments, with Special Emphasis on the Great Lakes, Eds. C.T. Jafvert and J.E. Rogers. EPA/600/9-91/001, pp. 166-171.

11. Stewart, B.M., R.H. Lambeth and B.C. Williams. 1990. Effects of Pyritic Tailings in an Abandoned Impoundment on Downgradient Water Quality *in* Mining and Mineral Processing Wastes, Ed. Fiona M. Doyle, Soc. for Min., Metall., and Explor., pp. 133-142.

12. Williams, B.C., R.H. Lambeth and B.M. Stewart. 1989. Determining Heavy Metal Leaching and Transport from Abandoned Mine Wastes. Transactions, Preprint #89-25, Soc. for Min., Metall., and Explor. Annual Meeting, Las Vegas, NV, Feb. 1989.

3. Compensation

Hourly Rate is 75 $/hr.

4. Cases for which witness has testified in past 4 years.

None

B. SUMMARY OF OPINIONS

This Summary of Opinions relies in part upon specific documents in the published literature, public documents, or documents prepared by or on behalf of Molycorp. These documents are identified and cited in the Basis for Opinions, in the section below. This Opinion depends upon a site visit to the Molycorp Mine on December 17, 1996; review of scientific reports prepared by Molycorp's consultants; review of published geologic, hydrologic, and river sampling reports from about the Mine and the River by state and federal agencies; examination of water quality data from laboratory leach tests, seeps, the Red River, groundwater monitoring wells, water supply wells, and the underground mine; examination of water level data from monitor wells and the Red River; numerous maps and figures prepared by Molycorp or the State; other data; and experience acquired at other mine sites with similar hydrologic settings.

1. The hydrologic setting of the Molycorp Mine facilitates direct hydraulic connection(s) between the Molycorp waste rock piles and the Red River. The waste rock piles were not placed on liners. Rain and snowmelt infiltrate the waste rock piles. Stormwater runoff on and from some of the waste rock piles is collected in impoundments, whereupon it subsequently infiltrates. Seepage flows laterally downhill along low hydraulic conductivity barriers at the base of the waste rock until it enters the shallow alluvial and/or fractured bedrock aquifers. These flow paths may be within the saturated zone or perched above it. Seepage from most of the waste rock disposal areas is not collected in a seepage interception system. The natural groundwater gradients in the alluvial and bedrock aquifers are directed toward the river. Groundwater discharge to the Red River occurs through the shallow bedrock and alluvial aquifers by observed seeps and springs. The cone of depression in the deep bedrock that is created by the underground workings of the mine does not collect most of the groundwater from the shallow bedrock and alluvial aquifers. Groundwater elevations in wells between the waste rock disposal areas and the Red River show vertically upward directed gradients, indicating that groundwater recharges the river in this area. Other studies have shown that the Red River is a gaining stream in the vicinity of the Molycorp Mine. Therefore groundwater flows into the river over this reach of the Red River.

2. In consideration with the hydrologic evidence provided in Opinion 1, geochemical data and water quality data demonstrate a direct hydraulic connection between the Molycorp waste rock piles and seeps that flow into the Red River. The same dissolved constituents are observed to be leached from the waste rock, present in the groundwater upgradient of the Red River, and present in the seeps that discharge from groundwater to the Red River. Monitor wells installed in the shallow alluvial aquifer near the Portal Springs and the Capulin Springs exhibit water quality with chemical signatures that are similar to each of these springs, respectively. The timing of appearance of white

precipitates in the Red River in conjunction with Molycorp's open pit operation also verifies the direct hydraulic connection between the Molycorp waste rock piles and the Red River.

3. Sulfate and metal loading now exhibited in the reach of the Red River adjacent to the Molycorp Mine is more attributable to mining activities and emplacement of waste rock piles than to natural hydrothermal scars. The increase in loading exhibited over the years 1966 to 1992 is due overwhelmingly to mining and waste rock emplacement. Several hydrothermal scars on site have been removed or disturbed by mining activity so that the areal extent of natural scar material within the mine area has been reduced since the onset of mining. The episodic sediment loading to the Red River caused by erosion and landslides from hydrothermal scars within the Molycorp Mine area has been effectively eliminated by the storm water management activities. The surface area and volume of waste rock now exposed to weathering and leaching is greater than the area of hydrothermal scars in the mine area that was exposed to weathering and leaching before the open pit operation commenced. Total concentrations of sulfate, aluminum, copper, cadmium, iron, manganese, and zinc in drainage water from waste rock and disturbed areas are higher, on average, than drainage from hydrothermal scars. In summary, because the sulfate and metal loading to the reach of the Red River adjacent to the Molycorp Mine has increased over the period 1965 to 1993, and the portion of this load which can be attributed to undisturbed hydrothermal scar seepage and episodic sediment loading has decreased over the same time period, then nearly all of the increase in loading must be attributed to mine-influenced seepage and groundwater recharge to the Red River.

4. The sulfate and TDS concentrations in the reach of the Red River adjacent to the Molycorp Mine increased with time, during the period of 1965 to 1993. Fish populations were impacted severely during that time period. Metal and sulfate concentrations in this section of the Red River are higher than in upstream sections. The increase in impact upon the reach of the river adjacent to the Molycorp Mine over upstream reaches is dominated by the metals zinc and manganese; these metals are correlated more strongly to waste rock drainage than to hydrothermal scar drainage. The relatively high concentrations of zinc and manganese substantiates the aforementioned direct hydraulic connection between the Molycorp waste rock dumps and the Red River.

5. Without abatement, the Molycorp Mine will continue to discharge to the Red River acidic water containing dissolved sulfate and heavy metals. When it is exposed to air and water, the oxidizable sulfide in the waste rock piles produces sulfuric acid which dissolves metals. In the mixed volcanic waste rock, most of the neutralizing minerals have been consumed; however, a large volume of oxidizable sulfide remains. Sulfide oxidation will continue indefinitely. The natural soil and gravel deposits between the waste rock and the Red River have

little or no ability to neutralize the acid. Consequently the acid and metals that leach out of the waste rock migrate to the Red River with little or no attenuation.

C. BASIS FOR OPINIONS

1. The hydrologic setting of the Molycorp Mine facilitates direct hydraulic connection(s) between the Molycorp waste rock piles and the Red River. The waste rock piles were not placed on liners. Rain and snowmelt infiltrate the waste rock piles. Stormwater runoff on and from some of the waste rock piles is collected in impoundments (1012, p.11; 1040, p.79), whereupon it subsequently infiltrates. Numerous investigators, including Molycorp's consultants and technical staff from multiple state agencies, describe two principal and interconnected groundwater systems in the mine area. These are (a) a fractured bedrock aquifer and (b) an alluvium aquifer comprised of mudflow and valleyfill materials within the Red River and tributary drainages (1012, p. 11, p. 21; 1013, p. 5; 1017, p.10; 1021, p.67). Seepage flows laterally downhill along low hydraulic conductivity barriers at the base of the waste rock until it enters the shallow alluvial and/or fractured bedrock aquifer(s). These flow paths may be within the saturated zone or perched above it (1013, p. 6). Seepage from most of the waste rock disposal areas is not collected in a seepage interception system (1012, p. 38). The natural groundwater gradients in the alluvial and bedrock aquifers are directed toward the river (1013, p. 5). Groundwater discharge to the Red River occurs through the shallow bedrock and alluvial aquifers by observed seeps and springs. Because of the high permeability of alluvium and shallow fractured bedrock near the ground surface, relative to the low permeability of the deep bedrock in the vicinity of the underground mine, the cone of depression in the deep bedrock that is created by the underground workings does not collect most of the groundwater from the shallow bedrock and alluvial aquifers (1012, p. 21; 1013, p. B-7). Groundwater elevations in wells between the waste rock disposal areas and the Red River show vertically upward directed gradients (1013, pp. 8-11), indicating that groundwater recharges the river in this area. Other studies have shown that the Red River is a gaining stream in the vicinity of the Molycorp Mine (1017, p. 10; 1021, p.4, p.10). Therefore groundwater flows into the river over this reach of the Red River.

Seepage from waste rock piles and impoundments infiltrates until it encounters a low hydraulic conductivity barrier such as a perching zone in waste rock, a perching zone on hydrothermal scar material, and/or weathered bedrock. It follows these controlled pathways until it enters either the fractured bedrock aquifer or the alluvial mudflow/valleyfill aquifer (1012, p. 11; 1013, p. 6). Seepage from the Sugar Shack South, Middle and Spring and Sulphur Gulch waste rock piles is not controlled by a seepage collection system. (1012, p. 38). A portion of the seepage from the Capulin Canyon waste rock dump probably bypasses a seepage collection system constructed in that tributary (1012, p. 11).

Groundwater discharge to the Red River occurs through the shallow bedrock and alluvial aquifers by observed seeps and springs including the Portal Springs, Cabin Springs, and Capulin Springs. The cone of depression in the deep groundwater flow system that is created by the underground workings does not capture most of the groundwater from the shallow bedrock and alluvial aquifers (1012, p. 21; 1013, p. B-7). Water level data in the monitoring wells installed by Molycorp in 1994 had not responded to dewatering of the new underground mine in the first five months of monitoring (1013, p. B-7). Monitor wells MMW-2, MMW-3, MMW-10A, MMW-10B and MMW-10C had not responded to the dewatering in 5 months (1013, p.12); and water level changes in monitor wells MMW-8A, MMW-8B and MMW-11 were inconclusive. Only well MMW-13 appears to be in the cone of depression of the mine due to its low water elevation with respect to the river; however this well had not shown a drawdown response in the first five months of monitoring (1013, p.8). Even well MMW-7, which is between Shafts #1 and #2 of the underground workings, has a water level which is 550 feet above the cone of depression, suggesting that it is completed in a perched zone within bedrock (1013, p. 11). The lack of response among these wells indicates that the underground mine is dewatering deep bedrock that is not well-connected to the shallow aquifers which recharge the Red River. Water quality data support this conclusion. Only one documented sampling point in the underground workings, Decline Station 1000, shows contaminated water of low pH and similar quality to waste rock drainage (1012, Table 1.4; 1012, p. 13). Groundwater elevations in wells MMW-2, MMW-3, MMW-8A and 8B, MMW-10A, 10B, and 10C, and MMW-11, which are located between waste rock disposal areas and the Red River exhibit vertically upward directed gradients, (1013, p. 11, p. 8, and p. 9) indicating that they are in a groundwater discharge area, i.e. that groundwater recharges the river in the vicinity of these wells.

2. In consideration with the hydrologic evidence provided in Opinion 1, geochemical data and water quality data demonstrate a direct hydraulic connection between the Molycorp waste rock piles and seeps that flow into the Red River. The same dissolved constituents are observed to be leached from the waste rock, present in the groundwater upgradient of the Red River, and present in the seeps that discharge from groundwater to the Red River. Monitor wells installed in the shallow alluvial aquifer near the Portal Springs and the Capulin Springs exhibit water quality with chemical signatures that are similar to each of these springs, respectively. The timing of appearance of white precipitates in the Red River in conjunction with Molycorp's open pit operation also verifies the direct hydraulic connection between the Molycorp waste rock piles and the Red River.

The same dissolved constituents are observed to be leached from the waste rock, present in the groundwater upgradient of the Red River, and present in the seeps that discharge from groundwater to the Red River. Samples of water

temporarily impounded on waste rock piles (1012, p. 28) contain elevated dissolved concentrations of sulfate, aluminum (Al), iron (Fe), manganese (Mn), zinc (Zn), and other metals (1012, Table C1). These concentrations are elevated with respect to sample location WS-Cap2 (1012, Table C1), which is used as a background seep by Molycorp contractors (1012,Table 1.2, footnote). Groundwater monitoring wells downgradient of the waste rock piles contain concentrations of sulfate, aluminum, cadmium, copper, manganese and zinc that are higher, on average, than concentrations in water supply wells (1012, Table 1.4). Of the metals, manganese shows the largest concentration difference. Seeps downgradient from waste rock dumps that discharge into the Red River contain concentrations of dissolved sulfate, aluminum, copper, iron, manganese and zinc (1012, Table 1.4) that are elevated with respect to seep WS-Cap2 (1012, Table C1).

The similarity of water quality in the Portal Springs to water quality in monitor wells MMW-10A, 10B, and 10C indicates that they are in the same general flowpath to the river. Portal Springs #2 and #2a exhibit low pH (4.8-4.0), high Al (10.9-19.4 mg/L), high Mn (4.7-10.6 mg/L), and moderate Zn (1.3-2 mg/L) with respect to water supply wells in the area (1012, Table 1.4). The Portal Springs are downgradient from alluvial wells MMW-10A, and 10C. Well 10C is completed in the upper valley fill aquifer, immediately above a clay stratum which may act as a perching layer (1013, p.9). Well 10C exhibits low pH (4.7), high Al (31.1 mg/L), high Mn (16.3 mg/L), and moderate Zn (3.2 mg/L) with respect to water supply wells in the area (1012, Table 1.4). Well 10A is completed in the lower valley fill, immediately above bedrock, and analyses show low pH (5.8), high Al (33.4 mg/L), high Mn (13.1 mg/L), and moderate Zn (2.29 mg/L) with respect to water supply wells in the area (1012, Table 1.4). Several investigators have documented the similarity in water quality between the Portal Springs and shallow alluvial wells MMW-10A and 10C (1013, p. D-12; 1021, p. 49).

The Capulin Canyon Springs exhibit water quality with a similar geochemical signature to monitor well MMW-2. The Capulin Canyon Springs have low pH (3.4), high Al (43-157 mg/L), high Fe (10-36 mg/L), high Mn (15-55 mg/L), and high Zn (4-13 mg/L) with respect to water supply wells in the area (1012, Table 1.4). Monitor well MMW-2, which is completed in the Capulin Canyon valleyfill (1013, p. 11), has low pH (4.9), high Al (64 mg/L), high Fe (51 mg/L), high Mn (52 mg/L), and high Zn (9.5 mg/L) with respect to water supply wells in the area (1012, Table 1.4). Molycorp contractors also conclude that the Capulin Canyon seeps' water quality is closely aligned to the alluvial groundwater quality (1013, p. D-12).

The timing of appearance of the white precipitate in the Red River also verifies the hydraulic connection between the Molycorp waste rock piles and the Red River. Longtime area residents are reported to have noticed a change in color of

the Red River below Molycorp within a year or two after development of the open pit (1021, p.21). Commencement of open pit operations marked the first large-scale disposal of waste rock on the Molycorp Mine property. The emergence of a white precipitate in the river reflects a change in aluminum chemistry of the groundwater that flows into the river over time. Low pH (<4.5) water can carry more aluminum in solution than higher pH water. When low pH water mixes with higher pH water (in the approximate pH range 4.5 to 5.0), the aluminum precipitates out as aluminum hydroxide (1041, pp.54-55). The onset of white precipitate in the Red River adjacent to Molycorp marked the beginning of low pH, aluminum-laden recharge to the river. Capulin Springs, Portal Springs 2 and 2a, and the Cabin Springs all yield water of pH less than 5.2, and aluminum concentrations of 11-157 mg/L (1012, Table 1.4). When these seeps enter the Red River, which has pH values greater than 7.0, the aluminum precipitates as white aluminum hydroxide (1041, pp. 54-55; 1021, p.26).

3. Sulfate and metal loading now exhibited in the reach of the Red River adjacent to the Molycorp Mine is more attributable to mining activities and emplacement of waste rock piles than to natural hydrothermal scars. The increase in loading exhibited over the years 1966 to 1992 is due overwhelmingly to mining and waste rock emplacement. Several hydrothermal scars on site have been removed or disturbed by mining activity so that the areal extent of natural scar material within the mine area has been reduced since the onset of mining. The episodic sediment loading to the Red River caused by erosion and landslides from hydrothermal scars within the Molycorp Mine area has been effectively eliminated by the storm water management activities (1012, p.10). The surface area (1012, Fig. 1.4) and volume (1012, p. 29) of waste rock now exposed to weathering and leaching is greater than the area of hydrothermal scars in the mine area that was exposed to weathering and leaching before the open pit operation commenced. Total concentrations of sulfate, aluminum, copper, cadmium, iron, manganese, and zinc in drainage water from waste rock and disturbed areas are higher, on average, than drainage from hydrothermal scars. The constituents with the highest relative concentrations in waste drainage are sulfate, aluminum, manganese and zinc (1021, p. 50). In summary, because the sulfate and metal loading to the reach of the Red River adjacent to the Molycorp Mine has increased over the period 1966 to 1993, and the portion of this load which can be attributed to undisturbed hydrothermal scar seepage and episodic sediment loading has decreased over the same time period, then nearly all of the increase in loading must be attributed to mine-influenced seepage and groundwater recharge to the Red River.

The extent of natural scar area has been reduced subsequent to the onset of mining. The largest natural hydrothermal scar on the mine site was mostly removed by mining of the open pit, and the removed portion can no longer be considered as a partial source of the natural pollutant load being delivered to the River. Other hydrothermal scar areas have been disturbed by mining activities.

When compared with seeps that emanate from undisturbed scar material on the mine site, disturbed scar seeps contain higher concentrations of all measured constituents except iron (1012, Table 1.2). Hydrothermal scars that are buried under waste rock (a) were disturbed physically by heavy equipment and haul trucks during emplacement of waste rock, (b) were disturbed physically by the impact of dumped waste rock, and (c)are now degraded chemically by acid leachate from overlying waste rock. Leachate from overlying waste rock that contacts underlying scar material has the potential to leach the scar material more aggressively than did rain and snow before placement of the waste.

Pulse, or episodic, loading of sediments and dissolved sediments has been documented as a significant problem in the Red River (1021, pp. 13-14). Stormwater management activities by Molycorp Mine have effectively eliminated the episodic sediment loading to the Red River caused by erosion and by landslides that derive from hydrothermal scars within the Molycorp area (1012, p. 10).

The surface area and volume of waste rock now exposed to weathering and leaching is greater than the area of hydrothermal scars in the mine area that was exposed to weathering and leaching before the open pit operation commenced (1012, Fig. 1.4). The original area (acreage) of hydrothermal scar zones is less than the area of waste rock disposal areas (1012, Fig. 1.4). Aerial photos indicate that Molycorp documents may over-estimate the hydrothermal scar areas in Capulin Canyon (1015, p. 2). The comparison of pre-mining hydrothermal scar zones to waste rock disposal area is even more important if the scars covered less area than generally has been represented by Molycorp. Oxidation of natural hydrothermal scars is limited largely to the weathered surface, where freeze-thaw cycles and erosion gradually expose new mineral surfaces to oxidizing conditions (1012, p. 29). During open pit mining, huge volumes of waste rock are blasted, excavated and disposed. This sequence of events exposes a large volume of fresh mineral surface to oxidation in a short time frame. Blasting of unweathered material leaves a high permeability rock mix that enhances movement of oxygen and infiltrating water, thereby increasing the production and migration of acid and dissolved metals in waste rock drainage as compared to natural hydrothermal scar drainage (1012, p. 29). There are now an estimated 328,000,000 tons of waste rock disposed on the Molycorp mine site (1012, p. 4). Waste rock and disturbed area acreage is more than pre-mining hydraulic scar area; however, the total volume and surface area exposed to oxidation is many times greater than pre-mining scar volume.

X-ray florescence analysis of soils and mine wastes used in reactivity tests found higher levels of metals in mine wastes than in soils collected from erosional scars (1021, p. 13). Total concentrations of sulfate, aluminum, copper, cadmium, iron, manganese, and zinc in drainage water from waste rock and disturbed areas are higher, on average, than drainage from hydrothermal scars.

The constituents with the highest relative concentrations in waste drainage are sulfate, aluminum, manganese and zinc (1021, p. 50).

In summary, because the sulfate and metal loading to the reach of the Red River adjacent to the Molycorp Mine has increased over the period 1965 to 1993, and the portion of this load which can be attributed to undisturbed hydrothermal scar seepage and episodic sediment loading has decreased over the same time period, then nearly all of the increase in loading must be attributed to mine-influenced seepage and groundwater recharge to the Red River. State of New Mexico employees have noted that it is indefensible for Molycorp to attribute the majority of the present-day seep impact upon the Red River to hydrothermal scars (1043, p. 3).

4. The sulfate and TDS concentrations in the reach of the Red River adjacent to the Molycorp Mine increased with time, during the period of 1965 to 1993 (1012, Table 1.7). Fish populations were impacted severely during that time period. Metal and sulfate concentrations in this section of the Red River are higher than in upstream sections. The increase in impact upon the reach of the river adjacent to the Molycorp Mine over upstream reaches is dominated by the metals zinc and manganese; these metals are more strongly correlated to waste rock drainage than to hydrothermal scar drainage. The relatively high concentrations of zinc and manganese substantiate the aforementioned direct hydraulic connection between the Molycorp waste rock dumps and the Red River.

During the time period 1965 to 1993, dissolved sulfate concentrations increased from 51 to 128 mg/L (increase of 77 mg/L) at the Goat Hill Campground and from 64 to 129 mg/L (increase of 65 mg/L) at the Ranger Station (1012, Table 1.7). Stations upstream from the Molycorp Mine (above the town of Red River, below the town of Red River, and below Hansen Creek) exhibited smaller increases of sulfate concentration; the changes in values were 5 to 12 mg/L (change of 6 mg/L), from 20 to 41 mg/L (change of 21 mg/L), and from 47 to 71 mg/L (change of 24 mg/L), respectively. Total dissolved solids (TDS) decreased during the 27-year period at the three stations upstream of the Molycorp mine (from 133 to 80 mg/L; from 138 to 124 mg/L; from 165 to 164 mg/L). TDS increased at the subject stations adjacent to and downstream of the Molycorp Mine; from 172 to 220 mg/l at the Goat Hill Campground and from 188 to 262 mg/L at the Ranger Station. On the basis of sulfate and TDS data, sampling locations adjacent to and downstream of the Molycorp Mine exhibited a greater increase over the 27-year period than did upstream sampling locations. It is not possible to quantify accurately the increases in Fe and Zn concentrations because detection limits were so high in 1965 (1012, Table 1.7). Unfortunately, Mn and Al were not measured in 1965 (1042, Table V-1).

Fish populations in the Red River were impacted severely during the period 1960 to 1988 (1021, p.5). Opinion 3 above demonstrates that sulfate and metal loading to the Red River in the reach adjacent to the Molycorp mine is due predominantly to mining disturbance and waste rock disposal. State of New Mexico investigators propose that consideration of fish populations that existed in the early 1960's (1021, p. 68) constitutes another method of assessing the relatively large impact of the Molycorp Mine on the Red River. In this analysis fish population data from the 1960's are evaluated in light of the impact of hydrothermal scars that occurred naturally in the vicinity of the mine. The baseline load due to natural hydrothermal scars prior to open pit mining at the Molycorp Mine, although only poorly documented, was sufficiently low that a fishery existed. "During ...the late 1960's and early 1970's ... the New Mexico Department of Game and Fish discovered in the course of routine population studies that fish were conspicuously absent in the middle reach of the Red River where thriving populations had once existed. Fish census data for 1960 indicate that approximately 572 fish per mile were estimated in the river. The 1988 fish census found no fish in this same reach (1021, p. 5)." State investigators cite the advent of large-scale modern mining, and subsequent release of ARD seepage as having overwhelmed the river's natural buffering capacity, "resulting in the biologically impoverished condition that exists now (1021, p. 68)."

Metal and sulfate concentrations in the section of the River adjacent to the Molycorp Mine are elevated compared to the concentrations present immediately above the Molycorp boundary at Expanded Site Inspection (ESI) location #16 (1017, Fig 3, location 16). Using dissolved concentrations from location #16 as a baseline (1017, Fig 3, location 16), concentrations of zinc have been measured as 3 times higher in the Red River at Goathill Gulch (1017, Table 16). Zinc was 4 times higher than at the baseline, and manganese was more than 3 times higher in the Red River immediately downstream of Capulin Springs; sulfate concentrations increased by 1.6 times over the same interval (1017, Table 16). The relatively high concentrations of zinc and manganese further supports the existence of a direct hydraulic connection between the Molycorp waste rock dumps and the Red River because these two metals are correlated more strongly to waste rock than to hydrothermal scar drainage. Total concentrations of sulfate, aluminum, manganese and zinc in drainage water from waste rock and disturbed areas are higher, on average, than drainage from hydrothermal scars (1021, p. 50). The baseline concentrations at ESI location #16 includes the impact of the smaller mining operations upstream from the Molycorp Mine. None of these operations has been documented as singly or cumulatively impacting the Red River as much as the Molycorp Mine has been demonstrated to be impacted by the reach adjacent to the Mine (1021, p. 57).

5. Without abatement, the Molycorp Mine will continue to discharge to the Red River acidic water containing dissolved sulfate and heavy metals. When it is exposed to air and water, the oxidizable sulfide in the waste rock piles produces

sulfuric acid which dissolves metals. In the mixed volcanic waste rock, most of the neutralizing minerals have been consumed; however, a large volume of oxidizable sulfide remains (1012, p. 33). Sulfide oxidation will continue indefinitely (1012, p. 33). The natural soil and gravel deposits between the waste rock and the Red River have little or no ability to neutralize the acid (1012, p. 31). Consequently the acid and metals that leach out of the waste rock migrate to the Red River with little or no attenuation.

Sulfide oxidation of the waste rock disposed at the Molycorp mine will continue indefinitely. Mixed volcanic waste rock exhibits the potential for acid production (1012, p.36). Black andesite and aplite/granite waste rock are not acid-generators when tested alone, but they may be acid-generators at locations where they are combined with volcanic waste rock (1012, p. 32). Acid generation has been documented in the in-pit disposal area and in the Spring and Sulphur Gulch disposal areas even though they contain primarily black andesite and aplite/granite waste rock (1012, p. 31).

Based upon my experience with acid rock production in mine waste rock, the waste rock dumps at the Molycorp mine will continue to generate acid rock drainage for decades. Molycorp contractors note that the waste rock in Capulin Canyon has generated acid for 25 years, and that laboratory and field investigations indicate sufficient acid-generating potential to continue acid generation indefinitely (1012, p. 34).

Molycorp was requested by the State of New Mexico Environmental Improvement Division to evaluate the need for and location of interceptor wells and/or a pumpback system at the base of the waste rock piles (1010, p. 2; 1040, p. 176). Molycorp has investigated and is continuing to evaluate the need for pumpback systems upgradient of seeps and springs adjacent to the Molycorp Mine (1040, p. 176). These investigations have focused on groundwater flow paths between the waste rock dumps and the Red River. Data collected for these investigations (1013) have been used to support this basis for opinions, which demonstrates a direct hydraulic connection between the Molycorp Mine and the Red River.

Barbara C. Williams

Barbara C. Williams

Dated March 13, 1997

Barbara Cooke Williams, Ph.D., PE

Work
Idaho Water Resources Research Institute
106 Morrill Hall
University of Idaho, ID 83843
(208) 885-6429
(208) 885-6431

Home
P.O. Box 15
Viola, Idaho 83872-0015
Phone: (208) 875-0147
Fax, Voicemail: (208) 875-2372

EDUCATION

Ph.D. in Agricultural Engineering
University of Idaho
Moscow, Idaho - May 1992
Concentration: Aqueous Geochemistry of Ground Water in Mine Wastes
Minor Concentrations: Hydrogeology, Natural Resource Law

M.S. in Civil and Environmental Engineering
Cornell University
Ithaca, NY - August 1983
Concentration: Hydrology
Minor Concentration: Agricultural Engineering

B.S. in Engineering
Swarthmore College
Swarthmore, PA - June 1981
Concentration: Civil Engineering

WORK EXPERIENCE

Research Scientist, 5/96-present
Idaho Water Resources Research Institute
University of Idaho, Moscow, ID

Conducts research on hydrologic aspects of mine waste management, metal dissolution and transport, mine reclamation, and mine closure. Reviews data, reclamation scenarios and risk assessments. Advises government land managers on policy matters for site remediations.

CONSULTING EXPERIENCE

Civil Engineer, Hydrologist 2/96-present
EnviroSearch International, Boise, ID

Critically reviewed environmental impact documents prepared by an international mining company in support of their expanded mining operations abroad. Researched mining and milling archives to trace arsenic in metallurgical waste streams from the 1920's, in support of litigation.

Project Manager, Hydrologist, 5/88-5/89
Williams and Associates, Inc., Moscow, ID

Compiled a spatial relational database of ground water quality data at uranium mill sites for the U.S. Nuclear Regulatory Commission to facilitate data access and interpretation.

Independent Cartographer, July-August, 1978
Conservation Commission, Town of Bethel, CT

Prepared a wetlands map for the town of Bethel, CT using USGS quadrangle maps, and presented it to the public at a Conservation Commission Meeting.

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2. Williams, B.C., R.H. Lambeth and B.M. Stewart. 1989. Determining Heavy Metal Leaching and Transport from Abandoned Mine Wastes. Transactions, Preprint #89-25, Soc. for Min., Metall., and Explor. Annual Meeting, Las Vegas, NV, Feb. 1989.

3. Stewart, B.M., R.H. Lambeth and B.C. Williams. 1990. Effects of Pyritic Tailings in an Abandoned Impoundment on Downgradient Water Quality *in* Mining and Mineral Processing Wastes, Ed. Fiona M. Doyle, Soc. for Min., Metall., and Explor., pp. 133-142.

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10. Williams, B.C. and J.A. Riley. 1993. Midnite Uranium Mine - Hydrologic Research and Characterization *in* The Challenge of Integrating Diverse Perspectives in Reclamation, Proceedings, 10th National Meeting of Amer. Soc. of Surface Mining and Reclamation, Spokane, WA, May 1993, v. II, pp. 455-466.

11. Stewart B.M., B.C. Williams, and R.H. Lambeth. 1995. Investigation of Acid Production, Leaching, and Transport of Dissolved Metals at an Abandoned Sulfide Tailings Impoundment: Monitoring and Physical Properties. US Bureau of Mines RI 9577. 82 pp.

12. Williams, B.C. and J.A. Riley. 1996. Hydraulic Characterization of Midnite Mine, Wellpinit, WA: Summary of 1994 Field Season.. US Bureau of Mines RI 9606. 33 pp.

13. Williams, B.C., J.A. Riley, J.R. Montgomery, and J.A. Robinson. 1996. Hydrologic and Geophysical Studies at Midnite Mine, Wellpinit, WA: Summary of 1995 Field Season. US Bureau of Mines RI 9607. 34 pp.

ABSTRACTS AND PRESENTATIONS

1. Feb. 1989 - Presented "Determining Heavy Metal Leaching and Transport from Abandoned Mine Wastes" (see Publications, above) at Soc. for Min., Metall., and Explor. Annual Meeting, Las Vegas, NV.

2. Mar. 1989 - Presented "Heavy Metal Leaching and Transport from Abandoned Mine Wastes" at Hydrology Seminar, Univ. of Idaho.

3. Nov. 1989 - Presented "Oxidation of Pyrite in the Unsaturated and Saturated Zones of Copper/Gold Mine Tailings", at Agricultural Engineering Seminar, Univ. of Idaho.

4. Sept. 1991 - Presented "Statistical and Geochemical Analyses of Vadose and Saturated Pore Waters in Sulfidic Mine Waste Tailings" (see Publications, above) at 4th International Mine Water Assoc. Congress, Ljubljana, Slovenia.

5. Feb. 1992 - Presented "Multivariate Statistical Analysis of Vadose and Saturated Zone Pore Waters of Sulfidic Mine Waste Tailings" (see Publications, above) at Soc. for Min., Metall., and Explor. Annual Meeting, Phoenix, AZ.

6. May 1993 - Presented "Midnite Uranium Mine - Hydrologic Research and Characterization" (see Publications, above) at10th National Meeting of Amer. Soc. Of Surface Mining and Reclamation, Spokane, WA.

7. Dec. 1993 - Presented "Comparison of EPA's Toxicity Characteristic Leaching Procedure to Field Data" at Northwest Mining Assoc. Annual Meeting, Spokane, WA.

8. Mar. 1995 - Presented "Hydrologic Testing at the Midnite Mine" at Soc. Min. and Metallurg. Eng. Annual Meeting, Denver, CO.

9. Apr. 1995 - Presented "Hydrologic Testing at the Midnite Mine" at Hydrology Seminar, Univ. of Idaho.

10. Dec. 1995 - Presented "Geophysical Method for Tracing Groundwater Contamination at the Midnite Mine" at Northwest Mining Assoc. Annual Meeting, Spokane, WA.

SHORTCOURSE

Co-organizer and instructor of "Implications of Aqueous Geochemistry in Mine Reclamation" 2-day shortcourse, May 1993, taught in conjunction with the 10th National Meeting of the Amer. Soc. of Surface Mining and Reclamation, Spokane, WA.

JOURNAL REVIEWER/EDITOR

May 1989 - Symposium Chair for "Hydrogeologic and Hydrogeochemical Investigations for Waste Management", Geol. Soc. of Amer., Rocky Mountain Section, Spokane, WA.

May 1993 - Technically reviewed papers on hydrology and geochemistry of waste rock and tailings reclamation for 10th Annual Meeting, Amer. Soc. of Surface Min. and Reclamation, Spokane, WA. Also served on Conference Organizing Committee.

COMMUNITY OUTREACH

Mar. 1990 - Presented a workshop entitled "Cleaning up Groundwater Pollution" to three earth science classes at Salk Middle School, Spokane WA.

Nov. 1990 - Presented a workshop entitled "The Mining Cycle/Keeping Groundwater Clean" to an earth science class at Public School #51, Brooklyn, NY.

Nov. 1992 - Presented a dinner talk entitled "Mining and the Environment" to the Lions Club, Spokane, WA.

Nov. 1994 and Oct. 1993 - Participated in "Women in Engineering Panel Discussion" organized by Univ. of Idaho, College of Engineering.

Dec. 1994 and Dec. 1993 - Coordinated the Nat. Soc. of Prof. Eng. (NSPE) North Idaho Chapter's review of scholarship applications for high school students.

HONORS AND AWARDS

- Elon Huntington Hooker Fellowship in Hydraulics, 1982 (Cornell University).
- U.S. Bureau of Mines Research Team Innovation of the Year Award, 1990, in groundwater contamination control technology.
- Gamma Sigma Delta induction, Honor Society of Agriculture, 1990 (Univ. of Idaho).
- U.S. Bureau of Mines Performance Awards, 1991, 1992, 1993, 1994, 1995.
- U.S. Bureau of Mines Special Service Team Awards, 1992, 1993.

CERTIFICATION

Engineer-in-Training, State of PA
Professional Engineer, State of WA

PROFESSIONAL AFFILIATIONS

- Member - National Society of Professional Engineers (NSPE)
- Member - American Society of Surface Mining and Reclamation (ASSMR)
- Member - Society for Mining, Metallurgy and Exploration (SME)
- Member - Northwest Mining Association (NWMA)
- Past Member - American Geophysical Union (AGU)

Western Environmental Law Center

P.O. Box 1507 • Taos, New Mexico 87571
505-751-0351 • Fax: 505-751-1775 • taoslaw@laplaza.org

DEFENDING THE WEST

Attorneys
Grove Burnett*
David Gomez*
* admitted in New Mexico

Office Manager
Linda Velarde

Legal Assistant
Linda Gomez

EUGENE OFFICE:
1216 Lincoln Street
Eugene, OR 97401
541-485-2471
Fax: 541-485-2457
westernlaw@igc.org

Attorneys
Michael Axline*
John E. Bonine*
Marianne Dugan*
Charles Tebbutt*†
Elizabeth Mitchell*✦
* admitted in Oregon
† admitted in New York
✦ admitted in Colorado

Scientist
Michael Wach

Development Director
Deborah Mailander, J.D.

Office Manager
Kathy Cannon

Development Assistant
Kari Kytola

Legal Assistant
Rachel Thiesmeyer

Administrative Assistant
Marilyn Kemp

May 16, 1997

RECEIVED
MAY 20 1997
6W-P

Mr. Sam Coleman 6EN
Director
Compliance Assurance and Enforcement Division
Environmental Protection Agency
1445 Ross Ave., Suite 1200
Dallas, TX 75201

Re: Clean Water Act violations from the waste rock piles at the Molycorp mine, Questa, New Mexico

Dear Mr. Coleman:

I write on behalf of Amigos Bravos and New Mexico Citizens for Clean Air & Water in connection with what we believe are serious violations of the Clean Water Act at Molycorp's molybdenum mine near Questa, New Mexico. As you know, this matter is currently the subject of a citizen suit in Federal Court in New Mexico captioned Amigos Bravos et al. vs. Molycorp, Inc., Civ. No. 95-1497 JP/DJS.

We respectfully request that EPA review this matter, especially the reports prepared by EnviroSearch Inc., to determine whether the agency should initiate appropriate enforcement action, including intervention in our civil action, and/or initiating a formal NPDES permitting process for the waste rock piles. We believe the facts of this case and the magnitude of the problem warrant EPA asserting jurisdiction over this source of pollution of the Red River.

I. Background

The Red River is a major tributary of the Rio Grande, which arises in the Taos range of the Sangre de Cristo Mountains in northern New Mexico. Until the late 1960s, water quality in the Red River watershed, including several tributaries with historic mining operations, was very good. In fact, until the late 1960s, the Red River watershed were considered a premier blue ribbon trout fishery.

The Molycorp mine is located four miles above Questa, New Mexico, and twelve miles above the confluence of the Red River and the Rio Grande. In 1964, Molycorp began open pit surface mining for molybdenum, a steel-hardening alloy.

After the ore had been milled, the spent ore was pumped down the Red River through slurry pipelines to a tailings impoundment west of Questa. Since 1964, Molycorp has discharged 95 million tons of tailings into the Questa impoundment. It recently announced its intent to recommence operations this fall.

During the open pit surface mining, Molycorp removed *328 million tons of waste rock.* The waste rock was reduced to rubble, gravel, and fine particulates, greatly increasing the surface area exposed to weathering and alteration. Leachate from the waste rock is extremely acidic (average pH 2.8). The acidic water, or "acid mine drainage", dissolves and transports a wide range of metals in the waste rock, including iron, aluminum, cadmium, cobalt, chromium, copper, molybdenum, manganese, nickel, lead, and zinc.

Molycorp placed the waste rock in six piles at the mine site near the Red River. Some of the piles are located in narrow canyons which drain into the Red River. The natural ground water gradient at the Molycorp mine site and in these canyons is toward the Red River. As a result, water moves through the waste rock piles and leaches acid and metals into the ground water, which is then discharged through springs and seeps into the Red River.

Molycorp's open pit surface mining has adversely affected the Red River. Mine-related activities has severely disturbed approximately 3,200 acres of steep mountain terrain. In the 1980s, the slurry lines broke frequently, spilling thousands of tons of slurry into the Red River. The NMED has identified the acid drainage from the waste rock piles to be the most significant source of pollutants being discharged from the mine site into the Red River. For this reason, the NMED's 1994 water quality report to Congress stated that the Red River at Molycorp was *"biologically dead."* The report continued: "[F]or several miles at and below Molycorp, the sheer volume of steady-state metal-loaded drainage seeping out of *mine waste dumps* and the old underground workings overwhelms the river and *has rendered it dead for at least eight miles.*" (emphasis added).

Section 301 of the Clean Water Act prohibits the discharge by a point source of any pollutant into waters of the United States except as authorized by a National Pollutant Elimination Discharge System ("NPDES") permit. Molycorp has discharge and continues to discharge pollutants from the waste rock piles into waters of the United States without a NPDES permit. Molycorp is liable for civil penalties for these discharges.

II. EPA Should Assert Jurisdiction Under the Clean Water Act.

The factual and legal basis for our claim that Molycorp is violating the Clean Water Act is strong. Amigos Bravos and New Mexico Citizens have commissioned International EnviorSearch Inc. to conduct a comprehensive investigation of the waste rock piles at the Molycorp mine. EnviroSearch is an international consulting firm that has extensive expertise and experience in acid

mine drainage in the Western United States and worldwide. Their findings confirm that the waste rock piles are discharging pollutants into the ground water and that there is a direct hydrological connection between the ground water beneath the waste rock piles and the Red River.

A copy of the reports of International EnviroSearch of their investigation of the Molycorp mine site waste rock piles are enclosed.

In addition, the case law supports our position that the waste rock piles are point sources regulated under the Clean Water Act. The majority of courts that have addressed the issue have held that discharges to ground water that are hydrologically connected to surface water *must* obtain NPDES permits under the Clean Water Act. In the District for New Mexico, Judge Hansen has held that a citizen suit plaintiff is entitled to present evidence at trial to prove the requisite hydrogeological connection. *Friends of Santa Fe County et al. v. LAC Minerals, Civ. No. 94-0569.* (Relevant pages citing case law and a list of cases is attached.)

Molycorp's basic defense is that the waste rock piles are not point sources regulated under the Clean Water Act because the U.S. Environmental Protection Agency ("EPA") made a determination to that effect when it issued Molycorp's NPDES permit in 1993. There are several reasons why this "determination", as Molycorp terms it, has no merit and is not entitled to deference.

First, the EPA never made a factual "determination" that the rock piles are not point sources. The agency's "determination" was not a final agency action but simply a response to pubic comments on the proposed NPDES permit, which did not even cover the waste rock piles. This two-sentence response was not an informed analysis, but rather an unsupported conclusion, that related primarily to seepage from the tailings ponds--which is not at issue here. *EPA has never conducted an investigation of whether the waste rock piles are point sources.*

Second, it is clear that Molycorp's waste rock piles should be regulated under the Clean Water Act in accordance with EPA's own policy. EPA's policy, both regionally and nationally, has evolved substantially since 1993 and now clearly encompasses discharges to ground water which is hydrogeologically connected to surface water. EPA Region VI has required NPDES permits for concentrated livestock feeding operations which discharge to ground water which is hydrogeologically connected to surface water. Other regions, most notably EPA Region VIII, has issued several NPDES permits for such discharges. On the national level, EPA has taken the position in Court that the discharge of pollutants to groundwaters comes within the jurisdiction of the Clean Water Act, if hydrologically connected to waters of the United States. *See:* Amicus Brief of the United States, *Village of Oconomowoc Lake v. Dayton-Hudson Corporation, No. 93-3380,* Seventh Circuit Court of Appeals.

From the outset of this litigation, the plaintiffs have tried to engage Molycorp in

meaningful settlement discussions. Molycorp's posture toward settlement, however, has been erratic. Settlement negotiations broke down last fall after Molycorp refused to agree to any procedures for abatement of the pollution from the waste rock piles. The plaintiffs remain committed to achieving a settlement which abates Molycorp's pollution of the Red River from its waste rock piles and requires a remedial program to restore and ameliorate the environmental damage to the river.

We believe that such a settlement could be achieved if EPA becomes involved, initiates the permitting process, and notifies Molycorp that an NPDES application is required for its waste rock piles. This action would provide the framework for a settlement to be developed with EPA in the lead position.

We hope that you will review this matter and the materials we have provided, in particular the reports by International EnviroSearch. We firmly believe that EPA' participation and involvement will result in a settlement that will abate pollution and save the Red River.

I look forward to speaking to you soon.

Sincerely,

Grove T. Burnett
Director, Southwest Office
Western Environmental Law Center

cc: Fred Humke
Caroline Kirksey

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

AUG 10 1998

OFFICE OF
GENERAL COUNSEL

MEMORANDUM

SUBJECT: Notice of Citizen Suit

FROM: Susan G. Lepow
Associate General Counsel
Water Law Office (2355)

TO: J. Charles Fox
Acting Assistant Administrator for Water (4101)

The attached notice of intent to sue was filed by the Western Environmental Law Center on behalf of Amigos Bravos and the New Mexico Citizens for Clean Air and Water. The notice alleges that Molycorp, Inc. a molybdenum mine in New Mexico is discharging to the Red River through a groundwater hydrological connection without an NPDES permit. The notice alleges that EPA has failed to perform nondiscretionary duties required by the CWA to prohibit Molycorp from discharging without a permit and to issue notice to Molycorp for violation of the CWA.

I have assigned this notice to Richard Witt; he can be reached at 260-7715. He will be working with your staff and staff in Region 6. Please call either Richard or me if you or your staff have any questions.

Attachment

cc: Randy Hill
Karyn Wendelowski
Mike Cook
Jim Pendergast
Larry Starfield, RC, Reg. 6
Bill Hathaway, WMD, Reg. 6
Brian Maas

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Western Environmental Law Center

DEFENDING THE WEST

Southwest Office
P.O. Box 1507
Taos, NM 87571
505/751-0351
505/751-1775 (fax)
taoslaw@laplaza.org

Director SW Office
Grove Burnett‡

Attorneys
David Gomez‡
Lore Bensel*•
‡ admitted in New Mexico
* admitted in Oregon
• admitted in Idaho

Office Manager
Linda Velarde

Legal Assistant
Linda Gomez

Northwest Office
1216 Lincoln Street
Eugene, OR 97401
541/485-2471
541/485-2457 (fax)
westernlaw@igc.org

Executive Director
Michael Axline*

Attorneys
John E. Bonine*
Marianne Dugan*
Elizabeth Mitchell*◆
Carrie Stilwell*
Charles Tebbutt*†
* admitted in Oregon
† admitted in New York
◆ admitted in Colorado

Scientist
Michael Wach*

Development Director
Deborah Mailander, J.D.

Office Manager
Kathy Cannon

Development Assistant
Kari Kytola

Legal Assistant
Rachel Thiesmeyer

Administrative Assistant
Marilyn Kemp

BY CERTIFIED MAIL
RETURN RECEIPT REQUESTED

August 4, 1998

Carol Browner, Administrator
Environmental Protection Agency
401 M Street
Washington, D.C. 20460

Greg Cook, Regional Administrator, Region VI
U.S. Environmental Protection Agency
1445 Ross Avenue
Suite 1200
Dallas, Texas 75202-2733

Re: Molycorp, Inc., NPDES Permit No. NM0022306

Dear Ms. Browner and Mr. Cook:

A. 60-DAY NOTICE OF INTENT TO SUE FOR FAILURE OF THE ADMINISTRATOR TO PERFORM A NON-DISCRETIONARY DUTY UNDER THE CLEAN WATER ACT

Our firm represents Amigos Bravos (c/o Brian Shields, Program Director, P.O. Box 238, Taos, NM 87571 (tel. 505-758-3874)), and New Mexico Citizens for Clean Air and Water (c/o Dr. John Bartlit, State Chairman, 113 Monte Rey Drive, Los Alamos, NM 87544 (tel. 505-672-9792). This letter is to provide the EPA with notice of intent of Amigos Bravos and New Mexico Citizens for Clean Air and Water to file a citizens' suit against the EPA pursuant to section 505(a)(2) of the Clean Water Act ("CWA"), 33 U.S.C. § 1365(a)(2). The EPA has failed to perform the following non-discretionary duties:

I. Failure to Prohibit the Discharge of Unpermitted Pollutants

Molycorp, Inc. ("Molycorp"), owns and operates a molybdenum mine in

"Hear within ourselves the sound of the Earth crying." Vietnamese Zen Master Thich Nhat Hanh
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2355

the Red River valley east of Questa, New Mexico. The Red River is a navigable water which is tributary to the Rio Grande River. In approximately 1965, Molycorp began open pit mining operations at the mine site. In the course of open pit mining operations, Molycorp removed approximately 328 million tons of waste rock. Molycorp placed the waste rock into six piles at the mine site:

A. Capulin Canyon Waste Rock Pile. Molycorp placed approximately twenty-six tons of waste rock in the upper portion of Capulin Canyon.

B. Goathill Gulch/Goathill Gulch South Waste Rock Piles. Molycorp placed approximately 25 tons of waste rock in the upper portion of Goathill Gulch.

C. Sugar Shack South Waste Rock Pile. Molycorp placed approximately fifty-three tons of waste rock in an unidentified side canyon on the north side of the Red River.

D. Sugar Shack West Waste Rock Pile. Molycorp placed approximately thirty-one tons of waste rock in an unidentified side canyon on the north side of the Red River.

E. Middle Waste Rock Pile. Molycorp placed approximately forty-six tons of waste rock in an unidentified side canyon the north side of the Red River.

F. Spring and Suphur Gulch Waste Rock Pile. Molycorp placed approximately 111 tons of waste rock in Spring and Sulphur Gulches.

These waste rock piles cover approximately 500 surface acres with hundreds of feet of this waste rock material. The precise dates of emplacement of the waste rock piles are not available to our clients. However, our clients allege that Molycorp placed the piles between 1965 and the present, and that the violations noticed herein began and have continued during this period. Water moves through the waste rock piles and leaches acids, heavy metals, and other pollutants into ground water in the aquifers beneath the piles. The ground water discharges through the aquifers below the waste rock piles to springs and seeps at the Red River. Our clients contend that the excavation and disposal activities, and resulting waste rock dumps, are the significant cause for the increase in metals concentrations and other pollutants in the Red River through a ground water hydrological connection to seeps along the bank of the Red River.

All of the above data has been confirmed by the EPA, Region 6, in a report entitled "Report on Hydrological Connection Associated with Molycorp Mining Activity, Questa, New Mexico," dated February 13, 1998 (the "EPA Report"). A true and correct copy of the EPA Report is being forwarded along with this letter. Some of the findings made in the EPA Report are as follows:

A. The objective of the EPA Report was to determine the source for the acidic, high metal seeps (ground water flowing gently from the soil) along the Red River bank and to determine if sufficient documentation exists to substantiate a ground water or surface water hydrological connection between the source and seep discharge to the river. EPA Report, page 1.

B. The New Mexico Environment Department (NMED) considers the acidic, high metal seeps, which exist within the Molycorp mine boundary, the principal cause for metals loading to this reach. EPA Report, page 1.

C. The most significant water quality degradation occurs within the middle reach of the Red River from Questa to the town of Red River which contains the Molycorp mine and most of the major scar areas. EPA Report, page 12.

D. Seeps are considered the primary and most incessant source for metals loading to the Red River. Consequently, an additional indicator of source location is that the greater percentage of and most active acidic, high metal seeps exist in the vicinity of the Molycorp mine. Therefore, Red River water quality data and seep locations indicate the source to be within the general area of the Molycorp mine property. EPA Report, page 13.

E. Leachate analysis conducted by NMED revealed that average metal concentrations were greater in Molycorp's waste rock dumps leachate than in the leachate from erosional scar leachate. EPA Report, page 16.

F. The unconsolidated waste rock dumps undoubtably allow greater infiltration rates than the more consolidated natural soils or erosional scars. Therefore, the waste rock dumps should have greater acid generation potential, storage capacity, metals transport capability, and consequently, greater recharge to the underlying aquifers than erosional scars. EPA Report, page 17.

G. The unconsolidated waste rock dump material appears to deliver greater concentrations of dissolved metals to the ground water than the consolidated erosional scars. EPA Report, page 25.

H. "The NPDES Program regulates point sources. NPDES regulations (40 C.F.R. §122.2) define point source as 'any discernible, confined, and discreet conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure,...from which pollutants are or may be discharged... .' **A documented ground water hydrological connection between a source and surface water discharge may be viewed as a conduit; or a discernible, confined, and discrete conveyance.**" EPA Report, page iii. (Emphasis added).

I. The EPA Report concluded, "[V]erification has been adequately established to support a ground water hydrological connection between the two sources [naturally occurring erosional scars and the Molycorp waste rock dumps] and the Red River seep discharge." EPA Report at page 27.

The EPA issued NPDES Permit No. NM0022306 to Molycorp in September of 1993. This permit expires on October 14, 1998. The permit does not authorize the discharges from Molycorp's waste rock dumps which are described above.

Upon information and belief, Molycorp made application for the renewal of Permit No. NM0022306 in April of 1998, but failed to include the discharges from the waste rock dumps in this application. However, in the renewal application, Molycorp included a Section III entitled "The Clean Water Act, Status of the Red River Ground Water Seepage Zones" ("Section III"), which is in *direct conflict* with the EPA Report, which is dated February 13, 1998, at least two months prior to Molycorp's submittal of its renewal application. Therefore, *Molycorp knew that EPA's position was contrary to the position set forth in Section III at the time the renewal application was submitted.*

In summary, the EPA Report concludes (a) that discharges from Molycorp's waste rock dumps are hydrologically connected to the seepages into the Red River; (b) that the seepages are the primary and most incessant source for metals loading to the Red River; (c)that the waste rock dump material delivers greater concentrations of dissolved metals to the ground water than the consolidated erosional scars; and (d) that a documented ground water hydrological connection between a source and surface water discharge is a point source. Based upon EPA's own findings and conclusions, Molycorp's waste rock dump discharges are unpermitted point source discharges. Therefore, our clients contend that Molycorp has violated, and continues to violate, Section 301(a) of the Clean Water Act, 33 U.S.C. §1311(a), by not obtaining a permit for the waste rock discharges described herein, as well as in the EPA Report, pursuant to

Section 402 of the Clean Water Act, 33 U.S.C. §1342. This is a violation of which the EPA is aware, as set forth in the EPA Report.

The citizen suit provisions of the Clean Water Act allow citizens to sue the Administrator of the EPA where there is an alleged "failure of the Administrator to perform any act or duty...which is not discretionary with the Administrator." 33 U.S.C. §1365(a)(2). The EPA has a *nondiscretionary duty* to prohibit the discharge of unpermitted pollutants. National Wildlife Federation v. Hanson, 623 F. Supp 1539 (E.D.N.C. 1985); 33 U.S.C. §1319. As described herein, the discharges of pollutants from Molycorp'. waste rock dumps are unpermitted.. The EPA has failed to prohibit Molycorp from discharging these unpermitted pollutants, a situation of which the EPA is fully aware. This is a nondiscretionary duty on the part of the EPA.

II. Failure to Issue Notice of Violation

33 U.S.C. 1319(1) *requires* the Administrator to issue notices of violations of the Clean Water Act upon the basis of any information available to him to violators of a permit issued by a State under an approved permit program. 33 U.S.C. 1342(3) provides that the permit programs of the Administrator shall be subject to the same terms, conditions, and requirements as apply to a State permit program and permits issued thereunder. Therefore, the Administrator shall also issue notices of violations of the Clean Water Act to violators of permits issued under a permit program of the Administrator.

This duty to issue notices of violations is not discretionary. The statute specifically states that, "Whenever, on the basis of any information available to him, the Administrator finds that a person is in violation of any condition or limitation..., he *shall* proceed under his authority in paragraph (3) of this subsection *or he shall notify the person in alleged violation...of such finding.*" 33 U.S.C. 1319(a)(1). Case law has recognized that this duty to make notification of violations is nondiscretionary. Therefore, the EPA has failed to perform the nondiscretionary duty of issuing notice to Molycorp of the violations of the Clean Water Act resulting from the illegal discharges of pollutants into the Red River, as described herein.

III. Failure to Require a Permit

Case law has held that when an action is illegal absent an agency-issued permit, the EPA has a mandatory duty to act promptly upon license applications.

Because NPDES permits are licenses required by law, it has been found to be mandatory that the EPA promptly process such permits.

In the present case, the action of Molycorp discharging into the Red River from the waste rock dumps is illegal pursuant to 33 U.S.C. 1311(a). If the EPA has a mandatory duty to process license applications in a situation of this type, it follows that the EPA also has a mandatory duty to promptly require a permit for illegal discharges. It is illogical to say that the EPA has a mandatory duty to process license applications for illegal discharges, when and if the violator makes application, yet has no mandatory duty to require a permit for illegal discharges that the violator refuses to report.

IV. Conclusion

If the conditions causing the above violations are not corrected within 60 days so that there is no reasonable likelihood that they will recur, the undersigned intend to file suit as provided in the Clean Water Act.

The names, addresses, and phone numbers on the persons giving notice of intent to sue are:

Amigos Bravos
c/o Brian Shields, Program Director
P.O. Box 238,
Taos, NM 87571
(tel. 505-758-3874)

New Mexico Citizens for Clean Air and Water
c/o Dr. John Bartlit, State Chairman
113 Monte Rey Drive
Los Alamos, NM 87544
(tel. 505-672-9792).

Counsel for the parties giving notice is:

Grove Burnett
Western Environmental Law Center
P. O. Box 1507
Taos, NM
(Tel. 505- 751-0351)

B. REQUEST FOR TERMINATION OF PERMIT

The Clean Water Act also provides that an NPDES permit may be *modified*, revoked and reissued, or *terminated* by the Director *at the request of any interested person* for any of the reasons set forth in 40 C.F.R. §122.62 or §122.64. 40 C.F.R. §124.5(a). For purposes of C.F.R. part 124, the term "Director" means the State Director or Regional Administrator. 40 C.F.R. §124.2. **This portion of this letter is a formal request to the Regional Administrator for termination or, alternatively, modification of Molycorp's permit.**

40 C.F.R. §122.64(a)(2) provides that a permit may be *terminated* if the permittee fails in an application or during the permit issuance process to disclose fully all relevant facts, or if the permittee misrepresents any relevant facts at any time. It is obvious that Molycorp misrepresented facts when it submitted its permit renewal application in April of 1998. The EPA Report, which was published prior to the April submission date, was directly in conflict with Section III of Molycorp's application. Molycorp was aware that the discharges from the waste rock dumps were point source discharges, yet they failed to ask the EPA to permit these discharges in the renewal process. For this reason, Molycorp's entire permit should be terminated.

In the alternative, 40 C.F.R. §122.62(a)(2) provides that a permit may be *modified* if the Director receives new information which was not available at the time of the permit issuance and which would have justified the application of different permit conditions at the time of issuance. At the time of Molycorp's last permit renewal, the EPA Report was not available. This Report, therefore, constitutes "new information" which was not available at the time of issuance of Molycorp's permit.

In addition, on or about May 16, 1997, this office wrote a letter to Mr. Sam Coleman, Director of the Compliance Assurance and Enforcement Division of the EPA, requesting the EPA to review the Molycorp matter in order to determine whether the agency should initiate enforcement action or a formal NPDES permitting process for the waste rock dumps. Along with this letter, this office forwarded reports prepared by EnviroSearch, Inc. documenting their investigation of the Molycorp mine site and the waste rock dumps. These findings confirmed that the waste rock dumps discharge pollutants into the ground water and that there is a direct hydrological connection between the ground water and the Red River. These findings were directly on point with the EPA Report. This, too,

constituted new information justifying modification of Molycorp's permit.

In addition, 40 C.F.R. §122.62 provides that a permit may be *modified* "to correct technical mistakes, such as errors in calculation, *or mistaken interpretations of law made in determining permit conditions*." 40 C.F.R. §122.62(a)(15). (emphasis added). When Molycorp's permit was issued, and then renewed in 1993, the EPA mistakenly failed to view the discharges from the waste rock dumps as point source discharges. It is now indisputable that these discharges are point sources. See EPA Report. Therefore, Molycorp's permit should be modified accordingly.

For the reasons set forth herein, Molycorp's NPDES permit should be terminated, or in the alternative, modified to include the illegal discharges from the waste rock dumps. The EPA is aware of these illegal discharges and they should not be allowed to continue.

Sincerely,
WESTERN ENVIRONMENTAL LAW CENTER

Grove T. Burnett
Vickie Minor
P.O. Box 1507
Taos, New Mexico 87571
(505) 751-0351

Attorneys for Amigos Bravos and
New Mexico Citizens for Clean Air and Water

cc by certified mail:

CT Corporation
Registered Agent for Molycorp, Inc.
119 East Marcy Street
Santa Fe, New Mexico 87501

Amanda Ashford, Esq.
Ashford & Thomas
P.O. Box 2205
Albuquerque, New Mexico 87103

Karen Potts, Esq.
Streich Lang
Renaissance Once
Two North Central Avenue
Phoenix, Arizona 875004-2391

Janet Reno
Attorney General of the United States
U.S. Department of Justice
Washington, D.C. 20460

Pete Maggiore, Secretary
Department of Environment
P.O. Box 26110
Santa Fe, New Mexico 87502

Molycorp, Inc.
Molybdenum Group
P.O. Box 469
Questa, NM 87556-0469
Telephone (505) 586-7601
Facsimile (505) 586-0811

David R. Shoemaker
General Manager, Molybdenum Group

Molycorp

Certified Mail – Return Receipt Requested

October 15, 1999

Received
OCT 27 1999
6WQ-PP

Mr. William B. Hathaway, Director
Water Quality Protection Division
U.S. Environmental Protection Agency
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Re: NPDES Permit Renewal Application No. NM0022306
308 Information Request for Biological Evaluation and Effluent Characterization

Dear Mr. Hathaway:

Following please find Molycorp's response to your letter dated July 23, 1999 requesting additional information under the authority of Section 308 of the Clean Water Act to allow further processing of the subject renewal application.

1. *A list of anticipated or demonstrated pollutants from your discharges and their concentrations.*

   Enclosed is the September 1999 DMR which characterizes the discharges. The mining operations at Molycorp will continue without changes. The Molycorp NPDES Renewal Application that was submitted to your office in April 1998 details historic discharge water quality data and other pollutants expected to be in the discharges. These data can be found in Exhibit I-4, Exhibit I-5, Exhibit I-9, and Exhibit II-1.

2. *Description of environmental baseline, including any previous Environmental Assessments or Evaluations, or consultations concerning other actions in the area.*

   The permit area is divided into two different ecological zones. The first is the tailings facility which is located west of Questa, NM at an elevation of about 7,500 feet in the piñon-juniper plant community. The plant community in the area surrounding the tailings dam is a mix of piñon and juniper trees, sagebrush and rabbitbrush as well as

grasses and forbs (Wagner and Harrington 1994). At the lower elevations, the plant community becomes a riparian area made up of typical species such as narrowleaf cottonwood, willows, etc.

The mine site is located at an elevation ranging from 8,000 feet to 10,000 feet. The storm water discharge points are located at the lower elevations and have not discharged since being placed. The plant community in this narrow canyon is primarily a mixed conifer forest (Wagner and Harrington 1994)

Wildlife and Wildlife Habitat were summarized for both areas in the Molycorp Mining Operation Site Assessment (ENSR 1994). Other applicable reports with information about the area include: The Rio Grande Corridor Proposed Plan and Final EIS (USDI BLM1998) and Prey Base Analysis by Habitat Site, Taos Resource Area (Kennedy and Stahlecker 1986). These reports, or appropriate portions of these reports, have been included in this package submitted by Molycorp, Inc.

3. *A determination of the species present and for each species:*

Information on species present has been compiled from the above mentioned reports as well as from brief discussions with the USFS Questa Ranger District Wildlife Biologist (Long 1999).

Potential endangered and threatened species in the area:

Common Name	**Status (Federal)**	**Scientific Name**
Black- footed Ferret	Endangered	*Mustela nigripes*
American peregrine falcon	Endangered *	*Falco peregrinus anatum*
Arctic peregrine falcon	Threatened	*Falco peregrinus tundrius*
Bald eagle	Threatened	*Haliaeetus leucocephalus*
Interior Least tern	Endangered	*Sterna antillarum athalassos*
Mexican spotted owl	Threatened	*Strix occidentalis lucida*
Southwestern willow flycatcher	Endangered	*Empidonax trailii extimus*
Colorado squawfish	Endangered	*Ptychocheilus lucius*

* removed from endangered list summer, 1999.

a. *Description of current conditions for each species:*

Black-footed Ferret:
According to information from the BLM the last confirmed sighting of a black-footed ferret in New Mexico was 1934. No critical habitat has been identified for the black-footed ferret in the Rio Grande Corridor and based on information from the US Forest Service, no critical habitat occurs in this region of the Carson National Forest.

American peregrine falcon and Arctic peregrine falcon (migration only): "Peregrine falcons are known to migrate seasonally through the area and have historically nested in the area. There is one historical nesting site on the Upper Rio Grande that has been monitored annually since 1990 and intermittently since 1986. No activity has been observed at this historical site. The Arctic subspecies would only migrate through New Mexico." (BLM 1998). While habitat may exist in the area for peregrine falcon it does not appear as if any active sites are near the site.

Bald Eagle:
New Mexico does provide habitat for bald eagle wintering and migration. No bald eagle nesting use has been identified on BLM administered lands (the most likely location for nesting near the site). The only documented winter roosting area along the Rio Grande is south of Pilar some distance from the mine site. The summer use habitat would be within ½ mile of large bodies of water.

Interior Least Tern:
According to the BLM (1998) the interior least tern would be considered an accidental migrant in this area. This bird is found mainly in Southeastern New Mexico and is only known to nest in Chaves County. There are no known nesting or use areas for this species within the area.

Mexican Spotted Owl:
The Mexican spotted owl habitat has been described as deep, narrow, timbered canyons with cool shady places, at elevations ranging from 6,500 to 9,000 feet. Possible habitat sites include canopy coverage greater than 80% and are dominated by larger (14 in. dbh or better) subalpine fir, Engelmann spruce and Douglas fir. With these constraints no appropriate habitat is located near the tailings facility or discharge points.

Southwestern Willow Flycatcher:
The southwestern willow flycatcher is found along riparian habitats where dense groves of willow, alder, and other species are present. For breeding, surface water must be present near the riparian habitat. Most of the documented sightings of southwestern willow flycatcher have been south of Taos, a considerable distance from the mine.

Colorado squawfish:
This species is characterized as a big river fish. This species is endemic to the Colorado River Basin and is not known to have occurred within the Red River basin and is not listed by the USFS as occurring within the Carson National Forest.

b. Description of critical habitat:

Black-footed ferret: No critical habitat designated
American peregrine falcon/Arctic peregrine falcon: No information on critical habitat information is available. The main threat to peregrine falcons has been attributed to pesticide use (particularly DDT) which has been discontinued in the U.S.
Bald eagle: No critical habitat is known.
Interior least tern: No critical habitat has been designated in this area.
Mexican spotted owl: The only critical habitat in this area has been rescinded.
Southwestern willow flycatcher: According to the BLM few areas have been designated as critical habitat and we are not aware that any of the areas are within the mine site discharge areas. No description of critical habitat is available in the BLM report.
Colorado squawfish: No critical habitat has been designated in the area.

c. *A review and an analysis of the effects of the action on the endangered species in terms of individuals and populations, including consideration of the indirect and cumulative effects of the action on the species and habitat.*

Based on analysis of information available at this time the only endangered species that occurs in the region is the Southwestern willow flycatcher, which have been documented south of Taos, over 20 miles south of the mine site. All discharge limits are calculated to conservatively meet all applicable water quality standards for the Red River, Segment 2-119, which are as restrictive as the standards for the Rio Grande below Taos, where the Flycatcher habitat is located.

d. *Analysis of alternative actions that would reduce, eliminate and/or minimize the facility's potential to adversely affect listed endangered species or critical habitat.*

The facility has no known potential to adversely affect listed endangered species and critical habitat.

4. *Conclusions of effects determination for each species.*

Black-footed ferret: No effect
American peregrine falcon / Arctic peregrine falcon: No effect
Bald eagle: No effect
Interior least tern: No effect
Mexican spotted owl: No effect
Southwestern willow flycatcher: No effect
Colorado squawfish: No effect

5. *Literature Cited:*

ENSR. 1994. Molycorp Mining Operation Site Assessment. ENSR Consulting and Engineering. Report submitted to the New Mexico Mining and Minerals Division (MMD) for the mine permit.

Kennedy, P.L. and D.W. Stahlecker. 1986. Prey base analysis by habitat site. Taos Resource Area near Questa in Taos County, New Mexico (peregrine falcon prey). Eagle Environmental and U.S. Department of the Interior. BLM, under contract #YA-551-CT4-340074.

Long, G. 1999. Wildlife Biologist, U.S.D.A. Forest Service, Carson National Forest, Questa Ranger District. Personal communication with A. Wagner, Molycorp, Inc. October 5, 1999.

U.S.D.I. Bureau of Land Management (BLM). 1998. The Rio Grande Corridor Proposed Plan and Final EIS. New Mexico/Colorado. BLM-NM-PL-98-009-1600. August, 1998.

Wagner, A.M. and J.T. Harrington. 1994. Fall 1994 Vegetation Survey at the Molycorp, Inc. Tailings Pile and Tailings Pond in Northern New Mexico. December 1, 1994. Report submitted to the New Mexico Mining and Minerals Division (MMD) for the mine permit.

6. *List of contacts made/preparers/sources.*

Contacts made:

S. Des Georges. Multi-Resources Branch Chief, U.S.D.I. Bureau of Land Management, Taos Resource Area.

G. Long, Wildlife Biologist, U.S.D.A. Forest Service, Carson National forest, Questa Ranger District.

J. Lusk, U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office.

R. MacRae, Environmental Contaminant Specialist, U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office.

Preparers:

G.I. Lorinczi, Environmental Manager, Molycorp, Inc. Questa, New Mexico.

A.M. Wagner, Ph.D., Environmental Coordinator, Molycorp, Inc. Questa, New Mexico.

G.G. Van Riper, Ph.D., Montgomery and Watson.

7. *Maps/photographs if available.*

It was determined that no other supporting documentation is necessary to accompany this package.

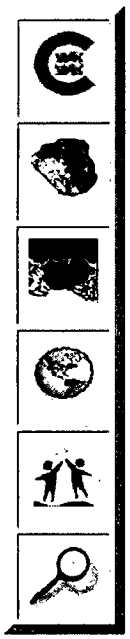
Should you or your staff have any questions concerning this correspondence, please call Geyza Lorinczi at (505) 586-7626.

Sincerely,

David R. Shoemaker
General Manager, Molybdenum Group

Enclosures

xc: Scott Wilson
Gary Van Riper
John Pugh
Richard Schwartz



Five minutes with Moly...(Part I)

What is Molybdenum ?

Molybdenum (often referred to as moly) is a metal that is gaining increasing significance in our industrial world. It has been discovered by Carl Wilhelm Scheele in 1778 and obtained the name from the Greek word molybdos or lead-like. In its pure state, molybdenum is a lustrous grey metal, somewhat heavier than iron but melting at a much higher temperature - 4730 degrees Fahrenheit as compared to 2795 for iron. (For further details visit - **IMOA** - the International Molybdenum Association.)

Where does Molybdenum come from ?

Molybdenum is found the world over but only a few deposits warrant the extensive **mining, milling and processing facilities** necessary for its economic recovery. By far the largest part of world production comes from the Western Hemisphere with the United States contributing the biggest share, Chile in the second place and Canada in third. Outside of a modest output from various locations in the CIS and China, little molybdenum is mined in the rest of the world.

Molybdenum is mined from two different types of mines. At primary mines its recovery is the prime target of the mining operation. Climax has two primary mines in Colorado, with the **Henderson mine** currently operating half a mile under the Continental Divide. More than 2,000 pounds of ore must be mined underground, crushed and miled to recover some four to six pounds of molybdenum.

New 9-cubic yard LHD in Henderson, Colorado

The other major source of molybdenum is a by-product of copper mines in the western part of the United States, Canada, Chile, Mexico

mines in the western part of the United States, Canada, Chile, Mexico and Peru. Climax is a division of Cyprus Climax Metals which owns and operates the **Sierrita Mine and Bagdad Mine** in Arizona. Substantial quantities of molybdenum are also recovered at these locations.

More about molybdenum

IMOA

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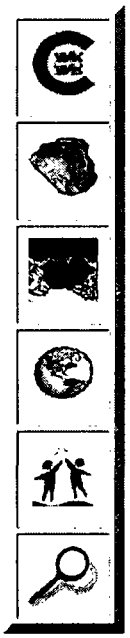
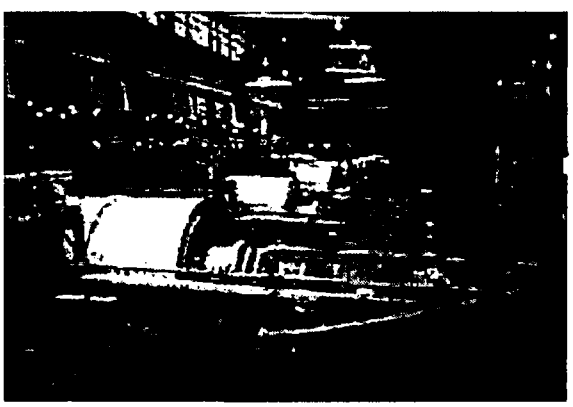


CLIMAX MOLYBDENUM GmbH
A Cyprus Amax Company

More minutes with Moly...(Part II)

How is Molybdenum used ?

After crushing, the molybdenum ore is concentrated by flotation to a product consisting largely of molybdenite, which is molybdenite sulfide. It can be purified to give a product used by lubricant manufacturers.
Most of the molybdenum concentrate is roasted to remove the sulfur and change the sulfide to oxide. This oxide, which is known as **technical molybdic oxide**, is the most common means of adding molybdenum to steel as there is almost no loss of molybdenum during the usual melting operations.
A mixture of technical molybdic oxide and iron oxide can be reduced to **ferromolybdenum** by aluminium in a thermite reaction. Foundries generally use ferromolybdenum for adding molybdenum to cast iron and steel, and steelmills may prefer it to the technical molybdic oxide for some types of steels.
Pure molybdic oxide is made by sublimation of technical oxide or by calcining ammonium molybdate. Pure oxide is suitable for use by chemical and catalyst manufacturers. Molybdenum metal powder is produced by hydrogen reduction of the pure molybdic oxide or ammonium molybdate. In turn, this molybdenum metal powder is consolidated into usable forms by vacuum melting or by pressing and sintering.


Sierrita Mill, Arizona

Who uses Molybdenum ?

Almost everyone uses molybdenum, even when they do not realize it. Superficially molybdenum looks like many other gray metals, and this

is one of the reasons many do not appreciate the extent of its use. Everyone knows what copper looks like and can immediately identify a cable as being copper. Not many can look at a light bulb or a TV tube and tell which parts are molybdenum.
The picture becomes even more difficult in the case of the main use of molybdenum as an alloying element added in small amounts to steels, irons and nonferrous alloys. Automotive ring gears and pinions are clearly steel but how many are aware that a little molybdenum, under 0.5%, gives them the properties to do the job?
On the other hand, the increasing popularity of lubricants containing Molysulfide has extended from heavy industry to service stations and home workshops. Their black color and the inclusion of the term Moly in the lubricant manufacturer's trademark can identify these.

More about molybdenum

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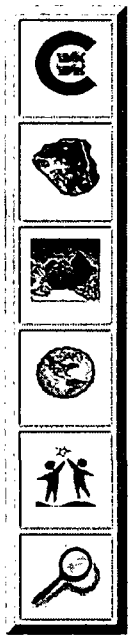


CLIMAX MOLYBDENUM GmbH
A Cyprus Amax Company

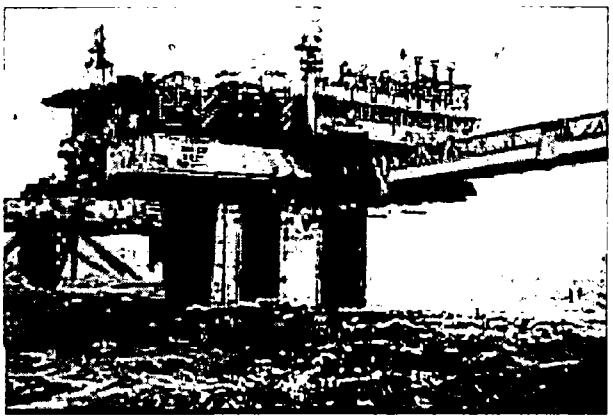
More minutes with Moly...(Part III)

What does molybdenum do ?

The demands of industry are becoming constantly more severe. Engineers want stronger, tougher materials with better hot strength, superior properties at low temperatures, more corrosion resistance and added wear resistance so they can design and build more efficient equipment to give us a better life. Molybdenum helps meet these demands.
Just like other common alloying elements such as chromium and nickel, molybdenum additions give alloy steel and iron a combination of strength, toughness and wear resistance not possible with unalloyed steels. Its extensive use is proof that, under many conditions, its inclusion (alone or with other alloys) results in a more economical and serviceable part. Moreover, molybdenum makes a unique contribution to hot strength, corrosion resistance and toughness.

Increasing temperature raises the efficiency of most types of equipment from steam turbines in central power stations to gas turbines in jet planes and eventually automobiles. Relatively small molybdenum additions are in many cases the best means of increasing hot strength. This applies not only to steel but also to the nonferrous super-alloys with nickel or cobalt as a base. In some aerospace and metalworking applications, molybdenum metal – either pure or with small additions of other alloys – is needed as it stands up even at temperatures where steel melts.

Molybdenum additions give stainless steel greater corrosion resistance. Molybdenum-containing stainless steel is now specified in automotive trim for long life even along the seacoast and in contact with de-icing salts. In other grades, the added corrosion resistance resulting from molybdenum makes chemical processes industrially feasible that would otherwise be confined to the laboratory.



Picture: Several thousand tons of UNS S31254 austenitic stainless steel have been used in ballast piping, fire control systems, and other critical systems where freedom from maintenance and reliability of performance are essential. (Source: IMOA)

Small amounts of molybdenum confer toughness to most steel including grades used at cryogenic temperatures for handling and containing liquid gases. Because of molybdenum's contribution to strength and toughness, low-alloy molybdenum containing steels offer safety and economy in pipelines for oil and natural gas even under arctic conditions.

While metals account for the larger part of molybdenum's consumption, its chemical and lubrication uses in the form of chemical compounds are also important.

IMOA

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UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF NEW MEXICO

AMIGOS BRAVOS, a nonprofit corp., and NEW MEXICO CITIZENS FOR CLEAN AIR AND WATER, a nonprofit corp.,

Plaintiffs,

v. **CIVIL NO. 99-327 DJS/RLP**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,

Defendant.

MEMORANDUM OPINION AND ORDER

THIS MATTER comes before the Court upon Defendant's Motion to Dismiss filed June 15, 1999 (Docket No. 12). Pursuant to 28 U.S.C. §636(c) and Fed.R.Civ.P. 73, this case has been assigned to a Magistrate Judge for final disposition.

This action is a suit pursuant to the Clean Water Act, 33 U.S.C. §§1251-1387 brought under the citizen suit provision located at 33 U.S.C. §1365(a)(2). Plaintiffs contend that the Molycorp Molybdenum mine located near Questa, New Mexico is illegally discharging pollutants such as acids and heavy metals from waste rock dumps located along the Red River. Plaintiffs further contend that those waste rock dumps constitute point sources of pollution and that Molycorp does not have a National Pollution Discharge Elimination System (NPDES) permit permitting the discharges. Plaintiffs state that Defendant issued a report on February 13, 1998 regarding Molycorp's mining

activity at Questa which found that discharges from the waste rock dumps were the primary source of metals polluting the Red River. Plaintiffs argue that, based upon the findings in the report, the discharges from those waste rock dumps are illegal. Plaintiffs seek a declaration that Defendant has violated a non-discretionary duty to take enforcement action regarding the discharge of pollutants from the Molycorp waste rock dumps. They ask that this Court order Defendant to either issue Molycorp a compliance order or bring a civil action against the company for the illegal discharge of pollutants. In addition, Plaintiffs request that the Court require Defendant to either issue an NPDES permit to Molycorp for the dishcarges or prohibit the discharges.

Defendant contends that this Court lacks jurisdiction to hear Plaintiffs' complaint because the exclusive jurisdiction for challenges to permits issued by the EPA is in the Courts of Appeals pursuant to 33 U.S.C. §1369(b)(1)(F). In addition, Defendant asserts that this suit should be barred by the doctrine of collateral estoppel because the issues contained in the complaint were decided in Amigos Bravos v. Molycorp, 95-Cv-1497 JP/DJS, another suit brought in this district. Further, Defendant asserts that Plaintiffs' claims are subject to dismissal because it does not have a mandatory duty under the Clean Water Act (CWA) to take any enforcement action against Molycorp. Finally, Defendant argues that this Court lacks subject matter jurisdiction to hear Plaintiffs' claims contained in Count I of the complaint and the allegation that it had a mandatory duty to issue an National Pollution Discharge Elimination System (NPDES) permit as alleged in Count II of the complaint because Plaintiffs failed to provide the mandatory, jurisdictional 60-day notice before filing this suit pursuant to 33 U.S.C. §1365(b)(2). The Court does not reach the latter questions because it concludes that this action is barred by the doctrine of collateral estoppel.

In Amigos Bravos v. Molycorp, 95-Cv-1497 JP/DJS, aff'd, 166 F.3d 220, 1998 WL792159

(10th Cir. Nov. 13, 1998) (unpublished disposition), the plaintiffs brought suit pursuant to the citizen suit provisions of the Clean Water Act, alleging that pollutants were being leached from the waste rock piles of the Molycorp mine into the Red River through groundwater flow and that the discharge was not authorized by an NPDES permit. The plaintiffs in that action sought several forms of relief, including an order declaring that Molycorp was violating the CWA by failing to obtain an NPDES permit, an order enjoining Molycorp from not complying with the CWA, and an order imposing maximum civil penalties against Molycorp for violating the Act. Amigos Bravos v. Molycorp, Inc., 1998 WL 791259 at 1. The District Court held that the complaint in that action attacked the EPA's decision to reissue an NPDES permit to Molycorp without regulating ground water seepage into the Red River. Amigos Bravos, 95-Cv-1497, Memorandum Opinion and Order entered Sept. 11, 1997 (Docket No. 51) (hereinafter Memorandum Opinion). The District Court therefore concluded that the claims must have been brought as a petition for review pursuant to 33 U.S.C. §1369(b)(1)(F) in the Circuit Court of Appeals. Id.

Plaintiffs argue that they are not challenging the adequacy of Molycorp's 1993 NPDES permit but rather are challenging Defendant's decision to ignore known illegal discharges of high metals concentrations into the Red River as documented in Defendant's February 13, 1998 report. Plaintiffs contend that they would not have filed the instant action but for the report. In order to apply the doctrine of collateral estoppel, each of the following criteria must be met:

> 1) the issue previously decided must be identical to the one presented in the action in question; 2) the prior action was finally adjudicated on the merits; 3) the party against whom the doctrine is invoked was a party or in privity with a party to the prior adjudication; and 4) the party against whom the doctrine is raised had a full and fair opportunity to litigate the issue in the prior adjudication.

United States v. Rogers, 960 F.2d 1501, 1508 (10th Cir.) cert. denied 506 U.S. 1035 (1992) (citations omitted). When determining whether collateral estoppel applies, a court must examine the record of

the prior proceeding and take into account the pleadings, evidence, charge, and other relevant matters. Id. (quoting Ashe v. Swenson, 397 U.S. 436, 444 (1970)).

In this case, the issue is the prohibition or permitting of contaminated groundwater seepage from the Molycorp mine waste rock piles into the Red River. That issue is identical to the issue in the previous case. In the first action, Plaintiffs brought suit against Molycorp to compel it to stop the pollution or obtain a permit. In this action, Plaintiffs argue that the EPA is required to compel Molycorp to stop polluting or issue it a permit. In the previous case, Judge Parker ruled that Plaintiff's action attacked the existing NPDES permit, which specifically excluded the groundwater seepage, and therefore must have been brought as a challenge to the permit in the Court of Appeals pursuant to 33 U.S.C. §1369(b)(1)(F). Memorandum Opinion at 5-6. In that case, the plaintiffs argued that the EPA never considered the effects of the pollution originating from the waste rock dumps, therefore they were not challenging the decision to issue or deny a permit. Id. at 4. Judge Parker looked to the relief requested to determine whether the plaintiffs were challenging the permit. Id. Plaintiffs' current reliance on the February 13, 1998 finding by Defendant that the waste rock piles constitute point sources is misplaced. Collateral estoppel requires an identity of the issues raised in the successive proceedings and the determination of those issues by a valid final judgment. Sil-Flo, Inc. v. SFHC, Inc., 917 F.2d 1507, 1520 (10th Cir. 1990). In this case, Plaintiffs have chosen a different legal theory to proceed under and named a different defendant than in the Molycorp suit; however, the ultimate question of whether the discharge of pollutants from the waste-rock piles at the Molycorp mine into groundwater and thus the Red River must be stopped or subject to an NPDES permit, remains the same.

There is no dispute that the prior action was adjudicated on the merits. Further, Plaintiff

Amigos Bravos brought both actions so the privity requirement for applying the doctrine of collateral estoppel has been satisfied. In addition, review of the file for 95-Cv-1497 JP/DJS establishes that Plaintiff had a full and fair opportunity to litigate the issues in that action. Consequently, all of the requirements listed in Rogers, *supra* have been met and summary judgment is appropriate.

IT IS THEREFORE ORDERED that Defendant's Motion to Dismiss is granted on the ground that this action is subject to collateral estoppel. This matter will be dismissed with prejudice.

DON J. SVET
UNITED STATES MAGISTRATE JUDGE

UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF NEW MEXICO

AMIGOS BRAVOS, a nonprofit corp., and NEW MEXICO CITIZENS FOR CLEAN AIR AND WATER, a nonprofit corp.,

Plaintiffs,

v. CIVIL NO. 99-327 DJS/RLP

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,

Defendant.

JUDGMENT

THIS MATTER came before this Court for decision pursuant to Defendant's Motion to Dismiss. By separate Memorandum Opinion and Order, the Court granted the motion on the ground that this action is barred by the doctrine of collateral estoppel.

IT IS THEREFORE ORDERED AND ADJUDGED that this matter be, and hereby is, dismissed with prejudice.

DON J. SVET
UNITED STATES MAGISTRATE JUDGE

Scott — Jane, Jack, FYI, Scott

State of New Mexico
Office of the Natural Resources Trustee

GARY E. JOHNSON
Governor

Dr. William M. Turner, Trustee
Steven Cary, Deputy Director
Charles de Saillan, Counsel

October 19, 1999

Do we have a copy yet?

Mr. Richard Schwartz
Crowell and Moring, LLP
1001 Pennsylvania Avenue, NW
Washington, D.C. 20004-2595

DELIVERED BY TELEFACSIMILE TO 202-628-5116 AND BY FIRST CLASS MAIL, POSTAGE PREPAID

RE: MOLYCORP

Dear Schwartz:

This is to inform you that on October 12, 1999, the Office of Natural Resources Trustee, received from its contractors their report entitled:

> Geochemistry of the Red River Stream System Before and After Open-Pit Mining, Questa Area, Taos County, New Mexico

In our view, this report has determined definitively, for the first time, that the mining operations of Molycorp have caused natural resources damage beyond that caused by natural weathering of mineralized rock.

It is our position that federal law gives the Natural Resources Trustee three years from October 12, 1999, to either collect monetary damages through the NRDA process or initiate litigation toward the same end. A tolling agreement can extend this period.

Under federal law, we are able to recover all costs associated with the NRDA process.

Sincerely,

Dr. William M. Turner
Natural Resources Trustee

cc: Mr. Peter Maggiore, Secretary, New Mexico Environment Department
Dr. Stephen Spencer, U.S. Department of the Interior
Ms. Penny Luerhing, U.S. Forest Service
Mr. Scott Wilson, NPDES Permits Branch, US EPA Region 6
Ms. Patricia Madrid, Attorney General

Phone: (505) 827-1045
FAX: (505) 827-1049

1190 St. Francis Dr.
P.O. Box 26110
Santa Fe, NM 87502

ROUTING AND TRANSMITTAL SLIP

Date 4-16-85

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2. ENGINEER - Humke		
3. PERMIT FILE NO. NM22306		
4.		
5.		

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	As Requested		For Correction		Prepare Reply
	Circulate		For Your Information		See Me
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	Coordination		Justify		

REMARKS

COMMENT LETTER - PN DATED: 3-9-85

ENGINEER HAS FILE

PERMIT FILE ATTACHED

I sent a copy to GORC since they are requesting an Evidentiary Hearing.

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

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OPTIONAL FORM 41 (Rev. 7-76)
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FPMR (41 CFR) 101-11.206

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R6-127

WORD PROCESSING JOB REQUEST

Requestor	Mail Code	Need - Date/Time	Date Submitted	***OFFICE USE ONLY***
Humke	6W-PF	ASAP	4/17/85	Job No. ~~4778~~

Job Description
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( ) Fact Sheet #
( ) Statement of Basis #
( ) Public Notice #
(X) Other # SD-077
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Molycorp, NM0022306

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R6-127

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Operator: JK

Disk No(s). J-B

Program No(s). #3

Name & NPDES Number:
Molycorp, NM0022306

Concurrences:

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Becks	Hannesschlager				

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R6-127

WORD PROCESSING JOB REQUEST

Fonzi

Requestor	Mail Code	Need - Date/Time	Date Submitted	***OFFICE USE ONLY***
Humke	6W-PI	ASAP	2/5/85	Job No.

Job Description
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Spacing
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Forms Needed:
( ) Letter #
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( ) Fact Sheet #
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( ) Public Notice #
( ) Other #
( ) CERTIFIED MAIL: RETURN RECEIPT REQUEST

Operator: JK

Disk No(s). 75+ 202

Program No(s). #8 NM22306-11-15

Name & NPDES Number:
Molycorp, Inc., NM0022306

Concurrences:

6	6	6	6	6	6

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Additional Instructions: (bcc's, etc.)
Change page 21 as shown

WORK COMPLETED 2/6/85

WORD PROCESSING JOB REQUEST

7/23/84

Requestor	Mail Code	Need - Date/Time	Date Submitted	***OFFICE USE ONLY***
Humko	6W-PI	ASAP	7/18/84	Job No. ~~4154~~ ~~4216~~ ~~5028~~

Job Description
()Draft (X)Final ()Revision ()Correction ()Special

Spacing
(X)Single ()Double

No. of Copies:
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( ) Yellow Concurrence
( ) White Tissue
( ) Plain Yellow
( ) Bond
( ) Memo
( ) Other

Forms Needed:
(X) Letter # AE-2A
(X) Industrial Permit Major(X) Minor( )
( ) Municipal Permit Major( ) Minor( )
(X) Fact Sheet # AE-4K
( ) Statement of Basis #
(X) Public Notice # AE-4B-2
(X) Other # Rationale
( ) CERTIFIED MAIL: RETURN RECEIPT REQUEST

Operator: ~~KW~~ LT

Disk No(s). [redacted] 202

Name & NPDES Number:
Molycorp, NM0022306

Program No(s). NM22306-1/-15

Concurrences:

6 6W-PI	6 6W-P	6	6	6	6
Becker	Hannemann				

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Additional Instructions: (bcc's, etc.)

WORK COMPLETED ~~8/11~~ 8/13

R6-127

WORD PROCESSING JOB REQUEST

Lonzi

Requestor	Mail Code	Need - Date/Time	Date Submitted	***OFFICE USE ONLY***
Humke	6W-PI	ASAP	1/17	Job No. 5010

Job Description
()Draft ()Final (X)Revision ()Correction ()Special

Spacing
()Single ()Double

No. of Copies:
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( ) Other

Forms Needed:
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( ) Municipal Permit Major( ) Minor( )
( ) Fact Sheet #
( ) Statement of Basis #
( ) Public Notice #
( ) Other #
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Operator: JR

Disk No(s). 202

Name & NPDES Number:
Molycorp, NM0022306

Program No(s). NM2230601
1-15

Concurrences:

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WORK COMPLETED 1/21/85

PN 3-9-85 Humke 4-16-85

CONCERNED CITIZENS of QUESTA

MR. MANUEL R. ORTEGA - MR. GEORGE WEISS (REPRESENTATIVES)

U.S.E.P.A. - Region VI
MS. Ellen Caldwell
Inter First - two Bldg.
1201 Elm Street
Dallas, Texas 75270

April 8, 1985

RE: NPDES Permit No. 022306; MolyCorp. Inc.

Dear Ms. Caldwell,

In Reference to Public Notice of Draft NPDES Permit Advertised in Order No. 5T-8216-NNLX, we as concerned citizens of Questa would strongly urge U.S.E.P.A. to deny certification or in the alternative to modify Permit No. 022306 presently held by MolyCorp. Inc for the following reasons:

(1.) Permit does not allow for Reclamation of Land(s) in and around the Village of Questa

(2) U.S.E.P.A. does not have Enforcement Powers pertaining to Reclamation of Lands in the State of New Mexico for Mining Industry.

(3) Spill Prevention Plan, for Mine Tailings, filed by MolyCorp Inc. with the U.S.EPA. is inadequate, since it does not protect Questa's Irrigation System from Abuse and/or serious contamination. (Acequias)

(4.) This Permit, under U.S.E.P.A. guidelines, does not allow for the full application of the New Mexico (State) Water Quality Act or the N.M. State Air Quality Act or their Regulatory Provisions.

Appropriate Supporting References on the Serious Effects of Water, Air and Soil Pollution caused by MolyCorp in and around Questa from mining and milling activities, are enclosed.

To further substantiate our concerns through slides, photos and documented evidence, a ~~Request for an Evidentiary Hearing is hereby made~~. If you have any questions please contact Messrs. Ortega or Weiss at 586-0699 or 586-1095, anytime.

Thank You,

George Weiss — Manuel R. Ortega

P. O. BOX 1025 • QUESTA, NEW MEXICO • 87556

COLORADO SCHOOL OF MINES RESEARCH INSTITUTE

CHEMICAL ANALYSIS

AS REQUESTED ~~BY THE~~ QUESTA SCHOOL BOARD

Parameter	"Dry" Sample[2]	"Wet" Sample[2]	Soils	CHANGED BY MOLYCORP LAB.
Aluminum	63,000	65,000		
1) Arsenic	400	450	6	3
Barium	<50	<50		
Boron	6	12		
Cadmium	<10	<10		
Calcium	18,900	20,300		
Chromium	60	80		
2) Cobalt	35	37	8	
3) Copper	140	200	20	
Iron	29,300	31,900		
4) Lead	90	80	10	
Magnesium	8,300	10,300		
Manganese	620	500		
Mercury	<0.5	<0.5		
5) Molybdenum	290	210	2	
Nickel	40	50		
Potassium	39,900	39,700		
6) Selenium	50	100	.2	<5
7) Silver	10	5	.1	
Sodium	20,400	19,800		
Uranium	<10	<10		
Vanadium	<40	60		
8) Zinc	240	210	50	
Carbonate	7,300	16,100		
Chloride	4,100	1,900		
Cyanide	<1	<1		
Fluoride	2,200	1,000		
Silica	665,000	632,000		
Sulfide	6,470	5,750		
Sulfate	5,440	7,790		
Total Organic Carbon[3]	2,000	1,100		

[1] All values in parts per million (ppm)

[2] Both samples dried and pulverized prior to analysis

[3] Indicates the presence of flotation reagents.

(46 spills 1975-1981)

MOLYCORP INC. TAILING LINE FAILURES

DATE & TIME	ESTIMATED AMOUNT	DID TAILINGS ENTER RED RIVER (Questa Acequias)	PIPE LINE	REMARKS
8101220630	.13 tons	yes	No. 3	pipes became uncoupled
8012232025	.9 tons	yes	No. 3	hole in pipe
8010260330	.75 tons	yes	No. 1	solids stayed on land, what entered river was mostly liquid
8008040000	unknown	no	No. 2	
8007140930	.25 tons	yes	No. 3 coupling 417	Break was caused by runaway truck (company truck)
8005200430	.9 tons	yes	No. 3	
7912170700	.5 tons	yes	No. 3	
7909272210	.8 tons	yes	No. 3	
7905290615	12 tons	yes	No. 2 & 3	caused by excessive spring runoff
7904190440	unknown	yes	No. 3	no knowledge of duration of leakage
7904162345		no	No. 2	completely contained
7903170600	9.7 ton total 2.9 ton in R.R.	yes	No. 3	small hole in pipe
7901210945		yes	No. 2	mostly water
7809021145	15 tons	no	No. 1	mostly sand-pipe separation
7808220520	1 ton	no	No. 1	sand-hole in pipe
7807231200	.5 tons	no	No. 1	hole in pipe
7805081915	1 to 10 tons	yes	No. 2	
7705100010	720 pounds	yes	No. 3	pipe & coupling separated
7704141715	unknown	yes	No. 1	
7703200600	600 pounds	yes	No. 2	hole in pipe
7703080630	.58 tons .38 tons in R.R.	yes	No. 3	split in line
7701030715	500 to 600 lbs.	yes	No. 2	hole in pipe
7606260400	1.4 tons	yes	No. 2	split in line
7606190845	1.5 tons	yes	No. 1	split in line
7604251810	10 gal.	yes	No. 3	hole in pipe
7604251220	1 quart	no	No. 2	hole in pipe
7604262240	10 tons	no	No. 2	hole in pipe
7603210745	2½ tons	no	No. 2	hole in pipe
7602240700	150 lbs.	no	No. 2	crack in pipe
7602230700	water only	no	No. 2	
7602230245	12 tons	no	No. 2	hole in pipe

Exhibit #7 (2 pages)
Page I

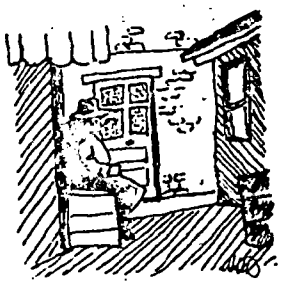
7601010900	12 tons	no	No. 2	hole in pipe
7601141555	.5 tons	no	No. 1	hole in pipe
7601201645	28 tons	no	No. 2	hole in pipe
7601080520	Not given	yes	No. 1	gasket leaking
7512241630	10-15 tons	no	No. 1	hole in pipe
7511261710	1 ton	no	No. 3	hole in pipe
7511070015	12-15 tons	yes	No. 1	
7510151230	1 ton	no	No. 3	hole in pipe
7508041740	10 lbs.	no	No. 2	hole in pipe
7508101745	.5 tons	no	No. 3	hole in pipe
7508270940	500 lbs.	no	No. 2	hole in pipe
7508280000	1 ton	no	No. 1	hole in pipe
7508310915	10 tons	yes	No. 2	
7506290900	<1 ton	no	No. 2	hole in pipe
7506280300	unknown	no	No. 3	hole in pipe

46 spills

hear its first case in twenty years involving homosexual rights. Specifically, it will determine whether a public school teacher can be fired for advocating homosexual activity, though not to students nor in her capacity as a teacher. In another case, the Court will pass judgement on a man who publicly resisted the Selective Service System. He claims he is the victim of "selective enforcement" of the Selective Service Act. Hundreds of thousands of men have refused to register, but only a handful of *public* protestors have been prosecuted. We can guess the outcome of these cases.

Twenty years ago, a docket like this would have been a civil libertarian's dream. Now it is merely an invitation for the Court to make bad law and further erode the rights of individuals in this country. And, with the likes of White House Counselor Edwin Meese and Robert Bork (known for firing Special Prosecutor Archibald Cox in Nixon's 1973 Saturday Night Massacre) as top candidates for appointment, we can expect more to come.

Peggy Nelson



CASA CRAFT

Interior Detail
505/758-8102

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THEATER

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RED RIVER BLUES

A Downstream Disgrace

In an article written for Field and Stream in 1977, "The Killing of a Wild River", Doyle Kline prophesied the possible death of the Red River. We can now enlarge that prophesy to include the Rio Grande. Thanks to the molybdenum mine in Questa, which is owned by MolyCorp, a subsidiary of Union Oil, the lower Red River is in very bad shape. And with molybdenum (Mo) concentrations found as far away as Socorro (275 miles) it is clear that the Rio Grande itself does not escape the poisonous influence of MolyCorp discharges.

Many local anglers who have fished the Red River for years, have become very discouraged with the increasing drop in the river's productivity. Some pass it off to temporary problems more associated with fishing lore or superstition. But full moons and low pressure systems can account for only so much. As a fishing guide who frequents the river more than most, I can no longer blame the cycles of the moon or the fluctuations of the barometer.

My journal, personal experiences, and constant contact with other anglers reveals a definite downward trend. Something like dropping a rock off the Gorge Bridge.

What was the lower Red River? Few seem to know. It's remoteness, and the Rio Grande's overshadowing reputation made it a great trout stream. Even experienced Taos anglers seldom fished there.

The Red River originates in the Wheeler Wilderness area. Its waters are rejuvinated by springs located around the Red River Hatchery. These springs help keep the water temperature at a constant level year round, which, in turn, helps promote growth and dense fish populations.

I remember a February day, some ten years ago, when my brother, two friends, and I fished the lower Red River. The fishing was spectacular. The crystal clear water produced some 300 fish for us. Not the spongy, stocked fish of today's Red River, but large, wild trout. My one "keeper", a 21 inch cutbow, was topped only by my brother's, a 22 incher.

The Rio Grande Cutbow (a cross between a cutthroat and a rainbow trout) is a trout common only to the upper Rio Grande and its tributaries. Since its main spawning grounds are the polluted lower Red River, these reproductions seem to be decreasing rapidly. Today it would be very unlikely that 300 fish existed in the entire lower Red River.

The mining process requires the use of very toxic chemicals. Not only have high molybdenum concentrations been found in the vegetation and in the waters of the Red River, but also high concentrations of cyanide, and other toxic elements such as arsenic, zinc and copper. The effects of these chemicals are devastating to any living matter. In addition, the "scrubbing effect", caused by suspended material from mine tailings scraping along the riverbed, kills the microorganisms essential to aquatic life. Siltation from all these unnatural additions to the watershed suffocate gilled insects and trout alike.

Slurry line breakage in past years has coincided with fish kills at the hatchery. The first spill occured in January, 1966, the very month that MolyCorp put its pipeline in service. Ruptures in the pipeline are caused by abrasive substances rubbing against the walls of the pipe. On that occasion, concentrations upwards of 3.35 parts per million (pp/m) of cyanide were found in the river. These amounts are lethal to

trout. The slurry was also known to contain Mo, but the Department of Game and Fish made no report on the exact amount at the time. No legal action was ever taken against MolyCorp. Only a promise was extracted that the mine would try to lessen the amount of cyanide levels in its slurry, a promise that remains empty to this day. The fish hatchery though, has become wiser. It no longer allows water from the Red River to mix in its rearing ponds with the clean flow from the large springs which now solely sustain the hatchlings.

On April 9, 1975, the Department of Game and Fish reported a spill three miles east of Questa that dumped an estimated 20 tons of solids into the Red River. The spill was not reported by MolyCorp. In addition, two other unreported spills during the preceding ten months were revealed. Eventually Moly was forced to pay a fine of $6,000 for not reporting the spill. During litigation of the case, the New Mexico Environmental Improvement Agency (EIA) monitored effluent from the mine and determined that the permit levels for cyanide had been exceeded by 23 times the average daily allowance, and by 11.6 times the maximum allowable. True to form, MolyCorp did not report these violations.

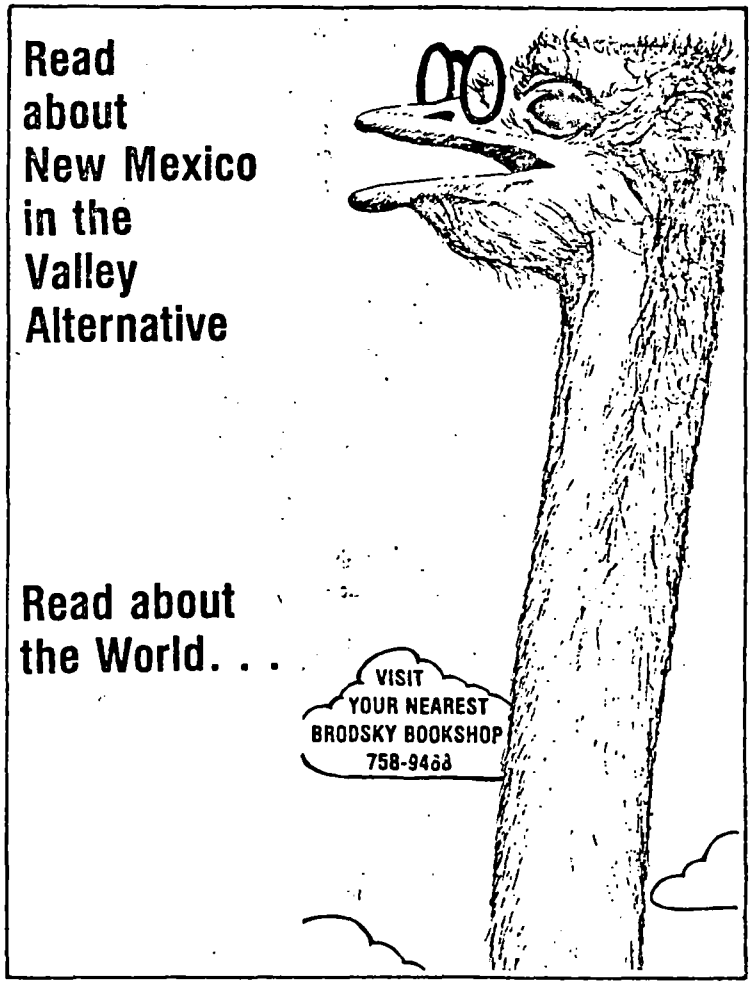
Since the mine has been back in production (1983) the magnitude of the problem has skyrocketed. New Mexico Game and Fish shocking surveys (when a body of water is given an electrical charge to kill the fish in a given locale in order to determine how many there are) done in the summer of '83 revealed some 800 fish per mile. Probably far less than it would have been ten years ago, but still not bad. In February, 1984, I witnessed another shock survey that produced less than 100 fish per mile. This was done below the hatchery, where the river is rejuvinated by fresh spring water. Just above the hatchery, the blue-grey water, with a visibility of just a few inches (the weather was below freezing, so the water could not have been affected by run-off) yielded no fish and very few insects. Trout simply cannot survive without food, and aquatic insects constitute 95% of their diet.

In a meeting with Steve Asher (then head of the EID) about a year ago, I, along with the Concerned Citizens of Questa, reported that a major spill had occured on the very day (9/26/83) that Governor Anaya dedicated the new underground mine shaft. The Governor was reportedly to have witnessed the spill. This was news to the flabbergasted EID chief. Of course, given the historic lack of consequence for MolyCorp and its toxic outpourings, it is little wonder that this latest insult was overlooked.

The Red River and the Rio Grande were among the first wild rivers designated as such by John F. Kennedy. Both rivers are part of the National Wild and Scenic Rivers System, and therefore, in theory, are under "protection" by the Federal Government. But no help from Washington or anywhere else has come forth to save these rivers. When it comes to receiving protection, MolyCorp gets it all.

Taylor Streit

First of a two-part article.



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Lynn Taylor Dick Schroeder

CONCERNED CITIZENS of QUESTA
P.O. BOX 99
Questa, New Mexico

February 11, 1985

Mr. Anthony Drypolcher
Water Pollution Control Bureau
State of New Mexico EID
P.O. Box 968
Santa Fe, New Mexico

Dear Mr. Drypolcher:

We, here in Questa, are still struggling to re-establish a healthy environment. In reviewing our file, we read with great interest a paper entitled, "PROTECTION OF WATER QUALITY IN MOUNTAIN STREAMS: A PANEL PRESENTATION" that was presented to the twenty-eighth Annual New Mexico Water Conference, April 5, 1983. Within this paper we studied a section which you authored, concerning activity in the Red River. As you well know the Red River begins east of Questa, flows past the Moly-Corp mine, through the village of Questa and eventually joins the Rio Grande sothwest of Questa. As you also know the MolyCorp mine disposes of its wastes, known as tailings, through pipes which parllel the Red River and end up in a dump site on the east side of Questa.

In your presentation you recognize the problem of tailings line breaks which cause chemical spills into the Red River. These spills have continued despite the attempts to correct them by installing new pipes and moving the pipes to the other side of the highway. In fact we personally witnessed one spill in November, 1984 which we saw cross the highway and enter the river. We've also heard of other recent spills from reliable sources. We are including a copy of an article which documents the effects of these spills on the "former" fish population of the Red River.

In another section of your presentation, we discovered that MOLYCORP has been fined for past spills and that these fines were to be earmarked for "environmentally beneficial research purposes in Northern New Mexico". Perhaps these funds could be used right here in Questa to establish and maintain monitoring apparatus to help rid this qrea once and for all of dangerous pollutants. We could provide voluntary manpower if only we were provided with legitimate scientific monitoring devices.

In conclusion we'd like to summarize our position toward MolyCorp. We welcome them as we do any neighbor and we deeply appreciate MolyCorp as the largest single employer in Taos County. We believe that all the pollution problems deriving from their mining operations could be corrected by pumping their tailings back into the open pit which is right there at the minesite. This would remove the possibility of spills, permit reclaimation of the toxic dump on the east side of Questa and eventually allow for the reclaimation of the gigantic open pit.

We appreciate your cooperation and anxiously await your reply.

Very truly yours,

Joe Ciancio

Manuel R. Ortega

George Weiss

Concerned Citizens of Questa
(505) 586-1095
586-0699

cc: Village of Questa Council

Jake Ortega, President MOLYCORP mineworkers union

3/27/85

Kathleen Ciancio - WATER QUALITY
Spill Prevention Plan in the mail
INSPECTIONS / SURVEILLANCE
DATES DONE - MORE RECENT
MAY 5, 1983
SEPT 14, 1984
Required under the N.P.D.E.S Permit Requirements
Moly Fined on Nov. Spill "84"

DRYPOKHER COULD NOT FIND RECLAIMATION PLAN
GOV. OFFICE REQUESTS LETTER FROM B. KING
(PAT DENSON) JULY 30, 1979

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

SEP 17 1999

Mr. Brian Shields, Executive Director
Amigos Bravos
P.O. Box 238
Taos, NM 87571

Dear Mr. Shields:

Thank you for your letter to Gregg Cooke concerning the Molycorp mine and proposed revisions to New Mexico's Water Quality Standards. I would like to provide you some specific information on the status of the Molycorp National Pollution Discharge Elimination System permit and the proposed New Mexico water quality standards.

Molycorp mine in Questa

EPA is in the process of reviewing the factual information as well as the legal precedents surrounding the Molycorp permit. The largest question is clearly how to deal with a series of seepages into the Red River at the mine site. Available data suggest that there may be a direct hydrological connection between the mine and the seeps. The seeps may be point source discharges from the mine and may then be subject to NPDES permitting. We are in the process of examining these issues to develop a record to support our decision. All information necessary to develop the permit should be available by May 2000.

New Mexico water quality standards

As you described, the specific exemption for irrigation and flood control facilities for specific conventional parameters proposed by NMED essentially reflects recently modified provisions in the New Mexico Water Quality Act (NMSA 1978). EPA provided written comments to NMED expressing significant concern with the appropriateness of these exemptions. Exempting an entire class of dischargers appears to invalidate the intended purpose of New Mexico's water quality standards, and conflicts with the intent of the Clean Water Act. These comments were entered into the record at the September 1998 Water Quality Control Commission (WQCC) hearing on water quality standards and should be available as part of that record.

The federal requirements pertaining to antidegradation (40 CFR 131.12) essentially direct adoption of an antidegradation policy and the identification of procedures that will be followed in implementing that policy. EPA has previously approved New Mexico's antidegradation policy, and has stated that the proposed modifications of that policy provide useful clarification. Most States, like New Mexico, have antidegradation policies that are based on the federal language.

A key aspect of an effective antidegradation program is the development of implementation procedures that explain the purpose and rationale for antidegradation decisions, in order to allow for better public understanding, acceptance, and support for the State's program. Unfortunately, current federal requirements for implementation procedures are not particularly detailed, but implementation is still clearly required. The concerns we expressed to NMED in our comments on its proposals focus on the need for a clear indication of what level (tier) of antidegradation protection is afforded to all stream segments, how antidegradation reviews are documented, or subjected to public review. NMED has proposed provisions moving in that direction. While retaining the "no degradation" provisions you mentioned, the proposals add procedures for nominating outstanding national resource waters (ONRW). These procedures provide a method to specifically identify the level of protection to be given to a specific water body. Without such a procedure, "no degradation" provisions are difficult to apply because there is no clear link between a stream segment and protections that are to be applied to it.

The WQCC is scheduled to deliberate on these and other proposals in its October 1999, meeting. Once revised standards are adopted by the WQCC and certified by the New Mexico Attorney General, the State will submit those revisions to EPA for review. EPA will then make a determination if the State's revised standards meet the requirements of the Clean Water Act and the water quality standards regulation.

I hope this has provided you with a better understanding of both the Molycorp and water quality standards issues. If I can be of further assistance, please call me or Scott Wilson of my staff at (214) 665-7511.

Sincerely,

for

Bill Hathaway, Director
Water Quality Division

cc: Hoppers
Watson
Dave Scott

6WQ-E and
6WQ-P

State of New Mexico
ENVIRONMENT DEPARTMENT
Surface Water Quality Bureau
1190 St. Francis Dr., P.O. Box 26110
Santa Fe, New Mexico 87502
Phone (505) 827-0187
Fax (505) 827-0160

GARY E. JOHNSON
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6W-EA

Mr. William B. Hathaway, Director
Water Quality Protection Division
United States Environmental Protection Agency
Region six
1445 Ross Avenue
Dallas, Texas 75202

Dear Mr. Hathaway:

This letter addresses an issue concerning the Red River of New Mexico which I feel is of importance to both the New Mexico Environment Department (NMED) and the Environmental Protection Agency (EPA). The Red River is currently on the State's 1998-2000 303(d) list as a high priority TMDL segment having both acute and chronic metal exceedences. These exceedences result from complex surface water and ground water issues. Currently, the renewal application for an NPDES permit for Molycorp, Inc. is under consideration by your agency. Molycorp, Inc. activities have the potential to be a significant source of metals in the segment of the Red River adjacent to Molycorp property.

I suggest that EPA Region 6 and NMED assume a coordinated role in the development of a TMDL designed to address these issues, and the subsequent NPDES permit reissuance. NMED will assume a lead role in overall development and TMDL issuance. In recognition of the technical expertise of Region 6 in the area of ground and surface water modeling, I suggest that EPA take the lead role in model development. Clearly, EPA will assume the lead role in permit issuance. However, NMED would like to participate in development of the permitting strategy. I believe this approach will provide a more defensible technical basis for the TMDL, the permit, and any subsequent challenges to them.

I look forward to working with you and EPA on this important environmental matter. I will discuss this further with Richard Hoppers and Sharon Parrish during their visit to New Mexico in mid-October. Your staff may contact James H. Davis, Chief of the Surface Water Quality Bureau at 505-827-0187 with any questions.

Sincerely,

Ed Kelley

Ed Kelley, Ph.D.
Director
Water and Waste Management Division

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT 8 1998

OFFICE OF
GENERAL COUNSEL

Grove T. Burnett
Vickie Minor
Western Environmental Law Center
Southwest Office
P.O. Box 1507
Taos, NM 87571

Dear Mr. Burnett and Ms. Minor:

This letter responds to your August 4, 1998, notice of intent, on behalf of Amigos Bravos and New Mexico Citizens for Clean Air and Water (Amigos, *et al.*), to sue the U.S. Environmental Protection Agency ("EPA") under section 502(a)(2) of the Clean Water Act ("CWA"), 33 U.S.C. § 1365(a)(2). The letter states that Molycorp, Inc. (Molycorp), the owner of an open-pit mining operation in the Red River Valley in New Mexico, has, since 1965, removed approximately 328 million tons of waste rock which it has placed into piles at the mine site. These piles cover 500 acres with hundreds of feet of waste rock. You state that water moves through the rock piles and leaches acids, heavy metals, and other pollutants into the ground water in the aquifers beneath the piles. You contend that the ground water is hydrologically connected to seeps along the banks of the Red River that are a primary source of metals loadings to the Red River. In your view, because Molycorp has no permit to discharge from the waste piles, Molycorp is, therefore, violating section 301(a) of the CWA and should be subject to enforcement action by EPA.

The letter asserts that EPA must enforce compliance with the CWA with respect to Molycorp's waste rock piles. As you know, while EPA has the authority to ensure compliance and take enforcement action under section 309 of the CWA against violators of the statute, the CWA does not mandate that EPA must take such action either in every instance of alleged noncompliance or in any specific instance of alleged noncompliance. Consequently, you should not file a claim against the Agency for breach of an asserted duty to take enforcement action because, as discussed below, such a suit would be subject to dismissal for lack of jurisdiction.

Any decision by EPA concerning compliance by the Molycorp with the CWA is purely discretionary and cannot be compelled through a citizen suit. Only those duties which the CWA specifically and unequivocally imposes on EPA can furnish a basis for a citizen suit under section 505(a)(2). *Natural Resources Defense Council, Inc. v. Train*, 510 F.2d 692, 700 (D.C. Cir. 1975); *Sierra Club v. Train*, 557 F.2d 485, 488, 491 (5th Cir. 1977); see also *Mountain States*

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Legal Found. v. Costle, 630 F.2d 754, 766 (10th Cir. 1980), cert. denied, 450 U.S. 1050 (1981)(narrowly interpreting a virtually identical Clean Air Act provision).

In order for the Agency to enforce the CWA most effectively, EPA must have the discretion to allocate its limited investigatory and other resources as it finds most appropriate. As the United States Supreme Court explained in *Heckler v. Chaney*, 470 U.S. 821 (1985) at 831:

> [A]n agency decision not to enforce often involves a complicated balancing of a number of factors which are peculiarly within its expertise. Thus, the agency must not only assess whether a violation has occurred. but whether agency resources are best spent on this violation or another, whether the agency is likely to succeed if it acts, whether the particular enforcement action required best fits the agency's overall policies, and, indeed, whether the agency has enough resources to undertake the action at all.

Further, to the extent that your letter inferentially asserts that EPA, when it issued Molycorp's permit in 1993, breached a nondiscretionary duty in failing to limit discharges associated with seepage from the waste piles, such a challenge would not be authorized under section 505 of the CWA. Section 509(b)(1) clearly provides that actions challenging final EPA actions on NDPES permits must be brought in a U.S. Court of Appeals within 120 days of the issuance of a permit. Consequently, the time for challenging Molycorp's permit has long passed, and your clients may not attack it collaterally in a citizens suit.

As you are aware, at the present time, the Agency's Regional Office is currently reviewing Molycorp's application for renewal of its NPDES permit. Among the issues being considered by the Agency is, of course, whether discharges from these waste rock piles will require permitting. When EPA proposes to re-issue the permit, you may wish at that time to submit comments on the proposed permit. If you have any questions, please feel free to contact me by telephone at (202) 260-7715.

Sincerely,

Richard T. Witt

Richard T. Witt
Attorney/Advisor

cc: Renea Ryland, Office of Regional Counsel, Region 6

ALBUQUERQUE
JOURNAL
THURSDAY
April 16, 1998
North EDITION
WEATHERLINE SERVICE® FROM MEGA 95.5 FM 988-5151
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Volunteers Keep Walkways Clear For Trail Users

PAGE B1

Judge Says No to Mann Retrial

Jury Misconduct Allegations Falter

PAGE A1

NEW MEXICO

Track Still Plans To Run Video Gaming

Gambling-Law Repeal Possible

PAGE D1

Report Pins Pollution on Molycorp

EPA Geologist Cites Waste Piles

BY IAN HOFFMAN
Journal Staff Writer

Towering waste piles at Molycorp's molybdenum mine, plus natural erosion, are sending acids and toxic metals through ground water into the Red River below, a federal geologist has found.

The geologist's report mounts pressure on the U.S. Environmental Protection Agency to regulate Molycorp's 328 million tons of waste rock as a water-pollution source.

Environmentalists have pressed the EPA unsuccessfully for such tighter pollution controls for at least five years.

"We're celebrating," said Brian Shields, executive director of Amigos Bravos, a Taos-based river advocacy group that sued Molycorp over pollution from its waste piles in 1995.

"This report doesn't do anything to immediately clean up the Red River ecosystem," Shields said, "but it means that Molycorp and the EPA will have to deal with it somehow."

If the EPA agrees to require a pollution discharge permit for the piles this year, Molycorp could come under a lasting legal duty to clean up the waste rock and the polluted ground water underneath.

Molycorp, owned by Union Oil of California, contends the pollution of the river is due to natural erosion of metals from the 25 million-year-old volcanic rocks that the company mines for molybdenum.

Geyza Lorinczi, Molycorp's chief geologist and environmental manager, said the company had not seen the new report and could not comment.

But Molycorp applied for renewed water pollution permits on Monday, and EPA is expected to consider adding the waste piles by October.

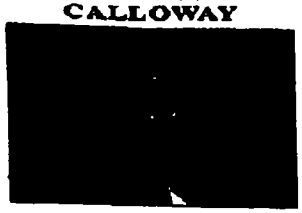
Running a milky blue from Molycorp to the Rio Grande, the Red River lost its ability to sustain wild trout in the early 1970s. Roughly half of the river's aquatic life below Molycorp is gone and the river's high content of toxic cadmium, copper and aluminum rank it among the more polluted mountain streams in New Mexico.

"Moly" mined at the Questa caldera was once used in shoe shine, but now is used to strengthen steel in knives, aircraft and other metal structures.

At Questa, the mineral occurs near sulfide deposits. As rain and snowmelt washes over these, the water turns to sulfuric acid

See REPORT on PAGE 3

LARRY CALLOWAY



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Taking A Whack At

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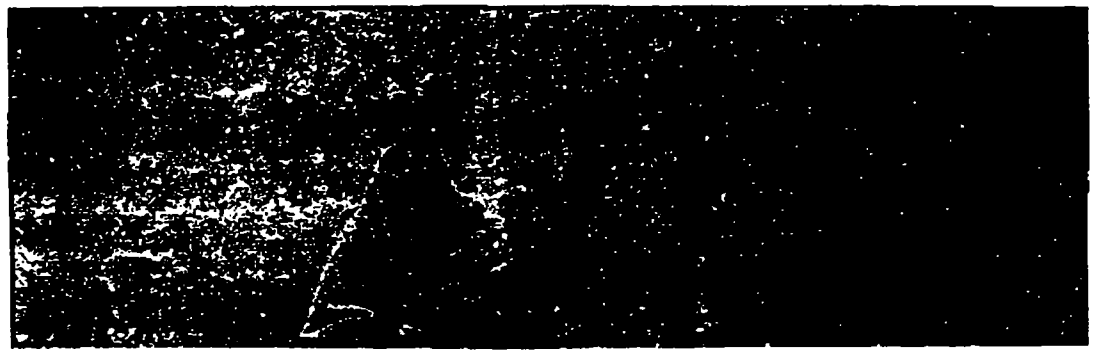

2nd Witness Describes Confession

Accused Admitted Wagner's Slaying, Friend Claims

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6-98 THU 3:46 PM NMED SWQB

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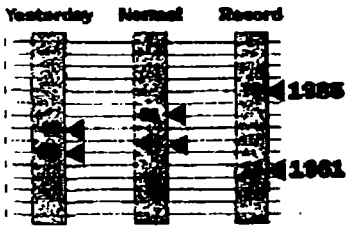

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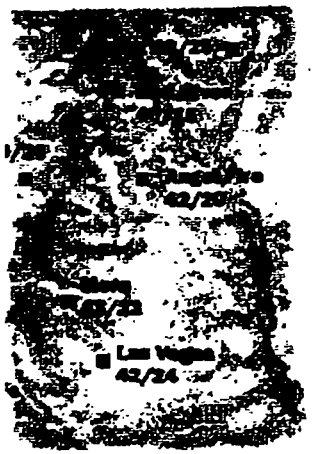

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na	Taos	na
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na		
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na		

achines operate for tourists. "He
id, 'Who gave you the orders?' I
id, 'I can't violate that
nfidence.' He said, 'You know, I
n have you picked up for
ntempt of court?' I said, 'I

after he was elected, Delgado made it clear exempt employees would be asked to step down.

It will be up to the new administration to accept the resignations

will find out their fate by April 30. In the meantime they are expected to keep working.

Assistant City Attorney Lidia Garza Morales, who already sub-

their job performance.

She said it didn't bother her the memo wasn't addressed to individual employees.

"Dr. Mier was trying to be as tact-

Kathryn Raveling, Director David Coss, Director Sabrina Pe[illegible] Intercultural Director Celina [illegible] de Garcia.

Report Pins Pollution on Molycorp

from **PAGE 1**

and dissolves metals out of the rock.

In his report, EPA geologist David Abshire found that the mine's 500 acres of waste rock piles and the eroded mountainsides are chemically similar and are probable sources for the same pollutants.

Those metals and acidic water can get past Molycorp's barriers and trenches into the ground water, then flow into the river from many seeps and springs on its north bank, Abshire found.

He was unable to determine Molycorp's share of the river pollution, but speculated its waste-rock dumps, or WRDs, probably contribute more than natural erosion because the broken rock presents more surface area to the acidic water.

"The unconsolidated WRD material appears to deliver greater concentrations of dissolved metals to the ground water than the consolidated erosional scars," Abshire wrote.

Ground water at Molycorp generally contains more metals than the seeps and springs emptying into the river, the report said, suggesting the flow of ground water contaminants could continue even if mining operations ended.

Some environmentalists claimed the report might expose Molycorp to as much as $100 million in Clean Water Act penalties. But most concluded the report boosts the chances Molycorp will have to better control pollutants going into the Red River.

"Can they solve the problem totally? Probably no," said chemical engineer John R. Bartlit, head of New Mexico Citizens for Clean Air and Water. "But they can make significant improvements. ... There are remedies available that are technically and economically feasible."

2nd Witness Describes Confession

from **PAGE 1**

Aguilar said she also overheard Perez-Barrera telling Martinez that he had parked a red pickup truck, which was later identified as Wagner's 1996 Dodge Ram, about three blocks from a hospital in La Junta.

Aguilar said she and Martinez didn't believe Perez-Barrera's story, but drove around the hospital in La Junta to find the red truck and couldn't find it.

The next morning, Aguilar said she was shocked when she read a story in a local newspaper about a stolen truck found in La Junta after its owner had been killed. "Oh my God, he really did it," she said.

Aguilar and Martinez went to La Junta police that night and gave written statements about what Perez-Barrera told them. La Junta

Martinez also gave police a gold and onyx ring belonging to Wagner, Hale said. Martinez told police Perez-Barrera had given him the ring "as a symbol of affection," Hale said.

Martinez has testified that Perez-Barrera told him he removed the ring from the dead woman's body after killing her.

An FBI agent testified Wednesday that investigators recovered 54 items of evidence from Wagner's truck, including two .22-caliber spent bullet casings and a can of WD-40.

Perez-Barrera, in a confession to police that his lawyers later claimed was coerced, said he used the lubricant to burn Wagner's body near a ranch in Boise City, Okla.

Investigators also recovered evi-

lace, another gold ring, earrings, a blanket and other items.

Also recovered from his home was a partially used Remington .22-caliber ammunition box, the FBI agent said.

Police also recovered a .22-caliber Jennings semi-automatic handgun that Perez-Barrera told police belonged to him. The gun was found in the back seat of a police car in which Perez-Barrera was transported.

Wagner, 41, was reported missing on July 28, 1997, and a woman's body found in Boise City that day was later identified as hers. Wagner's truck was found abandoned on a street in La Junta.

Perez-Barrera allegedly confessed to killing Wagner and stealing her truck near the Glorieta exit

failed.

Wagner held a garage sale the day before she was killed and she was removing a garage sale sign near the exit when Perez-Barrera allegedly attacked her.

A firefighter/paramedic, Wagner had submitted her resignation and was planning to move to Florida with her fiancé to start her own bed-and-breakfast.

Perez-Barrera, 25, a Mexican national who worked as a painter at a chassis company in Lamar, pleaded innocent to charges of first-degree murder, armed robbery, shooting at an occupied motor vehicle and felon in possession of a firearm in connection with Wagner's killing.

The jury trial, which began last Thursday before State District

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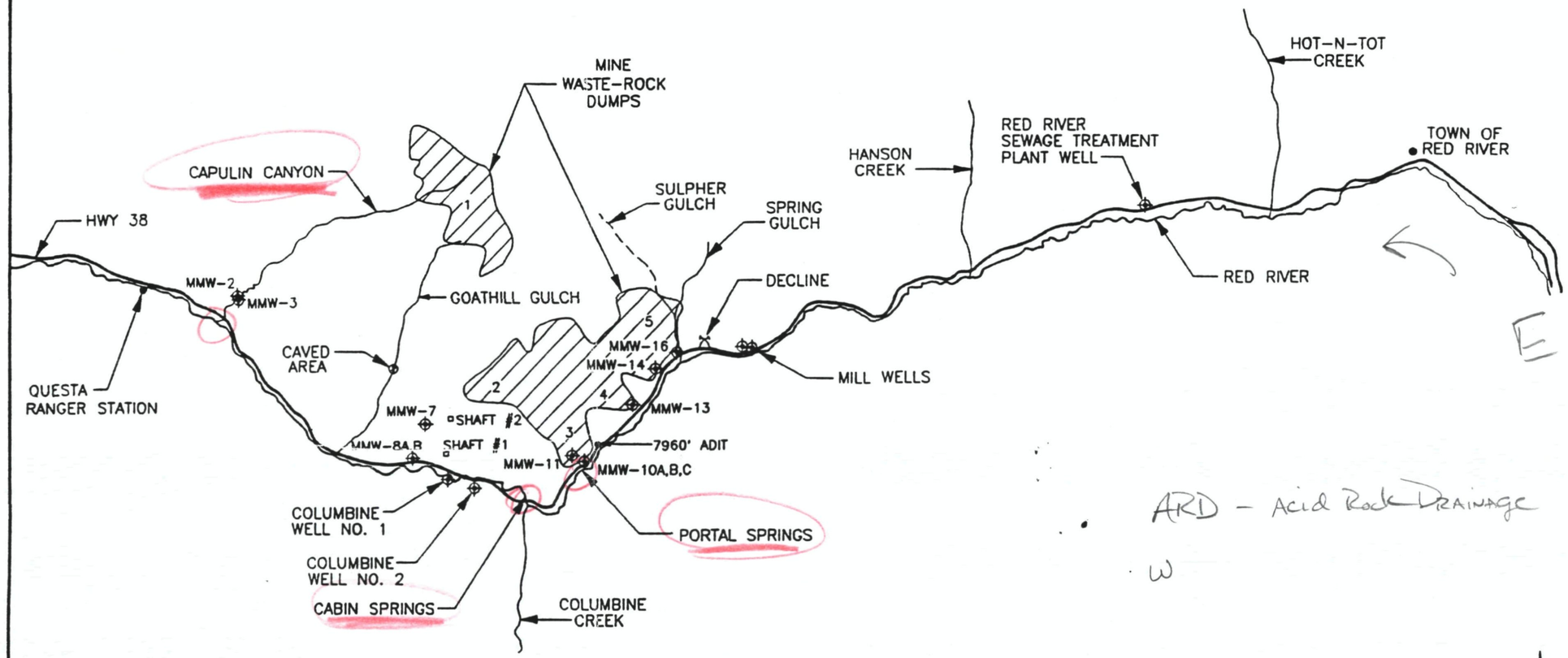

W

E

ARD - Acid Rock Drainage

W

WASTE-ROCK DUMP AREAS

1	CAPULIN/GOATHILL
2	SUGAR SHACK WEST
3	SUGAR SHACK SOUTH
4	MIDDLE
5	SULPHER/SPRING

0 0.5 1.0 1.5 2.0

SCALE IN MILES

N

FIGURE: 3

SOUTH PASS RESOURCES, Inc.

PROJECT No.:	DATE:	AUTHOR:	DRAWN BY:
001-05	2/10/95	OPS	M.O'M.

MINE AREA SITE MAP

Molycorp, Inc.

Questa, New Mexico

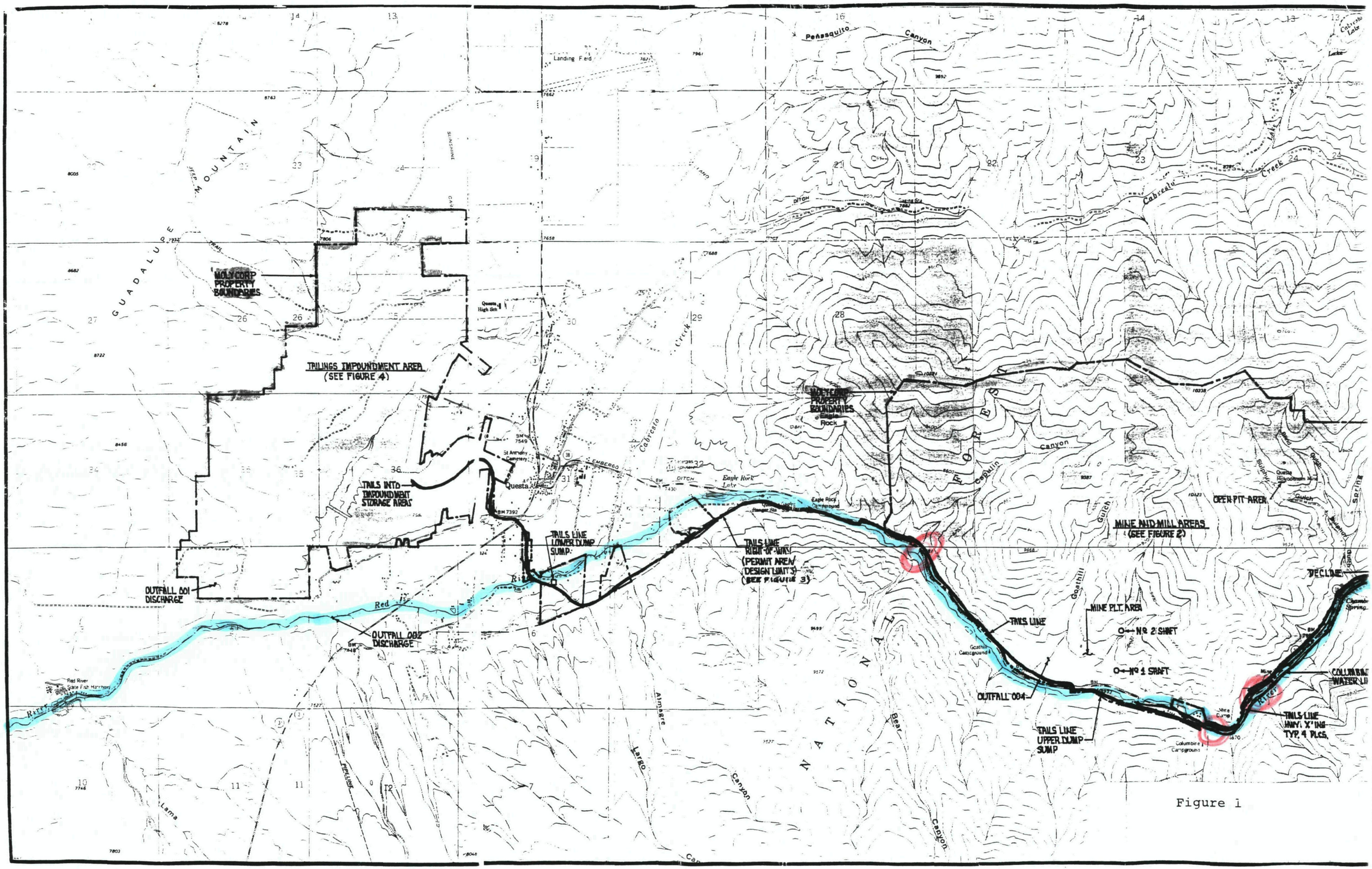
MOLYCORP PROPERTY BOUNDARIES
TAILINGS IMPOUNDMENT AREA (SEE FIGURE 4)
TAILS INTO IMPOUNDMENT STORAGE AREAS
TAILS LINE LOWER DUMP SUMP
TAILS LINE RIGHT-OF-WAY (PERMIT AREA/ DESIGN LIMITS) (SEE FIGURE 3)
OUTFALL 001 DISCHARGE
OUTFALL 002 DISCHARGE
MOLYCORP PROPERTY BOUNDARIES
MINE AND MILL AREAS (SEE FIGURE 2)
OPEN PIT AREA
TAILS LINE
MINE PLT. AREA
No 2 SHAFT
No 1 SHAFT
OUTFALL 004
TAILS LINE UPPER DUMP SUMP
DECLINE
COLUMBINE WATER LINE
TAILS LINE HWY. X'ING TYP. 4 PLCS.
Red River
Questa
Eagle Rock Lake
Cabresto Creek
Peñasquito Canyon
Cabresto Lake
Guadalupe Mountain
Sunshine
Landing Field
Goathill Campground
Columbine Campground
Red River State Fish Hatchery
Eagle Rock Campground
St Anthony Cemetery
Pipeline
Embargo
Ditch
Almagre
Largo
Canyon
Lama
Bear
Goathill
Gulch
Spring
Chamisa Spring
Mine Dump
Eagle Rock

Figure 1

INTENSIVE WATER QUALITY SURVEY REPORTS
Listed by Watershed

Surveillance and Standards Section
Surface Water Quality Bureau
New Mexico Environment Department

Acquisition of Reports

Water quality surveys and technical reports are completed by the Surveillance and Standards Section in fulfillment of work plan commitments under U.S. Environmental Protection Agency grants. Any interested person may obtain hard copies of one or more of these reports for a nominal charge of $5.00 per report plus an additional charge of $0.10 per page for photocopying plus $2.00 for postage; hence, a 30-page report can be purchased for $10.00 ($5.00 + $3.00 + $2.00). In the near future many of these reports may be available on the Department's web page at **http://www.nmenv.state.nm.us**.

To order reports write to: Steven Pierce, Surveillance and Standards Section, Surface Water Quality Bureau, New Mexico Environment Department, 1190 St. Francis Drive, P.O. Box 26110, Santa Fe, New Mexico 87502. The order must include a check for the purchase price of the reports requested, unless other arrangements have been made, payable to: State of New Mexico - NMED/SWQB.

The reports are listed in order by the segment numbers assigned in the New Mexico Standards for Interstate and Intrastate Stream. In the 1995 revision of these standards, segment numbers were assigned with the hyphen. Segment numbers appear as they do in the reports. A few segment boundaries have changed over the years. A comprehensive index of the water quality survey reports appears on pages **23-26**.

Rio Grande

* 2101 Pierce, S.T. 1995. Special Water Quality Survey of the **Rio Grande**, Doña Ana County, New Mexico, February 8 - November 4, 1993, p. 81-113. *In* Intensive Water Quality Stream Surveys, 1993. NMED/SWQ-95/1. 154 p.

2101 Pierce, S.T. 1988. Intensive Water Quality Survey of the **Rio Grande** in the Vicinity of Las Cruces, New Mexico, August 8-11, 1988. EID/SWQ-88/7. 46 p.

2101 Smolka, L.R., S.J. Oppenheimer, and D.F. Tague. 1982. Intensive Survey of the **Rio Grande** near Las Cruces, New Mexico, September 8-11, 1981. 33 p.

2101 Tague, D.F. 1978. Intensive Water Quality Survey of the **Rio Grande** near Las Cruces, New Mexico, July 25-27, 1978. 14 p.

2101
2102 Pierce, S.T. 1990. Intensive Water Quality Survey of the **Rio Grande** from Caballo Dam to Leasburg Dam, Sierra and Doña Ana Counties, New Mexico, April 24-27, 1989, p. 49-59. *In* Intensive Water Quality Stream Surveys and Lake Quality Assessment Surveys, 1989. EID/SWQ-90/2. 199 p.

2103 Pierce, S.T. 1991. Intensive Water Quality Survey of the **Rio Grande** from Elephant Butte Dam to Caballo Reservoir in Sierra County, New Mexico, May 21-24, 1990, p. 38-44. *In* Intensive Water Quality Stream Surveys and Lake Quality Assessment Surveys, 1990. EID/SWQ-91/1. 209 p.

2105 Pierce, S.T. 1996. Special Water Quality Survey of the **Rio Grande** from the Rio Bravo Bridge in Albuquerque to Bernardo, Bernalillo, Valencia and Socorro Counties, New Mexico, May 9 - October 6, 1994, p. 149-182. *In* Intensive Water Quality Stream Surveys, 1994. NMED/SWQ-96/2. 184 p.

2105
2105.1 Pierce, S.T. 1992. Special Water Quality Survey of the **Rio Grande** from Angostura Diversion Works to I-25 in Sandoval and Bernalillo Counties, June 18 - September 18, 1991, p. 118-149. *In* Intensive Water Quality Stream Surveys and Lake Quality Assessment Surveys, 1991. NMED/SWQ-92/2. 244 p.

2105 Pierce, S.T. 1988. Intensive Water Quality Survey of the **Rio Grande** from Angostura to the U.S. 85 Bridge, Sandoval and Bernalillo Counties, New Mexico, July 25-28, 1988. EID/SWQ-88/6. 51 p.

2105 Potter, D.U. 1987. Intensive Water Quality Survey of the **Rio Grande** in Socorro County, New Mexico, June 8-11, 1987. EID/SWQ-87/7. 70 p.

2105 Potter, D.U. 1986. Loading Effects of the Albuquerque **Wastewater Treatment Facilities** on **Elephant Butte Reservoir**, Sierra County, Water years 1976-1985. EID/SWQ-86/9. 81 p.

2105 Potter, D.U. 1985. **Rio Grande** Water Quality Survey (August 28 - September 4, 1984) in Response to a Sewer Line Break at Tijeras Arroyo on August 25, 1984. EID/SWQ-85/2. 52 p.

2105 Potter, D.U. 1984. Intensive Survey of the **Rio Grande** Upstream and Downstream from the City of Albuquerque **Wastewater Treatment Facilities**, March 21-22, 1984. EID/SWQ-84/5. 10 p.

2105 Potter, D.U. 1984. Summary of Water Quality Data Collected on the **Rio Grande**, November 1, 1983, through February 21, 1984, during Construction of Albuquerque's WWTP No. 2 (AO, Docket No. VI-83-744, issued by EPA for October 1, 1983-May 15, 1984). EID/SWQ-84/4. 33 p.

2105 Tague, D.F. and Anthony Drypolcher. 1979. Pollutant Loads in **Stormwater Runoff from Albuquerque**, New Mexico. 45 p.

2105 Environmental Improvement Agency. 1976. Assessment of the Impact of **Albuquerque** Wastewater on the Trophic Status of **Elephant Butte Reservoir**, Sierra County, New Mexico. 70 p.

2108 Ditmore, D.R. 1997. Special Water Quality Survey of the **Rio Grande,** Sandoval County, New Mexico, April 18 - October 25, 1995, p. 1-74. *In* Intensive Water Quality Stream Surveys. 1995. NMED/SWQ-97/2. 202 p.

2108 Davis, D.R. 1997. Special Cooperative Water Quality and Biological Assessment Survey of **Cochiti Lake**, Cochiti Pueblo, Sandoval County, New Mexico, April 19, July 19 and October 25, 1995, p. 49-93. *In* Cooperative Lake Water Quality Assessment Surveys for Selected New Mexico Tribal and Pueblo Lakes, 1994-1995. NMED/SWQ-97/1. 95 p.

2211 2120 Smolka, L.R. 1996. Special Water Quality Survey of the **Rio Grande,** Embudo to Otowi, Rio Arriba and Santa Fe Counties, New Mexico, May 16 - October 12, 1994, p. 117-148. *In* Intensive Water Quality Stream Surveys, 1994. NMED/SWQ-96/2. 184 p.

2211 Smolka, L.R. 1990. Intensive Water Quality Survey of the **Rio Grande** from Taos Junction Bridge to Otowi Bridge, Santa Fe, Rio Arriba and Taos Counties, New Mexico, July 10-13, 1989, p. 96-105. *In* Intensive Water Quality Stream Surveys and Lake Quality Assessment Surveys, 1989. EID/SWQ-90/2. 199 p.

2119 Smolka, L.R. 1991. Intensive Water Quality Survey of the **Upper Rio Grande** from Chiflo to Taos Junction in Taos County, New Mexico, February through October, 1990, p. 3-15. *In* Intensive Water Quality Stream Surveys and Lake Quality Assessment Surveys, 1990. EID/SWQ-91/1. 209 p.

Rio Grande Tributaries

2103 Coss, R.D. 1985. Reconnaissance Survey of **Alamosa Creek** near Monticello, Socorro and Sierra Counties, New Mexico, July 1-3, 1985. Data file only.

2105 Smolka, L.R. 1990. Intensive Water Quality Survey of the **Rio Puerco (East)** and its Tributaries in the Vicinity of Cuba, Sandoval County, New Mexico, June 19-22, 1989, p. 27-36. *In* Intensive Water Quality Stream Surveys and Lake Quality Assessment Surveys, 1989. EID/SWQ-90/2. 199 p.

2107 Potter, D.U., and D.F. Tague. 1986. Intensive Survey of the **Rio San Jose** near Grants, Cibola County, New Mexico, May 20-21, June 17-18 and July 8-9, 1986. EID/SWQ-86/13. 58 p.

2107 Tague, D.F. 1985. Intensive Survey of the **Rio San Jose** near Grants, Cibola County, New Mexico, October 1-4, 1984. EID/SWQ-85/2. 52 p.

2106 Jacobi, G.Z., and L.R. Smolka. 1984. Reconnaissance Survey of **Bluewater Creek**, Cibola County, July 20-21, 1983. EID/WPC-83/10. 9 p.

* 2106 Potter, D.U. 1990. Intensive Water Quality Survey of **Bluewater Reservoir** in Cibola County, New Mexico, 1989, p. 135-144. *In* Intensive Water Quality Surveys and Lake Quality Assessment Surveys, 1989. EID/SWQ-90/2. 199 p.

2108.5 Potter, D.U. 1985. Reconnaissance Survey of **Las Huertas Creek** near Placitas in Sandoval County, New Mexico, June 25-26, 1985. Data file only.

2106
2105.5 Potter, D.U. 1987. Intensive Water Quality Survey of the **Jemez River** and its Tributaries in Sandoval County, New Mexico, August 3-6, 1987. EID/SWQ-87/11. 59 p.

2109 Potter, D.U. 1985. Loading Effects of the Española, Santa Fe and Los Alamos County **Wastewater Treatment Facilities** on **Cochiti Reservoir**, Phase II: Nutrient Loading Calculations for April 1984 - March 1985 and Final Project Summary. EID/SWQ-85/4. 85 p.

* 2110 Ditmore, D.R. 1997. Special Water Quality Survey of the **Santa Fe River** in Santa Fe and Sandoval counties, New Mexico, April 11 - November 1, 1995, p. 103-169. *In* Intensive Water Quality Stream Surveys, 1995. NMED/SWQ-97/2. 202 p.

2110 Potter, D.U. 1986. Intensive Survey of the **Santa Fe River** in Santa Fe and Sandoval Counties, New Mexico, August 5-7, 1986. EID/SWQ-86/20. 38 p.

2110 Potter, D.U. 1986. Intensive Survey (II) of the **Santa Fe River** in Santa Fe and Sandoval Counties, New Mexico, May 27-29, 1985. EID/SWQ-86/4. 40 p.

2110 Potter, D.U., and G.Z. Jacobi. 1984. Intensive Survey of the **Santa Fe River** in Santa Fe and Sandoval Counties, August 7-8 and September 5-6, 1984. EID/SWQ-84/7. 54 p.

2118 Potter, D.U. 1985. Reconnaissance Survey of **Rito Cañon de los Frijoles** near Bandelier, Sandoval County, New Mexico, June 11-12, 1985. Data file only.

* 2118 Ditmore, D.R. 1996. Special Water Quality Survey of **Tesuque Creek, Rio en Medio and Rio Chupadero**, Santa Fe County, New Mexico, May 23 -November 2, 1994, p. 85-116. *In* Intensive Water Quality Stream Surveys, 1994. NMED/SWQ-96/2. 184 p.

2118 Smolka, L.R. 1987. Reconnaissance Survey of the **Rio Tesuque and the Pojoaque River** in Santa Fe County, New Mexico, April-October, 1987. EID/SWQ-87/12. 43 p.

2112 2113 Pierce, S.T. 1988. Intensive Water Quality Survey of the **Rio Chama** Downstream from Abiquiu Dam, Rio Arriba County, New Mexico, July 11-14, 1988. EID/SWQ-88/4. 47 p.

2114 Potter, D.U. 1989. Reconnaissance Surveys of **Abiquiu Reservoir** in Rio Arriba County, New Mexico, 1988. New Mexico Clean Lakes Program: Lake Water Quality Assessment for FY 89. 90 p.

* 2115 2116 Smolka, L.R. 1992. Intensive Water Quality Survey of **Tributaries to Abiquiu Reservoir: Rio Puerco de Chama, Rio Gallina and Encino, Poleo, Cañones and Coyote creeks** in Rio Arriba County, New Mexico, April 22-25, 1991, p. 41-59. *In* Intensive Water Quality Stream Surveys and Lake Quality Assessment Surveys, 1991. NMED/SWQ-92/2 244 p.

* 2116 Hopkins, J.S. 1992. Water Quality Survey of **Canjilon Lakes** in Rio Arriba County, New Mexico, August 27-28 and October 1-2, 1991, p. 225-242. *In* Intensive Water Quality Stream Surveys and Lake Quality Assessment Surveys, 1991. NMED/SWQ-92/2 244 p.

2116 Pierce, S.T. 1988. Intensive Water Quality Survey of the **Rio Chamita and Rio Chama** near Chama, Rio Arriba County, New Mexico, June 13-16, 1988. EID/SWQ-88/2. 59 p.

2116 Pierce, S.T. 1986. Intensive Survey of the **Rio Chamita and Rio Chama** near Chama in Rio Arriba County, New Mexico, August 11-13, 1986. EID/SWQ-86/21. 40 p.

2116 Jacobi, G.Z. and L.R. Smolka. 1983. Intensive Survey of the **Rio Chamita and Rio Chama,** near Chama, Rio Arriba County, New Mexico, March 22-23, 1982. 39 p.

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Permit File
NM22306

P/C

CROWELL & MORING LLP
1001 PENNSYLVANIA AVENUE, N.W.
WASHINGTON, D.C. 20004-2595
(202) 624-2500
FACSIMILE (202) 628-5116

SUITE 1200
2010 MAIN STREET
IRVINE, CALIFORNIA 92614
(714) 263-8400
FACSIMILE (714) 263-8414

180 FLEET STREET
LONDON EC4A 2HD
44-171-413-0011
FACSIMILE 44-171-413-0333

RICHARD E. SCHWARTZ
(202) 624-2905
rschwartz@cromor.com

May 5, 1997

RECEIVED
M - 6 1997
6W-P

By Facsimile and Federal Express

Mr. Frederick O. Humke
Environmental Engineer
Permits Branch (6WQ-P)
U.S. Environmental Protection Agency - Region 6
1445 Ross Avenue
Dallas, TX 75202-2733

Re: Molycorp's NPDES permit No. NM0022306

Dear Mr. Humke:

I am writing to ask you to confirm our telephone conversation of this morning, in which I asked you to clarify your April 30, 1997 letter to Mr. Brian Shields, which I received on Friday afternoon. I have three specific topics that I hope you will address.

1. Seepage sources described to you by Mr. Shields and Mr. Burnett. You told me the basis for the statement in your April 30 letter that "...EPA did not consider discharges or seepages associated with mine wasterock piles." Specifically, Mr. Shields and Mr. Grove Burnett told you that the waste rock piles were sources of discrete *above-ground* seeps from the waste rock piles which flowed across the ground surface into the Red River. That was type of seepage from waste rock piles that you were referring to in your letter. (As you will recall, EPA did permit storm water discharges from the waste rock piles in 1993; see Response to comments, Final Permit Decision re Molycorp, Issues Nos. 2 and 13; September 10, 1993.) I would appreciate it if you would confirm that this was the type of discrete seepage you were referring to in your April 30 letter.

2. Seepage sources that EPA considered in 1993. Second, you told me that in 1993 EPA *did* consider seepage from the waste rock piles at the mine that percolated into *ground water*. The enclosed comments describe the seepage as emerging in springs or seeps which then enter the Red River. I would appreciate it if you would confirm that in the 1993 permit proceeding EPA considered this subject.

3. Mine area seepage. In your April 30 letter, you indicated that EPA's consideration of seepage (reflected in its Response to Comments, Issue No. 9) included both the mine area and the tailings area, but primarily the latter. I am enclosing some of the comments to which EPA was responding, to refresh your recollection on that subject. I would be appreciative if you could let me know whether the major focus of EPA's consideration was the mine area.

Thank you very much for your help in clarifying the issues raised in your April 30, 1997 letter. We need your assistance to set the record straight.

Sincerely,

Richard E. Schwartz

Attorney for Molycorp, Inc.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE
DALLAS, TEXAS 75202-2733

May 6, 1997

Mr. Richard E. Schwartz
Attorney for Molycorp, Inc.
Crowell & Moring LLP
1001 Pennsylvania Avenue, N.W.
Washington, D.C. 20004-2595

Re: Molycorp, NPDES No. NM0022306

Dear Mr. Schwartz:

In response to your letter dated May 5, 1997, we have the following comments.

In the 1993 Response to Comments, it was the position of EPA Region 6 that percolation or infiltration from mine and tailings areas into groundwater did not constitute "point sources" under NPDES. However, we are aware that more recent U.S. District Court decisions are divided over this matter where "hydrologic connection" to surface waters is involved.

The only surface discharge sources from the mine areas which we considered in the 1993 reissuance in accordance with the application and our interpretation of other inputs are those associated with Outfalls 004 and 005. At that time we did not recognize and consider other surface discharges or surface seepage associated with mine wasterock piles. It was understood then that any other mine sources including the mine spoil piles percolated into groundwater. If other mine surface discharges or surface seeps exist, these would be "point sources" subject to the need for applications and permitting.

If I can add any further clarification, please contact me at voice (214) 665-7503 or FAX (214) 665-2191.

Sincerely,

Frederick O. Humke

Frederick O. Humke, P.E.
Environmental Engineer
Permits Branch (6WQ-PP)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE
DALLAS, TEXAS 75202-2733

April 30, 1997

Mr. Brian Shields
Executive Director
Amigos Bravos
P.O. Box 238
Taos, New Mexico 87671

Dear Mr. Shields:

This letter is in response to your FAX of April 21, 1997, to Dr. Oscar Ramirez, Deputy Director of the Water Quality Management Division of the EPA Region 6 office relative to Molycorp, near Questa, New Mexico. You further explained to me the specific issue in our telephone conversation of April 29, 1997.

A review of the record shows that in the permit reissuance dated September 10, 1993, EPA did not consider discharges or seepages associated with mine wasterock piles. You have indicated that these discharges are essentially discrete sources. Issue No. 9 of the associated Response to Comments was concerned with a different and more complex matter related to possible infiltration to existing groundwater sources primarily associated with the tailings areas although possibly to a much lesser extent also associated with the mine.

We hope that this clarifies the matter. If you have further questions, please contact me at (214) 665-7503.

Sincerely,

Frederick O. Humke

Frederick O. Humke, P.E.
Environmental Engineer
Permits Branch (6WQ-P)

From: Jack V. Ferguson
To: R6DAL01.R6TOXLAN(KIRKSEY-CAROLINE), HUMKE-FRED
Date: Tuesday, April 29, 1997 7:38 am
Subject: Molycorp, NM0022306 -Reply

while rcra may regulate groundwater - it is our branch position that hydralogic connection to a surface waters of the u.s. from material which would otherwise be a point source discharge, is something which we will claim authority to regulate under npdes - as we have claimed since 1976 -

jack

>>> Fred Humke 04/28/97 08:03am >>>
The point source issue at Molycorp may place NPDES in overlap with RCRA in some instances. What we are dealing with at Molycorp is principally "milling wastes", not "mining wastes". Under the NPDES regulations (Part 440, Ore Mining and Dressing Point Source Category) Subpart J specifically distinguishes between mining and milling activities; as does the associated development document.

A review of the RCRA regulations beginning at 40 CFR 241.100 confirms that "mining wastes" are exempted. However, the preamble further states "Concerning the specific practice of land disposal of milled solid wastes, EPA guidance is contained in a position statement issued in November 1972." It would seem that there may be some question relative to the applicability of RCRA to groundwater matters resulting from the disposal of "milled wastes". A further review of this aspect may be worthwhile.

Thanks!

CC: R6DAL03.R6WATLAN(WATSON-JANE),

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TEXAS 75202-2733

JAN 21 1992

Mr. Brian Shields
Projects Director
Amigos Bravos, Friends of the Wild River
P.O. Box 238
Taos, New Mexico 87571

Dear Mr. Shields:

With reference to your letter of December 30, 1991, relative to the closing of the Molycorp molybdenum mine in Questa, New Mexico, we have contacted Mr. David R. Shoemaker, Mine Manager for Molycorp.

Mr. Shoemaker advised us that there is no acid mine discharge associated with Molycorp mining and that Molycorp will divert any excess mine water through the tailings lines to the tailings pond where treatment will be maintained in accordance with the National Pollutant Discharge Elimination System (NPDES) permit prior to discharge from the permitted outfalls. Mr. Shoemaker stated that Molycorp intends to maintain the NPDES permit (NM0022306) in accordance with all permit provisions. Mr. Shoemaker states that the mine is not being permanently closed, but is on standby, and will be reopened when market conditions warrant.

This permit has been issued under Section 402 of the Clean Water Act. The Environmental Protection Agency (EPA) is the permitting authority and utilizes the assistance of the New Mexico Environment Department (NMED) in the oversight of this facility. We are requesting that the NMED evaluate any possible ground water impact since this is a State matter.

This facility does not require a written closure plan to discontinue pumping operations in the underground mine. The Enforcement Branch of the Water Management Division is aware of your concerns and will continue to monitor the status of the facility to assure that all EPA regulations and requirements are met.

Sincerely yours,

/s/ Joe D. Winkle for

B. J. Wynne
Regional Administrator

cc: New Mexico Environment Department

Mr. David R. Shoemaker

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE
DALLAS, TEXAS 75202-2733

April 30, 1997

Mr. Brian Shields
Executive Director
Amigos Bravos
P.O. Box 238
Taos, New Mexico 87671

Dear Mr. Shields:

This letter is in response to your FAX of April 21, 1997, to Dr. Oscar Ramirez, Deputy Director of the Water Quality Management Division of the EPA Region 6 office relative to Molycorp, near Questa, New Mexico. You further explained to me the specific issue in our telephone conversation of April 29, 1997.

A review of the record shows that in the permit reissuance dated September 10, 1993, EPA did not consider discharges or seepages associated with mine wasterock piles. You have indicated that these discharges are essentially discrete sources. Issue No. 9 of the associated Response to Comments was concerned with a different and more complex matter related to possible infiltration to existing groundwater sources primarily associated with the tailings areas although possibly to a much lesser extent also associated with the mine.

We hope that this clarifies the matter. If you have further questions, please contact me at (214) 665-7503.

Sincerely,

Frederick O. Humke, P.E.
Environmental Engineer
Permits Branch (6WQ-P)

From: Fred Humke
To: VICKERY-ROBERT
Date: Wednesday, February 7, 1996 9:37 am
Subject: Molycorp, NM0022306

With reference to the recent memo from Jim Piatt, dated 1/30/96, this ground water issue has been periodically resurrected by the NMED. Refer to Item 9 of the 1993 Response to Comments (attached).

While I continue to believe that ground water seepage is not an NPDES point source, I recommend that this be matter be referred to enforcement for investigation. Dave Shoemaker, Mine Manager at Molycorp, advised me today that the mine has reopened; the Western Environmental Law Center has filed suit against Molycorp with regard to the ground water matters; and the NMED staff is recommending that Molycorp be declared a superfund site.

As I have previously recommended, I suggest that fresh insight and intrapersonal skills be applied in terms of working with NMED.

Files: A:\NM22306.RTC

RESPONSE TO COMMENTS
FINAL PERMIT DECISION

This is our response to comments received on the subject draft permit in accordance with regulations promulgated at 40 CFR Part 124.17.

Permit No.	NM0022306
Applicant:	Molycorp, Inc. P.O. Box 469 Questa, New Mexico 87556
Issuing Office:	U.S. Environmental Protection Agency Region 6 1445 Ross Avenue Dallas, Texas 75202-2733
Prepared By:	Fred Humke Industrial Permits Section (6W-PI) Permits Branch Water Management Division (214) 655-7180

Permit Action:Final permit decision and response to comments received on the draft reissued permit publicly noticed on April 17, 1993.

Date Prepared:

Unless otherwise stated, citations to 40 CFR refer to promulgated regulations listed at Title 40, Code of Federal Regulations, revised as of 7/1/92.

STATE CERTIFICATION

Dated May 27, 1993.

The following effluent limitations and/or conditions are included in the final permit in conformance with regulations listed at 40 CFR Part 122.44(d)(3):

ISSUE No. 1

As conditions of certification, the NMED has specified revised values for Cs (water quality standards based on a hardness of 132 mg/l and a TSS of 59 mg/l) and Ca (ambient stream concentration upstream of discharge based on method- olgy specified by the NMED in a new interim guidance document dated May 3, 1993) to be used in the screening for and the calculation of State water quality standard effluent limitations.

RESPONSE NO. 1

This draft permit was public noticed on April 17, 1993, prior to the revised interim guidance. All permit water quality effluent limitations, as addressed on Page 7 of 10 of the Fact Sheet, issued to Public Notice on April 17, 1993, are recalculated as follows:

Cd = (QaCa + QeCe')/(Qa + Qe) and

and Ce = [Cs(Qa + Qe) - CaQa]/Qe

where Cd = instream waste concentration (mg/l)

Ce = allowable daily average effluent concentration (mg/l)

Ce'= reported concentration in effluent x 2.13 (mg/l)

Cs = water quality standard (mg/l)

Ca = ambient stream concentration upstream of discharge (mg/l)

Qa = critical low flow of stream = 16.7 MGD

Qe = combined daily average flow of dry weather Outfalls 001 and 002
= 4.7 MGD

and Me = Ce x 8.34 x 4.7

where Me = total daily average water quality based mass limits for

combined Outfalls 001, 002, 004 and 005 (lb/day)

WQ PARAMETER	Ca	Cs	Ce'	Cd	Ce	Me
T. Arsenic	0.005	0.049	0.022	0.009(*1)	N/A	N/A
T. Cadmium	0.00	0.005	0.036	0.008	0.023	0.90
T. Copper	0.044	0.059	0.155	0.068	0.112	4.39
T. Lead	0.022	0.043	0.214	0.064	0.118	4.63
T. Zinc	0.058	0.595	0.032	0.051(*1)	N/A	N/A
T. Aluminum	2.500	0.087	0.109	1.975	0.087(*2)	3.41
T. Boron	0.00	0.750	0.214	0.047(*1)	N/A	N/A
T. Chromium	0.006	0.546	0.023	0.010(*1)	N/A	N/A
T. Cobalt	0.00	0.050	0.023	0.005(*1)	N/A	N/A

T. Selenium	0.00	0.005	0.009	0.002(*1)	N/A	N/A
T. Vanadium	0.00	0.100	0.064	0.014(*1)	N/A	N/A
Ra226 + Ra228	0.00	30	3.195	0.702(*1)	N/A	N/A
pCi/l	pCi/l	pCi/l	pCi/l			
T. Beryllium	0.00	0.005	0.009	0.002(*1)	N/A	N/A
T. Mercury	0.00	0.000012	0.0043	0.00000094(*1)	N/A	N/A
T. Nickel	0.00	0.759	0.041	0.009(*1)	N/A	N/A
T. Silver	0.001	0.00012	0.003	0.001	0.00012(*2)	0.005
Chlordane	N/A	0.0000043	0.00009	0.00002	0.00002	0.0008
Un-ion. Amm.(as N)	N/A	0.03	0.0006	0.0001(*1)	N/A	N/A
T. Resid. Chlorine	N/A	0.002	0.023	0.005	0.009	0.35

(*1) Cd<Cs.
(*2) WQS level.

ISSUE NO. 2

As a condition of certification, the NMED specifies that combined biomonitoring should not be conducted for the four permitted outfalls
which are spread over approximately 8.75 river miles; and that individual biomonitoring shall be applied at each outfall.

RESPONSE No. 2

The draft permit was based on the discharges of "periodic mine drainage, including collected stormwater" for Outfalls 004 and 005. Subsequently the permittee has specified that the discharges from Outfalls 004 and 005 be limited to stormwater only, as specified in the Form 2D applications; and that "any acid mine drainage will be diverted and retained in the underground mine, where it will be neutralized, pumped from the underground mine to a tailings line and conveyed to the tailings impoundment area." Therefore, Outfalls 004 and 005 are now designated for "periodic mine drainage consisting only of all mine contacted surface stormwater runoff." Periodic stormwater only discharges are not subject to biomonitoring under EPA post third round policy which is applied to dry weather flows only. Outfalls 001 and 002, which are in close proximity, presently utilize composite biomonitoring under the June 21, 1988 permit as previously certified by the NMED.

However, the NMED has clarified in subsequent correspondence that they require as a condition of certification, that individual

biomonitoring be conducted on Outfalls 001, 002, 004 and 005. This change is included in the permit.

ISSUE NO. 3

The NMED has specified as a condition of certification that for SUM2 the mass limitations be expressed as "DAILY MAX" instead of "DAILY AVG" to assure that numeric water quality standards for attainable and designated uses set forth in 2-119 and 3-101 of the WQS are protected at all times, including episodic events such as rainfall and snowmelt.

RESPONSE NO. 3

As specified in the Fact Sheet on Page 6 of 10, Ce has been calculated and addressed as the "allowable daily average effluent concentration." Daily average flows, daily average reported effluent concentrations and average ambient stream concentration have been applied in the development of Ce.
While it is analytically correct to sum the daily average mass loads for Outfalls 001, 002, 003 and 004, there is no correlation in the occurence of daily maximum loads. However, the NMED has specified as a condition of certification that these mass limitations be applied as daily maximums at SUM2. EPA has made this change.

ISSUE NO. 4

The NMED requires as a condition of certification that chemical oxygen demand (COD) limits of 125 mg/l be applied for Outfalls 004 and 005.

RESPONSE NO. 4

EPA has applied COD limits of 125 mg/l daily average and daily maximum for Outfalls 004 and 005.

ISSUE NO. 5

The NMED and others have commented that an apparent error exists in the longitude shown for Outfall 004.

RESPONSE NO. 5

The longitude for Outfall 004 is corrected to W105°31'51".

ISSUE NO. 6

The NMED notes that "flow" monitoring for Outfalls 004 and 005 is shown as "estimate" but that a more reliable basis is needed for determining compliance with effluent limits at "SUM2".

RESPONSE NO. 6

EPA agrees. Flow monitoring for Outfalls 004 and 005 is changed to "Measure" via calibrated weir.

ISSUE No. 7

The NMED notes that the description of Outfalls 004 and 005 utilizes the phrase "including collected stormwater." NMED believes that there may be uncollected storm water which may be subject to NPDES regulation and not covered under the proposed permit.

RESPONSE NO. 7

As previously stated, the description of this discharge is changed to "periodic mine drainage consisting only of all mine contacted surface stormwater runoff."

ISSUE NO. 8

Molycorp objects to the application of the effluent limitations set forth in 40 CFR 440 for Outfalls 004 and 005, and, in particular, to the proposed discharge limitation for Total Suspended Solids. Molycorp believes that these Outfalls are subject to EPA's storm water regulations and not to those limitations which apply to process wastewater discharges.

RESPONSE NO. 8

Stormwater which comes in contact with mine products and wastes is process wastewater. This has been clarified in the recent revised description of the sources being discharged at Outfalls 004 and 005. The total suspended solids (TSS) limits required under the effluent guidelines are consistantly achievable by the mining industry when proper sedimentation and control has been applied.

ISSUE NO. 9

Various commenters have expressed concern with ground water seepage to the Red River; and suggest that this ground water may be infiltrated from the mine and tailings areas, in addition to natural sources. Some commenters believe that seepages of this type represent "point sources" under the NPDES permitting program. Several have cited case law such as Sierra Club v. Abstan Construction Co., Inc., 620 F.2d 41 (5th Cir. 1980).

RESPONSE NO. 9

While EPA understands the concern of these commenters for the possible impact of ground water seepage on the Red River, we do not agree that these are "point sources" under the NPDES permitting program. Ground water is regulated by the State

through the NMED.

We are familiar with the case law citation which relates to EPA authority to require the construction and control of surface discharges (proscribed "point sources" of pollution) in instances where the operator has not applied the proper control and construction to the sources. However, the issue of seepage of groundwater which may have been infiltrated through porous soil is a different matter. We recommend that the commenters continue to pursue this issue through the NMED.

ISSUE NO. 10

Some commenters raised objections to the inclusion of a compliance schedule for Molycorp to achieve WQS at SUM2.

RESPONSE NO. 10

A compliance schedule is provided in accordance with Section 1-106.D. of Water Quality Standards for Interstate and Intrastate Streams in New Mexico. A three year schedule is considered reasonable by EPA.

ISSUE NO. 11

A commenter questioned the mass limitations allowed under SUM1, based on a daily average flow of 4.726, since Outfall 001 is not currently discharging.

RESPONSE NO. 11

Both Outfalls 001 and 002 are limited by the concentration technology limitations which are continued from the present permit. In addition, mass technology limitations are applied under SUM1. See 40 CFR 122.45(f). Mass limitations are based on the daily average flows shown in the application. The fact that a particular outfall may not be currently discharging does not negate the allowance of full technology limits under the permit.

ISSUE NO. 12

A commenter questioned the fact that certain metals are not limited under SUM2.

RESPONSE NO. 12

Subject to the screening provisions, as addressed on Page 7 of 10 of the Fact Sheet, all applicable WQS parameters are addressed under SUM2.

ISSUE NO. 13

One commenter stated that Outfalls 004 and 005 may be considered

"new sources" because they are both 1.) new discharge points and 2.) "new" - as in previously unregulated-sources or mine drainage points; and that demonstration of the technical capability of the new source outfall works must be required before discharges to waters of the United States are permitted.

RESPONSE No. 13

Outfalls 004 and 005 are not new sources. The associated mines have been in operation prior to the 1982 promulgation of the associated new source performance standards. The associated storm water discharges may have been non-permitted outfalls. The facility is not required to demonstrate any technical capability before discharges; but must meet the best available technology economically achievable (BAT)/best conventional technology (BCT) without any permit compliance schedule. Any issues related to the operation and compliance of these outfalls are enforcement matters and beyond the scope of this permit reissuance process.

ISSUE NO. 14

One commenter stated that there are no concentration based limits for manganese and molybdenum associated with Outfall 001 and SUM1; and for cobalt, selenium, beryllium, silver, chlordane and chlorine. This commenter also questions the allowance of mass loads for outfall 001 because it is not currently in operation.

RESPONSE NO. 14

Technology limitations (BAT/BCT) have been established for Outfalls 001 and 002 for many years and are addressed in the present permit. Cobalt, selenium, beryllium, silver, chlordane and chlorine are not technology limitations. The Technology Based Effluent Limitations and/or Conditions are addressed on page 4 of 10, Paragraph VIII.A. of the Fact Sheet. The application daily average flow for Outfall is addressed on Page 1 of 10, Paragraph V.A. of the Fact Sheet.

ISSUE NO. 15

One commenter questions the dilutions used for biomonitoring; states that the "whole effluent toxicity testing" allows too much dilution of mixture for testing; and states that "a mixture of 36% should be used for most tests."

RESPONSE No. 15

The calculation of the critical dilution of 22% is shown on Page 6 of 10, Paragraph VIII.B.3. of the Fact Sheet. The 0.75 dilution series is applied as specified under the most recent EPA toxics policy.

This issue is in contradiction to another issue raised by

commenters. The same daily average effluent flows used to calculate loading limits are used to calculate the critical dilution which constitutes the basis for biomonitoring test dilutions. In the first case the application effluent flow limits result in loading limits which are questioned for being too high; in the second case these same application effluent flow limits result in percent dilutions which are questioned for being too low.

ISSUE NO. 18

Several commenters have requested a public hearing on the draft NPDES permit.

RESPONSE NO. 18

The principal issues which are being raised by most commenters are not relevant to the NPDES permit. These issues relate primarily to a possible impact on the Red River from the seepage of ground water. Other issues have been addressed in this respose to comments. Therefore, it is the judgment of the permitting authority that a public hearing is not justified.

I B.V.

State of New Mexico
ENVIRONMENT DEPARTMENT
Harold Runnels Building
1190 St. Francis Drive, P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-0187

GARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
SECRETARY

EDGAR T. THORNTON, III
DEPUTY SECRETARY

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5 - NCR
6 - Correspondence
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Date Filed
Clerk's Inits.

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

NOV 22 1996

November 19, 1996

Mr. David R. Shoemaker
Mine Manager, Molycorp - Questa Division
P. O. Box 469
Questa, New Mexico 87556

Re: NM0022306, NPDES Compliance Evaluation Inspection Report

Dear Mr. Shoemaker:

Enclosed is a copy of a Compliance Evaluation Inspection (CEI) that was conducted at the Molycorp Mine and Mill on October 8, 1996. These inspections are conducted under the National Pollutant Discharge Elimination System (NPDES) permit program for the US Environmental Protection Agency (USEPA); copies of this inspection report will be sent to the USEPA in Dallas for their review.

There were several problems noted during this inspection:

- The contract lab was not following analytical methodology specified under 40 CFR Part 136, as required by the NPDES permit; the permittee indicated this problem has been corrected;

- There were other QA/QC problems documented during this inspection;

- Flow at outfall 002 was not being measured properly.

- Molycorp has documented subsurface seepages of tailings leachate to the Red River that are not addressed in this NPDES permit.

Besides these items, additional findings and details are in the enclosed report and attachments.

Please thank your staff for the cooperation extended to Richard Powell and me during this inspection.

If there are any questions regarding this inspection report, I can be reached at 827-2800.

Sincerely,

Ann M. Young

Ann M. Young
Environmental Specialist
Point Source Regulation Section

Enclosure

pc: USEPA, Region 8, 2 copies
USEPA, Region 6, Robert Murphy, 6EX-W
NMED, District 2, Santa Fe
NMED, Taos Field File

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE
DALLAS, TEXAS 75202-2733

May 6, 1997

Mr. Richard E. Schwartz
Attorney for Molycorp, Inc.
Crowell & Moring LLP
1001 Pennsylvania Avenue, N.W.
Washington, D.C. 20004-2595

Re: Molycorp, NPDES No. NM0022306

Dear Mr. Schwartz:

In response to your letter dated May 5, 1997, we have the following comments.

In the 1993 Response to Comments, it was the position of EPA Region 6 that percolation or infiltration from mine and tailings areas into groundwater did not constitute "point sources" under NPDES. However, we are aware that more recent U.S. District Court decisions are divided over this matter where "hydrologic connection" to surface waters is involved.

The only surface discharge sources from the mine areas which we considered in the 1993 reissuance in accordance with the application and our interpretation of other inputs are those associated with Outfalls 004 and 005. At that time we did not recognize and consider other surface discharges or surface seepage associated with mine wasterock piles. It was understood then that any other mine sources including the mine spoil piles percolated into groundwater. If other mine surface discharges or surface seeps exist, these would be "point sources" subject to the need for applications and permitting.

If I can add any further clarification, please contact me at voice (214) 665-7503 or FAX (214) 665-2191.

Sincerely,

Frederick O. Humke, P.E.
Environmental Engineer
Permits Branch (6WQ-PP)

cc Jane W.

MAY 12 1997

CROWELL & MORING LLP
1001 PENNSYLVANIA AVENUE, N.W.
WASHINGTON, D.C. 20004-2595
(202) 624-2500
FACSIMILE (202) 628-5116

SUITE 1200
2010 MAIN STREET
IRVINE, CALIFORNIA 92614
(714) 263-8400
FACSIMILE (714) 263-8414

180 FLEET STREET
LONDON EC4A 2HD
44-171-413-0011
FACSIMILE 44-171-413-0333

RICHARD E. SCHWARTZ
(202) 624-2905
rschwartz@cromor.com

May 9, 1997

288:rls
89371.011

VIA FEDERAL EXPRESS

Mr. Sam Coleman
U.S. Environmental Protection Agency
Region 6
Suite 1200
1445 Ross Avenue
Dallas, TX 75202-2733

Re: Amigos Bravos et al. v. Molycorp, Inc.
(D.N.M. No. CIV 95-1497 JP/DJS)

Dear Mr. Coleman:

We represent Molycorp, Inc. in the above-captioned citizen's suit brought by two citizen groups, Amigos Bravos and New Mexico Citizens For Clean Air and Water, under the Clean Water Act. Molycorp operates the Questa molybdenum mine in Taos County, New Mexico. In this suit, the plaintiffs have alleged that certain discharges to ground water at the Questa mine require an NPDES permit. We understand that the plaintiffs recently contacted your office and made the same allegations.

EPA Region 6 has issued and reissued NPDES permits for this mine since 1977, most recently on October 15, 1993. The plaintiffs' allegations in the citizen suit are identical to allegations regarding alleged discharges to ground water raised by various public commenters (including the plaintiffs) before EPA Region 6 in Molycorp's last permit reissuance proceeding in 1993. EPA clearly rejected those allegations when it stated, in part:

> Various commenters have expressed concern with ground water seepage to the Red River and suggest that this ground water may be infiltrated from the mine and the tailings areas, in addition to natural sources....

> While EPA understands the concern of these commenters for the possible impact of ground water seepage on the Red River, we do not agree that these are "point sources" under the NPDES permitting program.

EPA, Response to Comments, NPDES Permit No. NM 0022306 (1993).

EPA can, of course, reevaluate these issues when Molycorp's permit comes up for renewal in 1998. In the meantime, we are concerned that the representatives of Amigos Bravos may be presenting a misleading portrayal of the facts. Accordingly, we are enclosing copies of the reports recently prepared by expert witnesses for Molycorp in the defense of the pending citizens' suit. The key conclusions of the enclosed reports are briefly set forth below.

The report by Dr. William Schafer, dated April 23, 1997, concludes:

> Based on these studies, changes in metal concentrations within a river system can be attributed to a number of factors including deposition in the stream bed, resuspension of previously deposited precipitates, adsorption onto bed sediments or dissolution from bed sediments. Consequently, changes in concentration in metals in the Red River cannot be reliably attributed to the Molycorp mine without proper consideration of these processes. When surface water data are properly interpreted, there is no indication that the Molycorp mine, currently, or at any time, has contributed metal loads to the Red River. [p. 16].

Another report, dated April, 1997, was prepared by biologists James Chadwick and Steve Canton of Chadwick Ecological Associates. It concludes as follows:

> The trends for both fish and benthic invertebrates indicate that the cumulative impacts of sediment from a number of sources, and possibly decreased water quality, substantially decrease the suitability of the Red River to sustain aquatic biota in the reaches upstream of the Molycorp Questa mine. This pattern was evident during both baseline [early 1960s] and present

> conditions. In the reaches of the Red River adjacent to the mine and downstream of Capulin Canyon, the suitability of the river to sustain aquatic biota does not improve. This pattern was established prior to open-pit mining during baseline conditions and continues to the present. The open pit mine and waste rock piles do not appear to have measurably impacted the suitability of the Red River to support aquatic biota. [p.66].

We suggest that you review Chadwick's figures which illustrate these findings, such as at pages 36, 40 and 63.

The report by Dr. Ian Hutchison, dated April 23, 1997, includes the following major opinions:

- **Constituent sources and conveyances:** There are no discernible, confined and discrete conveyances of constituents from the overburden piles (also referred to as waste rock piles) to the Red River.

- **Hydraulic connection:** Conditions at the mine site are not well enough understood to determine whether there is a direct hydraulic connection between the overburden piles and the Red River.

- **Red River Water Quality:** The available data does not support the conclusion that there has been a general reduction in the water quality of the Red river cause by mining activities between the mid-1960s and the mid-1990s.

- **Sources of constituents in Red River:** The available data does not allow for a determination of whether constituent loadings in Red River are derived from overburden piles, scar area, or from alluvial deposits in tributary and Red River channels. [pp. 2-3].

Finally, Mr. Richard Reavis, who has spent 18 years implementing the NPDES program with EPA (Region 9) and the State of Nevada, concludes in his report dated April 23, 1997, as follows:

> No unpermitted point sources of pollution as defined in 40 C.F.R. Sec. 122.2 exist at the Questa molybdenum mine (Molycorp mine)...The seepage zones that occur along the south boundary of the Molycorp property in the north bank of the Red River are unconfined seeps of groundwater that do not meet the definition of 40 C.F.R. Sec. 122.2, and must be considered non-point sources of pollution. [p. 2].

Please contact either of us if you have further questions regarding these matters.

Very truly yours,

Richard E. Schwartz
R. Timothy McCrum

Enclosures

cc: Mr. Jack Ferguson (w/o encs.)
Caroline Kirksey, Esq. (w/encs.)
Mr. Frederick Humke (w/encs.)

USGS

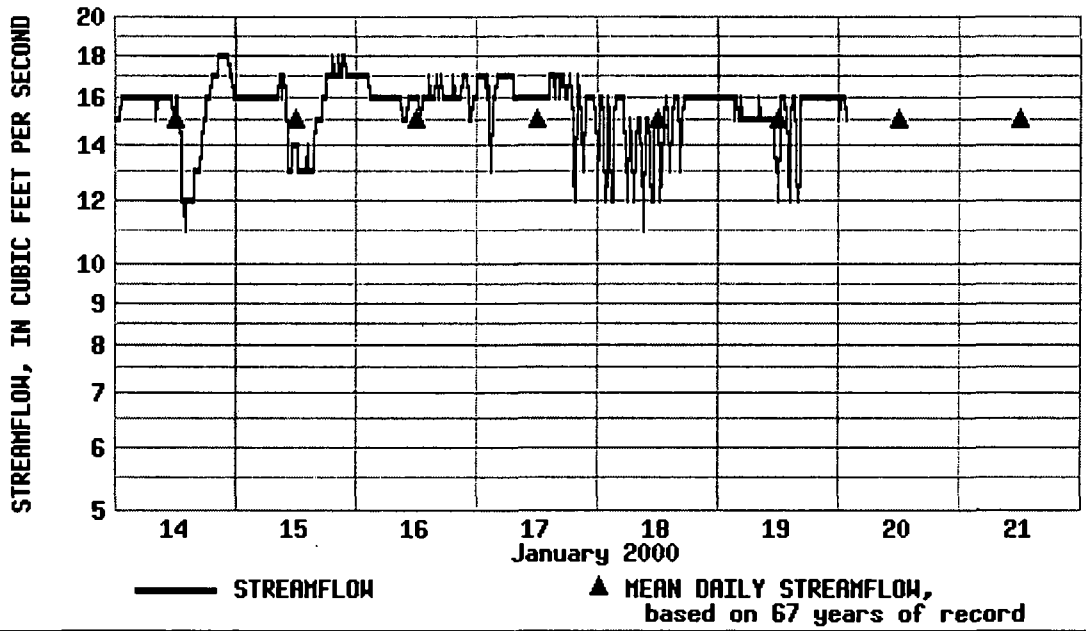
PROVISIONAL DATA SUBJECT TO REVISION

08265000-- RED RIVER NEAR QUESTA, NM

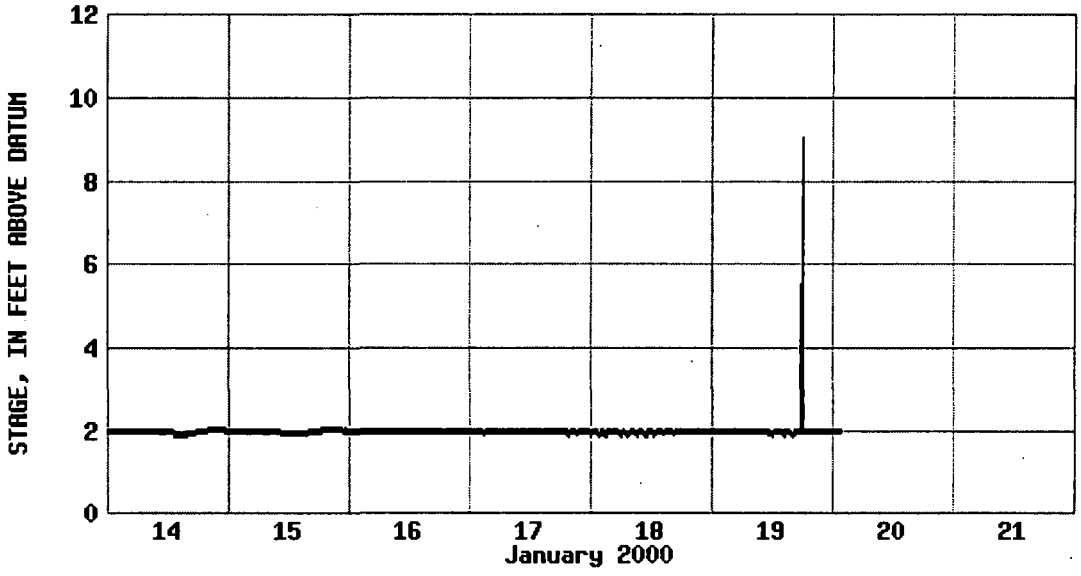
Current Conditions

Flow (ft^3/s)	Stage (ft)	Date	Time
15	1.98	01/20	01:45

Streamflow -- updated Thu Jan 20 01:45 2000 -- download presentation-quality graph



Stage -- updated Thu Jan 20 01:45 2000 -- download presentation-quality graph



- Historical daily mean or peakflow data for this station
- Complete station data for previous water year
- Return to Current Streamflow Conditions table

Station Description

STATION.--08265000 RED RIVER NEAR QUESTA, NM
LOCATION.--Lat 3642'12", long 10534'04", in NE1/4SE1/4 sec.32, T.29 N., R.13 E. (projected), Taos County, Hydrologic Unit 13020101, in Carson National Forest, on left bank 1.3 mi upstream from Cabresto Creek, 1.5 mi east of Questa, and at mile 9.0.
DRAINAGE AREA.--113 mi2.
PERIOD OF RECORD.--April to October 1910 and January to September 1911 (gage heights and discharge measurements only), October 1912 to March 1924, May 1924 to September 1925, January to March 1926, September 1926 to current year. Monthly discharge only for some periods, published in WSP 1312. Published as "Rio Colorado above Questa" 1910-11, 1926-30, and as "Rio Colorado near Questa" 1912-25, 1930-48.
REVISED RECORDS.--WSP 808: 1935. WSP 1392: 1913, 1932, 1941, 1947-48. WSP 1712: Drainage area.
GAGE.--Water-stage recorder. Wood or concrete control since Mar. 20, 1936. Datum of gage is 7,451.92 ft above National Geodetic Vertical Datum of 1929. See WSP 1923 for history of changes prior to Oct. 4, 1938.
REMARKS.--Records are good except for estimated daily discharges, which are fair. Diversions for irrigation of a few hundred acres upstream from station. Figures of discharge do not include flow in South ditch which diverts from left bank 1,500 ft upstream and bypasses gage for irrigation and stock water downstream. January 1966 to December 1991 surface and ground-water diversions by Molybdenum Corp. of America (Molycorp) refinery 5.5 mi upstream bypass gage in tailings pipelines on left bank and discharge into settling pond 3 mi downstream. Effluent from this pond enters Red River as surface water and is included in discharge at Red River below Fish Hatchery, near Questa (station 08266820).
AVERAGE DISCHARGE.--52 years (water years 1913-25, 1927-65), 55.9 ft3/s, 40,500 acre-ft/yr, prior to extensive upstream diversion by Molycorp.

Daily Mean Flow Statistics for 01/20 based on 67 years of record, in ft^3/s

Latest flow 01/20 01:45	Minimum	Mean	Maximum	80 percent exceedance	50 percent exceedance	20 percent exceedance
15	3.7	15	30	10.0	16	20
Percent exceedance means that 80, 50, or 20 percent of all daily mean flows for 01/20 have been greater than the the value shown.						

Return to Water Resources in New Mexico

Submit a request for hydrologic information Data Request Form
Please direct questions or comments about this web site to New Mexico Webmaster

Last modified: 6/2/99

rt_www -- (rev 2.02) -- Acknowledgements

UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF NEW MEXICO

AMIGOS BRAVOS, a nonprofit corp., and NEW MEXICO CITIZENS FOR CLEAN AIR AND WATER, a nonprofit corp.,

Plaintiffs,

v. **CIVIL NO. 99-327 DJS/RLP**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,

Defendant.

MEMORANDUM OPINION AND ORDER

THIS MATTER comes before the Court upon Defendant's Motion to Dismiss filed June 15, 1999 (Docket No. 12). Pursuant to 28 U.S.C. §636(c) and Fed.R.Civ.P. 73, this case has been assigned to a Magistrate Judge for final disposition.

This action is a suit pursuant to the Clean Water Act, 33 U.S.C. §§1251-1387 brought under the citizen suit provision located at 33 U.S.C. §1365(a)(2). Plaintiffs contend that the Molycorp Molybdenum mine located near Questa, New Mexico is illegally discharging pollutants such as acids and heavy metals from waste rock dumps located along the Red River. Plaintiffs further contend that those waste rock dumps constitute point sources of pollution and that Molycorp does not have a National Pollution Discharge Elimination System (NPDES) permit permitting the discharges. Plaintiffs state that Defendant issued a report on February 13, 1998 regarding Molycorp's mining

activity at Questa which found that discharges from the waste rock dumps were the primary source of metals polluting the Red River. Plaintiffs argue that, based upon the findings in the report, the discharges from those waste rock dumps are illegal. Plaintiffs seek a declaration that Defendant has violated a non-discretionary duty to take enforcement action regarding the discharge of pollutants from the Molycorp waste rock dumps. They ask that this Court order Defendant to either issue Molycorp a compliance order or bring a civil action against the company for the illegal discharge of pollutants. In addition, Plaintiffs request that the Court require Defendant to either issue an NPDES permit to Molycorp for the dishcarges or prohibit the discharges.

Defendant contends that this Court lacks jurisdiction to hear Plaintiffs' complaint because the exclusive jurisdiction for challenges to permits issued by the EPA is in the Courts of Appeals pursuant to 33 U.S.C. §1369(b)(1)(F). In addition, Defendant asserts that this suit should be barred by the doctrine of collateral estoppel because the issues contained in the complaint were decided in Amigos Bravos v. Molycorp, 95-Cv-1497 JP/DJS, another suit brought in this district. Further, Defendant asserts that Plaintiffs' claims are subject to dismissal because it does not have a mandatory duty under the Clean Water Act (CWA) to take any enforcement action against Molycorp. Finally, Defendant argues that this Court lacks subject matter jurisdiction to hear Plaintiffs' claims contained in Count I of the complaint and the allegation that it had a mandatory duty to issue an National Pollution Discharge Elimination System (NPDES) permit as alleged in Count II of the complaint because Plaintiffs failed to provide the mandatory, jurisdictional 60-day notice before filing this suit pursuant to 33 U.S.C. §1365(b)(2). The Court does not reach the latter questions because it concludes that this action is barred by the doctrine of collateral estoppel.

In Amigos Bravos v. Molycorp, 95-Cv-1497 JP/DJS, aff'd, 166 F.3d 220, 1998 WL792159

(10th Cir. Nov. 13, 1998) (unpublished disposition), the plaintiffs brought suit pursuant to the citizen suit provisions of the Clean Water Act, alleging that pollutants were being leached from the waste rock piles of the Molycorp mine into the Red River through groundwater flow and that the discharge was not authorized by an NPDES permit. The plaintiffs in that action sought several forms of relief, including an order declaring that Molycorp was violating the CWA by failing to obtain an NPDES permit, an order enjoining Molycorp from not complying with the CWA, and an order imposing maximum civil penalties against Molycorp for violating the Act. Amigos Bravos v. Molycorp, Inc., 1998 WL 791259 at 1. The District Court held that the complaint in that action attacked the EPA's decision to reissue an NPDES permit to Molycorp without regulating ground water seepage into the Red River. Amigos Bravos, 95-Cv-1497, Memorandum Opinion and Order entered Sept. 11, 1997 (Docket No. 51) (hereinafter Memorandum Opinion). The District Court therefore concluded that the claims must have been brought as a petition for review pursuant to 33 U.S.C. §1369(b)(1)(F) in the Circuit Court of Appeals. Id.

Plaintiffs argue that they are not challenging the adequacy of Molycorp's 1993 NPDES permit but rather are challenging Defendant's decision to ignore known illegal discharges of high metals concentrations into the Red River as documented in Defendant's February 13, 1998 report. Plaintiffs contend that they would not have filed the instant action but for the report. In order to apply the doctrine of collateral estoppel, each of the following criteria must be met:

> 1) the issue previously decided must be identical to the one presented in the action in question; 2) the prior action was finally adjudicated on the merits; 3) the party against whom the doctrine is invoked was a party or in privity with a party to the prior adjudication; and 4) the party against whom the doctrine is raised had a full and fair opportunity to litigate the issue in the prior adjudication.

United States v. Rogers, 960 F.2d 1501, 1508 (10th Cir.) cert. denied 506 U.S. 1035 (1992) (citations omitted). When determining whether collateral estoppel applies, a court must examine the record of

the prior proceeding and take into account the pleadings, evidence, charge, and other relevant matters. Id. (quoting Ashe v. Swenson, 397 U.S. 436, 444 (1970)).

In this case, the issue is the prohibition or permitting of contaminated groundwater seepage from the Molycorp mine waste rock piles into the Red River. That issue is identical to the issue in the previous case. In the first action, Plaintiffs brought suit against Molycorp to compel it to stop the pollution or obtain a permit. In this action, Plaintiffs argue that the EPA is required to compel Molycorp to stop polluting or issue it a permit. In the previous case, Judge Parker ruled that Plaintiff's action attacked the existing NPDES permit, which specifically excluded the groundwater seepage, and therefore must have been brought as a challenge to the permit in the Court of Appeals pursuant to 33 U.S.C. §1369(b)(1)(F). Memorandum Opinion at 5-6. In that case, the plaintiffs argued that the EPA never considered the effects of the pollution originating from the waste rock dumps, therefore they were not challenging the decision to issue or deny a permit. Id. at 4. Judge Parker looked to the relief requested to determine whether the plaintiffs were challenging the permit. Id. Plaintiffs' current reliance on the February 13, 1998 finding by Defendant that the waste rock piles constitute point sources is misplaced. Collateral estoppel requires an identity of the issues raised in the successive proceedings and the determination of those issues by a valid final judgment. Sil-Flo, Inc. v. SFHC, Inc., 917 F.2d 1507, 1520 (10th Cir. 1990). In this case, Plaintiffs have chosen a different legal theory to proceed under and named a different defendant than in the Molycorp suit; however, the ultimate question of whether the discharge of pollutants from the waste-rock piles at the Molycorp mine into groundwater and thus the Red River must be stopped or subject to an NPDES permit, remains the same.

There is no dispute that the prior action was adjudicated on the merits. Further, Plaintiff

Amigos Bravos brought both actions so the privity requirement for applying the doctrine of collateral estoppel has been satisfied. In addition, review of the file for 95-Cv-1497 JP/DJS establishes that Plaintiff had a full and fair opportunity to litigate the issues in that action. Consequently, all of the requirements listed in Rogers, *supra* have been met and summary judgment is appropriate.

IT IS THEREFORE ORDERED that Defendant's Motion to Dismiss is granted on the ground that this action is subject to collateral estoppel. This matter will be dismissed with prejudice.

DON J. SVET
UNITED STATES MAGISTRATE JUDGE

UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF NEW MEXICO

AMIGOS BRAVOS, a nonprofit corp., and NEW MEXICO CITIZENS FOR CLEAN AIR AND WATER, a nonprofit corp.,

Plaintiffs,

v. CIVIL NO. 99-327 DJS/RLP

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,

Defendant.

JUDGMENT

THIS MATTER came before this Court for decision pursuant to Defendant's Motion to Dismiss. By separate Memorandum Opinion and Order, the Court granted the motion on the ground that this action is barred by the doctrine of collateral estoppel.

IT IS THEREFORE ORDERED AND ADJUDGED that this matter be, and hereby is, dismissed with prejudice.

DON J. SVET
UNITED STATES MAGISTRATE JUDGE

AMIGOS BRAVOS

Friends of the Wild Rivers

Delivered in person: 7/29/99
Greg Cook, Regional Administrator
EPA Region VI

Dear Mr. Cook,

Thank you for coming to New Mexico and meeting with representatives of the environmental community. Due to previous commitments, I apologize for not staying for the entire meeting.

I wish to bring to your attention two major areas of concern for Amigos Bravos: 1) Pollution emanating from the Molycorp mine in Questa, and 2) New Mexico's water quality standards.

The Molycorp mine in Questa

On February 13, 1998, EPA released a report documenting a direct connection between Molycorp's 328 million tons of waste rock and pollution emanating from seeps along the Red River. The report also finds that the waste rock constitutes a "point source" of pollution. Over the past ten years concerned citizens have requested that EPA issue an NPDES permit for the waste rock. All requests have been denied. On October 1998, Molycorp's NPDES permit for its tailings facility and other mine operations (excluding the waste rock) expired. EPA is presently writing up a new permit which we hope will include the waste rock piles.

Could you please let me know if the new permit will include the waste rock piles, and when the permit is scheduled for release?

The New Mexico Water Quality Standards

The New Mexico State Legislature has passed a statute that exempts irrigation and flood control facilities from having to meet State water quality standards for temperature, dissolved oxygen, sediment and turbiditi. Through the triennial review process, the New Mexico Water Quality Control Commission is proposing to adopt this statute as part of the State's water quality standards. Amigos Bravos contends that the statute is contrary to the federal Clean Water Act and therefore the new standards cannot not be approved by EPA. Moreover, proposed changes in the State's Antidegradation Policy would downgrade rivers that are currently protected under the standards. Current standards specify that: *"**No degradation shall be allowed** in high quality waters of designated national and state monuments, parks and wildlife refuges including waters designated by the US Congress under the Wild and Scenic Rivers Act, if such degradation would impair any of the qualities which caused designation of these waters, parks and wildlife refuges."* NMED's proposed new language would remove all these sections of river from existing protection. We believe that removing existing protection without undertaking a User Attainability Study is illegal and therefore the proposed standards must not be approved by EPA.

How is EPA proposing to deal with these blatant violations of the Clean Water Act?

I look forward to your response regarding these two questions.

Sincerely,

Brian Shields, Executive Director

PO BOX 238 • TAOS, NEW MEXICO 87571
T. 505-758-3874 • F. 505-758-7345
email: bravos@taos.newmex.com www.newmex.com/amigosbravos

CROWELL & MORING LLP
1001 PENNSYLVANIA AVENUE, N.W.
WASHINGTON, D.C. 20004-2595
(202) 624-2500
FACSIMILE (202) 628-5116

SUITE 1200
2010 MAIN STREET
IRVINE, CALIFORNIA 92614
(714) 263-8400
FACSIMILE (714) 263-8414

100 FLEET STREET
LONDON EC4A 2HD
44-171-413-0011
FACSIMILE 44-171-413-0333

RICHARD E. SCHWARTZ
(202) 624-2905
rschwartz@cromor.com

May 5, 1997

By Facsimile and Federal Express

Mr. Frederick O. Humke
Environmental Engineer
Permits Branch (6WQ-P)
U.S. Environmental Protection Agency - Region 6
1445 Ross Avenue
Dallas, TX 75202-2733

Re: Molycorp's NPDES permit No. NM0022306

Dear Mr. Humke:

I am writing to ask you to confirm our telephone conversation of this morning, in which I asked you to clarify your April 30, 1997 letter to Mr. Brian Shields, which I received on Friday afternoon. I have three specific topics that I hope you will address.

1. Seepage sources described to you by Mr. Shields and Mr. Burnett. You told me the basis for the statement in your April 30 letter that "...EPA did not consider discharges or seepages associated with mine wasterock piles." Specifically, Mr. Shields and Mr. Grove Burnett told you that the waste rock piles were sources of discrete *above-ground* seeps from the waste rock piles which flowed across the ground surface into the Red River. That was type of seepage from waste rock piles that you were referring to in your letter. (As you will recall, EPA did permit storm water discharges from the waste rock piles in 1993; see Response to comments, Final Permit Decision re Molycorp, Issues Nos. 2 and 13; September 10, 1993.) I would appreciate it if you would confirm that this was the type of discrete seepage you were referring to in your April 30 letter.

2. Seepage sources that EPA considered in 1993. Second, you told me that in 1993 EPA *did* consider seepage from the waste rock piles at the mine that percolated into *ground water*. The enclosed comments describe the seepage as emerging in springs or seeps which then enter the Red River. I would appreciate it if you would confirm that in the 1993 permit proceeding EPA considered this subject.

3. Mine area seepage. In your April 30 letter, you indicated that EPA's consideration of seepage (reflected in its Response to Comments, Issue No. 9) included both the mine area and the tailings area, but primarily the latter. I am enclosing some of the comments to which EPA was responding, to refresh your recollection on that subject. I would be appreciative if you could let me know whether the major focus of EPA's consideration was the mine area.

Thank you very much for your help in clarifying the issues raised in your April 30, 1997 letter. We need your assistance to set the record straight.

Sincerely,

Richard E. Schwartz

Attorney for Molycorp, Inc.

CROWELL & MORING LLP
1001 PENNSYLVANIA AVENUE, N.W.
WASHINGTON, D.C. 20004-2595
(202) 624-2500
FACSIMILE (202) 628-5116

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Thank You.

FACSIMILE COVER PAGE

FAX TELEPHONE NUMBER: (202) 628-5116

Date: May 4, 1999

To: Fred Hamke

Firm: U.S. EPA - Region 6

Facsimile Telephone Number: 214/665-2191

Total Number of Pages (*Includes Cover Sheet*): 3

From: Rich Schwartz

Message: Thanks for your help.

Hard Copy to Follow: Yes No

C&M Form #7

from Centralized Waste Treatment Facility Guidelines via Timothy Connor HQS

	A	B	C
1		Table 1.	Revised
2		(Sorted by CAS Number, Carcinogens at 10-5 Risk)	
3			
4		Date	
5		of last	CAS
6		Update	Number
7		Classicals	
8	1		C002
9	2		C004
10	3		C007
11	4		C009
12	5		C010
13	6		C012
14	7		C020
15	8	11/98	57125
16	9	11/98	7664417
17	10	11/98	18496258
18	11	11/98	18540299
19		Metals	
20	1	11/98	7429905
21	2	5/99	7439885
22	3	11/98	7439896
23	4	11/98	7439921
24	5	3/99	7439932
25	6	11/98	7439965
26	7	11/98	7439976
27	8	11/98	7439987
28	9	11/98	7440020
29	10	3/99	7440213
30	11	11/98	7440224
31	12	3/99	7440246
32	13	11/98	7440280
33	14	11/98	7440315
34	15	11/98	7440326
35	16	11/98	7440360
36	17	11/98	7440382
37	18	11/98	7440393
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39	20	11/98	7440439
40	21	11/98	7440473
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42	23	11/98	7440508
43	24	11/98	7440622
44	25	11/98	7440655
45	26	11/98	7440666
46	27	5/99	7440677
47	28	11/98	7782492

	D	E	F
1	Toxic Weighting Factors for 128 Centralized Waste Treater Pollutants of Concer		
2			
3			
4		Freshwater Aquatic Life	
5		Chronic	
6	Pollutant Name	Value (ug/l)	Code
7			
8	BOD5		
9	COD		
10	HEM (and O&G)		
11	TSS		
12	TDS		
13	TOC		
14	Total Phenols		
15	Total Cyanide	5.2	C
16	Ammonia as N	2280	C
17	Sulfide, Total	2	C
18	Hexavalent Chromium	11	C
19			
20	Aluminum	87	C
21	Iridium		
22	Iron	1000	C
23	Lead	2.5	C
24	Lithium	464	LO
25	Manganese	388	LO
26	Mercury	0.77	C
27	Molybdenum	27.8	LO
28	Nickel	52	C
29	Silicon		
30	Silver	0.34	@A10
31	Strontium		
32	Thallium	40	LC
33	Tin	18.6	LO
34	Titanium	191	LO
35	Antimony	1600	LC
36	Arsenic	150	C
37	Barium	2813	LO
38	Boron	31.6	LO
39	Cadmium	2.2	C
40	Chromium	74	C
41	Cobalt	49	GRO
42	Copper	9	C
43	Vanadium	9	LO
44	Yttrium		
45	Zinc	120	C
46	Zirconium	10.3	LO
47	Selenium	5	C

	G	H	I	J	K
1					
2					
3					
4			Human Health		
5		Ingesting Org. Only			
6	Spec.	Ref.	Value (ug/l)	Code	Ref.
7					
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10					
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14					
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16	NA	1			
17	NA	3			
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21					
22		3			
23	NA	1			
24	RT	15			
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31			680000	@T	
32	FM	1	6.5	@T	
33	RT	15			
34	RT	15			
35	FM	1	4300	@T	
36	NA	1	1.6	@C	
37	RT	15			
38	RT	15			
39	NA	1	84	@T	
40	NA	1	1000000	@T	
41	FM	300			
42	NA	1	1200	@T	
43	RT	15			
44					
45	NA	1	69000	@T	
46	RT	15			
47	NA	1	11000	@T	

	L
1	
2	
3	
4	Toxic
5	Weighting
6	Factor
7	
8	
9	
10	
11	
12	
13	
14	
15	1.1E+00
16	2.5E-03
17	2.8E+00
18	5.1E-01
19	
20	6.4E-02
21	
22	5.6E-03
23	2.2E+00
24	1.2E-02
25	7.0E-02
26	1.2E+02
27	2.0E-01
28	1.1E-01
29	
30	1.6E+01
31	8.2E-06
32	1.0E+00
33	3.0E-01
34	2.9E-02
35	4.8E-03
36	3.5E+00
37	2.0E-03
38	1.8E-01
39	2.6E+00
40	7.6E-02
41	1.1E-01
42	6.3E-01
43	6.2E-01
44	
45	4.7E-02
46	5.4E-01
47	1.1E+00

	A	B	C
48		Organics	
49	1	11/98	50328
50	2	1/99	56235
51	3	11/98	56553
52	4	5/99	58902
53	5	11/98	59507
54	6	1/99	59892
55	7	3/99	60297
56	8	3/99	65850
57	9	11/98	67641
58	10	11/98	67663
59	11	11/98	68122
60	12	11/98	71432
61	13	11/98	71556
62	14	1/99	75014
63	15	11/98	75092
64	16	11/98	75150
65	17	1/99	75252
66	18	1/99	75354
67	19	11/98	78933
68	20	1/99	79005
69	21	1/99	79016
70	22	11/98	83329
71	23	11/98	84662
72	24	11/98	84742
73	25	11/98	85018
74	26	2/99	85687
75	27	11/98	86737
76	28	11/98	86748
77	29	1/99	87865
78	30	3/99	91203
79	31	11/98	91576
80	32	11/98	92524
81	33	11/98	95487
82	34	1/99	95501
83	35	5/99	95954
84	36	5/99	96184
85	37	3/99	98555
86	38	11/98	98862
87	39	11/98	99876
88	40	11/98	100414
89	41	2/99	100425
90	42	11/98	100516
91	43	5/99	101848
92	44	11/98	105679
93	45	3/99	106445
94	46	1/99	106467

Eighteen petitioners challenged EPA's final effluent limitation guidelines (ELGs) for the coastal oil and gas producing industry, which were promulgated January 15, 1997. Three of the petitions also sought review of a NPDES general permit for oil and gas producing facilities issued by EPA Region 6 on January 9, 1995. Petitioners challenged EPA's promulgation of zero discharge limits on produced water and produced sand, EPA's decision to set more lenient limits for coastal facilities in Cook Inlet, Alaska, and Region 6's issuance of a general permit that banned the discharge of produced water from coastal facilities in Texas.

Texas petitioners asserted that in developing the zero discharge limit on produced water in the final ELG, EPA relied on a flawed analysis of the economic achievability of the limit and the Agency based its pollutant reduction estimates on a limited and unrepresentative study (the "10-facility study"). Petitioners argued that EPA excluded from its consideration wells drilled before 1980 and not recompleted since then. The court rejected this argument, finding that although the fact that EPA did not consider pre-1980 wells in this action may have had some effect on EPA's analysis, it did not rise to the level of an "arbitrary and capricious agency action." Rather, the court found that because marginally producing wells similar to the pre-1980 wells had been adequately represented in the Agency's Section 308 survey data, EPA had established a rational relationship between its decision and the basis for that decision. Similarly, the court rejected petitioners arguments regarding the 10-facility study, finding that the study only was used to estimate pollution reduction benefits. The court stated that the "benefit to be achieved from adopting a particular pollution control technology is not an element of that technology's cost," and found that such benefits were not a required part of the BAT determination. Given this fact, the court observed that even serious flaws in the study would not have provided "grounds for remanding the zero discharge limit."

Cook Inlet petitioners asserted that in setting the zero discharge limit on produced sand, EPA improperly refused to consider a "no free oil" alternative based on a sand washing treatment technology. The court dismissed this argument based on the fact that every coastal facility surveyed except one was practicing zero discharge at the time of the rulemaking, and the Agency had considered sand washing and concluded that it was not always effective in eliminating pollutants from produced sand.

Alaska petitioners argued that EPA violated the CWA when the Agency established different limits for Coastal facilities outside Alaska than for those in Cook Inlet without establishing Cook Inlet as a separate subcategory. The court, however, found that EPA had engaged in a permissible construction of the CWA because the Agency had appropriately balanced the need for nationally uniform standards with the need for some flexibility to address one group of point sources within a long-established category that were "dramatically different from all other point sources within that subcategory. (Chem. Mfrs. Ass'n v. Natural Resources Defense Council, 470 U.S. 116 (1984)). The court found it significant that EPA had concluded that due to geography and the circumstances of Cook Inlet, the cost of complying with zero discharge would have been "substantially higher for Cook Inlet facilities." Ultimately, the court found that, based on these facts, EPA had sufficient plenary rulemaking authority to set different effluent limits for these facilities.

Finally, the court found the challenge to the Region 6 general permit was moot, since even if the permit was remanded the final result would be governed by the final ELGs and, thus, the same zero discharge standard would be imposed.

2. **Tenth Circuit holds that plaintiff cannot use CWA citizen suit provisions to challenge a NPDES permit that does not address the discharge of pollutants to groundwater where EPA determined during permit renewal that the**

permittee did not need a permit for groundwater seepage:

Notice: Rules of the Tenth Circuit Court of Appeals may limit citation to unpublished opinions. Please refer to the rule of the U.S. Court of Appeals for this Circuit (10th Cir. R. 36.3).

Amigos Bravos v. Molycorp, 1998 U.S. App. Lexis 28567 (10th Cir. 1998).

Plaintiffs, two non-profit corporations whose members are interested in protecting New Mexico's water resources, brought a citizen suit against defendant Molycorp, who operated a molybdenum mine that discharged pollutants pursuant to a NPDES permit into the Red River, alleging that pollutants were being leached from waste rock piles at defendant's mine and discharged into the Red River through groundwater flow, seeps, and springs, and that these discharges were not authorized under defendant's NPDES permit. The district court had previously dismissed plaintiff's claims for lack of subject matter jurisdiction, finding that such claims should have been brought before the court of appeals in connection with defendant's permit renewal in 1993.

On appeal, plaintiffs argued that EPA did not follow the procedures necessary to include the discharges from the waste rock piles to groundwater in the final permit, EPA's response to comments regarding groundwater issues pertained to issues other than the alleged discharges from the waste rock piles, EPA did not take any "action" regarding waste rock pile discharges to groundwater because EPA's response neither issued, denied, nor required an NPDES permit for these discharges, and EPA's response to comments on discharges to groundwater did not reflect EPA's position on groundwater discharges that are hydrologically connected to surface waters. **The court of appeals rejected these arguments and affirmed the decision of the district court. The court agreed that plaintiffs should have pursued their present claims during the permit renewal process.** The court stated that plaintiff's claims were not viable because several opportunities existed for plaintiffs to challenge EPA's decision through administrative and judicial review. The court noted that plaintiffs could have requested that the Regional Administrator grant an evidentiary hearing to reconsider or contest the decision, and could have petitioned the U.S. Court of Appeals for review of that decision. With regard to the plaintiff's arguments that EPA focused on groundwater issues other than discharges from the waste rock piles and, therefore, did not consider the discharges at issue, the court found that the issue of waste rock drainage was raised in the public comments and that EPA addressed this concern by stating that it understood the concern for possible impact of seepage to the Red River, but that groundwater seepage was not considered a "point source" under the NPDES permitting program but is regulated by the State through the New Mexico Environmental Department.

3. **District court holds that a NPDES storm water permit is not required for the construction of farming access roads, and that construction activities that disturb less than five acres and are not part of a larger common plan of development, are not subject to NPDES permit requirements:**

Mamo v. Galiher, 28 F. Supp. 2d 1258 (Dist. Ct. Haw., Nov. 25, 1998).

Plaintiff Na Mamo O 'Aha' Ino brought an action under the CWA that alleged that various construction activities on defendants' property triggered the need for a NPDES stormwater permit and that defendants failed to obtain a dredge and fill permit prior to filling a portion of an adjacent wetland and stream. The construction activities alleged included building a helipad and utility barn, creating terraces, erecting water tanks for irrigation, storing road building materials, filling wetlands, clearing a turnaround area, and constructing, using and maintaining access roads. Defendants argued

6WQ-P Jane

Date Stamped June 5, 1997

Memorandum

SUBJECT: Federal District Court Rulings In Oregon Concerning NPDES Coverage Of Groundwater Discharges And Discharges By Passive Migration

FROM: Paul Bangser
Attorney

THRU: Susan Lepow
Associate General Counsel
Water Division (2355)

TO: Robert Perciasepe
Assistant Administrator for Water 4101)

Two recent decisions by federal district courts in Oregon have reached opposite conclusions as to whether the Clean Water Act requires permits for discharges to groundwaters that are hydrologically connected to surface waters. These two cases are described below and copies of the opinions are attached. In the second case described below (Umatilla), the court also held that passive migration of pollutants in the subsoils can be an longoing ~~dischargek subject to~~ NPDES permitting. These two cases were citizen suits in which EPA was not a party, although we now need to decide whether to participate as amicus curiae in the appeal of the Umatilla case.

Background

As you know, the Clean Water Actjs NPDES permitting program regulates point source discharges to lnavigable waters.k The Act defines lnavigable watersk as lthe waters of the United States, including the territorial seas.k The Actjs legislative history makes it clear that by these terms, Congress intended the NPDES program in general to regulate only discharges to surface waters and not groundwaters. An exception, however, under EPAjs interpretation of the Act is that NPDES coverage does extend to discharges to groundwaters that have a direct hydrologic connection to surface waters.

EPA does not have a regulation setting forth this interpretation of the Act. The Agency has, however, stated its position on this issue in a number of places. First, there are at least three preambles in which EPA has interpreted CWA coverage to extend to hydrologically connected groundwaters. See 58 Fed. Reg. 7610, 7623, 7631 (Feb. 8, 1993) (general permit for CAFOs); 56 Fed. Reg. 64892 (Dec. 12, 1991) (water quality standards regulation); 55 Fed. Reg. 47990, 47997 (Nov. 16, 1990) (stormwater permit application regulations). In one, EPA explained that the affected groundwaters are not themselves lwaters of the United Statesk but discharges to these groundwaters are regulated because they are effectively discharges to the directly connected surface waters.

56 Fed. Reg. 64892. EPA also stated its position on the groundwater issue in the Office of Waterjs December, 1995 guidance manual on concentrated animal feeding operations. There are also Regional enforcement actions that have been based on this interpretation of the Act, and apparently there are also various letters from the Regions to the regulated community stating EPAjs position.

A number of federal court decisions in citizen suits have addressed the issue of discharges to surface waters via groundwater. The majority of these cases, including cases within the Ninth Circuit (which includes Oregon), have found in favor of NPDES jurisdiction over such discharges, e.g., Washington Wilderness Coalition v. Hecla Mining Co., 870 F.S. 983, 990 (E.D. Wash. 1994); Sierra Club v. Colorado Refining Co., 838 F.S. 1428, 1433-34 (D. Colo. 1993); MESS v. Weinberger, 707 F.S. 1182, 1195-96 (E.D. Cal. 1988). A few cases have found against jurisdiction, e.g., Kelly v. U.S., 618 F.S. 1103, 1106-07 (W.D. Mich. 1985); Village of Oconomowoc Lake v. Dayton Hudson Corp., 24 F.3d 962, 965 (7th Cir. 1994). The two recent decisions described below are the latest additions to this body of case law.

Recent Court Rulings

Friends of the Coast Fork -- CWA Does Cover Hydrologically Connected Groundwater. On January 31, 1997, Magistrate Judge Coffin of the federal district court, District of Oregon issued a decision finding that the Act does reach discharges to hydrologically connected groundwaters. Friends of the Coast Fork v. County of Lane, Oregon, No. 95-6105-TC. This case involved a creek that ran across one portion of a landfill site. The court made a factual finding that groundwater that contained leachate from the landfilljs garbage pile and lagoons had reached the surface waters of the creek through a hydrologic connection. Without any discussion or elaboration, the court found as a legal matter that these discharges (without an NPDES permit) violated the CWA.

Umatilla -- CWA Does Not Cover Hydrologically Connected Groundwater. On April 9, 1997, Judge Robert E. Jones, also of the federal district court, District of Oregon reached the opposite conclusion. He ruled that the Clean Water Act does not govern discharges to groundwater, even if the groundwater is hydrologically connected to a nearby surface water. Umatilla Waterquality Protective Association v. Smith Frozen Foods, No. 956-657-AS. Umatilla involved the leaching of pollutants from an unlined lagoon to groundwaters. According to the company, its discharge of wastewater to the unlined lagoon was allowed under the State of Oregonjs (non-NPDES) permit. Some of the wastewater seeped into the soils and then to the groundwater. The company conceded that these discharges ultimately reached a nearby creek. In 1986, the company and the State entered into an agreement under which the company excavated the unlined lagoon to build new lined ones. Some residues, however, were left in the deeper soils beneath the new lagoon. Plaintiffs claimed that the residues from the old lagoon continue to migrate through the soils and groundwaters to the creek and require an

NPDES permit. Plaintiffs also claimed that pollutants are currently leaching from the new lagoons to the groundwaters and surface waters.

Judge Jones looked at the CWAjs language and legislative history and found that they call for groundwater discharges to be excluded from NPDES coverage. Further, the Judge noted, Oregon has clearly interpreted its authorized program for over two decades not to reach groundwater discharges, and EPA in its oversight role has not objected to that interpretation. Moreover, he found, EPA has offered no lformal or consistent interpretationk of its own that would subject certain groundwater discharges to the NPDES permitting program (p.15). Instead, the Judge observed that EPA has issued only one brief statement in a 1991 preamble claiming jurisdiction over surface water discharges via groundwater. (He apparently was unaware of the other instances noted above in which EPA has expressed this position.) On the other hand, EPA issued two regulatory interpretations and one General Counseljs opinion in the 1970's restricting the \gencvjs authority over groundwater discharges. In light of all these factors, the Judge ruled that CWA coverage does not extend to any discharges to groundwaters. The Judge stated, however, that if EPA were to issue a new interpretation that explicitly brings groundwaters with a hydrologic connection to surface waters within the Actjs jurisdiction, he would give deference to that interpretation (p.17, n.2).

Passive Migration Issue. Judge Jones decided one additional issue in Umatilla that should be noted. The Judge is allowing the plaintiffs to request immediate review of his decision by the Ninth Circuit (even though the district court case is not yet concluded). If the Ninth Circuit accepts the appeal, it might reverse the district courtjs holding on the groundwater issue. Therefore, Judge Jones also ruled on the following: If NPDES jurisdiction does encompass groundwater discharges to surface waters, does the continuing lpassive migrationk to the waters of pollutants that leached into the subsoils from the old lagoon constitute an longoing discharge,k which is one of the prerequisites for citizens to bring suit? The Judge held that does. He found that whether there is an ongoing violation depends only on whether pollutants are continuing to reach navigable waters and it is irrelevant that the discharger is no longer adding pollutants to the point source itself (pages 18-25).

Defendants have criticized this part of the decision as one that could affect numerous entities whose activities (including wholly past ones) affect groundwater but who have not historically been required to obtain NPDES permits. They believe this decision could lead to a type of retroactive liability for such parties.

Conclusion

The Ninth Circuit has not yet accepted an appeal of Umatilla but is likely to do so soon and to set a briefing schedule. In the meantime, we will be discussing with your office and the Department of Justice whether to participate as an amicus party in this

appeal. (We are unaware of any appeal being taken in the Friends of the Coast Fork case. We will investigate and let you know if there is an appeal.)

Also, as noted, the district court in Umatilla seems to have invited EPA to issue a formal interpretation on the issue of discharges to surface waters via hydrologically connected groundwaters. The court stated it would defer to an agency interpretation on this matter if a clear one existed, and your office therefore may want to issue one. OGC would be glad to work with your office to determine what form this interpretation would need to take (e.g., a new interpretive rule or guidance, an addition to an existing rulemaking, a simple letter, etc.)

If you have any questions, please call Susan Lepow at 260-7696 or Paul Bangser at 260-7630.

Attachments

cc: Jon Cannon
Scott Fulton
Bob Dreher
Lisa Friedman
Michael Cook
Jim Pendergast
Gary Hudiburgh
Brian Maas
Ivan DeLoatch
Joe Theis
Water Management Division Directors, Regions I-X (via e-mail)
Regional Counsels, Regions I-X (via e-mail)
ORC Water Branch Chiefs, Region I-X (via e-mail)
Water Attorneys (via e-mail)

EPA's RESPONSE TO
Molycorp, Inc. comments on the EPA
Report on the Probable Hydrological Connection at the Molycorp Mine site, NM

In response to a request for technical assistance from the National Pollution Discharge Elimination Systems (NPDES) Permits Branch, the Ground Water Center of Excellence (GWCE) reviewed several technical reports to determine if Molycorp mining activities, at its mine site and tailings ponds at Questa, New Mexico, are a source of Red River contamination through a ground water hydrological connection. The "Report on Hydrological Connection Associated with Molycorp Mining Activity, Questa, NM" (the Report) was finalized and delivered to the NPDES Permits Branch on February 13, 1998. The Report found that Molycorp is one of the most probable sources for low pH and high metals concentrations in the ground water that is delivered to the Red River. EPA received Molycorp's response to the Report (letter dated September 15, 1998) on September 21, 1998. The following is EPA's response to Molycorp's September 15, 1998 letter.

Molycorp has divided its response to the Report into two sections: Substantive Issues and Specific Corrections. The following is EPA's response to comments in each section.

SUBSTANTIVE ISSUES:

Item 1, page 1, second paragraph:

> Molycorp states that its representatives asked Mr. Abshire (author of the Report) about the "may be viewed as a conduit" statement in the later part of the Executive Summary. Abshire was not asked, he offered the information to Molycorp for clarification. Molycorp also states that the statement was urged upon Abshire. No person or persons urged Abshire in any way. The statement "may be viewed" was used because, apparently, concerned conservation groups view a hydrological connection as a conduit.

Item 2, page 2, third paragraph:

> Molycorp contends that the Report neglects the impact of underground mine de-watering on surface water and ground water flows. EPA contends that no Molycorp study has indicated that surface water has been affected by mine de-watering. In addition, several areas of the Report (e.g., page 14, 18, 19, 20, 21, and 22) indicate that de-watering does not affect the shallow aquifer considered by EPA to be the conduit for low pH and high metals transport to the Red River.

Item 3, page 2, fourth paragraph:

> Molycorp states that a large cone of depression is formed due to the caved area and that no water will reach the river due to the caved area being at a lower elevation than the river. No Molycorp or other study/report reviewed by EPA discussed or recognized the caved area as generating a large cone of depression. Only the Report discussed a probable cone of depression caused by the discharge of water down the caved area into the underground mine. However, in the response letter, it appears that Molycorp now considers the caved

area, and its vertical connection to the underground mine, as causing a large cone of depression. It is improbable that the total depth to the underground workings, from the surface expression of the caved area, dictates the potentiometric surface. It is very improbable that the total stratigraphic section, from surface to the underground workings, would be uniformly shattered an equal distance laterally as vertically for a large cone to develop. Thickness and permeability (transmissivity) of the water bearing formations dictates the radius (size) of a cone of depression. The controlling factors for defining the potentiometric surface within the vicinity of the caved area are described at the bottom of page 14 of the Report. In support of the Reports's findings, the Molycorp contractor South Pass Resources, Inc. (SPRI) (April 21, 1995) states that mounding of the water table surface in the vicinity of the caved area may direct ground water to the river via the valley fill aquifer (see page 14 of the Report).

Item 4, page2, last paragraph:

Molycorp states that water balance studies indicate that 313 gallons per minute of water will flow into the underground workings from an area of 2,300 acres. This rate would be supplied by runoff, infiltration, and seepage. Molycorp considers virtually all of the water within a large portion of the mine area to be directed to the underground mine workings: and therefore, away from the Red river. However, several Molycorp reports of USGS studies indicate that the Red River is a gaining stream within the reach adjacent to the mine property (page 21 of the Report, specifically the SPRI April 21, 1995 statement on post-1994 de-watering). No transmissivity values have been determined for the formations or deep flows within the 2,300 acre area of the mine to support the water balance values reported by Molycorp. As stated in Item 2 above, the Report considers the shallow valley fill aquifer, which is apparently unaffected to some degree by the de-watering of the mine, as the most probable conduit to the Red River. In addition, not considering the volumes of ground water entering the river system from below the river water level, many visible high discharge seeps, which are supplied by ground water, exist within the reach adjacent to the mine property, indicating a large area of ground water supply.

Item 5, page 3, first paragraph:

Granted, natural discontinuities (fractures) can exist in a clay layer. However, Molycorp has not presented clay core data to support its view. Fractures apparently do not exist in the immediate area of the monitor wells at the mine site. Following the drilling of monitor well (MW) No. 13, the valley fill was saturated while the bedrock aquifer was found to be dry (see page 21 of the Report). Many continuous high discharge seeps exist within the reach adjacent to the mine property, which indicates a large area of ground water supply. In addition, the ground water samples, from the shallow aquifer, indicate low pH and high metals content in areas down gradient of and a great distance from the probable sources. This indicates that the ground water transports these constituents from the probable sources to the Red River through a laterally continuous aquifer. Springs exist at the upper elevations, which are within Molycorp's cone of depression limits. Therefore, at least one

shallow aquifer transports ground water down gradient; and therefore, its waters are not captured by the cone of depression, which would be hundreds to thousands of feet below the spring using Molycorp's cone of depression outline.

It is unlikely that the stratigraphic material, from the surface to the mine depth and from the river to the ground water divide has been fractured to such a degree that it has affected the confining capabilities of the shallow aquitards solely due to underground mining as Molycorp contends. Molycorp states that due to discontinuities in the clay layer below the valley fill, dissolved constituent transport to the river through the fill is unlikely. However, monitor well water quality analysis has determined that acidic, dissolved metal waters are in the upper valley fill.

Molycorp also states that the upper valley fill does not contain an independent aquifer. However, MW-13 found the shallow aquifer saturated and the bedrock aquifer dry, indicating separation. In addition, Molycorp's letter at page 3 paragraph 3 contradicts Molycorp"s contention that no shallow aquifer exists by agreeing that the fan delta deposits can redirect ground water flow.

Molycorp believes that ground water transport through the valley fill would be unlikely whether or not the cone of depression underlay the valley fill. Molycorp has neglected to consider the numerous acidic, dissolved metals seeps adjacent to the mine site. However, considering that Molycorp is correct in its contention that the subsurface, from surface to the underground mine level, acts as one aquifer; dissolved metals from the most probable sources would still move down gradient along a combination of mountain and river relief to the river.

Item 6, page 3, second paragraph:

Molycorp contends that pulse loading is the cause for Red River degradation. The primary EPA NPDES concern is the seep discharge to the river, not the river's overall health. In addition to the discharge of dissolved metals, many seeps adjacent to the mine site deposit aluminum precipitate onto the river bed. Therefore, the seep is a direct source of metals to the Red River.

Molycorp states that it has controlled storm water runoff at the mine site through a surface water run off capture system; and therefore, large sediment loading (which Molycorp implies is the only source of river metals concentrations) to the river comes from up river at areas such as Hanson Creek. However, river water analysis for sulfates has indicated that the source for Red River metals concentrations exists within the Molycorp mine boundary. SPRI (April 21, 1995; page5) states that "Analytical results of water quality sampling along and adjacent to the Red River indicates both natural and mine-related seepage affect the water quality of the Red River."

Item 7, page 3, third paragraph:

Molycorp cites page 19 to 20 of the Report in support of its contention that the fan delta deposits act as conduits to transport ground water far down gradient of the source. Molycorp apparently agrees that the fan delta deposits (valley fill) can redirect ground water flow. However, Molycorp's contention that valley fill aquifer ground water is transported far down gradient is incorrect. The Red River fan delta deposits are not large enough to redirect valley fill ground water to the extent that Molycorp implies. Ground water flow within the fractured bedrock may be directed far down river, however, not the upper valley fill ground water.

Item 8, page 3, fourth paragraph:

Molycorp states that seep flow within the mine property has decreased and that this reduction in discharge is probably due to a combination of mine de-watering and the pumping of the Columbine supply wells which are located on Molycorp mine site property. The Columbine well is completed in the valley fill aquifer. Therefore, Molycorp apparently agrees that the valley fill supplies ground water to the seeps adjacent to the mine site. In addition, all reports reviewed by EPA indicate that minor changes in Red River discharge rates are most probably due to precipitation and that changes are not dramatic. SPRI (April, 1995) states that post-1994 de-watering of the new under ground mine workings showed no noticeable effect on the rates of ground water recharge to the Red River in the vicinity of the mine and that most of the ground water recharge to the river may have come from the upper part of the ground water system (e.g., valley fill aquifer). Molycorp states that seep discharge rates have decreased. However, the New Mexico Environment Department (NMED) has stated that subsequent field trips to the mine site has revealed that new seeps continually develop along the river.

Item 9, page 3, fifth paragraph:

Molycorp is correct, no one has ever done a mass balance comparing storm water and ground water contributions of constituents to the river. However, Molycorp has previously stated that its surface water runoff collection system captures the majority of the surface water within the mine site. Therefore, the seep discharge of ground water with low pH and high metals concentrations is the major discharge to the river.

Item 10, page 4, first paragraph:

Seep, spring and ground water analysis has shown that although attenuation is a minor factor in water quality; analysis of Waste Rock Dump (WRD), erosional scar, ground water and seep discharge has shown that the sources (WRDs and erosional scars) have the potential to deliver low pH, high metals concentrations to ground water and that ground water transports high metals concentrations to seeps which discharge to the Red River.

The Steffen Robertson and Kirsten (SRK) report (page 10) states that "...the neutralization potential and sulfate, acidity and metal attenuating capacity of seepage and surface water flow paths have been consumed."

Item 11, page 4, second paragraph:

EPA stands corrected; the Moly tunnel is not a route of contamination because Molycorp has found that no water exists behind the cement plug. However, EPA does not understand Molycorp's statement "...no significant buildup."

Item 12, page 4, third paragraph:

Molycorp states that the Sugar Shack WRD catchment basins are unlikely sources of dissolved constituents to the Red River. If this is so, then the catchment basins are not needed. If there is no accumulation of runoff in these basins as Molycorp contends, then there is a greater volume of low pH and metals concentrations delivered to the underlying aquifers because all the precipitation enters the WRD and moves downward to the aquifer (i.e., no runoff from WRD). In addition, if most of the accumulated water evaporates as Molycorp assumes, this would leave behind a concentrated metals soup, which would move further down with each subsequent rain event to eventually enter the ground water system below.

Item 13, page 4, fourth paragraph:

Molycorp states that natural seeps occur both on the north and south sides of the river. The NMED states that seeps occur only on the north side of the river at the mine site. The objective is to determine where the most numerous and acidic, high metal seeps exist. It appears that the NMED considers these to exist on the north side of the river. Apparently, acidic high metals seeps exist only on the north side of the river because sampling has shown that the inflow from Columbine Creek, which exists on the south side of Red River, improves Red River Water quality. This indicates that there is a good probability that Columbine Creek does not contain acidic seeps.

Molycorp also states that storage of water within the WRD and subsequent evaporation may decrease ground water recharge. This is incorrect. The WRD's unconsolidated nature allows greater infiltration rates, and therefore, less evaporation.

Item 14, page 4, fifth paragraph:

Previously completed and tested monitor wells do not agree with Molycorp's contention that the upper valley fill aquifer is unsaturated.

Item 15, page 4, sixth paragraph:

The only reference to a biological study within the Report is in the second paragraph of page 3 (New Mexico Department of Game and Fish), all other references on this page are to metals concentrations. The primary issue relative to the NPDES Program is the seep discharge, not the overall health of the river.

Item 16, page 5, second paragraph:

EPA response is similar to Item 15 above.

SPECIFIC CORRECTIONS:

Bullet 1, page 6:

EPA stands corrected; Molycorp states that the ponds have no ARD. However, the pond waters are derived from the collection of spring discharge and runoff from within the mine site. This, and several other comments in supplied reports, indicated that this collected water, which is redirected to the underground mine workings for milling operations, consisted of low pH and high metals concentrations (i.e., ARD). Molylcorp stated that runoff and sediment loading to the river were the primary causes of river degradation; it also indicated that runoff and seep water from the WRDs and erosional scars was also collected (through capture basins and drawdown caused by mine dewatering) and redirected to the underground mine. If this is the case, it was assumed that the collected and redirected runoff and spring discharge had the characteristic ARD. In addition, if all runoff is collected, the only possible conduit from the source to the acid, high metals seeps is the groundwater (in lieu of the surface water entering to ground water at a point between the source and seeps).

Bullet 2, page 6:

EPA believed the chimney drains to be more in line with a french drain. However, Molycorp has clarified a chimney drain's function.

Bullet 3, page 6:

Molycorp is correct, the mine rhyolite does not consist primarily of the mineral pyrite. The bottom paragraph of page 15 of the Report is misleading; the statement is within a paragraph which discusses the acid generating sulfide minerals. Therefore, EPA's statement should have read "one of the primary sulfide minerals."

Bullet 4, page 6:

It is agreed that erosional features are gradient dependent and that they can consist of different rock types. However, all reports reviewed on whole rock analysis within the area indicate that the acidic waters needed to transport high metals concentrations to the

underlying aquifers is generated primarily within the rhyolitic erosional scars and WRDs.

Bullet 5, page 6:

That was the point. Sample CCS-2 was utilized as the background sample to show that the rhyolitic material was the primary contaminant source.

Bullet 6, page 6:

Molycorp is correct. The diffusive and dispersive nature of a constituent in ground water would yield a mixing zone. The statement should not have used the word "ground water", and should have been clarified to indicate this well is screened in a pyritic andesite bedrock (possibly extremely low flow rates), and that the sample may have been taken from an un-purged monitor well (i.e., longer residence time) with inflow from a shallower member. However, Molycorp may have misinterpreted EPA's concept of residence time; considering that there is in fact a greater concentration of metals at this location indicates that dissolution is moving to chemical equilibrium. This occurs because the unsaturated ground water, at this location, remains on the mineral surface for a greater time (relatively low ground water velocity); i.e., greater residence time.

Bullet 7, page 6:

Molycorp states that EPA is incorrect in its statement that the rhyolitic erosional scar is a brecciated rock, which is easily eroded due to a lack of cementation and its highly fractured nature. EPA agrees that the rhyolitic erosional scar may not be highly fractured. Several drilled holes within erosional scars confirm this assumption (see page 17 of the Report; and SPRI, April 21, 1995, page B-2). However, EPA has not had access to the rock material to make a visual analysis. EPA found a description of the rhyolite on page 23 of the SRK report.

CONCLUSIONS:

It must be remembered that an area of weathering and oxidation and hydration is required to generate the low pH waters to dissolve the metals and transport them to the river, and therefore, the saturated aquifers do not have the potential to generate dissolved metals. It has been shown by sample analysis that the alluvium does not have the potential to generate the low acidic waters found in ground water samples. However, it has been shown that the exposed rhyolitic erosional scars and the WRD material do generate acidic waters. These acid generating areas only exist up gradient of the Red River. Therefore, logic dictates that the acidic metal laden monitor well ground water samples and seeps, which are down gradient of the probable sources, must receive waters from ground water which once flowed below these sources. Even if one only considers the aquifers above the basement as acting as one aquifer, ground water will still flow to the river. SPRI states that the basement has low hydraulic conductivity; considering that the valley fill aquifer has much greater hydraulic conductivity, this conclusion supports EPA's contention that the valley

fill alluvium, with a gradient from the source down to the river, delivers the acidic, metal laden ground water to the river.

Cabin Springs seep (alluvium approximately 30 feet high and 6 feet wide) is flanked by outcrops. However, the seep exists within and at the base of the alluvium, with no ground water seeps noticeable from the outcrop. This is additional support that the alluvium has a higher permeability than the more consolidated basement material and is the conduit between the sources and the acidic high metals seeps.

Top of WRDs is flat but exposed erosional scars are steep. Therefore, greater infiltration capacity, and therefore, greater acidic leaching capacity in WRDs and less in erosional scars.

Taking into consideration that the upper aquifers are not sealed and the bedrock is fractured, the contaminated ground water can still reach the river by going down gradient of the mountains and then along strike with the river until it out flows from below the river into it.

Background shows that mine to river is high in acidic metals due to source(s) within mine area.
All agree that erosional scars and WRD material generate acidic metals.
Logically, WRDs are flat at the surface allowing more infiltration than the steep sided erosional scars, and the acid generating material and the repose of the fragments in WRDs presents more surface area to weathering than the more consolidated erosional scars.

In support of its contention that erosional scars are the source for the river contaminants, Molycorp contractors state, through groundwater/seep sample collection, that the Hanson Creek seeps and groundwater has high concentrations of metals and low ph. This shows that the shallow groundwater, from scar seepage, is moving to the river along the shallow aquifers, and is delivering metals to the surface water. Therefore, Molycorp's contradicts its earlier contention that shallow ground water is not moving to the river.

From: STEPHEN HOFFMAN
To: DCWIC01.IN("Ryland.Renea@epamail.epa.gov")
Date: 11/10/99 8:58am
Subject: Molycorp -Reply

I had our inhouse minerals geologist, Bill Schoenborn, review the report entitled , Geochemcistry of the Red River Stream System before and after Open-Pit Mining, Questa Area, Taos County, New Mexico prepared for the New mexcio Offcie of natural Resources trustees. His review follows:

The investigation measured and compared the effects of weathering and metals transport on the Red River stream system at seven key sites along the stream in areas of both natural mineralzation and mine dumps.

Analyzed stream and water sediments for a 1-year period of field study.

Evaluated the effects of weathering on natural exposures of mineralized rock, as well as the effects of mining operations and mine dumps.

Also compared patterns in the distribution of metals in the stream system and invertebrate fauna living within stream sediments.

Important Conclusions (italics mine):

Geochemical results are in agreement with those of previous investigations, *which indicate a significant increase in metal loading in reaches of the stream that are adjacent and downstream from the mine dumps.*

Although concentrations of metals in stream waters adjacent to natural areas of mineralized rock (scars) increase measureably above background during baseflow conditions (e.g. Zn increased during winter months from <2 ug/L to ~50 ug/L downstream from scars), *in reaches below mine dumps, metal loadings can increase by nearly an order of magnitude above above concentrations found downstream of scar areas (Zn increased to 413 ug/L downstream of mine dumps).*

- increases in metals, including total aluminum, and dissolved nickel and zinc, occurs about midway through the mine-disturbed area, downstream from areas receiving drainage from waste rock dumps.

A census of invertebrates indicates changes in population and diversity that are consistent with upstream and downstream changes in metal concentrations, *with reduced sub-bottom fauna in the reach below the mine dumps.*

Bill and I agree that this report clearly indicates that mining has increased metals loading down gradient--just becuase ground water standards are exceeded up gradient does not negate the fact that standards are violated down gradient many orders of magnitude. since we are not biologists we really can not comment on biological impacts. If you need us to back you up on this just ask--You may also want to contact Larry Eccles in our Vegas office at 702-798-2385-he recently completed a report "Characterization of Mine Leachates and the Development of a ground Water Monitoring Strategy fro Mine sites" which looks at the problem you have in Questa--how much is the mine contributing to overal metl loadings--

From: STEPHEN HOFFMAN
To: RTPMAINHUB:R6DAL00:R6DAL03.R6WATLAN(WILSON-JS)
Date: 11/10/99 9:24am
Subject: Your E-mail on Molycorp -Reply

USGS did some fingerprinting at the Sumittville mine for Region 8--contact Jim Dunn there and he can tell you who at USGS's Geochemistry center in Dever worked on that site. you also want to contact Larry Eccles in our Vegas lab at 702-798-2385--he completed a 4 year study and developed a method to finger print mine drainage--report is titled Characterization of mine Leachate and the Development of a Ground Water Monitoring strategy for Mines--

From: <Kiehn.Orville@epamail.epa.gov>
To: R6DAL02.R6SUPER(AISLING-KATHLEEN)
Date: 10/25/99 9:42am
Subject: Re: Moly Is anyone working on this now? -Reply

Our ground water specialists Jim Dunn, Mike Wireman & Rich Muza have been in contact with the State of New Mexico
and have been involved both in site visits and instruction. Jim Dunn is on travel to Africa but on his return could advise an update of R8's assistance to
NM. (James Dunn 303-312-6573, Mike Wireman 303-312-6719).

Chris Mann of the State of New Mexico Ground Water Quality Group has contacted me for reclamation bonding , analysis and procedures information. Based on preliminary research of the available literature and that which is in personal files, I have recommended as a primer to Chris the U.S. Bureau of Mines-Spokane
WFOC Heaprec for cyanide heap leach reclamation performance bond determinations
and the USBM Lotus Version 1.02 software. Chris has the USBM IC, the hard copy discussion and I am in the process of sending him the Lotus diskette.

Several of the states also have proprietary reclamation procedural and costing programs for dirt moving, some of which are based on the out-of-date Office of Surface Mining "Handbook for calculation of Reclamation Bond Amounts" or on internal procedures. In this regard, and as only one example, the State of Montana has experienced significant problems in applying the OSM (coal) reclamation bonding procedures at the Zortman and Landusky mines. Based on my review of some of the dirt moving problems experienced here in Colorado and in Montana, the OSM dirt moving costing, which presently does not include water management and water treatment costing, should only be applied using expert analysis coupled with completed detail engineering of quantities and direct costs so that all of the appropriate indirect costs and an appropriate analysis
of item and overall contingencies can be determined.

Also, as an update on our Federal Mining Dialogue-Financial Assurance reclamation dirt moving bonding (and water management/water treatment) bonding
evaluation, organized for purposes of reducing U.S. Government hard rock mine sites liabilities, I have forwarded, for review purposes, a bibliography of 88 financial evalution/bond calculation references to our Federal task/work group members responsible for the costing/cost engineering aspects of compiling a "source book". Our leadership includes representatives from the BLM, EPA, DOI, USDA/USFS and is headed by George DaBai of the BLM. Presently we are at odds with BLM as to the inclusion of water management/water treatment costs in the sourcebook. It will be included, possibly over BLM's objection, one way or another, even if it is an appendix or an addendum.

CC: R6DAL02.R6SUPER(TRAVIS-PAMELA,BOYDSTON-MICHAEL),RT...

USDA FOREST SERVICE SOUTHWESTERN REGION

Current Status of New Mexico CERCLA Projects-December 14, 1999

Nacimiento Mine Site; Santa Fe National Forest; Cuba, New Mexico:

Mixed Land Ownership-
NM State Land Office (NMSLO), Private, and USDA FOREST SERVICE
Agencies Involved-
NM Environment Department, NMSLO, USDA FOREST SERVICE, Environmental Protection Agency Region 6, U.S. Fish and Wildlife.

Kirk Minckler, USDA Office of the General Counsel, (303) 275-5549, and Arnold Rosenthal, Department of Justice, are working on an MOU with EPA, Pam Travis, attorney. The purpose of the MOU is to establish the Forest Service as the lead agency so that the FS may conduct work on the private land. The FS does not have jurisdiction on the private land so it does not have the authority to operate outside its jurisdiction.

Kirk is also working with NM State Land Office, Kelly Brooks, attorney, to complete the Joint Powers Agreement between the FS and NMSLO. This is almost done.

These two documents must be in place before we can proceed with negotiations for an Engineering Evaluation/Cost Analysis (EE/CA).

Kirk will conduct a thorough research of the PRP study and report to the FS of the next step with the PRP issue.

On August 5, 1999, the site was split into two operable units: Surface Removal Action and Groundwater Remedial Action.

NMED Counsel is pursuing LTI/Signorello in a lawsuit due to their violation of the Discharge Permit issued in 1983.

San Mateo Uranium Mine; Cibola National Forest; Grants, New Mexico:

This is an inactive uranium mine. There is a fair amount of radioactivity at the site. The next step is the development of the ARARs and the EE/CA. This is a docketed site.

On October 21, 1999, Kirk Minckler, Bobbi Baca, and Maria McGaha met with the PRPs in Denver, CO to discuss the possibility of entering into an AOC for the performance of the EE/CA. As a result, a Technical Committee (TC) was assembled to further evaluate the risks, the ARARs, and the cleanup levels for the site. The TC is currently working on these efforts. Technical contacts have been established with EPA Region 6 and 8 in an attempt to research and determine the cleanup levels for the site. The USDA FOREST SERVICE, NMED, and the PRPs will meet on January 7, 2000 to present and discuss the

objectives and potential alternatives for cleanup of the site. The timeline for this site is as follows:

January 2000:	PRPs develop a workplan for the EE/CA
February 2000:	AOC is signed by USDA FOREST SERVICE and the PRPs.
April 2000:	Complete EE/CA, and begin the Action Memo
Fall 2000:	Begin cleanup.

Red River (Bitter & Pioneer Creeks, Hansen, Hot-n-Tot drainages; Carson NF; Taos, New Mexico:

This is a watershed approach to addressing impacts from inactive mines. A Removal Preliminary Assessment is almost done. The Sampling and Analysis was done this past summer. NMED is currently working on this site.

Silver Creek Watershed; Glenwood Ranger District; Gila National Forest:

This is an inactive gold and silver mine. The Mogollon Mining District dates back to the mid-1800's and was a significant gold and silver mining area, with several thousand people living and working there. The topography is extremely rugged and consists of steep drainages cutting through rocky canyons with some perennial streams. A large portion of the watershed consists of patented land. The largest mines are on the patented land. The Fanny Hill is by far the largest, with tailings cascading down the steep slopes into Silver Creek. A 20 plus foot high concrete dam in Silver Creek is completely silted up with tailings below the mine. Tailings are evident in Silver Creek down to the confluence with the San Francisco River, approximately 8 miles below Mogollon. The New Mexico Environment Department has done some sampling of the sediments.

A Removal Preliminary Assessment will be completed in the spring of 2000. Sampling will be done on public land, though this site is adjacent to private land parcels. If the RPA determines that there is a release or a threat of release to the environment, the FS will pursue a Non-Time Critical Removal; the FS will need EPA's Region 6 involvement at this site due to its proximity to private land.

Other Sites in which the FS will be conducting a Removal Preliminary Assessment:

Rosedale Mine, Cibola National Forest, Magdalena, New Mexico.
Black Goose Mine, Cibola National Forest, Magdalena, New Mexico.
Esperanza Mine, Carson National Forest, Taos, New Mexico
Double Jerry Uranium Mine; Cibola National Forest, Grants, New Mexico
Shuree Ponds Diesel Spill; Carson National Forest; Questa, New Mexico
Parsons Mine, Lincoln NF, Smokey Bear Ranger District

Other Issues:

-Illegal dumping on National Forest System lands

-Discuss the possibility of a broad Interagency Agreement (IAG) under which separate addums could be issued site by site. (IAG would allow for transfer of $)

-Regular 106 meetings

-Docket review meetings

Total Maximum Daily Load for Metals in the Red River from its mouth on the Rio Grande to Placer Creek

Water Quality Concerns	
Basin:	Upper Rio Grande, Segment 2119
Waterbody Identifier:	URG1-20400
Parameters of Concern:	Metals (Chronic Zn, Acute Al, Cd, Cu), Stream Bottom Deposits
Uses Affected:	Coldwater Fishery, Livestock Watering, Irrigation
Identified Sources:	Agriculture (1500), Resource Extraction (5600, 5700, 5900), Road Maintenance/Runoff (8300)
Watershed Ownership:	USFS, State, BLM, Private and Municipal

I. Project Location and Description

The Red River watershed, covering an area of 226 square miles, is a major tributary to the Rio Grande and begins as headwaters originating from the highest terrain in New Mexico. The east or main fork of the Red River begins at nearly 13,000 feet as springs just east of Wheeler Peak. The Red River has 21 perennial tributaries which originate as very high quality mountain streams. The Red River watershed lies entirely within Taos County in northern New Mexico. Approximately 90% of the watershed is under management of the US Forest Service (USFS), Carson National Forest, and includes two wilderness areas (Wheeler Peak and Latir Peaks) and a wilderness study area (Columbine-Hondo). Elevations range from 13,161 feet at Wheeler Peak (highest point in New Mexico) to 6,500 feet at the confluence of the Red River and Rio Grande. The USFS high country consists of the Taos Range of the Sangre de Christo Mountains, while the lower elevations of the watershed occur on the Taos Plain and are a combination of private lands and federal Bureau of Land Management (BLM) lands.

The lowest four miles of the Red River flow through a spectacular canyon that is part of the BLM-

managed Wild and Scenic River Area, which includes the Rio Grande Gorge. The only towns within the watershed are Questa (population 800) and Red River (population 400). At 8,750 feet elevation, Red River is the highest incorporated town in New Mexico.

The region is semi-arid, but the elevational range accounts for large variations in temperature and precipitation. Annual precipitation varies from 8 to more than 20 inches, and winter temperatures range from -25 to 50°F, with summer ranging from 30 to 90°F. From May to October the moisture occurs as rain or hail, except in higher elevations where snow may occur throughout the year.

The Red River occupies one of the most popular multiple use watersheds in the state. The upper portion of the watershed is a mountainous area devoted to recreational activities, chiefly skiing, hunting and fishing, along with livestock grazing by USFS permittees.

There are currently three NPDES-permitted point sources with a total of six outfalls discharging into the Red River: the Town of Red River waste water treatment plant (WWTP), the State trout hatchery below Questa and four NPDES-permitted outfalls for Molycorp Mine (two at the tailings impoundments and two at the mine site). Only the WWTP discharges upstream of the most impaired segment of the Red River, and its effluent is described as excellent quality. The hatchery discharge is return-water from the raceways and actually serves to improve water quality in the Red River due to its dilution effect. The Molycorp discharges are regulated under NPDES Permit Number 0022306, which was approved by EPA in September 1993. These discharge points are described briefly as follows:

Discharge Point 001: from Pope Lake in the tailings dam area. There has been no discharge reported here since the mining operation ceased in 1992.

Discharge Point 002: from the seepage collection system at the toe of the tailings dams. This discharge is monitored and sampled as required in the permit. There have been no exceedences of specified concentration limits.

Discharge Point 004: Stormwater runoff from the mine area at the Goathill Gulch drainage (effectively, the area below the caved area). No discharges have been reported by Molycorp since the permit was approved in 1993.

Discharge Point 005: Stormwater runoff from the mine area in the vicinity of the mill, including drainage from Spring Gulch. No discharges have been reported since 1993.

Nonpoint sources that are thought to be impacting the Red River include mining sites (primarily Molycorp and to a lesser extent old gold mines and milling sites located in the Red River tributaries of Bitter Creek, Placer Creek and Pioneer Creek); naturally occurring, highly erosive and acidic soils in mineralized areas known as hydrothermal alteration scars; septic tank leach fields in the alluvial valley bottoms above the Town of Red River; unlined sewage lagoons from the Village of Questa; three known leaking underground petroleum storage tanks in the Town of Red River; and sediment from steep bare slopes at the Red River Ski Area and from many dirt roads, grazing allotments and scar areas on the Carson National Forest.

As a gaining stream, the Red River is recharged throughout the length of its mainstem by groundwater, as documented by the USGS and the New Mexico State Engineers Office. As point sources of contamination come under better control, it becomes more apparent that nonpoint source contaminants contained in groundwater recharge are contributing to the continuing impairment of this river.[1]

The State of New Mexico's 1998-2000 §303(d) List designates 20.2 miles of the Red River from the mouth on the Rio Grande to Placer Creek as not supporting water quality standards for metals (Chronic Zn, Acute Al, Cd, Cu) and stream bottom deposits. The waterbody designation for this stream is a priority one listing with a TMDL due date of December 31, 2017. There are no threatened or endangered aquatic species or acute public health concerns on this reach.

II. Surface Water Hydrology

The Red River watershed, covering an area of 226 square miles, is a major tributary to the Rio Grande and begins as headwaters originating from the highest country in New Mexico. The Red River has 21 perennial tributaries which originate as very high quality mountain streams. Those tributaries that do not have major concentrations of mining remain high quality streams up to their confluence with Red River.

Cabresto Creek is the largest tributary to the Red River, having a drainage area of 36.5 square miles and an average discharge of 14 cfs, or 10,135 acre-feet/year (af/y). The average annual discharge of Red River, excluding Cabresto Creek, is 55.9 cfs, or 40,500 af/y. The upper Red River (above Zwergle Dam) has a drainage area of 29.42 square miles and discharges 17.7 cfs, or 12,820 af/y as an average (Dames and Moore, April 19, 1988). A number of seepage studies have demonstrated that the Red River is a gaining stream in the vicinity of both the Molycorp tailings area and mine area.

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1 Slifer, Dennis, ***Red River Groundwater Investigation, Final Report***, New Mexico Environment Department, Surface Water Quality Bureau, March 1996, pp. 1-4

The lower reach of the Red River (from Cabresto Creek to the mouth of the Red River) has been measured as having an average accretion rate (seepage of groundwater) of 31 to 33 cfs out of a total flow of 84 cfs at the mouth of the Red River (Winograd, 1959, p. 40). In the middle reach of the Red River (the reach from Red River to Questa, which includes the Molycorp mine area) seepage studies have documented accretion from groundwater into the Red River at average rates of 4 cfs (USGS, Oct. 1988).

The USGS has been measuring discharge and collecting water quality samples at various points on the Red River for over twenty years. Published data is available from their Water Resources Data Book for New Mexico for discharge, field parameters, anions/cations and trace elements for the following years: 1964-65 and 1967-69 at the Fish Hatchery; 1978-82 at Zwergle Dam, Molycorp Mine, Questa, Fish Hatchery, and mouth of the Red River; 1983-87, at Questa, Fish Hatchery, and mouth of the Red River. There is no data available for the period following 1987.

Background or source water pH values within the Red River watershed range from 6.94 to 8.04, and conductivity values range from 114 to 177 umhos/cm. With exceptions, metal concentration values at these source waters are below detection limits and well below State standards. At the headwaters stations, all metals except magnesium are below detection limits. Magnesium at these stations is generally well below 2.0 mg/l (NMED-SWQB, Jan. 1995). Source water samples collected from Columbine Creek contained both chromium and lead in levels just above detection limits but within State standards. Bitter Creek's source waters contain chromium at similar levels. In both cases however, analytical results of subsequent same-day samples of the middle reach of these tributaries found all metals tested for were below detection limits. In the two roadless tributaries (East Fork of the Red River and Columbine Creek) there are no significant changes in water chemistry up to there confluence with Red River. In fact within these tributary reaches there is a subtle increase in alkalinity and pH and a reduction in total dissolved solids (TDS) and conductivity.

Most of the mining in this watershed is concentrated in seven tributaries and in the middle reach of the mainstem of the Red River. Cabresto Creek drainage, with the exception of a few minor old prospects and mines, is free of mining impacts and associated water quality problems. Acid rock drainage (ARD) from a number of small mines on other tributaries to Red River (Bitter, Placer, Pioneer, Black Copper, Goose and Bear Creeks) and from the Molycorp complex of waste dumps, underground mines and open pit constitute the worst sources of metal loading in the Red River watershed. This ARD commonly exhibits pH values at or below 3.0 and conductivity over 3,500 umhos/cm. This drainage is also characterized by very high values for total dissolved solids (TDS) and sulfates. Acidic metal-loaded seep waters collected from a variety of sources throughout the watershed show a range of pH values from 2.44 to 3.22 and a range of conductivity values from 1,769 to 3,668 umhos/cm. Those metals found in typical acidic seeps along Red River that exceed state standards include Al, Cd, Cu and Zn. In the three tributaries where most of the historic mining has occurred (Bitter, Pioneer and Placer Creeks), there is a slight but detectable increase in metal loading at base flows.

The metals that show detectable increases are primarily aluminum, zinc, manganese and magnesium. Obviously associated with this increase in metals is a slight increase in TDS and conductivity, however, the volume of ARD from these locations is quickly diluted by alkaline receiving waters. Metal loading in base flow conditions is not a serious problem until the mainstem of Red River encounters the five square miles (3,200 acres) of mining related disturbance at the Molycorp mine operation twelve miles above the confluence of the Red River and Rio Grande. The reach of Red River just below the Molycorp mill to the Red River Fish Hatchery (a distance of approximately eight miles), has been adversely affected by pollutants, resulting in biological impoverishment. The primary reason for this current condition is an infusion of acidic, metal-loaded seep waters in such volume that it overwhelms the river's natural buffering capacity. As a result, the river in this reach is a pale blue or milky white color due to metal ions and minerals (primarily silica-aluminum hydroxide) precipitating out of solution. Mineral deposits precipitated in this reach have cemented the stream substrate thus limiting potential for benthic community colonization and development.

III. Contaminant Transport

There are two general modes of contaminant transport at work in the hard rock mining districts of the Red River watershed; Steady-state, or perennial form of ARD, and the pulse loading mode in which sometimes very large volumes of weathered sulfide waste rock and sediment are transported to stream channels by storm events and rapid snowmelt. These two principal mechanisms are addressed as separate but related issues.

The steady-state form of contaminant transport has received the most attention from researchers since its full pollution potential was first recognized. The earliest work in the U.S. in regard to this problem was carried out in the Appalachian coal fields. Further research into this form of water pollution has been carried out in the last twenty years in the Rocky Mountain region, much of it in response to widespread degradation of the Arkansas River in Colorado and a 120 mile reach of the Clark Fork River in Montana. In both cases, the stream degradation originates in hard rock mineral extraction and processing areas. The mechanisms of ARD formation and its effects on aquatic ecosystems are well known. ARD is characterized by low pH and elevated concentrations of metals and TDS. The most common mechanism for its formation involves the oxidation and hydration of sulfide minerals (typically pyrite or iron sulfide), resulting in the generation of sulfuric acid and elevated concentrations of iron. A number of promising passive treatment technologies have emerged from the study of this phenomenon in recent years.

The pulse loading mode of pollution from hardrock minesites is less well understood and can be more difficult to control. Field investigations and laboratory experiments have proven that pulse events not only transport large volumes of mine waste through direct erosive processes but also through solution facilitated by reduction in pH. The suspended metal load from a pulse event may fall out within a relatively short distance, but the dissolved metal load may be transported for many miles before pH conditions allow precipitates to form.

In either case, the pulse loading mode of mine waste transport is the primary mechanism by which these contaminants are moved far from their origins.

Pulse loading of sediments and dissolved constituents is a significant problem in the Red River and several of its tributaries. SWQB Standards and Surveillance Section has documented a rapid decrease in pH and increase in turbidity in the mainstem of the Red River just below a tributary above Fawn Lakes Campground (Hansen Creek) in response to a summer rain event. Analysis of water samples collected during this pulse event proved that metal loading also increased dramatically (Smolka and Tague, 1988). This tributary contains a large hydrothermal alteration scar that may have been exacerbated by erosion triggered by mineral exploration roads and at least one mine. The weathered sulfide materials exposed in large erosional scars in a number of locations within the Red River watershed do react rapidly with distilled water. Data from the simple laboratory reactivity tests conducted by NMED staff using wastes from the mines and soils from erosional scars have reproduced field pulse conditions and verified the rapid reduction in pH and increased turbidity. Subsequent X-ray Fluorescence (XRF) analysis of the soils and mine wastes used in the reactivity tests found higher levels of metals in mine wastes than in soils collected from erosional scars (SWQB files, personal communication B. Salter, 1993). Of the 21 perennial tributaries to the Red River only two, Columbine Creek and the Upper East Fork do not contribute significant amounts of sediment in response to pulse events. Both of these sub-watersheds are roadless, have no mining activity, and do not contain alteration scars.

In response to pulse events such as snow melt or intense summer rainstorms, the Red River becomes seriously degraded from sedimentation. Much of this sediment load originates in large, barren erosional scars caused by slope failures in at least fifteen locations within the middle reach. Some of these slope failures may be related to human influences such as small mine and mineral exploration roads. Also, and extensive system of forest roads, mineral exploration roads, tracks and off-road vehicle trails erode and convey significant amounts of sediment to the Red River. The negative influence of these sedimentation episodes is mainly temporal. However, the effect on water quality and the dependent biotic community during these events is dramatic. The sediment loading problem in the Bitter Creek tributary is especially severe, and is being addressed by a separate 319(h) grant (Lower Bitter Creek Restoration, FY-94-B) which the SWQB has implemented.

IV. Categories of NPS Pollution in the Watershed

Metals

Metal loading of the Red River is the most widespread and significant form of NPS pollution in the watershed. The primary metals involved in contaminant transport include: aluminum, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, molybdenum, nickel and zinc.

The primary cause of metal loading in the Red River is by steady-state input of acidic metal-enriched seep water. This first appears at the mouth of Bitter Creek and again in small volumes from several small drainages between the Town of Red River and just below Hansen Creek. From below Molycorp mill to the Questa Ranger Station, a series of acidic, metal-loaded seeps appears to overcome the river's natural buffering capacity. From that area downstream to the Questa Fish Hatchery, the Red River appears to be largely devoid of any biotic communities.

Secondly, pulse event loading of acidic, metal-laden water is of concern. During and after pulse events, metals are transported from various source areas at high concentrations in both the suspended load and in the dissolved fraction of the water column (Smolka and Tague, 1986, 1988). Metal loading problems associated with pulse events are largely temporal. In most cases, a degree of equilibrium is restored to affected stream reaches within a day or so after a major pulse event. Short-term biological impacts may however be significant due to exceedences of acute criteria. If high enough concentrations are reached, lethality is possible. Therefore, even short term effects can cause long term biological impacts.

Sediment

Sediment transport in the middle reach of the Red River during pulse events is extreme - turbidity values in excess of 1000 NTU are typical. Distinctive plumes of yellow-orange turbidity transform the Red River to its confluence with the Rio Grande, and similarly affect the Rio Grande for at least fifty miles downstream (NMED/SWQB field notes, August 1994). The primary source areas for sediment loading are the alteration scars plus unpaved roads in the watershed. As well, Pioneer Creek has been documented as exceeding turbidity standards on several occasions due to ski area runoff (Those problems have been addressed in part by a separate 319(h) grant [Ski Area Impacts, FY-91] through the SWQB). Sediment transport from the sub-alpine components of the watershed is also a significant problem. Within these areas, the excessive road network and riparian loss due to historic grazing practices are primary causes of sediment loading.[2]

V. Applicable Standards and Endpoint Identification

Stream Segment 2119

The main stem of the Rio Grande from Taos Junction Bridge upstream to the New Mexico-Colorado line, the Red River from its mouth on the Rio Grande upstream to the mouth of Placer Creek, and the Rio Pueblo de Taos from its mouth on the Rio Grande upstream to the mouth of the Rio Grande del Rancho.

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[2] Slifer, Dennis, pp. 10-15

A. **Designated uses:** coldwater fishery, fish culture, irrigation, livestock watering, wildlife habitat and secondary contact.

B. **Standards:** (1) In any single sample: pH shall be within the range of 6.6 to 8.8, and temperature shall not exceed 20.0°C (68°F), and turbidity shall not exceed 50 NTU. The use-specific numeric standards set forth in Section 3101 are applicable to the designated uses listed above in Section 2119.A.

(2) The monthly geometric mean of fecal coliform bacteria shall not exceed 100/100 ml; no single sample shall exceed 200/100 ml (see Section 1103.B.).

As previously stated, the Red River is categorized as a coldwater fishery, livestock watering source and irrigation source in the New Mexico state surface water quality standards. The following define the uses not fully supported on this reach:

Coldwater Fishery - a stream reach, lake or impoundment where the water temperature and other characteristics are suitable for the support and propagation or both of colwater fishes such as but not limited to longnose dace, roundtail chub, Rio Grande chub, Rio Grande sucker, brown, Gila, cutthroat (including the native Rio Grande cutthroat), brook or rainbow trout or speckled dace.

Applicable Standards

Acute Standards

The acute standards shall be applied to any single grab sample. Acute standards shall not be exceeded.

Dissolved aluminum	750 μg/l
Dissolved beryllium	130 μg/l
Total mercury	2.4 μg/l
Total recoverable selenium	20.0 μg/l
Dissolved silver	e(1.72[ln(hardness)]-6.52) μg/l

(For numeric standards dependent on hardness, hardness (as mg $CaCO_3$/l) shall be determined as needed from available verifiable data sources including, but not limited to, the U.S.

Environmental Protection Agency's STORET water quality database).

Cyanide, amenable to chlorination	22.0 μg/l
Total chlordane	2.4 μg/l
Dissolved cadmium	e(1.128[in(hardness)]-3.828) μg/l
Dissolved chromium	e(0.819[In(hardness)]+3.688) μg/l

(The standards for chromium shall be applied to an analysis which measures both the trivalent and hexavalent ions).

Dissolved copper	e(0.9422[In(hardness)]-1.464) μg/l
Dissolved lead	e(1.273[In(hardness)]-1.46) μg/l
Dissolved nickel	e(0.8460[In(hardness)]+3.3612) μg/l
Dissolved zinc	e(0.8473[In(hardness)]+0.8604) μg/l
Total chlorine residual	19.0 μg/l

Chronic Standards

The chronic standards shall be applied to the arithmetic mean of four samples collected on each of four consecutive days. Chronic standards shall not be exceeded more than once every three years.

Dissolved aluminum	87.0 μg/l
Dissolved beryllium	5.3 μg/l
Total mercury	0.012 μg/l
Total recoverable selenium	2.0 μg/l
Cyanide, amenable to chlorination	5.2 μg/l
Total chlordane	0.0043 μg/l
Dissolved cadmium	e(0.7852[In(hardness)]-3.49) μg/l

(For numeric standards dependent on hardness, hardness (as mg $CaCO_3$/l) shall be determined as needed from available verifiable data sources including, but not limited to, the U.S. Environmental Protection Agency's STORET water quality database).

Dissolved chromium	e(0.819[In(hardness)]+1.561) μg/l

(The standards for chromium shall be applied to an analysis which measures both the trivalent and hexavalent ions).

Dissolved copper	e(0.8545[In(hardness)]-1.465) μg/l
Dissolved lead	e(1.273[In(hardness)]-4.705) μg/l
Dissolved nickel	e(0.846[In(hardness)]+1.1645) μg/l
Dissolved zinc	e(0.8473[In(hardness)]+0.7614) μg/l
Total chlorine residual	11.0 μg/l

Livestock Watering - a water of the State used as a supply of water for consumption by livestock and other animals.

Applicable Standards

Dissolved aluminum	5.0 mg/l
Dissolved arsenic	0.2 mg/l
Dissolved boron	5.0 mg/l
Dissolved cadmium	0.05 mg/l
Dissolved chromium	1.0 mg/l

(The standards for chromium shall be applied to an analysis which measures both the trivalent and hexavalent ions).

Dissolved cobalt	1.0 mg/l
Dissolved copper	0.5 mg/l
Dissolved lead	0.1 mg/l
Total mercury	0.01 mg/l
Dissolved selenium	0.05 mg/l
Dissolved vanadium	0.1 mg/l
Dissolved zinc	25.0 mg/l
Radium-226 + radium-228	30.0 pCi/l
Tritium	20,000 pCi/l
Gross alpha	15 pCi/l

Irrigation - a water of the State used as a supply of water for crops.

Applicable Standards

Dissolved aluminum	5.0 mg/l
Dissolved arsenic	0.10 mg/l
Dissolved boron	.75 mg/l
Dissolved cadmium	0.01 mg/l
Dissolved chromium	.010 mg/l
Dissolved cobalt	0.05 mg/l
Dissolved copper	0.20 mg/l
Dissolved lead	5.0 mg/l
Dissolved molybdenum	1.0 mg/l
Dissolved selenium	0.13 mg/l
Dissolved selenium in presence of >500 mg/l SO_4	0.25 mg/l
Dissolved vanadium	0.1 mg/l

Dissolved zinc 2.0 mg/l[3]

VI. Calculated Metals Daily Loads

A total maximum daily load (TMDL) is defined as an allocation of pollutant loading among all sources that would result in attainment of surface water quality standards. A TMDL consists of the sum of all wasteload allocations (WLAs), which are those portions of the total loading set aside for contributions of the pollutant from point source discharges, the sum of all load allocations (LAs), which are those portions of the total loading set aside for contributions of the pollutant from nonpoint sources of pollution and a margin of safety (MOS) which takes into account any lack of certainty or confidence concerning the relationship between data and water quality. In establishing pollutant loading necessary to attain and maintain water quality standards, a TMDL is to take into account seasonal variations. A TMDL can be expressed as mass per time, (such as pounds per day), toxicity, or other appropriate measure. (40 CFR 130.2(I)).

Sources of Metals

Possible sources of metals to the lower Red River watershed include the Molycorp mine tailings pond. Background contributors of metals to the lower watershed include Cabresto Creek, Questa Sewage Lagoons and the Red River State Fish Hatchery discharge. Possible sources of metals to the upper Red River watershed include Bitter Creek, Mallette Creek, Placer Creek, Pioneer Creek, Hotentot Creek, Hansen Creek, the Molycorp mine and mill, and associated springs and seeps. Background contributors of metals to the upper watershed include the watershed upstream of Placer Creek, the Red River wastewater treatment plant and Columbine Creek.

Monitoring Data

A 1996 NMED report documented high concentrations of dissolved aluminum, cadmium, copper and zinc in groundwater seeps to the Red River (NMED 1996). These concentrations exceeded acute criteria and indicated that acute criteria would be exceeded in the Red River.

A 1992 NMED study of the Red River found two exceedences of the chronic cadmium criterion and four exceedences of the acute zinc criterion in the watershed (NMED 1993). For the study single water samples were collected in February, March and April of 1992 for metals analysis. One exceedence of the chronic cadmium criterion and two exceedences of the acute zinc criterion were downstream of the Molycorp mine and mill.

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[3] New Mexico Water Quality Control Commission, ***State of New Mexico Standards for Interstate and Intrastate Streams***, January 23, 1995, p. 21, 39, 41, pp. 44-47.

Additionally, a water sample collected in April 1997 from this site indicated chronic toxicity to Ceriodaphnia. Several NMED studies have documented impairment to the benthic macroinvertebrate community and the fish community. This is due to a reduction in available stream bottom substrate attributable to mineral deposition.

Translation of Dissolved Metals Criteria to Total Metals Concentrations

As stated above, the New Mexico surface water quality standards include dissolved metals criteria to protect fishery uses. The amount of dissolved metal in a stream can vary in part due to instream conditions such as suspended solids. TMDLs for metals, as well as NPDES permits, use the total metal concentration to develop metals limits. This requires the translation of the dissolved metal criteria to a total recoverable metal concentration to ensure that water quality standards are protected. Generally, NMED and EPA use metals partitioning equations and the amount of total suspended solids (TSS) in the stream to translate the dissolved metal criteria to a total recoverable metal concentration (EPA 1995).

Two sets of dissolved to total translators are used for the Red River watershed, one for each sub-watershed. One set is for the Red River from its mouth on the Rio Grande to Cabresto Creek. The geometric mean of TSS for this section of Red River is 42 mg/l, based on USGS data from the Red River at its mouth near Questa (station 08267000). At this level of TSS, the fraction of total copper that is dissolved is 0.27, while the fraction of total zinc that is dissolved is 0.21. Concentrations of total metals in discharges to this portion of the Red River watershed should not exceed 79.6 μg/l for copper, (21.5/0.27), and 662 μg/l for zinc (139/0.21) in order to meet the acute criteria for fisheries protection. Currently, there is no translator for cadmium. The concentration of total cadmium in discharges to the lower Red River watershed should not exceed 4.95 μg/l in order to meet the acute cadmium criterion.

A translator for aluminum was recently developed by the NMED for the Rio Grande (NMED 1998b). At a TSS concentration of 42 mg/l, the fraction of total aluminum that is dissolved is estimated to be 0.010. Concentration of total aluminum in discharges to the Red River downstream of Cabresto Creek should not exceed 75 mg/l in order to meet the acute aluminum criterion. These translators are also applicable to the dissolved chronic criteria. For the lower watershed, total metals concentrations translated from dissolved chronic criteria are 8.7 mg/l for aluminum, 1.33 μg/l, 52.2 μg/l for copper, and 614 μg/l for zinc.

The second dissolved to total translator is for the Red River watershed upstream of Cabresto Creek. The geometric mean of TSS for this sub-watershed is 67 mg/l, based on USGS data from the Red River upstream of Cabresto Creek, (USGS station 08265000). At this level of TSS, the fraction of total aluminum that is dissolved is estimated to be 0.0066, the fraction of total copper is 0.24, and the fraction of total zinc is 0.18. As stated above, there is no translator for cadmium.

Concentrations of total metals in discharges to this portion of the Red River watershed should not exceed 113 mg/l for aluminum, 4.95 μg/l, 89.6 μg/l for copper, and 772 μg/l for zinc. These translators are also applicable to the dissolved chronic criteria. Total metals concentrations translated from dissolved chronic criteria are 13.1 mg/l for aluminum, 1.33 μg/l, 58.8 μg/l for copper and 717 μg/l for zinc.

Translators used to convert dissolved metals criteria to total metals concentrations are listed in table 2.

Critical Low Flows

The New Mexico water quality standards define the critical low flow as the minimum average four consecutive day flow which occurs with a frequency of once in three years (4Q3).

As stated above, for the purposes of the TMDL the Red River watershed is divided into two sub-watersheds: and 1) from the mouth on the Rio Grande to upstream of Cabresto Creek and 2) upstream of Cabresto Creek. The 4Q3 flow of the Red River upstream of Cabresto Creek is 8.09 cfs (USGS gage 08265000). The 4Q3 flow upstream of the Red River near its confluence with the Rio Grande is 39.84 cfs (USGS gage 08267000). The 4Q3 values were obtained using the EPA flow program DFLOW that is accessible through the EPA STORET water quality database.

Background Loading of Metals

NMED data was used to develop background loading allocations. This data is found in appendix B. Background loading allocations are listed in table 5.

NMED data from Cabresto Creek at USGS gage 08266000, (NMED station URG120028020), was used to develop background loading allocation for the lower watershed. The 4Q3 flow for Cabresto Creek is 3.43 cfs. At this site concentrations of total cadmium were less than 1 μg/l. Concentrations of total copper and zinc were less than 50 μg/l. Total aluminum was measure once with a concentration of 610 μg/l. These concentrations and a flow of 3.43 cfs were used develop background loading allocations for the lower watershed.

NMED data from the Red River below Zwergle Damsite at USGS gage 08264500, (NMED station URG120028080), was used to develop background loading allocations for the upper watershed. Drainage area at this site is 28.9 square miles or 26% of the upper watershed (USGS 1983). An estimate of the 4Q3 at this site would be 2.10 cfs, (26% of the upper watershed 4Q3 of 8.09 cfs). At this site concentrations of total cadmium were less than 1 μg/l. Concentrations of total copper and zinc were less than 50 μg/l. Concentrations of total aluminum were 100 μg/l or less in 7 of 10 observations. These concentrations and a flow of 2.10 cfs were used to develop background loading allocations for the upper watershed.

Acute Levels

New Mexico surface water quality standards do not allow a mixing zone for acute criteria, therefore, the appropriate measure for protecting the acute criteria is concentration or mass per unit water. Total metal discharge concentrations were developed to protect the fisheries in the Red River watershed from acute toxicity.

Discharges should not exceed the following total metals concentration:

Red River Watershed from its mouth on the Rio Grande upstream to Cabresto Creek	
Aluminum	**75 mg/l**
Cadmium	**4.95 μg/l**
Copper	**79.6 μg/l**
Zinc	**662 μg/l**

Red River Watershed upstream of Cabresto Creek	
Aluminum	**113 mg/l**
Cadmium	**4.95 μg/l**
Copper	**89.6 μg/l**
Zinc	**772 μg/l**

Chronic Levels

New Mexico surface water quality standards allow a mixing zone for chronic criteria, therefore, the appropriate measure for protecting the chronic criteria is mass per unit time. Total metal discharge concentrations were developed to protect the fisheries in the Red River watershed from chronic toxicity.

Discharges should not exceed the following total metals concentration:

Red River Watershed from its mouth on the Rio Grande upstream to Cabresto Creek	
Aluminum	**847 kg/day**
Cadmium	**130 grams/day**
Copper	**5.08 kg/day**
Zinc	**59.8 kg/day**

Calculations:

Aluminum

8.7 mg/l x 39.84 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-6} kg/mg = **847 kilograms/day**

Cadmium

1.33 μg/l x 39.84 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-6} g/μg = **130 grams/day**

Copper

52.2 μg/l x 39.84 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-9} kg/μg = **5.08 kilograms/day**

Zinc

614 μg/l x 39.84 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-9} kg/μg = **59.8 kilograms/day**

Red River Watershed upstream of Cabresto Creek	
Aluminum	**261 kg/day**
Cadmium	**26.3 g/day**
Copper	**1.16 kg/day**
Zinc	**14.2 kg/day**

Calculations:

Aluminum

13.2 mg/l x 8.09 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-6} kg/mg = **261 kilograms/day**

Cadmium

1.33 μg/l x 8.09 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-6} g/μg = **26.3 grams/day**

Copper

58.8 μg/l x 8.09 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-9} kg/μg = **1.16 kilograms/day**

Zinc

717 μg/l x 8.09 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-9} kg/μg = **14.2 kilograms/day**

Allocation of Metals Loading to Attain and Maintain Chronic Criteria

Allocation of the total allowable daily loadings to protect chronic criteria for fisheries in the watershed are listed in table 6.

Drainage areas for Bitter Creek, Mallete Creek, Placer Creek and Pioneer Creek were estimated from a map produced by the NMED Surface Water Quality Bureau Geographic Information Systems Center. Estimated drainage areas for these creeks are 7.9, 5.9, 2.0 and 6.6 square miles, respectively. These drainage areas correspond to 7%, 5%, 2%, and 6% of the upper watershed. Allocations for these creeks were based on these percentages.

In the lower watershed, the Molycorp tailings pond, which also had a small drainage area, was allocated nn percent of the total load for the lower watershed.

Table 1 Dissolved Metals Criteria for Aluminum, Cadmium, Copper and Zinc to Protect Fisheries[4]

Aluminum			
	Acute	750 μg/l	
	Chronic	87 μg/l	
Cadmium			
	Acute	$e^{(1.128[\ln(hardness)]-3.828)}$ μg/l	(4.95 μg/l)
	Chronic	$e^{(0.7852[\ln(hardness)]-3.49)}$ μg/l	(1.33 μg/l)
Copper			
	Acute	$e^{(0.9422[\ln(hardness)]-1.464)}$ μg/l	(21.5 μg/l)
	Chronic	$e^{(0.8545[\ln(hardness)]-1.465)}$ μg/l	(14.1 μg/l)
Zinc			
	Acute	$e^{(0.8473[\ln(hardness)]+0.8604)}$ μg/l	(139 μg/l)
	Chronic	$e^{(0.8473[\ln(hardness)]+0.7614)}$ μg/l	(129 μg/l)

[4] A hardness value of 123 mg/l was used to calculate criteria for cadmium, copper and zinc.

Table 2 Translators to Convert Dissolved Metals Criteria to Total Metals Concentrations

A. Red River Watershed from the mouth on the Rio Grande upstream to Cabresto Creek (Total Suspended Solids = 42 mg/l)

Metal	Cd/Ct[5]	Dissolved Acute	Total Acute	Dissolved Chronic	Total Chronic
Aluminum	0.010	750 μg/l	75 mg/l	87 μg/l	8.7 mg/l
Cadmium	1	4.95 μg/l	4.95 μg/l	1.33 μg/l	1.33 μg/l
Copper	0.27	21.5 μg/l	79.6 μg/l	14.1 μg/l	52.2 μg/l
Zinc	0.21	139 μg/l	662 μg/l	129 μg/l	614 μg/l

B. Red River Watershed Upstream of Cabresto Creek (Total Suspended Solids = 67 mg/l)

Metal	Cd/Ct[5]	Dissolved Acute	Total Acute	Dissolved Chronic	Total Chronic
Aluminum	0.0066	750 μg/l	113 mg/l	87 μg/l	13.2 mg/l
Cadmium	1	4.95 μg/l	4.95 μg/l	1.33 μg/l	1.33 μg/l
Copper	0.24	21.5 μg/l	89.6 μg/l	14.1 μg/l	58.8 μg/l
Zinc	0.18	139 μg/l	772 μg/l	129 μg/l	717 μg/l

[5] Cd/Ct = concentration of dissolved metal/concentration of total metal

Table 3 Allowable Discharge Concentrations for Aluminum, Cadmium, Copper and Zinc to Protect Acute Criteria for Fisheries in the Red River Watershed

A. Discharges to the Red River Watershed from its mouth on the Rio Grande upstream to Cabresto Creek

Metal	Total Metal Concentration
Aluminum	75 mg/l
Cadmium	4.95 μg/l
Copper	79.6 μg/l
Zinc	662 μg/l

B. Discharges to the Red River Watershed upstream of Cabresto Creek

Metal	Total Metal Concentration
Aluminum	113 mg/l
Cadmium	4.95 μg/l
Copper	89.6 μg/l
Zinc	772 μg/l

Table 4 Allowable Daily Loadings for Aluminum, Cadmium, Copper and Zinc to Protect Chronic Criteria for Fisheries in the Red River Watershed

A. Red River from its mouth on the Rio Grande upstream to Cabresto Creek

Aluminum

8.7 mg/l x 39.84 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-6} kg/mg = 847 kilograms/day

Cadmium

1.33 μg/l x 39.84 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-6} g/μg = 130 grams/day

Copper

52.2 μg/l x 39.84 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-9} kg/μg = 5.08 kilograms/day

Zinc

614 μg/l x 39.84 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-9} kg/μg = 59.8 kilograms/day

B. Red River upstream of Cabresto Creek

Aluminum

13.2 mg/l x 8.09 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-6} kg/mg = 261 kilograms/day

Cadmium

1.33 μg/l x 8.09 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-6} g/μg = 26.3 grams/day

Copper

58.8 μg/l x 8.09 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-9} kg/μg = 1.16 kilograms/day

Zinc

717 μg/l x 8.09 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-9} kg/μg = 14.2 kilograms/day

Table 5 Background Loading Allocations for the Red River Watershed Upstream of Cabresto Creek

A. Red River from its mouth on the Rio Grande upstream to Cabresto Creek (Cabresto Creek background)

Aluminum

690 μg/l x 3.43 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-9} kg/μg = 5.72 kilograms/day

Cadmium

1 μg/l x 3.43 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-6} g/μg = 8.33 grams/day

Copper

50 μg/l x 3.43 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-6} g/μg = 419 grams/day

Zinc

50 μg/l x 3.43 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-6} g/μg = 419 grams/day

B. Red River upstream of Cabresto Creek

Aluminum

100 μg/l x 2.10 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-6} g/μg = 513 grams/day

Cadmium

1 μg/l x 2.10 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-6} g/μg = 5.13 grams/day

Copper

50 μg/l x 2.10 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-6} g/μg = 257 grams/day

Zinc

50 μg/l x 2.10 cfs x 28.3 l/cfs x 86,400 seconds/day x 10^{-6} g/μg = 257 grams/day

Table 6 **Percent allocation of total aluminum loading (chronic) for the Red River watershed upstream of Cabresto Creek**

Source	Percent Allocation	Allocation (kg/day)
Bitter Creek	7%	18.27
Mallete Creek	5%	13.05
Placer Creek	2%	5.22
Pioneer Creek	6%	15.66
Molycorp Mine & Mill	25%	65.25
Hotentot Creek	5%	13.05
Hanson Creek	5%	13.05
Background	0.2%	0.513
Drainage above Placer Creek to Headwaters (7.02mi^2)	24%	62.64
Margin of Safety	**20.8%**	**54.29**
TOTAL	100%	261

Table 7 **Percent allocation of total cadmium loading (chronic) for the Red River watershed upstream of Cabresto Creek**

Source	Percent Allocation	Allocation (g/day)
Bitter Creek	7%	1.84
Mallete Creek	5%	1.32
Placer Creek	2%	.53
Pioneer Creek	6%	1.58
Molycorp Mine & Mill	25%	6.58
Haut-N-Taut Drainage	5%	1.32
Hansen Creek	5%	1.32
Background	20%	5.13
Drainage above Placer Creek to Headwaters (7.02mi^2)	24%	6.31
Margin of Safety	**1%**	**.37**
TOTAL	100%	26.3

Table 8 **Percent allocation of total copper loading (chronic) for the Red River watershed upstream of Cabresto Creek**

Source	Percent Allocation	Allocation (kg/day)
Bitter Creek	7%	.081
Mallete Creek	5%	.058
Placer Creek	2%	.023
Pioneer Creek	6%	.069
Molycorp Mine & Mill	25%	.290
Hotentot Creek	5%	.058
Hanson Creek	5%	.058
Background	20%	.257
Drainage above Placer Creek to Headwaters (7.02mi^2)	24%	.278
Margin of Safety	**1%**	**.012**
TOTAL	100%	1.16

Table 9 **Percent allocation of total zinc loading (chronic) for the Red River watershed upstream of Cabresto Creek**

Source	Percent Allocation	Allocation (kg/day)
Bitter Creek	7%	.994
Mallete Creek	5%	.71
Placer Creek	2%	.284
Pioneer Creek	6%	.852
Molycorp Mine & Mill	25%	3.55
Hotentot Creek	5%	.71
Hanson Creek	5%	.71
Background	1.8%	.257
Drainage above Placer Creek to Headwaters (7.02mi^2)	24%	3.41
Margin of Safety	**19.2%**	**2.72**
TOTAL	100%	14.2

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Appendix A

Partitioning of Metals between Total and Dissolved Phases

Cd/Ct is the percent of metal in dissolved form and TSS is total suspended solids in mg/l.

A. Red River watershed from mouth on Rio Grande upstream to Cabresto Creek (TSS = 42 mg/l)

1). Aluminum (from Pierce 1998)

$$Cd/Ct = [(2.2462 \times TSS) + 1]^{-1}$$

$$Cd/Ct = [(2.2462 \times 42) + 1]^{-1} = 0.010$$

2). Copper

$$Cd/Ct = [1 + (Kp \times TSS \times 10^{-6})]^{-1}$$

$$Kp = Kpo \times TSS^{\alpha}$$

$$Kpo = 1.04 \times 10^{6} \qquad \alpha = -0.74$$

$$Kp = 1.04 \times 10^{6} \times (42)^{-0.74} = 0.065 \times 10^{6}$$

$$Cd/Ct = [1 + (0.065 \times 10^{6} \times 42 \times 10^{-6})]^{-1} = 0.27$$

3). Zinc

$Cd/Ct = [1 + (Kp \times TSS \times 10^{-6})]^{-1}$

$Kp = Kpo \times TSS^{\alpha}$

$Kpo = 1.25 \times 10^{6}$ $\alpha = -0.70$

$Kp = 1.25 \times 10^{6} \times (42)^{-0.70} = 0.091 \times 10^{6}$

$Cd/Ct = [1 + (0.091 \times 10^{6} \times 42 \times 10^{-6})]^{-1} = 0.21$

B. Red River watershed upstream of Cabresto Creek (TSS = 67 mg/l)

1). Aluminum

$Cd/Ct = [(2.2462 \times TSS) + 1]^{-1}$

$Cd/Ct = [(2.2462 \times 67) + 1]^{-1} = 0.0066$

2). Copper

$Cd/Ct = [1 + (Kp \times TSS \times 10^{-6})]^{-1}$

$Kp = Kpo \times TSS^{\alpha}$

$Kpo = 1.04 \times 10^{6}$ $\alpha = -0.74$

$Kp = 1.04 \times 10^{6} \times (67)^{-0.74} = 0.046 \times 10^{6}$

$Cd/Ct = [1 + (0.046 \times 10^{6} \times 67 \times 10^{-6})]^{-1} = 0.24$

3). Zinc

$Cd/Ct = [1 + (Kp \times TSS \times 10^{-6})]^{-1}$

$Kp = Kpo \times TSS^{\alpha}$

$Kpo = 1.25 \times 10^{6} \quad \alpha = -0.70$

$Kp = 1.25 \times 10^{6} \times (67)^{-0.70} = 0.066 \times 10^{6}$

$Cd/Ct = [1 + (0.066 \times 10^{6} \times 67 \times 10^{-6})]^{-1} = 0.18$

APPENDIX B

Background Concentrations of Aluminum, Cadmium, Copper and Zinc in the Red River Watershed.

```
STORET RETRIEVAL DATE 98/07/08                PGM=RET                                                    PAGE:     1
                                                                 HRG20          URG120028020 08266000
                                                                36 43 50.0 105 33 12.0 4
                                                                CABRESTO CREEK AT USGS GAGE
                                                                35055   NEW MEXICO       TAOS
                                                                                         120991
/TYPA/AM BNT/STREAM/BIO
                                                                21NMEX                       13020101029 0003.490 ON
                                                                0003 FEET DEPTH
```

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01027 CADMIUM CD,TOT UG/L	01042 COPPER CU,TOT UG/L	01092 ZINC ZN,TOT UG/L	01105 ALUMINUM AL,TOT UG/L	
85/04/15	1130	WATER			1K	50K	50K	
85/04/16	1045	WATER			1K	50K	50K	
85/04/17	1145	WATER			1K	50K	50K	
86/08/18	1655	WATER			1K	50K	50K	610

STORET RETRIEVAL DATE 98/06/19 PGM=RET PAGE: 1

HRG22 URG120028080 08264500
36 40 25.0 105 22 45.0 4
UPPER RED RIVER AT USGS GAGE
35055 NEW MEXICO TAOS
120991

/TYPA/AMBNT/STREAM/BIO

21NMEX 13020101028 0015.180 ON
0003 FEET DEPTH

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	01027 CADMIUM CD,TOT UG/L	01042 COPPER CU,TOT UG/L	01092 ZINC ZN,TOT UG/L	01105 ALUMINUM AL,TOT UG/L
84/01/27	1040	WATER		1K		50K	
85/04/15	0925	WATER		1K	50K	50K	
85/04/16	0905	WATER		1K	50K	50K	
85/04/17	0915	WATER		1K	50K	50K	
86/08/18	1300	WATER		1K	50K	50K	100K
86/08/19	0900	WATER		1K	50K	50K	100K
86/08/20	1300	WATER		1K	50K	50K	100K
88/09/13	0910	WATER		1K	50K	50K	700
88/09/20	0845	WATER		1K	50K	50K	50K
88/09/26	0800	WATER		1K	50K	50K	100K
88/10/25	0850	WATER		1K	50K	50K	240
92/02/26	1040	WATER					100
92/03/25	1045	WATER					100
92/04/29	1025	WATER					900

Jane / Scott

From: <Aisling.Kathleen@epamail.epa.gov>
To: R6DAL03.R6WATLAN(WILSON-JS),R6DAL00.IN("Baca_Rober...
Date: 12/20/99 6:57am
Subject: Molycorp news

----- Forwarded by Kathleen Aisling/R6/USEPA/US on 12/20/1999 06:55 AM -----

Michael Boydston
12/17/1999 08:28 AM

To: Kathleen Aisling/R6/USEPA/US@EPA, Brenda Cook/R6/USEPA/US@EPA, Dan Wall/R6/USEPA/US@EPA
cc: Susan Webster/R6/USEPA/US@EPA
Subject: Molycorp news

The Associated Press State & Local Wire

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December 16, 1999, Thursday, BC cycle

SECTION: State and Regional

LENGTH: 647 words

HEADLINE: Molycorp likely to be named Superfund site, officials say

DATELINE: QUESTA, N.M.

BODY:

State and federal officials expect the U.S. Environmental Protection Agency to propose the Molycorp molybdenum mine near here as a Superfund cleanup site after negotiations over cleanup broke down.

If the site were declared a Superfund site, the EPA would oversee a cleanup and bill the responsible parties to recover the costs. The process could take years, and some estimates of the cost exceed $100 million.

Molycorp denies its mining operation contributes to the pollution of the Red River in Taos County. The company intends to fight any proposed Superfund designation, mine manager David Shoemaker said Wednesday.

He also said he didn't know whether the mine, which employs 150, would continue to operate if it's declared a Superfund site.

For decades, Molycorp has mined molybdenum, which is used to harden steel. It now has 300 million tons of waste rock stored in piles at the site, and some of the piles slope down toward the Red River.

Molycorp and the state Environment Department have been involved in closed-door negotiations in recent months to come to terms over the cleanup without the Superfund designation.

William Turner, the state's natural resources trustee, said Wednesday he believes Molycorp has been in a state of denial for 16 years about the effect of
its mining on the environment.

Turner said he was surprised Molycorp wouldn't jump at the chance to work out an agreement with the state to clean up the site and avoid the cumbersome, expensive Superfund process.

"It just boggles my mind that they wouldn't take this carrot that we've offered them," he said.

Turner's office released a report in October that concluded pollution from waste rock piles at the mine is contaminating the Red River and ground water in the area with acidic drainage and heavy metals.

Shoemaker would not discuss points of disagreement with state regulators in the negotiations to try to avoid Superfund listing, but said the company does not believe the listing is justified..

Molycorp has submitted detailed information to various state agencies that Shoemaker said establishes to the company's satisfaction that it's not responsible for pollution in the area.

"We do have a very comprehensive package with the state with the Mining Act and the Water Quality Act that would address any issue that Superfund would address, so we really don't understand why this is going on," Shoemaker said. "That's basically our position."

Maura Hanning, program manager of the Superfund Oversight Section of the Environment Department, said Wednesday she plans to meet with the mayors of Questa and Red River next week to try to secure their support for the Superfund designation.

She said her office is still talking to Molycorp but that the company has balked at the state's demand that the company commit to cleaning up the site.

"Their concern is that we're asking them to write a blank check," Hanning said.

Susan Webster, Superfund site assessment team leader with the EPA in Dallas, said Wednesday her office is still working on the Molycorp site but plans to submit a proposal to the EPA's national office in time for the proposed listing to be published in the Federal Register late next month. If the Molycorp site is placed on the list, the next step will be an investigation to determine what risk the site poses to human health and the environment, she said.

The investigation also would list alternatives for cleaning up the site.

It probably would take a couple of years to reach a formal decision about how to clean up the site. Cleanup would follow that.

Brian Shields, executive director of Amigos Bravos, a Taos County environmental group, said his group supports Superfund designation for the mine.

"We want cleanup and we want cleanup assurance," Shields said. "We want a mechanism that is really enforceable."

LANGUAGE: ENGLISH

LOAD-DATE: December 17, 1999

Molycorp, Inc.
Molybdenum Group
P.O. Box 469
Questa, NM 87556-0469
Telephone (505) 586-7601
Facsimile (505) 586-0811

RECEIVED
EPA-6WQ-DIR OFC
99 OCT 20 PM 1:52

David R. Shoemaker
General Manager, Molybdenum Group

Molycorp

Certified Mail – Return Receipt Requested

Received
OCT 20 1999
6WQ-PP

October 15, 1999

Mr. William B. Hathaway, Director
Water Quality Protection Division
U.S. Environmental Protection Agency
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Re: NPDES Permit Renewal Application No. NM0022306
308 Information Request for Biological Evaluation and Effluent Characterization

Dear Mr. Hathaway:

Following please find Molycorp's response to your letter dated July 23, 1999 requesting additional information under the authority of Section 308 of the Clean Water Act to allow further processing of the subject renewal application.

1. *A list of anticipated or demonstrated pollutants from your discharges and their concentrations.*

   Enclosed is the September 1999 DMR which characterizes the discharges. The mining operations at Molycorp will continue without changes. The Molycorp NPDES Renewal Application that was submitted to your office in April 1998 details historic discharge water quality data and other pollutants expected to be in the discharges. These data can be found in Exhibit I-4, Exhibit I-5, Exhibit I-9, and Exhibit II-1.

2. *Description of environmental baseline, including any previous Environmental Assessments or Evaluations, or consultations concerning other actions in the area.*

   The permit area is divided into two different ecological zones. The first is the tailings facility which is located west of Questa, NM at an elevation of about 7,500 feet in the piñon-juniper plant community. The plant community in the area surrounding the tailings dam is a mix of piñon and juniper trees, sagebrush and rabbitbrush as well as

grasses and forbs (Wagner and Harrington 1994). At the lower elevations, the plant community becomes a riparian area made up of typical species such as narrowleaf cottonwood, willows, etc.

The mine site is located at an elevation ranging from 8,000 feet to 10,000 feet. The storm water discharge points are located at the lower elevations and have not discharged since being placed. The plant community in this narrow canyon is primarily a mixed conifer forest (Wagner and Harrington 1994)

Wildlife and Wildlife Habitat were summarized for both areas in the Molycorp Mining Operation Site Assessment (ENSR 1994). Other applicable reports with information about the area include: The Rio Grande Corridor Proposed Plan and Final EIS (USDI BLM1998) and Prey Base Analysis by Habitat Site, Taos Resource Area (Kennedy and Stahlecker 1986). These reports, or appropriate portions of these reports, have been included in this package submitted by Molycorp, Inc.

3. *A determination of the species present and for each species:*

Information on species present has been compiled from the above mentioned reports as well as from brief discussions with the USFS Questa Ranger District Wildlife Biologist (Long 1999).

Potential endangered and threatened species in the area:

Common Name	**Status (Federal)**	**Scientific Name**
Black- footed Ferret	Endangered	*Mustela nigripes*
American peregrine falcon	Endangered *	*Falco peregrinus anatum*
Arctic peregrine falcon	Threatened	*Falco peregrinus tundrius*
Bald eagle	Threatened	*Haliaeetus leucocephalus*
Interior Least tern	Endangered	*Sterna antillarum athalassos*
Mexican spotted owl	Threatened	*Strix occidentalis lucida*
Southwestern willow flycatcher	Endangered	*Empidonax trailii extimus*
Colorado squawfish	Endangered	*Ptychocheilus lucius*

* removed from endangered list summer, 1999.

a. *Description of current conditions for each species:*

Black-footed Ferret:
According to information from the BLM the last confirmed sighting of a black-footed ferret in New Mexico was 1934. No critical habitat has been identified for the black-footed ferret in the Rio Grande Corridor and based on information from the US Forest Service, no critical habitat occurs in this region of the Carson National Forest.

American peregrine falcon and Arctic peregrine falcon (migration only): "Peregrine falcons are known to migrate seasonally through the area and have historically nested in the area. There is one historical nesting site on the Upper Rio Grande that has been monitored annually since 1990 and intermittently since 1986. No activity has been observed at this historical site. The Arctic subspecies would only migrate through New Mexico." (BLM 1998). While habitat may exist in the area for peregrine falcon it does not appear as if any active sites are near the site.

Bald Eagle:
New Mexico does provide habitat for bald eagle wintering and migration. No bald eagle nesting use has been identified on BLM administered lands (the most likely location for nesting near the site). The only documented winter roosting area along the Rio Grande is south of Pilar some distance from the mine site. The summer use habitat would be within ½ mile of large bodies of water.

Interior Least Tern:
According to the BLM (1998) the interior least tern would be considered an accidental migrant in this area. This bird is found mainly in Southeastern New Mexico and is only known to nest in Chaves County. There are no known nesting or use areas for this species within the area.

Mexican Spotted Owl:
The Mexican spotted owl habitat has been described as deep, narrow, timbered canyons with cool shady places, at elevations ranging from 6,500 to 9,000 feet. Possible habitat sites include canopy coverage greater than 80% and are dominated by larger (14 in. dbh or better) subalpine fir, Engelmann spruce and Douglas fir. With these constraints no appropriate habitat is located near the tailings facility or discharge points.

Southwestern Willow Flycatcher:
The southwestern willow flycatcher is found along riparian habitats where dense groves of willow, alder, and other species are present. For breeding, surface water must be present near the riparian habitat. Most of the documented sightings of southwestern willow flycatcher have been south of Taos, a considerable distance from the mine.

Colorado squawfish:
This species is characterized as a big river fish. This species is endemic to the Colorado River Basin and is not known to have occurred within the Red River basin and is not listed by the USFS as occurring within the Carson National Forest.

b. Description of critical habitat:

Black-footed ferret: No critical habitat designated
American peregrine falcon/Arctic peregrine falcon: No information on critical habitat information is available. The main threat to peregrine falcons has been attributed to pesticide use (particularly DDT) which has been discontinued in the U.S.
Bald eagle: No critical habitat is known.
Interior least tern: No critical habitat has been designated in this area.
Mexican spotted owl: The only critical habitat in this area has been rescinded.
Southwestern willow flycatcher: According to the BLM few areas have been designated as critical habitat and we are not aware that any of the areas are within the mine site discharge areas. No description of critical habitat is available in the BLM report.
Colorado squawfish: No critical habitat has been designated in the area.

c. *A review and an analysis of the effects of the action on the endangered species in terms of individuals and populations, including consideration of the indirect and cumulative effects of the action on the species and habitat.*

Based on analysis of information available at this time the only endangered species that occurs in the region is the Southwestern willow flycatcher, which have been documented south of Taos, over 20 miles south of the mine site. All discharge limits are calculated to conservatively meet all applicable water quality standards for the Red River, Segment 2-119, which are as restrictive as the standards for the Rio Grande below Taos, where the Flycatcher habitat is located.

d. *Analysis of alternative actions that would reduce, eliminate and/or minimize the facility's potential to adversely affect listed endangered species or critical habitat.*

The facility has no known potential to adversely affect listed endangered species and critical habitat.

4. *Conclusions of effects determination for each species.*

Black-footed ferret: No effect
American peregrine falcon / Arctic peregrine falcon: No effect
Bald eagle: No effect
Interior least tern: No effect
Mexican spotted owl: No effect
Southwestern willow flycatcher: No effect
Colorado squawfish: No effect

5. *Literature Cited:*

ENSR. 1994. Molycorp Mining Operation Site Assessment. ENSR Consulting and Engineering. Report submitted to the New Mexico Mining and Minerals Division (MMD) for the mine permit.

Kennedy, P.L. and D.W. Stahlecker. 1986. Prey base analysis by habitat site. Taos Resource Area near Questa in Taos County, New Mexico (peregrine falcon prey). Eagle Environmental and U.S. Department of the Interior. BLM, under contract #YA-551-CT4-340074.

Long, G. 1999. Wildlife Biologist, U.S.D.A. Forest Service, Carson National Forest, Questa Ranger District. Personal communication with A. Wagner, Molycorp, Inc. October 5, 1999.

U.S.D.I. Bureau of Land Management (BLM). 1998. The Rio Grande Corridor Proposed Plan and Final EIS. New Mexico/Colorado. BLM-NM-PL-98-009-1600. August, 1998.

Wagner, A.M. and J.T. Harrington. 1994. Fall 1994 Vegetation Survey at the Molycorp, Inc. Tailings Pile and Tailings Pond in Northern New Mexico. December 1, 1994. Report submitted to the New Mexico Mining and Minerals Division (MMD) for the mine permit.

6. *List of contacts made/preparers/sources.*

Contacts made:

S. Des Georges. Multi-Resources Branch Chief, U.S.D.I. Bureau of Land Management, Taos Resource Area.

G. Long, Wildlife Biologist, U.S.D.A. Forest Service, Carson National forest, Questa Ranger District.

J. Lusk, U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office.

R. MacRae, Environmental Contaminant Specialist, U.S. Fish and Wildlife Service, New Mexico Ecological Services Field Office.

Preparers:

G.I. Lorinczi, Environmental Manager, Molycorp, Inc. Questa, New Mexico.

A.M. Wagner, Ph.D., Environmental Coordinator, Molycorp, Inc. Questa, New Mexico.

G.G. Van Riper, Ph.D., Montgomery and Watson.

7. *Maps/photographs if available.*

It was determined that no other supporting documentation is necessary to accompany this package.

Should you or your staff have any questions concerning this correspondence, please call Geyza Lorinczi at (505) 586-7626.

Sincerely,

David R. Shoemaker
General Manager, Molybdenum Group

Enclosures

xc: Scott Wilson
Gary Van Riper
John Pugh
Richard Schwartz

Molycorp, Inc.
Molybdenum Group
P.O. Box 469
Questa, NM 87556-0469
Telephone (505) 586-7601
Facsimile (505) 586-0811

Molycorp

David R. Shoemaker
General Manager, Molybdenum Group

October 14, 1999

Environmental Protection Agency
Enforcement and Compliance Assurance Division
Water Enforcement Branch (6EN-W)
1445 Ross Avenue
Dallas, TX 75202-2733

Dear Sirs:

Enclosed are the DMR forms for the month of September, 1999 for Permit No. NM0022306, Outfalls 001, 002, 004 and 005. Please be advised that no discharge occurred in Outfalls 001, 004, and 005 for the entire month.

Also included with this report are the bio-monitoring results of analyses for the third quarter of 1999 for Outfall 002. Please be advised that there was no discharge from Outfalls 001, 004, and 005 during the third quarter of 1999 and there were no samples available for bio-monitoring testing as per permit requirements.

Should you have any questions, please call me at (505) 586-7601 or Fred Martinez at (505) 586-7673.

Sincerely yours,

David R. Shoemaker
Mine Manager

DRS/bjd

xc: NM Environment Dept

Enclosures

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TACS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

NM0022306 (2-16)	SUM 1 (17-19)
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	09	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

F - FINAL
SUM TOTAL OF 001 & 002

*** NO DISCHARGE [ ] ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

NOTE: Read Instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
OXYGEN DEMAND, CHEM. (HIGH LEVEL) (COD)	SAMPLE MEASUREMENT	22.9	******	(26) LBS/DY	******	******	******		0	1/30	CALCTD
00340 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	2364 DAILY AV	******	IES/DY	******	******	******	**** ****	C	NCE/ NCNTE	CALCTD
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	11.32	******	(26) LBS/DY	******	******	******		0	1/30	CALCTD
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	788 DAILY AV	******	IES/DY	******	******	******	**** ****	C	NCE/ NCNTE	CALCTD
CYANIDE, TOTAL (AS CN)	SAMPLE MEASUREMENT	0	******	(26) LBS/DY	******	******	******		0	1/30	CALCTD
00720 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	0.98 DAILY AV	******	IES/DY	******	******	******	**** ****	C	NCE/ NCNTE	CALCTD
FLUORIDE, TOTAL (AS F)	SAMPLE MEASUREMENT	4.41	******	(26) LBS/DY	******	******	******		0	1/30	CALCTD
00951 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	118 DAILY AV	******	IES/DY	******	******	******	**** ****	C	NCE/ NCNTE	CALCTD
ARSENIC, TOTAL (AS AS)	SAMPLE MEASUREMENT	0	******	(26) LBS/DY	******	******	******		0	1/30	CALCTD
01002 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	19.6 DAILY AV	******	IES/DY	******	******	******	**** ****	C	NCE/ NCNTE	CALCTD
IRON, TOTAL (AS FE)	SAMPLE MEASUREMENT	0.281	******	(26) LBS/DY	******	******	******		0	1/30	CALCTD
01045 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	23.6 DAILY AV	******	IES/DY	******	******	******	**** ****	C	NCE/ NCNTE	CALCTD
MANGANESE, TOTAL (AS MN)	SAMPLE MEASUREMENT	3.87	******	(26) LBS/DY	******	******	******		0	1/30	CALCTD
01055 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	39.4 DAILY AV	******	IES/DY	******	******	******	**** ****	C	NCE/ NCNTE	CALCTD

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		TELEPHONE	DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 586 7601	99	10	14
TYPED OR PRINTED		AREA CODE / NUMBER	YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
SUM TOTAL OF DAILY AVERAGE MASS LOADS FOR OUTFALLS 001 & 002.

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TAOS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*
(2-16) *(17-19)*

NM0022306	SUM 1
PERMIT NUMBER	DISCHARGE NUMBER

MAJOR

F - FINAL
SUM TOTAL OF 001 & 002

*** NO DISCHARGE |__| ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	09	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read Instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
MOLYBDENUM, TOTAL (AS MO) 01062 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	5.06	******	(26) LBS/DY	******	******	******		0	1/30	CALCTD
	PERMIT REQUIREMENT	25.0 DAILY AV	******	IES/DY	******	******	******	**** ****		ONCE/ MONTH	CALCTD
ZINC, TOTAL (AS ZN) 01092 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0	******	(26) LBS/DY	******	******	******		0	1/30	CALCTD
	PERMIT REQUIREMENT	7.84 DAILY AV	******	IES/DY	******	******	******	**** ****		ONCE/ MONTH	CALCTD
MERCURY, TOTAL (AS HG) 71900 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0	******	(26) LBS/DY	******	******	******		0	1/30	CALCTD
	PERMIT REQUIREMENT	0.04 DAILY AV	******	IES/DY	******	******	******	**** ****		ONCE/ MONTH	CALCTD
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		TELEPHONE	DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 686 7601 AREA CODE NUMBER	99	10	14
TYPED OR PRINTED			YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
SUM TOTAL OF DAILY AVERAGE MASS LOADS FOR OUTFALLS 001 & 002.

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TACS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

(2-16)	(17-19)
NM0022306	SUM 2
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	09	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

F - FINAL
SUM OF 001, 002, 004 & 005

*** NO DISCHARGE |__| ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
CADMIUM, TOTAL (AS CD)	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	******	******		0	1/30	CALCTD
01027 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	0.90 DAILY MX	LBS/DY	******	******	******	**** ****		CONCE/ MONTH	CALCTD
COPPER, TOTAL (AS CU)	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	******	******		0	1/30	CALCTD
01042 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	4.39 DAILY MX	LBS/DY	******	******	******	**** ****		CONCE/ MONTH	CALCTD
LEAD, TOTAL (AS PB)	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	******	******		0	1/30	CALCTD
01051 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	4.63 DAILY MX	LBS/DY	******	******	******	**** ****		CONCE/ MONTH	CALCTD
SILVER, TOTAL (AS AG)	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	******	******		0	1/30	CALCTD
01077 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	0.005 DAILY MX	LBS/DY	******	******	******	**** ****		CONCE/ MONTH	CALCTD
ALUMINUM, TOTAL (AS AL)	SAMPLE MEASUREMENT	0.281	0.281	(26) LBS/DY	******	******	******		0	1/30	CALCTD
01105 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	4.31 DAILY MX	LBS/DY	******	******	******	**** ****		CONCE/ MONTH	CALCTD
CHLORDANE (TECH MIX. AND METABOLITES)	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	******	******		0	1/30	CALCTD
39350 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	0.0008 DAILY MX	LBS/DY	******	******	******	**** ****		CONCE/ MONTH	CALCTD
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	******	******		0	1/30	CALCTD
50060 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	0.35 DAILY MX	LBS/DY	******	******	******	**** ****		CONCE/ MONTH	CALCTD

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		TELEPHONE		DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 586 7601 AREA CODE NUMBER	99	10	14
TYPED OR PRINTED			YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
SUM TOTAL OF DAILY AVERAGE & DAILY MAXIMUM MASS LOADS FOR OUTFALLS 001, 002, 004 & 005.

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TAOS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

(2-16) PERMIT NUMBER	(17-19) DISCHARGE NUMBER
NM0022306	001 A

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	09	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

F - FINAL
PROCESS WATER

*** NO DISCHARGE |X| ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
TEMPERATURE, WATER DEG. FAHRENHEIT	SAMPLE MEASUREMENT	******	******		******			(15)			
00011 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT DAILY AV	REPORT DAILY MX	DEG.F		WEEKLY	GRAB
OXYGEN DEMAND, CHEM. (HIGH LEVEL) (COD)	SAMPLE MEASUREMENT			(26)	******			(15)			
00340 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	60 DAILY AV	90 DAILY MX	MG/L		WEEKLY	CMPOS
PH	SAMPLE MEASUREMENT	******	******			******		(12)			
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	6.0 MINIMUM	******	9.0 MAXIMUM	SU		WEEKLY	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT			(26)	******			(15)			
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	20 DAILY AV	30 DAILY MX	MG/L		WEEKLY	CMPOS
CYANIDE, TOTAL (AS CN)	SAMPLE MEASUREMENT			(26)	******			(15)			
00720 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.025 DAILY AV	0.05 DAILY MX	MG/L		WEEKLY	CMPOS
FLUORIDE, TOTAL (AS F)	SAMPLE MEASUREMENT			(26)	******			(15)			
00951 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	3.0 DAILY AV	3.0 DAILY MX	MG/L		WEEKLY	CMPOS
ARSENIC, TOTAL (AS AS)	SAMPLE MEASUREMENT			(26)	******			(15)			
01002 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.5 DAILY AV	1.0 DAILY MX	MG/L		WEEKLY	CMPOS

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		TELEPHONE	DATE
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 586 7601 AREA CODE NUMBER	99 10 14 YEAR MO DAY
TYPED OR PRINTED			

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY LOCATION MOLYCORP INC. QUESTA DIVISION
TAOS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

NM0022306 (2-16)	001 A (17-19)
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	09	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

F - FINAL
PROCESS WATER

*** NO DISCHARGE [X] ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

NOTE: Read Instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
BERYLLIUM, TOTAL (AS BE)	SAMPLE MEASUREMENT			(26)	******			(19)			
01012 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		CONCE/ MONTH	CMPCS
CADMIUM, TOTAL (AS CD)	SAMPLE MEASUREMENT			(26)	******			(19)			
01027 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.05 DAILY AV	0.05 DAILY MX	MG/L		WEEKLY	CMPCS
COBALT, TOTAL (AS CO)	SAMPLE MEASUREMENT			(26)	******			(19)			
01037 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		CONCE/ MONTH	CMPCS
COPPER, TOTAL (AS CU)	SAMPLE MEASUREMENT			(26)	******			(19)			
01042 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.15 DAILY AV	0.30 DAILY MX	MG/L		WEEKLY	CMPCS
IRON, TOTAL (AS FE)	SAMPLE MEASUREMENT			(26)	******			(19)			
01045 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.6 DAILY AV	0.6 DAILY MX	MG/L		WEEKLY	CMPCS
LEAD, TOTAL (AS PB)	SAMPLE MEASUREMENT			(26)	******			(19)			
01051 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.3 DAILY AV	0.6 DAILY MX	MG/L		WEEKLY	CMPCS
MANGANESE, TOTAL (AS MN)	SAMPLE MEASUREMENT			(26)	******			(19)			
01055 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	1.0 DAILY AV	1.5 DAILY MX	MG/L		WEEKLY	CMPCS

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
David R. Shoemaker
Mine Manager
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
505	586 7601	99	10	14
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TAOS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

NM0022306 (2-16)	001 A (17-19)
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99 (20-21)	09 (22-23)	01 (24-25)	TO	99 (26-27)	09 (28-29)	30 (30-31)

MAJOR
F - FINAL
PROCESS WATER
*** NO DISCHARGE [X] ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

NOTE: Read Instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
MOLYBDENUM, TOTAL (AS MO)	SAMPLE MEASUREMENT			(26)	******			(19)			
01062 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	1.0 DAILY AV	2.0 DAILY MX	MG/L		WEEKLY	COMPOS
SILVER, TOTAL (AS AG)	SAMPLE MEASUREMENT			(26)	******			(19)			
01077 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS
VANADIUM, TOTAL (AS V)	SAMPLE MEASUREMENT			(26)	******			(19)			
01087 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS
ZINC, TOTAL (AS ZN)	SAMPLE MEASUREMENT			(26)	******			(19)			
01092 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.2 DAILY AV	0.2 DAILY MX	MG/L		WEEKLY	COMPOS
ALUMINUM, TOTAL (AS AL)	SAMPLE MEASUREMENT			(26)	******			(19)			
01105 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS
SELENIUM, TOTAL (AS SE)	SAMPLE MEASUREMENT			(26)	******			(19)			
01147 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS
CHLORDANE (TECH MIX AND METABOLITES)	SAMPLE MEASUREMENT			(26)	******			(19)			
39350 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 (AREA CODE)	586 7601 (NUMBER)	99 (YEAR)	10 (MO)	14 (DAY)
TYPED OR PRINTED							

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TACS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

NM0022306 (2-16)	001 A (17-19)
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	09	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

F - FINAL
PROCESS WATER

*** NO DISCHARGE [X] ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

NOTE: Read Instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	SAMPLE MEASUREMENT	NO DISCHARGE	FOR ENTIRE	(03) MONTH:	******	******	******				
50050 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	MGD	******	******	******	**** ****		CONTINUOUS	CONTINUOUS
CHLORINE, TOTAL RESIDUAL	SAMPLE MEASUREMENT			(26)	******			(19)			
50060 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	CONTINUOUS
MERCURY, TOTAL (AS HG)	SAMPLE MEASUREMENT			(26)	******			(19)			
71900 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.001 DAILY AV	0.002 DAILY MX	MG/L		MONTHLY	CONTINUOUS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE	DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 586 7601 AREA CODE NUMBER	99 YEAR	10 MO	14 DAY
TYPED OR PRINTED						

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TAOS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

NM0022306 (2-16)	002 A (17-19)	MAJOR
PERMIT NUMBER	DISCHARGE NUMBER	P - FINAL

SEEPAGE PE/TAILINGS IMPOUNDMENT

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	09	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE |__| ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

NOTE: Read Instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
TEMPERATURE, WATER DEG. FAHRENHEIT 00011 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	53.6	54.0	(19) DEG F	0	1/7	GRAB
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT DAILY AV	REPORT DAILY MX	DEG.F		WEEKLY	GRAB
OXYGEN DEMAND, CHEM. (HIGH LEVEL) (COD) 00340 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	22.9	28.2	(26) LBS/DY	******	8.1	10.0	(19) MG/L	0	1/7	COMPOS
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	60 DAILY AV	90 DAILY MX	MG/L		WEEKLY	COMPOS
PH 00400 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		7.14	******	7.87	(12) SU	0	1/7	GRAB
	PERMIT REQUIREMENT	******	******	**** ****	6.0 MINIMUM	******	9.0 MAXIMUM	SU		WEEKLY	GRAB
SOLIDS, TOTAL SUSPENDED 00530 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	11.32	11.53	(26) LBS/DY	******	4.0	4.1	(19) MG/L	0	1/7	COMPOS
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	20 DAILY AV	30 DAILY MX	MG/L		WEEKLY	COMPOS
CYANIDE, TOTAL (AS CN) 00720 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	LESS THAN .010	LESS THAN .010	(19) MG/L	0	1/7	COMPOS
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.025 DAILY AV	0.05 DAILY MX	MG/L		WEEKLY	COMPOS
FLUORIDE, TOTAL (AS F) 00951 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	4.41	4.70	(26) LBS/DY	******	1.57	1.67	(19) MG/L	0	1/7	COMPOS
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	3.0 DAILY AV	3.0 DAILY MX	MG/L		WEEKLY	COMPOS
ARSENIC, TOTAL (AS AS) 01002 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	LESS THAN .010	LESS THAN .010	(19) MG/L	0	1/7	COMPOS
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.5 DAILY AV	1.0 DAILY MX	MG/L		WEEKLY	COMPOS

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		TELEPHONE	DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 586 7601 AREA CODE NUMBER	99	10	14
TYPED OR PRINTED			YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY LOCATION MOLYCORP INC. QUESTA DIVISION
TACS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*
(2-16) (17-19)

NM0022306	002 A
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	09	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

F - FINAL
SEEPAGE FF/TAILINGS IMPOUNDMENT

*** NO DISCHARGE |__| ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

NOTE: Read Instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
BERYLLIUM, TOTAL (AS BE)	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	LESS THAN .004	LESS THAN .004	(19) MG/L	0	1/30	COMPOS
01012 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	IES/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/I		CNCE/ RCNTH	COMPOS
CADMIUM, TOTAL (AS CD)	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	LESS THAN .001	LESS THAN .001	(19) MG/L	0	1/7	COMPOS
01027 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	IES/DY	******	0.05 DAILY AV	0.05 DAILY MX	MG/I		WEEKLY	COMPOS
COBALT, TOTAL (AS CO)	SAMPLE MEASUREMENT	.028	.028	(26) LBS/DY	******	LESS THAN .010	LESS THAN .010	(19) MG/L	0	1/30	COMPOS
01037 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	IES/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/I		CNCE/ RCNTH	COMPOS
COPPER, TOTAL (AS CU)	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	LESS THAN .010	LESS THAN .010	(19) MG/L	0	1/7	COMPOS
01042 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	IES/DY	******	0.15 DAILY AV	0.30 DAILY MX	MG/I		WEEKLY	COMPOS
IRON, TOTAL (AS FE)	SAMPLE MEASUREMENT	0.281	0.282	(26) LBS/DY	******	LESS THAN 0.10	LESS THAN 0.10	(19) MG/L	0	1/7	COMPOS
01045 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	IES/DY	******	0.6 DAILY AV	0.6 DAILY MX	MG/I		WEEKLY	COMPOS
LEAD, TOTAL (AS PB)	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	LESS THAN .003	LESS THAN .003	(19) MG/L	0	1/7	COMPOS
01051 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	IES/DY	******	0.3 DAILY AV	0.6 DAILY MX	MG/I		WEEKLY	COMPOS
MANGANESE, TOTAL (AS MN)	SAMPLE MEASUREMENT	3.87	3.94	(26)	******	1.38	1.40	(19) MG/L	0	1/7	COMPOS
01055 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	IES/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/I		WEEKLY	COMPOS

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		TELEPHONE		DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 586 7601		99	10	14
TYPED OR PRINTED			AREA CODE NUMBER	YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TAOS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

PERMIT NUMBER (2-16)	DISCHARGE NUMBER (17-19)
NM0022306	002 A

MONITORING PERIOD

	YEAR (20-21)	MO (22-23)	DAY (24-25)		YEAR (26-27)	MO (28-29)	DAY (30-31)
FROM	99	09	01	TO	99	09	30

MAJOR

F - FINAL
SEEPAGE FR/TAILINGS IMPOUNDMENT

*** NO DISCHARGE |__| ***
NOTE: Read Instructions before completing this form.

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (82-83)	FREQUENCY OF ANALYSIS (84-88)	SAMPLE TYPE (69-70)
MOLYBDENUM, TOTAL (AS MO) 01062 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	5.06	5.08	(26) LBS/DY	******	1.80	1.80	(19) MG/L	0	1/7	COMPOS
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	IES/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		WEEKLY	COMPOS
SILVER, TOTAL (AS AG) 01077 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	LESS THAN .002	LESS THAN .002	(19) MG/L	0	1/30	COMPOS
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	IES/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS
VANADIUM, TOTAL (AS V) 01087 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	.028	.028	(26) LBS/DY	******	LESS THAN .010	LESS THAN .010	(19) MG/L	0	1/30	COMPOS
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	IES/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS
ZINC, TOTAL (AS ZN) 01092 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	LESS THAN .020	LESS THAN .020	(19) MG/L	0	1/7	COMPOS
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	IES/DY	******	0.2 DAILY AV	0.2 DAILY MX	MG/L		WEEKLY	COMPOS
ALUMINUM, TOTAL (AS AL) 01105 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0.281	0.281	(26) LBS/DY	******	LESS THAN 0.1	LESS THAN 0.1	(19) MG/L	0	1/30	COMPOS
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	IES/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS
SELENIUM, TOTAL (AS SE) 01147 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	LESS THAN .005	LESS THAN .005	(19) MG/L	0	1/30	COMPOS
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	IES/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS
CHLORDANE (TECH MIX. AND METABOLITES) 39350 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	LESS THAN .0002	LESS THAN .0002	(19) MG/L	0	1/30	COMPOS
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	IES/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE	DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 586 7601 AREA CODE NUMBER	99 YEAR	10 MO	14 DAY
TYPED OR PRINTED						

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556
FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TAOS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER	(17-19) DISCHARGE NUMBER
NM0022306	002 A

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	09	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

F - FINAL
SEEPAGE FR/TAILINGS IMPOUNDMENT

*** NO DISCHARGE |__| ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

NOTE: Read Instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
FLOW, IN CONDUIT OR THRU TREATMENT PLANT 50050 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0.336	0.426	(03) MGD	******	******	******		0	DAILY	GAUGING
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	MGD	******	******	******	**** ****		DAILY	RECORD
CHLORINE, TOTAL RESIDUAL 50060 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	LESS THAN .010	LESS THAN .010	(19) MG/L	0	1/30	COMPOS
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS
MERCURY, TOTAL (AS HG) 71900 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0	0	(26) LBS/DY	******	LESS THAN .0002	LESS THAN .0002	(19) MG/L	0	1/7	COMPOS
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.001 DAILY AV	0.002 DAILY MX	MG/L		WEEKLY	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
David R. Shoemaker
Mine Manager
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
505	586 7601	99	10	14
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TACS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

NM0022306 (2-16)	CO4 A (17-19)
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	09	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR
F - FINAL
MINE DRAINAGE

*** NO DISCHARGE |X| ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

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PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
OXYGEN DEMAND, CHEM. (HIGH LEVEL) (COD)	SAMPLE MEASUREMENT	******	******		******			(19)			
00340 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	125 DAILY AV	125 DAILY MX	MG/L		DAILY	GRAB
PH	SAMPLE MEASUREMENT	******	******			******		(12)			
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	6.0 MINIMUM	******	9.0 MAXIMUM	SU		DAILY	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT			(26)	******			(19)			
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	20 DAILY AV	30 DAILY MX	MG/L		DAILY	GRAB
ARSENIC, TOTAL (AS AS)	SAMPLE MEASUREMENT	******	******		******			(19)			
01002 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		DAILY	GRAB
BERYLLIUM, TOTAL (AS BE)	SAMPLE MEASUREMENT			(26)	******			(19)			
01012 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	GRAB
CADMIUM, TOTAL (AS CD)	SAMPLE MEASUREMENT			(26)	******			(19)			
01027 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.05 DAILY AV	0.10 DAILY MX	MG/L		DAILY	GRAB
COBALT, TOTAL (AS CO)	SAMPLE MEASUREMENT			(26)	******			(19)			
01037 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	GRAB

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		TELEPHONE		DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 586 7601	99	10	14
TYPED OR PRINTED		AREA CODE NUMBER	YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
DURING PERIODS OF DISCHARGE.

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TAOS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

PERMIT NUMBER (2-16)	DISCHARGE NUMBER (17-19)
NM0022306	004 A

MAJOR
F - FINAL
MINE DRAINAGE

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	09	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE |X| ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

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PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
COPPER, TOTAL (AS CU)	SAMPLE MEASUREMENT			(26)	******			(19)			
01042 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.15 DAILY AV	0.30 DAILY MX	MG/L		DAILY	COMPOS
LEAD, TOTAL (AS PB)	SAMPLE MEASUREMENT			(26)	******			(19)			
01051 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.3 DAILY AV	0.6 DAILY MX	MG/L		DAILY	COMPOS
SILVER, TOTAL (AS AG)	SAMPLE MEASUREMENT			(26)	******			(19)			
01077 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS
VANADIUM, TOTAL (AS V)	SAMPLE MEASUREMENT			(26)	******			(19)			
01087 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS
ZINC, TOTAL (AS ZN)	SAMPLE MEASUREMENT			(26)	******			(19)			
01092 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.75 DAILY AV	1.5 DAILY MX	MG/L		DAILY	COMPOS
ALUMINUM, TOTAL (AS AL)	SAMPLE MEASUREMENT			(26)	******			(19)			
01105 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS
SELENIUM, TOTAL (AS SE)	SAMPLE MEASUREMENT			(26)	******			(19)			
01147 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		TELEPHONE	DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 586 7601	99	10	14
TYPED OR PRINTED		AREA CODE / NUMBER	YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
DURING PERIODS OF DISCHARGE.

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TAOS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

PERMIT NUMBER (2-16)	DISCHARGE NUMBER (17-19)
NM0022306	004 A

MAJOR

F - FINAL
MINE DRAINAGE

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	09	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE |X| ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

NOTE: Read Instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
CHLORDANE (TECH MIX AND METABOLITES) 39350 1 0 C EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT			(26)	******			(19)			
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	UG/L		ONCE/MONTH	COMPOS
FLOW, IN CONDUIT OR THRU TREATMENT PLANT 50050 1 0 C EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	NO DISCHARGE	FOR ENTIRE	(03) MONTH:	******	******	******				
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	MGD	******	******	******	*** ****		DAILY	MEASRD
CHLORINE, TOTAL RESIDUAL 50060 1 0 C EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT			(26)	******			(19)			
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	UG/L		ONCE/MONTH	COMPOS
MERCURY, TOTAL (AS HG) 71900 1 0 C EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT			(26)	******			(19)			
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.001 DAILY AV	0.002 DAILY MX	UG/L		DAILY	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE	DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 586 7601 AREA CODE / NUMBER	99 YEAR	10 MO	14 DAY
TYPED OR PRINTED						

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
DURING PERIODS OF DISCHARGE.

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TAOS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

(2-16) PERMIT NUMBER	(17-19) DISCHARGE NUMBER
NM0022306	005 A

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	09	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

F - FINAL
MINE DRAINAGE

*** NO DISCHARGE |X| ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

NOTE: Read Instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
OXYGEN DEMAND, CHEM. (HIGH LEVEL) (COD)	SAMPLE MEASUREMENT	******	******		******			(19)			
00340 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	******	125 DAILY AV	125 DAILY MX	MG/L		DAILY	CONPOS
PH	SAMPLE MEASUREMENT	******	******			******		(12)			
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	6.0 MINIMUM	******	9.0 MAXIMUM	SU		DAILY	GRAB
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT			(26)	******			(19)			
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	20 DAILY AV	30 DAILY MX	MG/L		DAILY	CONPOS
ARSENIC, TOTAL (AS AS)	SAMPLE MEASUREMENT	******	******		******			(19)			
01002 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		DAILY	CONPOS
BERYLLIUM, TOTAL (AS BE)	SAMPLE MEASUREMENT			(26)	******			(19)			
01012 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	CONPOS
CADMIUM, TOTAL (AS CD)	SAMPLE MEASUREMENT			(26)	******			(19)			
01027 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.05 DAILY AV	0.10 DAILY MX	MG/L		DAILY	CONPOS
COBALT, TOTAL (AS CO)	SAMPLE MEASUREMENT			(26)	******			(19)			
01037 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	CONPOS

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE	DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 586 7601	99	10	14
TYPED OR PRINTED			AREA CODE NUMBER	YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
DURING PERIODS OF DISCHARGE.

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY LOCATION MOLYCORP INC. QUESTA DIVISION
TAOS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

PERMIT NUMBER (2-16)	DISCHARGE NUMBER (17-19)
NM0022306	005 A

MAJOR

F - FINAL
MINE DRAINAGE

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	09	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

*** NO DISCHARGE [X] ***
NOTE: Read Instructions before completing this form.

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
COPPER, TOTAL (AS CU)	SAMPLE MEASUREMENT			(26)	******			(19)			
01042 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.15 DAILY AV	0.30 DAILY MX	MG/L		DAILY	CMPOS
LEAD, TOTAL (AS PB)	SAMPLE MEASUREMENT			(26)	******			(19)			
01051 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.3 DAILY AV	0.6 DAILY MX	MG/L		DAILY	CMPOS
SILVER, TOTAL (AS AG)	SAMPLE MEASUREMENT			(26)	******			(19)			
01077 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	CMPOS
VANADIUM, TOTAL (AS V)	SAMPLE MEASUREMENT			(26)	******			(19)			
01087 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	CMPOS
ZINC, TOTAL (AS ZN)	SAMPLE MEASUREMENT			(26)	******			(19)			
01092 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.75 DAILY AV	1.5 DAILY MX	MG/L		DAILY	CMPOS
ALUMINUM, TOTAL (AS AL)	SAMPLE MEASUREMENT			(26)	******			(19)			
01105 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	CMPOS
SELENIUM, TOTAL (AS SE)	SAMPLE MEASUREMENT			(26)	******			(19)			
01147 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	CMPOS

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE	DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 586 7601 AREA CODE NUMBER	99	10	14
TYPED OR PRINTED				YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
DURING PERIODS OF DISCHARGE.

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TAOS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

PERMIT NUMBER (2-16)	DISCHARGE NUMBER (17-19)
NM0022306	005 A

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	09	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

F - FINAL
MINE DRAINAGE

*** NO DISCHARGE [X] ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

NOTE: Read Instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
CHLORDANE (TECH MIX AND METABOLITES) 39350 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT			(26)	******			(19)			
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS
FLOW, IN CONDUIT OR THRU TREATMENT PLANT 50050 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	NO DISCHARGE	FOR ENTIRE	(03) MONTH:	******	******	******				
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	MGD	******	******	******	**** ****		DAILY	MEASRD
CHLORINE, TOTAL RESIDUAL 50060 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT			(26)	******			(19)			
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	REPORT DAILY AV	REPORT DAILY MX	MG/L		ONCE/ MONTH	COMPOS
MERCURY, TOTAL (AS HG) 71900 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT			(26)	******			(19)			
	PERMIT REQUIREMENT	REPORT DAILY AV	REPORT DAILY MX	LBS/DY	******	0.001 DAILY AV	0.002 DAILY MX	MG/L		DAILY	COMPOS
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		TELEPHONE		DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 586 7601 AREA CODE NUMBER	99 YEAR	10 MO	14 DAY
TYPED OR PRINTED						

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
DURING PERIODS OF DISCHARGE.

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TACS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

NM0022306 (2-16)	1X1 C (17-19)
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	07	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

F - FINAL
WHOLE EFFLUENT TOXICITY

*** NO DISCHARGE [X] ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

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PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
LF P/F 10TH STATRE 7 DAY CHR CERIODAPHNIA TLP3B 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******		******	(9A)			
	PERMIT REQUIREMENT	******	******	*****	******	REPORT 7 DA AVG	******	PASS=0 FAIL=1		CTELY	CCEP24
LF P/F 10TH STATRE 7 DAY CHR PIMEPHALES TLP6C 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******		******	(9A)			
	PERMIT REQUIREMENT	******	******	*****	******	REPORT 7 DA AVG	******	PASS=0 FAIL=1		CTELY	CCEP24
NOEL LETHAL STATRE 7 DAY CHR CERIODAPHNIA TOP3B 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******		******	(23)			
	PERMIT REQUIREMENT	******	******	*****	******	REPORT 7 DA AVG	******	PER-CENT		CTELY	CCEP24
NOEL LETHAL STATRE 7 DAY CHR PIMEPHALES TOP6C 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******		******	(23)			
	PERMIT REQUIREMENT	******	******	*****	******	REPORT 7 DA AVG	******	PER-CENT		CTELY	CCEP24
NOEL SUB-LTH STATRE 7DAY CHR CERIODAPHNI TPP3B 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******		******	(23)			
	PERMIT REQUIREMENT	******	******	*****	******	REPORT 7 DA AVG	******	PER-CENT		CTELY	CCEP24
NOEL SUB-LTH STATRE 7DAY CHR PIMEPHALES TPP6C 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******		******	(23)			
	PERMIT REQUIREMENT	******	******	*****	******	REPORT 7 DA AVG	******	PER-CENT		CTELY	CCEP24
COEF OF VAR STATRE 7 DAY CHR CERIODAPHNIA TQP3B 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******		******	(23)			
	PERMIT REQUIREMENT	******	******	*****	******	REPORT 7 DA AVG	******	PER-CENT		CTELY	CCEP24

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		TELEPHONE		DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 586 7601 AREA CODE NUMBER	99	10	14
TYPED OR PRINTED			YEAR	MO	DAY

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
(PASS = 0 FAIL = 1) REPORT PASS AS '0' REPORT FAIL AS '1' IN CONCENTRATION AVG ABOVE. REPORT INVALID TEST AS '*' IN THE REPORTING FIELD AND FOOTNOTE IN THE COMMENT FIELD.

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TAOS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

PERMIT NUMBER (2-16)	DISCHARGE NUMBER (17-19)
NM0022306	TX1 C

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	07	01	TO	99	05	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

F - FINAL
WHOLE EFFLUENT TOXICITY

*** NO DISCHARGE |X| ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

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PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
COEF OF VAR STATHE DAY CHR PIMEPHALES TQP6C 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******		******	(23)			
	PERMIT REQUIREMENT	******	******	*** ****	******	REPORT 7 DA AVG	******	PER-CENT		ONLY	CCRP24
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE	DATE		
David R. Shoemaker Mine Manager	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. *(Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)*	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	505 586 7601 AREA CODE NUMBER	99 YEAR	10 MO	14 DAY
TYPED OR PRINTED						

COMMENTS AND EXPLANATION OF ANY VIOLATIONS *(Reference all attachments here)*
(PASS = 0 FAIL = 1) REPORT PASS AS '0' REPORT FAIL AS '1' IN CONCENTRATION AVG ABOVE. REPORT INVALID TEST AS '*' IN THE REPORTING FIELD AND FOOTNOTE IN THE COMMENT FIELD.

PERMITTEE NAME/ADDRESS *(Include Facility Name/Location if Different)*
NAME MOLYCORP INC. QUESTA DIV.
ADDRESS P. O. BOX 469
QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TACS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

NM0022306	TX2 C
PERMIT NUMBER (2-16)	DISCHARGE NUMBER (17-19)

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	07	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

MAJOR

F - FINAL
WHOLE EFFLUENT TOXICITY

*** NO DISCHARGE |__| ***

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OMB No. 2040-0004
Approval expires 05-31-98

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PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUANTITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
LF P/F LETH STATRE 7 DAY CHR CERIODAPHNIA TLP3B 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0	******	(SA)	0	1/90	COMP24
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 7 DA AVG	******	PASS=0 FAIL=1		QTRLY	COMP24
LF P/F LETH STATRE 7 DAY CHR PIMEPHALES TLP6C 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	0	******	(SA)	0	1/90	COMP24
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 7 DA AVG	******	PASS=0 FAIL=1		QTRLY	COMP24
NOEL LETHAL STATRE 7 DAY CHR CERIODAPHNIA TOP3B 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	29	******	(23)	0	1/90	COMP24
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 7 DA AVG	******	PER-CENT		QTRLY	COMP24
NOEL LETHAL STATRE 7 DAY CHR PIMEPHALES TOP6C 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	29	******	(23)	0	1/90	COMP24
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 7 DA AVG	******	PER-CENT		QTRLY	COMP24
NOEL SUB-LTH STATRE 7DAY CHR CERIODAPHNI TPP3B 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	29	******	(23)	0	1/90	COMP24
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 7 DA AVG	******	PER-CENT		QTRLY	COMP24
NOEL SUB-LTH STATRE 7DAY CHR PIMEPHALES TPP6C 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	29	******	(23)	0	1/90	COMP24
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 7 DA AVG	******	PER-CENT		QTRLY	COMP24
COEF OF VAR STATRE 7 DAY CHR CERIODAPHNIA TQP3B 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******	32.30	******	(23)	0	1/90	COMP24
	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 7 DA AVG	******	PER-CENT		QTRLY	COMP24

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QUESTA NM 87556

FACILITY MOLYCORP INC. QUESTA DIVISION
LOCATION TACS NM
ATTN: DAVID R SHOEMAKER, GEN. SUPT.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

NM0022306	TX2 C
PERMIT NUMBER (2-16)	DISCHARGE NUMBER (17-19)

MAJOR

F - FINAL
WHOLE EFFLUENT TOXICITY

*** NO DISCHARGE |_X| ***

Form Approved.
OMB No. 2040-0004
Approval expires 05-31-98

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	99	07	01	TO	99	09	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

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	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT .7 DA AVG	******	PER-CENT		CTFLY	COMP24
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
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QUESTA NM 87556

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LOCATION TACS NM
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NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

NM0022306	TX4 C
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MAJOR

P - FINAL
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	PERMIT REQUIREMENT	******	******	**** ****	******	REPORT 7 DA AVG	******	PASS=0 FAIL=1		QTRLY	CCRP24
LF P/F LETH STATRE DAY CHR PIMEPHALES TLP6C 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******		******	(9A)			
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NOEL LETHAL STATRE DAY CHR CERIODAPHNIA TOP3B 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******		******	(23)			
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NOEL SUB-LTH STATRE 7DAY CHR CERIODAPHNI TPP3B 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******		******	(23)			
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COEF OF VAR STATRE DAY CHR CERIODAPHNIA TQP3B 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	******	******		******		******	(23)			
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NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM *(NPDES)*
DISCHARGE MONITORING REPORT *(DMR)*

PERMIT NUMBER (2-16)	DISCHARGE NUMBER (17-19)
NM0022306	TX4 C

MONITORING PERIOD

	YEAR (20-21)	MO (22-23)	DAY (24-25)		YEAR (26-27)	MO (28-29)	DAY (30-31)
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MAJOR

F - FINAL
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	SAMPLE MEASUREMENT										
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TYPED OR PRINTED			AREA CODE NUMBER		YEAR	MO	DAY

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MAJCR

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LF P/F 16TH STATRE 7 DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	******	******		******		******	(9A)			
TLP3B 1 0 C EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	******	REPORT 7 DA AVG	******	PASS=0 FAIL=1		CTBLY	CCMP24
LF P/F 16TH STATRE 7 DAY CHR PIMEPHALES	SAMPLE MEASUREMENT	******	******		******		******	(9A)			
TLP6C 1 0 C EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	******	REPORT 7 DA AVG	******	PASS=0 FAIL=1		CTBLY	CCMP24
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TOP3B 1 0 C EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*****	******	REPORT 7 DA AVG	******	PER-CENT		CTBLY	CCMP24
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COEF OF VAR STATRE 7 DAY CHR CERIODAPHNIA	SAMPLE MEASUREMENT	******	******		******		******	(23)			
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DAY CHR PIMEPHALES TQ6C 1 0 C EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	******	******	*** ****	******	REPORT 7 DA AVG	******	PER-CENT		QTRLY	CCMP24
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
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ENSR Consulting and Engineering

Molycorp - Mining Operation Site Assessment

June 27, 1994

5.0 Local Communities

5.1 Background Information

The Molycorp/Questa Mine operation is located in Taos County. The communities of Questa, Taos, and Cerro are located within 30 miles of the Molycorp operation. The county, as well as this entire region, was historically dependent on small scale agriculture as its chief source of income. However, with a national movement toward large scale agricultural facilities and with the advent of large-scale mechanized farming techniques, this sector has decreased its contribution to the county economy. Tourist-related business is currently the major economic activity and source of revenue in Taos County.

Population.

The population of Taos County is growing at an annual rate of approximately 2 percent. The 1990 Census estimated Taos County population at 23,118, an 18.8 percent increase over the 1980 population count (Taos County Economic Development Corporation [TCEDC] 1994). The most recent available population estimate is for 1992 when the population was 24,228 (Brook 1994). This represents a 4.8 percent increase over the 1990 census count (Table 1). Of the total population, approximately 25 percent reside in or near the towns of Taos and Questa (TCEDC 1994).

Economy and Employment.

The most recently available estimates indicate that county employment numbers approximately 8,747 persons. The county has historically had a high unemployment rate, fluctuating between 15 and 25 percent (TCEDC, 1994). Employment in Taos County is dominated by the service and retail trade sectors (See Table 2 and Figure 1). Together these sectors account for 64 percent of employed persons over 16 years of age (Brook 1994). As tourist-related activities contribute to the service sector in Taos County, many of the available jobs are service related in such

industries as lodging, food, and entertainment. The government sector accounts for approximately 18 percent of employed persons. Taos County employment is largely wage and salary work, however approximately 17 percent consists of self-employed persons (TCEDC, 1994). The 1991 per capita personal income was $11,063 and has been growing at an average annual rate of 5.5 percent since 1986 (Brook 1994).

Fiscal resources for Taos County are largely dependent on property tax revenue. Taxable valuation of county properties has increase by 18 percent over a three year period beginning in 1991. The 1993 taxable valuation was $308,111,937. Commercial properties are assessed a mill levy of $20 per $1000 of value, while residential properties are assessed $11 per $1000 of value (Nichols 1994).

According to the 1990 Census, there were 12,020 housing units in Taos County. Of these, approximately 8,752 are occupied by both renters and owners. There were approximately 3,268 vacant units. Of these, 371 were rental units and 137 were units for sale. Temporary housing, such as hotel and motel units, vary in availability according to seasonal tourist fluctuations. The average vacancy rate, however, is listed as 14.5 percent in Taos County (TCEDC 1994).

Taos County and its associated municipalities provide an array of public and private services and facilities. These include health care, law enforcement, education, recreation, water and wastewater services, gas and electric (USDI BLM 1988).

Table 1

Recent Population Trends
Taos County

	1980 (Census)	1990 (Census)	1991 (Estimated)	1992 (Estimated)
Taos County	19,456	23,118	23,694	24,228
Percent Change	--	18.8	2.5	2.3
Town of Taos	5,369	4,065	--	--
Questa Village	--	1,699	--	--

Source: Brook, K. - State Data Center 1994.

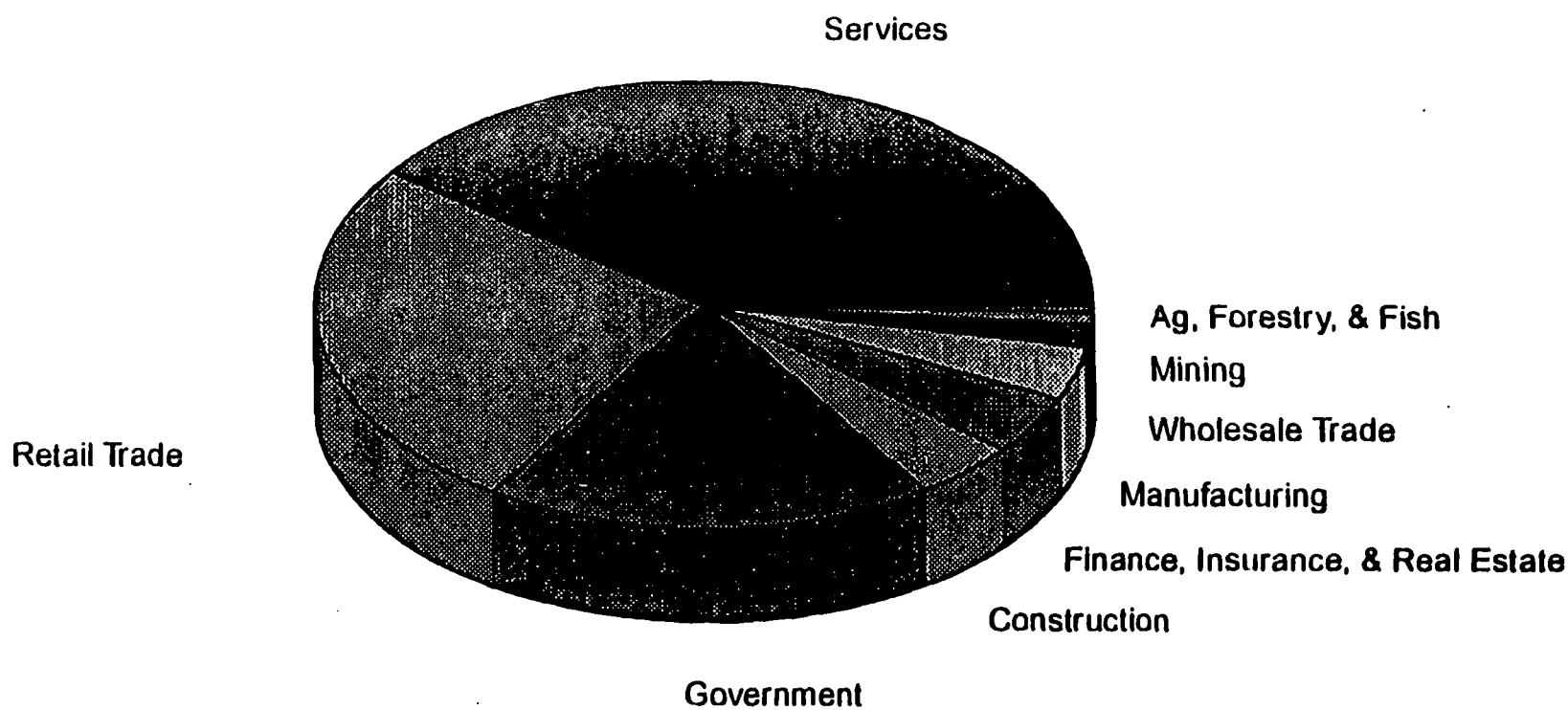
Table 2

Employment by Sector (1993)

Agriculture, Forestry, and Fish	41
Mining	77
Construction	375
Manufacturing	328
Transportation, Communication, and Utilities	256
Wholesale Trade	139
Retail Trade	2,207
Finance, Insurance, and Real Estate	358
Services	3,379
Government	1,587
Total	8,747

Source: Brook, K. - State Data Center 1994.

Figure 1
Employment by Sector (1993)



5.2 Effects of Current Mining Operations

Mining at the current site began in the 1920s. At its peak in 1985, the Molycorp/Questa Mine operation employed over 800 persons. Due to the drop in world market prices for molybdenum, the mine scaled down operations and employment from 1986 to 1992. In 1992, mining operations were placed on stand-by status (Shoemaker 1994).

The current activities at the Molycorp/Questa Mine operation consist of administrative services, maintenance, and environmental and reclamation work. Current operations employ approximately 19 persons. Should mining operations eventually resume, employment would increase to at least 220 persons (minimum operating staff) with the potential full-operational staff possibly reaching 800 persons.

Population.

Current mine operations have had no impact on the County's population or demographics. If operations at the mine are resumed, an increase in County population of not more than 1 to 3 percent (depending on actual hires) can be expected. This potential population increase would be reduced to the extent that Molycorp is able to hire local residents to fill job openings.

Economy and Employment.

Mining employment in Taos County in 1993 consisted of 77 jobs, accounting for approximately one percent of total employment. Current operations at the Molycorp/Questa mine provide approximately 19 of those jobs. If operations are eventually resumed, an increase to 220 employees at the Molycorp mine would increase mining employment to 4 percent of total employment in the county and an increase to 800 employees would increase mining sector employment to 12 percent of total county employment. Resumption of mining at the Molycorp/Questa mine would serve to decrease unemployment in Taos County. The amount of this decrease would depend on the necessary skills required by mine employers and the

availability of these skills in the local population.

Current average annual wage for mining staff at the Molycorp mine is approximately $510,000 plus benefits, more than twice the income per capita for the county. The current average monthly payroll (summer months) is approximately $74,000. These wages are largely spent on local goods and services in those communities where mine employees reside (primarily Questa and Taos). If operations are eventually resumed the monthly payroll could increase to as much as $1.83 million (average monthly payroll in 1985) (Santistevan 1994).

Current operating expenditures are approximately $4,000,000 annually. These expenditures are made to local, state, and out-of-state suppliers and contractors. Depending on the goods and services purchased, these expenditures generate sales and use taxes. In 1993, such expenditures generated approximately $65,000 in sales and gross receipts taxes. These taxes are paid to federal, state, and local governments. If the mine eventually resumes operation, expenditures could increase to as much as $68 million annually (1985 total expenditures), dramatically increasing potential tax revenues (Santistevan 1994).

Current mine operations generated approximately $27,000 in county property taxes in 1993. These taxes are currently paid on the depreciated value of equipment. If operations resume. taxes would be paid on equipment and mining activity. In 1985, at full operation, Molycorp paid over $400,000 in county property taxes (Santistevan 1994).

<u>Community Services.</u>

Current operations have little effect on local community services. If mining operations are eventually resumed. there would be some in-migration of persons due to mining employment and skill requirements. Given the current level of services and the availability of housing, adverse impacts to community services are not anticipated.

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6.0 Wildlife and Wildlife Habitat

6.1 Background Information

The Molycorp/Questa Mine operation includes the mine and mill facilities, tailings slurry pipelines, and tailings ponds. The mine and mill are located in mixed conifer forest on the western slope of the Taos Range of the Sangre de Cristo Mountains approximately 5 miles east of the Village of Questa. The tailings slurry pipelines run from the milling operation along riparian habitats associated with the Red River from the mill to the tailings ponds, and the tailings ponds are located adjacent to sagebrush and grassland habitats approximately 1/2 mile to the west of Questa. Figure 1 provides a general location map of the Molycorp operation. The general area of the mining operation ranges from over 10,000 feet in elevation at portions of the mine to less than 8,000 feet at the tailings facilities. A variety of mammals, birds, reptiles and amphibians are associated with the mining operation area.

Mammals.

Game animals or furbearers that may typically use the mine area or adjacent habitats include mule deer, elk, black bear, mountain lion, bobcat, coyote, gray fox, raccoon, ringtail, and cottontail.

Mule deer occur year-round throughout most of the operations area with populations considered to be stable. Annual aerial survey data collected by the New Mexico Game and Fish Department (NMGF) showed observations in Hunt Unit 53 of 188, 226, and 194 mule deer during the winter census of 1992, 1993, and 1994, respectively. Hunt Unit 53 includes the Molycorp Mine and much of the forest lands in the Taos Range. The State of New Mexico has not mapped any specific big game ranges in the mining operations area (Catanach 1994) nor has the U.S. Forest Service, Carson National Forest (USFS) according to Long (1994). Both agencies report that mule deer regularly use the mine site and adjacent habitats with winter, spring, fall use of the

south-facing slopes near the mine. Mule deer may also use habitats near, and particularly west of, the tailings ponds.

Elk are also present in the mine area. USFS biologists and Molycorp personnel report that elk are regularly seen on the mine property (Kuykendall 1994). Annual aerial survey data collected by NMGF showed observations in Hunt Unit 53 of 96, 116, and 107 elk during the winter census of 1992, 1993, and 1994, respectively. No specific elk ranges have been mapped by either NMGF or USFS (Catanach 1994, Long 1994), but use patterns generally parallel mule deer with elk more tolerant of greater snow depth.

Bobcat, coyote, gray fox, raccoon, and ringtail are all found within the mine operations area. The coyote is thought to be the most common of these and is found throughout the area, and the raccoon would be expected along the Red River. Black bear and mountain lion occur in limited numbers in the mountainous areas near the mine and have also been reported just west of the tailings facilities near Guadalupe Mountain (USDI BLM 1987).

Numerous small mammals may also inhabit the mine area. Productivity of these species varies from year to year. Small, non-game mammals on or near the mine or tailings area include such species as the white-tailed jackrabbit, Ord's kangaroo rat, deer mouse, and least chipmunk.

Birds.

The high elevation mixed conifers, ponderosa pine woodlands, riparian systems, and sagebrush/grasslands support a broad diversity of both nesting and migrant bird species. Kennedy and Stahlecker (1986) recorded 133 avian species in studies conducted near the tailings facilities. Additional bird species occur in the mine area (USDI BLM 1988). Upland game birds include Merriam's turkey, blue grouse, scaled quail, and mourning dove. Waterfowl and shorebirds use the Red River as well as the tailings impoundment with typical nesting species including the mallard and common merganser. Raptors are found throughout the area and are represented by species such as the red-tailed hawk, American kestrel, great-horned owl, and saw-whet owl. Threatened or endangered species are discussed later.

Fisheries.

Fisheries resources in the project area are found in the Red River. The Red River lies in the Rio Grande watershed in northern New Mexico with headwaters in the Sangre de Cristo Mountains at an elevation of 12,500 feet. The East and Middle forks of the Red River merge to form the main channel approximately 6 miles upstream of the town of Red River at an elevation of 9,400 feet. From that point, the river flows in a westerly direction for approximately 27 miles, eventually emptying into the Rio Grande at an elevation of 6,500 feet. The river flows adjacent to the Molycorp Mine and Mill approximately 6 miles below the town of Red River and 21 miles above its confluence with the Rio Grande. Figure 1 shows that the Red River canyon forms the southern boundary of the Molycorp Mine and Mill complex. The drainage area of the Red River is approximately 190 square miles with an average annual discharge of 34.5 cubic feet per second (cfs) (Smolka and Jacobi 1986).

There are reproducing populations of cutthroat, brook, and brown trout inhabiting the river's upper reaches above the town of Red River. A reproducing brown trout population provides a high quality fishery in the rivers lower reach. Rainbow trout are stocked annually in the middle reaches of the River by the Town of Red River and by the New Mexico Game and Fish Department (Smolka and Jacobi 1986). The middle reaches of the river between the towns of Red River and Questa have been characterized as having poor potential for trout reproduction; this is thought to be related to both a paucity of available macroinvertebrates for trout prey and to limited availability spawning substrates (Smolka and Tague 1987).

Effects of Current Mining Operations

Fisheries resources in the Red River are not being affected by the current mining operations. Limitations in fisheries habitat in the middle reaches of the river are thought to be due to natural processes acting on the extensive hydrothermal scarring occurring along this segment of the river, some of which were incorporated into the historic surface mining area of the Molycorp Mine. Observation made during a thunderstorm runoff event by Smolka and Tague (1987) show

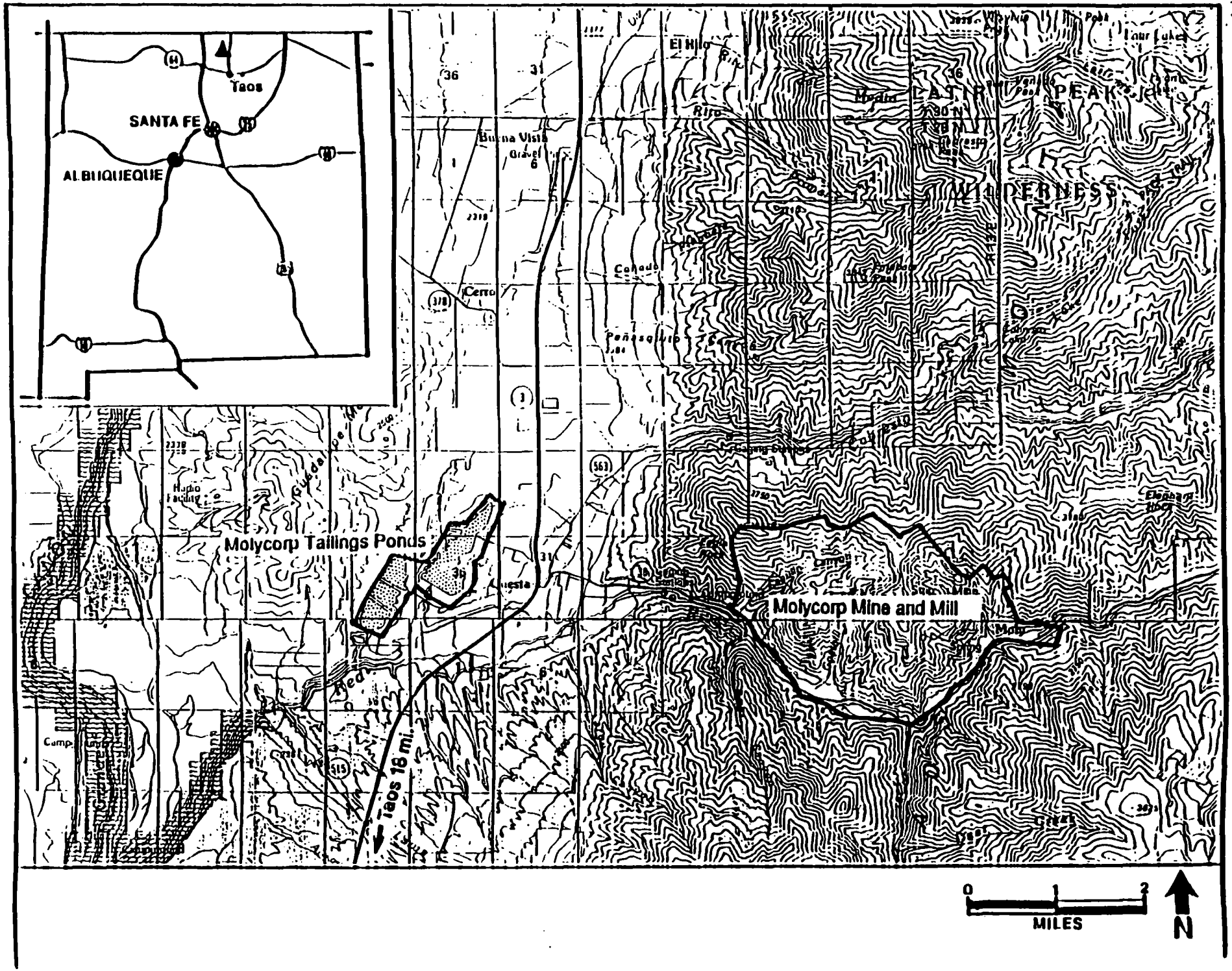
that flooding of these geothermal scars and other erodible soils substantially increase turbidity and the presence of many minerals and metals while lowering the pH from slightly basic to very acidic (8.1 to 3.8) This may result in periodic toxicity, and downstream, these materials may precipitate out to armor the channel and limit spawning substrate (see Water Resources Section).

Amphibians and Reptiles.

Amphibians and reptiles found in the area include the western spadefoot toad, leopard frog, collard lizard, great plains skink, bullsnake, and prairie rattlesnake.

Threatened or Endangered Species.

Threatened or endangered species associated with the mine area include the bald eagle, American peregrine falcon, and whooping crane. The bald eagle is both federal and state-listed as endangered. Wintering bald eagles are known from the upper Rio Grande Gorge to the west of the tailings ponds and may occasionally use Red River habitats as well. Likewise, the peregrine falcon and whooping crane are also both federal and state-listed. An active peregrine aerie is located within the region. The whooping crane may potentially pass through the project area during migration but use of habitats on or adjacent to the mining operation is not expected.


Taos
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ALBUQUERQUE
Molycorp Tailings Ponds
Molycorp Mine and Mill
Taos 18 mi.
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WILDERNESS
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6.2 Effects of Current Mining Operations

Current mining operations are not substantially affecting wildlife or wildlife habitat. The current activities at the Molycorp/Questa Mine operation consist of administrative services, maintenance, and environmental and reclamation work and employs approximately 19 persons.

No additional surface disturbance to the mine is occurring at this time. Physical work on the mine property consists primarily of road maintenance, drainage control, and limited reclamation plantings in conjunction with revegetation studies. Natural revegetation is occurring slowly on certain microclimates within the historic mining area. Wildlife regularly use the mine and adjacent habitats. There have been numerous observations of elk and deer on the mine and in the area surrounding the Administration Building (Shoemaker 1994). A site visit during April 1994 showed established big game trails across portions of the mine and evidence of substantial big game use in undisturbed habitats nearby.

Because the mine and mill are not operational, there is currently no concern over a break or leak in the tailings lines along the Red River canyon. Molycorp plans to use the lines during the summer months to provide water to the tailings ponds for dust control as necessary.

The tailings ponds west of Questa are approximately 85 percent capped during this closure period to control dust. A portion of this area has also been revegetated to further aid in the control of wind-generated dust. Water is regularly applied to the uncapped portion of the ponds as needed. There is limited bird and other wildlife use of the tailings ponds area.

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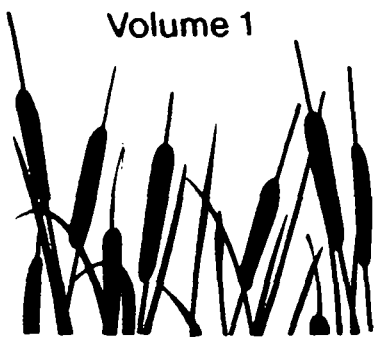
Proposed
Rio Grande Corridor Coordinated Resource Management Plan
and Taos Resource Management Plan Amendment/
Final Environmental Impact Statement

THE RIO GRANDE CORRIDOR PROPOSED PLAN AND FINAL EIS

AUGUST 1998

Volume 1



United States Department of the Interior
Bureau of Land Management
New Mexico/Colorado

Copper Hill Unit

The Copper Hill Unit provides winter range that is crucial for mule deer, elk, and bald eagle foraging (based on a NMDF&F assessment). Part of this unit (1,768 acres) is designated as critical habitat for the Mexican spotted owl.

Approximately 27 acres of riparian habitat exist within eight separate drainages in this unit. They are the Arroyo Hondo, Rito Cieneguilla, Piedra Lumbre Canyon, Tierra Amarilla Canyon, Agua Caliente Canyon, Rio Embudo, Rio de las Trampas, Cañada del Agua, and Cañada de Ojo Sarco. Fishery resources are known to exist only in Agua Caliente Canyon and the Rio Embudo. The Rio Embudo is managed by the NMDG&F as a Type III-A stream that is capable of supporting supplemental trout populations year-round.

This unit contains the only perennial stream, Agua Caliente Canyon, that is suitable for Rio Grande cutthroat trout reintroduction within the planning area. This stream is approximately 5 miles long and originates on national forest lands.

The USGS is taking biological inventories of invertebrates on portions of the Rio Grande as part of its National Water Quality Assessment. The reports should be available this year. Early indications are that the survey may have discovered a new species of caddis fly near the Rio Embudo.

Special-Status Animal Species

There are 13 mammals, 15 birds, 3 fish, 2 amphibians, and 2 mollusk species which were considered for analysis within the planning area as a result of a species list request to the U.S. Fish and Wildlife Service (FWS) (refer to Table 3-9).

Black-footed Ferret (Mustela nigripes)

This species is usually associated with prairie dog towns in grassland plains, semi-arid grasslands, and adjacent mountain basins. The black-footed ferret historically occurred over most of New Mexico (USDI, BLM 1984). The last confirmed sighting was in 1934 (USDI, BLM 1995). No black-footed ferrets are known to exist other than the captive and reintroduced populations in Wyoming, Montana, and South Dakota. However, remnant populations may still exist in portions of the former range (Hillman and Carpenter 1980).

The decline in black-footed ferret populations was due mainly to historic extermination of prairie dogs, habitat alterations, and major plague outbreaks in the prairie dog populations (USDI, FWS 1988).

The most recent information from the FWS (USDI, FWS 1989) indicates that prairie dog towns of the following sizes are necessary to maintain a black-footed ferret population: (a) 80 acres for black-tailed prairie dogs, and (b) 200 acres for Gunnison's prairie dogs.

No critical habitat has been identified for the black-footed ferret in the planning area. Information gathered from range management specialists, wildlife biologists, and other resource individuals who are continuously conducting fieldwork throughout the area have not identified any prairie dog towns the size necessary to support a black-footed ferret population. The largest known prairie dog town (Gunnison's) is approximately 5 acres in size.

Bat Species

The bat species of concern include fringed myotis (*Myotis thysanodes*), Pale Townsend's bat (*Plecotus townsendii pallescens*), big free-tailed bat (*Nyctinomops macrotis*), spotted bat (*Euderma masculatum*), Western small-footed myotis (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), Yuma myotis (*Myotis yumanensis*), long-legged myotis (*Myotis volans*), and occult little brown bat (*Myotis lucifugus occultus*). These species occupy various habitats that range generally through riparian areas, woodlands, canyons, and rocky areas. Habitat requirements typically include (1) a roost site or sites (cracks, crevices, cliffs, trees, caves, mines, buildings); (2) proximity to water, feeding near trees and over water; (3) an adequate prey base consisting mostly of insects; and (4) hibernacula (caves, tunnels, and buildings).

TABLE 3-9
ANIMALS OF CONCERN IN THE RIO GRANDE CORRIDOR BETWEEN LA SAUSES, COLORADO AND VELARDE, NEW MEXICO

Common Name	Status (Federal)	Scientific Name
Mammals		
black-footed Ferret	endangered	*Mustela nigripes*
fringed myotis	species of concern	*Myotis thysanodes*
Pale Townsend's western big-eared bat	species of concern	*Plecotus townsendii pallescens*
big free-tailed bat	species of concern	*Nyctinomops macrotis*
spotted bat	species of concern	*Euderma maculatum*
western small-footed myotis bat	species of concern	*Myotis ciliolabrum*
long-eared myotis	species of concern	*Myotis evotis*
Yuma myotis	species of concern	*Myotis yumanensis*
long-legged myotis	species of concern	*Myotis volans*
occult little brown bat	species of concern	*Myotis lucifugus occultus*
Goat Peak pika	species of concern	*Ochotona princeps nigrescens*
New Mexican meadow jumping mouse	species of concern	*Zapus hudsonius luteus*
southwestern otter	species of concern	*Lutra canadensis sonorae*
Birds		
American peregrine falcon	endangered	*Falco peregrinus anatum*
Arctic peregrine falcon	threatened	*Falco perefrinus tundrius*
Baird's sparrow	species of concern	*Ammodramus bairdii*
bald eagle	threatened	*Haliaeetus leucocephalus*
black tern	species of concern	*Chlidonias niger*
ferruginous hawk	species of concern	*Buteo regalis*
Harlequin duck	species of concern	*Histrionicus histrionicus*
interior Least tern	endangered	*Sterna antillarum athalassos*
loggerhead shrike	species of concern	*Lanius ludovicianus*
Mexican spotted owl	threatened	*Strix occidentalis lucida*
mountain plover	candidate	*Charadrius montanus*

TABLE 3-9
ANIMALS OF CONCERN IN THE RIO GRANDE CORRIDOR BETWEEN LA SAUSES, COLORADO AND VELARDE, NEW MEXICO

Common Name	Status (Federal)	Scientific Name
northern goshawk	species of concern	*Accipiter gentilis*
southwestern willow flycatcher	endangered	*Empidonax trailii extimus*
white-faced ibis	species of concern	*Plegadis chihi*
whooping crane	experimental non-essential	*Grus americana*
Fish		
Colorado squawfish	endangered	*Ptychocheilus lucius*
flathead chub	species of concern	*Platygobio gracilis*
roundtail chub	species of concern	*Gila robusta*
Amphibians		
boreal western toad	species of concern	*Bufo boreas boreas*
Jemez Mountains salamander	species of concern	
Mollusks		
Cockerell's striate disc	species of concern	*Discus shemeki cockerelli*
Sangre de Cristo pea clam	species of concern	*Pisidium sanguinichristi*

Large cliffs and caves occur along the Rio Grande and other isolated rivers within the planning area. In addition, water and the associated prey base are found in numerous locations throughout the area.

A bat survey was completed by the Taos Field Office between 1994 and 1996 at different locations in both Taos and Rio Arriba counties. A total of 14 species were captured. Two sites, Big Arsenic Springs and Ojo Caliente, were particularly high in abundance (Gannon 1997).

Goat Peak Pika (Ochotona princeps nigrescens)

In New Mexico, goat peak pikas are confined to talus slides and boulder fields in alpine and subalpine areas. Other subspecies are common in the alpine area of the Sangre de Cristo Range, descending as low as 11,000 feet (Findley 1975).

The historic range of this species includes only areas in New Mexico, and is not found beyond the state's borders (Federal Register 1994).

Nests are located at the deeper parts of the burrow system and consist of grasses and shredded paper when available. Burrows may be many feet long and three or more feet deep (NMDG&F 1967).

New Mexican Meadow Jumping Mouse (Zapus hudsonius luteus)

The New Mexican meadow jumping mouse is usually found in marshes, moist meadows, and riparian habitats in open prairies. The preferred

habitat for the meadow jumping mouse contains permanent streams, moderate to high soil moisture, and dense and diverse streamside vegetation consisting of grasses, sedges, and forbs. The nearest reported locations for this species are in the Española Valley of the Rio Grande (Hafner, personal communication 1996). Presently, the highest potential habitat for this species on BLM lands within the planning area is found from Taos Junction Bridge to Velarde, New Mexico.

Southwestern Otter (Lutra canadensis sonorae)

Otters are largely aquatic, doing most of their hunting and traveling in the water. They travel on land slowly and with considerable effort, unless there is soft snow, over which they slide with great rapidity. Their principal food consist of fish, crawfish, and other forms of animal life they can pick up in or under the water.

In March 1953 an adult male river otter was trapped on the Gila River near Cliff, New Mexico (McClellan 1954). This animal, attributed to the southwestern subspecies, *Lutra canadensis sonora*, is the only specimen that is known to have been procured in New Mexico (Findley et. al. 1975).

In Colorado efforts to establish self-sustaining populations of river otter in 1976 began by releasing wild otters from northern states and Canadian provinces into mountain rivers and lakes. No otters have as yet been introduced into the Rio Grande drainage. The closest release site to New Mexico was the Piedra River in southwestern Colorado releasing 24 between 1979 and 1982 (Beck, personal communication 1986).

A river otter was reportedly seen on the Vermejo River in Colfax County, New Mexico in 1979. Two additional sightings of river otter were reported in Taos County during the summer of 1986. These sightings have renewed interest in the status of river otter in New Mexico, prompting further studies to be conducted.

The BLM currently is conducting additional surveys for otters and other wetland furbearers in the area so that the presence of otter can be documented in order that the population can receive proper protection and management. The results of these ongoing surveys suggest that otter no longer inhabit the Rio Grande.

American Peregrine Falcon (Falco peregrinus anatum) and Arctic Peregrine Falcon (Falco pereginus tundrius) - Migration Only

Peregrine falcons historically nested (20 sites) in New Mexico (USDI, FWS 1984) and have been documented within the planning area. During the early 1970s a major decline occurred primarily due to the use of pesticides and their detrimental effect on the eggs of this species.

The preferred habitats for the peregrine falcon are generally large cliff areas near water and with relatively dense avian prey species (e.g., passerine birds, shorebirds). Large cliffs occur along the Rio Grande within the planning area. In addition, water and the associated avian prey base are found in numerous locations throughout the area. Habitat requirements typically include (1) an inaccessible nest site, (2) an adequate prey base, (3) proximity to water, and (4) isolation from human disturbances (USDI, FWS 1984). Peregrine falcons typically forage along water sources (USDI, FWS 1984). The vast majority of peregrine falcon eyries in the Rocky Mountain/ Southwest Region are within 1 mile of a stream or river (USDI, FWS 1984).

Peregrine falcons are known to migrate seasonally through the area and have historically nested in the area. There is one historical nesting site on the Upper Rio Grande that has been monitored annually since 1990, and intermittently since 1986. No activity has been observed at this historical site. The Arctic subspecies would only migrate through New Mexico.

The main threat to peregrine falcons has been attributed to pesticide use, particularly dichloro diphebyl trichloroethane (DDT) and its metabolites

(USDI, FWS 1984). The BLM uses some chemicals for noxious weed control and to remove sagebrush for desired plant community goals; however, none of the chemicals used by the BLM contain any DDT as a component.

Baird's Sparrow (Ammodramus bairdii)

The Baird's sparrow forages on the ground. Reluctant to fly, it runs like a mouse through grass and eats seeds of grasses (e.g., brome, fescue, three-awn green foxtail), and weed seeds (e.g., pigweeds, mustards, ragweed), along with some insects grasshoppers, caterpillars, moths, and spiders.

They build their nests on the ground in drier parts of prairie in tangled grass, sometimes under low shrubs often close together in a small community, and in slight cavities in the ground of interwoven grasses and weed stems lined with finer grasses. This type of habitat is found adjacent to and in the extreme northern end of the planning area, and migration through the corridor is possible.

Baird's sparrows winter in New Mexico, arriving in small groups in February and at their main breeding grounds further north in April and May where the males establish territories.

Bald Eagle (Haliaeetus leucocephalus)

Bald eagles are generally associated with medium to large perennial streams, rivers, and other water bodies that provide an adequate prey base and appropriate nesting/roosting habitat. Within the area, the bald eagle is generally associated with the major reservoirs along the Rio Grande and its tributaries. This bird also frequents the mainstem sections between the reservoirs.

The breeding population of bald eagles has historically been low, although New Mexico does provide habitats for wintering and migration. No bald eagle nesting use has been identified on BLM administered lands. Food availability is a major factor influencing bald eagle distribution, and fish is generally considered the preferred prey base. However, waterfowl (particularly dead or crippled individuals), dead livestock, rabbits, and small mammals could be utilized as a prey base for a wintering population.

Bald eagles migrate seasonally through the area, and have been documented as roosting in one area along the Rio Grande. The area where bald eagles have been observed on roost sites during the winter is along the lower Rio Grande south of Pilar. The area is predominantly private lands with scattered tracts of riparian habitat managed by the BLM.

Black Tern (Chlidonias niger)

The black tern hovers over meadows and grassy marshes and with its bill snatches insects from the air; and darts down to pick others from tall grasses such as dragonflies, moths, grasshoppers, crickets, flies, beetles, and many others. It also eats crayfishes and small mollusks, spiders, and other invertebrates.

It nests in small, loose colonies, sometimes in hollows in prostrate dead canes of marsh or on floating masses of dead plants, and on muskrat houses.

Preferred tern habitat is associated with marshes and floating masses of dead plants where nests are built. Known distribution of the black tern in New Mexico is as a migrant within the Rio Grande corridor. The BLM administers no marsh habitat within the planning area.

Ferruginous Hawk (Buteo regalis)

The ferruginous hawk may winter throughout its nesting range which includes New Mexico, and is on its northern part of summer range by March to early April. Summer range includes treeless plains and grassy prairies, where the ferruginous hawk sits quietly on low trees or fence posts or sometimes even on the ground or knoll watching for prey.

The ferruginous hawk eats mainly prairie dogs and is also very fond of jackrabbits, cottontails, mice, gophers, and on occasion bats, bull snakes, lizards,

grouse, meadowlarks, grasshoppers, crickets, and beetles.

The ferruginous hawk prefers nesting in tall trees when they are available, in timber belts along streams 6 to 55 feet above ground or on a ledge of a cliff. The nests are usually between 12 to 15 feet high, made of sticks, twigs, or old bones and lined with turf, dried grasses, cow or horse dung, and used year after year.

Presently there are no known nesting or use areas for this species within the planning area.

Harlequin Duck (Histrionicus histrionicus)

In the summer the Harlequin duck lives on turbulent mountain streams or ponds and lakes and along rocky Arctic shores; in winter, in heavy surf along rugged rocky coasts with shelves, reefs, and jagged sunken rocks.

Being such proficient divers, Harlequin ducks seem to prefer to feed in rough waters broken by rocks and surf in which they dive to the bottom using their feet and wings. The ducks poke their bill among the stones where they catch and eat nymphs and mayflies, stoneflies, and larvae of caddis flies. At sea, they eat mostly animal foods consisting mainly of crustaceans (crabs, amphipods, isopods, etc.) and mollusks (barnacles, limpets, snails, chitons, etc.) which they dislodge from rocks.

Nesting occurs in a hollow in the ground under bushes usually lined with grasses and down, or in a hollow tree or cavity among the rocks.

Presently there are no known nesting or use areas for this species within the planning area.

Interior Least Tern (Sterna antillarum athalassos)

The interior least tern is found mainly in southeast New Mexico, in and around Bitter Lake National Wildlife Refuge. It is an occasional migrant to other counties. However, presently the only known nesting population is in Chaves County along the Pecos River within the refuge. Within the area this bird would be considered only as an accidental migrant (David Leal, personal communication). No critical habitat has been designated within the planning area.

This species is a colonial nesting shorebird. Although it is associated with water, it spends most of its time on sand bars, playas, or snatching its food from the surface of the water. It nests on the ground along the sandbars or playas.

Channelization, irrigation, and the construction of reservoirs and pools have contributed to the elimination of much of the least tern's nesting habitat. In addition, the increase of human recreation use of sand bars along rivers and lakes have caused disturbance to nesting birds.

Presently there are no known nesting or use areas for this species within the planning area.

Loggerhead Shrike (Lanius ludovicianus)

The loggerhead shrike prefers mainly open country, thinly wooded or scrubby land with clearings, meadows, pastures, thickets along roads and hedges.

This species, because of its range, has a wide variety of foods which consist mainly of mice and birds in the winter and insects in the summer. It prefers habitats with thorny trees, shrubs, or barbed wire on which to impale all kinds of animal food: small birds, crayfishes, frogs, mice, and some small fishes.

Presently there are no known nesting or use areas for this species within the planning area.

Mexican Spotted Owl (Stirx occidentalis lucida)

The Mexican spotted owl occupies mountainous areas with its preferred habitat consisting of dense, multi-storied forests with moderately closed to closed

canopies. In addition, these owls have been found in canyon systems with little or no tree cover (USDI FWS 1993). These canyon systems appear to provide the same or similar microclimate as occurring within the dense multi-storied forests.

Loss of preferred habitats mainly by timber harvesting has been the major impact causing the decline of the Mexican spotted owl. Historically the planning area contained forest stands that no longer occur today. From as early as the 1800s homesteaders, owners of land grants, and private logging companies removed most of large commercial timber within the planning area. Due these past forestry practices the area has no dense, old-growth forests and thus a very limited timber harvest program. The program basically consists of some fuelwood cutting in piñon-juniper woodlands, and small salvage cuts in ponderosa pine stands with mistletoe and other damage.

The *Mexican Spotted Owl Recovery Plan* (USDI, FWS 1995) does not have specific guidelines for ponderosa pine and piñon-juniper habitats, which are considered as "Other Forest and Woodland Types" within the recovery plan. The BLM would follow the recovery plan quidelines in managing its timber and fuelwood programs in areas where spotted owls or their habitat is identified on BLM administered lands, or where BLM lands are adjacent to other lands that have been identified as spotted owl habitat.

Critical habitat has been identified in one location by the FWS on BLM lands within the planning area (NM-BLM-3). Although the critical habitat designation has been recently rescinded the area would continue to be protected from any type of vegetative manipulation (e.g., timber harvesting).

Mountain Plover (Charadrius montanus)

The mountain plover prefers flat, short-grass prairie and tends to avoid taller grasses and hillsides (USDI, BLM 1995). Suitable habitat occurs in areas often grazed by livestock (USDI, BLM 1995). The bird prefers habitat composed of large areas of bare ground and short grass (less than 4-inch-tall stubble). Prairie dog towns and turf farms are likely areas of use. Outside the breeding season, this species occurs in flocks of up to several hundred, feeding in alkaline flats, plowed ground, sprouting grain fields, and grazed pastures (Terres 1991).

Surveys conducted in 1995 by the BLM and NMDG&F located a population in the northern part of the resource area (Williams, personal communication 1995). This population is considered by the NMDG&F to be the largest concentration of mountain plovers yet identified within the state and is found in an area adjacent to the planning area. The mountain plover has not been identified within the planning area.

Northern Goshawk (Accipiter gentilis)

Goshawks are generally associated with northern forests preferring mixed hardwoods and conifers that provide an adequate prey base (e.g., hares, rabbits, gray squirrels, chipmunks, weasels, ducks, grouse, or quail).

The northern goshawk winters over summer breeding range but irregularly migrates southward in fall when its staple prey of hares, lemmings, and grouse are scarce in the north. In its northern range thinning of eggshells is noted due to use of pesticides in the environment and in its prey. Within the planning area the Northern goshawk has not been found to occur.

Southwestern Willow Flycatcher (Empidonax traillii extimus)

The southwestern willow flycatcher is found along riparian habitats (e.g., rivers, streams and other wetlands) of the desert southwest where dense groves of willows (e.g., *Salix*, *Baccharis* spp.), arrowweed, buttonbrush, boxelder, and alder are present, often with a scattered overstory of cottonwood (Tibbitts et al. 1994). In some locations, exotic plants including tamarisk and Russian olive are also used for nesting. The bird is generally associated with multi-layered vegetation in proximity to water. The surrounding vegetation of the nesting areas generally range from 10 to 12 meters high. Willow flycatchers breed in riparian habitat where surface water is present.

Historically the Southwestern willow flycatcher has nested along the major river systems in northern New Mexico. However, as the result of riparian degradation, very few habitats still remain.

Within the planning area, the BLM administers riparian habitat along the Rio Grande and other area water bodies. Many of these riparian areas are small (generally a few miles long) and very linear (less than 5 to 30 feet wide). However, few areas have been designated as critical habitat for the southwestern willow flycatcher (USDI, FWS 1997).

In 1993 the BLM began surveying for the southwestern willow flycatcher along the Rio Grande in the most likely areas for the species to occur. The following are the results of the surveys for BLM-administered lands:

1993: Two nesting pairs of southwestern willow flycatchers were located along the Rio Grande south of Taos.

1994: One nesting pair of southwestern willow flycatchers was located at a previously identified site, as well as two singing males (unknown willow flycatcher) on the upper Rio Grande above Taos. The two singing males were identified two days before protocol would allow them to be counted as southwestern willow flycatchers.

1995: One nesting pair was located at a previously identified location, and two singing male Southwestern willow flycatchers were sighted on the upper Rio Grande above Taos.

In 1994 and 1995 an additional pair of Southwestern willow flycatchers were identified on private lands along the lower Rio Grande by the BLM and FWS. This pair is located in an area where disturbance is infrequent. An adjacent area (about 5 acres) appears to be high-quality habitat, but is located closer to a main highway, so the disturbance from vehicular traffic may be impacting additional nest establishment in this area.

1996: Two nesting pairs of Southwestern willow flycatchers were located along the Rio Grande.

1997: One nesting pair of Southwestern willow flycatchers were located along the Rio Grande south of Taos, unfortunately the pair's attempt to nest failed.

In 1997 a survey was conducted south of Taos on the Rio Grande to determine whether or not active willow flycatcher nests were being parasitized by brown-headed cowbirds (*Molothrus ater*). The results concluded that on two separate occasions, five to six pairs of cowbirds and later three to four cowbirds were observed near the nesting site. Evidence of parasitism on other species of birds was noted.

Also in 1997, a cowbird distribution and behavior study was initiated. Potential cowbird foraging habitat was identified within 5 miles of known willow flycatcher nesting sites occurring within the area. Although the information is provisional there were no observations of foraging on public land sites. However, foraging by cowbirds was observed at downstream locations on private lands. Monitoring and surveys would continue on an annual basis.

The high-potential habitats for southwestern willow flycatcher have been identified and are currently inventoried on an annual basis.

The pair south of Taos established their residency near an intensively used BLM campground, built in 1965 and actively used continuously since then. In addition, the nesting area is adjacent to a state highway, and has been used by recreational float-boaters along the Rio Grande since the late 1970s. In the mid-1980s the commercial floatboater use was approximately 8,000 user-days annually through this area. In 1993, the use had increased to approximately 39,000 user-days annually. The birds established their territory with these existing activities ongoing, and have apparently been able to exist within the area for the past three years.

White-faced Ibis (Plegadis chihi)

The white-faced ibis is generally associated with freshwater marshes where it eats insects, newts,

leeches, earthworms, some snails, crustaceans (especially crayfishes), frogs, and fishes. Within the planning area the white-faced ibis would be considered only as an accidental migrant. The white-faced ibis could migrate seasonally through the area, occasionally using the rivers and larger lakes and reservoirs. However, no known use of BLM lands by the white-faced ibis has been identified.

Whooping Crane (Grus americana)

The whooping crane breeds mainly at Wood Buffalo National Park, Canada. The Wood Buffalo population winters mainly along the gulf coast of Texas at the Arkansas National Wildlife Refuge. A few whooping cranes that were raised by foster parents (Sandhill Cranes), at Gray Lake, Idaho migrate with the sandhill cranes to the Rio Grande Valley, New Mexico. These birds (three to five in number) winter mainly in the Bosque del Apache National Wildlife Refuge, located approximately 20 miles south of Socorro, New Mexico.

Whooping cranes select an open expanse of shallow water in rivers, lakes, reservoirs, and native wetlands for nightly roosting. These sites include stockponds, marshes, and flooded grain fields. Feeding sites include the same wetland types as those used during roosting. Within New Mexico, the whooping crane is associated with the agricultural fields and valley pastures, particularly where there is waste grain or sprouting crops. The whooping crane typically roosts on sand bars within the Rio Grande floodplain (NMDG&F 1988, BISON-M 1995).

No whooping cranes have been observed using any BLM lands, and no critical habitat has been designated within the planning area. The lack of any suitable wetland/agricultural habitat on BLM-administered lands within the planning area generally accounts for the lack of whooping crane observations.

Whooping cranes may move seasonally across the Rio Grande Corridor during their spring and fall migrations; however, they would be considered rare visitors to the area. No documented roost sites or feeding areas occur on BLM lands within this area.

Colorado Squawfish (Ptychocheilus lucius)

This species formerly inhabited the Colorado River Basin from southwesternmost Wyoming southward to northwestern Sonora and adjacent Baja California; at present, natural populations are confined to the upper portion of the basin in Utah, Colorado, Arizona, and New Mexico (e.g., Holden 1980). In New Mexico, the Colorado squawfish currently occurs in the San Juan River, and it may also have entered the state in historic time in the Gila River Basin. Until recently, the last record of Colorado squawfish was in 1961 in the San Juan River near Bloomfield. However, in 1987 and 1988, adult and young-of-year squawfish were captured in the San Juan between Shiprock and the Four Corners area (NMDG&F files).

At one time the Colorado squawfish was an abundant species, even to the point of serving as a significant food fish for early European settlers (Minckley 1973). Nonetheless, such settlement in the region soon saw a decline in the species, both in terms of range and numbers.

The Colorado squawfish was first collected from the San Juan River of New Mexico in 1936 by Elliot S. Barker (USNM 118996). In 1959, two more specimens were taken from the San Juan River near Rosa, Rio Arriba County. Four squawfish were subsequently collected in the vicinity of Navajo Dam. There are other unconfirmed reports of the species from anglers from the San Juan River upstream from Bloomfield, New Mexico, including one as recently as 1987.

This species is characterized as a "big river" fish, with adults (fish that are greater than 200 millimeters total length) occurring in turbid, deep, and strong-flowing water (Minckley 1973). In contrast, young-of-the-year, juveniles, and subaldults occupy shallow backwater areas, with little or no current and silty or sandy substrates. This shift in habitat preference may be associated with differences in the feeding habits of the two categories (Sublette 1990).

The Colorado squawfish spawns from early July through about mid-August, after water temperatures have exceeded 18 degrees Celsius (°C) for about a month. Preferred spawning sites are apparently

gravel and cobble-bottomed riffles, where the interstitial spaces are free of organic matter and sediment. Typically in the vicinity of such spawning riffles are sand-bottomed pools with slow laminar flows (NMDG&F 1988).

For spawning, this species selects white water riffles or rapids (Tyus 1986) with gravel and cobble substrate devoid of organic, silts, and clays (Sublette 1990).

The larvae drift downstream until they reach a size where they can move into shoreline areas consisting of embayments, backwaters, and isolated backwater pools (Sublette 1990).

Younger age classes of squawfish feed primarily upon insects and crustaceans, whereas older fish are obligate piscivores (NMDG&F 1988).

Studies have shown that abnormally high water releases from upstream dams during the primary nursery period of August through September were detrimental to survival of larvae, and that surviving larvae showed a significantly lower growth rate (Sublette 1990).

The species is endemic to the Colorado River Basin and is not known to have occurred within the planning area.

Flathead Chub (Hybopsis gracilis)

The flathead chub is native to the Rio Grande drainage and has been recently collected (1971 to 1980) within the planning area. This species is usually found in moderate to strong currents in rivers and larger streams above shifting sand bottoms, in highly turbid waters. Spawing usually occurs in summer when water temperatures range from 18 to 25°C (Sublette et. al., 1990).

Roundtail Chub (Gila robusta)

This species occurs in the San Juan and Gila basins, and it was formerly also present in the Zuni and San Francisco drainages. In the San Juan Basin, this chub is currently found in the mainstem San Juan River from Navajo Reservoir downstream to the Four Corners area and in the Mancos, Navajo, and Animas rivers (San Juan and Rio Arriba counties). The roundtail chub occurs locally in the Gila Basin in the East and Middle forks, the confluence area of the West and Middle forks, Turkey Creek, and sporadically in the mainstem Gila River downstream to the Middle Box (NMDG&F 1988). The species is not known to occur within the planning area.

The roundtail chub is generally associated with large rivers inhabiting pools with proximal overhead cover and rapids. They generally seek out pools 64 centimeters in depth whereas young chubs are frequently associated with more shallow habitats of 20 to 32 centimeters.

All age groups prefer cobble-rubble, sand-cobble, or sand-gravel substrata in association with undercut banks, fallen logs, or other overhead cover.

This species consumes a variety of invertebrates (including insects, gastropods, and crayfish), as well as algae and small fish (NMDG&F 1988).

Boreal Western Toad (Bufo boreas boreas)

The Boreal western toad has a very wide range from Alaska to New Mexico, which apparently is the extreme southeastern limit of its range. This species appears to be exclusively a high-mountain form in New Mexico, where it is restricted to the vicinities of rivers, creeks, lakes, and reservoirs. In the state it is known only from three lakes in the San Juan Mountains (Lagunitas, Trout and Canjilon). Within the planning area there are no public lands within the preferred habitat of this species.

Jemez Mountains Salamander (Plethodon neomexicanus)

This species is endemic to north-central New Mexico where it is found only in the Jemez Mountains in portions of Los Alamos, Sandoval, and Rio Arriba counties. It is locally common only in areas where essential microhabitat exists.

This salamander is generally found on loose rocky soils between 2,200 and 2,900 meters. They occur in and under rotting coniferous logs or under rocks on both flat areas and steep slopes. The habitat is coniferous forest dominated by Douglas fir, blue spruce, Engelmann spruce, ponderosa pine, and white fir with occasional aspen, Rocky Mountain maple, and various shrubby oaks. It is not known to occur within the planning area.

Cockerell's Striate Disc (Discus shemeki cockerelli)

This species of snail is typically found under stones, logs, and pieces of wood. They are often associated with woody debris of spruce, fir, and or aspen and are found at elevations between 7,000 and 12,000 feet. They appear to have a preference for spruce-fir woods, as six of the collections from a 1952 to 1954 study of central and north-central New Mexico were collected from this type of climax community. They are also considered "casual" in aspen and tundra habitats.

This species has not been identified within the planning area. The preferred habitat and elevations for the species, however, may be found in the upper elevations of the Upper Gorge and Copper Hill units in the planning area.

Sangre de Cristo Peaclam (Pisidium sanguinichristi)

The Sangre de Cristo peaclam is endemic to northern New Mexico. The species is found only in Middle Fork Lake, in the Sangre de Cristo Mountains. This is a typical alpine lake of the area, with no submergent aquatic vegetation, and emergent grasses are only in sheltered embayments. This mollusk occurs in the mud among these emergent grasses, as well as in that at the lake outlet (NMDG&F 1988).

Distribution of the Sangre de Cristo peaclam occurs in high elevation alpine lakes that do not occur within the planning area.

Fire

Fire has played an integral role in the development of Rio Grande Corridor, which is made up of numerous vegetative plant communities that have developed as part of a fire-dependent ecosystem. Periodic burning of these plant communities allows their natural composition, structure, and function to continue. Historically, natural fires occurred frequently, at a low intensity and involving small acreage. The natural fire cycle resulted in open savanna-type stands of ponderosa pine and piñon- juniper. The low intensity of the fires caused little or no effect on soil structure or chemistry, while resulting in a fairly diverse non-woody layer.

The decrease in natural fires that resulted from aggressive fire suppression caused these plant communities to change from more open grasslands to shrub grasslands and piñon-juniper woodlands. These latter communities do not produce the fine fuels needed to carry periodic natural fires, which also contributes to the change in vegetation. The practice of suppressing all natural fires has resulted in increased hazardous fuel loads, a change in ecosystem types, soil erosion, and a loss of ecosystem and biological diversity.

To blend fire back into the natural process of a functioning ecosystem, the Taos Field Office has begun a program of prescribed fires. However, until completion of fire managements plans and detailed prescribed burn plans, the BLM will continue to suppress all fires in the planning area.

Issue 4: Prehistoric and Historic Resources

The Rio Grande and Colorado River are the two largest river systems in the Southwest. The Rio Grande has provided the natural resources, including water, animals, plants and fertile soils, needed to support human beings throughout their existence in the area. The story of human use of the area provides an excellent opportunity for public education, interpretation, and research.

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PREY BASE ANALYSIS BY

HABITAT SITE, TAOS RESOURCE AREA

NEAR QUESTA IN TAOS COUNTY,

NEW MEXICO

(PEREGRINE FALCON PREY)

A STUDY PERFORMED FOR THE

U. S. BUREAU OF LAND MANAGEMENT

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PATRICIA L. KENNEDY

AND

DALE W. STAHLECKER

EAGLE ENVIRONMENTAL, INC.

P. O. BOX 40557

ALBUQUERQUE, NEW MEXICO 87196

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1.0 INTRODUCTION

The American Peregrine Falcon (Falco peregrinus anatum) is an endangered species, protected by the Endangered Species Act of 1973. As such, care must be taken to protect suitable nesting habitat and adjacent hunting areas. The Guadalupe Mountain Study Area could be a hunting area for nesting Peregrine Falcons, since nearby areas fit the definition of Suitable Nesting Habitat (Rocky Mountain/Southwest Peregrine Falcon Recovery Team 1984; USDA Forest Service et al. 1985).

This study was initiated to gather information on the availability and quality of the avian prey base breeding in or migrating through the 18,770 acre Guadalupe Mountain Study Area in northern New Mexico. This area includes active and proposed future mill tailings sites (USDI/BLM 1983). The majority of the area (> 95%) is managed by the U. S. Bureau of Land Management (BLM) and the information generated from this study will be used by the BLM to make land use decisions, develop environmental assessments and/or impact studies, and aid in compliance with Section 7 requirements of the Endangered Species Act of 1973. This information will also allow the BLM to manage for preferred avian habitat sites in northern New Mexico, recommend mitigating measures for management of active tailings reservoirs, and aid the reclamation of defunct tailings facilities near Questa, New Mexico.

The primary objectives of this study are:

- to identify the habitat sites within the study area, using vegetative and land form characteristics as the bases for identification;
- to map the habitat sites within the study area and provide a detailed narrative description of each habitat site;
- to determine populations of potential avian prey of Peregrine Falcons by habitat site during the nesting season; and
- to determine organochlorine contamination levels of representative and /or probable Peregrine Falcon prey.

The study area description and habitat site narratives are presented in Section 2.0 and the habitat map is in Appendix A. The avian communities nesting on the study area are discussed in Section 3.0, and the quality of potential Peregrine Falcon prey species based on organo-chlorine analysis of representative samples is presented in Section 4.0. Management recommendations and the literature cited within the report follow in Sections 5.0 and 6.0, respectively. Avian census grid maps are in Appendix B, photographs documenting grid corners are in Appendix C, and avian species incidentally observed in the study area are in Appendix D.

2.0 HABITAT SITES

Study Area

The study area is located in east central Taos County, New Mexico and includes the BLM managed Rio Grande Wild and Scenic River Area and Guadalupe Mountain. Twelve hundred acres of existing mill tailings sites and agricultural fields owned by Molycorp, Inc., which are located 1 1/2 miles east of Guadalupe Mountain, are also included in the study area. No mill tailings sites currently exist on the BLM property but the property is currently being evaluated as a future mill tailings site (USDI/BLM, 1983).

The Guadalupe Mountain Study Area (hereafter GMSA) is bordered by the Rio Grande Gorge on the west, the Red River Canyon on the south, BLM and Molycorp property lines west of Questa, New Mexico on the east and N. M. Highway 378 on the north (Appendix A). The BLM portion of the study area is characterized by an elongated northwest-southeast trenching, nearly flat-lying valley, flanked on the northeast and southeast by moderately steep (up to 30% gradient), fairly well dissected mountain slopes (USDI/BLM 1983). The valley slopes gently (< 5%) from a high point near its center towards both ends, where it abruptly narrows to steep-sided arroyos that drain towards the Rio Grande and the Red River (USDI/BLM, 1983). Local relief on the site is about 2200 ft, with elevations varying from a low of 6600 ft at the confluence of the Red and Rio Grande rivers to 8763 ft at the top of the northeast peak of Guadalupe Mountain.

The Molycorp, Inc. property is in a gently sloping agricultural valley southeast of Guadalupe Mountain. The valley slopes (< 1% grade) to the southwest where it drains into the Red River. Local relief is 200 ft, with elevations ranging from about 7400 to 7600 ft (USDA/SCS 1981).

The study area is located in the High Intermountain Plateau Subresource Area (USDA/SCS, 1978; 1982a). This area of north central New Mexico is characterized by nearly level to gently sloping old valley fill with gently sloping to steep hills and canyons, underlain by basalt. Annual precipitation

is 10-14 in., and the average annual temperature is 45° F. with a range of -30° to 100° F. The frost free season ranges from 90-130 days. Soils and associated climatic factors support vegetative communities similiar to that of the Great Basin Desert Shrub Formation (see Habitat Site descriptions for more details) (USDA/SCS, 1982a). The potential natural vegetation for this area includes the big sagebrush, western wheatgrass/big sagebrush and pinyon-juniper/big sagebrush associations at lower elevations and the Ponderosa pine-Douglas fir association at the upper elevations (USDA/SCS, 1978).

Habitat Sites

Methods

Initial delineation of habitat sites on the study area was made by analyzing aerial photographs and then preparing a preliminary habitat site map. Eight habitat sites were initially delineated: sagebrush/grassland, pinyon-juniper woodland, agricultural lands, wooded canyon benches, canyon slopes, riparian, mixed conifer, and pinyon-juniper/mixed conifer. Mill tailings were also mapped separately but were not considered a habitat site for breeding birds because of the paucity of vegetation on them. Efforts were concentrated on agricultural lands on Molycorp's property, since this plant community would best represent the vegetation of the reclaimed tailings.

These preliminary habitat sites were tested and refined through field studies conducted in September 1984. Two step-point transects (Evans and Love, 1957) were conducted across each habitat site on paths selected to ensure thorough coverage of the habitat site diversity while permitting reliable characterization of the habitat site. One transect per habitat site was located in the area of the spot-mapping grid on that site (see Section 3.0). The transect locations are indicated on the map in Appendix A.

Each transect consisted of approximately 200 recording points. Total percent ground cover was estimated ocularly at every twentieth point, and shrub and tree characterization plots were sampled every sixtieth point. The

following data were collected in the 1/100th acre shrub and tree characterization plots:

- total number of trees and shrubs by species within the plot; and
- form, average phenology, age class and height of a minimum of five individuals within each plot.

Results

Based on the step-point transect data, detailed aerial photo analyses, a review of the relevant literature, and general field observations the mixed conifer and pinyon-juniper/mixed conifer initial habitat sites were combined into one habitat site, upland forest. The remaining six habitat sites delineated initially remained unchanged. Descriptions of the seven habitat sites are presented below. A list of the plant species found on the study area during the September 1984 field investigations are listed in Table 2-1. Common and scientific names used in the following narratives are from Martin and Hutchins (1980). Acronyms are based on the USDA/Forest Service (1978) system.

Sagebrush/Grassland Habitat Site

The Sagebrush/Grassland Habitat Site is characterized by a paucity of trees and the appearance of widespread uniformity in the composition and growth habits of the plant community. Only 11 plant species were noted on the two transects conducted through this habitat site (Table 2-2). Of these, three species, crested wheatgrass (*Agropyron cristatum*), blue grama (*Bouteloua gracilis*), and big sagebrush (*Artemisia tridentata*) accounted for an average of 94% of all vegetative hits on the two transects. Ninety-five percent of the individuals in the shrub and tree plots were big sagebrush (Table 2-3) and the majority of individuals were mature, in the vegetative stage, and 1-2 ft in height.

The Sagebrush/Grassland Habitat Site is found throughout north central New Mexico (USDA/SCS, 1978; Martin and Cramer 1980). While soil types and plant species composition exhibit some variation within this habitat site, it

Table 2-1. Plant list for the Guadulupe Mountain Study Area, Taos County, New Mexico.

Scientific Name	Common Name	Symbol
Alnus tenuifolia Nutt.	thinleaf alder	Alte
Agropyron cristatum (L.) Gaertn.	crested wheatgrass	Agcr
Agropyron smithii Rydb.	western wheatgrass	Agsm
Agropyron trachycaulum (Link) Malte	slender wheatgrass	Agtr 1
Agropyron sp.	wheatgrass	AGRO
Andrpogon scoparius Michx.	little bluestem	Ansc
Androsace septentrionalis var. subulifera Gray	rockjasmine	Anse
Apocynum sp.	indian-hemp	APOC
Arctium minus (Hill) Bernb.	burdock	Armi
Aristida fendleriana Steud.	Fendler three-awn	Arfe 1
Aristida purpurea Nutt. var. purpurea	purple three-awn	Arpu 1
Artemisia campestris subsp. pacifica (Nutt.) Heller	sagebrush	Arca
Artemisia dracunculus L.	false tarragon	Ardr 2
Artemisia frigida Willd.	fringed sage	Arfr
Artemisia cf. ludoviciana	Louisiana wormwood	Arlu
Artemisia tridentata Nutt.	big sagebrush	Artr
Astragalus sp.	milkvetch	ASTR
Atriplex canescens (Pursh) Nutt.	fourwing saltbush	Atca
Beckmannia syzigachne (Steud.) Fernald	American sloughgrass	Besy
Bouteloua curtipendula (Michx.) Torr.	sideoats grama	Bocu
Bouteloua eriopoda (Torr.) Torr.	black grama	Boer
Bouteloua gracilis (H.B.K.) Lag.	blue grama	Bogr
Bromus ciliatus L.	hairy brome	Brci
Bromus cf. inermis	smooth brome	Brin 1
Bromus tectorum L.	cheatgrass	Brte
Bromus sp.	brome-chess	BROM
Carex nebrascensis Dewey	Nebraska sedge	Cane
Carex sp.	sedge	CARE
Cercocarpus montanus Raf.	mountain mahogany	Cemo
Chenopodium fremontii Wats.	goosefoot	Chfr
Chrysothamnus nauseosus subs. bigloviii (Gray) H.&C.	rubber rabbitbrush	Chna
Chrysothamnus parry (Gray) Greene subs. attenuatus (M. E. Jones) H.&C.	rabbitbrush	Chpa
Chrysothamnus vaseyi (Gray) Greene	rabbitbrush	Chva
Cicuta douglassii (DC.) Coult. & Rose	western water hemlock	Cido
Clematis ligusticifolia Nutt.	virgin's bower	Clli
cf. Commandra pallida	bastard flax	Copa
Compositae	sunflower family	COMP
Conyza canadensis (L.) Cronq.		Coca
Cornus stolonifera Michx.	red-osier dogwood	Cost 1
Cruciferae	mustard family	CRUC
Delphinium sp.	larkspur	DELP
Eleocharis macrostachya Britt.	spikerush	Elma
Eriogonum jamesii Benth. var. jamesii	wee Mary buckwheat	Erja
Eriogonum jamesii var. flavescens Wats.	wee Mary buckwheat	Erja
Eriogonum leptophyllum (Torr.) Woot. & Standl.	buckwheat	Erle
Eriogonum racemosum Nutt.	redroot wild buckwheat	Erra

Table 2-1. (Continued).

Scientific Name	Common Name	Symbol
Eriogonum simpsonii Benth.	buckwheat	Ersi
Equisetum laevigatum A. Br.	scouring rush	Egla
Galium sp.	bedstraw	GALI
Glyceria grandis Wats.	American mannagrass	Glgr
Graminae	grass family	GRAM
Grindelia squarrosa (Pursh) Dunal. var. squarrosa	curleycup gumweed	Grsq
Gutierrezia microcephala (DC.) Gray	broom snakeweed	Gumi
Haplopappus spinulosus subsp. australis (Greene) Hall		Hasp
Heracleum lanatum Michx.	cowparsnip	Hela
Hilaria jamesii (Torr.) Benth.	galleta grass	Hija
Holodiscus dumosus (Nutt.) Heller	mountain spray	Hodu
Hordeum jubatum L.	foxtail barley	Hoju
Humulus americanus Nutt.	American hop	Huam
Hymenoxys richardsonii var. floribunda Gray (Parker)	pinque	Hyri
Hymenopappus sp.	white-ragweed	HYME 2
Iris missouriensis	flag	Irmi
cf. Juncaceae	rush family	JUNC 1
Juncus cf.balticus	wire-rush	Juba
Juncus tenuis var. dudleyi (Wieg.)	rush	Jute
Juncus sp.	rush	JUNC 2
Juniperus monosperma	oneseed juniper	Jumo
Juniperus scopulorum Sarg.	Rocky Mountain juniper	Jusc
Kochia scoparia (L.) Roth	summer-cypress	Kosc
Lappula redowskii (Hornem.) Greene	stickseed	Lare
Leucelene ericoides (Torr.) Greene		Leer
Lesquerella sp.	bladderpod	LESQ
Lupinus hillii Greene	red-hills lupine	Luhi
Lupinus sp.	lupine	LUPI
Machaeranthera sp.	aster	MACH
Medicago sativa L.	alfalfa	Mesa
Melilotus officinalis (L.) Lam.	sweetclover	Meof
Mentha sp.	mint	MENT
Mirabilis multiflora (Torr.) Gray	desert four o'clock	Mimu
Muhlenbergia cf. dubia	pine muhly	Mudu 1
Muhlenbergia montana (Nutt.) Hitchc.		Mumo
Muhlenbergia pauciflora (Buckl.)	New Mexico muhly	Mupa
Muhlenbergia sp.	muhly	MUHL
Opuntia polyacantha Haw. var. polycantha	plains prickly pear	Oppo
Oryzopsis hymenoides (R.&S.) Ricker	indian ricegrass	Orhy
Oxytropis lambertii Pursh	Lambert crazyweed	Oxla
Parthenocissus inserta (Kerner) K. Fritsch	virginia creeper	Pain
Pericome caudata Gray var. caudata		Peca
Petradoria pumila (Nutt.) Greene subs. pumila		Pepu
Phleum sp.	timothy	PHLE
Pinus edulis Engelm.	pinyon pine	Pied
Pinus ponderosa Laws.	Ponderosa pine	Pipo
Poa fendleriana	muttongrass	Pofe

Table 2-1. (Concluded).

Scientific Name	Common Name	Symbol
Poa biglovii Vasey & Scribn.	Bigelow bluegrass	Pobi 1
Poa sp.	bluegrass	POA
Polemoneaceae	phlox family	POLE
Populus angustifolia James	narrowleaf cottonwood	Poan
Potentilla pennsylvanica L.	Pennsyslvania cinquefoil	Pope 2
Prunus virginiana L. var. melanocarpa (A. Nels.) Sarg.	chokecherry	Prvi
cf. Pseudocymopterus montanus		Psmo
Pseudotsuga menziesii (Mirabel) Franco var. glauca (Beissner) Franco	Douglas fir	Psme
Quercus gambellii	gamble oak	Quga
Rhus radicans L.	poison ivy	Rhra
Rhus trilobata Nutt.	squawberry	Rhtr
Ribes cereum Dougl.	wax current	Rice
Ribes leptanthum Gray	trumpet gooseberry	Rile
Ribes sp.	gooseberry	RIBE
Rorippa nasturtium-aquaticum (L.) Schinz & Thell.	watercress	Rona
Rosa woodsii Lindl.	rose	Rowo
cf. Schizacne purpurescens	false melic	Scpu
Rudbeckia laciniata L.	cutleaf coneflower	Rula
Salix exigua Nutt.	coyote willow	Saex
Scrophulariaceae	figwort family	SCRO
Sitanion hystrix (Nutt.) J.G. Smith	bottlebrush squirreltail	Sihy
Smilacina sp.	false solomon's seal	SMIL
Sporobolus cryptandrus	sand dropseed	Spcr
Symphoricarpos oreophilus Gray	mountain snowberry	Syor
Symphoricarpos sp.	snowberry	SYMPH
Stipa robusta (Vasey) Scribn.	sleepygrass	Stro
Stipa sp.	needlegrass	STIP
cf. Taraxacum sp.	dandelion	TARA
Thalictrum sp.	meadowrue	THER
Yucca baccata Torr.	datil	Yuba
Yucca cf. glauca	small soapweed	Yugl

Table 2-2. Summary of the Sagebrush/Grassland Habitat Site Vegetation Transects.

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total hits[b]
Transect S-1						
Non-vegetative						
Litter	115	0	0	0	115	33
Bare Ground	42	0	0	0	42	12
Gravel	1	0	0	0	1	00
Manure	1	0	0	0	1	00
Subtotal	159	0	0	0	159	45
Vegetative						
Shrubs						
Artr	5	4	36	0	45	13
Gume	1	1	0	0	2	01
Subtotal	6	5	36	0	47	13
Grasses						
Agcr	22	96	1	0	119	34
Bogr	12	4	0	0	16	05
Sihy	1	4	0	0	5	01
Agsm	0	3	0	0	3	01
Subtotal	35	107	1	0	143	41
Forbs						
Oppo	0	1	0	0	1	00
Subtotal	0	1	0	0	1	00
TOTALS	200	113	37	0	350	100
Transect S-2						
Non-vegetative						
Litter	66	1	1	0	68	23
Bare Ground	37	0	0	0	37	12
Gravel	33	0	0	0	33	11
Subtotal	136	1	1	0	138	46

Table 2-2. (Concluded).

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total hits[b]
Vegetative						
Shrubs						
Artr	15	14	57	0	86	29
Chna	1	1	0	0	2	01
Gume	1	1	0	0	2	01
Subtotal	17	16	57	0	90	30
Grasses						
Bogr	45	7	1	0	53	18
Agcr	1	11	0	0	12	04
Arfe	1	0	0	0	1	00
Sihy	1	0	0	0	1	00
Subtotal	48	18	1	0	67	23
Forbs						
ERIG	1	0	0	0	1	00
Leer	1	0	0	0	1	00
Subtotal	2	0	0	0	2	01
TOTALS	203	35	59	0	297	100

[a]The species codes are the first two letters of the generic name and the first two letters of the species name. A complete list of species are presented in Table 2-1.

[b]00 represents any value < 0.5%.

Table 2-3. Average density and height of shrub and tree species by habitat site.

Habitat Site	Species	N	Avg #/ acre	Avg ht. (ft)
Sagebrush/ Grassland	Artr	329	5530	1.3
	Gusa	13	210	< 1.0
	Pied	2	33	< 1.0
	Chna	2	33	< 1.0
Pinyon/Juniper Woodland	Artr	64	1067	1.0
	Pied	79	817	7.6
	Jusc	5	83	8.5
	Jumo	1	17	< 1.0
Upland Forest[a]	Jusc	23	192	7.5
	Pied	19	158	11.6
	Psme	19	158	11.2
	Lemo	10	83	3.7
	Jumo	6	50	8.6
	Pipo	4	33	16.5
Riparian	Prvi	54	900	4.5
	Alte	21	350	16.6
	Quga	2	33	5.5
	Jusc	1	17	3.0
Wooded Canyon Benches	Artr	49	817	1.5
	Gusa	11	183	< 1.0
	Jumo	5	83	8.4
	Pied	3	50	4.3
	Hodu	3	50	3.2
	Jusc	2	33	1.8
Canyon Slopes	Artr	57	950	2.3
	Syor	14	233	1.7
	Atca	8	133	2.0
	SYMP	6	100	1.8
	Hodu	6	100	4.3
	Chpa	4	67	3.3
	RIBE	2	33	2.5
Agricultural Land	Artr	6	100	< 1.0
	Chna	1	17	3.0

[a]The number of plots sampled in the Upland Forest was 12; in all other habitat sites six plots were sampled.

is generally characterized by small variations in species composition, community structure and low species diversity. Over most of its range, this habitat site is managed for grazing, and therefore, is subject to periodic intervention to improve its livestock carrying capacity. These management practices are probably the principal source of variation in the vegetative structure and composition within this habitat site.

Range management practices in many locations of this habitat site have focused on the destruction of big sagebrush and the introduction of crested wheatgrass. This has produced subareas within the habitat site which may be distinguished by their relative proportions of big sagebrush and crested wheatgrass.

Shrubs and grasses constituted about 53% of the total hits recorded within the habitat site, with big sagebrush acounting for approximately 25-55% of the vegetative hits (Table 2-2). The percent contribution of big sagebrush to total cover is dependent on the intensity of brush removal efforts. For example, most of step-point transect S-1 was located in an area that has been subjected to recent sagebrush removal practices. The sagebrush density was one half of the sagebrush density on Transect S-2 which is located in a relatively undisturbed site (Table 2-3).

Big sagebrush is returning to the areas from which it has been removed. Some minor invasions by pinyon pines (Pinus edulis) and junipers (Juniperus monosperma and J. scopulorum) were observed; in some areas where old stumps can be seen, pinyons and junipers may be reestablishing in artificially created areas of Sagebrush/Grassland. Despite this minor influx of pinyons and junipers, the potential vegetation community for this habitat site is probably a mixed grassland - shrub site characterized by big sagebrush and cool and warm season grasses (USDA/SCS, 1984a). Major grasses of the potential community include Indian ricegrass (Oryzopsis hymenoides), galleta (Hilaira jamesii), bottlebrush squirreltail (Sitania hystrix), and blue grama (USDA/SCS, 1984). When in poor condition this habitat site is characterized by big sagebrush, rubber rabbitbrush (Chrysothamnus nauseosus), snakeweed (Gutierrezia microcephala) and cactus (Opuntia sp.) (USDA/SCS, 1980b).

Bare ground, gravel, and litter are predicted to contribute about 80% of the ground cover in the potential community (USDA/SCS 1984). These non-vegetative components accounted for an average of 73 % of the basal hits on the transects (Table 2-2).

This habitat site covers approximately 6,250 acres within the project area and is confined largely to nearly level to gently sloping mesa lands and low rolling hills. The slopes vary from 1 to 5 % (USDA/SCS, 1982b). All aspects are represented in this habitat site on the study area. The soils are of the Fernando Hernandez Association. These soils are deep, well drained clay and silty, clay loams with high, available, water holding capacities. Effective rooting depth is five or more feet. Although this habitat site is found on plains, fans, and broad valley floors at elevations ranging from about 7,400 to about 8,000 ft in the project area, the majority of this habitat site occurs between 7,500 and 7,600 ft.

Pinyon-Juniper Woodland Habitat Site

The Pinyon-Juniper Woodland Habitat Site is the second most extensive habitat site in the project area, covering approximately 6,230 acres. It is a community with high species diversity; 39 species were encountered on the two transects conducted within this habitat site (Table 2-4). It is characterized by an extensive canopy of approximately 75% in some areas. An average of 41% of the vegetative hits recorded on both transects were canopy species with the pinyon pine (817 plants/acre) outnumbering the two juniper species (100 plants/acre) by almost an order of magnitude (Table 2-3). The two junipers hybridize throughout north central and northwestern New Mexico where their ranges overlap (Martin and Hutchins, 1980). Considerable hybridization was noted on the study area with many individuals displaying characteristics of both species. The three tree species averaged 7-9 ft in height (Table 2-3). The pinyon pines were predominantly in the mature and seedling age classes. The phenology of mature individuals was varied, ranging from the vegetative stage to bearing ripe seeds. The age class of the six junipers recorded in the plots ranged from seedling to decadent. The sample size was to small to describe their phenological stage during the sampling period.

Table 2-4. Summary of the Pinyon/Juniper Woodland Habitat Site Vegetation Transects.

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total hits[b]
Transect PJ-1						
Non-vegetative						
Litter	98	0	1	0	99	27
Bare Ground	18	0	0	0	18	05
Rock	9	0	0	0	9	02
Gravel	7	0	0	0	7	02
Cobble	6	0	0	0	6	02
Subtotal	138	0	1	0	139	38
Vegetative						
Trees						
Pied	6	0	6	63	75	20
Jumo	0	0	2	9	11	03
Jusc	0	0	0	3	3	01
Pipo	0	0	0	1	1	00
Subtotal	6	0	8	76	90	24
Shrubs						
Ardr	1	1	10	0	12	03
Chna	3	5	0	0	8	02
Gume	1	1	0	0	2	01
Subtotal	5	7	10	0	22	06
Grasses						
Bogr	19	11	0	0	30	08
Agsm	5	19	0	0	24	06
AGRO	3	9	0	0	12	03
BROM	2	5	0	0	7	02
GRAM	2	2	0	0	4	01
Sihy	0	3	1	0	4	01
STIP	1	2	0	0	3	01
Bocu	1	1	0	0	2	01
Orhy	0	2	0	0	2	01
Subtotal	33	54	1	0	88	24

Table 2-4. (Continued).

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total hits[b]
Forbs						
Oppu	9	1	0	0	10	03
Pepu	2	5	0	0	7	02
Unid. forb	3	1	0	0	4	01
Erra	2	0	0	0	2	01
HYME	1	1	0	0	2	01
LESQ	0	2	0	0	2	01
Anse	1	0	0	0	1	00
Erja	1	0	0	0	1	00
Hyci	1	0	0	0	1	00
Yuba	1	0	0	0	1	00
Subtotal	21	10	0	0	31	08
TOTALS	203	71	20	76	370	100
Transect PJ-2						
Non-vegetative						
Litter	88	1	0	0	89	25
Gravel	31	0	0	0	31	09
Rock	18	0	0	0	18	05
Bare Ground	12	0	0	0	12	03
Cobble	9	0	0	0	9	03
Bedrock	2	0	0	0	2	01
Subtotal	160	1	0	0	161	45
Vegetative						
Trees						
Pied	2	1	4	63	70	20
Jusc	0	0	5	16	21	06
Jumo	0	0	4	5	9	03
Subtotal	2	1	13	84	100	28
Shrubs						
Ardr	1	5	2	0	8	02
Cemo	0	0	3	0	3	01
Subtotal	1	5	5	0	11	03

Table 2-4. (Concluded).

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total hits[b]
Grasses						
MUHL	5	16	0	0	21	06
Bogr	13	5	0	0	18	05
Pofe	5	5	0	0	10	03
BROM	2	6	0	0	8	02
STIP	3	3	0	0	6	02
Bocu	1	3	0	0	4	01
GRAM	2	1	0	0	3	01
AGRO	0	1	0	0	1	00
Subtotal	31	40	0	0	71	20
Forbs						
Unid. forb	2	3	0	0	5	01
Oppu	2	0	0	0	2	01
Anse	0	2	0	0	2	01
Pepu	0	1	0	0	1	00
Erja	1	0	0	0	1	00
Chvi	1	0	0	0	1	00
MACH	1	0	0	0	1	00
Subtotal	7	6	0	0	13	04
TOTALS	201	53	18	84	356	100

[a]The species codes are the first two letters of the generic name and the first two letters of the species name. A complete list of species are presented in Table 2-1.

[b]00 represents any value < 0.5%.

In general, this habitat site is characterized by an extensive tree canopy cover with a moderate ground cover (24.5% avg. of basal hits) and a sparse brush canopy (9.8% avg. of vegetative hits) (Table 4). Big sagebrush is the most common shrub in this habitat site but is only 20% of its density in the Sagebrush/Grassland Habitat Site (Tables 2-3). Other shrubs, e.g. mountain mahogany (Cercocarpus montanus), and Ponderosa pines (Pinus Ponderosa) are found in the more mesic spots within the habitat site.

Although ground cover is sparse, this site supports numerous species of grasses; over 25% of the species encountered on the two transects were grasses (Table 2-4). No one grass species is dominant. The common grasses include blue grama, western wheatgrass (Agropyron smithii), bromes (Bromus sp.), muttongrass (Poa fendleriana), and needlegrass (Stipa sp.).

This habitat site occupies well drained slopes with shallow, rocky, soils of the Rock Outcrop-Raton Complex. This soil complex covers Guadalupe Mountain, Cerro Chiflo, and other hills in the area as well as the rims of the Rio Grande and Red River canyons. This complex consists of intermingled rock outcrop and very stony, silt loam. The Raton soil is strongly sloping to moderately steep. Rock outcrop is steep to very steep. The soil is shallow, well drained, and slowly permeable. The effective rooting depth is 10-20 inches. The available water capacity is very low, and runoff is rapid. The hazard of water erosion is moderate, and the wind erosion hazard is slight (USDA/SCS 1982b).

This habitat site occurs at all aspects on the study area. The elevation range is from 7,400 to 8,600 ft, which is the typical elevation range of the pinyon-juniper woodlands in Taos, Rio Arriba, and San Juan counties (USDA/SCS, 1982b).

The existing vegetation on this habitat site is similar to the potential natural vegetation described for it (USDA/SCS, 1978; 1982b). The potential vegetation is predicted to be a canopy of Colorado pinyon pine as the primary dominant, with junipers as the secondary dominant. Big sagebrush is uniformly dispersed through the association. This community may include scattered Ponderosa pine, generally at high elevations. The herbaceous understory

consists of mountain muhly (Muhlenbergia montanus), muttongrass, Arizona fescue (Festuca arizonica) and western wheatgrass.

The Pinyon-Juniper Woodland Habitat Site on the study area is generally mature and does not appear to be expanding significantly into the adjacent Sagebrush/Grassland areas nor is it being replaced by large conifers. The heavier soils and less effective drainage of these soils probably limits expansion into the Sagebrush/Grassland Habitat Site, and the lack of sufficient moisture probably limits the movement of large conifers into the Pinyon-Juniper Woodland Habitat Site. On the mesic areas of this habitat site, e.g., north slopes in narrow valleys, large conifers are more abundant. Similarly, some expansion of the pinyon-juniper woodland into the sagebrush/grassland areas can be seen where soil and drainage conditions are favorable, e.g., grasslands artificially created by clearing pinyon-juniper woodlands.

Upland Forest Habitat Site

The Upland Forest Habitat Site makes up 8.4% of the GMSA (1,570 acres). This community occurs at higher elevations where soils are well drained and poorly formed. It is an upland site occupying mountaintops and strongly sloping to very steep, mostly north-facing, slopes. The elevation range of this community on the study area is from 7600 to 8600 ft.

The soils are in the Rock Outcrop - Raton complex. This soil complex is described in the Pinyon-Juniper Woodland Habitat Site narrative.

This community is characterized by a mixed conifer overstory composed of pinyon pine (32% - average number of canopy hits), Rocky Mountain juniper (23%), one-seed juniper (19%), Ponderosa pine (15%) and Douglas fir (Pseudotsuga menziesii) (11%) (Table 2-5).

The average density and height of the tree species encountered in the plots are presented in Table 2-3. The small average height (11.2 ft) of the Douglas fir individuals is because more seedlings (N=11) were encountered than mature individuals (N=9). The phenology of the mature individuals of all

Table 2-5. Summary of the Upland Forest Habitat Site Vegetation Transects.

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Transect MC-1						
Non-vegetative						
Litter	108	1	0	0	109	32
Cobble	22	0	0	0	22	06
Gravel	21	0	0	0	21	06
Rock	16	0	0	0	16	05
Bare Ground	11	0	0	0	11	03
Bedrock	5	0	0	0	5	01
Subtotal	183	1	0	0	184	54
Vegetative						
Trees						
Pied	0	0	5	17	22	06
Jusc	0	0	0	22	22	06
Pipo	0	1	0	16	17	05
Jumo	0	0	0	14	14	04
Psme	0	0	1	7	8	02
Subtotal	0	1	6	76	83	24
Shrubs						
Cemo	0	0	8	0	8	02
Quga	0	0	7	0	7	02
Syor	0	1	2	0	3	01
Artr	0	0	3	0	3	01
Subtotal	0	1	20	0	21	06
Grasses						
BROM	2	13	0	0	15	04
MUHL	5	6	0	0	11	03
STIPA	4	4	0	0	8	02
Arpu	2	1	0	0	3	01
Agcr	0	1	0	0	1	00
GRAM	0	1	0	0	1	00
Subtotal	13	26	0	0	39	11

Table 2-5. (Continued).

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Forbs						
Pepu	3	2	0	0	5	01
THERM	0	4	0	0	4	01
Luhi	0	2	0	0	2	01
Erra	1	0	0	0	1	00
DELP	0	1	0	0	1	00
COMP	0	1	0	0	1	00
Oxla	0	1	0	0	1	00
Psmo	0	1	0	0	1	00
Subtotal	4	12	0	0	16	05
TOTALS	200	41	26	76	343	100
Transect MC-2						
Non-vegetative						
Bare Ground	14	0	0	0	14	04
Litter	107	2	1	0	110	29
Gravel	19	0	0	0	19	05
Cobble	16	0	0	0	16	04
Rock	5	1	0	0	6	02
Bedrock	2	0	0	0	2	01
Subtotal	163	3	1	0	167	45
Vegetative						
Trees						
Pied	0	2	3	22	27	07
Jusc	1	1	5	20	27	07
Jumo	0	1	4	7	12	03
Pipo	0	0	0	9	9	02
Psme	1	0	0	4	5	01
Subtotal	2	4	12	62	80	21
Shrubs						
Cemo	2	3	17	0	22	06
Rice	0	0	3	0	3	01
Artr	0	0	1	0	1	00
Subtotal	2	3	21	0	26	07

Table 2-5. (Continued).

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Grasses						
BROM	11	21	0	0	32	09
MUHL	6	10	1	0	17	05
GRAM	5	11	0	0	16	04
Bogr	2	5	0	0	7	02
Sihy	1	2	0	0	3	01
Bocu	0	1	0	0	1	00
Subtotal	25	50	1	0	76	20
Forbs						
Pepu	3	2	0	1	6	02
Meof	3	3	0	0	6	02
Erja	2	1	0	0	3	01
Arpu	1	1	0	0	2	01
Unid. forb	1	1	0	0	2	01
ASTR	0	1	0	0	1	00
POLE	1	0	0	0	1	00
CRUC	0	1	0	0	1	00
Ipag	0	1	0	0	1	00
Coca	0	1	0	0	1	00
Chfr	0	1	0	0	1	00
Luhi	0	1	0	0	1	00
Subtotal	11	14	0	1	26	07
TOTALS	203	74	35	63	375	100
Transect T-1						
Non-vegetative						
Litter	82	0	0	0	82	30
Cobble	19	0	0	0	19	07
Gravel	17	0	0	0	17	06
Bedrock	11	0	0	0	11	04
Bare Ground	7	0	0	0	7	03
Rock	4	0	0	0	4	01
Subtotal	140	0	0	0	140	51

Table 2-5. (Continued).

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Vegetative						
Trees						
Jusc	0	0	1	23	24	09
Pied	0	0	1	14	15	05
Psme	0	0	0	15	15	05
Pipo	0	0	0	6	6	02
Subtotal	0	0	2	58	60	22
Shrubs						
Cemo	2	10	0	0	12	04
Quga	1	0	0	0	1	00
Subtotal	3	10	0	0	13	05
Grasses						
MUHL	27	5	0	0	32	12
BROM	19	0	0	0	19	07
Bocu	1	0	0	0	1	00
Orhy	0	1	0	0	1	00
Subtotal	47	6	0	0	53	19
Forbs						
THER	2	1	0	0	3	01
Pepu	2	0	0	0	2	01
DELP	1	0	0	0	1	00
HYME	1	0	0	0	1	00
Subtotal	6	1	0	0	7	03
TOTALS	196	17	2	58	273	100

Table 2-5. (Continued).

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Transect T-2						
Non-vegetative						
Litter	60	5	0	0	65	22
Gravel	31	0	0	0	31	10
Bare Ground	25	0	0	0	25	08
Cobble	16	0	0	0	16	05
Bedrock	2	0	0	0	2	01
Rock	1	0	0	0	1	00
Subtotal	135	5	0	0	140	47
Vegetative						
Trees						
Pied	1	3	0	19	23	08
Pipo	0	0	0	9	9	03
Jumo	1	1	0	7	9	03
Jusc	0	0	0	9	9	03
Psme	0	0	0	1	1	00
Subtotal	2	4	0	45	51	17
Shrubs						
Artr	2	6	1	0	9	03
Chva	5	3	0	0	8	03
Gumi	2	1	0	0	3	01
Syor	0	1	0	0	1	00
Subtotal	9	11	1	0	21	07
Grasses						
MUHL	19	4	0	0	23	08
BROM	22	0	0	0	22	07
AGRO	4	2	0	0	6	02
Orhy	4	0	0	0	4	01
Bogr	2	0	0	0	2	01
Subtotal	51	6	0	0	57	19

Table 2-5. (Concluded).

Species	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Forbs						
Pepu	5	4	0	0	9	03
HYME	4	2	0	0	6	02
LUPI	4	1	0	0	5	02
Unid. forb	2	0	0	0	2	01
Arpu	2	0	0	0	2	01
Erle	1	0	0	0	1	00
Oxla	1	0	0	0	1	00
Chvi	0	1	0	0	1	00
THER	1	0	0	0	1	00
Subtotal	20	8	0	0	28	09
TOTALS	217	34	1	45	297	100

[a]The species codes are the first two letters of the generic name and the first two letters of the species name. A complete list of species are presented in Table 2-1.

[b]00 represents any value < 0.5%.

canopy species varied from the vegetative stage to bearing ripe seeds. Seedlings were recorded for all tree species except one-seed juniper.

The understory is sparse (24% - average number of basal hits) and is dominated by Muhlenbergia and Bromus grasses (Table 2-5). The grasses in these two genera could not be identified to species because all of the individuals encountered in the field had disseminated seeds and had no remaining floral parts necessary for species identification.

A wide variety of shrub species (N=8) occur in this habitat site including big sagebrush, mountain mahogany, mountain snowberry (Symphoricarpos oreophilus), snakeweed and Gambel Oak (Quercus gambelii) (Table 2-5). Low densities of big sagebrush (8.3 individuals/acre) and moderate densities of mountain mahogany (83.3) (Table 2-3) were recorded in the plots. The other shrub species were only encountered on the transects. The mountain mahogany plants averaged 4 ft in height (Table 2-3), were either seedlings or mature, and mature plants had ripe seeds ready for dispersal. The sample size of big sagebrush individuals was too small to characterize their height, age class, and phenology in this habitat site.

This habitat has characteristics of both the the pinyon-juniper woodland of lower elevations and the mixed conifer forest at higher elevations. Therefore the potential natural vegetation probably includes the Pinyon-Juniper/Big Sagebrush Association described in the Pinyon-Juniper Woodland Habitat Site and the Ponderosa Pine/Douglas Fir Association (USDA/SCS, 1978). The Ponderosa Pine/Douglas Fir Association is a community with Ponderosa pine as the dominant and Douglas fir as the sub-dominant species. The brushy understory typically includes snowberry, rock-spiraea (Holodiscus dumosus) and gooseberry (Ribes sp.). Limited grass production is present, but includes Arizona and Thurber fescues (Festuca thurberi) and mountain brome (Bromus marginatus). Guadalupe Mountain apparently does not attain climatic and edaphic conditions necessary for a true mixed conifer forest.

Wooded Canyon Benches Habitat Site

The Rio Grande and Red River canyon slopes are comprised of two habitat sites, Wooded Canyon Benches and Canyon Slopes (Appendix A). The Wooded Canyon Benches Habitat Site occupies slightly more acreage on the study area (1720 acres) than the Canyon Slopes Habitat Site (1690 acres). Twenty six species were recorded on the two transects conducted in the Wooded Canyon Benches Habitat Site. Total vegetative cover averages 52% with a moderate canopy coverage (avg. 36% of total vegetative hits), and an avg. of 26% ground cover, comprised predominantly of grasses (Table 2-6). Elevations of this habitat site range from 6,600 ft at the confluence of the two rivers to an average of 7,500 ft at the canyon rims.

The canopy layer in this habitat site is similar in total cover (avg 20% of the total hits) and species composition to that of the Upland Forest Habitat Site. The major difference between the canopy composition of the two habitat sites is the abundance of Douglas fir. Douglas fir is almost absent in the canyons but is one of the major canopy species in the Upland Forest Site. It's absence in the canyon is probably related to the more xeric condition of this site.

As in the Upland Forest Habitat Site, juniper densities are higher than pinyon pine densities in this habitat site. This is in contrast to the Pinyon-Juniper Woodland Habitat Site in which the pinyon pine is much more abundant than the two juniper species (Table 2-3).

Three shrub species were recorded in this habitat site, big sagebrush, snakeweed, and rock-spiraea. Shrub densities in this habitat site are equivalent to densities in other habitat sites on the study area. The average height of the shrub species ranged from < 1 ft for snakeweed to 3 ft for rock-spiraea (Table 2-3). All age classes were represented for all three shrub species. Mature big sagebrush individuals were predominantly in the vegetative stage, and mature snakeweed and rock-spiraea individuals were flowering or bore ripe seeds.

Table 2-6. Summary of the Wooded Canyon Benches Habitat Site Vegetation Transect.

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Transect Cw/-1						
Non-vegetative						
Litter	73	2	0	0	75	20
Rock	56	0	0	0	56	15
Gravel	20	0	0	0	20	05
Cobble	14	0	0	0	14	04
Bare Ground	4	0	0	0	4	01
Subtotal	167	2	0	0	169	46
Vegetative						
Trees						
Jumo	2	0	5	22	29	08
Pied	0	0	2	23	25	07
Pipo	0	0	0	15	15	04
Jusc	0	0	2	3	5	01
Subtotal	2	0	9	63	74	20
Shrubs						
Artr	4	1	13	0	18	05
Hodu	1	2	8	1	12	03
Subtotal	5	3	21	1	30	08
Grasses						
POA	6	14	0	0	20	05
Agsm	4	14	0	0	18	05
Bogr	8	1	0	0	9	02
MUHL	2	7	0	0	9	02
Bocu	1	4	1	0	6	02
CARE	1	4	0	0	5	01
AGRO	1	3	0	0	4	01
Sihy	1	2	0	0	3	01
BROM	1	1	0	0	2	01
Spcr	1	1	0	0	2	01
Subtotal	26	51	1	0	78	21

Table 2-6. (Continued).

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Forbs						
Arca	0	8	0	0	8	02
Arfr	0	5	0	0	5	01
Oppo	4	0	0	0	4	01
unid. forb	1	0	0	0	1	00
Subtotal	5	13	0	0	18	05
TOTALS	205	69	31	64	369	100
Transect Cw/-2						
Non-vegetative						
Litter	80	2	1	4	87	24
Rock	38	2	8	0	48	13
Gravel	23	0	0	0	23	06
Cobble	14	0	0	0	14	04
Bare Ground	9	0	0	0	9	02
Subtotal	164	4	9	4	181	50
Vegetative						
Trees						
Jumo	3	0	3	14	20	06
Pipo	0	0	0	18	18	05
Pied	0	0	0	12	12	03
Jusc	0	0	3	5	8	02
Psme	0	0	0	7	7	02
Subtotal	3	0	6	56	65	18
Shrubs						
Artr	1	1	14	0	16	04
Gumi	1	2	0	0	3	01
SYMP	0	1	0	0	1	00
Subtotal	2	4	14	0	20	06

Table 2-6. (Concluded).

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Grasses						
Bogr	10	8	0	0	18	05
POA	2	8	2	0	12	03
Ansc	3	5	2	0	10	03
CARE	1	8	0	0	9	02
MUHL	2	6	0	0	8	02
Agsm	1	2	0	0	3	01
Orhy	2	0	0	0	2	01
Bocu	0	1	0	0	1	00
GRAM	1	0	0	0	1	00
Sihy	0	0	1	0	1	00
Spcr	0	1	0	0	1	00
Subtotal	22	39	5	0	66	18
Forbs						
Arlu	3	14	0	0	17	05
Oppo	4	0	0	0	4	01
Ersi	1	2	0	0	3	01
Hyri	1	2	0	0	3	01
CRUC	2	0	0	0	2	01
Chvi	0	2	0	0	2	01
Subtotal	11	20	0	0	31	09
TOTALS	202	67	34	60	363	100

[a]The species codes are the first two letters of the generic name and the first two letters of the species name. A complete list of species are presented in Table 2-1.

[b]00 represents any value < 0.5%.

Twelve species of grasses were recorded on this site. The most abundant species were Poa sp., blue grama, little bluestem (Andropogon scoparius) and western wheatgrass. These grasses constituted an average of 44% of the herbaceous vegetative hits (layers 1 and 2 - Table 2-6).

The soils in this habitat site are of the Orthents-Rock Outcrop association (USDA/SCS, 1982b). This association consists of very steep soils (70% of association) and rock outcrops (30%). The soils are deep, well drained, very gravelly or cobbly loams on slopes that range from 40 to 80%. The soils formed in material derived from old alluvium of the Santa Fe Formation. Permeability varies from moderately rapid to moderate and the effective rooting depth is $\geq$ 60 inches. The available water capacity is very low. Runoff is rapid and the water erosion hazard is high. The rock outcrops are nearly vertical escarpments of basalt that form a protective cap over the alluvial sediment. The rock outcrops are along the borders of this association (USDA/SCS 1982b).

Because this habitat site has low potential for grazing (USDA/SCS 1982b) and other human activities it has probably not been disturbed drastically. Therefore the existing vegetation is probably representative of the potential natural vegetative community, a pinyon-juniper/Ponderosa pine association where pinyon pine and junipers are primary dominants with Ponderosa pine as the secondary dominant. Usually this association is found with a moderately open canopy and no appreciable woody understory is present. Herbaceous understory is variable, depending on elevation, aspect, and local soils.

Canyon Slopes Habitat Site

The second habitat site in the canyons is the Canyon Slopes Habitat Site. The vegetative cover of this habitat site is similar to the Wooded Canyon Benches Habitat Site; an average of 51% of the total hits in the Wooded Canyon Benches Habitat Site (Table 2-6) and an average of 45% of the total hits in the Canyon Slopes Habitat Site (Table 2-7) were vegetative. However, the vegetative structure of these two habitat sites is very different. Unlike the Wooded Canyon Benches Habitat Site, the Canyon Slopes Habitat Site has a

Table 2-7. Summary of the Canyon Slopes Habitat Site Vegetation Transect.

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Transect Cw/o-1						
Non-vegetative						
Rock	96	0	3	0	99	28
Litter	39	0	1	0	40	11
Cobble	25	0	0	0	25	07
Bare Ground	9	0	0	0	9	03
Gravel	8	0	0	0	8	02
Sand	8	0	0	0	8	02
Subtotal	185	0	4	0	189	53
Vegetative						
Trees						
Jumo	0	0	0	6	6	02
Jusc	0	0	0	5	5	01
Subtotal	0	0	0	11	11	03
Shrubs						
Artr	3	4	33	1	41	11
Hodu	0	1	20	0	21	06
Syor	3	4	10	0	17	05
Prvi	0	2	3	0	5	01
Chpa	1	0	3	0	4	01
RIBE	1	0	3	0	4	01
SYMP	0	0	3	0	3	01
Rhtr	0	0	1	0	1	00
Subtotal	8	11	76	1	96	27
Grasses						
MUHL	3	10	0	0	13	04
AGRO	2	9	0	0	11	03
Spcr	2	5	0	0	7	02
Orhy	2	4	0	0	6	02
POA	4	1	0	0	5	01
Sihy	0	3	0	0	3	01
Agsm	1	1	0	0	2	01
Bogr	1	1	0	0	2	01
Brte	0	1	0	0	1	00
Subtotal	15	35	0	0	50	14

Table 2-7. (Continued).

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Forbs						
Arlu	1	2	1	0	4	01
Arca	0	2	0	1	3	01
Leer	0	3	0	0	3	01
Unid. moss	2	0	0	0	2	01
Subtotal	3	7	1	1	12	03
TOTALS	211	53	81	13	358	100
Transect Cw/o-2						
Non-vegetative						
Rock	64	0	2	0	66	19
Cobble	46	0	0	0	46	14
Gravel	37	0	1	0	38	11
Litter	37	1	0	0	38	11
Bare Ground	7	0	0	0	7	02
Subtotal	191	1	3	0	195	57
Vegetative						
Trees						
Jumo	0	0	1	7	8	02
Jusc	0	0	0	2	2	01
Pied	0	0	1	0	1	00
Subtotal	0	0	2	9	11	03
Shrubs						
Artr	2	3	24	0	29	09
Atca	2	1	9	1	13	04
Subtotal	4	4	33	1	42	12

Table 2-7. (Concluded).

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Grasses						
Bocu	7	17	2	0	26	08
Orhy	3	14	0	0	17	05
Spcr	1	12	0	0	13	04
Bogr	2	6	0	0	8	02
Boer	1	4	1	0	6	02
Mupa	2	4	0	0	6	02
Sihy	2	4	0	0	6	02
Subtotal	18	61	3	0	82	24
Forbs						
CRUC		3	1		4	01
Oppo	3				3	01
Arlu		2			2	01
Leer	1	0			1	00
Subtotal	4	5	1	0	10	03
TOTALS	217	71	42	10	340	100

[a]The species codes are the first two letters of the generic name and the first two letters of the species name. A complete list of species are presented in Table 2-1.

[b]00 represents any value < 0.5%.

sparse canopy (7.5% avg. of the vegetative hits), and a sparse ground cover (12% avg. of basal hits).

The differences in the two canyon habitat sites can probably be attributed to the soil and water conditions of the two sites. The soil complex of the Canyon Slopes Habitat Site is Rock Outcrops, very steep (USDA/SCS, 1982b). It consists mainly of basalt that have some layers of terrace sediment. Slopes are very steep and local relief is 50-600 ft. Runoff is very rapid and the erosion hazard is slight. The only vegetation that occurs in this habitat site are species that can establish in these severe soil and moisture conditions.

The sparse tree canopy is dominated by one-seed and Rocky Mountain junipers. These occur at such low densities that none were encountered in the plots.

The brush canopy density (1616 plants/acre) is 1.65 times the brush canopy density in the Wooded Canyon Benches Habitat Site (1,050 plants/acre) (Table 2-3). This habitat site supports the densest brush canopy of any of the seven habitat sites on the study area.

The average height of the shrub species ranged from 2-4 ft (Table 2-3) and the majority of individuals in all species with the exception of snowberry, were in reproductive stages. All snowberry individuals encountered in the plots were in the vegetative stage. Few seedlings of any species were found in the plots.

Sixteen species were recorded in the herbaceous layer of which 12 species were grasses. The most abundant grass species were side-oats grama (Bouteloua curtipendula) and Indian ricegrass which comprised an average of 27% of the vegetative basal hits (Table 2-7).

Although the potential natural vegetation has not been described in the literature, this habitat site is probably a seral stage. As the plants break down the rock outcrops and soil is produced, the site will probably undergo succession resulting in the Wooded Canyon Benches Habitat Site as the climax

community. Portions of this habitat site are bare, talus slopes that could be considered even earlier seral stages of this ongoing succession. Although these slopes probably have a plant community that differs from the sampled community of this habitat site, these slopes were not sampled due to their inaccessibility.

Agricultural Land Habitat Site

This habitat site only occurs on the Molycorp, Inc. property within the study area (Appendix A). It comprises only about 2.2% (420 acres) of the study area and includes all agricultural lands surrounding Molycorp's tailings areas, approximately 800 acres of dams and settling ponds. The tailings areas have been subjected to reclamation experiments since 1975 (USDA/SCS, 1981; 1982c). Many native and exotic shrub, grass, and forb species have been introduced on the tailings areas. These introductions have probably affected the species composition of the surrounding agricultural lands which are owned by Molycorp and are fallow. Therefore, the plant species composition of the habitat site on the study area is probably a result of the reproduction of the species orginally planted on these lands when it was farmed, and invasion of species introduced on the adjacent tailings areas and other agricultural properties.

The plant community associated with this habitat site consists of a dense herbaceous layer (avg. of 56.3% of vegetative hits) (Table 2-8) with scattered shrubs (3.3%) and trees (0.4%) in the windrows that border the agricultural properties.

The species composition of the two agricultural areas sampled by Transects A-1 and A-2 were markedly different, as a result of the continual disturbance to this habitat site from tailings and agricultural activities. The herbaceous cover on Transect A-2 was dominated by sleepy grass (Stipa robusta), summer cypress (Kochia scoparia) and curlycup gumweed (Grindelia squarrosa) which comprised 78% of the vegetative hits (Table 2-8).

Transect A-1 is located closer to from the active tailings and reclamation areas than Transect A-2 and has been used more recently for agricultural

Table 2-8. Summary of the Agricultural Lands Habitat Site Vegetation Transects.

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Transect A-1						
Non-vegetative						
Litter	117	0	0	0	117	30
Bare Ground	19	0	0	0	19	05
Gravel	8	0	0	0	8	02
Subtotal	144	0	0	0	144	37
Vegetative						
Trees						
Jusc	0	0	0	2	2	01
Subtotal	0	0	0	2	2	01
Grasses						
Stro	8	37	13	0	58	15
Brin 1	9	19	8	0	36	09
Mesa	3	26	7	0	36	09
Agcr	8	16	0	0	24	06
Agsm	4	8	0	0	12	03
Scpu	6	6	0	0	12	03
GRAM	1	9	0	0	10	03
Agtr	1	7	0	0	8	02
Hoju	3	3	1	0	7	02
Brci	1	1	0	0	2	01
JUNC 2	0	1	1	0	2	01
Besy	0	0	1	0	1	00
JUNC 1	0	1	0	0	1	00
POA	0	1	0	0	1	00
Sihy	0	1	0	0	1	00
Subtotal	44	136	31	0	211	54
Forbs						
Kosc	9	2	0	0	11	03
COMP	5	5	0	0	10	03
unid. seedlings	4	0	0	0	4	01
Grsq	1	1	0	0	2	01
Irmi	2	0	0	0	2	01
MACH	0	2	0	0	2	01
Subtotal	21	10	0	0	31	08
TOTALS	209	146	31	2	388	100

Table 2-8. (Concluded).

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Transect A-2						
Non-vegetative						
Litter	91	0	0	0	91	30
Bare Ground	38	0	0	0	38	12
Gravel	12	0	0	0	12	04
Subtotal	141	0	0	0	141	46
Vegetative						
Shrubs						
Chna	1	2	5		8	03
Artr		2	1		3	01
Subtotal	1	4	6	0	11	04
Grasses						
Stro	8	36	8	0	52	17
Agcr	1	5	0	0	6	02
JUNC 1	1	1	0	0	2	01
GRAM	1	0	0	0	1	00
Mesa	0	1	0	0	1	00
Subtotal	11	43	8	0	62	20
Forbs						
Kosc	36	27	0	0	63	21
Grsq	3	10	0	0	13	04
MACH	4	5	1	0	10	03
Hasp	1	1	0	0	2	01
COMP	1	0	0	0	1	00
Meof	0	1	0	0	1	00
unid. forb	1	0	0	0	1	00
Subtotal	46	44	1	0	91	30
TOTALS	199	91	15	0	305	100

[a]The species codes are the first two letters of the generic name and the first two letters of the species name. A complete list of species are presented in Table 2-1.

[b]00 represents any value < 0.5%.

purposes. This is reflected by the higher number of species recorded on this transect (22 species) in comparison with Transect A-2 (14 species). The plant community sampled by Transect A-1 was dominated by sleepy grass, alfalfa (Medicago sativa), Hungarian brome (Bromus inermis), and crested wheatgrass. These four species comprised 63% of the vegetative hits on Transect A-1. The two sampled plant communities had large numbers of native grasses and annual forbs, and introduced species associated with disturbed sites, e.g., summer cypress, aster (Machaeranthera sp.), crested wheatgrass, and Hungarian brome. However, none of the dominant species recorded on the two transects were reported as reclamation species on Molycorp's tailings areas (USDA/SCS, 1981; 1982c).

Few shrubs and no trees were encountered in the shrub and tree characterization plots. The only shrub species encountered in the plots (Table 2-3) and along the transects (Table 2-8) were big sagebrush and rubber rabbitbrush. One Rocky Mountain juniper was encountered along the transects.

The soils of the Agricultural Land Habitat Site and the tailings areas range from sandy loams to sandy clays with alternating layers of heavy clay (USDA/SCS, 1981). This habitat site is located at approximately 7,500 ft on the study area; the aspect is generally south and slopes are gentle, usually less than 1%. This area receives 11-13 in. of rainfall annually, predominantly between March and October (USDA/SCS, 1981).

According to the Soil Conservation Service (SCS) (USDA/SCS, 1981), the potential vegetation for this habitat site (as represented by undisturbed sites) contains the following species: pinyon pine, Apache plume (Fallugia paradoxa), wood's rose (Rosa woodsii), Gambel oak, gooseberry, mountain brome, hairy grama (Bouteloua hirsuta), muttongrass, and mountain muhly. Other species typically found in the area include western wheatgrass, needle and thread, big sagebrush, junegrass (Koeleria cristata), blue grama, Arizona fescue, and galleta.

Riparian Habitat Site

The Riparian Habitat Site within the study area is limited to a very narrow band along the banks of the Red River and local springs (Appendix A). The vegetative community of this habitat site is comprised of deciduous trees, shrubs, and vines growing along the river's edge and around springs. This community has the highest number of species (N=44) of any of the habitat sites on the study area (Table 2-9). A primary reason this habitat site exists here is because it is adjacent to a stable perennial water source. Although the Rio Grande within the study area is also perennial, its water level fluctuates dramatically precluding the establishment of a dense riparian community along its banks.

Unlike some of the previously discussed habitat sites, no single species is dominant within the plant community. The most common species, thinleaf alder (Alnus tenuifolia), western black chokecherry (Prunus virginiana), western virgin's bower (Clematis ligusticifolia), and Bigelow bluegrass (Poa bigelovii) accounted for only an average of 34% of the total hits (Table 2-9). The vegetative structure within this habitat site is more complex than that of any other site. The shrub and tree canopy layers (#'s 3 and 4) had an average of 56 and 98% of the vegetative hits respectively (Table 2-9). Ninety-four percent of the individuals in the shrub and tree plots were chokecherry and thinleaf alder (Table 2-3). The chokecherry individuals averaged 4.5 feet in height and were saplings and in the vegetative stage. The thinleaf alder individuals averaged 16.6 feet in height (Table 2-3) and were evenly distributed among the mature, sapling, and seedling age classes. The mature individuals all had ripe seeds.

Of 898 hits recorded on the two transects, 67% were vegetative hits. However, 72% of the basal hits were non-vegetative material (Table 2-9). Thus, while ground cover is low (28% avg. of basal hits) relative to other habitat sites, total vegetative cover is high due to the canopy development in this habitat site.

Table 2-9. Summary of the Riparian Habitat Site Vegetation Transects.

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Transect R-1						
Non-vegetation						
Litter	105	10	0	0	115	22
Rock	41	0	0	0	41	08
Bare ground	7	0	0	0	7	01
Sand	2	0	0	0	2	00
Cobble	1	0	0	0	1	00
Gravel	1	0	0	0	1	00
Silt	1	0	0	0	1	00
Styrofoam	1	0	0	0	1	00
Water	1	0	0	0	1	00
Subtotals	160	10	0	0	170	32
Vegetative						
Trees						
Alte	1	6	16	70	93	18
Prvi	0	18	32	22	72	14
Psme	0	1	0	6	7	01
Jusc	0	0	1	5	6	01
Subtotal	1	25	49	103	178	34
Shrubs						
Rile	0	17	0	4	21	04
Rowo	0	7	3	0	10	02
SYMP	0	7	0	0	7	01
Artr	3	1	0	0	4	01
Hodu	0	1	1	0	2	00
Rhtr	0	0	1	0	1	00
Cost	0	1	0	0	1	00
Subtotal	3	34	5	4	46	09
Grasses						
Agtr	12	9	1	0	22	04
Brci	4	1	0	0	5	01
Cane	1	1	0	0	2	00
Brte	0	1	0	0	1	00
Muhl	0	1	0	0	1	00
Subtotal	17	13	1	0	31	06

Table 2-9. (Continued).

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Forbs						
Clli	8	16	16	0	40	08
Rula	2	15	1	0	18	03
Pain	3	2	7	1	13	02
APOC	0	4	5	0	9	02
Huam	1	3	2	0	6	01
Hela	1	2	0	0	3	01
Peca	0	3	0	0	3	01
GALI	1	1	0	0	2	00
Rona	2	0	0	0	2	00
Armi	0	1	0	0	1	00
CIRS	0	1	0	0	1	00
ERIG	1	0	0	0	1	00
MENT	1	0	0	0	1	00
Subtotal	20	48	31	1	100	19
TOTALS	201	130	86	108	525	100
Transect R-2						
Non-vegetation						
Litter	62	1	0	0	63	18
Rock	24	0	0	0	24	07
Bare ground	19	0	0	0	19	05
Gravel	12	0	0	0	12	03
Sand	4	0	0	0	4	01
Subtotals	121	1	0	0	122	34
Vegetative						
Trees						
Alte	1	0	1	48	50	14
Quga	2	3	2	16	23	06
Jusc	2	0	0	22	24	07
Prvi	0	4	6	1	11	03
Psme	0	0	0	2	2	01
Subtotal	5	7	9	89	110	31

Table 2-9. (Concluded).

Species[a]	Hits by Canopy Level 1	2	3	4	Total Hits	% of Total Hits[b]
Shrubs						
Rowo	0	10	4	2	16	04
Cost	3	3	0	0	6	02
Saex	2	2	1	0	5	01
Rile	2	1	0	0	3	01
Chna	0	2	1	0	3	01
Rhtr	0	1	1	0	2	01
SYMP	1	1	0	0	2	01
Rhra	0	1	0	0	1	00
Subtotal	8	21	7	2	38	11
Grasses						
Pobi	30	1	0	0	31	09
Agtr	12	1	0	0	13	04
Elca	3	4	1	0	8	02
Brci	1	1	0	0	2	01
Subtotal	46	7	1	0	54	15
Forbs						
Eqla	6	4	0	0	10	03
Clli	0	5	3	0	8	02
Rula	0	4	0	0	4	01
CIRS	1	1	0	0	2	01
Huam	1	1	0	0	2	01
Cane	1	0	0	0	1	00
Elma	1	0	0	0	1	00
Hela	0	1	0	0	1	00
Pain	1	0	0	0	1	00
SMIL	0	1	0	0	1	00
THAL	0	1	0	0	1	00
Subtotal	11	18	3	0	32	09
TOTAL	191	54	20	91	356	100

[a]The species codes are the first two letters of the generic name and the first two letters of the species name. A complete list of species are presented in Table 2-1.

[b]00 represents any value < 0.5%.

The common plants within this habitat site are restricted to this site within the study area. However, mesic species common in other habitat sites, e.g., Rocky Mountain juniper, Douglas fir, and Gambel oak occur in low numbers in this habitat site.

This habitat site covers approximately 90 acres in the project area, but because of its uniqueness, proximity to permanent water, diversity, and heterogenous vegetative structure, it is an important avian habitat site (Section 3.0). The Red River enters the habitat site at 7,200 ft and leaves it at 6,900 ft. The slopes of the Red River canyon range from 40 to 80%.

The soils in this habitat site are principally overbank deposits of the Orthents-Rock Outcrop Association. This association is described in the Wooded Canyon Benches Habitat Site narrative.

Outside the study area this habitat site is widely scattered throughout north central New Mexico along the banks of perennial streams and springs not subject to marked water level variation. This habitat site is probably not a seral stage but is a climax community for the narrow stream bank zone it occupies.

3.0 AVIAN OCCURRENCE BY HABITAT SITE

One of the primary objectives of this study was to document and quantify the avian prey within the study area that would be available to Peregrine Falcons if they nest in nearby suitable habitat. In order to quantify avian populations, a censusing grid was established in each of the seven habitat sites identified in Section 2.0. The methods and results of these population studies are described below.

Methods

Grid Selection and Layout

The locations of the seven spot-mapping grids were selected after preliminary habitat maps of the study area had been completed. Grids that were located within large tracts of homogenous habitat were selected on the following criteria:

- grid boundaries were at least 1/8 mi. from the edges of other habitat sites,
- no unusual enclave of another habitat site or special habitat feature (e.g., cliff, deep arroyo) totalling more than one acre were included within its boundaries,
- each grid was accessible and traversable,
- grid corners were well documented from established section corners or other permanent points for future relocation, and
- each grid was 8 to 10 ha (20-30 acres) in size.

For grids that were located in narrow habitat sites (Riparian and Canyon Slopes) or a habitat site with limited area (Agricultural Lands), meeting the first criteria was not required. Final grid locations are shown on the Avian Habitat Map (Appendix A).

One external corner of each grid was established by plane survey from a USGS brass cap or other permanent definable point. The remaining exterior grid corners and all interior grid points were then established by standard plane surveying techniques. Corners were staked with 1/2 in. rebar driven at least 18 in. into the ground and extending at least 2 ft. above the surface.

Interior grid points were marked with flagging tape and spray paint, usually on a nearby tree, rock, or a wooden stake driven at the surveyed point. A letter and number denotation (i.e., A1 in northeast corner of grid) was also marked on each grid point so that the observer would always be able to locate their position on the grid.

A master map of each grid was prepared showing the denoted grid points and identifiable features such as rock outcrops, drainages, or identifiable trees and snags. Each grid map was reproduced on 8 1/2 x 11 in. paper (Appendix B) for easy field use on a standard clipboard. Color prints and slides document all exterior grid corners (Appendix C).

Avian Censusing

Birds were censused on the study area using the International Bird Plot Census (Spot Mapping) Method which involves repeated counts of birds occurring within a sample of homogenous habitat. Spot mapping was developed by Williams (1936) as a means of determining breeding bird densities and has since served as the principle technique for estimating densities of small, non-flocking territorial birds. Because of the popularity of this technique, census methods were standardized in 1969 by the International Bird Census Committee (IBCC; 1969, 1970). No censusing method is applicable in every instance or is without its drawbacks. Many workers regard the spot-mapping method as providing a reliable absolute density estimate which, in fact, has been found to be above 90% in accuracy for the majority of species examined in a northern Arizona study (Franzreb 1981). If the observer can obtain an accurate count of the number of territorial males, then a reasonably good estimate of breeding bird density can be calculated. However, the disadvantages of this technique are:

- it is not effective for flocking or non-territorial species (IBBC 1970),
- it is applicable only during the breeding season (Edwards et al. 1981),
- it requires considerable time and effort in grid layout and censusing (Emlen 1971),

- it is applicable only to relatively small tracts of homogenous habitat (Marchant 1981),
- there can be considerable variation in interpretation of cumulative maps (Best 1975), and
- the result of multiple censuses is one cumulative sample of the number of territories per grid; therefore, statistical tests of variances and significances cannot be easily applied (Eagles 1981).

During censusing, observers traversed the grid, looking and listening for birds. Each contact, called a registration, was plotted on the grid map. Registrations that were indicative of territorial behavior, such as a singing male or boundary dispute, were particularly important. Each registration also contained coded information on the bird's identity, sex (if it could be determined), song (presence and type), and behavior. Standard IBCC (1970) mapping codes were used. Constant effort was made to track movements of individuals so that multiple registrations of the same bird did not occur. All nests found were also recorded.

Each grid was censused seven times between April 9 and June 22, 1985. This period was chosen because it coincided with the most critical phases, incubation (mid-April to mid-May) and nestling (mid-May to late June) rearing, of Peregrine Falcon reproductive activity. No less than eight or more than twelve days elapsed between counts on each grid. Inventories were completed within 180 minutes of sunrise, which was defined as the time when first light enabled the observer to see flagged stakes within the grid. This was 20-30 minutes before official sunrise. Counts were not conducted on rainy or windy (> 12 mph winds; Beaufort rating of 3) mornings. Two observers conducted all censuses, alternating so that each grid was censused approximately equally by each observer.

Data for each census was recorded on a fresh map. The results of each census were also summarized on a BLM Daily Inventory Summary Form. Copies of all completed maps and forms were submitted to the BLM Taos Resource Area Office with this report. After completion of the counts in the field, each observer prepared a composite map for each species on each grid for the

censuses they had conducted. These maps were combined, thereby placing the results of all seven counts on one map. The two observers then independently estimated the number of breeding pairs of each species on each grid. At least two registrations, both having high territorial significance (e.g., song; IBCC 1970) were required for a territory to be delineated. A nest found on a grid was also considered evidence of a breeding pair. Observers also classified non-breeders as either visitors, species seen or heard on a grid at least once, or partial breeders, species having at least a portion (but less than half) of their territory on a grid. Results of the two observers' estimates were averaged to provide population estimates. To maintain consistency with IBCC (1970) standards (whole or half territories only), an average of X.25 (X = 0 or an integer) was rounded up to X.5, one ending in X.75 was rounded down to X.5. Differences between observer density estimates within grids and between grids were tested with an Analysis of Variance; because of the single sample dilemna mentioned above differences between sampling periods could not be measured with statistical methods.

Breeding pairs of birds per square kilometer (km^2) were calculated from census results so that comparisons could be made with published accounts of previous spot-mapping studies in similar habitats. Data from two or more years of counts on the same grid were averaged before comparing them with counts from GMSA grids. This had a stabilizing effect on that data, since increased sampling increased the validity of the means. Therefore ranges for these grids are also given when comparisons are made with GMSA grids. Multiple years of data also increases the chance of less common species being encountered on a grid; thus the number of species encountered during long term (2-3 years) studies would be expected to be more than in the 1-year GMSA study.

The number of breeding pairs expected to occur within each habitat site was calculated based on the total acreage of that habitat site in the GMSA. Because we have only a single sample for each habitat site, it was not possible to determine confidence limits for these population estimates, though ranges are provided by the estimates made by the two observers. However, this lack of an estimate of variance decreases the predictive value of these habitat site population estimates.

Species diversity indices were calculated for all grids, both on the GMSA and from previous studies, using the equation,

$$H = -\sum P_i \ln(P_i) \quad \text{(MacArthur and MacArthur 1961).}$$

For calculations the formula becomes

$$H = \ln N - 1/N \sum n_i \ (\ln n_i)$$

where n = number of individuals of the ith species and N = total number of individuals. Species diversity indices of the seven habitat sites within the GMSA were compared to each other as well as to the indices calculated for previously published censuses in similar habitats.

Results

Tests of Observer Variability

Because most species on all grids had three or fewer breeding pairs, species were lumped into two categories before analysis; those species which were most likely to be seen first (visual cues) and those species which were most likely to be heard first (auditory cues) (Table 3-1). In three of four cases the data are not normally distributed (Table 3-2). Therefore the data were analyzed for observer differences with a Willcoxon 2-Sample test for non-parametric data (Table 3-3). The results of this test indicate that 1) there was no significant difference between observers (Probability of > Z = 0.47) and 2) there was a highly significant difference between species separated by cue (Probability of > Z = 0.0025). Interaction between observers and cues could not be tested.

Avian Communities of the GMSA

A total of 85 species of birds were recorded on or flying over one or more of the seven census grids. An additional 48 avian species were recorded within the GMSA but not on a grid (Appendix D). The species list of 133 birds is presented in Table 3-4. A discussion of the bird populations on each of the seven habitat sites follows; habitat sites are discussed in the same order as in Section 2.0.

Table 3-1. Estimates of total breeding pairs on each grid by each observer.

Habitat Site	Number of Breeding Pairs			
	Observer #1		Observer #2	
	Visual[a]	Auditory[b]	Visual	Auditory
Sagebrush/Grassland	2.5[c]	17	0	15.5
Pinyon/Juniper Woodland	8	28	5	23.5
Upland Forest	7.5	36	4	33.5
Wooded Benches	6	29	4	30
Canyon Walls	6	32	4	32.5
Agriculture	4	4	2	4
Riparian	33	49.5	31.5	45.5
Mean	9.6	27.9	7.2	26.4
Standard Deviation	10.5	14.4	10.8	13.5

[a] Those species likely to be seen first, or easily seen and heard.

[b] Those species likely to be heard first, usually seen only after hearing.

[c] Breeding pairs presented in whole or half territories only (IBCC 1970).

Table 3-2. Results of normal distribution test.

	Pairs versus		Pairs versus	
	Observer #1	Observer #2	Visual	Auditory
Probability of > F[a]	0.041	0.025	0.01	0.501

[a]Must be greater than 0.05 for data to be considered normally distributed.

Table 3-3. Results of the Willcoxon 2-Sample Test.

Level	N	Sum of Scores	Expected Under Ho	Std. Dev. Under Ho	Mean Score	Z	Probability[a] of a > Z
		Willcoxon Scores (Rank Sums)					
Observer #1	14	219	203	21.67	15.6		
Observer #2	14	187	203	21.67	13.4	0.72	0.47
Visual Cue	14	137	203	21.67	9.8		
Auditory Cue	14	269	203	21.67	19.2	-3.02	0.0025

[a]Must be greater than 0.05 for data to be considered normally distributed.

Table 3-4. The 133 avian species recorded on the Guadalupe Mountain Study Area, August and September 1984 and April through June 1985.

Common Name	Scientific Name	Abundance[a]	Status[b]
Eared Grebe	Podiceps nigricollis	U	T
White-faced Ibis	Plegadis chihi	U	T
Canada Goose	Branta canadensis	U	SR
Green-winged Teal	Anas crecca	C	T
Mallard	Anas platyrhynchos	C	SR
Blue-winged Teal	Anas discors	C	T
Cinnamon Teal	Anas cyanoptera	U	T
Northern Shoveler	Anas clypeata	C	T
Gadwall	Anas strepera	C	T
American Wigeon	Anas americana	C	T
Redhead	Aythya americana	C	T
Ring-necked Duck	Aythya collaris	C	T
Lesser Scaup	Aythya affinis	U	T
Hooded Merganser	Lophodytes cucullatus	U	T
Common Merganser	Mergus merganser	C	T
Ruddy Duck	Oxyura jamaicensis	C	T
Turkey Vulture	Cathartes aura	C	SR
Osprey	Pandion haliaetus	U	T
Sharp-shinned Hawk	Accipiter striatus	U	R
Cooper's Hawk	Accipiter cooperii	U	R
Northern Goshawk	Accipter gentilis	U	R
Red-tailed Hawk	Buteo jamaicensis	C	R
Golden Eagle	Aquila chrysaetos	U	R
American Kestrel	Falco sparverius	C	R
Prairie Falcon	Falco mexicanus	U	R
American Coot	Fulica americana	C	T
Semi-palmated Sandpiper	Charadrius semipalmatus	U	T
Killdeer	Charadrius vociferous	C	SR
American Avocet	Recurvirostra americana	C	T
Greater Yellowlegs	Tringa melanoleuca	U	T
Willet	Catoptrophorus semipalmatus	U	T
Spotted Sandpiper	Actitiu macularia	C	SR
Marbled Godwit	Limosa fedoa	U	T
Long-billed Dowitcher	Limnodromus scolopaceus	U	T
Common Snipe	Gallinago gallinago	U	T
Wilson's Phalarope	Phalaropus tricolor	C	T
Ring-billed Gull	Larus delawarensis	C	SR
Rock Dove	Columba livia	C	R
Band-tailed Pigeon	Columba fasciata	U	SR
Mourning Dove	Zeniada macroura	C	SR
Flammulated Owl	Otus flammeolus	U	R
Western Screech Owl	Otus kennicottii	U	R
Great Horned Owl	Bubo virginianus	U	
Burrowing Owl	Athene cunicularia	U	R
Northern Saw-whet Owl	Aegolius acadicus	U	SR
Common Nighthawk	Chordeiles minor	U	SR
Common Poorwill	Phalaenoptilus nuttallii	U	SR
White-throated Swift	Aeronautes saxatalis	A	SR
Broad-tailed Hummingbird	Selasphorus platycercus	C	SR

Table 3-4. (Continued).

Common Name	Scientific Name	Abundance[a]	Status[b]
Belted Kingfisher	Ceryle alcyon	U	SR
Lewis' Woodpecker	Melanerpes lewis	U	R
Hairy Woodpecker	Picoides villosus	U	R
Northern Flicker	Colaptes auratus	C	R
Olive-sided Flycatcher	Contopus borealis	U	SR
Western Wood-Peewee	Contopus sordidulus	C	SR
Dusky Flycatcher	Empidonax oberholseri	C	SR
Gray Flycatcher	Empidonax wrightii	U	SR
Western Flycatcher	Empidonax difficilis	U	SR
Say's Phoebe	Sayornis saya	U	SR
Ash-throated Flycatcher	Myiarchus cinerascens	U	SR
Eastern Kingbird	Tyrannus tyrannus	U	SR
Horned Lark	Eremophila alpestris	A	R
Tree Swallow	Tachycineta bicolor	C	T
Violet-green Swallow	Tachycineta thalassina	A	SR
Northern Rough-winged Swallow	Stelgidopteryx serripennis	U	T
Cliff Swallow	Riparia riparia	A	SR
Barn Swallow	Hirundo rustica	U	SR
Steller's Jay	Cyanocitta stelleri	C	R
Scrub Jay	Aphelacoma coerulescens	C	R
Pinyon Jay	Gymnorhinus cyanocephalus	C	R
Clark's Nutcracker	Nucifraga columbiana	C	R
Black-billed Magpie	Pica pica	C	R
American Crow	Corvus brachyrhychos	U	R
Common Raven	Corvus corax	U	R
Black-capped Chickadee	Parus atricapillus	U	R
Mountain Chickadee	Parus gambeli	C	R
Plain Titmouse	Parus inornatus	C	R
Common Bushtit	Psaltriparus minimus	U	R
Red-breasted Nuthatch	Sitta canadensis	U	R
White-breasted Nuthatch	Sitta carolinensis	U	R
Pygmy Nuthatch	Sitta pygmae	U	R
Rock Wren	Salpinctes obsoletus	C	SR
Canyon Wren	Catherpes mexicanus	C	SR
House Wren	Troglodytes aedon	U	SR
American Dipper	Cinclus mexicanus	C	R
Ruby-crowned Kinglet	Regulus calendula	U	T
Blue-gray Gnatcatcher	Polioptila caerulea	U	SR
Western Bluebird	Sialia mexicana	C	R
Mountain Bluebird	Sialia currucoides	C	R
Townsend's Solitaire	Myadestes townsendi	U	R
Veery	Catharus ustulatus	R	T
Hermit Thrush	Catharus guttatus	U	SR
American Robin	Turdus migratorius	C	R
Gray Catbird	Dumetella carolinesis	U	SR
Northern Mockingbird	Mimus polyglottos	U	SR
Sage Thrasher	Oreoscoptes montanus	C	SR
Water Pipit	Anthus spinoletta	A	T
European Starling	Sturnus vulgarus	C	R
Solitary Vireo	Vireo solitarius	U	SR
Warbling Vireo	Vireo gilvus	U	SR
Virginia's Warbler	Vermivora virginiae	C	SR

Table 3-4. (Concluded).

Common Name	Scientific Name	Abundance[a]	Status[b]
Yellow Warbler	Dendroica petechia	A	SR
Yellow-rumped Warbler	Dendroica coronata	A	T
Black-throated Gray Warbler	Dendroica nigresens	C	SR
Townsend's Warbler	Dendroica townsendi	U	T
Grace's Warbler	Dendroica graciae	U	SR
Yellow-breasted Chat	Icteria virens	U	SR
Hepatic Tanager	Piranga flava	U	SR
Western Tanager	Piranga ludoviciana	C	SR
Rose-breasted Grosbeak	Pheuctucus ludovicianus	U	T
Black-headed Grosbeak	Pheucticus melanocephalus	R	SR
Blue Grosbeak	Guiraca caerulea	U	SR
Lazuli Bunting	Passerina cyanea	U	SR
Green-tailed Towhee	Pipilo chlorurus	C	SR
Rufous-sided Towhee	Pipilo erythrophthalmus	C	R
Chipping Sparrow	Spizella passerina	C	SR
Brewer's Sparrow	Spizella breweri	C	SR
Vesper Sparrow	Pooecetes gramineus	C	SR
Sage Sparrow	Amphispiza belli	C	SR
Song Sparrow	Melospiza melodia	C	SR
White-crowned Sparrow	Zonotrichia leucophrys	U	WR
Dark-eyed Junco	Junco hymealis	C	R
Red-winged Blackbird	Agelaius phoeniceus	U	SR
Western Meadowlark	Sturnella neglecta	C	R
Brewer's Blackbird	Euphagus cyanocephalus	C	SR
Brown-headed Cowbird	Molothrus ater	C	SR
Pine Grosbeak	Pinicola enucleator	U	R
Cassin's Finch	Carpodacus cassini	A	R
Red Crossbill	Loxia curvirostra	C	R
Lesser Goldfinch	Carduelis psaltria	U	R
Pine Siskin	Carduelis pinus	C	R
American Goldfinch	Carduelis tristis	U	R
Evening Grosbeak	Coccothraustes vespertina	A	R

[a]Abundance Categories

A - species is almost always seen in large numbers.
C - species is usually seen in numbers in suitable habitat.
U - species is not often seen but is not out of range.
R - species is very infrequently seen in the study area or is out of normal range.

[b]Status Categories

R - species is resident in study area year-round.
SR - species is resident only during the summer; often a breeding species.
WR - species is resident only during the winter.
T - species only occurs in study area during periods of spring or fall migration; or a wandering species.

Sagebrush/Grassland Habitat Site

There are 6,250 acres of Sagebrush/Grassland Habitat within the GMSA. This habitat site (33.3%) and the Pinyon/Juniper Woodland (33.2%) each occupy about one third of the study area. Twenty two species of birds were recorded at least once on the Sagebrush/Grassland Grid (Table 3-5). Twelve species were classified as visitors, four as partial breeders, and six as breeding species. The majority of breeding pairs (89%) on the grid were of the following species; Brewer's Sparrow, Vesper Sparrow, or Sage Sparrow. An estimated 18 breeding pairs of birds occurred on this grid. This is equal to a breeding density of 200 pairs/km^2 and an estimated 5,006 breeding pairs within the GMSA.

The Sagebrush/Grassland Grid had the second lowest breeding bird density among the grids, the lowest number of breeding species, and the lowest diversity index of the GMSA grids (Table 3-6). Its diversity index (1.43) was well below those of the other five native vegetation grids, which ranged from 2.34 to 2.88. However, because it was the largest habitat site in total area within the GMSA, the estimated breeding population for the Sagebrush/Grassland Habitat Site (5,006 pairs) was the second highest on the study area.

The results of this study are comparable with previous studies in sagebrush habitats in Wyoming and Utah and rabbitbrush grassland in western New Mexico (Table 3-7). The estimated population of 200 breeding pairs/km^2 in this study was the second highest density estimate among the five studies. The GMSA grid, which was 67% chained and 33% undisturbed, had a diversity index of 1.43. This index is slightly higher than the index for one year of a two year study on undisturbed sagebrush in Utah (1.29) and noticeably higher than the indices for both years in chained sagebrush in Utah (1.00, 1.08). It is lower than the indices for undisturbed sagebrush in Wyoming (1.77) and the second year in undisturbed sagebrush in Utah (1.89). The rabbitbrush grassland in western New Mexico, similar in structure to the Sagebrush/Grassland Habitat Site, also had similar (1.33, 1.45) diversity indices. This study reported the second highest number of breeding species (6) and total species observed (22) (Table 3-7).

Table 3-5. Estimated breeding bird pairs on the Sagebrush/Grassland Grid.

Species	Observer # 1	Observer # 2	Avg	No./[a] km^2(range)	Total on GMSA(range)[b]
American Kestrel	+	+	+	0	0
Mourning Dove	V	V	0	0	0
Common Nighthawk	V	V	0	0	0
White-throated Swift	V	V	0	0	0
Broad-tailed Hummingbird	2	+	1	11 (0-22)	278 (0-278)
Horned Lark	V	V	0	0	0
Violet-green Swallow	V	V	0	0	0
Barn Swallow	V	V	0	0	0
Pinyon Jay	+	+	+	0	0
Common Raven	V	V	0	0	0
Western Bluebird	V	V	0	0	0
Mountain Bluebird	.5	+	.5	6 (0-6)	139 (0-139)
American Robin	V	V	0	0	0
Sage Thrasher	V	V	0	0	0
Green-tailed Towhee	.5	+	.5	6 (0-6)	139 (0-139)
Chipping Sparrow	+	+	+	0	0
Brewer's Sparrow	4	4.5	4.5	50 (45-50)	1252 (1112-1252)
Vesper Sparrow	6.5	5	5.5	61 (55-72)	1530 (1390-1808)
Sage Sparrow	6	6	6	67 (67)	1669 (1669)
Red-winged Blackbird	V	V	0	0	0
Western Meadowlark	+	+	+	0	0
Brewer's Blackbird	V	V	0	0	0
Breeding Pairs	19.5	15.5	18	200(172-216)	5006(4311-5423)

[a]Range based on estimates by individual observers.

[b]Estimated total breeding pairs for GMSA based on 6,250 acres of available habitat.

V - Visitor to the grid.

+ - Breeding species with part of a territory on the grid.

Table 3-6. Comparisons of breeding densities, number of breeding species, species diversities, and total estimated GMSA populations in the seven habitat sites.

Habitat Site	Estimated Breeding pairs/km	Rank	Number of Breeding Species	Rank	Diversity Index	Rank	Estimated Study Area Breeding Population (pairs)[a]
Sagebrush/ Grassland	200 (172-216)	6	6	7	1.43	7	5,006 (4,311-5,423)
Pinyon/Juniper Woodland	366 (316-400)	5	19	3	2.55	4	9,149 (7,898-9,978)
Upland Forest	500 (446-518)	2	21	1	2.79	2	3,139 (2,813-3,375)
Wooded Canyon Benches	378 (366-389)	4	20	2	2.88	1	2,602 (2,541-2,695)
Canyon Slopes	457 (444-475)	3	16	5	2.67	3	2,745 (2,673-2,861)
Agricultural Lands	88 (78-104)	7	8	6	1.95	6	147 (127-169)
Riparian	723 (701-751)	1	19	3	2.34	5	260 (254-272)
Total							23,048 (20,613-24,654)
Average density[b]	307						

[a]Includes only those species with >0.5 territories on the grid.

[b]Average density = 23,048 breeding pairs/758 km

Table 3-7. A comparison of the 1985 GMSA census results on the Sagebrush-Grassland Habitat Site with census results in similar habitats in the western United States.

		Sagebrush			Rabbitbrush
			Utah[b]		
	This study	Wyoming[a]	Undisturbed	Chained	New Mexico[c]
Grid Size (hectares)	9.0	8.1	16.2	16.2	16.2
(acres)	22.5	20.0	40.0	40.0	40.0
Breeding pairs/km^2	200	222	104	85	122
(range)[d]	(172-216)	-	(100-108)	(80-90)	(90-154)
Total Breeding Species[e]	9	7	5	3	5
(range)			(5,5)	(4,5)	(5,6)
Breeding Species[f]	6	7	4	3	5
(range)			(4,4)	(3,3)	(5,5)
Breeding Species in common with this study[e]	-	3	3	2	3
All species observed[g]	22	7+[h]	15	13	22
(range)			(15, ?)	(13, ?)	(18.21)
Species in common with this study[g]	-	5+[h]	10	7	16
Diversity Index[i]	1.43	1.77	1.29,1.86	1.00,1.08	1.33,1.45
(range)					

[a]Todd (1974); counts conducted in 1974.

[b]Castrale and Parker (1981); counts conducted in 1979 and 1980.

[c]McCallum and Price (1978), McCallum and Leibman (1980); counts conducted in 1977 and 1979.

[d]ranges given for studies with multiple estimates (this study) or multiple years of data.

[e]Includes species with partial (< .5) territories on the grid.

[f]Includes only species with ≥ .5 territories on the grid.

[g]Includes breeding species, partial breeders, and visitors.

[h]Visitors not given.

[i]Calculated using breeding species (≥ .5 territories) only.

? - Visitors given for only one year.

Pinyon/Juniper Woodland Habitat Site

The Pinyon/Juniper Woodland Habitat within the GMSA contains 6,230 acres. Thirty five species of birds were recorded on the Pinyon/Juniper Woodland Grid (Table 3-8). Eleven of these species were classified as visitors, five as partial breeders, and 19 as breeding species. Black-throated Gray Warblers and Plain Titmice were most numerous on the grid, while Mountain Chickadees and Brown-headed Cowbirds were also common. An estimated 33 breeding pairs of birds occurred on this grid, which extrapolates to 366 breeding pairs/km^2 and an estimated 9,149 breeding pairs within the study area.

The Pinyon/Juniper Woodland Grid ranked fifth in breeding pair density (366/km^2) and third in number of breeding species (19) among the GMSA grids (Table 3-6). Its diversity index (2.55) ranked fourth, though it was only 11.5% less than the highest index of 2.88 (Wooded Canyon Benches). Because the Pinyon/Juniper Woodland Habitat Site was one of the largest habitat sites on the GMSA and had a moderate density of breeding pairs, it contributed the highest number of breeding pairs (9,149) to the total GMSA avian population.

The estimated breeding bird density (366/km^2) in this habitat was second highest among five reported studies in similar habitats (Table 3-9). All four of the other studies cited also presented the results of a single year's survey. The GMSA grid had noticeably more breeding species (19) than the other four grids (range: 9-13), though total species observed (35) was comparable to the total species reported in an eastern California woodland (32). Twenty two species were observed on a grid in western New Mexico, while two other studies, one in northwestern Colorado and one in southeastern California, did not report grid visitors. The GMSA diversity index (2.55) was also noticeably higher than that of the other four studies, which averaged 2.00 (Table 3-9).

Upland Forest Habitat Site

There are 1,570 acres (8.4%) of Upland Forest Habitat within the GMSA. Thirty six avian species were recorded on the Upland Forest grid (Table 3-10).

Table 3-8. Estimated breeding bird pairs on the Pinyon/Juniper Woodland Grid.

Species	Observer # 1	Observer # 2	Avg	No./[a] km^2 (range)	Total on GMSA (range)[b]
Mourning Dove	1	1	1	11 (11)	277 (277)
Common Nighthawk	V	V	0	0	0
White-throated Swift	V	V	0	0	0
Broad-tailed Hummingbird	2	+	1	11 (0-22)	277 (0-554)
Hairy Woodpecker	.5	+	.5	6 (0-6)	139 (0-139)
Northern Flicker	.5	+	.5	6 (0-6)	139 (0-139)
Gray Flycatcher	1	.5	.5	6 (6-11)	139 (139-277)
Ash-throated Flycatcher	.5	.5	.5	6 (6)	139 (139)
Violet-green Swallow	1	1	1	11 (11)	277 (277)
Steller's Jay	V	V	0	0	0
Scrub Jay	+	+	+	0	0
Pinyon Jay	+	+	+	0	0
Clark's Nutcracker	+	+	+	0	0
American Crow	V	V	0	0	0
Mountain Chickadee	3	3	3	33 (33)	832 (832)
Plain Titmouse	6	5.5	5.5	61 (61-67)	1525 (1525-1662)
Common Bushtit	V	V	0	0	0
Red-breasted Nuthatch	1	+	.5	6 (0-11)	139 (0-277)
White-breasted Nuthatch	1	1	1	11 (11)	277 (277)
Pygmy Nuthatch	1.5	1	1.5	17 (11-17)	416 (277-416)
Ruby-crowned Kinglet	V	V	0	0	0
Western Bluebird	1	1	1	11 (11)	277 (277)
Townsend's Solitaire	V	V	0	0	0
American Robin	+	+	+	0	0
Solitary Vireo	.5	.5	.5	6 (6)	139 (139)
Yellow-rumped Warbler	V	V	0	0	0
Black-throated Gray Warbler	6.5	6	6.5	72 (67-72)	1802 (1662-1802)
Townsend's Warbler	V	V	0	0	0
Rufous-sided Towhee	.5	.5	.5	6 (6)	139 (139)
Chipping Sparrow	2	2	2	22 (22)	554 (554)
Dark-eyed Junco	2.5	2	2.5	28 (22-28)	693 (554-693)
Brown-headed Cowbird	4	3	3.5	39 (33-44)	970 (831-1108)
Cassin's Finch	V	V	0	0	0
Red Crossbill	+	+	+	0	0
Pine Siskin	V	V	0	0	0
Breeding Pairs	36	28.5	33	366 (316-400)	9149 (7899-9978)

[a]Range based on estimates by individual observers.

[b]Estimated total breeding pairs for GMSA based on 6,230 acres of available habitat.

V - Visitor to grid; too few territorial registrations.

+ - Breeding species with part (but < 0.5) of territory on grid.

Table 3-9. A comparison of the 1985 census results on the Pinyon/Juniper Habitat Site with census results in similar habitats in the western United States.

	This study	SE Calif.[a]	E Calif.[b]	NW Colorado[c]	W New Mexico[d]
Grid Size (hectares)	9.0	9.0	27.8	12.0	3.9
(acres)	22.5	22.5	69.5	30.0	9.8
Breeding pairs/km^2 (range)[e]	366 (316–400)	100	196	290	475
Total Breeding Species[f]	24	13	13	10	9
Breeding Species[g]	19	7	13	10	8
Total Breeding Species[f] in common with this study	-	3	8	7	5
All species observed[h]	35	13+[i]	32	10+[i]	22
Species in common with this study[h]	-	6	16	7	14
Diversity Index[j]	2.55	1.91	2.00	2.10	2.00

[a]Cardiff (1979); counts were conducted in 1978.

[b]Woodman (1979); counts were conducted in 1978.

[c]O'Meara, et al. (1981); counts were conducted in 1977.

[d]McCallum (1979); counts were conducted in 1979.

[e]range given for multiple estimates (this study).

[f]Includes species with partial (< .5) territories on the grid.

[g]Includes only species with $\geq$ .5 territories on the grid.

[h]Includes breeding species, partial breeders, and visitors.

[i]Visitors not given.

[j]Calculated using breeding species (0.5 territories or more) only.

Table 3-10. Estimated breeding bird pairs on the Upland Forest Grid.

Species	Observer # 1	Observer # 2	Avg	No./ km^2 (range)[a]	Total on GMSA(range)[b]
Mourning Dove	3.5	3	3.5	42 (36-42)	262 (225-262)
Northern Saw-whet Owl	V	V	0	0	0
Broad-tailed Hummingbird	2.5	+	1.5	18 (0-30)	112 (0-187)
Hairy Woodpecker	1	1	1	12 (12)	75 (75)
Northern Flicker	1	1	1	12 (12)	75 (75)
Olive-sided Flycatcher	+	+	+	0	0
Dusky Flycatcher	1.5	1.5	1.5	18 (18)	112 (112)
Violet-green Swallow	1.5	1	1.5	18 (12-18)	112 (75-112)
Steller's Jay	1	1	1	12 (12)	75 (75)
Pinyon Jay	V	V	0	0	0
Clark's Nutcracker	+	+	+	0	0
Black-billed Magpie	V	V	0	0	0
Common Raven	V	V	0	0	0
Mountain Chickadee	3	3	3	36 (36)	224 (224)
Common Bushtit	+	+	+	0	0
Red-breasted Nuthatch	1	1	1	12 (12)	75 (75)
White-breasted Nuthatch	1	+	.5	6 (0-12)	37 (0-75)
Pygmy Nuthatch	3	3	3	36 (36)	224 (224)
House Wren	1	1	1	12 (12)	75 (75)
Western Bluebird	.5	+	.5	6 (0-6)	37 (0-37)
Townsend's Solitaire	1.5	1.5	1.5	18 (18)	112 (112)
American Robin	+	+	+	0	0
Solitary Vireo	1	1	1	12 (12)	75 (75)
Virginia's Warbler	3	4	3.5	42 (36-48)	262 (225-300)
Yellow-rumped Warbler	V	V	0	0	0
Western Tanager	1.5	1	1.5	18 (12-18)	112 (75-112)
Black-headed Grosbeak	.5	.5	.5	6 (6)	37 (37)
Rufous-sided Towhee	7	6	6.5	77 (71-83)	486 (450-525)
Chipping Sparrow	V	V	0	0	0
Dark-eyed Junco	4.5	4	4.5	54 (48-54)	336 (300-336)
Brown-headed Cowbird	3	3	3	36 (36)	224 (224)
Pine Grosbeak	V	V	0	0	0
Cassin's Finch	V	V	0	0	0
Red Crossbill	V	V	0	0	0
Pine Siskin	V	V	0	0	0
Evening Grosbeak	V	V	0	0	0
	43.5	37.5	42	500 (446-518)	3139 (2813-3263)

[a]Ranges based on estimates by individual observers.

[b]Estimated total breeding pairs for GMSA based on 1,570 acres of available habitat.

V - Visitor to grid; too few registrations or one or no territorial registrations.

+ - Breeding species with part (but < 0.5) of territory on grid.

Eleven of these species were classified as visitors, four as partial breeders, and 21 as breeding species. Rufous-sided Towhees were the most numerous breeding species, while Dark-eyed Juncos, Mourning Doves, and Virginia's Warblers were also common. An estimated 42 breeding pairs of birds occurred on this grid, which converts to 500 breeding pairs/km^2 and an estimated 3,139 breeding pairs within the GMSA.

The Upland Forest Grid had the second highest density of breeding pairs (500/km^2) and the second highest diversity index (2.79) of the GMSA grids (Table 3-6). It also had the greatest number of breeding species (21). Though only 8.4% of the total area, it contributed 13.6% (3,139 pairs) of the estimated breeding pairs on the GMSA. The 3,139 breeding pairs was the third highest total, ranking the Upland Forest Habitat Site behind the Sagebrush/Grassland and Pinyon/Juniper Woodland Habitat Sites which have significantly more acreage.

As discussed in Section 2.0, this habitat site has characteristics of both the Pinyon/Juniper/Big Sagebrush Association and the Ponderosa Pine/Douglas Fir Association (USDA/SCS, 1978). Because of this vegetative mix in the Upland Forest Habitat Site, there is a paucity of comparable spot mapping studies. The most suitable comparison is between data from this grid and data from an isolated low elevation Ponderosa Pine/Douglas Fir stand in Colorado (Traynor 1983) and from logged and unaltered stands of the same species in Arizona (Franzreb 1977) (Table 3-11). Ponderosa Pine was the dominant tree in the Colorado study plot; Douglas Fir was dominant in both Arizona grids. The Upland Forest Grid overstory is a mixture of Douglas Fir and Ponderosa Pine (Section 2.0). The avian population in the Upland Forest Grid reflects this mixed canopy overstory; it had twice the number of total breeding species of the Colorado grid, but about half the number of total breeding species of the two Arizona grids. Seven of 12 (58%) Colorado breeding species were also breeders in the GMSA, while 17 of 21 (81%) GMSA species also bred in the logged Arizona grid and 19 of 21 (90%) GMSA species were present in the unaltered Arizona grid. Finally, the Upland Forest Grid's diversity index (2.79) was noticebly higher than that of the Colorado grid (2.25), and within the range of both Arizona grids (2.69-3.15; 2.76-3.19). In only one respect did the Upland Forest Grid vary from its mid-range position;

Table 3-11. A comparison of the 1985 GMSA census results on the Upland Forest Habitat Site with census results in similar habitats in Colorado and Arizona.

	This study	Colorado[a]	Arizona[b] Logged	Arizona[b] Unaltered
Grid Size (hectares)	8.4	7.5	15.5	15.5
(acres)	21.0	18.6	36.8	36.8
Breeding pairs/km^2	500	545	814	936
(range)[c]	(446-518)		(680-948)	(791-1082)
Total Breeding Species[d]	24	12	41	37
(range)			(30,36)	(28,34)
Breeding Species[e]	21	12	41	37
(range)			(30,40)	(28,34)
Breeding Species in common with this study[d]	-	7	19	17
All species observed[f]	36	21	45	42
(range)			(32,41)	(30,39)
Species in common with this study[f]	-	10	22	21
Diversity Index[g]	2.79	2.25	2.69,3.15	2.76,3.19
(range)				

[a]Traynor (1983); counts conducted in 1982.

[b]Franzreb (1977); counts conducted in 1973 and 1974.

[c]Ranges given for studies with multiple estimates (this study) or multiple years of data.

[d]Includes species with partial (< 0.5) territories on the grid.

[e]Includes species with $\geq$ 0.5 territories on the grid.

[f]Includes breeding species, partial breeders, and visitors.

[g]Calculated using breeding species ($\geq$ 0.5 territories) only; on the Arizona study, diversity indices are given for each year of the study.

it had the lowest density (500 pairs/km^2), though only slightly lower than that calculated for the Colorado grid (545 pairs/km^2). Breeding densities on both logged (814 pairs/km^2;2 year average) and unaltered Arizona grids (936 pairs/km^2 ; 2 year average) were noticeably higher than the density on the GMSA.

Wooded Canyon Benches Habitat Site

This habitat site contributes 1,720 acres (9.2%) of the total area on the GMSA. Thirty three species occurred on the Wooded Canyon Benches Grid (Table 3-12); a nine hectare (22.5 acre) grid. Twelve species were only visitors, one was a partial breeder, and 20 were breeding species. All 20 breeding species occurred in low (1-3.5 pairs on the grid) densities, though Chipping Sparrows, Violet-green Swallows, Pygmy Nuthatches, and Rock Wrens were the most numerous breeding species. The estimated densities are 35 breeding pairs on the grid, 378 pairs/km^2, and 2,602 pairs within the study area.

The Wooded Canyon Benches Habitat Site had the highest diversity index (2.88) of all the GMSA grids, though five other grids had indices within 20% of this grid (Table 3-6). Many species with approximately equal numbers result in the highest diversity indices (MacArthur and MacArthur 1961); this was the case with the Wooded Canyon Benches avian population (Table 3-12). This grid ranked fourth in density (378 breeding pairs/km^2), the GMSA average was 307 pairs/km^2. However, it ranked second in number of breeding species. Thus its avifauna can be summarized as diverse, but only occurring in moderate numbers.

Census data from truly comparable habitats could not be found in the literature.

Canyon Slopes Habitat Site

There are 1,690 acres (9.0%) on the study area that are part of the Canyon Slopes Habitat Site. Thirty eight species were recorded on the Canyon Slopes Grid (Table 3-13), an eight hectare (20 acre) grid. Fourteen species were visitors, eight species had territories partially on the grid, and 16

Table 3-12. Estimated breeding bird pairs on the Wooded Canyon Benches Grid.

Species	Observer # 1	Observer # 2	Observer Avg	No./ km^2(range)[a]	Total on GMSA(range)[b]
Turkey Vulture	V	V	0	0	0
Cooper's Hawk	V	V	0	0	0
White-throated Swift	V	V	0	0	0
Broad-tailed Hummingbird	2	+	1	11 (0-22)	77 (0-154)
Hairy Woodpecker	1	1	1	11 (11)	77 (77)
Northern Flicker	1	1	1	11 (11)	77 (77)
Dusky Flycatcher	1	1	1	11 (11)	77 (77)
Violet-green Swallow	3	3	3	33 (33)	230 (230)
Steller's Jay	V	V	0	0	0
Clark's Nutcracker	+	+	+	0	0
Common Raven	V	V	0	0	0
Mountain Chickadee	2	2	2	22 (22)	153 (153)
Plain Titmouse	2	2	2	22 (22)	153 (153)
Common Bushtit	1	1	1	11 (11)	77 (77)
Red-breasted Nuthatch	V	V	0	0	0
Pygmy Nuthatch	3	3	3	33 (33)	230 (230)
Rock Wren	2.5	3	2.5	28 (28-33)	191 (191-230)
Canyon Wren	1	2	1.5	17 (11-22)	115 (77-154)
House Wren	V	V	0	0	0
Ruby-crowned Kinglet	V	V	0	0	0
Western Bluebird	V	V	0	0	0
Townsend's Solitaire	1	1	1	11 (11)	77 (77)
American Robin	2	2	2	22 (22)	153 (153)
Solitary Vireo	1	1	1	11 (11)	77 (77)
Black-throated Gray Warbler	V	V	0	0	0
Virginia's Warbler	3	3	3	33 (33)	230 (230)
Western Tanager	1	1	1	11 (11)	77 (77)
Green-tailed Towhee	1	1	1	11 (11)	77 (77)
Rufous-sided Towhee	1.5	1	1.5	17 (11-17)	115 (77-115)
Chipping Sparrow	4	3	3.5	39 (33-44)	268 (230-308)
Brown-headed Cowbird	1	1	1	11 (11)	77 (77)
Cassin's Finch	V	V	0	0	0
Red Crossbill	V	V	0	0	0
Breeding Pairs	35	33	34	378 (366-389)	2602 (2541-2695)

[a]Range based on estimates by individual observers.

[b]Estimated total breeding pairs for GMSA based on 1,720 acres of available habitat.

V - Visitor to grid; too few registrations or one or no territorial registrations.

+ - Breeding species with part (but < 0.5) of territory on grid.

Table 3-13. Estimated breeding bird pairs on the Canyon Slopes Grid.

Species	Observer # 1	Observer # 2	Avg	No./ km^2(range)[a]	Total on GMSA(range)[b]
Canada Goose	V	V	0	0	0
Turkey Vulture	V	V	0	0	0
Mourning Dove	2	2	2	25 (25)	150 (150)
Great Horned Owl	V	V	0	0	0
White-throated Swift	V	V	0	0	0
Broad-tailed Hummingbird	3	1	2	25 (13-36)	150 (75-225)
Northern Flicker	+	+	+	0	0
Western Wood-Pewee	4	4	4	50 (50)	301 (301)
Dusky Flycatcher	3	3	3	38 (38)	226 (226)
Say's Phoebe	1	1	1	13 (13)	75 (75)
Violet-green Swallow	+	+	+	0	0
Pinyon Jay	+	+	+	0	0
Clark's Nutcracker	+	+	+	0	0
Black-billed Magpie	V	V	0	0	0
Common Raven	+	+	+	0	0
Mountain Chickadee	V	V	0	0	0
Plain Titmouse	V	V	0	0	0
Common Bushtit	V	V	0	0	0
Rock Wren	2.5	3	2.5	31 (31-38)	188 (188-225)
House Wren	3	3	3	38 (38)	226 (226)
Ruby-crowned Kinglet	V	V	0	0	0
Western Bluebird	V	V	0	0	0
Mountain Bluebird	V	V	0	0	0
Townsend's Solitaire	1	1	1	13 (13)	75 (75)
American Robin	2	2	2	25 (25)	150 (150)
Solitary Vireo	1	1	1	13 (13)	75 (75)
Warbling Vireo	+	+	+	0	0
Virginia's Warbler	2	2	2	25 (25)	150 (150)
Yellow Warbler	2.5	2.5	2.5	31 (31)	188 (188)
Yellow-breasted Chat	1	1	1	13 (13)	75 (75)
Western Tanager	+	+	+	0	0
Green-tailed Towhee	2	2	2	25 (25)	150 (150)
Rufous-sided Towhee	5	4	4.5	56 (50-63)	338 (300-375)
Dark-eyed Junco	+	V	+	0	0
Brewer's Blackbird	V	V	0	0	0
Brown-headed Cowbird	3	3	3	38 (38)	226 (226)
Cassin's Finch	V	V	0	0	0
Red Crossbill	V	V	0	0	0
	38	35.5	36.5	457 (444-475)	2745 (2673-2861)

[a]Range based on estimates of individual observers.

[b]Estimated total breeding pairs for GMSA based on 1,690 acres of available habitat.

V - Visitor to grid; too few territorial registrations.

+ - Breeding species with part (but < 0.5) of territory on grid.

were breeding species. Rufous-sided Towhees and Western Wood-Pewees were most common, followed by House Wrens and Dusky Flycatchers. Breeding pair density was estimated as 36.5 pairs on the grid, 457 pairs/km^2 and 2,745 pairs for the Canyon Slopes Habitat Site within the GMSA.

The Canyon Slopes Grid ranked third in density (457 breeding pairs/km^2), third in diversity index (2.67), and fifth in number of breeding species (16) (Table 3-6) . Since the ranges of the density estimates by the two observers for this habitat site and the Upland Forest Habitat Site (second in density) overlapped, their breeding populations appear quite comparable in size. Likewise, the diversity index was within 8% of the highest for the GMSA, Wooded Canyon Benches (2.88), which is not a discernable difference.

Density estimates for several species recorded within this habitat site are probably artificially high due to the grid location. This habitat site is restricted to narrow, steep canyon slopes. To establish a grid of appropriate size and accessibility, the western border of the grid was the shoreline of the Rio Grande. This shoreline contains more and taller trees than the rest of the grid. This vegetation and its close proximity to the river concentrated birds within the grid, especially the Yellow Warbler and the Yellow-breasted Chat. Since these species were restricted to the thin belt of riparian vegetation, extrapolating their grid populations to the entire 1,690 acres of the Canyon Slopes Habitat Site, much of which is unsuitable habitat for them, probably overestmates their GMSA populations (Table 3-13).

Townsend's Solitaires were recorded as breeding species in this and the preceeding two habitat sites. Most individuals recorded exhibiting breeding behavior were documented in April and early May; only on the Wooded Canyon Benches grid were Townsend's Solitaires seen after early May. We assume that most Townsend's Solitaires moved to higher elevations, i.e., the nearby Sangre de Cristo Range, to nest. Although GMSA estimates do not reflect true breeding densities for this species on the study area, they do reflect the availability of this species to Peregrine Falcons during April and early May.

Census data from truly comparable habitats could not be found in the literature.

Agricultural Lands Habitat Site

Only 420 acres (2.2%) of the GMSA was in the Agricultural Lands Habitat Site. There were 24 species of birds recorded on this grid; 16 species were visitors and the remaining eight were breeding species. Western Meadowlarks were the most obvious and numerous grid residents. There were an estimated 7 breeding pairs on the grid, 88 pairs/km^2, and 147 pairs for the habitat site within the GMSA (Table 3-14).

The Agricultural Lands Habitat Grid had the lowest breeding density (88 pairs/km^2) and contributed the smallest number of birds (147 pairs) to the overall breeding bird population of the GMSA (Table 3-6). It was also second lowest in number of breeding species (8) and in diversity index (1.95). Its diversity index fell midway between those of the the five habitats with the highest indices (2.34-2.88) and the habitat with the lowest index (Sagebrush/Grassland, 1.43).

This habitat site was vegetatively similar to two grids in alfalfa fields in North Dakota (Fleckenstein and Mack 1981). One of these fields was an alfalfa monoculture; the other contained clumps of shrubs and rockpiles. The grid with shrub islands had a higher density of breeding birds and a higher diversity index than the alfalfa monoculture (Table 3-15). The GMSA grid had scattered trees and fence rows and was close to a stand of Pinyon/Juniper Woodland and an abandoned building. Not surprisingly, it had higher values than the alfalfa monoculture for all paramaters (Table 3-15), but lower values than the more diverse alfalfa hayland with shrub clumps. However, the overlap in breeding species and all species observed between the GMSA grid and the North Dakota grids was low. North Dakota has a noticeably different avifauna, with strong northern and eastern influences, from that of nothern New Mexico. No comparable study sites, however, could be found nearer to New Mexico and the overall comparisons were deemed appropriate.

Riparian Habitat Site

This habitat site has the lowest acreage (90 acres) on the GMSA. There were 37 species recorded on the Riparian grid; 16 species were visitors, two

Table 3-14. Estimated breeding bird pairs on the Agricultural Lands Grid.

Species	Observer # 1	Observer # 2	Avg	No./ km^2(range)[a]	Total on GMSA(range)[b]
American Kestrel	V	V	0	0	0
Rock Dove	V	V	0	0	0
Band-tailed Pigeon	V	V	0	0	0
Mourning Dove	V	V	0	0	0
Broad-tailed Hummingbird	1	+	.5	6 (0-13)	11 (0-21)
Barn Swallow	.5	.5	.5	6 (6)	11 (11)
Black-billed Magpie	1	1	1	13 (13)	21 (21)
Common Raven	V	V	0	0	0
American Crow	V	V	0	0	0
Black-capped Chickadee	V	V	0	0	0
Western Bluebird	V	V	0	0	0
American Robin	V	V	0	0	0
Water Pipit	V	V	0	0	0
European Starling	.5	.5	.5	6 (6)	11 (11)
Yellow-rumped Warbler	V	V	0	0	0
Chipping Sparrow	1	1	1	13 (13)	21 (21)
Vesper Sparrow	1	1	1	13 (13)	21 (21)
Song Sparrow	V	V	0	0	0
Red-winged Blackbird	V	V	0	0	0
Western Meadowlark	2	2	2	25 (25)	42 (42)
Brewer's Blackbird	1	+	.5	6 (0-13)	11 (0-21)
Brown-headed Cowbird	V	V	0	0	0
Pine Siskin	V	V	0	0	0
American Goldfinch	V	V	0	0	0
Breeding Pairs	8	6	7	88 (78-104)	147 (127-169)

[a]Range based on estimates by individual observers.

[b]Estimated total breeding pairs for GMSA based on 420 acres of available habitat.

V - Visitor to grid; too few territorial registrations or observations.

+ - Breeding species with part (but < 0.5) of territory on grid.

Table 3-15. A comparison of the 1985 census results on the Agricultural Lands Habitat Site with census results in similar habitats North Dakota.

	This Study	North Dakota[a] Alfalfa Hayland	North Dakota[a] Alfalfa Hayland with shrub clumps
Grid Size (hectares)	8.0	16.2	10.8
(acres)	20.0	40.0	26.7
Breeding pairs/km^2	88	56	218
(range)[b]	(78-104)		
Total Breeding Species[c]	8	4	12
Breeding Species[d]	8	4	12
Breeding Species in common with this study[c]	-	1	2
All species observed[e]	23	15	31
Species in common with this study[e]	-	6	8
Diversity Index[f]	1.95	1.31	2.18

[a]Fleckenstein and Mack (1981); counts conducted in 1980.

[b]Ranges given for the multiple estimates (this study).

[c]Includes species with partial (< 0.5) territories on the grid.

[d]Includes species with $\geq$ 0.5 territories on the grid.

[e]Includes breeding species, partial breeders, and visitors.

[f]Calculated using breeding species ($\geq$ 0.5 territories) only.

were partial breeders, and 19 were breeding species (Table 3-16). Cliff Swallows and Yellow Warblers were by far the most abundant breeding species on the grid, while Song Sparrows, Western Wood-Pewees, and American Robins were also common. Density estimates are 79.5 breeding pairs on the grid, 723 pairs/km^2, and 260 pairs for the habitat within the GMSA.

The Riparian Habitat Site had the highest density of breeding pairs (723/km^2) on the GMSA. Though it had the highest density, the small amount of riparian habitat supported an estimated population of only 260 breeding pairs, 1.1% of the GMSA total (Table 3-5). The Riparian Grid also had the third highest number of breeding species (19), and the fifth highest diversity index (2.34). Diversity indices are highest when all species have approximately equal numbers (MacArthur and MacArthur 1961). Conversely, when a few species are much higher (or lower) than the others, it decreases the diversity index. This is the effect that high breeding populations of Yellow Warblers and Cliff Swallows on the Riparian Grid had upon its diversity index. Still, it was within 20% of the highest calculated diversity index, 2.88 on the Wooded Canyon Benches Grid, on the GMSA.

The population density (723 pairs/km^2) on the Riparian Grid was comparable to 873 pairs/km^2 in a mixed mesophytic canyon bottom in western New Mexico (Price and McCallum 1978, McCallum 1979). However, this two year study reported twice the number of breeding species and 1.7 times the number of total species observed. Their diversity indices, especially in the second year of the study (3.15), were noticeably higher than that of the GMSA riparian grid (2.34) (Table 3-17). It appears from the grid description that a significant amount of Ponderosa Pine forest was part of the mesophytic grid (Sheppard 1959), providing more habitat variety and thereby significantly increasing the number of breeding species, though not the number of breeding pairs. This premise was confirmed by McCallum (pers. comm. 1985).

Mill Tailings Habitat Site

An additional 800 acres (4.3%) of the study area were characterized as mill tailings (Appendix A). This area included open water, exposed wet and dry tailings, dams, dikes, roads, and interspersed areas of native vegetation,

Table 3-17. A comparison of the 1985 census results on the Riparian Habitat Site with census results from a similar habitat in western New Mexico.

	This Study	Western New Mexico Mixed Mesophytic Canyon Bottom[a]
Grid Size (hectares)	11.3	12.2
(acres)	28.3	30.1
Breeding pairs/km^2	726	873
(range)[b]	(701-751)	(861-885)
Total Breeding Species[c]	21	41
(range)		(35,33)
Breeding Species[d]	19	41
(range)		(35,29)
Breeding Species in common with this study[c]	-	12
All species observed[e]	37	55
(range)		(51, ?)
Species in common with this study[e]	-	15
Diversity Index[f]	2.34	2.69,3.15
(range)		

[a]Price and McCallum (1978), McCallum (1979); counts conducted in 1977 and 1978.

[b]Ranges given for multiple estimates (this study) of multiple years of data.

[c]Includes species with partial (< .5) territories on the grid.

[d]Includes only species with $\geq$ .5 territories on the grid.

[e]Includes breeding species, partial breeders, and visitors.

[f]Calculated using breeding species ($\geq$ .5 territories) only.

? - visitors given for only one year.

Table 3-16. Estimated breeding bird pairs on the Riparian Grid.

Species	Observer # 1	Observer # 2	Avg	No./ km^2 (range)[a]	Total on GMSA (range)[b]
Common Merganser	V	V	0	0	0
Turkey Vulture	V	V	0	0	0
Osprey	V	V	0	0	0
White-throated Swift	V	V	0	0	0
Broad-tailed Hummingbird	3	+	1.5	14 (0-27)	5 (0-10)
Western Wood-Pewee	4.5	5	4.5	41 (41-46)	15 (15-16)
Empidonax sp.	3	2	2.5	23 (18-27)	8 (7-10)
Say's Phoebe	V	V	0	0	0
Violet-green Swallow	+	+	+	0	0
Cliff Swallow	20	20	20	182 (182)	66 (66)
Steller's Jay	.5	1	.5	5 (5-9)	2 (2-3)
Clark's Nutcracker	V	V	0	0	0
Black-billed Magpie	V	V	0	0	0
Common Raven	V	V	0	0	0
Black-capped Chickadee	1	1	1	9 (9)	3 (3)
Rock Wren	+	+	+	0	0
House Wren	2	1	1.5	14 (9-18)	5 (3-7)
American Dipper	3.5	4.5	4	36 (32-41)	13 (12-15)
Ruby-crowned Kinglet	V	V	0	0	0
Townsend's Solitaire	1.5	1	1.5	14 (9-14)	5 (3-5)
Veery	V	V	0	0	0
American Robin	5.5	4	4.5	41 (36-50)	15 (13-18)
Gray Catbird	V	V	0	0	0
Warbling Vireo	1	1	1	9 (9)	3 (3)
Virginia's Warbler	.5	+	.5	5 (0-5)	2 (0-2)
Yellow Warbler	18	18.5	18.5	168 (164-168)	61 (59-61)
Yellow-breasted Chat	2	2	2	18 (18)	7 (7)
Western Tanager	2	1	1.5	14 (9-18)	5 (3-7)
Blue Grosbeak	V	V	0	0	0
Lazuli Bunting	V	V	0	0	0
Green-tailed Towhee	1	+	.5	5 (0-9)	2 (0-2)
Song Sparrow	5.5	8	6.5	59 (50-73)	21 (18-26)
White-crowned Sparrow	V	V	0	0	0
Dark-eyed Junco	2	1	1.5	14 (9-18)	5 (3-7)
Brewer's Blackbird	6	6	6	55 (55)	20 (20)
Brown-headed Cowbird	V	V	0	0	0
Cassin's Finch	V	V	0	0	0
Breeding Pairs	82.5	77	79.5	723 (701-751)	260 (254-272)

[a]Range based on estimates of individual observers.

[b]Estimated total breeding pairs for GMSA based on 90 acres of available habitat.

V - Visitor to grid; too few territorial registrations.

+ - Breeding species with part (but < 0.5) of territory on grid.

principally Pinyon/Juniper Woodland and Sagebrush/Grassland stringers. The Agricultural Lands Grid was selected for sampling rather than a tailings site because the Agricultural Lands Habitat Site is assumed to reflect a reclaimed mill tailings site. It was also not physically possible to establish or census a spot-mapping grid on mill tailings due to the extent of open water nor does the spot-mapping method adequately census most waterbirds (IBCC 1970). However, qualitative data were collected on bird use of the Mill Tailings Habitat Site.

Species observed within the islands of Pinyon/Juniper Woodland and Sagebrush/Grassland were typically the same as those seen on the grids in those habitat sites. Waste areas and edges were favored by Mountain Bluebirds and Say's Phoebes. Open water attracted 37 species of ducks, shorebirds, and aerial insect feeders (Table 3-18), some of which were abundant for short periods during spring migration. Large flocks of Cliff Swallows and Violet-green Swallows fed extensively over the water, though these species nested in other habitat sites. White-throated Swifts also fed over tailings ponds, but were much less common than the swallows. Mallards, Killdeer, Spotted Sandpipers, Brewer's Blackbirds, and Red-winged Blackbirds all were breeding species associated with the open water.

Discussion

The Avian Prey Population of the Study Area

There were 85 avian species recorded on spot mapping grids during the spring of 1985. Population estimates were generated for 50 (60%) of these species for the GMSA from the spot mapping data (Table 3-19). Population estimates range from a low of 3 breeding pairs each of Black-capped Chickadees and Warbling Vireos to 1,802 breeding pairs of Black-throated Gray Warblers. Because we had only a single sample for each habitat site, it was not possible to determine confidence limits for these population estimates. However, ranges are provided by the independent estimates made by the two observers. The total estimated breeding population of the 50 species on the GMSA in 1985 is 23,048 pairs (range of estimates: 20,525 (-11%) to 24,731 (+7.3%)) (Table 3-19). This is an average of 1.23 breeding pairs/acre for the entire GMSA.

Table 3-18. Species of birds recorded in association with water areas on the Mill Tailings Habitat Site.

	Abundance[a]	Status[b]
Eared Grebe	U	T
White-faced Ibis	U	T
Green-winged Teal	C	T
Mallard	C	T
Blue-winged Teal	C	T
Cinnamon Teal	U	T
Northern Shoveler	C	T
Gadwall	C	T
American Wigeon	C	T
Redhead	C	T
Ring-necked Duck	C	T
Lesser Scaup	C	T
Hooded Merganser	C	T
Common Merganser	C	T
Ruddy Duck	C	T
American Coot	C	T
Semi-palmated Sandpiper	U	T
Killdeer	C	SR
American Avocet	C	T
Greater Yellowlegs	U	T
Willet	U	T
Spotted Sandpiper	C	SR
Marbled Godwit	U	T
Long-billed Dowitcher	U	T
Common Snipe	U	T
Wilson's Phalarope	C	T
Ring-billed Gull	C	SR
White-throated Swift	A	SR
Tree Swallow	C	T
Violet-green Swallow	A	SR
Northern Rough-winged Swallow	C	T
Cliff Swallow	A	SR
Barn Swallow	C	SR
Mountain Bluebird	C	SR
Water Pipit	A	T
Yellow-rumped Warbler	A	T
Red-winged Blackbird	U	SR
Brewer's Blackbird	C	SR

[a]Abundance Categories
- A - species is almost always seen in large numbers.
- C - species is usually seen in numbers in suitable habitat.
- U - species is not often seen but is not out of range.
- R - species is very infrequently seen in the study area or is out of normal range.

[b]Status Categories
- SR - species occurs principally as a summer resident.
- T - species occurs principally during periods of spring or fall migration; or a wandering species.

Table 3-19. Population estimates for breeding species on the Guadalupe Mountain Study Area, 1985.

	Habitat Sites							
	Sage-brush/ Grass-land	Pinyon/ Juniper Wood-land	Upland Forest	Wooded Canyon Benches	Canyon Slopes	Agri-cultural Lands	Ri-parian	Totals (Range)
Canada Goose					V			A[a]
Common Merganser							V	A
Turkey Vulture				V	V		V	A
Osprey							V	A
Cooper's Hawk				V				A
American Kestrel	+					V		A
Rock Dove						V		A
Band-tailed Pigeon						V		A
Mourning Dove	V	277	262		150	V		689 (652-689)
Great Horned Owl					V			A
Northern Saw-whet Owl			V					A
Common Nighthawk	V	V						A
White-throated Swift	V	V		V	V		V	B
Broad-tailed Hummingbird	278	277	112	77	150	11	5	910 (75-1,429)
Hairy Woodpecker		139	75	77				291 (291-291)
Northern Flicker		139	75	77	+			291 (291-291)
Olive-sided Flycatcher			V					A
Western Wood-Pewee					301		15	316 (316-317)
Empidonax spp.							8	8 (7-10)
Gray Flycatcher		139						139 (139-277)
Dusky Flycatcher			112	77	226			415 (415-415)
Say's Phoebe					75			75 (75-75)
Ash-throated Flycatcher		139						139 (139-139)
Horned Lark	V							
Violet-green Swallow	V	277	112	230	V		V	619 (619-619)
Cliff Swallow							66	66 (66-66)
Barn Swallow						11		11 (11-11)
Steller's Jay		V	75	V			2	77 (77-78)

Table 3-19. (Continued).

	Habitat Sites							
	Sage-brush/ Grass-land	Pinyon/ Juniper Wood-land	Upland Forest	Wooded Canyon Benches	Canyon Slopes	Agri-cultural Lands	Ri-parian	Totals (Range)
Scrub Jay		+						C
Pinyon Jay	+	+	V		+			C
Clark's Nutcracker		+	+	+	+			C
Black-billed Magpie			V		V	21	V	21 (21-21)
American Crow		V						C
Common Raven	V		V	V	V	V	V	C
Black-capped Chickadee						V	3	3 (3-3)
Mountain Chickadee		832	224	153	V			1209 (1,209-1,209)
Plain Titmouse		1525		153	V			1678 (1,678-1,815)
Common Bushtit		V	V	77				77 (77-77)
Red-breasted Nuthatch		139	75					214 (75-352)
White-breasted Nuthatch		277	37					314 (277-352)
Pygmy Nuthatch		416	224	230				870 (731-870)
Rock Wren				191	188		+	379 (379-455)
Canyon Wren				115				115 (77-154)
House Wren			75	V	226		5	306 (304-308)
American Dipper							13	13 (12-15)
Ruby-crowned Kinglet		V			V		V	
Western Bluebird	V	277	37		V	V		314 (314-314)
Mountain Bluebird	139	V			V			139 (0-139)
Townsend's Solitaire		V	112	77	75		5	269 (267-269)
Veery							V	
American Robin	V	V	+	153	150	V	15	318 (316-321)
Gray Catbird							V	
Sage Thrasher	V							A
Water Pipit						V		M
European Starling						11		11
Solitary Vireo		139	75	77	75			366 (336-366)

Table 3-19. (Continued).

	Habitat Sites							
	Sage-brush/ Grass-land	Pinyon/ Juniper Wood-land	Upland Forest	Wooded Canyon Benches	Canyon Slopes	Agri-cultural Lands	Ri-parian	Totals (Range)
Warbling Vireo							3	3 (3-3)
Virginia's Warbler			262	230	150		2	644 (605-680)
Yellow Warbler					188		61	249 (247-249)
Yellow-rumped Warbler			V			V		M
Black-throated Gray Warbler		1802						1802 (1,662-1,802)
Townsend's Warbler		V				V		M
Yellow-breasted Chat					75		7	82 (82-82)
Western Tanager			112	77	+		5	194 (155-196)
Black-headed Grosbeak			37					37 (37-37)
Blue Grosbeak						V	V	A
Lazuli Bunting						V	V	A
Green-tailed Towhee	139			77	150		2	368 (227-368)
Rufous-sided Towhee		139	486	115	338			1078 (966-1,154)
Chipping Sparrow	+	554	V	268		21		843 (805-883)
Brewer's Sparrow	1252							1252 (1,112-1,252)
Vesper Sparrow	1530					21		1551 (1,411-1,829)
Sage Sparrow	1669							1669 (1,669-1,669)
Song Sparrow							21	21 (18-26)
Dark-eyed Junco		693	336		V		5	1034 (857-1,036)
Red-winged Blackbird	V							A
Western Meadowlark	+					42		42 (42-42)
Brewer's Blackbird	V				V	11	20	31 (20-41)
Brown-headed Cowbird		970	224	77	226			1497 (1,358-1,635)
Pine Grosbeak			V					C
Cassin's Finch		V	V	V	V			C
Red Crossbill		+	V	V	V			C
Evening Grosbeak			V					C

Table 3-19. (Concluded).

	Habitat Sites								
	Sage-brush/ Grass-land	Pinyon/ Juniper Wood-land	Upland Forest	Wooded Canyon Benches	Canyon Slopes	Agri-cultural Lands	Ri-parian	Totals	(Range)
Pine Siskin		V						C	
American Goldfinch								C	
	5,006	9,149	3,139	2,602	2,745	147	260	23,048	(20,525-24,731)

[a] A = probable breeding species on study area, but density could not be determined from spot mapping data.

B = colonial nestin species. Populations not accurately measured by spot mapping.

C = flocking, calling, mobile, species; corvids and finches. Difficult to census with spot mapping method.

M = Migrant.

V = Visitor to grid; too few territorial registrations or observations to quantify.

+ = Breeding species with part (but < 0.5) of territory on grid.

Many species of birds were found breeding on more than one grid (Table 3-19). To better understand this phenomonen, the percentage of overlap in breeding species between each pair of grids was calculated using the equation

$$P = \frac{C}{A + B - C}$$

where

P = percent overlap,

C = number of species in common between Habitats A and B,

A = number of species in Habitat A, and

B = number of species in Habitat B.

A total of 21 comparisons were made (Table 3-20). A natural break in the data occurred between 30 and 40 percent. Two thirds (14) of the paired grids had minor ($\leq$ 30.0%) amounts of breeding species overlap. In the remaining seven grids, percent overlap was considered moderate (40.0%$\leq$ P $\leq$ 66.6%)). Six of the seven cases of moderate breeding species overlap were between structurally similar habitats. Five cases were among the four grids (Pinyon/Juniper Woodland, Upland Forest, Wooded Canyon Benches, and Canyon Walls) that were moderately to extensively wooded (Table 3-20). The greatest overlap was between Pinyon/Juniper Woodland and Upland Forest (66.6%), the least was between Pinyon/Juniper Woodland and Wooded Canyon Benches (44.4%). The treeless Sagebrush/Grassland Grid and the nearly treeless Agricultural Lands Grid had 40.0% breeding species overlap. In the last case of moderate breeding species overlap, the Riparian Grid shared 45.8% of its breeding species, largely because of the previously discussed shoreline vegetation present in the latter grid.

Spot mapping does not provide valid estimates of numbers of mobile, flocking, and calling species, such as corvids and late nesting finches. Eleven species of corvids and finches were recorded on grids, sometimes in large flocks, but population estimates could not be made for these species (Table 3-19). White-throated Swifts, obviously abundant over the canyons most of the day, were only visitors on the spot mapping grids. Cliff Swallows, another colonial nester, were probably underestimated. However, density estimates for the Townsend's Solitaire, Yellow Warbler, and Yellow-breasted Chat were probably overstimated (see Canyon Slopes Habitat Site in Results for

Table 3-20. Percent overlap in breeding species composition between the seven habitat sites censused during 1985 on the GMSA.

	Habitat Sites						
	Sage-brush/ Grass-land	Pinyon/ Juniper Wood-land	Upland Forest	Wooded Canyon Benches	Canyon Slopes	Agri-cultural Lands	Ri-parian
Sagebrush/ Grassland	——	08.7	03.8	13.0	15.8	40.0	08.7
Pinyon/Juniper Woodland	——	——	66.6	44.4	29.7	08.0	05.5
Upland Forest	——	——	——	57.7	54.2	03.6	25.0
Wooded Canyon Benches	——	——	——	——	56.5	07.7	21.9
Canyon Slopes	——	——	——	——	——	04.3	45.8
Agricultural Lands	——	——	——	——	——	——	03.8
Riparian	——	——	——	——	——	——	——

detailed discussion). Overall, we believe that the breeding population of the GMSA is larger than the estimate given above, although it is not possible to estimate how much larger it actually is.

Availability of Prey to Peregrine Falcons

Twenty five species of prey known to be utilized by Peregrine Falcons in Colorado and northern New Mexico were encountered on spot mapping grids (Table 3-21. Those species frequently found in eyries are designated in Table 3-21 as Frequent Peregrine Prey, those species sometimes found in eyries or those that, because of their habits and habitats, are probably taken by Peregrine Falcons (Enderson et. al., 1982; Dr. John Hubbard, New Mexico Department of Game and Fish, personal communication 1985) are designated as Available Peregrine Prey in Table 3-21.

There are 13 species of Frequent Prey in Table 3-21. Population estimates have been calculated for nine of these species. Their total estimated breeding population is 2,334 pairs, or approximately 10% of the GMSA's estimated breeding population. The other four Frequent Prey species are White-throated Swifts, Clark's Nutcrackers, Pine Siskins, and Red-winged Blackbirds. The first three species were frequently observed in the GMSA, but we have no estimate of their populations since spot mapping did not adequately sample their numbers.

There are 12 species of Available Prey in Table 3-21. Seven of these species have an estimated total breeding population of 2,651 pairs, or again about 10% of the study area's estimated population. Three of the remaining five species, Red Crossbills, Evening Grosbeaks, and Pinyon Jays were commonly encountered on the GMSA but their numbers could not be estimated by spot mapping. Common Nighthawks occurred on the GMSA, but did not appear to be very numerous. The fifth species, Yellow-rumped Warblers, did not appear to breed on the GMSA, but were abundant migrants on the Mill Tailings Habitat Site in mid-May (Table 3-18).

The Frequent and Available Prey found on the GMSA are not uniformly distributed among the seven sampled habitat types. Sagebrush/Grassland, the

Table 3-21. Population estimates for potential Peregrine Falcon prey breeding species on the Guadalupe Mountain Study Area, 1985.

	Habitat Sites							
	Sage-brush/ Grass-land	Pinyon/ Juniper Wood-land	Upland Forest	Wooded Canyon Benches	Canyon Slopes	Agri-cultural Lands	Ri-parian	Totals (Range)
Frequent Peregrine Prey[a]								
Mourning Dove	V	277	262		150	V		689 (652-689)
White-throated Swift	V	V		V	V		V	B
Northern Flicker		139	75	77	+			291 (291-291)
Violet-green Swallow	V	277	112	230	V		V	619 (619-619)
Clark's Nutcracker		+	+	+	+			C
Mountain Bluebird	139	V			V			139 (0-139)
American Robin	V	V	+	153	150	V	15	318 (316-321)
European Starling						11		11
Western Tanager			112	77	+		5	194 (155-196)
Red-winged Blackbird	V							A
Western Meadowlark	+					42		42 (42-42)
Brewer's Blackbird	V				V	11	20	31 (20-41)
Pine Siskin		V						C
Subtotals	139	693	561	537	300	64	40	2,334 (2,095-2,338)

Table 3-21. (Continued).

	Habitat Sites							
	Sage-brush/ Grass-land	Pinyon/ Juniper Wood-land	Upland Forest	Wooded Canyon Benches	Canyon Slopes	Agri-cultural Lands	Ri-parian	Totals (Range)
Available Peregrine Prey[b]								
Common Nighthawk	V	V						
Western Wood-Peewee					301		15	316 (316-317)
Say's Phoebe					75			75 (75-75)
Cliff Swallow							66	66 (66-66)
Steller's Jay		V	75	V			2	77 (77-78)
Pinyon Jay	+	+	V		+			C
Western Bluebird	V	277	37		V	V		314 (314-314)
Townsend's Solitaire		V	112	77	75		5	269 (267-269)
Yellow-rumped Warbler			V			V		M
Black-headed Grosbeak			37					37 (37-37)
Brown-headed Cowbird		970	224	77	226			1497 (1,358-1,635)
Red Crossbill		+	V	V	V			C
Evening Grosbeak			V					C
Subtotals	0	1,247	485	154	677	0	88	2,651 (2,510-2,791)
Totals	139	1,940	1,046	691	977	64	128	4,985 (4,605 5,129)

Table 3-21. (Concluded).

[a]Frequent Peregrine Prey = prey often found in Peregrine Falcon nests (Enderson, et. al. 1982; John Hubbard, New Mexico Department of Game and Fish, personal communication 1985).

[b]Available Peregrine Prey = prey sometimes found in Peregrine Falcon nests and usually available in the vicinity of their nests (Enderson, et. al. 1982; John Hubbard, New Mexico Department of Game and Fish, personal communication 1985)

A = probable breeding species on study area, but density could not be determined from spot mapping data.

B = colonial nesting species. Populations not accurately measured by spot mapping.

C = flocking, calling, mobile, species; corvids and finches. Difficult to census with spot mapping method.

M = Migrant.

V = Visitor to grid; too few territorial registrations or observations to quantify.

+ = Breeding species with part (but < 0.5) of territory on grid.

second largest habitat type on the GMSA, contributed few breeding pairs in either category. The Agricultural and Riparian Habitat Sites, the smallest in size on the GMSA, also contributed few Preferred or Available Peregrine Prey. Thus the wooded and canyon habitat sites provide the majority of the habitat for most of the species that are probably taken as prey by hunting Peregrine Falcons (Table 3-21).

Based on these estimates, there were at least 5,000 breeding pairs of Frequent or Available Peregrine Prey plus their offspring present in the GMSA during the spring of 1985. In addition, there were numerous land and water birds (Table 3-18) passing through or stopping for short periods within the study area. Finally, there are the colonial nesting and flocking species that could not be quantified by spot mapping. This would appear to be a quite adequate prey base to support a local nesting population of Peregrine Falcons. The quality of that prey base is further examined in the following section.

4.0 ORGANOCHLORINE ANALYSIS OF AVIAN PREY

During the last two decades, considerable study has been given to population declines in Peregrine Falcons and other raptors, particularly those feeding on fish or insectivorous birds. Mounting evidence suggests that the primary stress factor is contamination with certain chlorinated hydrocarbons (Wiemeyer and Porter 1970; Cade et al. 1971; Porter and Wiemeyer 1972; Snyder et al. 1973; Peakall 1976; Enderson et al. 1982; Henny et al. 1982; Mendenhall et al. 1983; Springer et al. 1984).

Clark and Krynitsky (1983) recently found large areas of DDT contamination in New Mexico with probable harmful effects to wildlife. Their data indicate a portion of the observed residue levels may be from heavy agricultural use of DDT before it was banned in 1972. However, some of the data indicate there may still be illegal useage of DDT in New Mexico.

Due to the potential threat to Peregrine Falcons from pesticide contamination and the potential impacts the proposed Guadalupe Mountain mill tailings site may have on the prey of local breeding Peregrine Falcons, the BLM funded this study of the organochlorine (OCL) residues in the Peregrine Falcon avian prey species currently nesting on the GMSA. The focus of this portion of the study was to: 1) evaluate the "quality" of local avian prey; 2) evaluate the potential impact the proposed mill tailings site may have on local breeding Peregrine Falcons by creating new habitat for potentially comtaminated prey species, e.g., migratory shorebirds, and reducing the numbers of avian prey with negligible OCL contamination; and 3) provide baseline data for future monitoring programs of environmental pollutant levels in the GMSA.

Methods

Collecting was conducted during the same field visits used to census breeding birds (Section 3.0; Methods). Specimens were collected with 12 and 20 guage shotguns and strategically placed mist nets after completion of early morning censuses. A total of 316 individuals of 35 potential prey species were collected. No specimens were collected within 1/4 mile of any census

grid nor more than one mile outside the study area boundaries. Between two and 20 specimens of each of the 35 species were collected. The species collected were chosen based on the following criteria:

- those species, based on a review of the literature and Eagle Environmental's experience with avian communities in northern New Mexico, that are abundant in the different habitat types on the study area and are considered preferred prey of local Peregrine Falcons;
- those species known to be common prey of local Peregrine Falcons based on prey remains data and observations of hunting behavior collected in other investigations (John Hubbard, New Mexico Department of Game and Fish, personal communication 1985); and
- those species found to be abundant during initial spot mapping censuses, assuming the abundant species incur a higher rate of predation.

Freshly collected specimens were prepared for analysis (skinned with bills, wings, GI tract, and legs removed), labeled, wrapped in foil, and frozen for shipment to Hazleton Raltech, Inc., Madison, Wisconsin. A specimen collection log was maintained and each bird collected was individually recorded. Information recorded included species, date, habitat site, and legal description (to 1/4 section) of the collection site. The completed log was submitted to the Taos Area Office, BLM, with this report.

The individuals of each species were homogenized as a pool, resulting in one pooled sample per species. The number of individuals within each pool are presented in Table 4-1. Each sample was analyzed for percent lipid composition and concentrations of the following OCL compounds: p,p'DDE (DDE), p,p'DDD (DDD), p,p'DDT (DDT), polychlorinated biphenyls (PCBs), dieldrin, alpha-benzene hexachloride, hexachloro benzene, endrin, heptachlor epoxide, mirex, toxaphene, and oxychlordane. The analysis methods are described in detail in Heath and Hill (1974) and are summarized below.

A 40-g aliquot of each pool was allowed to dry, mixed with anhydrous sodium sulfate, and subjected to Soxhlet extraction with 300 ml of a 70:170 mixture of ethyl ether:petroleum ether for 8 hrs. The extract was eluted

Table 4-1. Organochlorine residue levels in pools of prey species available to Peregrine Falcons on the GMSA.

Category and Species	N[a]	% Lipid	Residues (ppm. wet weight) DDE	PCB[b]	Dieldrin	Other OCL[c]
Resident[e] Herbivore[f]						
Pinyon Jay	15	3.9	0.03	ND[d]	ND	0.03
Clark's Nutcracker	10	3.4	0.09	ND	ND	ND
Red Crossbill	10	7.2	0.02	ND	ND	ND
Pine Siskin	10	6.0	0.18	ND	0.01	ND
Weakly Migratory[g] Herbivore						
Mallard	5	6.5	0.10	ND	ND	ND
Mourning Dove	10	5.7	0.02	ND	ND	ND
Evening Grosbeak	10	4.7	<0.01	ND	0.01	ND
Strongly Migratory[h] Herbivore						
Vesper Sparrow	10	4.1	2.38	ND	ND	ND
Resident Omnivore						
Northern Flicker	10	4.5	0.06	ND	ND	<0.01
Steller's Jay	10	8.9	0.04	ND	ND	0.03
Black-billed Magpie	10	4.1	0.20	0.20	ND	0.03
European Starling	10	3.1	1.96	0.13	<0.01	0.02
Rufous-sided Towhee	10	3.6	0.07	ND	ND	ND
Weakly Migratory Omnivore[i]						
Horned Lark	10	3.8	0.17	ND	0.02	0.03
Townsend's Solitaire	3	5.5	0.06	ND	ND	ND
American Robin	10	5.9	1.56	ND	ND	0.14
Red-winged Blackbird	10	3.0	0.13	ND	ND	ND
Western Meadowlark	10	4.6	6.25	ND	ND	ND
Strongly Migratory Omnivore						
Blue-winged Teal	5	20.5	0.62	ND	0.02	0.09
Marbled Godwit	2	19.6	0.23	ND	0.01	0.02
Brewer's Blackbird	10	5.1	5.28	ND	<0.01	0.10
Brown-headed Cowbird	10	3.7	0.31	ND	<0.01	0.04
Resident Insectivore/Carnivore						
Hairy Woodpecker	4	3.5	0.01	ND	ND	ND

Table 4-1. (Concluded).

Category and Species	N[a]	% Lipid	Residues (ppm. wet weight) DDE	PCB[b]	Dieldrin	Other OCL[c]
Weakly Migratory Insectivore/Carnivore						
Killdeer	10	6.8	13.49	ND[d]	0.15	0.31
Belted Kingfisher	5	6.2	4.59	1.42	0.02	0.51
Mountain Bluebird	20	6.1	0.76	ND	ND	0.02
Sage Thrasher	10	5.9	0.14	ND	ND	ND
Strongly Migratory Insectivore/Carnivore						
Willet	2	20.8	4.74	ND	0.04	0.37
Spotted Sandpiper	10	9.4	1.04	ND	0.04	0.06
White-throated Swift	10	9.4	0.78	ND	ND	0.07
Say's Phoebe	5	6.0	22.01	ND	0.02	0.03
Violet-green Swallow	10	10.4	2.21	0.26	0.02	0.35
Cliff Swallow	10	13.2	1.31	ND	ND	0.07
Water Pipit	10	7.0	11.63	ND	0.01	0.24
Yellow-rumped Warbler	10	6.6	0.37	ND	ND	ND

[a]N = the number of individuals in each pooled sample; one pooled sample per species.

[b]The only PCB compound identified in the samples was Aroclor 1260.

[c]The other OCL compunds include: DDD, DDT, alpha-benzene hexachloride, beta-benzene hexachloride, lindane, delta-benzene hexachloride, hexachloro benzene, endrin, heptachlor epoxide, mirex, toxaphene, and oxychlordane.

[d]ND = not detected.

[e]Food habits based on Martin et al. (1961).

[f]Status based on Hubbard (1978) and arrival dates observed in this study.

[g]Weakly migratory = a species in which some individuals do an altitudinal migration or move short distances (up to several hundred miles) latitudinally for the winter. Other individuals of this species remain resident throughout the year. Most individuals remain within the United States throughout the winter.

[h]Strongly migratory = a species in which almost all individuals winter outside of the United States.

[i]Omnivore = animal prey comprises 75+% of diet, by dry weight.

through a standardized Florisil column with 250 ml of a mixture (3:1) of hexane:benzene, partitioned into acetonitrile, and passed a second time through a Florisil column. The eluate was concentrated and made to volume. Half the Florisil eluate was used to measure OCL pesticides and the second half was reserved for PCB analysis. Percent lipids were measured by drying a 25-ml aliquot of the Soxhlet extract.

Pesticides were separated from PCBs using thin-layer chromatography. Residues of OCL's and PCB's were quantified on a 3% OV-17 with confirmation on a 5% DC-200 and a 3% XE-60 G.C.O. gas chromatograph column. PCB determinations were derived using semiquantitative thin-layer methods. All PCB samples were read by comparison of total area with an Aroclor 1254 standard. The lower limit of detection was 0.005 ppm for all compounds except PCBs (0.01 ppm), mirex (0.01 ppm), and toxaphene (0.10 ppm). Residues were not analyzed for percent recovery. Residues are reported as ppm wet weight. They may be converted to lipid weight residues by dividing the wet weight values by the percent lipid of the samples (Table 4-1).

Results

There was wide variation in OCL levels among the 35 potential prey species (Table 4-1). Residues of DDE were found in all species, ranging from 0.008 ppm in Evening Grosbeaks to 22.01 ppm in Say's Phoebes. Thirteen (37%) of the species pools contained residues >1.0 ppm. The Say's Phoebe (22.01), Killdeer (13.49), Water Pipit (11.63), Western Meadowlark (6.25), and Brewer's Blackbird (5.28) pools had residue levels >5.0 ppm. The lowest DDE residues were found in Mourning Dove (0.02 ppm), Hairy Woodpecker (0.01 ppm), Pinyon Jay (0.03 ppm), Red Crossbill (0.02 ppm), and Evening Grosbeak (0.008 ppm) pools.

Residues of PCBs were detected in the Belted Kingfisher (1.42 ppm), Violet-green Swallow (0.26 ppm), Black-billed Magpie (0.20 ppm), and European Starling (0.13 ppm). Small amounts of residues of dieldrin and other OCL compounds were found in 15 (43%) and 21 (60%) species pools, respectively.

We grouped the 35 species by their predominant food habits and migratory status to characterize the potential sources of DDE to Peregrine Falcons (Table 4-2). Migratory and non-migratory insectivores and carnivores had average DDE residues >4.0 ppm. Resident omnivore residue levels averaged 0.5 ppm while migratory omnivores had residue levels >1.6 ppm. Residue levels were low in weakly-migratory and resident herbivore species, but the Vesper Sparrow (the only strongly-migratory herbivore) had a pool residue level of 2.38 ppm. Despite great variation, DDE levels among migratory insectivorous and carnivorous prey were clearly higher than among non-migratory insectivores, omnivores, and herbivores. With the exception of weakly-migratory herbivores, DDE residues in migratory species were always higher than non-migratory species of equivalent food habits. These results are similar to the findings of Enderson et al. (1982) and DeWeese et al.(in press).

Discussion

It is difficult to correlate the residues we found in prey in the GMSA with the OCL-related reproductive effects reported by other investigators because 1) prey selection by Peregrine Falcons in and adjacent to the study area is difficult to predict, 2) the amount of foraging time spent in the GMSA by local Peregrine Falcons is unknown, and 3) there is great variation of OCL contamination in potential prey (Table 4-1). However, based on a review of the literature, qualitative inferences can be made about the extent to which local Peregrine Falcons are threatened by OCL compounds.

Newton and Bogan (1978) concluded that PCBs have not been linked to eggshell thinning in field or controlled laboratory studies of Sparrowhawks (*Accipiter nisus*). DDE and PCBs appeared to interact in reducing breeding success of American Kestrels (Lincer 1972) and Mallards (Risebrough and Anderson 1975). McLane and Hughes (1980) found no effect on eggshell thickness, young hatched, and young fledged in captive Eastern Screech Owls (*Otus asio*) fed PCBs where levels ranged from 3.9-17.8 ppm in egg contents. Enderson et al. (1982) found PCBs averaged about 2 ppm in egg contents of Peregrine Falcons in Colorado and northern New Mexico. They concluded that there is no evidence PCBs have impaired falcon reproduction. In this study, PCBs were

Table 4-2. Average DDE levels in Peregrine Falcon prey grouped by food habits and migration status.[a]

Status	DDE (ppm, wet weight) Herbivore	Omnivore	Insectivore/ Carnivore
Resident	0.08 (0.07)[b]	0.47 (0.84)	0.01
Weakly Migratory	0.04 (0.05)	1.63 (2.65)	4.75 (6.15)
Strongly Migratory	2.38	1.61 (2.45)	5.51 (7.63)

[a]Status and food habits of each species collected are identified in Table 4-1.

[b]Arithmetic mean (standard deviation).

detected in only four species, and the Belted Kingfisher was the only species with PCB residues >1.0 ppm (1.42 ppm).

Mendenhall et al. (1983) fed captive Barn Owls (Tyto alba) diets containing 3.0 ppm DDE and 0.5 ppm dieldrin; doses were given separately and in combination for two years. DDE was associated with significant eggshell thinning, egg breakage, embryo mortality, and reduced production per pair. Dieldrin alone was associated with slight eggshell thinning, but not with reduction of breeding success. Dieldrin was also associated with adult mortality. The dieldrin results of this study are consistent with other studies conducted on Galliformes (DeWitt 1956; Graves et al. 1969; Wiese et al. 1969; Dahlgren and Linder 1974). Mendenhall et al. (1983) suggest that DDE has a much more severe effect on reproduction in wild raptors than dieldrin, which contributes to their decline primarily through adult mortality.

All prey species in this study had dieldrin residues of 0.15 ppm or less. This is less than the 0.5 ppm fed the Barn Owls by Mendenhall et al. (1983). Based on the residue levels reported in this study and the published information, we conclude that in isolation PCBs, dieldrin, and the other OCL compounds examined in this study are currently not a threat to the reproduction or survivability of Peregrine Falcons using the area. However, this does not take into account possible effects of these contaminants occurring in combination.

Several laboratory and field studies have found eggshell thinning, egg breakage, embryo mortality, and overall reduced production in birds fed DDE. Captive Black Ducks (Anas rubripes) and Mallards produced eggshells 8 to 22% thinner than controls when fed about 3 ppm DDE (wet weight) for periods up to a year (Heath et al. 1969; Longcore and Samson 1973). Ringed Turtle-Doves (Streptopelia risoria) fed about 3 ppm DDE (wet weight) produced eggshells 9.2% thinner than controls (Peakall et al. 1973).

Among raptors, Eastern Screech Owl eggshells were found to be 13.3% thinner than controls when fed a diet containing 2.8 ppm DDE (McLane and Hall 1972). American Kestrels fed a diet containing 3 ppm DDE 2-3 months prior to egg-laying produced eggshells 14% thinner than controls (Lincer 1975). Dose-

response curves calculated in that study predicted that 1 ppm of DDE would produce about 7% thinning, and 2 ppm DDE about 11% thinning. Wild kestrels showed a similar shell thinning response to DDE.

Based on the results of their study and review of the literature, Enderson et al. (1982) concluded that a diet containing 1.0 ppm DDE or more could be expected to produce the 13% eggshell thinning observed in eggs from Colorado and New Mexico Peregrine Falcons. DDE residues averaged 20 ppm in egg contents analyzed in their study. Peakall (1976) predicted 15-20 ppm DDE is the level at which hatching failure occurs.

We also used a 1.0 ppm residue level (Enderson et al. 1982) as a criterion for categorizing prey species on the GMSA as to their potential risk to Peregrine Falcons hunting in the area. Prey available to Peregrine Falcons in the GMSA showed extreme variation in DDE contamination (Table 4-1). However, since only a single pool was analyzed for all species, care must be taken in interpreting the reported residue values because of occasional wide variation between pools for the same species. To insure careful interpretation, the results of this study were compared with results from similar studies (Enderson et al. 1982; Clark and Krynitsky 1983; DeWeese et al., in press) (Table 4-3). These studies were used for the comparison because their data sets included substantial numbers of specimens from New Mexico and southern Colorado. Enderson et al. (1982) focused on residues in known or potential peregrine prey collected in northern New Mexico and Colorado. Clark and Krynitsky (1983) present residue levels for a wide spectrum of wildlife species in New Mexico and Arizona. The residue data in Table 4-3 from Clark and Krynitsky are for species pools collected in northern New Mexico. DeWeese et al. (in press) present OCL residue levels for a large spectrum of Peregrine Falcon prey collected near eyrie sites in eight western states. The data in Table 4-3 from DeWeese et al. (in press) represent average residue levels for this range. However, only those species with composite pools of specimens collected in New Mexico or southern Colorado were used in this comparison. Table 4-3 contains data only for species analyzed in this study and in at least one of the other studies.

Table 4-3. Average DDE residues in avian species collected in New Mexico.[a]

Species	This Study	Enderson et. al. (1982)	Clark and Krynitsky (1983)	DeWeese et al. (in press)
Mallard	0.10	NA[b]	< 0.10	NA
Killdeer	13.49	19.50	NA	NA
Mourning Dove	0.02	0.21	5.38	0.05
White-throated Swift	0.78	1.50	NA	1.88
Northern Flicker	0.06	0.06	NA	0.07
Say's Phoebe	22.01	2.00	7.10	NA
Violet-green Swallow	2.21	5.90	3.87	4.13
Cliff Swallow	1.31	2.00	3.68	3.18
Steller's Jay	0.04	0.51	NA	0.07
Pinyon Jay	0.03	0.12	NA	NA
Clark's Nutcracker	0.09	0.04	NA	NA
American Robin	1.56	0.52	NA	0.67
Mountain Bluebird	0.76	0.10	NA	NA
Townsend's Solitaire	0.06	0.28	NA	NA
European Starling	1.96	0.45	15.80	< 0.70
Yellow-rumped Warbler	0.37	0.97	NA	< 0.70
Western Meadowlark	6.25	0.86	6.11	0.61
Red-winged Blackbird	0.13	0.49	NA	0.20
Brewer's Blackbird	5.28	6.00	NA	5.32
Brown-headed Cowbird	0.31	1.20	NA	< 0.70
Red Crossbill	0.02	0.02	NA	NA
Pine Siskin	0.18	0.08	NA	NA

[a]Only those species represented by pools of specimens collected in New Mexico and southern Colorado were used in this comparison. Composite arithmetic means from Table 4 are reported.

[b]NA = not available.

Considerable variation exists between the results of the four studies, emphasizing the variability that can occur between pools within a species. Despite this variability, the prey species that clearly represent major sources of DDE to Peregrine Falcons in the study area and throughout northern New Mexico can be identified.

Of the 22 species in Table 4-3, 11 (50%) consistently had residues <1.0 ppm. These species and the additional eight species collected in this study (but not documented in the other two studies) with DDE residues <1.0 ppm (Blue-winged Teal, Marbled Godwit, Hairy Woodpecker, Horned Lark, Black-billed Magpie, Sage Thrasher, Rufous-sided Towhee, and Evening Grosbeak) are currently not a major source of DDE contamination for local breeding Peregrine Falcons. This group of 19 species includes four resident herbivores, two weakly-migratory herbivores, four resident omnivores, five migratory omnivores, one resident insectivore, and three migratory insectivores (Table 4-2).

Those prey species with DDE levels between 1-2 ppm in any one of the four studies are considered moderate-risk prey species. In general, these are species with residue levels that are inconsistent between studies (vary between very low ppm to 1.5-2.0 ppm) or are between 1-2 ppm in one pool from this study and require further investigation. These moderate-risk species include: White-throated Swifts, American Robins, Brown-headed Cowbirds, and Spotted Sandpipers. This group includes two migratory omnivores and two migratory insectivores.

Twelve of the 35 prey species (29%) considered in this study had DDE residues >2.0 ppm in at least one study. These species are considered to be a major potential source of DDE contamination for local Peregrine Falcons. These species are: Killdeer, Willets, Mourning Doves, Say's Phoebe, Violet-green Swallows, Cliff Swallows, European Starlings, Western Meadowlarks, Brewer's Blackbirds, Belted Kingfishers, Water Pipits, and Vesper Sparrows. Of the 12 species, 58% (7) are strongly-migratory (Table 4-2) and could be accumulating DDE residues on their wintering grounds. The remaining five species (Killdeer, Mourning Doves, European Starlings, Western Meadowlarks, Belted Kingfishers) are weakly-migratory or residents known to winter in this area (Hubbard 1978). Clark and Krynitsky (1983) summarized a large data base

on pesticide levels of various wildlife species in the southwest and concluded that wildlife species have been exposed to DDT in New Mexico, Arizona, and southern Texas since the 1972 ban. The southern Rio Grande river valley was suggested by Clark and Krynitsky to be a heavily contaminated area in New Mexico. The source of this DDT is unknown. In addition, White et al. (1983) found that DDE residues increased significantly in shorebirds after they arrived on the south Texas coast from their breeding grounds. This study demonstrates that aquatic areas near agricultural lands on the south Texas coast may still be a potential threat to waterbirds eight years after the DDT ban (data were collected in 1980). Aquatic areas near agricultural lands in southern New Mexico may also be a source of DDT contamination for the species using agricultural habitat sites, e.g., European Starling, Mourning Dove, and Western Meadowlark, and aquatic habitat sites, e.g., Killdeer and Belted Kingfisher.

Local illegal useage of DDT is probably not the source of the DDE residues in the resident and weakly-migratory species on the GMSA. DDT and DDD were rarely detected in our samples which suggests little recent input of DDT into the local environment. These species may be wintering in DDT contaminated areas in southern New Mexico. More information is needed on the wintering areas of these species before the source of this contamination can be identified.

The creation of new aquatic areas (mill tailings ponds) on the GMSA could potentially increase the availability of prey species heavily contaminated with DDE and decrease the availability of low-risk prey species through removal of the Upland Forest and Pinyon-Juniper Woodland Habitat Sites (77% of the acreage at the proposed mill tailings site). The dominant prey species in these two sites are predominantly low and moderate-risk prey (Table 4-1 and Section 3.0). However, of the 12 high-risk species in this study, three species (Killdeer, Willet, and Water Pipit) were only encountered near Molycorp's existing mill tailings ponds, and two species (Violet-green Swallow and Cliff Swallow) were encountered in large flocks foraging over or near the ponds (Section 3.0). Large flocks of Cliff Swallows were also encountered in the Riparian Habitat along with the Belted Kingfisher and Brewer's Blackbird (Section 3.0). Belted Kingfishers could potentially occur near any aquatic

habitat although none were observed near the existing mill tailings ponds. Sizable populations of Brewer's Blackbirds were observed in the disturbed habitats adjacent to the ponds. The European Starling was encountered in small numbers in disturbed habitats throughout the GMSA. The Say's Phoebe, Western Meadowlark, and Vesper Sparrow were common in the lower elevation habitat types throughout the study area (including the tailings ponds), but were uncommon or absent in the Upland Forest and Pinyon-Juniper Woodland Habitat Sites (Section 3.0).

Based on the results of this study, we conclude that the Peregrine Falcons utilizing the GMSA and similar sites in northern New Mexico are faced with a potential source of DDE contamination that could affect their reproductive success. The source of the DDE contamination is unknown but it may be from wintering areas in agricultural and aquatic habitats in southern New Mexico as well as from wintering areas in Latin America. The development of new mill tailings ponds on the GMSA could potentially increase this threat to their reproductive success by providing additional acres of habitat that attracts concentrations of highly contaminated prey such as migrant shorebirds and swallows.

5.0 MANAGEMENT RECOMMENDATIONS

The GMSA, because of the variety of habitat sites it contains, supports an abundant and diverse breeding and transient avifauna. During the fall of 1984 and the spring of 1985, 133 species were recorded on the GMSA (Table 3-1). Of these 133 species, 55 (42%) were documented as breeding species. GMSA habitat sites appear to support substantial and diverse breeding populations of birds (Table 3-19). The estimated breeding bird density for the GMSA during 1985 is 23,048 pairs. The estimated populaton densities for each habitat site within the GMSA are:

- Pinyon-Juniper Woodland - 9,149 pairs,
- Sagebrush/Grassland - 5,006 pairs,
- Upland Forest - 3,139 pairs,
- Canyon Slopes,- 2,745 pairs,
- Wooded Canyon Benches - 2,602 pairs,
- Riparian - 260 pairs, and
- Agricultural Land - 147 pairs.

Of these 23,000 pairs, approximately 20% (5,000) (Table 3-21) are species that are known to be utilized by Peregrine Falcons (Enderson et al. 1982). These 10,000 birds plus those species whose populations could not be estimated by spot-mapping techniques, e.g., jays, swallows, swifts, and the offspring of all these birds, provide a substantial prey base for local Peregrine Falcons. Although the actual availability of the individual prey species is unknown and probably highly variable, and the amount of foraging time spent by local Peregrine Falcons on the GMSA is unknown, the GMSA appears to support a prey population that is more than adequate in size to support the local breeding Peregrine Falcons.

However, there are three land management practices that could potentially occur in the GMSA that would reduce the local avian breeding population and consequently lower prey availability for local breeding Peregrine Falcons. The first practice is intensive fuelwood removal from the Pinyon-Juniper Woodland Habitat Site. Although avian density data were not collected in woodlands subjected to intensive timber management practices, the effect of canopy removal in the GMSA on avian nesting populations can be predicted based

on the results of a study by O'Meara et al. (1981). They compared avian breeding populations in 8- and 15-year old chained areas with unchained woodlands in northwestern Colorado. Their data indicate complete canopy removal of woodland habitat via chaining results in an avian community with 60-70% fewer species, and 60% fewer individuals. Although canopy removal through intensive fuelwood sales in woodland habitat does not remove as much vegetation as chaining, both techniques remove the overstory. Overstory removal changes the structural diversity and microclimate of a site which will effect avian diversity and density. We predict that canopy removal on the GMSA will reduce avian breeding densities by 50-60% within the treatment areas. Based on the 1985 density estimate for the Pinyon-Juniper Woodland Habitat on the GMSA, this will reduce the woodland breeding population by 180-200 pairs/km^2 of treated woodland.

The second potential forest management practice of concern is logging of commercial trees, Ponderosa Pine and Douglas Fir, from the Upland Forest Habitat Site. As discussed in Section 2.0, Guadalupe Mountain apparently does not attain climatic and edaphic conditions necessary for a true mixed conifer forest. Yet the large pines and firs that do occur in this site are a very important structural component in the nesting habitat of breeding birds. They provide an additional feeding and nesting stratum to the avian community. This habitat site supported the second highest population density (500 pairs/km^2) and also ranked second in species diversity ($H = 2.79$) of the seven study area habitat sites. Commercial size trees are at low density in the Upland Forest, yet their removal could noticeably decrease the numbers and diversity of the breeding bird populations. Further, birds breeding in this site are generally among the least contaminated by pesticides (Section 4.0). Therefore, removal of commercial trees could, by decreasing upland forest birds, make local Peregrine Falcons more dependent upon more contaminated prey species from other habitat sites (see below).

The third land management practice of concern is the proposed mill tailings site which is predicted to remove 1,320 acres of existing vegetaton (USDI-BLM 1983). The affected habitat sites are approximately 895 acres of Pinyon-Juniper Woodland, 300 acres of Sagebrush/Grassland, and 125 acres of Upland Forest. Based on the density estimates for these habitat sites in the

GMSA, the development of the proposed mill tailings site will remove nesting habitat for 1,820 breeding pairs (8% of the total nesting population on the GMSA). If this is done in conjunction with Pinyon-Juniper Woodland fuelwood removal and commercial logging of the Upland Forest Habitat Site, avian breeding densities in the forested habitats could be reduced significantly.

Reclamation of the mill tailings sites will provide avian nesting habitat and mitigate some of the impact of habitat removal on avian populations. However, the reclaimed sites (as represented by the Agricultural Land Grid) support fewer species and lower densities than the native communities (Table 3-19).

In addition to reducing the quantity of prey available to local Peregrine Falcons, the addition of new mill tailings ponds could have a significant effect on their reproductive success by creating habitats that attract "poor quality" prey. A total of 36 species were associated with the existing mill tailings ponds and adjacent disturbed habitats on Molycorp's property (Table 3-18). These species were predominantly waterfowl (15 species), shorebirds (11 species), swallows (5 species), and blackbirds (2 species); many of these species have moderate to high levels of DDE contamination.

Of the 35 potential prey species analyzed for DDE levels in this study, 16 species had residue levels >1.0 ppm. These species are potential sources of DDE contamination for local breeding Peregrine Falcons. Of these 16 species, four species were only associated with the mill tailings ponds and adjacent disturbed habitats (Spotted Sandpiper (1.04 ppm), Killdeer (13.49 ppm), Willet (4.74 ppm), and Water Pipit (11.63 ppm). The Violet-green Swallow (2.21 ppm) and Cliff Swallow (1.31 ppm) foraged in large flocks over the mill tailings ponds. Say's Phoebes (22.01 ppm), Brewer's Blackbirds (%.28 ppm), Western Meadowlarks (6.25 ppm), and Vesper Sparrows (2.38 ppm) were common in the disturbed areas adjacent to the ponds. Although these four species were uncommon to common in the lower elevation habitat types throughout the GMSA, they were rare to absent in the Upland Forest and Pinyon-Juniper Woodland Habitat Sites, which comprise 77% of the acreage of the proposed mill tailings site.

Additional shorebird species were recorded using the mill tailings ponds during the study. Migrant shorebirds are common prey for Peregrines during migration, courtship, egg laying, and incubation. As indicated by the Killdeer, Willets, and Spotted Sandpipers sampled in this study, and the results of other studies on OCL residue levels in migrant shorebirds (Section 4.0), all of the shorebirds utilizing the mill tailings ponds also represent a potential source of DDE contamination for the local Peregrine Falcons. The development of new mill tailings ponds on the GMSA is a potential negative impact to the reproductive success of the local Peregrine Falcons because it creates additional acreage of habitat sites that attract concentrations of prey highly contaminated with DDE such as migrant shorebirds, swallows, and blackbirds.

Based on the results of this study, we recommend:

- minimal canopy removal of the Pinyon-Juniper Woodland Habitat. We recommend thinning practices if fuelwood harvest is deemed necessary on the GMSA and if thinning practices maintain vegetative age class diversity;
- no commercial logging should be planned for the GMSA. The Ponderosa Pine and Douglas Fir densities are low on the GMSA, but those that are present are important nesting, foraging, and roosting sites for the local avian breeding population; and
- selecting an alternative site for the proposed mill tailings site that is not located within potential hunting territories of nesting Peregrine Falcons. If the GMSA is chosen for the mill tailings site, reclamation of tailing ponds should proceed as quickly as possible to minimize the availability of aquatic and disturbed habitats with contaminated prey.

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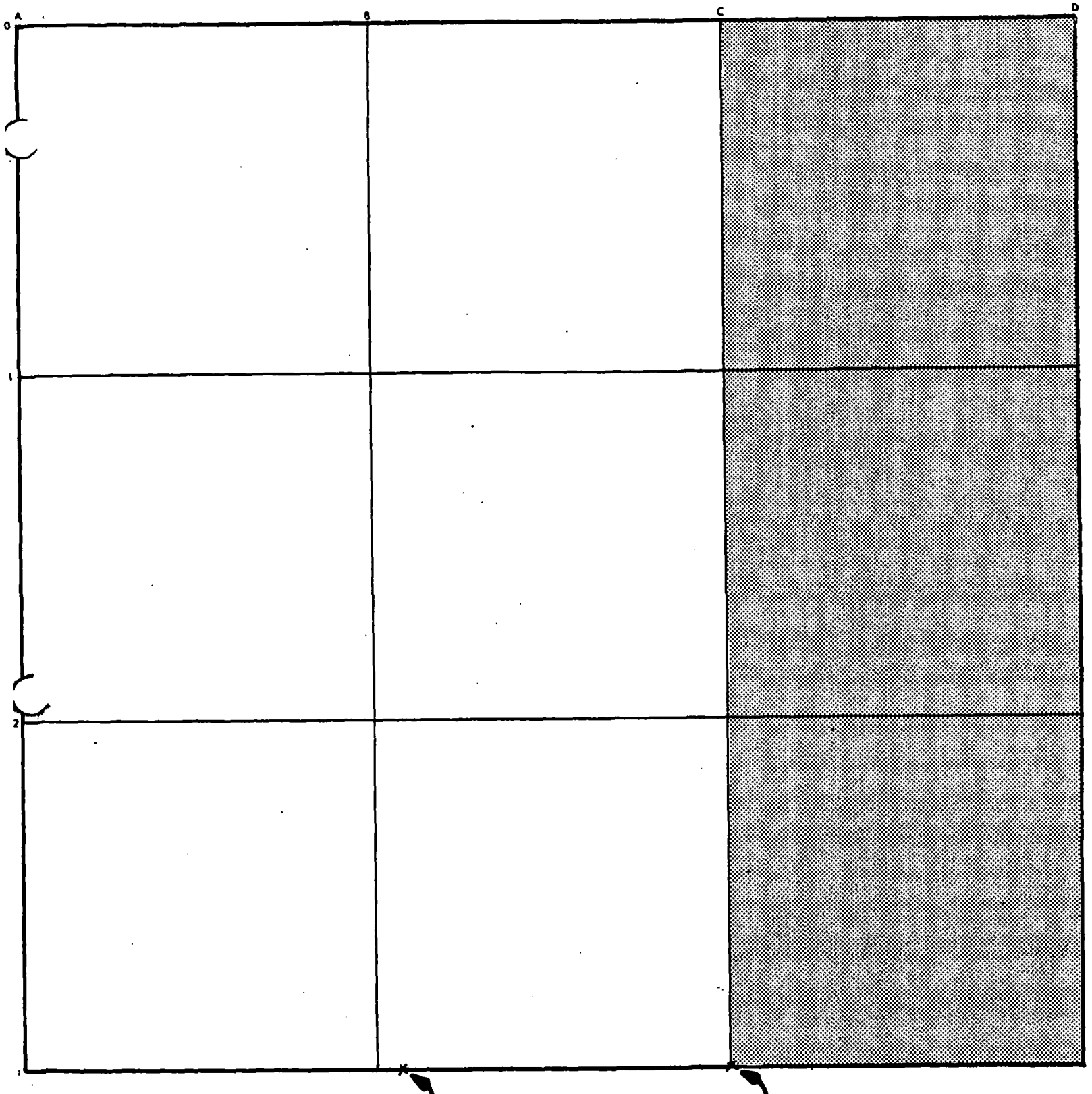
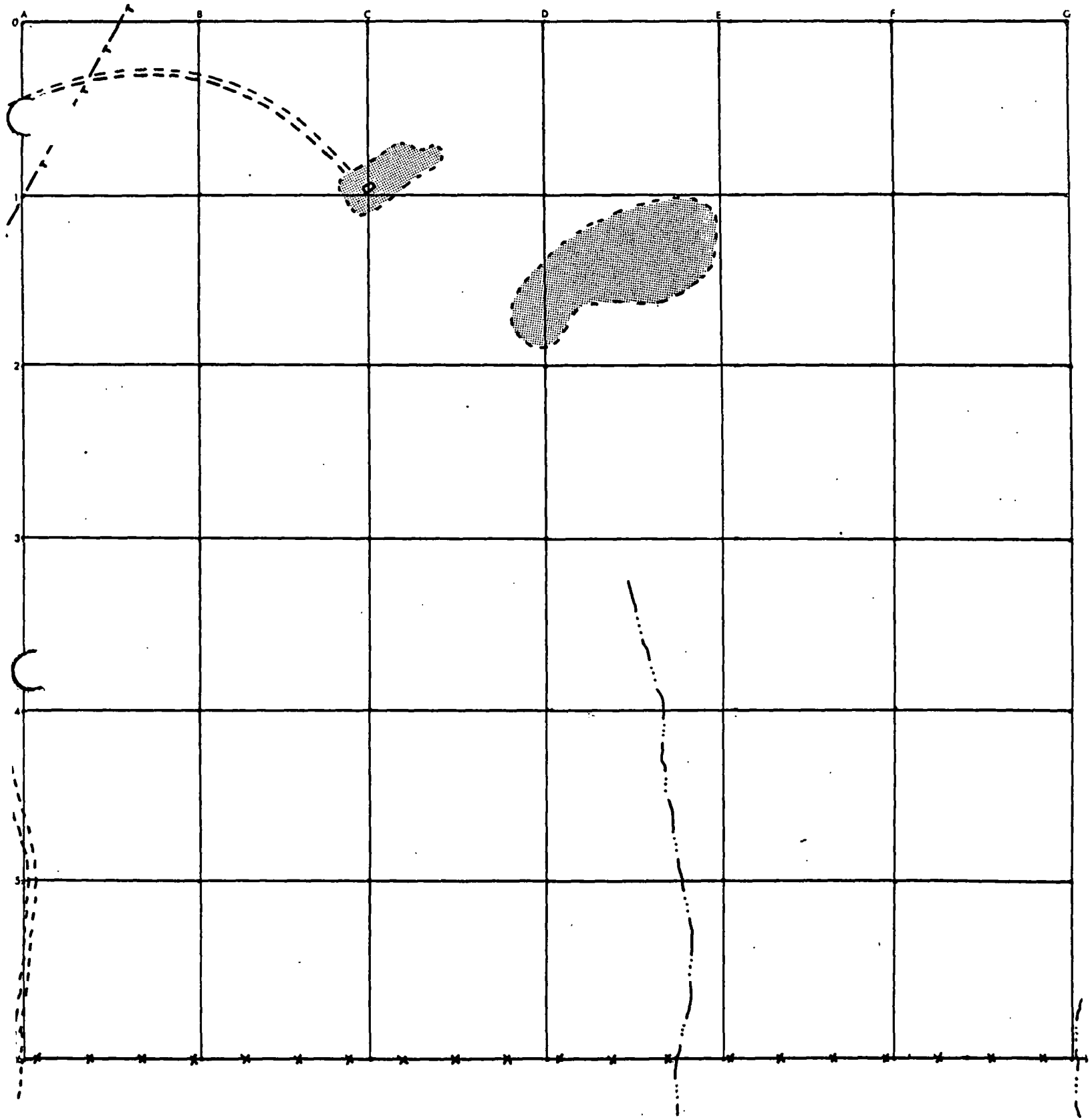
A.0 APPENDIX A - GUADALUPE MOUNTAIN STUDY AREA MAP

B.O APPENDIX B - AVIAN CENSUS GRID MAPS



SAGEBRUSH/GRASSLAND



ROAD

FENCE

DRAINAGE

POWER LINE

AREAS WITHOUT TREE CANOPY

0 100 200
FEET

DATE

START TIME

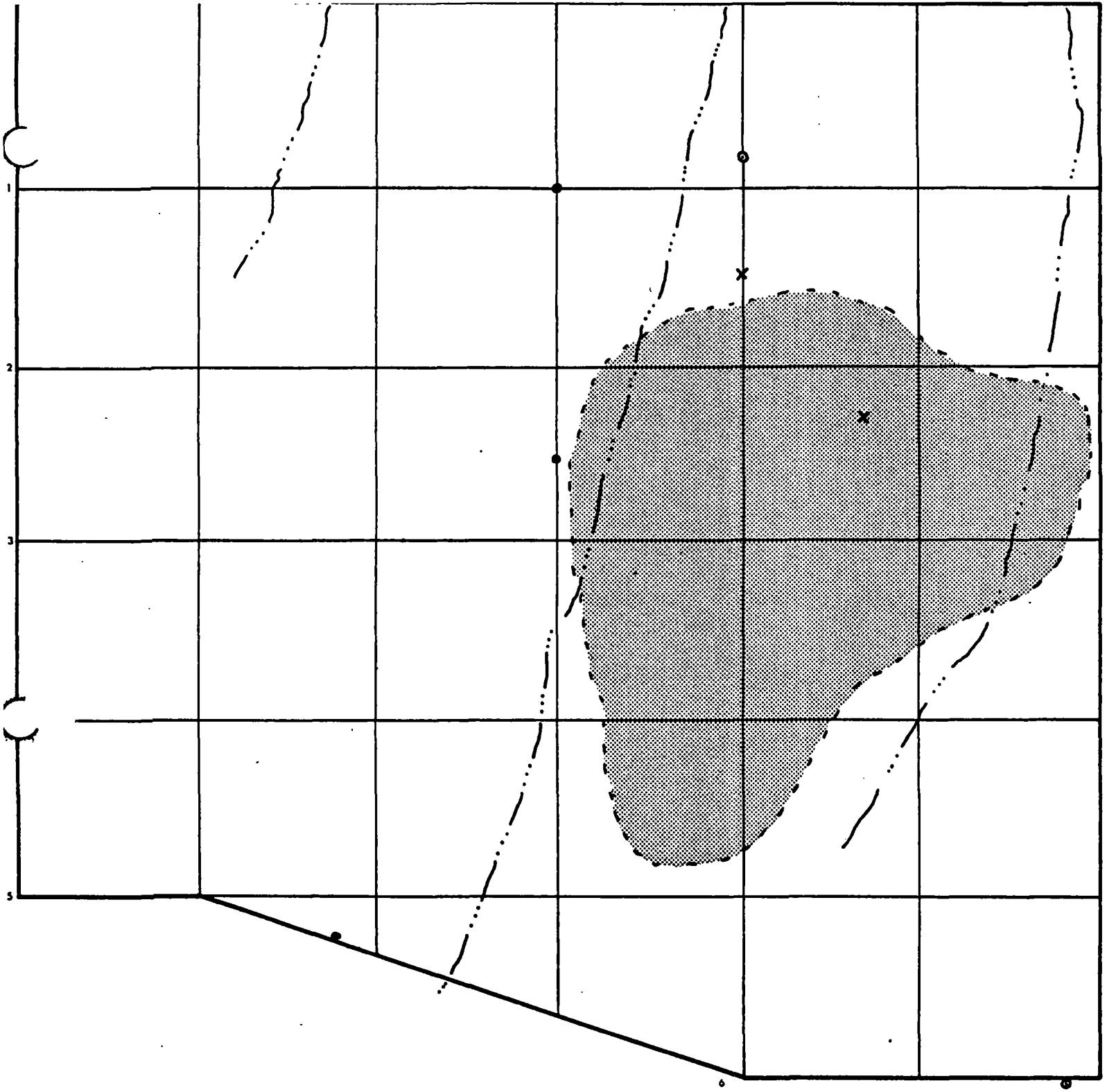
STOP TIME

TEMPERATURE

WIND

OBSERVER

PINON - JUNIPER WOODLAND



SNAG ×

DRAINAGE

QUARTER CORNER SECTIONS 26 & 27

ISOLATED PONDEROSA

FEW MATURE PONDEROSAS

0 100 200
FEET

DATE

START TIME

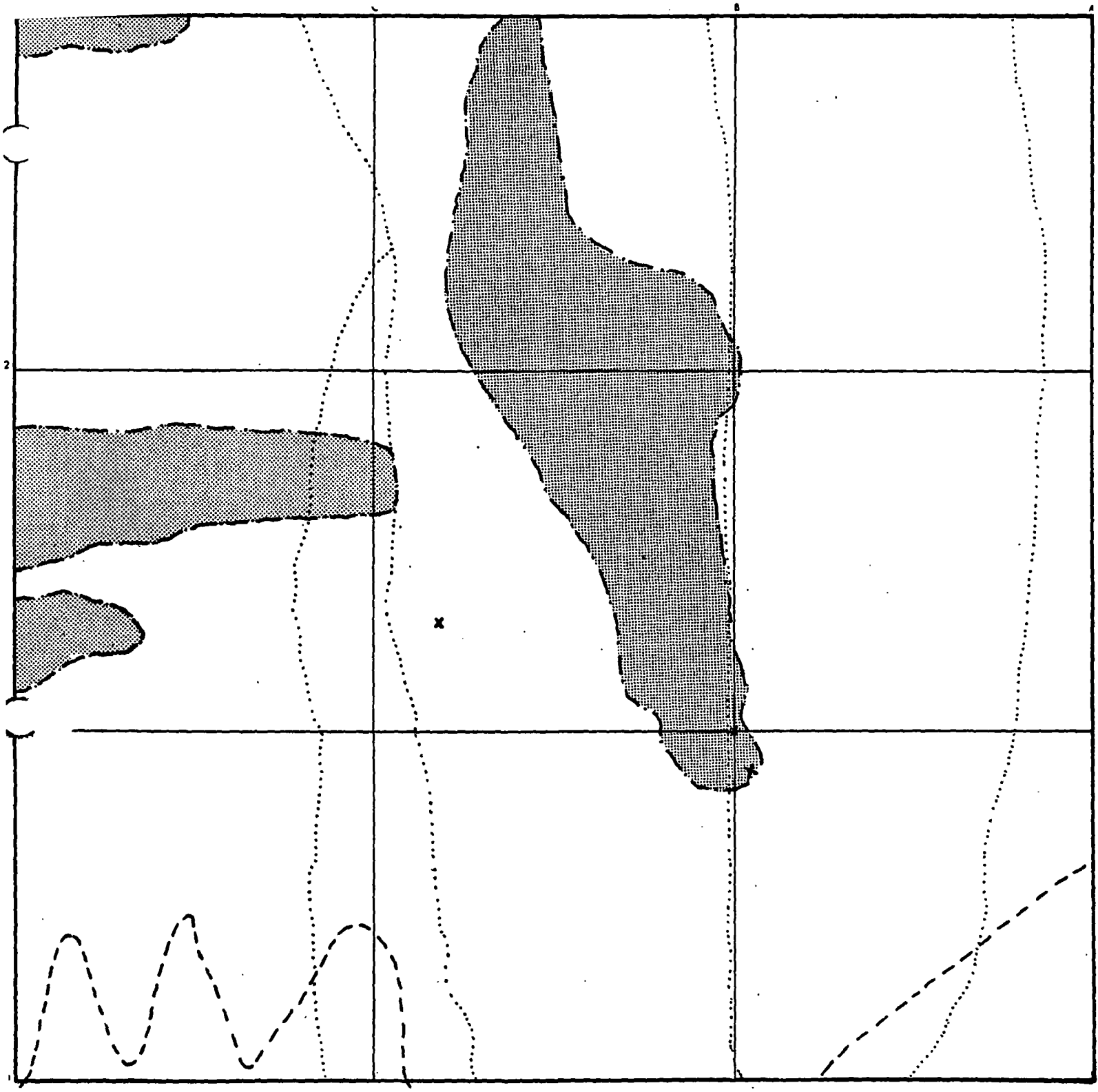
STOP TIME

TEMPERATURE

WIND

OBSERVER

UPLAND FOREST

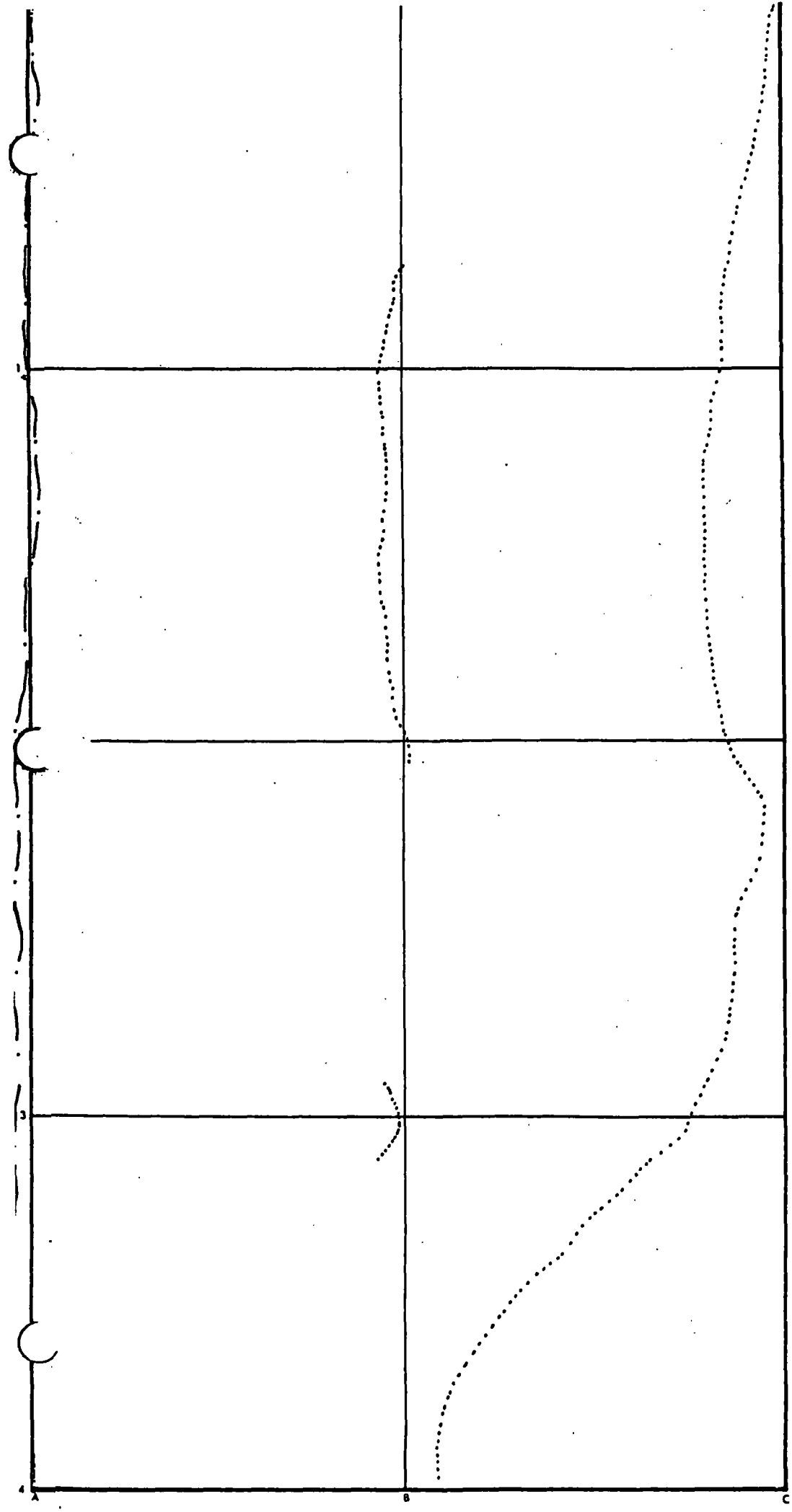


TRAIL
SNAG
BOULDER FIELD
BREAK IN SLOPE

0 100 200
FEET

DATE
START TIME
STOP TIME
TEMPERATURE
WIND
OBSERVER

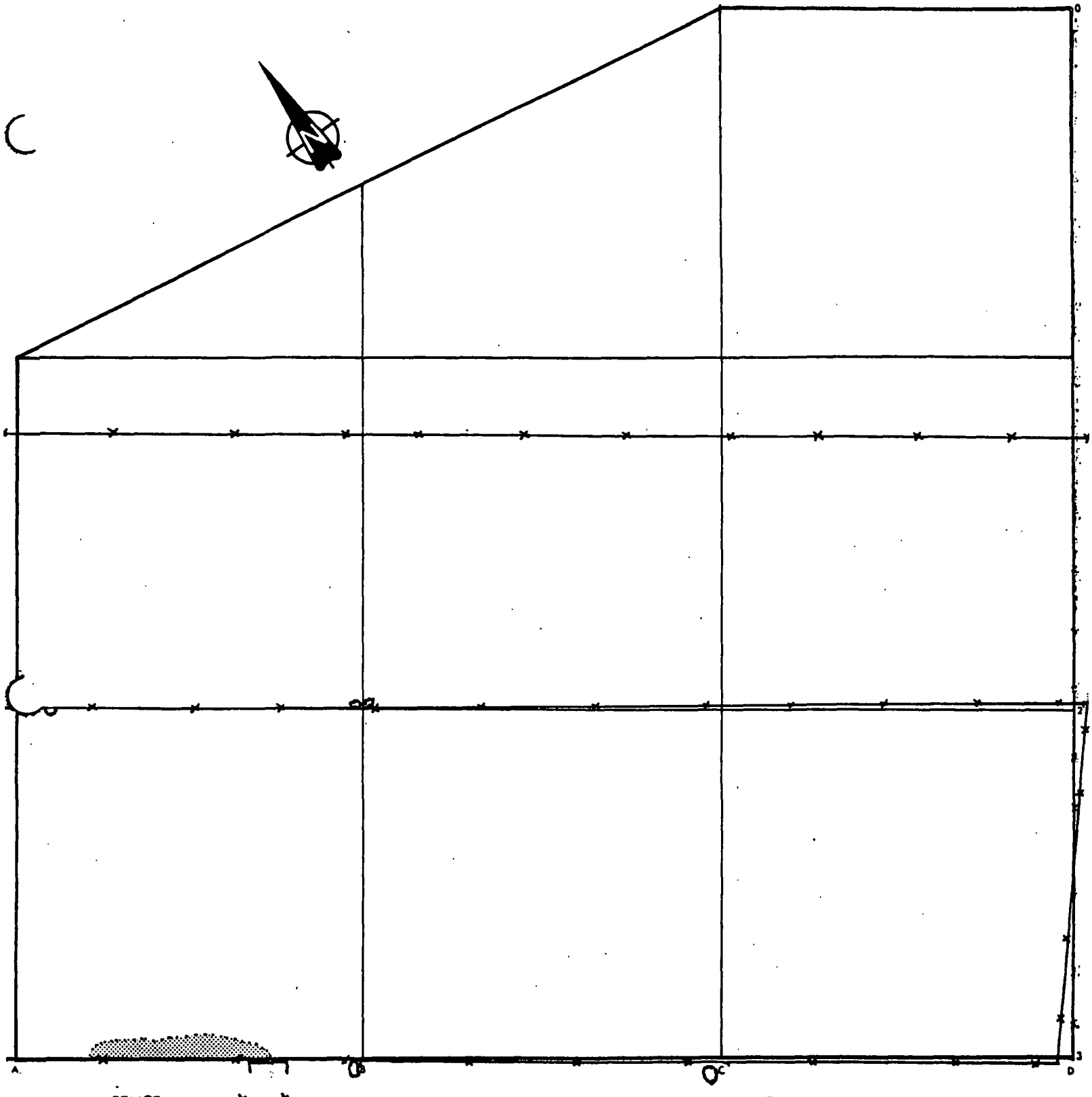
WOODED CANYON BENCHES



DATE
START TIME
STOP TIME
TEMPERATURE
WIND
OBSERVER

BREAK IN SLOPE
EAST BANK OF RIO GRANDE

CANYON SLOPES



DATE
START TIME
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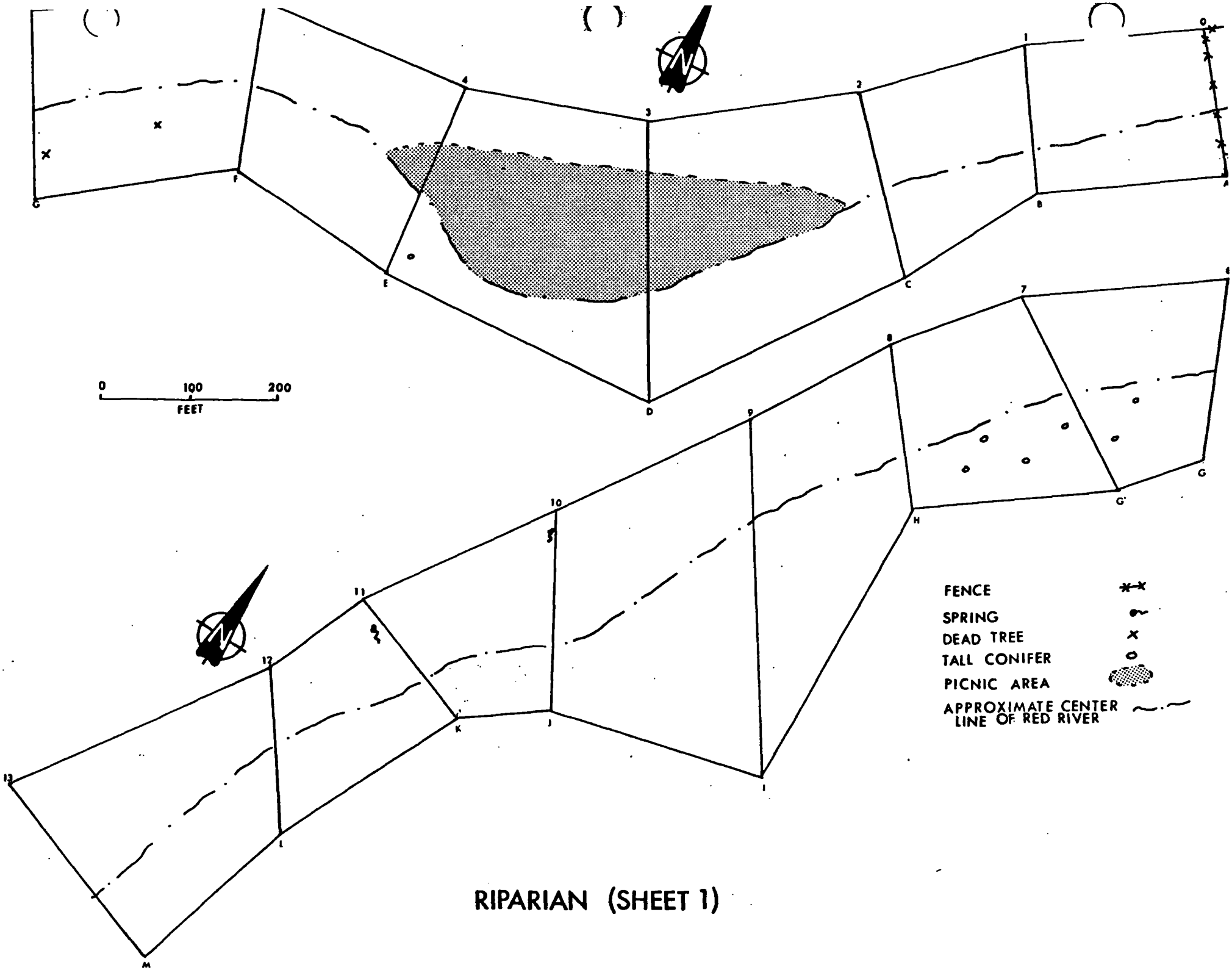
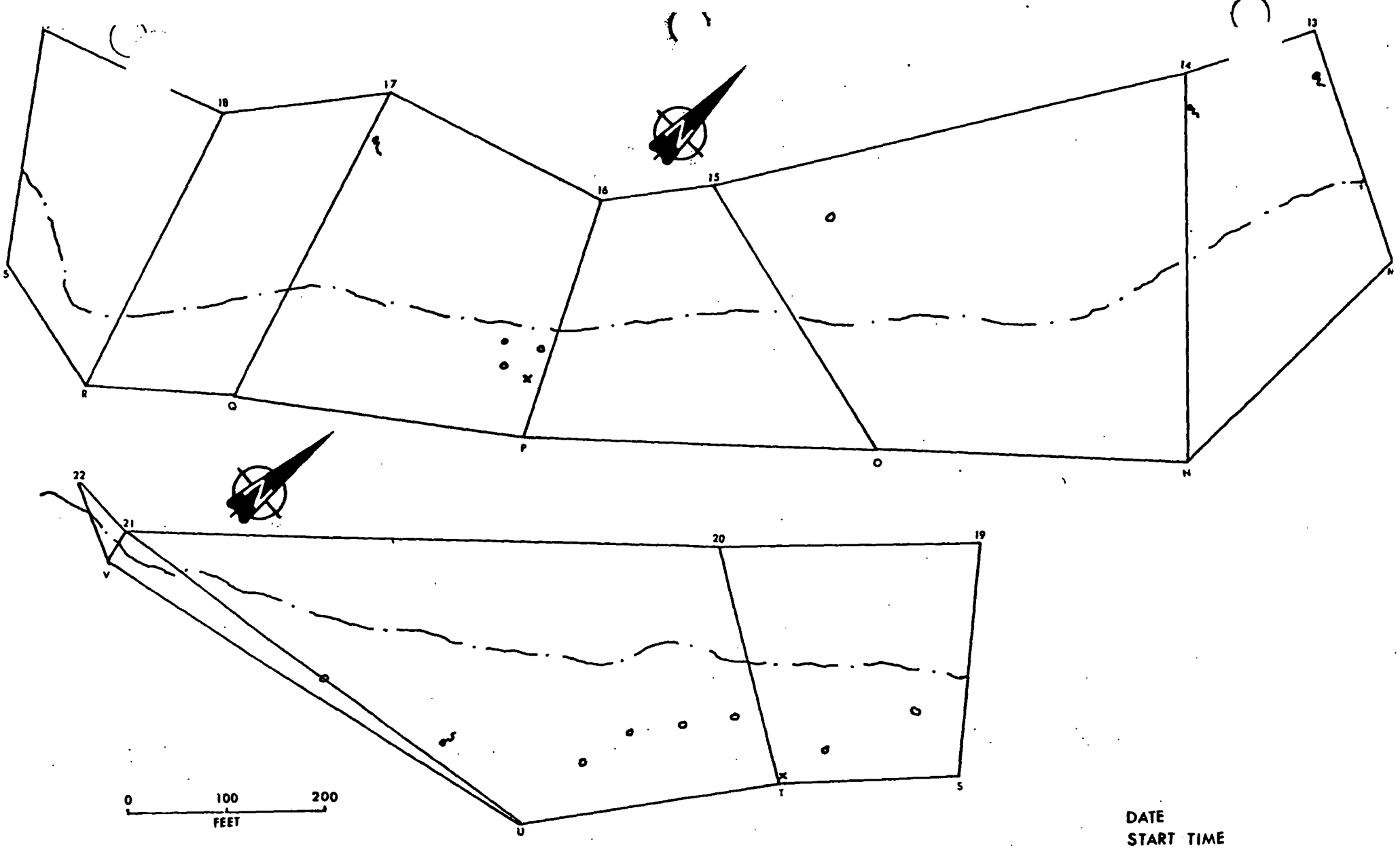
WIND
OBSERVER

AGRICULTURAL LAND



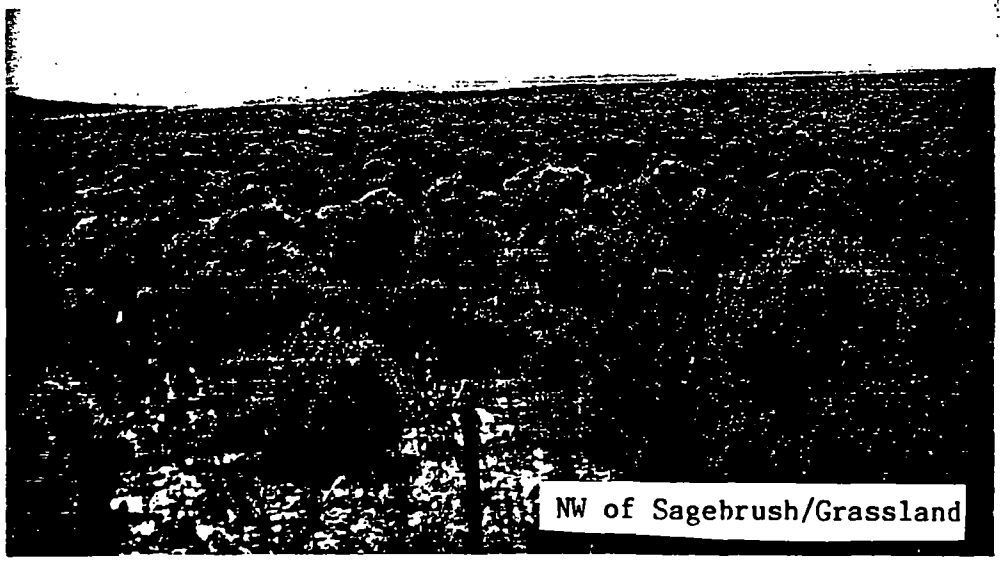
RIPARIAN (SHEET 1)



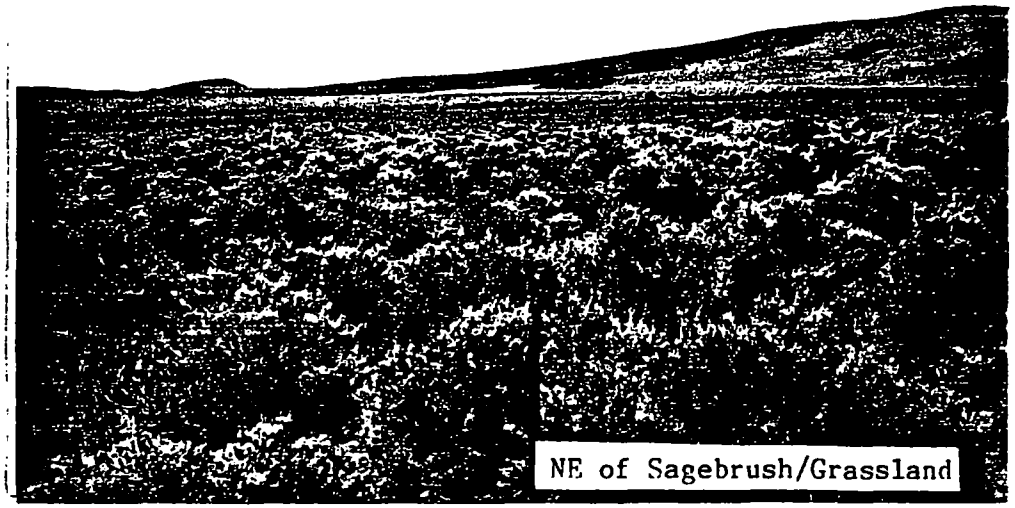
DATE
START TIME
STOP TIME
TEMPERATURE
WIND
OBSERVER

RIPARIAN (SHEET 2)

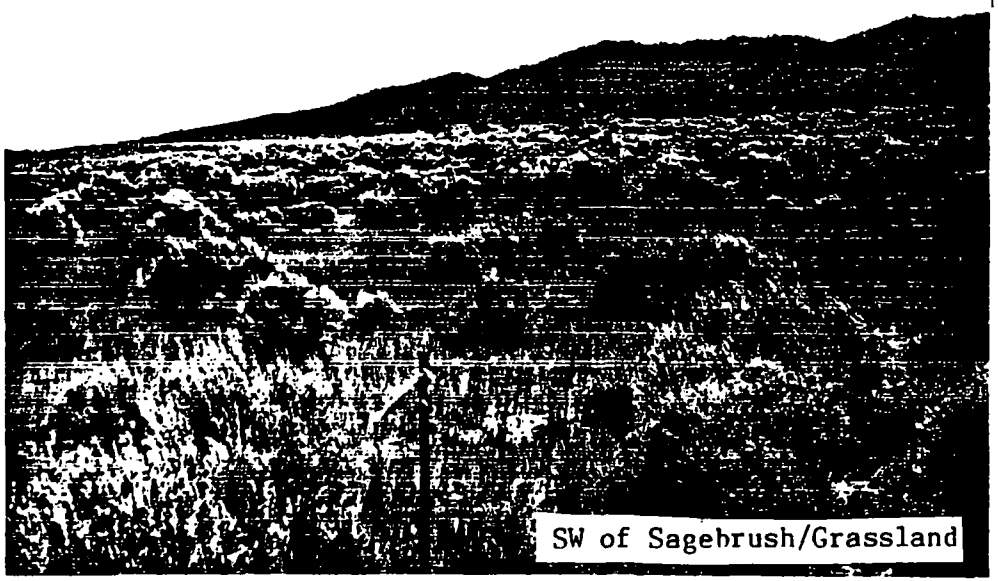
C.0 APPENDIX C - PHOTOGRAPHS AND SLIDES OF AVIAN CENSUS GRID MAPS



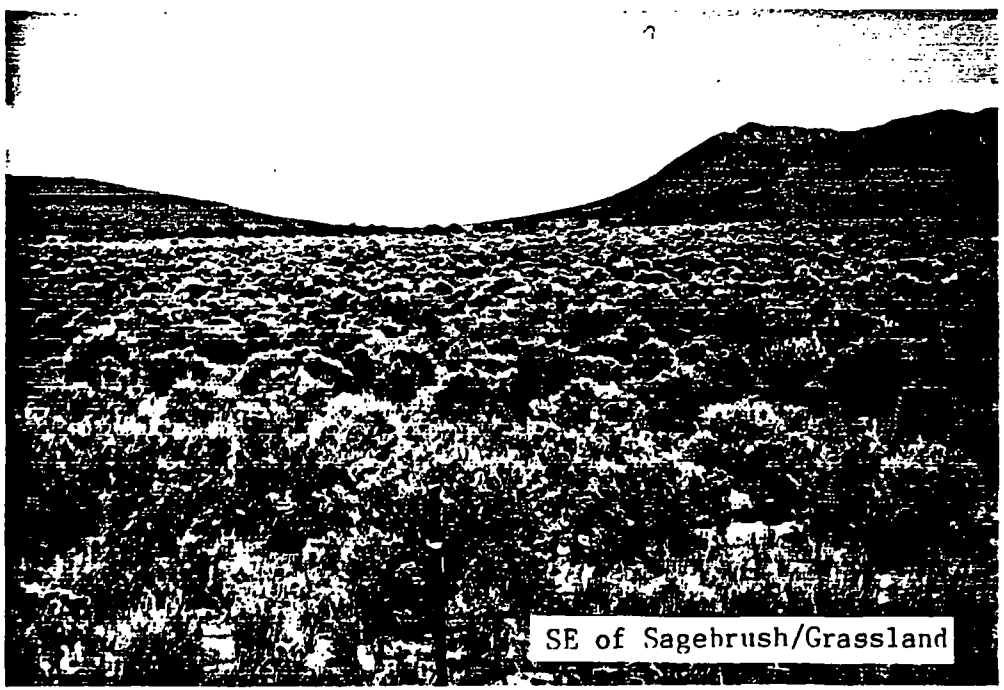
NW of Sagebrush/Grassland



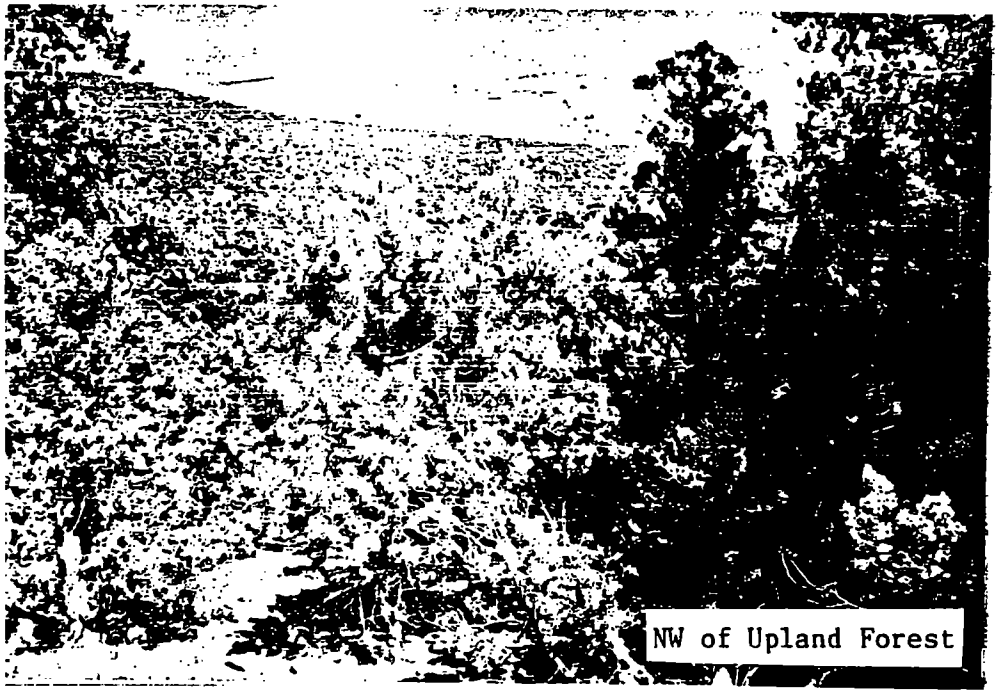
NE of Sagebrush/Grassland



SW of Sagebrush/Grassland



SE of Sagebrush/Grassland



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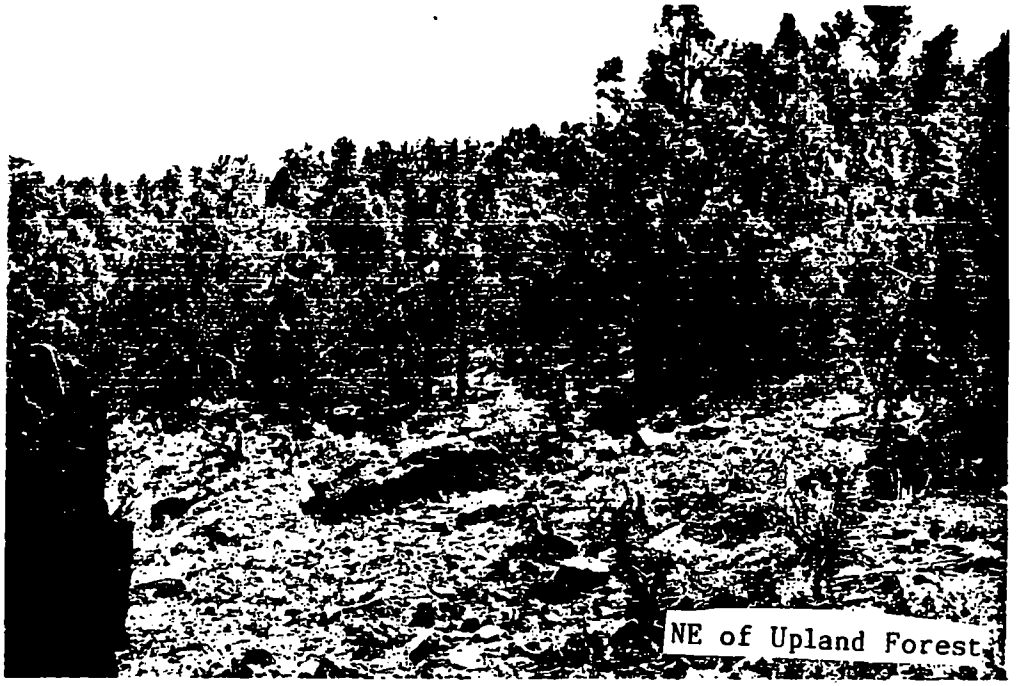

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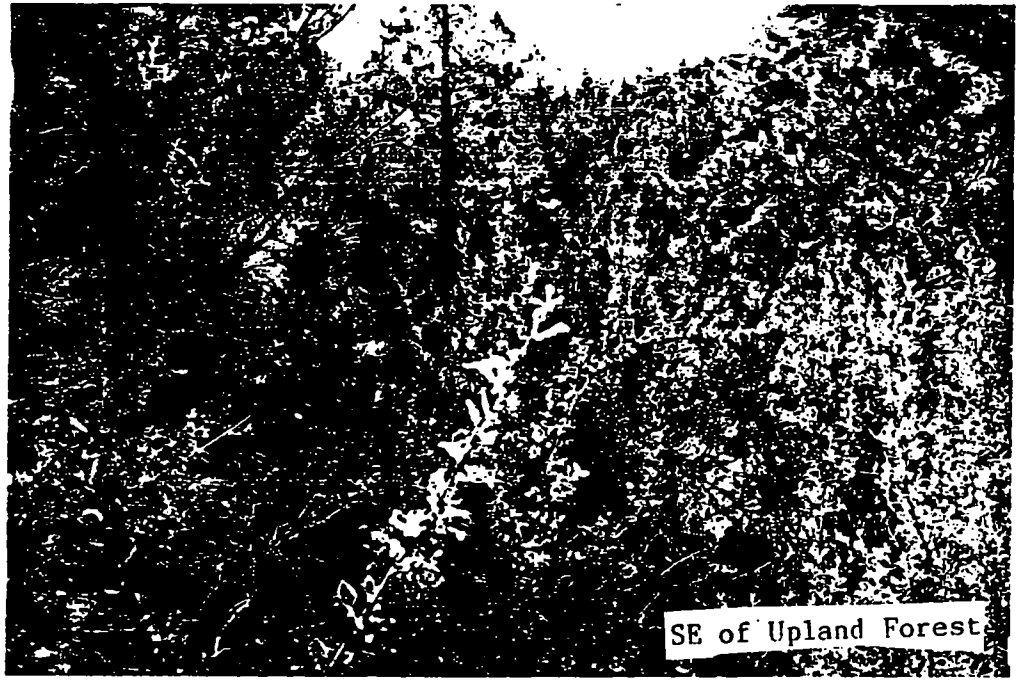

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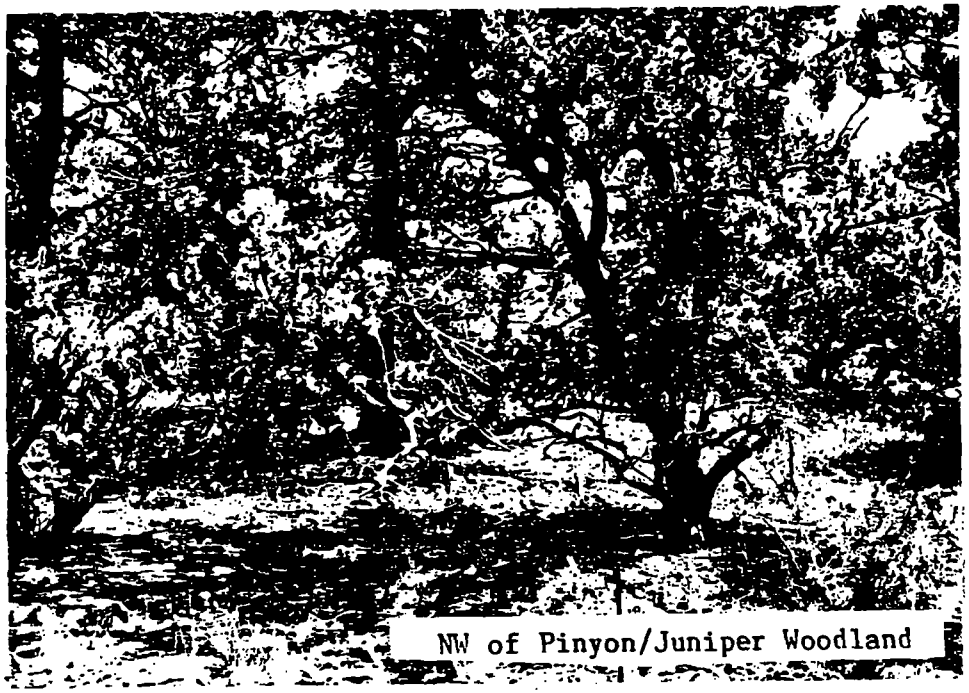

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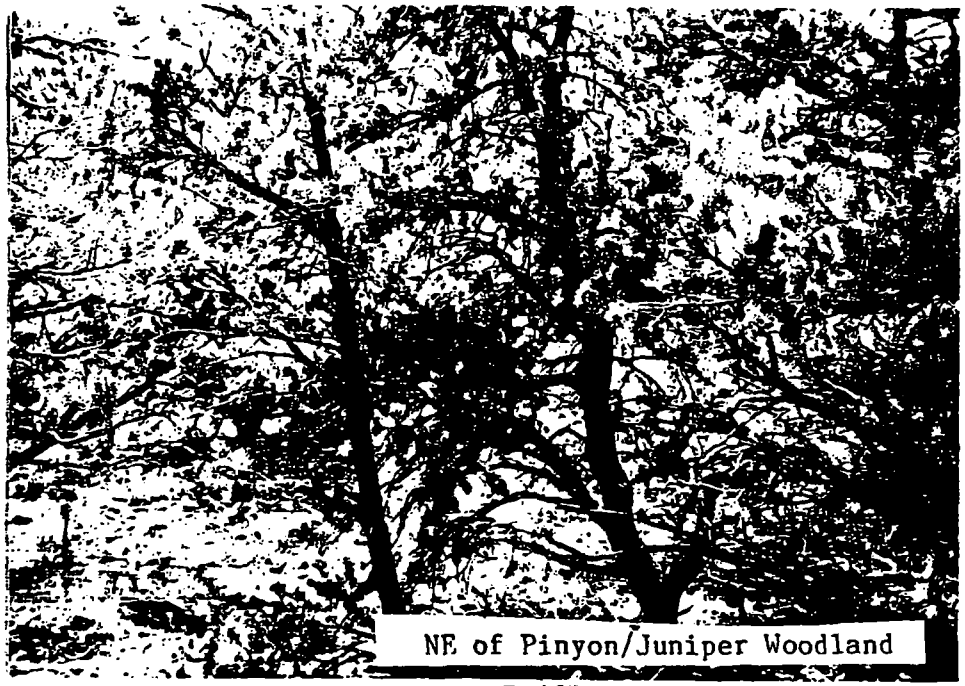

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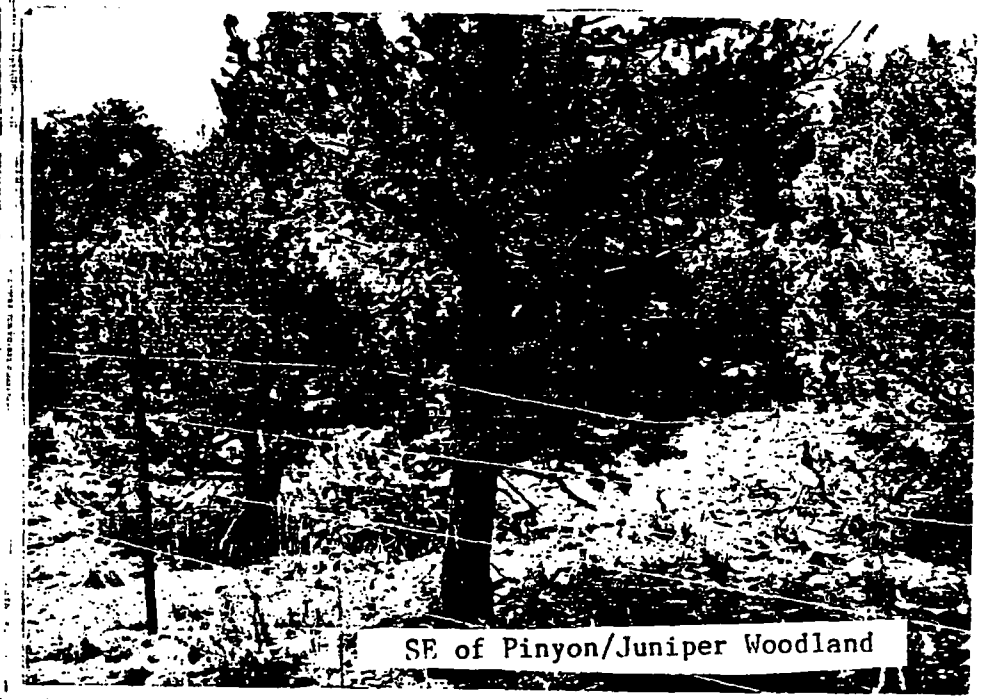

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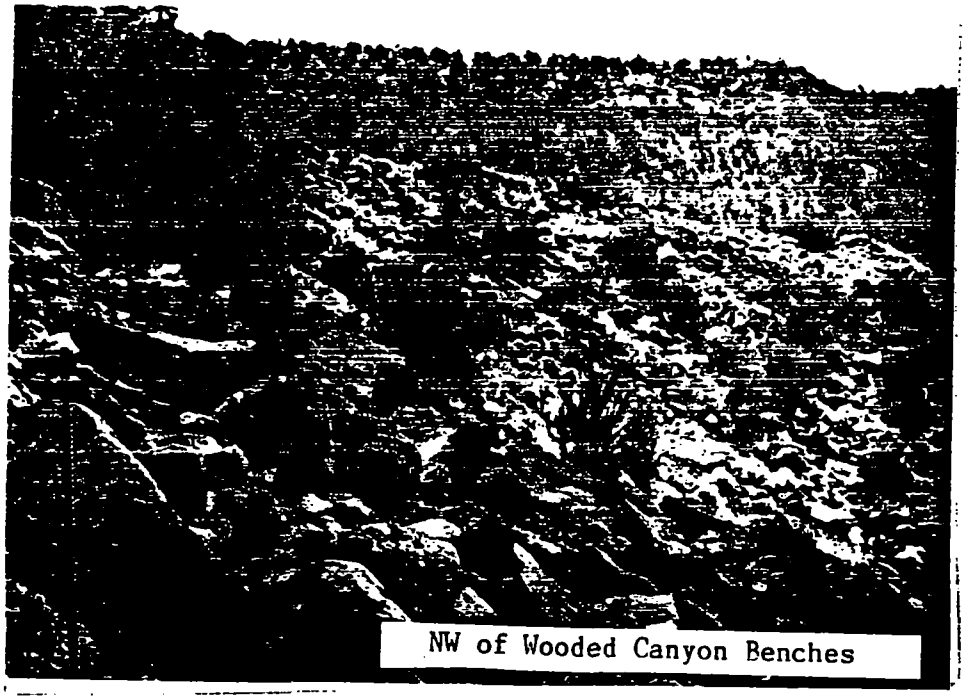

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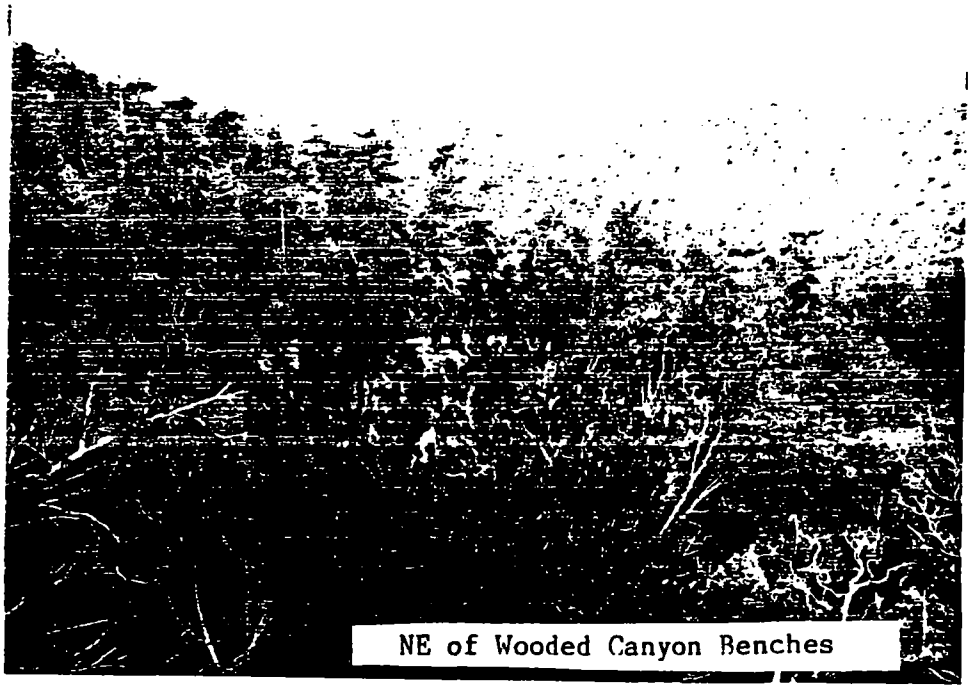

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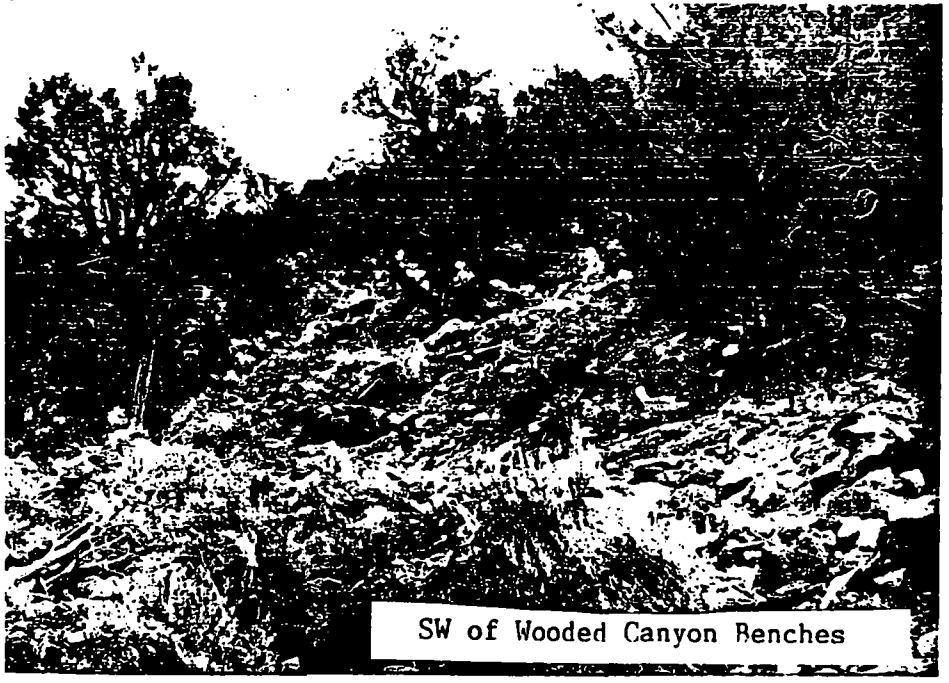

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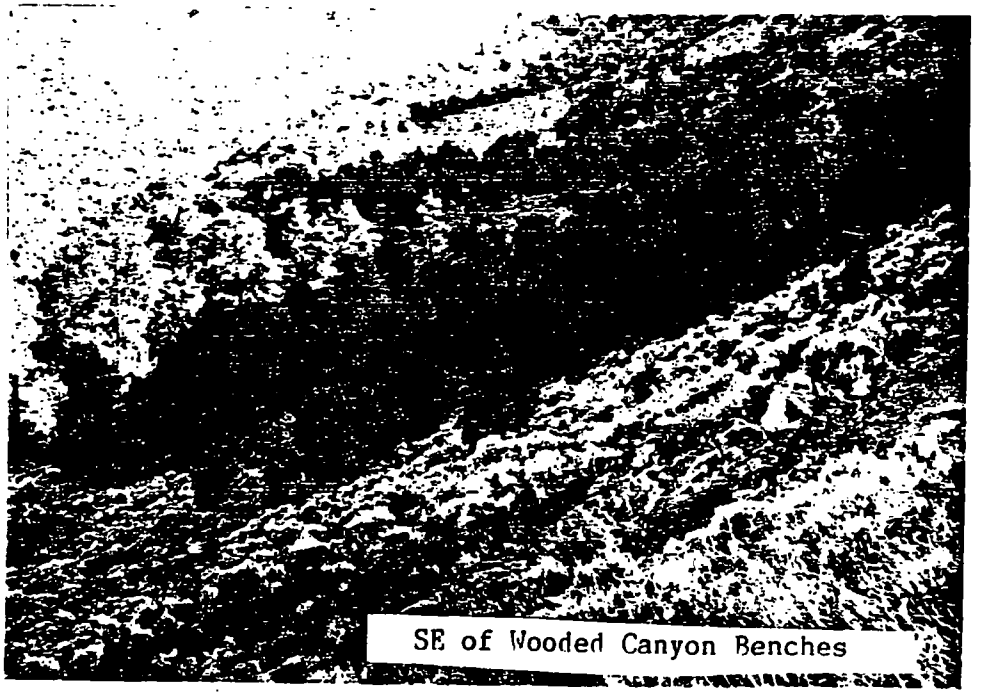

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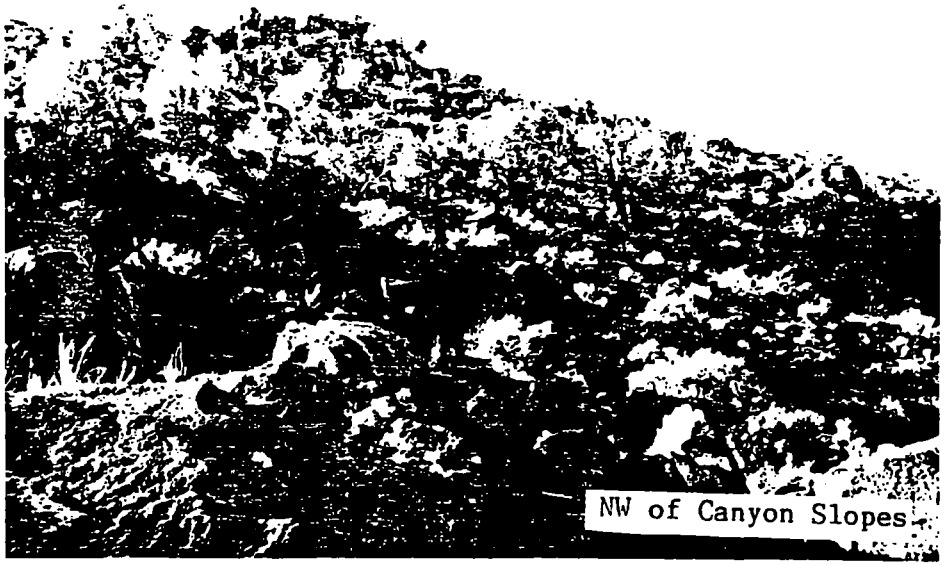

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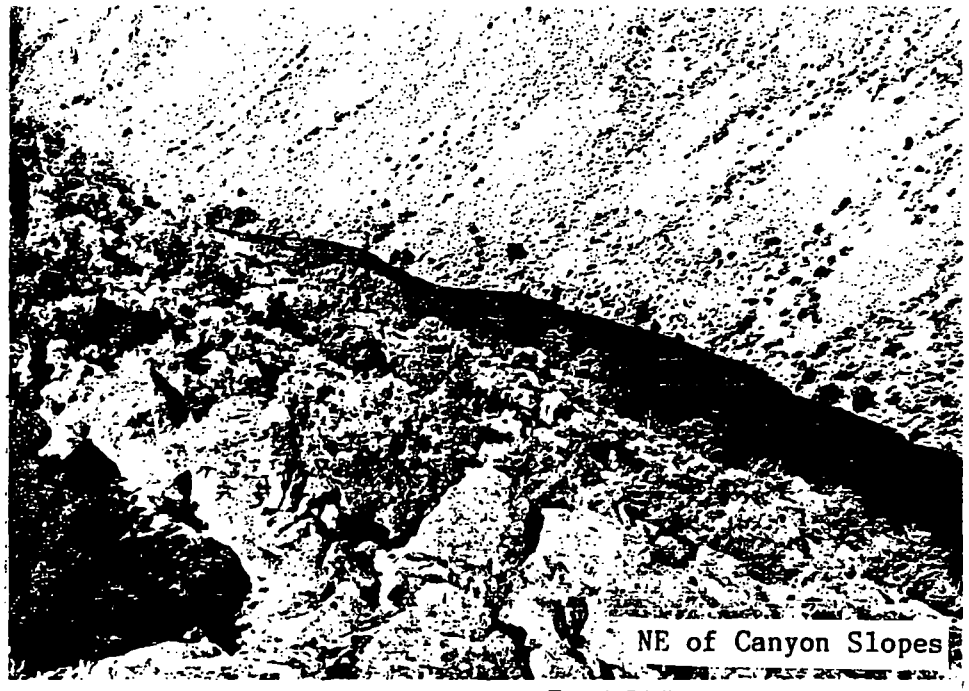

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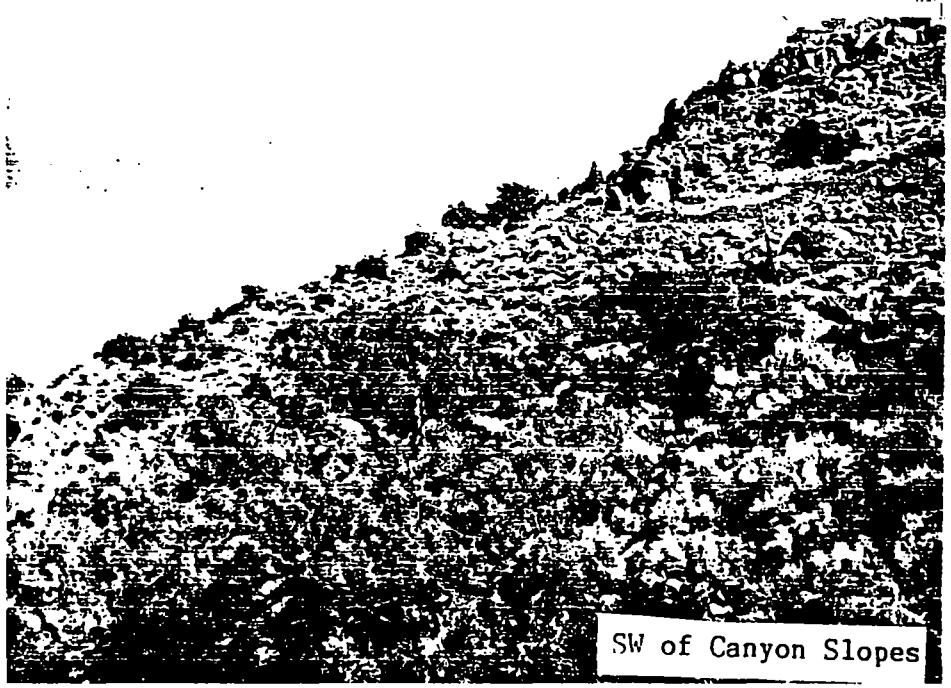

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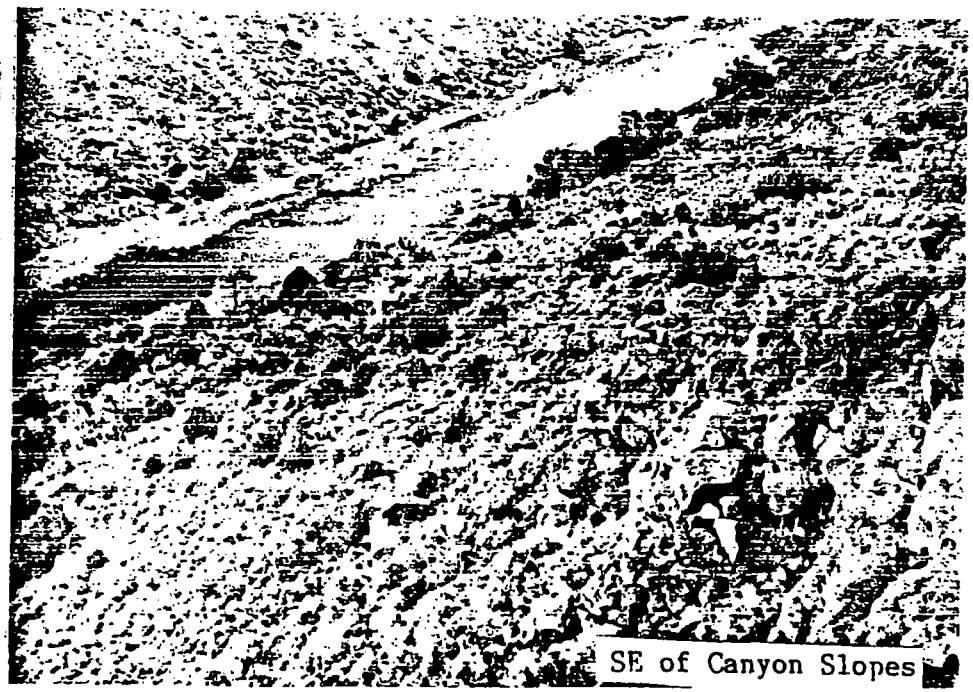

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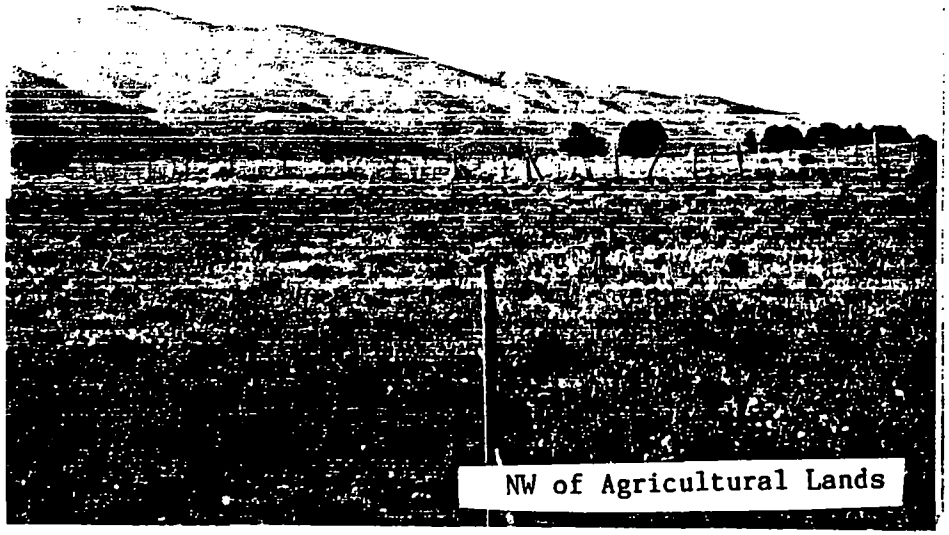
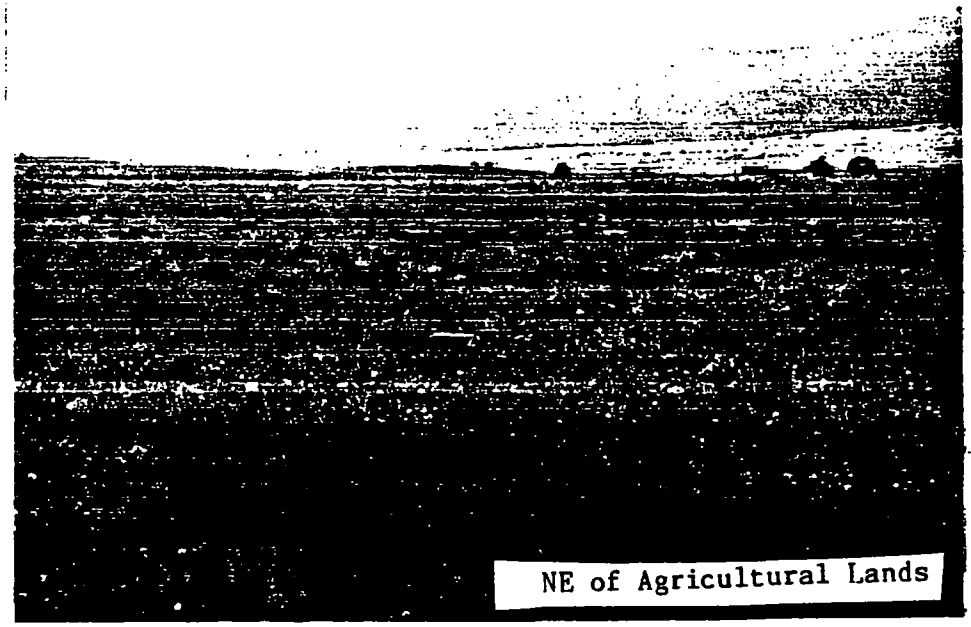


NW of Agricultural Lands



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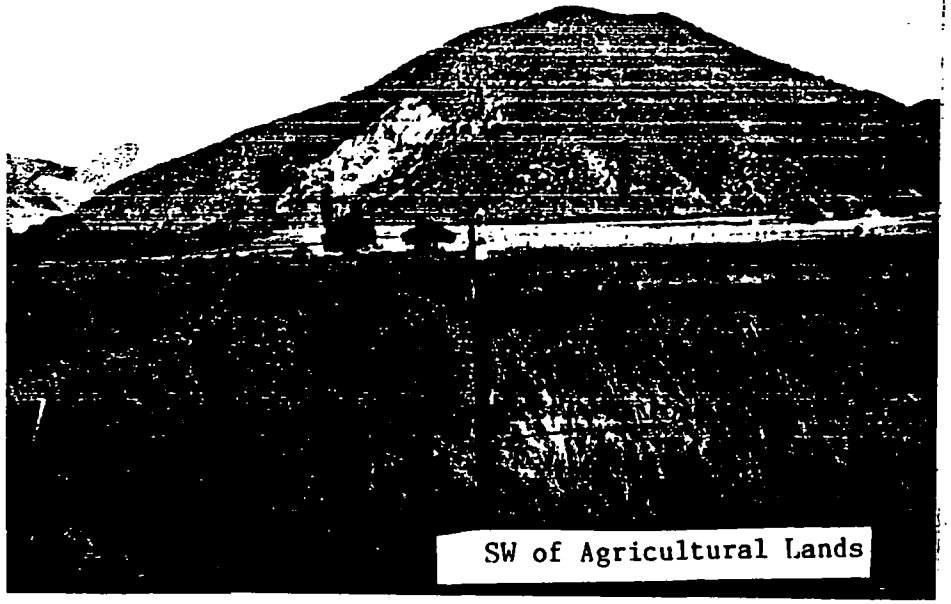

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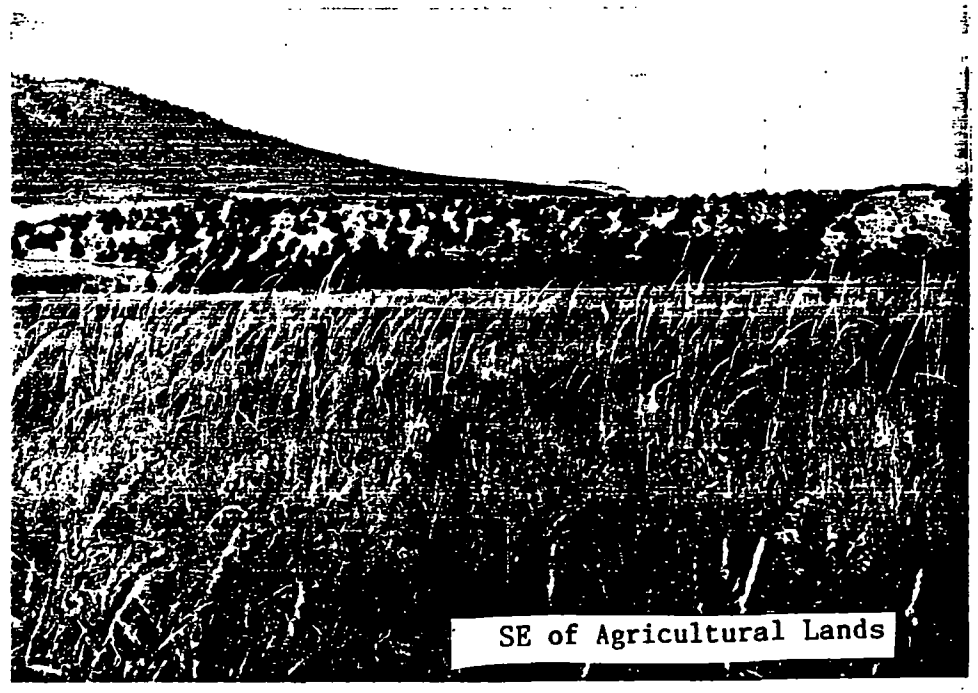
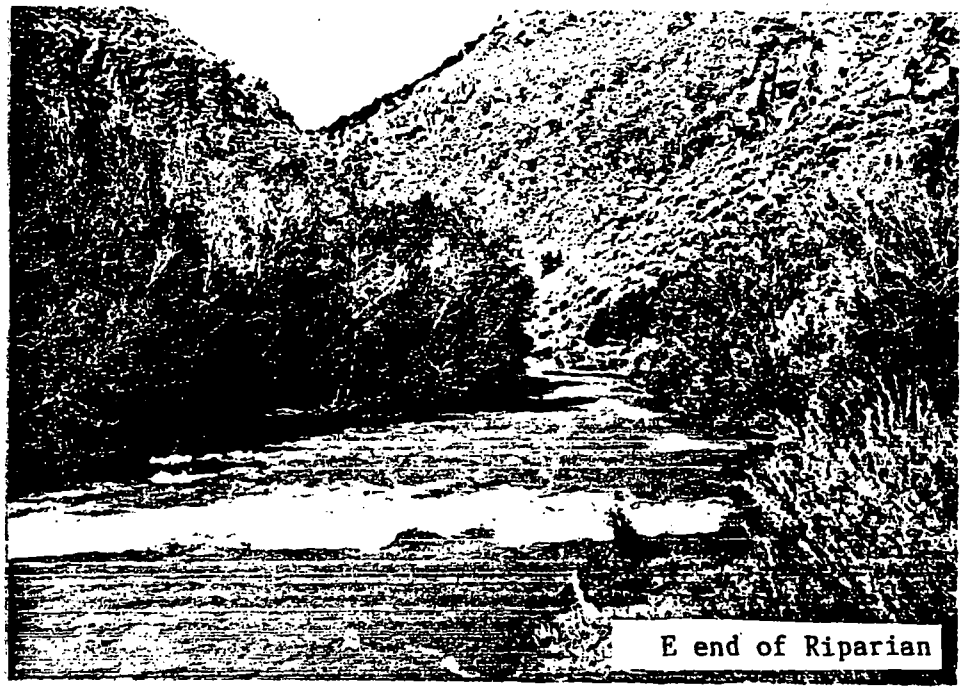


SE of Agricultural Lands

W end of Riparian



E end of Riparian

D.0 APPENDIX D - ADDITIONAL SPECIES OF BIRDS DOCUMENTED DURING STUDY

Appendix D. Avian species documented by Eagle Environmental, Inc. on the GMSA during this study, though not on an avian census grid.

Species	Date	Habitat Site	Relative Abundance	Status
Eared Grebe	various	Mill Tailings	U	T
White-faced Ibis	4-25-85	" "	U	T
Green-winged Teal	various	" "	C	T
Mallard	"	" "	SR	T
Blue-winged Teal	"	" "	C	T
Cinnamon Teal	5-27-85	" "	U	T
Northern Shoveler	various	" "	C	T
Gadwall	"	" "	C	T
American Wigeon	"	" "	C	T
Redhead	"	" "	C	T
Ring-necked Duck	"	" "	C	T
Lesser Scaup	5-27-85	" "	U	T
Hooded Merganser	5-16-85	" "	U	T
Ruddy Duck	various	" "	C	T
Sharp-shinned Hawk	9-14-84	Canyon Slopes	U	R
Northern Goshawk	5-09-85	Upland Forest	U	R
	6-09-85	" "		
Red-tailed Hawk	various	all	C	R
Golden Eagle	"	Sagebrush/Grassland	U	R
Prairie Falcon	5-06-85	Sagebrush/Grassland	U	R
American Coot	various	Mill Tailings	C	T
Semi-palmated Sandpiper	4-26-85	" "	U	T
Killdeer	various	" "	C	SR
American Avocet	"	" "	C	T
Greater Yellowlegs	5-16-85	" "	U	T
Willet	various	" "	U	T
Spotted Sandpiper	"	" "	C	SR
Marbled Godwit	"	" "	U	T
Long-billed Dowitcher	5-09-85	" "	U	T
Common Snipe	various	" "	U	T
Wilson's Phalarope	"	" "	C	T
Ring-billed Gull	"	" "	C	SR
Flammulated Owl	6-21-85	Upland Forest	U	SR
Western Screech Owl	9-15-84	Pinyon/Juniper Woodland	U	SR
Burrowing Owl	4-25-85	Sagebrush/Grassland	U	SR
Common Poorwill	5-17-85	Pinyon/Juniper Woodland	U	SR
Belted Kingfisher	various	Riparian	U	R
Lewis' Woodpecker	4-25-85	Agricultural Lands	U	R
Western Flycatcher	5-28-85	Pinyon/Juniper Woodland	U	SR
Eastern Kingbird	6-04-85	Agricultural Lands	U	SR
Tree Swallow	various	Mill Tailings	C	T

Appendix D. (Concluded).

Species	Date	Habitat Site	Relative Abundance	Status
Northern Rough-winged Swallow	"	" "	C	T
Blue-gray Gnatcatcher	5-28-85	Pinyon/Juniper Woodland	U	SR
Hermit Thrush	various	Pinyon/Juniper Woodland	U	SR
Northern Mockingbird	4-24-85	Sagebrush/Grassland	U	R
Grace's Warbler	various	Upland Forest	U	SR
Hepatic Tanager	5-29-85 6-07-85	Wooded Canyon Benches	U	SR
Rose-breasted Grosbeak	5-16-85	Canyon Slopes		
Lesser Goldfinch	8-23-84	Pinyon/Juniper Woodland	U	SR

Abundance Categories

A - species is almost always seen in large numbers.
C - species is usually seen in numbers in suitable habitat.
U - species is not often seen but is not out of range.
R - species is very infrequently seen in the study area or is out of normal range.

Status Categories

R - species is resident in study area year-round.
SR - species is resident only during summer; often a breeding species.
T - species only occurs in study area during periods of spring or fall migration; or a wandering species.

R-1

FALL 1994 VEGETATION SURVEY

AT THE MOLYCORP INC. TAILINGS PILE

AND TAILINGS POND IN NORTHERN

NEW MEXICO

DECEMBER 1, 1994

Submitted by:

Anne M. Wagner, Ph.D.

John T. Harrington, Ph.D.

for

Vail Engineering, Inc.

Santa Fe, NM

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Table 22. Deleted

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LISTS

Species list.

FIGURES

Figure 1. Aspect/Elevation breakdown map of tailings piles.

Figure 2. Plot locations.

SAMPLING PROCEDURE

Plot Determination

Boundaries of the overburden piles were delineated on the 6-5-1991 topographic map of the Questa mine site. The overburden piles were divided into elevation (4) and aspect categories (6; Figure 1, Table 1, 2). The resulting 103 divisions fell into 19 of the potential 24 elevation/aspect categories (Table 1).

Table 1. Elevation and aspect categories delineated for the Questa mine site. The number inside the cell refers to the number of delineated overburden units which are located in the particular elevation/aspect category.

ASPECT/ ELEVATION	N 315.0 - 45.0	E 45.0 - 112.5	SE 112.5 - 157.5	S 157.5 - 202.5	SW 202.5 - 247.5	W 247.5 - 315.0
Less than 8,500'	0	0	9	7	2	0
8,500' - 9,000'	2	4	6	3	6	7
9,000' - 9,500'	3	6	11	6	8	3
greater than 9,500'	0	4	2	0	7	6

Using land adjacent to the Questa mine site, 10 - 1/20th acre overstory plots and 10 - 1/100th understory plots were surveyed for vegetation analysis in each of the elevation/aspect categories present on the overburden piles. Two criteria were used to locate sample plots. First, plots were located to maximize the diversity of the vegetation surveyed and the second criteria was plot accessibility. This type of sampling is not

Table 2. Map codes for aspect and elevation categories.

Map Code	Elevation	Aspect
1A	8000-8500	150
1B	8000-8500	132
1C	8000-8500	120
1D	8000-8500	148
1E	8000-8500	120
1F	8000-8500	141
1G	8000-8500	165
1H	8000-8500	137
1I	8000-8500	210
1J	8000-8500	171
1K	8000-8500	131
1L	8000-8500	163
1M	8000-8500	207
1N	8000-8500	180
1O	8000-8500	162
1P	8000-8500	173
1Q	8000-8500	188
1R	8000-8500	120
2A	8500-9000	237
2B	8500-9000	260
2C	8500-9000	295
2D	8500-9000	61
2E	8500-9000	150
2F	8500-9000	120
2G	8500-9000	148
2H	8500-9000	120
2I	8500-9000	137
2J	8500-9000	65
2K	8500-9000	6

Table 2 continued. Map codes for aspect and elevation categories.

Map Code	Elevation	Aspect
4L	8500-9000	72
4M	8500-9000	208
4N	8500-9000	108
4O	8500-9000	152
2P	8500-9000	196
2Q	8500-9000	245
2R	8500-9000	250
2S	8500-9000	201
2T	8500-9000	184
2U	8500-9000	233
2V	8500-9000	272
2W	8500-9000	8
2X	8500-9000	215
2Y	8500-9000	275
2Z	8500-9000	280
2AA	8500-9000	312
2AB	8500-9000	220
3A	9000-9500	120
3B	9000-9500	160
3C	9000-9500	188
3D	9000-9500	183
3E	9000-9500	215
3F	9000-9500	177
3G	9000-9500	128
3H	9000-9500	214
3I	9000-9500	173
3J	9000-9500	232
3K	9000-9500	215
3L	9000-9500	125

Table 2 continued. Map codes for aspect and elevation categories.

Map Code	Elevation	Aspect
3M	9000-9500	14
3N	9000-9500	350
3O	9000-9500	65
3P	9000-9500	96
3Q	9000-9500	120
3R	9000-9500	148
3S	9000-9500	129
3T	9000-9500	120
3U	9000-9500	150
3V	9000-9500	156
3W	9000-9500	237
3X	9000-9500	260
3Y	9000-9500	236
3Z	9000-9500	275
3AA	9000-9500	325
3AB	9000-9500	280
3AC	9000-9500	228
3AD	9000-9500	188
3AE	9000-9500	135
3AF	9000-9500	136
3AG	9000-9500	215
3AH	9000-9500	95
3AI	9000-9500	92
3AJ	9000-9500	66
3AK	9000-9500	92
4A	> 9500	215
4B	> 9500	128
4C	> 9500	215
4D	> 9500	86

Table 2 continued. Map codes for aspect and elevation categories.

Map Code	Elevation	Aspect
4E	> 9500	92
4F	> 9500	66
4G	> 9500	92
4H	> 9500	150
4I	> 9500	260
4J	> 9500	296
4K	> 9500	241
4L	> 9500	248
4M	> 9500	237
4N	> 9500	305
4O	> 9500	278
4P	> 9500	230
4Q	> 9500	214
4R	> 9500	258
4S	> 9500	225

to be considered systematic and unbiased and therefore the data presented in this report should not be used to imply abundance of plant species or habitat types in the area of the Questa mine site. The plot locations are illustrated in Figure 2.

Seven plots were surveyed along a drainage beneath a hydrothermal scar approximately 3 miles north of the mine site. Ten additional plots were also taken along the west side of the tailings pond near the town of Questa, NM. These plots were located from immediately below the dam, north to above the tailings pond area.

Plot Procedure

At each plot a 1/20th acre, circular plot (52.6 ft. diameter) was delineated for overstory plant sampling. Tree species and diameter at 4.5 ft. were recorded for all trees in the plot with a diameter at 4.5 ft. greater than 3/4 in. Diameters were measured using either a diameter tape or a biltmore cruising stick and recorded to the nearest inch. All trees less than 3/4 in. diameter at 4.5 ft. were recorded as overstory regeneration by species.

At each plot, a 1/100th acre circular plot (23.6 ft. diameter) was delineated for understory (shrub, forb and grass) presence and abundance. Visual estimations of percent ground cover, and percent coverage for each species present were made to the nearest 5%. Overstory tree species were not included in this portion of the survey. Some species, such as willow, oak,

mountain mahogany may be included in both overstory and understory categories.

Species were either identified in the field or samples taken and identified at a later time. (See references cited for plant identification texts used during this process). Due to the timing of the survey 10/9-11/94, and 11/2-8/94 some plants were only identified as to genus. This is due to the lack of leaf and/or floral parts used to identify at the species level. In addition, some species are tentatively identified based on plant material available. Many forbs were not identified because of lack of floral parts. On some plots, ground cover estimates on the 1/100th acre plots were not made because of snow cover, however when possible, plant samples were taken.

RESULTS

Data is presented in several tabular forms for ease of indexing and presentation as well as a brief narrative.

Tabular Information

The following tables provide summary plot information in several formats. Tables 3 through 22 and Tables 30 and 31 report information regarding overstory vegetation. Tables 24 through 29 and Table 32 report information regarding understory vegetation. For both overstory and understory vegetation two types of information are provided in the tables. First, is the frequency of occurrence of a given plant species, and second the range in relative abundance observed of the species. Some tables contain the same data; however, the format in which the data is presented

is somewhat different. For instance, Table 3 contains the same information which can be found in Tables 6, 9, 12, and 15. Thus allowing the data to be sorted by plant species or by site category. This should simplify use of the information.

Tables 3 through 20 present information on the frequency (number of plots a species occurred) of overstory species. Tables 23 and 24 present information regarding the range in abundance of understory species types (grass, forb, and shrub). Tables 25 through 29 report information on the frequency (number of plots a species occurred) of understory species.

Finally, Table 30 contains information pertaining to the occurrence of overstory species occurring along the drainage beneath the hydrothermal scar. Table 31 contains information on the presence of overstory species at the tailings pond site. Table 32 contains information regarding understory species presence at the tailings pond site.

Narrative

Throughout all aspect and elevation categories several trends were apparent. First, was the presence of rocky sites void of all vegetation. In some, but not all, aspect elevation categories plots were put in on these areas. The lack of placing a plot on such an area does not imply there are no such areas in those aspect and elevation categories. Second, there was a pronounced lack of understory vegetation on sites under the influence, (either located on or immediately beneath), of hydrothermal scars. It is also interesting to note that no *Abies concolor* existed on these sites. Finally, regarding the

overstory coniferous species. The presence or evidence of previous presence of many pests occur throughout the study area. Pinus flexilis, P. edulis, Juniperus scopulorum and Abies concolor are the only species present not currently influenced by pests.

Lastly, it is recommended that a series of less intensive surveys be conducted at several times throughout the growing season to further add to the species list, especially those annual and perennial species which were not identifiable at the time of these surveys.

Table 3. Overstory species present by elevation and aspect class. Represents only overstory species without regeneration. Number represents number of plots species occurs out of 10 plots.

Elevation	Aspect	SWP[1]	PP	PIN	DF	WF	ES	JUN	ASP	RMM	CT	WI	OK	MM
8000-8500	SW	5	5	7	5	8		4					4	3
8000-8500	S	1	5	6	3	3		6					4	4
8000-8500	SE	1	1	4		2		6					5	2
8500-9000	SW		1	7	4	5		9					3	2
8500-9000	S	3	4	2	4	3					1		3	
8500-9000	SE	3	1	4	6	2		4					1	1
8500-9000	N	5	3		8	10		4		1				
8500-9000	E	4	6	4	5	5	1	4			1			
8500-9000	W	7	2	3	9	7		4						
9000-9500	SW	1	5	2	8	6		3					1	1
9000-9500	S	3	4	5	5	3		5		1			1	
9000-9500	SE		4	4	2	2		6					1	2
9000-9500	N**	8	6		9	11		1	1	1		1		
9000-9500	E***	2	3	1	7	7		3						
9000-9500	W	5	4	1	7	8		4	1	1		1		1
>9500	SW	7			7	7		8						1
>9500	SE	7	2		5	3			2			1	4	2
>9500	E	6	4		9	3			3			1		1
>9500	W	2	3		9	10		1	1					

** Eleven plots were sampled at this elevation/aspect.
*** Nine plots were sampled at this elevation/aspect.

[1]Abbreviations as follows:

SWP - Southwestern white pine (*Pinus flexilis*)
PP - Ponderosa pine (*P. ponderosa*)
PIN - Piñon pine (*P. edulis*)
DF - Douglas fir (*Pseudotsuga menziesii*)
WF - White fir (*Abies concolor*)
ES - Engelmann spruce (*Picea engelmannii*)
JUN - Rocky Mountain juniper (*Juniperus scopulorum*)
ASP - Aspen (*Populus tremuloides*)
RMM - Rocky Mountain maple (*Acer glabrum*)
CT - Narrow leaf cottonwood (*Populus angustifolia*)
WL - Willow (*Salix* spp.)
OK - Oak (*Quercus gambelii*)
MM - Mountain mahogany (*Cercocarpus ledifolius*)

Table 4. Overstory species present by elevation and aspect class. Represents overstory species and regeneration. Number represents number of plots species occurs out of 10 plots.

Elevation	Aspect	SWP[1]	PP	PIN	DF	WF	ES	JUN	ASP	RMM	CT	WI	OK	MM
8000-8500	SW	5	5	8	5	8		4					4	3
8000-8500	S	1	5	6	3	3		6					4	4
8000-8500	SE	1	1	4		3		6					5	2
8500-9000	SW	2	1	7	4	5		9					3	2
8500-9000	S	6	6	4	6	4		2			2		3	
8500-9000	SE	4	2	4	7	2		5					1	1
8500-9000	N	7	5	1	8	10		6		1				
8500-9000	E	5	7	5	7	5	1	5			1			
8500-9000	W	9	2	3	9	7		4						
9000-9500	SW	2	5	3	8	7		4					1	1
9000-9500	S	5	4	7	5	5		6		1			1	
9000-9500	SE		3	7	2	3		9					1	2
9000-9500	N	10	6		11	11		3	1	1		1		
9000-9500	E	4	3	1	7	7		5						
9000-9500	W	5	4	1	8	9		4	1	1		1		1
>9500	SW	8		4	9	8		9						1
>9500	SE	8	4	4	6	6		3	4			2	6	4
>9500	E	8	5		10	9		2	7			2		1
>9500	W	2	3		9	10		2	1					

Table 5. Overstory species present by elevation and aspect class. Represents only overstory species regeneration. Number represents number of plots species occurs out of 10 plots.

Elevation	Aspect	SWP[1]	PP	PIN	DF	WF	ES	JUN	ASP	RMM	CT	WI	OK	MM
8000-8500	SW	4	2	6	2	2		1						
8000-8500	S	1		3	1			4						
8000-8500	SE			1		1								
8500-9000	SW	2	1	5	1	3		3						
8500-9000	S	4	5	3	5	2		2			1			
8500-9000	SE	1	1	3	2	1		2						
8500-9000	N	4	3	1	6	9		4						
8500-9000	E	2	3	3	4	2		4						
8500-9000	W	4		2	4	3		4						
9000-9500	SW	1		2	3	1		2						
9000-9500	S	3	1	4	1	3		4						
9000-9500	SE			3		2		7						
9000-9500	N	8			9	8		2	2					
9000-9500	E	3	1	1	6	2		5						
9000-9500	W	3			7	7		4	1	1		1		
>9500	SW	6		5	7	4		1						
>9500	SE	3	2	3	6	4		3	4					
>9500	E	6			10	9		2	7					
>9500	W	1	1		7	8		1	1					

Table 6. Overstory species present in plots. Represents only overstory trees. Number is number of plots species occurs out of 10 plots.

Elevation: 8,000 to 8,500 ft.

Species	Aspect: Southwest	Aspect: South	Aspect: Southeast
P. flexilis	5	1	1
P. ponderosa	5	5	1
P. edulis	7	6	4
P. menziesii	5	3	
A. concolor	8	3	2
P. englemannii			
J. scopulorum	4	6	9
P. tremuloides			
A. glabrum			
P. angustifolia			
Salix spp.			
Q. gambelii	4	4	3
C. ledifolius	3	4	2

Table 7. Overstory species and regeneration present in plots. Number is number of plots species occurs out of 10 plots.

Elevation: 8,000 to 8,500 ft.

Species	Aspect: Southwest	Aspect: South	Aspect: Southeast
P. flexilis	5	1	1
P. ponderosa	5	5	1
P. edulis	8	6	4
P. menziesii	5	3	
A. concolor	8	3	3
P. englemannii			
J. scopulorum	4	6	6
P. tremuloides			
A. glabrum			
P. angustifolia			
Salix spp.			
Q. gambelii	4	4	5
C. ledifolius	3	4	2

Table 8. Overstory species regeneration present in plots. Number is number of plots species occurs out of 10 plots.

Elevation: 8,000 to 8,500 ft.

Species	Aspect: Southwest	Aspect: South	Aspect: Southeast
P. flexilis	4	1	
P. ponderosa	2		
P. edulis	6	3	1
P. menziesii	2	1	
A. concolor	2		1
P. englemannii			
J. scopulorum	1	4	
P. tremuloides			
A. glabrum			
P. angustifolia			
Salix spp.			
Q. gambelii			
C. ledifolius			

Table 9. Overstory species present in plots. Represents only overstory trees present. Number is number of plots species occurs out of 10 plots.

Elevation: 8,500 to 9,000 ft.

Species	Aspect SW	Aspect South	Aspect SE	Aspect North	Aspect East	Aspect West
P. flexilis		3	3	5	4	7
P. ponderosa	1	4	1	3	6	2
P. edulis	7	2	4		4	3
P. menziesii	4	4	6	8	5	9
A. concolor	5	3	2	10	5	7
P. englemannii					1	
J. scopulorum	9		4	4	4	4
P. tremuloides						
A. glabrum				1		
P. angustifolia		1			1	
Salix spp.						
Q. gambelii	3	3	1			
C. ledifolius	2		1			

Table 10. Overstory species and regeneration present in plots. Number is number of plots species occurs out of 10 plots.

Elevation: 8,500 to 9,000 ft.

Species	Aspect SW	Aspect South	Aspect SE	Aspect North	Aspect East	Aspect West
P. flexilis	2	6	4	7	5	9
P. ponderosa	1	6	2	5	7	2
P. edulis	7	4	4	1	5	3
P. menziesii	4	6	7	8	7	9
A. concolor	5	4	2	10	5	7
P. englemannii					1	
J. scopulorum	9	2	5	6	5	4
P. tremuloides						
A. glabrum				1		
P. angustifolia		2			1	
Salix spp.						
Q. gambelii	3	3	1			
C. ledifolius	2		1			

Table 11. Overstory species regeneration present in plots. Number is number of plots species occurs out of 10 plots.

Elevation: 8,500 to 9,000 ft.

Species	Aspect SW	Aspect South	Aspect SE	Aspect North	Aspect East	Aspect West
P. flexilis	2	4	1	4	2	4
P. ponderosa	1	5	1	3	3	
P. edulis	5	3	3	1	3	2
P. menziesii	1	5	2	6	4	4
A. concolor	3	2	1	9	2	3
P. englemannii						
J. scopulorum	3	2	2	4	4	4
P. tremuloides						
A. glabrum						
P. angustifolia		1				
Salix spp.						
Q. gambelii						
C. ledifolius						

Table 12. Overstory species present in plots. Represents only overstory trees present. Number is number of plots species occurs out of 10 plots.

Elevation: 9,000 to 9,500 ft.

Species	Aspect SW	Aspect South	Aspect SE	Aspect North	Aspect East	Aspect West
P. flexilis	1	3		8	2	5
P. ponderosa	5	4	4	6	3	4
P. edulis	2	5	4		1	1
P. menziesii	8	5	2	9	7	7
A. concolor	6	3	2	11	7	8
P. englemannii						
J. scopulorum	3	5	6	1	3	4
P. tremuloides				1		1
A. glabrum		1		1		1
P. angustifolia						
Salix spp.				1		1
Q. gambelii	1	1	1			
C. ledifolius	1		2			1

Table 13. Overstory species and regeneration present in plots. Number is number of plots species occurs out of 10 plots.

Elevation: 9,000 to 9,500 ft.

Species	Aspect SW	Aspect South	Aspect SE	Aspect North	Aspect East	Aspect West
P. flexilis	2	5		10	4	5
P. ponderosa	5	4	3	6	3	4
P. edulis	3	7	7		1	1
P. menziesii	8	5	2	11	7	8
A. concolor	7	5	3	11	7	9
P. englemannii						
J. scopulorum	4	6	9	3	5	4
P. tremuloides				1		1
A. glabrum		1		1		1
P. angustifolia						
Salix spp.				1		1
Q. gambelii	1	1	1			
C. ledifolius	1		2			1

Table 14. Overstory species regeneration present in plots. Number is number of plots species occurs out of 10 plots.

Elevation: 9,000 to 9,500 ft.

Species	Aspect SW	Aspect South	Aspect SE	Aspect North	Aspect East	Aspect West
P. flexilis	1	3		8	3	3
P. ponderosa		1			1	
P. edulis	2	4	3		1	
P. menziesii	3	1		9	6	7
A. concolor	1	3	2	8	2	7
P. englemannii						
J. scopulorum	2	4	7	2	5	4
P. tremuloides				2		1
A. glabrum						1
P. angustifolia						
Salix spp.						1
Q. gambelii						
C. ledifolius						

Table 15. Overstory species present in plots. Represents only overstory trees present. Number is number of plots species occurs out of 10 plots.

Elevation: >9,500 ft.

Species	Aspect: Southwest	Aspect: Southeast	Aspect: East	Aspect: West
P. flexilis	7	7	6	2
P. ponderosa		2	4	3
P. edulis				
P. menziesii	7	5	9	9
A. concolor	7	3	3	10
P. englemannii				
J. scopulorum	8			1
P. tremuloides		2	3	1
A. glabrum				
P. angustifolia				
Salix spp.		1	1	
Q. gambelii		4		
C. ledifolius	1	2	1	

Table 16. Overstory species and regeneration present in plots. Number is number of plots species occurs out of 10 plots.

Elevation: >9,500 ft.

Species	Aspect: Southwest	Aspect: Southeast	Aspect: East	Aspect: West
P. flexilis	8	8	8	2
P. ponderosa		4	5	3
P. edulis	4	4		
P. menziesii	9	6	10	9
A. concolor	8	6	9	10
P. englemannii				
J. scopulorum	9	3	2	2
P. tremuloides		4	7	1
A. glabrum				
P. angustifolia				
Salix spp.		2	2	
Q. gambelii		6		
C. ledifolius	1	4	1	

Table 17. Overstory species regeneration present in plots. Number is number of plots species occurs out of 10 plots.

Elevation: >9,500 ft.

Species	Aspect: Southwest	Aspect: Southeast	Aspect: East	Aspect: West
P. flexilis	6	3	6	1
P. ponderosa		2		1
P. edulis	5	3		
P. menziesii	7	6	10	7
A. concolor	4	4	9	8
P. englemannii				
J. scopulorum	1	3	2	1
P. tremuloides		4	7	1
A. glabrum				
P. angustifolia				
Salix spp.				
Q. gambelii				
C. ledifolius				

Table 18. Overstory species present by elevation class. Represents only overstory trees.

Species	Elevation	Aspects Present
P. flexilis	8000-8500	SW, S, SE
P. flexilis	8500-9000	S, SE, N, E, W
P. flexilis	9000-9500	SW, S, N, E, W
P. flexilis	> 9500	SW, SE, E, W
P. ponderosa	8000-8500	SW, S, SE
P. ponderosa	8500-9000	SW, S, SE, N, E, W
P. ponderosa	9000-9500	SW, S, SE, N, E, W
P. ponderosa	> 9500	SE, E, W
P. edulis	8000-8500	SW, S, SE
P. edulis	8500-9000	SW, S, SE, E, W
P. edulis	9000-9500	SW, S, SE, E, W
P. menziesii	8000-8500	SW, S
P. menziesii	8500-9000	SW, S, SE, N, E, W
P. menziesii	9000-9500	SW, S, SE, N, E, W
P. menziesii	> 9500	SW, SE, E, W
A. concolor	8000-8500	SW, S, SE
A. concolor	8500-9000	SW, S, SE, N, E, W
A. concolor	9000-9500	SW, S, SE, N, E, W
A. concolor	> 9500	SW, SE, E, W
P. englemannii	8500-9000	E
J. scopulorum	8000-8500	SW, S, SE
J. scopulorum	8500-9000	SW, SE, N, E, W
J. scopulorum	9000-9500	SW, S, SE, N, E, W
J. scopulorum	> 9500	SW, W
P. tremuloides	9000-9500	N, W
P. tremuloides	> 9500	SE, E, W
A. glabrum	8500-9000	N
A. glabrum	9000-9500	S, N, W

Table 18. Continued.

Species	Elevation	Aspects Present
P. angustifolia	8500-9000	S, E
Salix spp.	9000-9500	N, W
Salix spp.	> 9500	SE, E
Q. gambelii	8000-8500	SW, S, SE
Q. gambelii	8500-9000	SW, S, SE,
Q. gambelii	9000-9500	SW, S, SE
Q. gambelii	> 9500	SE
C. ledifolius	8000-8500	SW, S, SE
C. ledifolius	8500-9000	SW, SE
C. ledifolius	9000-9500	SW, SE, W
C. ledifolius	> 9500	SW, SE, E

Table 19. Overstory species present by elevation class. Represents both overstory trees and regeneration.

Species	Elevation	Aspects Present
P. flexilis	8000-8500	SW, S, SE
P. flexilis	8500-9000	SW, S, SE, N, E, W
P. flexilis	9000-9500	SW, S, N, E, W
P. flexilis	> 9500	SW, SE, E, W
P. ponderosa	8000-8500	SW, S, SE
P. ponderosa	8500-9000	SW, S, SE, N, E, W
P. ponderosa	9000-9500	SW, S, SE, N, E, W
P. ponderosa	> 9500	SE, E, W
P. edulis	8000-8500	SW, S, SE
P. edulis	8500-9000	SW, S, SE, N, E, W
P. edulis	9000-9500	SW, S, SE, E, W
P. edulis	> 9500	SW, SE
P. menziesii	8000-8500	SW, S
P. menziesii	8500-9000	SW, S, SE, N, E, W
P. menziesii	9000-9500	SW, S, N, E, W
P. menziesii	> 9500	SW, SE, E, W
A. concolor	8000-8500	SW, S, SE
A. concolor	8500-9000	SW, S, SE, N, E, W
A. concolor	9000-9500	SW, S, SE, N, E, W
A. concolor	> 9500	SW, SE, E, W
P. englemannii	8500-9000	E
J. scopulorum	8000-8500	SW, S, SE
J. scopulorum	8500-9000	SW, S, SE, N, E, W
J. scopulorum	9000-9500	SW, S, SE, N, E, W
J. scopulorum	> 9500	SW, SE, E, W
P. tremuloides	9000-9500	N, W
P. tremuloides	> 9500	SE, E, W
A. glabrum	8500-9000	N
A. glabrum	9000-9500	S, N, W

Table 19. Continued.

Species	Elevation	Aspects Present
P. angustifolia	8500-9000	S, E
Salix spp.	9000-9500	N, W
Salix spp.	> 9500	SE, E
Q. gambelii	8000-8500	SW, S, SE
Q. gambelii	8500-9000	SW, S, SE,
Q. gambelii	9000-9500	SW, S, SE
Q. gambelii	> 9500	SE
C. ledifolius	8000-8500	SW, S, SE
C. ledifolius	8500-9000	SW, SE
C. ledifolius	9000-9500	SW, SE, W
C. ledifolius	> 9500	SW, SE, E

Table 20. Overstory species regeneration present by elevation class.

Species	Elevation	Aspects Present
P. flexilis	8000-8500	SW, S
P. flexilis	8500-9000	SW, S, SE, N, E, W
P. flexilis	9000-9500	SW, S, N, E, W
P. flexilis	> 9500	SW, SE, E, W
P. ponderosa	8000-8500	SW
P. ponderosa	8500-9000	SW, S, SE, N, E
P. ponderosa	9000-9500	S, E
P. ponderosa	> 9500	SE, W
P. edulis	8000-8500	SW, S, SE
P. edulis	8500-9000	SW, S, SE, N, E, W
P. edulis	9000-9500	SW, S, SE, E
P. edulis	> 9500	SW, SE
P. menziesii	8000-8500	SW, S
P. menziesii	8500-9000	SW, S, SE, N, E, W
P. menziesii	9000-9500	SW, S, SE, N, E, W
P. menziesii	> 9500	SW, SE, E, W
A. concolor	8000-8500	SW, SE
A. concolor	8500-9000	SW, S, SE, N, E, W
A. concolor	9000-9500	SW, S, SE, N, E, W
A. concolor	> 9500	SW, SE, E, W
J. scopulorum	8000-8500	SW, S
J. scopulorum	8500-9000	SW, S, SE, N, E, W
J. scopulorum	9000-9500	SW, S, SE, N, E, W
J. scopulorum	> 9500	SW,SE, E, W
P. tremuloides	9000-9500	N, W
P. tremuloides	> 9500	SE, E, W
A. glabrum	9000-9500	W
P. angustifolia	8500-9000	S
Salix spp.	9000-9500	W

Tables 21 and 22 were dropped from the report.

Table 23. Understory ground cover including range of percent ground cover and number of shrubs, grasses and forbs species present.

Elevation	Aspect	Range of cover (%)	No. of spp.	No. of shrub spp.	No. of grass spp.	No. of forb spp.
8000-8500	SW	< 5-40	13	6	4	3
8000-8500	S	5-30	12	4	3	5
8000-8500	SE	< 5-50	18	10	4	4
8500-9000	SW	10-90	17	7	5	5
8500-9000	S	0-50	14	5	4	5
8500-9000	SE	0-50	16	7	4	5
8500-9000	N	< 10-10*	12	6	3	3
8500-9000	E	0-40	13	6	6	1
8500-9000	W	0-30	14	6	5	3
9000-9500	SW	< 10-60	18	8	5	5
9000-9500	S	5-50	19	8	7	4
9000-9500	SE	< 5-80	23	7	9	7
9000-9500	N	10-40*	16	8	5	3
9000-9500	E	10-85	20	8	7	5
9000-9500	W	10-50	19	10	5	4
> 9500	SW	10-45	19	8	7	4
> 9500	SE	5-70	18	8	5	5
> 9500	E	1-30	15	8	4	3
> 9500	W	10-70	19	8	4	7

* Most of plots in this category were too snow covered to determine percent ground cover.

Table 24. Range of percent ground cover by cover type.

Elevation	Aspect	Range of % shrub cover	Range of % grass cover	Range of % forb cover
8000-8500	SW	0-100	0-90	0-10
8000-8500	S	0-100	0-99	0-10
8000-8500	SE	1-100	0-90	0-40
8500-9000	SW	5-100	2-95	2-15
8500-9000	S	0-100	0-100	0-90
8500-9000	SE	0-100	0-50	0-15
8500-9000	N	unable to	determine /	snow cover
8500-9000	E	0-100	0-100	0-10
8500-9000	W	1-100	0-100	0-10
9000-9500	SW	10-95	5-80	0-80
9000-9500	S	10-90	10-80	0-40
9000-9500	SE	0-85	10-95	0-50
9000-9500	N	unable to	determine /	snow cover
9000-9500	E	10-90	5-90	0-10
9000-9500	W	10-80	20-90	0-20
> 9500	SW	0-70	0-90	0-10
> 9500	SE	5-95	5-90	5-50
> 9500	E	0-90	0-95	0-90
> 9500	W	0-40	45-95	5-55

Table 25. Understory cover types. Number represents number of plots type present out of 10 plots.

Elevation	Aspect	No. plots w/ shrubs	No. plots w/ grasses	No. plots w./ forbs
8000-8500	SW	9	9	4
8000-8500	S	9	6	7
8000-8500	SE	10	7	7
8500-9000	SW	10	10	10
8500-9000	S	8	8	6
8500-9000	SE	8	6	6
8500-9000	N	10	7	4
8500-9000	E	6	8	2
8500-9000	W	4	6	4
9000-9500	SW	10	10	7
9000-9500	S	10	10	9
9000-9500	SE	8	10	9
9000-9500	N	9	4	2
9000-9500	E	9	9	6
9000-9500	W	10	10	6
> 9500	SW	9	9	8
> 9500	SE	10	10	10
> 9500	E	9	5	9
> 9500	W	8	10	10

Table 26. Understory species list by aspect.
Elevation: 8,000-8,500 ft.

Species	Aspect: SW	Aspect: S	Aspect: SE
Cercocarpus ledifolius	5	6	4
Q. gambelii	6	6	6
Chrysothamnus nauseosus			1
Holodiscus dumosus			1
Philadelphus microphyllus	4	2	2
Ribes spp.			2
Artemsia spinescens		2	2
A. tridentata			1
Jamesia americana			1
Berberis spp.	1		
Rhus trilobata	2		
Bromus carinatus	1		2
Vulpia octoflora			1
Sitanion hystrix	1		
Muhlenbergia montana	6	3	2
Bouteloua gracilis	2	3	6
Koeleria pyramidata		1	
Erigoneum umbellatum	3	4	6
Artemesia frigida	2		4
Opuntia		2	1
Yucca spp.	1	2	3
Vergascum thapsus		1	
Foresteria neomexicana	1		
Mint		1	

Table 27. Understory species list by aspect.
Elevation: 8,500-9,000 ft.

Species	Asp. SW	Asp. S	Asp. SE	Asp. N	Asp. E	Asp. W
Cercocarpus ledifolius	8	2	7		2	3
Q. gambelii	6	3	4	1	3	3
Philadelphus microphyllus	2		1			
Ribes spp.	7	2	3	2	1	1
Holodiscus dumosus	3	1	2			
Rubus idaeus			1			1
Foresteria neomexicana						1
Symphoricarpos spp.	1		1	9	3	3
Chrysothamnus nauseosus	1	2		1	3	
Juniperus communis				2	1	
Rosa spp.				1		
Muhlenbergia montana	9	4	4	1	3	4
Bouteloua gracilis			3		1	
Bromus carinatus	1	4	3	5	3	1
Sitanion hystrix	1	1	1		1	1
Koeleria pyramidata	1	1		3	2	2
Sporobolus cryptandrus						1
Oryzopsis hymenoides					1	
Hordeum jubatum	2					
Berberis repens		1	1	1		
Yucca spp.	4		3			
Erigoneum umbellatum	8	2	2		1	1
Artemesia frigida	8	3	4			2
Opuntia	1		1			
Arctostaphylos uva-ursi						1
Cirsium spp.		2				
Vergascum thapsus	1	2				
Clematis psuedoalpina				1		
Achillea millefolium				1		

Table 28. Understory species by aspect.
Elevation: 9,000-9,500 ft.

Species	Asp. SW	Asp. S	Asp. SE	Asp. N	Asp. E	Asp. W
Cercocarpus ledifolius	5	4	8		6	4
Q. gambelii	5	4	3		5	2
Philadelphus microphyllus	1	2	1			
Ribes spp.	2	2		3	1	1
Holodiscus dumosus	2	1			3	2
Jamesia americana				4		1
Foresteria neomexicana					1	
Symphoricarpos spp.	6	2	1	7	5	7
Chrysothamnus nauseosus		3	2			
Juniperus communis		1		2	2	3
Rosa spp.				3		
Populus angustifolia				1		
Salix spp.				2		2
Acer glabrum	1			3		1
Cornus stolonifera					1	
Physocarpus monogynus	1		1			
Pachystima myrsinites						1
Gutierrezia sarothrae			2			
Muhlenbergia montana	8	7	7		4	6
Bouteloua gracilis		1	5		2	
Bromus carinatus	4	4	2	3	6	5
Sitanion hystrix	1	1	3			2
Koeleria pyramidata	4	2	1	2	5	7
Phleum alpinum				1		
Oryzopsis hymenoides		1			2	
Hordeum jubatum	1	1	1	1	1	1
Elymus canadensis				2		
Agrostis stolonifera					1	
Vulpia octoflora			1			

Table 28. Continued.

Species	Asp. SW	Asp. S	Asp. SE	Asp. N	Asp. E	Asp. W
Deschampisia caespitosa			1			
Berberis repens	3		1	2		1
Yucca spp.		2	3		1	1
Erigoneum umbellatum	7	1	5		2	
Opuntia			2		1	
Artemesia frigida	3	4	5		3	1
Cirsium spp.			1			
Vergascum thapsus		1	1		1	
Achillea millefolium				1		3
Frageria virginiana				1		
Taraxacum officinale	1					
Penstemon spp.	1					

Table 29. Understory species by aspect. Elevation: > 9,500 ft.

Species	Aspect SW	Aspect SE	Aspect E	Aspect W
Cercocarpus ledifolius	1	6	1	
Q. gambelii	4	6		
Ribes spp.	3	2	1	1
Holodiscus dumosus	1	1		
Symphoricarpos spp.	7	3	7	6
Juniperus communis	2	3	7	1
Rosa spp.	2	2	3	5
Populus angustifolia			1	
Salix spp.		2	2	
Physocarpus monogynus				1
Pachystima myrsinites	1		1	1
Rubus idaeus				1
Ceanothus fendleri				1
Muhlenbergia montana	6	5	2	1
Poa fendleriana	1			
Bromus carinatus	3	1	1	10
Sitanion hystrix	1	4		1
Koeleria pyramidata	3	1	2	7
Festuca idahoensis		1		
Poa secunda	1			
Hordeum jubatum	1		1	
Berberis repens	3	4	5	6
Erigoneum umbellatum		2		1
Yucca spp.	1			
Cirsium spp.				1
Vergascum thapsus		2	1	
Achillea millefolium	1			3
Frageria virginiana			2	1
Taraxacum officinale	1	1		
Penstemon spp.	3			2
Clematis psuedoalpina				2
Arctostaphylos uva-ursi		1		

Table 30. Acid Scar Overstory species: includes overstory trees and regeneration. Seven plots sampled.

Species	No. of Plots present
P. flexilis	6
P. ponderosa	4
P. menziesii	5
P. englemannii	6

Only one plot had understory species. The species were: Muhlenbergia montana and Hordeum jubatum.

Table 31. Tailings pond overstory species. Includes both overstory trees and regeneration.

Species	No. of plots present
P. edulis	7
J. scopulorum	6

Table 32. Tailings pond understory species present.

Species	No. plots present
Artemesia tridentata	10
Chrysothamnus nauseosus	3
Oryzopsis hymenoides	3
Bouteloua curtipendula	1
Koeleria pyramidata	1
Bouteloua gracilis	9
Hordeum jubatum	7
Agropyron smithii	3
Stipa columbiana	1
Gutierrezia sarothrae	6
Opuntia	4

Species list of identified plants found at the Questa mine site during surveys performed in October and November, 1994.

Pinus flexilis
P. ponderosa
P. edulis
Pseudotsuga menziesii
Abies concolor
Picea engelmannii
Juniperus scopulorum
Populus tremuloides
P. angustifolia
Acer glabrum
Salix spp.
Quercus gambelii
Cercocarpus ledifolius
Chrysothamnus nauseosus
Holodiscus dumosus
Philadelphus microphyllus
Ribes spp.
Artemesia spinescens
A. tridentata
A. frigida
Jamesia americana
Berberis spp.
Rhus trilobata
Symphoricarpos spp.
Foresteria neomexicana
Rubus idaeus
Juniperus communis
Rosa spp.
Cornus stolonifera
Physocarpus monogynus
Pachystima myrsinites
Gutierrezia sarothrae
Ceanothus fendleri
Bromus carinatus
Vulpa octoflora
Sitanion hystrix
Muhlenbergia montana
Bouteloua gracilis
Koeleria pyramidata
Sporobolus cryptandrus
Poa fendleriana
Festuca idahoensis
Poa secunda
Oryzopsis hymenoides
Hordeum jubatum
Phleum alpinum
Elymus canadensis
Agrostis stolonifera
Deschampsia caespitosa
Erigoneum umbellatum
Opuntia
Yucca spp.
Vergascum thapsus
Mint
Berberis repens
Arctostaphylos uva-ursi
Cirsium spp.
Clematis pseudoaplina
Achillea millefolium
Frageria virginiana
Taraxacum officinale
Penstemon spp.

References used:

Stubbendieck, J., S.L. Hatch and C.H. Butterfield. 1993. North American Range Plants. Fourth Edition. University of Nebraska Press, Lincoln, NE. 493 pp.

Elmore, F.H. and J.R. Janish. 1976. Shrubs and trees of the southwest uplands. Southwest Parks and Monuments Association, Tuscon, AZ. 214 pp.

Niehaus, T.F., C.L. Ripper and V. Savage. 1984. Peterson Field Guides: Southwestern and Texas Wildflowers. Houghton Mifflin Co., Boston. 449 pp.

Lamb, S.H. 1989. Woody plants of the southwest. Sunstone Press, Santa Fe, NM. 177 pp.

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT CORPS OF ENGINEERS
P. O. BOX 1580
ALBUQUERQUE, NEW MEXICO 87103-1580

January 28, 1988

REPLY TO
ATTENTION OF:

Construction-Operations Division
Regulatory Branch

Ms. Ellen Caldwell
US EPA, Permits Branch (6W-PS)
Allied Bank Tower
1445 Ross Avenue
Dallas, Texas 75202-2733

Dear Ms. Caldwell:

This is in response to your request for an evaluation of the impact that the discharge described in the following permit applications will have on anchorage and/or navigation.

Applicant	Application Number
Arizona Public Service Company, Morgan Lake, San Juan County, NM	NM0000019
Molycorp, Inc., Red River, Taos County, NM	NM0022306
Village of Los Lunas, Rio Grande, Los Lunas, Valencia County, NM	NM0020303

The receiving waters are not subject to navigation. If the proposed work involves discharges of dredged or fill material into waters of the United States a Department of the Army permit under Section 404 of the Clean Water Act may be required. The work may be permitted by the nationwide permit for utility lines including outfall and intake structures (33 CFR 330.5 (a)(7)) provided the applicant complies with all permit conditions. A summary of the provisions of this nationwide permit is enclosed. Activities which are not authorized by the nationwide permit may require an individual permit.

Sincerely,

Robert E. Meehan

Robert E. Meehan, P.E.
Chief, Construction-Operations Division

Enclosure

RECEIVED
FEB 2 1988
6W-PS

COMPLIANCE REVIEW ACTION SHEET

☒ MAJOR

☐ MINOR

DMR

Non-compliance

Bypass

Compliance Schedule

Other

NPDES NM22306

Name Molycorp Inc.

Location Questa NM

Reviewer Gladys Gooden-Jackson

Date Routed 12-1-88

Suspense Date 12-12-88

ROUTED TO	INITIALS	DATE	ACTION RECOMMENDED
GW-PI Humke	GH	12/20/88	Require Correct testing
GW-CAT Jackson	GJ	12/20	to Comp Engineer for Action
* GW-PI Humke	GH	2/1/89	to Permit File

REMARKS:

12/1 Attached is the one time bio testing for 002. Please clarify if this is the only data required as stated under the Frequency column of permit. See attachment from Curt McCormick - They should repeat testing for permit requirements.

* Fred, a reply was drafted by B. Hellen 12/21/88, please retain this documents in your permit file. Thanks.

Gladys.

NM 22304
@ Gladys

Molycorp, Inc.

Questa Division
P.O. Box 469
Questa, New Mexico 87556
Telephone: (505) 586-0212

UNOCAL 76
MOLYCORP

November 10, 1988

RECEIVED
NOV 17 1988
6W-EA

Gladys Jackson
Enforcement Branch
U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas TX 75202-2733

Dear Ms Jackson:

Enclosed please find the data that you requested concerning the Bio Monitoring reports we submitted on September 13, 1988.

The enclosed data is for the one time Chronic Bio Monitoring requirements for Outfall 002 under our new permit effective June 21, 1988. See page 3 of Part III paragragh D and page 4 of part III section e and d subsections of paragragh D.

Please feel free to call if you have any questions with the enclosed data.

Sincerely Yours,

Fred Martinez
Environmental Analyst

1 - Permit/CD
2 - AO & AO mail
3 - DMR's
4 - Vio. Sum. Log
5 - NCR
6 - Correspondence
7 - CIAS
Date Filed
Clerk's Inits.

Molycorp, Inc.

Questa Division
P.O. Box 469
Questa, New Mexico 87556
Telephone: (505) 586-0212

UNOCAL 76
MOLYCORP

September 13, 1988

RECEIVED
NOV 17 1988
6W-EA

Mr. Robert Layton, Jr.
Regional Administrator
Region VI - Allied Bank Tower
1445 Ross Avenue
Dallas, Texas 75202-2733

Dear Mr. Layton:

Enclosed are the Discharge Monitoring Reports for the month of August, 1988, Permit No. NM0022306. Please be advised that no flow occurred from Outfall 001 for the entire month.

Enclosed with these reports are the test results for the Chronic Bio Monitoring requirements for Outfall 002, page 3, part III, Section D, under our new NPDES permit effective 6/21/88.

On July 25, 1988, samples of the receiving water, (Red River), were submitted to ERT Test Laboratories to determine if any pre-existing instream toxicity existed. Test results of these waters indicated that it was satisfactory with less than 20% mortality. The Bio Monitoring test work for Outfall 002 was scheduled for the week of August 8, through August 14, 1988, using the receiving water as dilution water. However, on subsequent weeks following the testing of our receiving water, unusually heavy rains occurred resulting in heavy loading of silt, soils, and other debris from the surrounding highly acidic, erodable geological scars along both sides of the Red River upstream of Outfall 002. During heavy rains, these scars contribute very high contents of total suspended solids, total dissolved solids, and high concentrations of heavy metals; creating toxic conditions and high oxygen demand of the river.

As a result of this dramatic change in the quality of the river, we felt we could not use the receiving water as dilution water for the test. On August 3, 1988, Mr. Leroy Apodaca of my staff contacted Mr. Fred Humke, Permit Writer, Region VI, Environmental Protection Agency. Mr. Apodaca informed Mr. Humke about the above circumstances. Mr. Humke, upon learning about the circumstances, advised Mr. Apodaca to use reconstituted water instead of the receiving water. Molycorp proceeded with the test the following week.

If you have any questions regarding procedures used, or the waters ultimately used in the testing, please call me at the telephone number listed on first page.

Very truly yours,

David R. Shoemaker

David R. Shoemaker
Mine Manager

cc: N.M. EID Surface
Water Quality
Bureau

files

8505-088-003-001
8/16/88

TABLE 1

SHEET 1 OF 4

BIOMONITORING REPORTING

CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION TEST

Permittee: Molycorp, Inc.
NPDES No.: NM0022306

Composite collected FROM: ~~UAK~~ 08:20 am/pm 8/7/88 date 8/23/88
TO: ~~UAK~~ 08:20 am/pm 8/8/88 date

Test initiated: 1200 am/pm 8/9/88 date

Dilution water used: ☐ Receiving water ☒ Reconstituted water

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

Percent effluent (%)

REP	0%	~~1%~~ 15%	~~3%~~ 50%	~~10%~~	~~30%~~	100%	(2.8%) % at low flow %	(5.5%) % at 1/2 low flow %
A	26	25	20	NA	NA	6	15	26
B	22	24	25			12	24	27
C	29	24	19			12	19	24
D	23	21	23			10	21	23
E	26	22	20			14	21	26
F	26	24	24			10	17	25
G	25	24	22			11	18	28
H	26	25	25			8	23	27
I	24	23	20			10	21	23
J	23	25	21			11	21	22

8/22/88

8505-088-005-001
8/16/88

TABLE 1

SHEET 2 OF 4

BIOMONITORING REPORTING

CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION TEST

Permittee: Molycorp, Inc.
NPDES No.: NM0022306

PERCENT SURVIVAL

Percent effluent (%)

Time of Reading	0%	~~1%~~ 15%	~~3%~~ 50%	~~10%~~	~~30%~~	100%	(2.8%) % at low flow %	(5.5%) % at 1/2 low flow %
24h	100	100	100	NA	NA	100	100	100
48h	100	100	100			100	100	100
7-day	100	100	100			80	100	100

1. Fisher's Exact Test:

   Is the mean survival at 7 days significantly different (p=0.05) than the control survival for the % effluent corresponding to:

   a. LOW FLOW: ____ YES ✓ NO
   b. 1/2 LOW FLOW: ____ YES ✓ NO

dh 8/22/88

2. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate:

   Is the mean number of young produced per female significantly different (p=0.05) than the control's number of young per female for the % effluent corresponding to:

   a. LOW FLOW: ✓ YES ____ NO
   b. 1/2 LOW FLOW: ____ YES ✓ NO

3. Enter percent effluent corresponding to each NOEL below and circle lowest number:

   a. NOEL survival = 100 % effluent
   b. NOEL reproduction = <2.8 % effluent

4. If you answered NO to 1.a. and 2.a., enter [P]; otherwise enter [F]: F

5. Enter response to item 4 on DMR Form, Parameter No. TEP3B.

6. If you answered NO to 1.b. and 2.b., enter [P]; otherwise enter [F]: P

KM 8/16/88

TABLE 1

SHEET 3 OF 4

BIOMONITORING REPORTING

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL TEST
(Pimephales promelas)

Permittee: Molycorp, Inc.
NPDES No.: NM0022306

KM 8/23/88

Composite collected FROM: ~~UAK~~ 08:20 am/pm 8/7/88 date
TO: ~~UAK~~ 08:20 am/pm 8/8/88 date

Test initiated: 1210 am/pm 8/9/88 date

Dilution water used: ☐ Receiving water ☒ Reconstituted water

DATA TABLE FOR GROWTH OF FATHEAD MINNOWS

Effluent Conc. (%)	Average Dry Weight in milligrams in replicate chambers				MEAN DRY WEIGHT	
	A	B	C	D	mg	CV%*
0%	0.39	0.49	0.36	NA	0.41	16.48
~~1%~~ 15%	0.34	0.42	0.41		0.39	11.18
~~3%~~ 50%	0.47	0.43	0.44		0.45	4.63
~~10%~~	NA				NA	
~~30%~~	NA				NA	
100%	0.52	0.54	0.44		0.50	10.58
Low Flow 2.8 %	0.43	0.34	0.50		0.42	19.10
1/2 Low Flow 5.5 %	0.36	0.32	0.33		0.34	6.12

* coefficient of variation = standard deviation x 100/mean

clk 9/22/88

1. Dunnett's Procedure:

Is the mean dry weight (growth) at 7 days effluent significantly different (p=0.05) than the control's dry weight (growth) for the % effluent corresponding to:

a. LOW FLOW: ____ YES ✓ NO
b. 1/2 LOW FLOW: ____ YES ✓ NO

8116188

TABLE 1

SHEET 4 OF 4

BIOMONITORING REPORTING

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL TEST
(*Pimephales promelas*)

Permittee: Molycorp, Inc.
NPDES No.: NM0022306

DATA TABLE FOR FATHEAD MINNOW SURVIVAL

Effluent Conc. (%)	Percent Survival in replicate chambers				MEAN PERCENT SURVIVAL			
	A	B	C	D	24h	48h	7-day	CV%*
0%	100	100	100	NA	100	100	100	0
~~1%~~ 15%	100	90	100		100	100	96.7	5.97
~~3%~~ 50%	100	100	100		100	100	100	0
~~10%~~	NA				NA			NA
~~30%~~	NA				NA			NA
100%	100	100	100		100	100	100	0
Low Flow 2.8 %	100	100	100		100	100	100	0
1/2 Low Flow 5.5 %	100	100	100		100	100	100	0

* coefficient of variation = standard deviation x 100/mean

2. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate:

   Is the mean survival at 7 days significantly different (p=0.05) than the control survival for the % effluent corresponding to:

   a. LOW FLOW: _____ YES ✓ NO
   b. 1/2 LOW FLOW: _____ YES ✓ NO

dk 8/22/88

3. Enter percent effluent corresponding to each NOEL below and circle lowest number:

   a. NOEL survival = 100 % effluent
   b. NOEL growth = 100 % effluent

4. If you answered NO to 1.a. and 2.a., enter [P]; otherwise enter [F]: P

5. Enter response to item 4 on DMR Form, Parameter No. TEPGC.

6. If you answered NO to 1.b. and 2.b., enter [P]; otherwise enter [F]: P

Fred

[redacted]

Invalidates test.

[redacted]

Used 1-24 hr composite of effluent.
Test methods specify [redacted] seven, we require a minimum of 3.

- Permit requires [redacted]% 5.5 [redacted]% 2.8 100% effluent concentrations in a dilution series of .3 (minimum). Permittee used
- 0%, 15%, 50%, 100%, 2.8%, 5.5% effluent.

Data analysis indicates that low flow 2.8% is toxic.

They did not demonstrate that the receiving water was toxic.

[redacted]

Curt

[redacted]

nm22306
File: nm22306 Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.020	14.520	22.920	14.520	4.020
OBSERVED	4	15	26	13	2

Calculated Chi-Square goodness of fit test statistic = 1.6040
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

nm22306
File: nm22306 Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	0	10	22.000	29.000	25.000
2	2.8	10	15.000	24.000	20.000
3	5.5	10	22.000	28.000	25.100
4	15	10	21.000	25.000	23.700
5	50	10	19.000	25.000	21.900
6	100	10	6.000	14.000	10.400

nm22306
File: nm22306 Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	0	4.222 [1]	2.055	0.650
2	2.8	7.556	2.749	0.869
3	5.5	4.100	2.025	0.640
4	15	1.789	1.337	0.423
5	50	4.989	2.234	0.706
6	100	4.933	2.221	0.702

nm22306
File: nm22306 Transform: NO TRANSFORM

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	1542.683	308.537	67.102
Within (Error)	54	248.300	4.598	
Total	59	1790.983		

Critical F value = 2.45 (0.05,5,40)
Since F > Critical F REJECT Ho:All groups equal

nm22306
File: nm22306 Transform: NO TRANSFORM

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	0	25.000	25.000		
2	2.8	20.000	20.000	5.214	*
3	5.5	25.100	25.100	-0.104	
4	15	23.700	23.700	1.356	
5	50	21.900	21.900	3.233	*
6	100	10.400	10.400	15.225	*

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, df=23,5)

nm22306
File: nm22306 Transform: NO TRANSFORM

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	0	10			
2	2.8	10	2.215	8.9	5.000
3	5.5	10	2.215	8.9	-0.100
4	15	10	2.215	8.9	1.300
5	50	10	2.215	8.9	3.100
6	100	10	2.215	8.9	14.600

nm22306
File: nm22306 Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	RANK SUM	SIG
1	0	25.000	25.000		
2	2.8	20.000	20.000	60.500	*
3	5.5	25.100	25.100	108.500	
4	15	23.700	23.700	85.000	
5	50	21.900	21.900	70.000	*
6	100	10.400	10.400	55.000	*

Minimum significant rank sum (10,5) = 75 (1 tail, P = 0.5)

JAN 2 6 1989

REPLY TO: 6W-ET

Mr. David R. Shoemaker, Mine Manager
Molycorp, Inc., Questa Division
P.O. Box 469
Questa, New Mexico 87556

Re: NPDES Permit No. NM0022306

Dear Mr. Shoemaker:

We are in receipt of the chronic biomonitoring test results that you have submitted for outfall 002 on September 13, 1988.

Part III.C.a. of the NPDES Permit requires that the chronic biomonitoring procedure be conducted in accordance with the "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms", EPA/600/4-85/014. This procedure requires six composite samples be collected. EPA, Region 6 requires a minimum of three composite samples. The results that you submitted only indicates that you took one composite sample.

Part III.D.C. of the permit requires the permitee to report to EPA the toxicity of the upstream receiving water. The report that you submitted did not demonstrate the toxicity of the receiving water.

Since the sampling procedure was done incorrectly, the sampling and testing for chronic biomonitoring will have to be repeated. It will also be necessary for you to demonstrate the toxicity of the receiving water.

You are required to submit this information within thirty (30) days from receipt of this letter.

If you have any questions concerning this letter you may call me at (214) 655-6475 or Curt McCormick at (214) 655-7175.

Sincerely yours,

bcc: Pendergast, 6W-PT
Jackson, 6W-EAT
Reading File, 6W-E

Robert L. Hiller
Environmental Engineer
Enforcement Branch (6W-ET)

cc: Mr. Richard Mitzelfelt, Director
Environmental Improvement Division of the
New Mexico Health and Environmental Department

Jane,

This was the MSGP mod to resolve the American Mining Assoc. lawsuit on interpreting of the mining EFG's.

R

federal register

Friday
August 7, 1998

Part III

Environmental Protection Agency

National Pollutant Discharge Elimination System (NPDES) Storm Water Multi-Sector General Permit Modification for Industrial Activities; Notice

ENVIRONMENTAL PROTECTION AGENCY

[WH-FRL-6135-8]

Modification of the National Pollutant Discharge Elimination System (NPDES) Storm Water Multi-Sector General Permit for Industrial Activities

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final modification of NPDES general permits; notice of interpretation.

SUMMARY: Today's action clarifies an interpretation of the technology-based effluent limitations applicable to point sources of "mine drainage" at active ore mining and dressing operations, which was contained in a recently-issued NPDES general permit for storm water associated with industrial activity. With this notice, EPA provides a more definitive interpretation of the applicability of those recently-issued general permits; specifically, as they apply to certain storm water discharges at active ore mining and dressing operations. To incorporate today's interpretation, EPA modifies the NPDES general permits issued by EPA Regions 1, 6, 9 and 10 because the Agency is the permit issuance authority in States in those Regions. EPA intends, however, that the interpretation apply nationwide in all EPA Regions.

DATES: These permit modifications shall be effective on September 8, 1998.

ADDRESSES: The complete administrative record for today's permit modification is available for public review the Water Docket MC-4101, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC, 20460.

FOR FURTHER INFORMATION CONTACT: For further information, contact Bryan Rittenhouse, Office of Wastewater Management, Office of Water at (202) 260-0592 or the appropriate EPA Regional Office. For EPA Region 1, covering discharges in the State of Maine and Federal Indian reservations in Maine, in the Commonwealth of Massachusetts and Federal Indian reservations in Massachusetts, in the State of New Hampshire and Federal Indian reservations in New Hampshire, as well as Federal Indian reservations in the States of Vermont, Connecticut, and Rhode Island, and Federal facilities in Vermont, contact Thelma Hamilton at (617) 565-3569. For EPA Region 6, covering discharges in the State of Texas and Federal Indian reservations in Texas, in the State of New Mexico and Federal Indian reservations in New Mexico (except Navajo Reservation lands, which are covered by EPA Region 9 and Ute Reservation lands, which are covered by EPA Region 8 and were not covered by the Multi-Sector General Permit), as well as Federal Indian reservations in Oklahoma and Louisiana, contact Brian Burgess at (214) 665-7534. For EPA Region 9, covering the State of Arizona and Federal Indian reservations in Arizona, and Federal Indian reservations in California (except the Hoopa Valley Tribe) and Nevada, as well as the Duck Valley, Fort McDermitt, Goshute Reservations and Navajo Reservations, each of which cross State boundaries, contact Eugene Bromley at (415) 744-1906. For EPA Region 10, covering the State of Alaska and Federal Indian reservations in Alaska, the State of Idaho and Federal Indian reservations in Idaho (except the Duck Valley Reservation, which is covered by EPA Region 9), Federal Indian reservations in Washington and Oregon (except the Fort McDermitt Reservation, which is covered by EPA Region 9), as well as Federal facilities in Washington, contact Joe Wallace at (206) 553-6645.

SUPPLEMENTARY INFORMATION:

Authority: EPA issues NPDES permits under the authority of CWA section 402, 33 U.S.C. section 1342. Today's modification is based on an interpretation of rules published under the authority of CWA sections 301, 304, 308, 402, and 501(a), 33 U.S.C. sections 1311, 1314, 1318, 1342, and 1361(a). Today's action modifies a table that was initially published in conjunction with NPDES permits for storm water associated with industrial activity issued pursuant to CWA section 402, 33 U.S.C. section 1342.

In today's notice, EPA announces its interpretation of the technology-based effluent limitations applicable to point sources of "mine drainage" at ore mining and dressing operations under the Clean Water Act ("CWA"). 33 U.S.C. § 1251 *et seq.* This interpretation updates and replaces an earlier interpretation published in the fact sheet for the final National Pollutant Discharge Elimination System ("NPDES") Storm Water Multi-Sector General Permit for Industrial Activities at 60 FR 50804 (Sept. 29, 1995)("Multi-Sector Permit"). The interpretation in today's notice replaces EPA's interpretation in Table G-4 of the Multi-Sector Permit regarding the applicability of the "mine drainage" provisions of regulations found at 40 CFR Part 440. 60 FR at 50897. Today's notice also supersedes and clarifies the interpretation that the Agency proposed at 62 FR 54950 (Oct. 22, 1997).

EPA reviewed the administrative record supporting the Part 440 regulations, as well as Agency statements made during the course of litigation over those regulations, and revises Table G-4 accordingly. In litigation challenging the Multi-Sector Permit, *National Mining Association* v. *EPA*, No. 95-3519 (8th Cir.), the National Mining Association (NMA) argued that the regulatory interpretation contained in Table G-4 was overly expansive and not supported by appropriate economic and technological evaluation. To support its argument, NMA cited Agency statements made during the course of litigation approximately twenty years earlier. These statements were not raised and presented to the Agency during the public comment period of the permit. In response to NMA's arguments in the current litigation, EPA has re-evaluated the underlying record supporting the Part 440 regulations and is supplementing its interpretation of the "mine drainage" provisions contained in Table G-4. Today's action supersedes the Agency interpretation contained in the Fact Sheet to the Multi-Sector Permit, as originally issued.

Upon review of those documents, the Agency believes the documents (including judicial case law) speak for themselves. Therefore, the Agency is proposing to withdraw portions of the Table that discuss applicability of the Part 440 regulations; i.e., those portions of the Table that do not specify applicability of the Multi-Sector permit. By today's action, EPA also expands the applicability of the Multi-Sector permit consistent with the interpretation in today's notice.

I. Effluent Guidelines for Ore Dressing and Mining Point Source Category

A. Background

Congress enacted the Clean Water Act to establish a comprehensive program to "restore and maintain the chemical, physical and biological integrity of the Nation's waters' through the reduction, and eventual elimination, of the discharge of pollutants into those waters. CWA § 101(a); 33 U.S.C. § 1251(a). To achieve its objective, the CWA provides for a permit program to control "point source" pollution. The CWA point source permitting program is known as the National Pollutant Discharge Elimination System ("NPDES"), under which EPA or authorized States issue permits for point source discharges. Except in accordance with an NPDES permit, a point source discharge of a pollutant is unlawful. CWA § 301(a); 33 U.S.C. § 1311(a). All NPDES permits must, at a minimum, contain technology-based effluent limitations established in effluent guidelines or standards or, if no such

guidelines have been established, limitations derived on the basis of best professional judgment.

Individual NPDES permits contain substantive restrictions, called "effluent limitations," which are aimed at controlling the level of pollutants in point source discharges. CWA § 402(a); 33 U.S.C. § 1342(a). Effluent limitations may be "technology-based" or "water quality-based."[1] For some industrial point source categories, EPA has published technology-based effluent limitations that apply on a nationwide basis, pursuant to CWA §§ 304(b) and 306(b)(1)(B); 33 U.S.C. §§ 1314(b) and 1316(b)(1)(B).[2] These limitations are called national effluent limitations guidelines or standards. EPA has published best practicable control technology currently available ("BPT"), best conventional pollutant control technology ("BCT"), best available technology economically achievable ("BAT") effluent guidelines, and new source performance standards ("NSPS") for point sources in over fifty different industrial categories. Among the effluent guidelines and standards which EPA has established are those applicable to the ore mining and dressing industry. These guidelines are known as the "Effluent Guidelines for the Ore Mining and Dressing Point Source Category" (hereinafter referred to as the "Guidelines"). The Guidelines are published at 40 CFR Part 440.

EPA first published the Guidelines on an interim final basis on November 6, 1975. 40 FR 51722. On July 11, 1978, after substantially expanding the data base supporting the Guidelines, and after considering comments submitted since initial promulgation, EPA republished the Guidelines in modified form. 43 FR 29771 (July 11, 1978). Both the initial and republished Guidelines established BPT effluent limitations for discharges for ore mining and dressing operations.

B. Storm Water Regulation Under the Guidelines[3]

The Guidelines establish industry-wide effluent limitations for two types of mine discharges: (1) mill discharges and (2) mine drainage. "Mine drainage" means "any water drained, pumped, or siphoned from a mine." 40 CFR 440.132(h). A "mine," in turn, is defined as:

An active mining area, including all land and property placed under, or above the surface of such land, used in or resulting from the work of extracting metal ore or minerals from their natural deposits by any means or method, including secondary recovery of metal ore from refuse or other storage piles, wastes, or rock dumps and mine tailings derived from the mining, cleaning, or concentration of metal ores. 40 CFR 440.132(g)(emphasis added). An "active mining area," in turn, is defined as: A place where work or other activity related to the extraction, removal, or recovery of metal ore is being conducted, except, with respect to surface mines, any area of land on or in which grading has been completed to return the earth to desired contour and reclamation work has begun. 40 CFR 440.132(a).

1. Petition for Reconsideration

After EPA promulgated the Guidelines on July 11, 1978, a number of mining companies filed petitions for judicial review challenging the Guidelines. [The judicial challenges are discussed below.] During the pendency of its judicial challenge, one of those companies, Kennecott Copper Corporation ("Kennecott") filed an administrative petition with EPA (dated September 26, 1978) requesting that the Agency reconsider and clarify the Guidelines. Kennecott amended its petition on November 9, 1978. Kennecott identified five areas of alleged deficiencies and concerns with the Guidelines. One of these issues related to the storm water runoff provisions of the Guidelines.

Kennecott objected to the storm water runoff provisions, which it argued were overly vague and capable of being interpreted in a manner that would violate applicable law. Among other things, Kennecott was particularly concerned about applicability of the Guidelines to what it referred to as "non-process" areas at mining operations. Kennecott further argued that the Guidelines, if applied in the manner suggested by Kennecott, would entail exorbitant costs not considered during the rule making. Kennecott presented EPA with cost estimates that Kennecott believed it would have to incur to comply with the Guidelines. Kennecott estimated costs to control storm water drainage flows from what Kennecott referred to as the "process" and "non-process" areas at two Kennecott mining operations, the Ray Mine and the Chino Mine. As discussed more fully below, the Agency's decision on Kennecott's petition is at the core of the NMA litigation over the Multi-Sector Permit.

In partial response to the Kennecott petition, EPA published a notice in the **Federal Register** that clarified the scope of the Guidelines' applicability to storm water runoff. 44 FR 7953–54 (Feb. 8, 1979). That Notice of Clarification explained that the Guidelines applied only to point sources in the active mining area. The Notice clarified EPA's interpretation that the "mine drainage" provisions applied to "water which contacts an active mining area and flows into a point source." *Id.* EPA further explained that mining operations are not required to "collect and contain diffuse storm [water] runoff which would not otherwise be collected in or does not otherwise drain into a point source." *Id.* at 7954. In other words, diffuse storm water (from an active mining area) that was collected or contained in, or that naturally flowed into, a point source was subject to the Guidelines. Other storm water drainage flows were not subject to the Guidelines.

EPA denied Kennecott's petition on February 21, 1979. In doing so, EPA relied in part on the Notice of Clarification. The decision on the reconsideration petition discussed the applicability of the Guidelines to Kennecott's Ray Mine. For storm water drainage flows from what Kennecott called "non-process" areas at the Ray Mine, EPA concluded that Kennecott would incur no additional costs. Kennecott had, for the purposes of its petition, defined "non-process" area to mean "overburden dumps, material too low in mineral content even to leach, and exposed benches at the mine." Citing to the Notice of Clarification, EPA concluded that the definition of "mine drainage" did not include diffuse storm water runoff from overburden dumps and material too low in mineral content to leach. As that Notice of Clarification explained, "[a]ll water which contacts an 'active mining area * * *' and either does not flow, or is not channeled by the operator, to a point source, is considered runoff, and it is not the regulations' intent to require the mine operator to collect and treat such runoff." 44 FR at 7954. On the matter of storm water contacting the exposed benches, EPA could not determine whether such discharges would constitute point source discharges and thus, concluded that the issue would best be addressed by the permitting

[1] Water quality based effluent limitations are included in permits when necessary to assure compliance with water quality standards.

[2] If no such guidelines have been established, technology-based limits are developed on a case-by-case basis based on the best professional judgment of the permit writer.

[3] The definitions of and discussion of these terms in this notice are within the use of these terms under the NPDES program and the Clean Water Act. These definitions are not specifically applicable to the use of these terms under other federal environmental laws, including under the Resources Conservation and Recovery Act, 42 U.S.C. §§ 6901, *et seq.* (RCRA) and its implementing regulations.

authority in the context of a permit proceeding.

2. Judicial Challenge

The Guidelines rule was ultimately upheld by the U.S. Court of Appeals for the Tenth Circuit. *Kennecott Copper Corp.* v. *EPA*, 612 F.2d 1232 (10th Cir. 1979). In affirming the Guidelines, the Tenth Circuit relied on the language of the Notice of Clarification and considered moot the Petitioner's challenges to storm water runoff provisions, which were based on the argument that the Guidelines were overly board and included "nonpoint" as well as "point sources." *Kennecott Copper Corp.*, 612 F.2d at 1242. The court further found that "* * * EPA is entirely within its authority in regulating [discharges of] storm runoff that falls within [the definition of] a 'point source.'" *Id.* at 1243. Additionally, the court reasoned that the determination of whether a particular discharge constitutes a point source is best made in the context of permit proceedings, guided by the broad definition of "point source" provided in the CWA.[4] The Court recognized that it is "unrealistic, if not altogether impossible" to provide an "absolute and unequivocal" definition of "point source" and rule of applicability, further supporting case-by-case or site-specific determinations on applicability of the Guidelines.

Congress has purposefully phrased this definition broadly. This is as it should be given its contemplated applicability to literally thousands of pollution sources. To cast such definitions in absolute, unequivocal terms would be unrealistic, if not altogether impossible. As we observed in *American Petroleum Institute*, 540 F.2d at 1032: "On the road to attainment of the no discharge objective some flexibility is needed." 612 F.2d at 1243.

The court did not say anything further in response to Kennecott's arguments complaining that the Guidelines would improperly regulate nonpoint source discharges at mine sites. The court did not rely on or cite to any other references in the administrative record before it. In response to any remaining arguments before it, the court simply noted that "careful examination of petitioner's remaining arguments has persuaded us that they are without merit." *Id.* at 1243. Thus, the court either summarily rejected Kennecott's arguments that the Guidelines were vague and overly board, or affirmatively upheld the regulations against Kennecott's challenges based on reasons explained in the decision.[5]

While, over the course of the intervening years, the federal courts have refined their interpretations of "point source," EPA's conclusions about point sources at mining operations has remained constant. In upholding the Guidelines in *Kennecott Copper Corp.*, the Tenth Circuit specifically cited to one of the seminal cases upon which courts rely for the proposition that the term "point source" should be interpreted broadly, *United States* v. *Earth Sciences, Inc.*, 599 F.2d 368 (10th Cir. 1979). 612 F.2d at 1241, 1243.

3. Subsequent Agency Action

Apart from the Agency statements made during the course of the *Kennecott Copper Corp.* litigation, EPA staff has not been able to locate evidence of subsequent Agency action referring to those statements. Since that time, EPA and authorized NPDES States have issued permits to a significant number of ore mining and dressing operations. Until the instant litigation, no party identified or presented any of the Agency litigation statements from the *Kennecott Copper Corp.* case to Agency personnel working with NPDES permits.

A subsequent judicial case, which EPA cited in the 1990 storm water regulations, further clarifies that storm water associated with industrial activity at mining sites may result in point source discharges. *See Sierra Club* v. *Abston Construction Co., Inc.*, 620 F.2d 41 (5th Cir. 1980); 55 FR at 47997. In that case, the court determined that whether a point source discharge was present due to rainfall causing sediment basin overflow and erosion of piles of discarded material, even without direct action by coal miners, was a question of fact. 620 F.2d at 45. The ultimate question was whether the discharge is from a "discernible, confined, discrete conveyance," whether by gravitational or non-gravitational means. *Id.* It was irrelevant that operators did not construct the conveyances, so long as those conveyances were reasonably likely to be the means by which pollutants were ultimately deposited into a navigable body of water. *Id.* Conveyances of pollution formed either as a result of natural erosion or by material means may fit the statutory definition of point source. *Id.*

II. NPDES Storm Water General Multi-Sector Permit for Industrial Activities

A. Background

In 1987, Congress amended the CWA by adding, among other things, several provisions concerning the control of point source discharges composed entirely of storm water. In the 1987 amendments, Congress directed EPA to publish permit application regulations for "discharges of storm water associated with industrial activity." CWA § 402(p)(4)(A), 33 U.S.C. § 1342(p)(4)(A). On November 16, 1990, EPA published those regulations. In doing so, EPA defined "storm water" as storm water runoff, snow melt runoff, and surface runoff and drainage. It also defined "[s]torm water discharge associated with industrial activity" to mean the discharge of pollutants from any conveyance which is used for collecting and conveying storm water and which is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant. See 40 CFR 122.26(b)(14). Included among these discharges were discharges from conveyances at mining facilities, including from active and inactive mining operations that discharge storm water contaminated by contact with or that has come into contact with overburden. 40 CFR 122.26(b)(14)(iii). In the course of that rule making, in order to reconcile those application regulations with a statutory exemption from CWA section 402(l)(2), EPA noted that "a permit application will be required when discharges of storm water runoff from mining operations come into contact with any overburden. * * *" 55 FR 47990, 48032. Today's interpretation and permit modification implements those provisions.

Upon challenge, this part of the regulations was upheld by the U.S. Court of Appeals for the Ninth Circuit. *American Mining Congress* v. *EPA*, 965 F.2d 759 (9th Cir. 1992) (regulations upheld against industry challenge that the rules, among other things, imposed retroactive liability for storm water discharges from existing mine sites). The issues in that case are related to, but different from, the issues addressed in today's action. That case involved inactive mines; today's action involves active mining operations.

[4] "Point source" is defined at Clean Water Act § 502(14) to mean "any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. *See also* 40 CFR 122.2.

[5] In litigation over the Multi-Sector Permit, NMA now suggests that the 10th Circuit relied on the Agency statements concerning the status of storm water drainage flows at the Ray Mine to uphold the Guidelines and that the Agency cannot now conclude that the court independently found the storm water runoff provisions of the Guidelines acceptable. EPA disagrees. The court's decision never cites or discusses any of these statements.

The NPDES regulations for storm water describe three mechanisms by which dischargers of storm water associated with industrial activity could apply for permits. 40 CFR 122.26(c)(1). First, dischargers can apply for "individual permits." Second, (prior to 1992) dischargers could apply for permits through a "group application." Third, dischargers can apply for coverage under an "EPA promulgated storm water general permit." Dischargers from numerous industries applied for permits through the group application process. Among them were dischargers from the ore mining and dressing industry.

On March 10, 1993, EPA accepted group applications from ore mining and dressing industry applicants and began processing those group applications. On November 19, 1993, EPA proposed to issue a single "general" permit (for each State where EPA issues permits) based on all of the group applications accepted and received from group applicants in various covered industries. 58 FR 61146, 61236–61251 (November 19, 1993). EPA issued that set of general permits on September 29, 1995, and took subsequent action concerning these general permits on February 9, 1996, February 20, 1996 and September 24, 1996. These general permits are entitled the NPDES Storm Water Multi-Sector General Permits for Industrial Activities (hereinafter referred to in the singular as the "Multi-Sector Permit"). The Multi-Sector Permit applies in most States, Territories, and Indian Country where EPA administers the NPDES permitting program.

The Multi-Sector Permit contains requirements that are specifically tailored to the types of industrial activity occurring at facilities represented by various industry groups applicants. Unlike much of the Ore Mining and Dressing Guidelines, the Multi-Sector Permit incorporates narrative effluent limitations for storm water discharges. These narrative effluent limitations are referred to as "best management practices" ("BMPs"). BMPs are designed to represent the pollution reductions achievable through application of BAT and BCT. Permits include BMPs to control or abate the discharge of pollutants when, for example, numeric effluent limitations are infeasible. 40 CFR 122.44(k).

In addition to the narrative BMPs, the Multi-Sector Permit includes eligibility restrictions. Multi-Sector Permit Part I.B.3.(a)–(h), 60 FR at 51112. Discharges that do not comply with the eligibility restrictions are not authorized by the permit. For example, storm water discharges that the Agency has determined to be or may reasonably be expected to be contributing to a violation of a water quality standard are not authorized by the Multi-Sector Permit. Multi-Sector Permit Part I.B.3.f.

B. Multi-Sector Permit Coverage of Mining Activity

By its terms, the Multi-Sector Permit provides authorization for some storm water discharges from ore (metal) mining and dressing facilities. Authorization initially was limited, however, to storm water discharges from or off of: topsoil piles; offsite haul/access roads outside the active mining area; onsite haul roads if not constructed of waste rock or spent ore (except if mine drainage is used for dust control); runoff from tailings dams/dikes when not constructed of waste rock/tailings and no process fluids are present; concentration buildings, if no contact with material piles; mill sites, if no contact with material piles; chemical storage areas; docking facilities, if no excessive contact with waste product; explosive storage areas; reclaimed areas released from reclamation bonds prior to December 17, 1990; and partially/inadequately reclaimed areas or areas not released from reclamation bonds.

The Multi-Sector Permit covers discharges composed of entirely storm water flows, as well as certain allowable non-storm water discharges. 60 FR at 51114; Part III.A. The Multi-Sector Permit does not authorize point source dry weather discharges, such as from mine adits, tunnels, or contaminated springs or seeps, which are not storm water. *Id.*; Part III.A.2.a.; 60 FR at 51155. Note that such dry weather discharges are not affected by today's clarification.

Under the Multi-Sector Permit at Part I.B.3.g., permit coverage is available for storm water discharges covered by some, but not all, of the various effluent guidelines that address storm water, including, for example, some of the storm water discharges under the Mineral Mining and Processing Guidelines at 40 CFR Part 436. 60 FR at 51112. The Multi-Sector Permit does not, however, cover storm water discharges from point sources that are subject to the Ore Mining and Dressing Guidelines. 60 FR at 51155; Part XI.G.1.a.

Table G–4 of the Multi-Sector Permit, entitled "Applicability of 40 CFR Part 440 Effluent Limitations Guidelines to Storm Water," identified various discharge sources associated with ore mining and dressing operations. The Table indicated EPA's view at that time concerning standards of regulatory control for those discharges. The different standards of regulatory control include: "mine drainage" effluent limitations guidelines, found in the Guidelines; "mill discharge process water" effluent limitations guidelines, also found in the Guidelines; "storm water," which could, for example, be found in the Multi-Sector Permit; and "unclassified," indicating discharges not regulated under the Guidelines or the Multi-Sector Permit.

As EPA said in adopting the Multi-Sector Permit: "Table G–4 clarifies the applicability of the Effluent Limitations Guidelines found in 40 CFR Part 440. *This Table does not expand or redefine these Effluent Limitations Guidelines.*" 60 FR at 50897 (emphasis added). EPA's intent in publishing Table G–4, therefore, was merely to reiterate the interpretation that EPA issued when it promulgated the Guidelines.

III. Legal Challenge Concerning Table G–4

On October 10, 1995, the National Mining Association (hereinafter referred to as "NMA" or the "Petitioners") petitioned the U.S. Court of Appeals for the Eighth Circuit for judicial review of the Multi-Sector Permit. Specifically, Petitioners challenged EPA's determination that storm water runoff from a number of ancillary mine sources identified in Table G–4 of the Multi-Sector Permit would constitute sources of "mine drainage" under the Guidelines. The particular mining activities of concern include overburden piles, haul roads made of overburden and other ancillary mine areas. As noted above, EPA excluded storm water runoff from these sources from coverage under the Multi-Sector Permit. The Petitioners contended that this determination reflects a new, more expansive interpretation of the Guidelines.

NMA presented documents from the prior *Kennecott* litigation, namely: EPA's 1979 decision responding to Kennecott's petition for reconsideration of the Guidelines; a letter of EPA counsel which was attached to a decision responding to the Kennecott petition for reconsideration of the Guidelines; and a brief that EPA filed before the Tenth Circuit. NMA cited these documents to support its argument that EPA's interpretation prior to publishing the Multi-Sector Permit was that "overburden" ("waste rock/overburden piles") and ancillary areas at mining operations would be outside the scope of the Guidelines. NMA asserted that certain entries in Table G–4 were incorrect to the extent that the table categorically identified discharges from such sources as covered by the Guidelines. NMA argued that, based on

EPA statements made during the course of the *Kennecott* litigation, *no* overburden-related areas are covered by the Guidelines.

EPA has reviewed the Agency statements made during the 1979 litigation challenging the Guidelines rule making. While disagreeing with NMA's categorical conclusion that no overburden-related areas are covered by the Guidelines, EPA believes the earlier Agency statements reflect an EPA interpretation that a storm water discharge from a waste rock or overburden piles would not be subject to the Guidelines unless: (1) it naturally drains (or is intentionally diverted) to a point source; and (2) combines with "mine drainage" that is otherwise regulated under the Part 440 regulations. Such a discharge would be subject to the Part 440 regulations if, however, it combined with either process waters (i.e., mill drainage) or other mine drainage. This clarification was not obvious from the face of Table G–4 as presented in the Multi-Sector Permit.

NMA's challenge to the Multi-Sector Permit is currently under the advisement of the Eighth Circuit. Both parties have submitted briefs. A coalition of citizens' interest groups, the Western Mining Action Project and Sierra Club Legal Defense Fund, also filed an *amicus curiae* brief with the Court. On March 10, 1997, the Eighth Circuit heard oral argument in *National Mining Association* v. *EPA*, No. 95–3519. At that time, counsel for EPA represented to the court that EPA intended to prepare a clarification of the Agency's interpretation of the technology-based effluent limitations applicable to point source discharges from various areas at ore mining and dressing operations. Today's notice provides that clarification and would revise the Table so that it reflects only sources to which the Permit would apply.

IV. Interpretation

Upon fuller review of the underlying record, EPA now believes that, in 1978–79, the Agency did not consider certain point source discharges of storm water associated with "waste rock and overburden" to be subject to the Ore Mining and Dressing Guidelines. Specifically, EPA did not conduct a complete economic and technological assessment of diverting drainage flows from "waste rock or overburden" outside the active mining area into the active mining area. Therefore, the Agency did not consider such discharges to be sources of mine drainage. First, discharges from waste rock and/or overburden piles would be outside the scope of the Guidelines if they consist "entirely of diffuse runoff which contacts overburden piles, which did not either normally flow to, or by design drain to a point source." Such diffuse runoff would not even be subject to the NPDES permit program if it was not added to waters of the United States through a discrete, confined, discernable conveyance. *See* 44 FR 7953 (Feb. 8, 1979). Second, such discharges would be outside the scope of the Guidelines if storm water runoff from waste rock and/or overburden-related sources does not combine with mine drainage otherwise subject to the Part 440 regulations. In light of the above, EPA believes that, to the extent that a reader could misinterpret the Table as categorically including all "waste rock/overburden" sources to be within the "active mining area," Table G–4 did not accurately reflect the scope of the applicability of the Guidelines.

Today's action does not change in any way EPA's interpretation of the coverage of the Guidelines set forth in the 1979 Notice of Clarification, which provides that the Guidelines "are not intended to require the operator to collect and contain diffuse storm water runoff which would not otherwise be collected in or does not otherwise drain into a point source." Today's notice articulates the 1979 interpretation to the fact situation contained in Table G–4 of the Multi-Sector Permit.

Discharges from overburden-related sources that do not combine with "mine drainage" otherwise subject to the Part 440 regulations are not covered by the Guidelines. Like all "point source" discharges, however, these discharges require NPDES permit authorization to be in compliance with the CWA. If these discharges are entirely composed of storm water (and are not covered by the Guidelines), then they may be authorized under an EPA general permit for storm water (if it otherwise meets the eligibility provisions), or an individual permit with BPJ-based controls, which may include either numeric limitations and/or narrative limitations (in the form of BMPs).

Discharges from haul roads constructed of waste rock or spent ore are subject to the Guidelines only if the discharge combines with "mine drainage" otherwise subject to the Part 440 regulations and the resulting storm water flows drain into a point source. Point source discharges consisting entirely of storm water from haul road-related sources would be addressed in the same manner as "waste rock and overburden" (see above). As noted above, such discharges would be outside the scope of the NPDES program if they consist entirely of diffuse runoff which does not flow to a point source.

EPA notes that NPDES permit coverage is still required when runoff from waste rock and overburden piles is channeled or drains to a point source. Under today's clarification, determinations about whether numeric effluent limitations similar to those in the Ore Mining and Dressing Guidelines should apply to discharges from overburden piles and haul roads are ones to be made on a site-by-site basis based on the "best professional judgment" of the permit writer (according to regulations at 40 CFR 125.3(d)). Such permits might include effluent limitations similar to the effluent limitations for "mine drainage" under the Guidelines. If determined feasible, EPA acknowledges that compliance with such limits may necessitate diversion of flows from such sources for treatment purposes. EPA provides additional guidance below.

V. Guidance To Permit Applicants and Permit Writers

Based on the foregoing discussion, EPA is revising Table G–4 today. In its earlier form, Table G–4 could have been misinterpreted. Consistent with earlier EPA statements made in the preamble to the Guidelines, the Notice of Clarification and other documents discussed above, the Table G–4 references to discharges from "waste rock/overburden" and "onsite haul roads constructed of waste rock or spent ore" at active ore mining and dressing sites are hereby modified. The Agency does not consider those discharges to be subject to the Guidelines unless they combine with "mine drainage" otherwise subject to the Part 440 regulations and the resulting storm water flows drain into a point source. Although not compelled by the Guidelines, numeric effluent limitations may be appropriate for these discharges if the permit writer so determines on a BPJ basis or if the discharge would cause or contribute to a violation of water quality standards.

The term "active mining area" should be interpreted in accordance with the plain language of the regulations; however, application of the definition may vary from mine to mine. As the Tenth Circuit recognized in the *Kennecott Corp.* case, "to cast such definitions in absolute, unequivocal terms would be unrealistic, if not altogether impossible." 612 F.2d at 1243. The regulations define "active mining area" as "a place where work or other activity related to the extraction, removal, or recovery of metal ore is

being conducted, except, with respect to surface mines, any area of land on or in which grading has been completed to return the earth to desired contour and reclamation work has begun." 40 CFR 440.132(a).

Today's interpretation and guidance describe a distinct class of discharges that was not apparent from the face of Table G–4 when the Agency published the Multi-Sector Permit. Specifically, today's interpretation identifies some discharges that could have been interpreted to be "mine drainage" under the plain language of the Guidelines and, therefore, within the applicability of the Guidelines and ineligible for coverage under the ore mining and dressing portion of the Multi-Sector General Permit (and under Table G–4) even though the Agency did not evaluate the technological feasibility and cost impacts of diverting drainage from those sources into the active mining area when it developed the Ore Mining and Dressing Guidelines. Based on today's clarification, such an interpretation would be inaccurate because EPA did not require diversion of flows from outside the active mining area into the active mining area for treatment. For this class of discharges described by today's notice, i.e., those from overburden and/or waste rock sources that do not combine with mine drainage otherwise subject to the Part 440 regulations, authorization under a EPA general permit for storm water may be available subject to the eligibility restriction against storm water discharges that the Agency has determined to be or may reasonably be expected to be contributing to a violation of a water quality standard.

Note that the permit applicant bears the initial responsibility to determine whether its discharges are eligible for coverage under an EPA-issued general permit. Discharges of "mine drainage" from the "active mining area" are not eligible for authorization under either the NPDES Baseline General permit or the Multi-Sector Permit because such discharges are subject to the Guidelines. For this reason, EPA encourages permit applicants to contact the NPDES permit issuance authority if there is any doubt regarding the nature and scope of the "active mining area" at the site of their operations. In many cases, modifications to individual permits may be more appropriate for longer-term authorization of the storm discharges in question. Of course, as indicated in the Table, there may be other such point sources of drainage from within the active mining area that would not be "mine drainage." Such discharges may be appropriately regulated under EPA general permits for storm water.

EPA also recommends that permit applicants contact the relevant NPDES authority for assistance in determining the appropriate permitting vehicle to address the class of discharges described in today's notice. At the time of reissuance, individual permits provide the best opportunity to evaluate all discharges at a mining operation, determine appropriate technology-based and water quality-based limitations, and tailor controls appropriate for the discharge, for example, through the use of best professional judgment (BPJ) according to 40 CFR § 125.3(d) or analogous State law, and where necessary to assure compliance with water quality standards.

NPDES permitting authorities should consider the following pollutants of concern when determining appropriate permit limitations:

—*pH, Acidity, and Alkalinity.* The term pH is a measure of relative acidity or alkalinity of water. Acidity is produced by substances that yield hydrogen ions upon hydrolysis and alkalinity is produced by substances that yield hydroxyl ions. The concentration of hydrogen ions is termed "pH." At a pH of 7, the water is neutral; lower pH values indicate acidity and higher values indicate alkalinity. Mine waste water is generally acidic as a result of the oxidation of minerals. Extremes in pH or rapid pH changes can exert stress conditions on aquatic biota, even to the point of killing aquatic life. The relative toxicity to aquatic life of other pollutants often is related to pH. For example, metalocyanide complexes can increase a thousand-fold in toxicity with a decline of 1.5 pH units. pH also affects the availability of nutrients utilized by aquatic life.

—*Total Suspended Solids* ("TSS"). Suspended solids adversely affect fisheries by covering the bottoms of streams and lakes, destroying the bottom dwelling fish and spawning grounds. Solids in suspension increase water turbidity, reduce light penetration and impair photo synthetic activity. When solids settle to the bottom, they are often more damaging to aquatic life. TSS composed of organic matter may deplete available oxygen supplies necessary for maintaining aquatic ecosystems. High TSS concentrations are prevalent in discharges from mining operations as a result of the mining process itself.

—*Copper.* In relatively low doses, copper can cause systems of gastroenteritis in humans, with nausea and intestinal irritations. Copper concentrations of less than one milligram per liter can be toxic to many kinds of fish and aquatic biota.

—*Zinc.* Concentrations of zinc ranging from 0.01 to 0.1 milligrams per liter are lethal to fish. Zinc may be rendered more toxic in the presence of copper.

If the NPDES permitting authority has data, for example, which indicate that discharges outside the active mining area only present pollution concerns associated with solids (e.g., settleable solids or total suspended solids), the permit requirements for those discharges may be limited to controlling those solids. However, if discharges contain heavy metals, the permitting authority, using BPJ, may establish appropriate technology-based metals effluent limitations. Further, if the permitting authority has data to indicate a reasonable potential to cause or contribute to an excursion of water quality standards for other pollutants, including pH and/or heavy metals, then the permit must include those more stringent requirements to assure compliance with water quality standards. EPA recommends ongoing monitoring for both pH and metals because the complex geochemistry at many mine sites presents difficulty in predicting the quality of storm water into the future.

In making BPJ determinations to require, for example, diversion of contaminated storm water flows for treatment, permitting authorities need to consider: the age of the equipment and facilities involved; process employed; the engineering aspects of the application of various types of control techniques; process changes; the costs of achieving effluent reduction; and non-water quality environmental impacts (including energy requirements). Such considerations should be documented in permit fact sheets.

In cases where there is a dry weather discharge outside the scope of the Guidelines, EPA strongly recommends that the permitting authority issue an individual NPDES permit using BPJ to establish appropriate technology-based limits or more stringent limitations necessary to assure compliance with water quality standards. The permitting authority should consider the degree of pollutant discharges (especially, whether the discharge contains heavy metal pollutants) and must consider the impact on the receiving water when establishing appropriate water quality-based controls on the discharge.

Finally, the Agency cautions that today's interpretation should not be

read as a license for mine operators to convert point source discharges into "nonpoint" sources in order to avoid regulation under the NPDES permit program. If a mining operation has a discernable, confined, discrete conveyance, any attempt to avoid regulation by intentional "diffusion" of that waste water stream, for example by spraying it over a hill side or inserting diffusing devices at the ends of drainage culverts, would still constitute a point source discharge if the waste water ultimately enters waters of the United States (as opposed to appropriate land application of such waste waters). While such diffusion may beneficially reduce the potential for erosion and instream sedimentation, it would not eliminate the need for treatment where necessary, for example, where the discharge contains metals contributing to a violation of State water quality standards.

VI. Monitoring Requirements for Waste Rock and/or Overburden Sources Eligible for Authorization Under Today's Modification

Subject to the eligibility limitations in the Multi-Sector Permit, storm water discharges from waste rock and overburden sources are eligible for general permit authorization according to the terms and conditions of the permit. For the most part, permittees will control such discharges in the same manner as other storm water discharges associated with the operation that were already eligible for permit coverage. In response to comments that extending Multi-Sector Permit coverage to this category of discharges is inappropriate, however, today's permit modifications impose requirements for analytic monitoring of storm water discharges from these waste rock and/or overburden sources.

By authorizing storm water discharges from waste rock and/or overburden sources, today's modifications to the Multi-Sector Permit will assure identification of and pollutant reduction at waste rock and/or overburden sources that might otherwise have remained unregulated until EPA (or State) regulatory personnel conduct individual, mine-by-mine, source-by-source evaluations. Under the monitoring requirements in today's modification, permittees (at all types of mines) will sample and measure at least once for a variety of mining-related pollutants. In addition, depending on the type of ore mined, permittees will also sample and measure twice annually for a list of pollutants specified for specific types of ore mining categories.

The Multi-Sector Permit, as modified, expires in September 2000. Thus, the authorization provided by today's permit modification will be of limited duration. Given the limitations in the data set from which EPA derived the requirements in the Multi-Sector Permit, the Agency believes that monitoring over time (until September 2000) is necessary, both to appropriately control storm water discharges from waste rock and overburden until September 2000, and to determine the appropriate control measures upon reissuance of the Multi-Sector Permit. As such, the monitoring is both "regulatory," in that it will identify sources of particular concern, as well as "evaluative," in that it will provide data to describe and evaluate storm water discharges from waste rock and overburden sources in a comprehensive fashion.

For storm water discharges from waste rock and overburden piles, permittees will sample and analyze at least once for the following metals: antimony, arsenic, beryllium, cadmium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, zinc. Each of these metals can be measured using the same analytic test procedure. The original Multi-Sector Permit also included "parameter benchmark values" for each of these metals. See 60 FR at 50826 (Table 5). Consistent with the identification of pollutants in the benchmark values table, permittees will measure for total "recoverable" metals. Though the Agency has expressed a policy preference for measurement of total dissolved metals in describing ambient water quality, the monitoring for total metals to characterize effluent discharges under today's modification is consistent with NPDES regulations, which specify that, when a permit contains a *limitation* for a metal, the limit be expressed in terms of total recoverable metals. See 40 CFR 122.45(c). At the discretion of the permittee, however, the permittee may also report information about "dissolved" metal analysis for the measured samples because EPA will evaluate all available monitoring information to determine appropriate terms and conditions for the Multi-Sector Permit upon reissuance. Permittees will also sample and analyze for pH, hardness, total settleable solids (TSS) and turbidity in the storm water discharges from such piles.

For any pollutant occurring above a benchmark value, the permittee will sample and analyze twice annually. In the case of pH monitoring, two annual samples is required if the measured pH falls outside the range listed in Table 5. Hardness does not have a benchmark value; twice annual measurement of hardness would accompany measurement for any hardness dependent metals (cadmium, copper, lead, nickel, silver, and zinc) required to be measured twice annually based on this initial measurement.

The permit includes this monitoring "screen" based on the geologic variability of waste rock and overburden associated with various ore types. Though a particular site may be mined only for a particular ore type, other metals may exist in the overburden (though not high enough in content to be of economic value). This initial monitoring will identify any such metals of concern. Measurement of such metals above the identified "benchmark" necessitates continuing attention through twice annual monitoring. Measurement of pH will also identify mine piles of concern for acidity. Information about hardness is important in determining bioavailability of measured metals, which in turn is useful to predict water quality impact. Measurement of total settleable solids and turbidity provides an indication of the effectiveness of measures to control erosion and runoff of storm water, which may impair aquatic life and aquatic habitat at high levels.

As noted above, permittees are also automatically required to conduct twice annual monitoring for specified pollutants associated with the specific type of ore mined at the facility. For certain types of ore mines, the effluent limitations guidelines (the Part 440 regulations) identified specific "pollutants of concern." Given the potential for changes in geochemistry of waste rock and overburden piles over time, this categorical monitoring (twice yearly) is required regardless of the test results from the initial monitoring screen. Note that two types of ore mining operations, iron mining and uranium/radium/vanadium mining, are required to measure for dissolved iron and dissolved radium, respectively.

The permit requires two monitoring events per year (once between January and June, and once between July and December) in order to assure that collected samples reliably "represent" expected discharges over the course of the year and to account for the significant potential difficulty (and potential for resulting error) in sampling. Given the opportunity for a sampling waiver under certain temporally-dependent conditions, the twice annual monitoring requirement will provide a meaningful representation of discharges, including seasonal variability.

The analytic monitoring requirements only apply to storm water discharges from piles of waste rock and overburden piles, not to haul roads and access roads constructed from waste rock or overburden. While the Agency is aware of the potential for water quality problems associated with acid rock drainage from piles of waste rock and/or overburden, the Agency is not aware of the same threat from drainage from access roads and haul roads. Given the relative flow per discharge source compared to piles, visual discharge monitoring and inspection should be adequate for haul roads and access roads.

Monitoring is required only at representative outfalls. Consistent with the existing Multi-Sector Permit, permittees are only required to sample and analyze discharges from the representative outfalls, which in turn, are to be identified in pollution prevention plans (i.e., in the topographic maps identifying drainage patterns). The pollution prevention plan also must explain why the discharges are expected to be substantially identical, estimate the drainage area and runoff coefficient. See generally, the explanation in the Multi-Sector Permit at 60 FR at 51160, col. 3 ("Representative Discharge").

Similar to the reporting requirements in the Multi-Sector Permit, permittees need to submit monitoring results in Discharge Monitoring Reports on an annual basis. Because the Multi-Sector Permit will expire in September 2000, this requirement will result in essentially two reports for each mining operation. The first report will provide important information upon which the Agency can begin the process to reissue the Multi-Sector Permit; the second report will confirm (or refute) preliminary decisions with sufficient time for the Agency to evaluate the information prior to proposing reissuance.

The permit modification (and monitoring requirements) apply to both "active" piles, as well as "inactive" piles, though only at "active" mining and dressing operations. Permittees have discretion to sample discharges at any convenient point prior to discharge to waters of the United States, including a sampling point after application of the best management practice. Consistent with the analytic monitoring requirements for discharges from active copper mines (in the existing Multi-Sector Permit), permittees may collect substitute samples when adverse weather conditions create dangerous conditions for personnel or otherwise make the collection of a sample impracticable.

VII. Summary of Responses to Public Comments

EPA has prepared a comprehensive response to public comments received on the proposal and that document is available in the administrative record for today's action. Some of those comments and responses are included below.

Comment. EPA's 1978 and 1982 Development Documents reveal that EPA has never analyzed the technical and economic feasibility of subjecting storm water runoff from vast overburden piles, haul roads and similar ancillary areas to the strict Part 440 effluent limitations. EPA wrongly still presumes that the "active mining area" should be interpreted broadly. The purported definition of the term "mine" [from the 1975 preamble and 1978 Development Document] is inconsistent with (and far broader than) the subsequently-promulgated regulatory definition of the term "mine" for the purposes of 40 CFR § 440.132. That definition does not include such things as "haul roads" or "all lands affected by the construction of new roads or the improvements or use of existing roads to gain access to the site," nor does it include "overburden piles" or "storage areas" (except to the extent that such piles or areas are currently being used for the "secondary recovery of metal ore"). Thus, the proposed modification is inconsistent on its face with the existing regulation and should be eliminated. All references to the scope of the term "mine" (or the "active mining area") should be limited to the regulatory definitions which speak for themselves.

Response. The commenter presents forceful arguments supporting revision of the interpretation of "the" definition as proposed, but some of its assumptions understate and confuse the nature of the Agency's actions in developing and promulgating the Part 440 regulations. By today's action, EPA explains its interpretation.

The definition of "mine" at 40 CFR 440.132(g) includes "an active mining area, including all land and property placed under, or above the surface of such land, used in or resulting from the work of extracting metal ore or minerals from their natural deposits by any means or method, including secondary recovery of metal ore from refuse or other storage piles, wastes, or rock dumps and mill tailings derived from the mining, cleaning, or concentration of metal ores." An "active mining area" is "a place where work or other activity related to the extraction of, removal, or recovery of metal ore is being conducted, except, with respect to surface mines, any area of land on or in which grading has been completed to return the earth to desired contour and reclamation work has begun." 40 CFR 440.132(a)(emphasis added). The plain meaning of the words "other activity related to * * *" could be interpreted to include overburden-related sources (in that disposal of mining waste is "related to" and, in fact integral to, mining) and haul roads (in that access to and from mining sites is "related to" and, in fact, integral to mining). Under today's interpretation, however, overburden-related sources would not be categorically subject to the Part 440 regulations unless otherwise sited in the active mining area. Likewise, waste rock and overburden-related sources are not categorically excluded from applicability of the Part 440 regulations because some such sources may be sited in the active mining area and combine with mine drainage otherwise regulated under the Part 440 regulations.

The definitions of the term "mine" from the 1975 preamble and 1978 Development Document differ from the definition of the term "mine" published at 40 CFR § 440.132. Descriptions in the 1975 preamble and 1978 Development Document were developed and used by Agency personnel gathering information at existing mining operations. EPA presumes that *some* of the sources identified in the 1975 preamble and 1978 Development Document did drain to existing treatment systems at some facilities. EPA acknowledges, however, that the location of such sources does not necessarily and categorically define the geographic scope of active mining area. EPA notes that the definition of "mine" in the 1982 Development Document more closely paraphrases the regulatory definitions.

To respond to this comment and avoid further confusion, however, EPA has removed references to the 1975 and 1978 developmental definitions in the interpretation published today. By today's action, a discharge associated with the disposal of waste rock or overburden source would not be subject to regulation under the Part 440 regulations unless it: (1) naturally drains (or is intentionally diverted) to a point source; and (2) combines with "mine drainage" that is otherwise regulated under the Part 440 regulations. As such, EPA has modified the provisions of the Multi-Sector permit to include monitoring provisions that should effectively identify any waste rock and overburden sources of environmental concern.

Comment. The newly proposed version of Table G–4 omits certain sources of storm water discharges that were listed in the prior version and as to which the multi-sector general permit should be applicable, specifically, crusher areas, ore piles, and spent ore piles. The commenter believes these areas are outside the active mining area.

Response. The published interpretation no longer attempts to enumerate various areas at mining operations for the purposes of indicating those for which the Part 440 regulations apply. By deciding not to list those areas, EPA specifically does not expand permit coverage to include those areas. In the group applications from the mining industry, group applicants did not specifically seek permit authorization for such areas. EPA therefore lacks sufficient information to address these areas today.

Comment. Mines are subject to state and federal regulations pertaining to dust. Nevada encourages the use of pumped groundwater for dust control in order to conserve water. To subject haul roads to numeric effluent limitations because they use pumped groundwater to limit dust in order to comply with other regulations seems counterproductive and shortsighted. Any statement that would subject these roads to such limitations should be deleted. In Nevada, groundwater is typically pumped from an underground aquifer to a holding tank for dust control usage. Groundwater used for dust control is not normally applied to roads during storm events, thus, there would be no commingling of storm water and ground water.

Response. EPA did not intend to identify all waters used for dust control as sources of mine drainage. EPA recognizes that groundwater is used for dust control in some areas of the country. EPA does not necessarily consider groundwater to be mine drainage, especially uncontaminated groundwater. When mine water, which might otherwise constitute mine drainage, is used for dust control, however, then such dust control waters would remain mine drainage.

Comment. The proposed modification should not be limited to EPA Regions 1, 6, 9, and 10. EPA Region 8 has relied on Table G–4 from the original Multi-Sector Permit to dictate to States with EPA-approved NPDES permit programs how 40 CFR Part 440 must be interpreted. EPA has provided the 1995 Multi-Sector Permit to authorized States as a model. Because authorized States must have requirements that are at least as stringent as the federal program, EPA should confirm that any revised interpretation of 40 CFR Part 440 is applicable to all States with ore mining and dressing facilities. EPA's interpretation in Table G–4 is applicable to all States, not just EPA, including for the purposes of withdrawal of authorized State NPDES programs. EPA has not provided a reasoned and viable basis for regional distinctions in applicability of the interpretation in the proposed modification.

Response. EPA agrees that the Agency's interpretation of the Part 440 regulations should apply on a national basis. States authorized to administer the NPDES permitting program are to include effluent limitations in permits that are at least as stringent as the limitations that EPA would include in NPDES permits. Because the interpretation in today's action is just that—an interpretation—and because the primary action EPA takes in today's action is to modify EPA-issued NPDES general permits for storm water associated with industrial activity (the Multi-Sector Permit), only the EPA Regional Administrators who issue the Multi-Sector Permit sign today's notice. EPA does intend, however, that the interpretation associated with the modification to the Multi-Sector Permit apply on a nationwide basis.

Comment. EPA should address the situation where an overburden pile is physically separated from and does not naturally drain to an open pit.

Response. EPA generally acknowledges that some mining operations and some States authorized to administer the NPDES program have not historically interpreted the term "active mining area" in the same manner as the Agency would have interpreted that term reflected in the 1995 version of Table G–4. Upon fuller review of the underlying administrative record to the original Part 440 rule makings, EPA concludes that the Agency did not conduct a complete economic and technological assessment of diversion of drainage flows from "waste rock or overburden" outside the active mining area into the active mining area. As such, the Agency agrees that a waste rock or an overburden pile that is physically separated from and does not naturally drain (or has not been intentionally diverted) to treatment would not be a source of mine drainage. In such a case, however, evaluation of the resulting discharges would be necessary and appropriate to determine whether such discharge would cause, have a reasonable potential to cause, or contribute to a violation of any water quality standard.

Comment. EPA should clarify that water quality treatment of "mine drainage" necessitated by active mining (e.g., construction of a waste rock pile) is part of the "active mining area" and the "mine" and that such drainage is subject to the effluent limitations guidelines for the life of the discharge.

Response. EPA generally agrees that mining operation point sources from active mining that represent water quality concerns remain subject to CWA control requirements for as long as the discharge causes or contributes (or has a reasonable potential to contribute) to a violation of a water quality standard. EPA presumes that treatment to protect water quality may be necessary, for example, for discharges from a waste rock pile with mineral content high enough to leach metals under normal environmental conditions. EPA does not, however, conclude that all regulation of point sources to protect water quality necessarily means that such point sources are subject to regulation under the national effluent limitations guidelines. Any more stringent water quality based effluent limitations are necessary when technology-based limitations are insufficient to assure compliance with water quality standards. The imposition of a water quality based effluent limitation does not necessarily expand the applicability of technology-based limitations. Such water quality-based limitations may regulate different or fewer (or more) pollutants than applicable technology-based limitations.

Comment. EPA should interpret the Neuman letter to exempt only releases from "areas * * * where work or other activity related to the extraction, removal or recovery of metal ore *is not being conducted.*" EPA should clarify that an active waste dump is clearly within an area where such work is being conducted. The proposed modification correctly notes the distinction between discharges from active waste rock dumps and inactive dumps. The former are subject to the effluent limitations guidelines and the latter are not.

Response. EPA believes that, as a practical matter, it would be difficult to differentiate discharges from newly placed overburden and existing overburden, especially when placement of overburden is being conducted at existing piles. Importantly, the mere placement of such "new" overburden to an existing overburden pile does not automatically make the pile part of the active mining area under the Part 440 regulations.

Comment. The Administrator's decision of February 21, 1979, did not exempt *active* waste rock dumps that *do* drain to a point source.

Response. As noted previously, EPA has struggled to provide meaning to the Administrator's February 21, 1979 decision in light of the appended letter from Mr. Neuman. EPA agrees that the Administrator's decision, to the extent it addresses drainage to a point source, clearly does not provide any basis to presume any exemption from NPDES permit requirements. The Agency does not, however, endorse the negative inference that the commenter draws from the Administrator's decision. Under today's clarification, a discharge associated with the disposal of waste rock and/or overburden would not be subject to regulation under the Part 440 regulations unless it: (1) drains naturally (or is intentionally diverted) to a point source; and (2) combines with "mine drainage" that is otherwise regulated under the Part 440 regulations.

VIII. Regulation Assessment Requirements

A. Executive Order 12866

Under Executive Order 12866 (58 FR 51735; October 4, 1993), the Agency must determine whether the regulatory action is "significant" and therefore subject to OMB review and the requirements of the Executive Order. The Order defines "significant regulatory action" as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Because the Agency takes the position that NPDES general permits are not "rules" or "regulations" subject to the rule making requirements of Administrative Procedure Act section 553, it has been determined that this rule is not a "significant regulatory action" under the terms of Executive Order 12866 and is therefore not subject to OMB review.

B. Regulatory Flexibility Act

The Agency has determined that the permit modification being published today is not subject to the Regulatory Flexibility Act ("RFA"), which generally requires an agency to conduct a regulatory flexibility analysis of any significant impact the rule will have on a substantial number of small entities. By its terms, the RFA only applies to rules subject to notice-and-comment rule making requirements under the Administrative Procedure Act ("APA") or any other statute. Today's permit modification is not subject to notice and comment requirements under the APA or any other statute because the APA defines "rules" in a manner that excludes permits. See APA section 551 (4), (6), and (8).

APA section 553 does not require public notice and opportunity for comment for interpretative rules or general statements of policy. In addition to modifying the general permit, today's action repeats an interpretation of existing regulations promulgated almost twenty years ago. The action would impose no new or additional requirements.

C. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), P.L. 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year.

For reasons explained in the discussion regarding the Regulatory Flexibility Act, the UMRA only applies to rules subject to notice-and-comment rule making requirements under the APA or any other statute. Today's permit modification is not subject to notice and comment requirements under the APA or any other statute because the APA defines "rules" in a manner that excludes permits. See APA section 551 (4), (6), and (8).

Today's permit modification contains no Federal mandates (under the regulatory provisions of Title II of the UMRA) for State, local, or tribal governments or the private sector. Today's modification merely announces an Agency interpretation of existing regulations. EPA has determined that this permit modification does not contain any Federal mandate that may result in expenditures of $100 million or more for State, local, and tribal governments, in the aggregate, or the private sector in any one year. Therefore, today's permit modification is not subject to the requirements of section 202 of the UMRA.

Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements. Because today's modification is based on an interpretation of existing regulations and because EPA anticipates that extremely few, if any, small governments operate mining operations, EPA has determined that this action contains no regulatory requirements that might significantly or uniquely affect small governments.

D. Paperwork Reduction Act

The permit modification contains no requests for information and consequently is not subject to the Paperwork Reduction Act, 44 U.S.C. §§ 3501 *et seq.*

Official Signatures

Accordingly, I hereby find consistent with the provisions of the Regulatory Flexibility Act, that these final permit modifications will not have a significant impact on a substantial number of small entities.

Authority: Clean Water Act, 33 U.S.C. 1251 *et seq.*

Dated: July 29, 1998.

Mindy Lubber,

Acting Regional Administrator, Region 1.

Dated: July 29, 1998.

Gregg A. Cooke,

Regional Administrator, Region 6.

Dated: July 18, 1998.

Laura Yoshii,

Acting Regional Administrator, Region 9.

Dated: July 21, 1998.

Chuck Clarke,

Regional Administrator, Region 10.

Final Permit Modification

This permit modification shall become effective on September 8, 1998.

Region 1

Signed and issued this 24th day of July, 1998.

Linda M. Murphy,

Director, Office of Ecosystem Protection.

Areas of coverage	Permit No.
Connecticut Indian Country	CTR05*##F
Maine	MER05*###
Maine Indian Country	MER05*##F
Massachusetts	MAR05*###
Massachusetts Indian Country.	MAR05*##F
New Hampshire	NHR05*###
Rhode Island Indian Country	RIR05*##F
Vermont Federal Facilities	VTR05*##F

Region VI

Signed this 29th of July, 1998.

William B. Hathaway,

Water Quality Protection Division Director.

Areas of coverage	Permit No.
Louisiana Indian country	LAR05*##F
New Mexico	NMR05*###
Indian country (except Navajo and Ute Mountain Reservation lands).	NMR05*##F
Oklahoma:	
Indian country	OKR05*##F
Oil and gas exploration and production related industries and pipeline industries that are regulated by the Oklahoma Corporation Commission.	OKR05*##F
Texas	TXR05*###
Indian country	TXR05*##F

Region IX

Signed this 24th of July, 1998.

Alexis Strauss,

Acting Director, Water Division.

Areas of coverage	Permit No.
Arizona	AZR05*###
Indian country	AZR05*##F
Federal Facilities	AZR05*##F
California:	
Indian country (Not including Hoopa Valley Tribe).	CAR05*##F
Idaho:	
Duck Valley Reservation	NVR05*##F
Nevada Indian country	NVR05*##F
New Mexico:	
Navajo Reservation	AZR05*##F
Oregon:	
Fort McDermitt Reservation.	NVR05*##F
Utah	
Goshute Reservation	NVR05*##F
Navajo Reservation	AZR05*##F

Region X

Signed this 21st of July, 1998.

Philip G. Millam,

Director, Office of Water.

Areas of coverage	Permit No.
Alaska Indian country	AKR05*##F
Idaho:	IDR05*###
Federal Facilities	IDR05*##F
Indian country (except Duck Valley Reservation lands).	IDR05*##F
Oregon Indian country (except for Fort McDermitt Reservation lands).	ORR05*##F
Washington Indian country	WAR05*##F
Washington Federal Facilities.	WAR05*##F

1. For the reasons set forth in this preamble, the table published at 60 FR 50897 is modified to read as follows:

TABLE G–4.—APPLICABILITY OF THE MULTI-SECTOR GENERAL PERMIT TO STORM WATER RUNOFF FROM ACTIVE ORE (METAL) MINING AND DRESSING SITES

Discharge/source of discharge	Note/comment
Piles:	
Waste rock/overburden	If composed entirely of storm water and not combining with mine drainage. See Note below.
Topsoil.	
Roads constructed of waste rock or spent ore:	
Onsite haul roads	If composed entirely of storm water and not combining with mine drainage. See Note below.
Offsite haul/access roads.	
Roads not constructed of waste rock or spent ore:	
Onsite haul roads	Except if "mine drainage" is used for dust control.
Offsite haul/access roads.	
Milling/concentrating:	
Runoff from tailings dams/dikes when constructed of waste rock/tailings.	Except if process fluids are present and only if composed entirely of storm water and not combining with mine drainage. See Note below.
Runoff from tailings dams/dikes when not constructed of waste rock/tailings.	Except if process fluids are present.
Concentration building	If storm water only and no contact with piles.
Mill site	If storm water only and no contact with piles.
Ancillary areas:	
Office/administrative building and housing	If mixed with storm water from the industrial area.
Chemical storage area.	
Docking facility	Except if excessive contact with waste product that would otherwise constitute "mine drainage".
Explosive storage	
Fuel storage (oil tanks/coal piles)	
Vehicle/equipment maintenance area/building	
Parking areas	But coverage unnecessary if only employee and visitor-type parking.
Power plant.	
Truck wash area	Except when excessive contact with waste product that would otherwise constitute "mine drainage".
Reclamation-related areas:	
Any disturbed area (unreclaimed)	Only if not in active mining area.

TABLE G–4.—APPLICABILITY OF THE MULTI-SECTOR GENERAL PERMIT TO STORM WATER RUNOFF FROM ACTIVE ORE (METAL) MINING AND DRESSING SITES—Continued

Discharge/source of discharge	Note/comment
Reclaimed areas released from reclamation bonds prior to Dec. 17 1990.	
Partially/inadequately reclaimed areas or areas not released from reclamation bond.	

Storm water runoff from these sources are subject to the NPDES program for storm water unless mixed with discharges subject to the 40 CFR Part 440 that are not regulated by another permit prior to mixing. Non-storm water discharges from these sources are subject to NPDES permitting and may be subject to the effluent limitation guidelines under 40 CFR Part 440.

Note: Discharges from overburden/waste rock and overburden/waste rock-related areas are not subject to 40 CFR Part 440 unless: (1) it drains naturally (or is intentionally diverted) to a point source; and (2) combines with "mine drainage" that is otherwise regulated under the Part 440 regulations. For such sources, coverage under this permit would be available if the discharge is composed entirely of storm water does not combine with other sources of mine drainage that are not subject to 40 CFR Part 440, as well as meeting other eligibility criteria contained in Part I.B. of the permit. Permit applicants bear the initial responsibility for determining the applicable technology-based standard for such discharges. EPA recommends that permit applicants contact the relevant NPDES permit issuance authority for assistance to determine the nature and scope of the "active mining area" on a mine-by-mine basis, as well as to determine the appropriate permitting mechanism for authorizing such discharges.

2. The fourth sentence in the first paragraph in permit eligibility provision for Storm Water Discharges Associated with Industrial Activity from Metal Mining (Ore Mining and Dressing), Section XI.G.1. (introductory language), previously published at 60 FR 51155, is modified and a fifth and sixth sentence are added to read as follows:

1. Discharges Covered Under This Section

* * * All storm water discharges from inactive metal mining facilities and storm water discharges from the following areas of active, and temporarily inactive, metal mining facilities are the only discharges covered by this permit: waste rock/overburden piles if composed entirely of storm water and not combining with mine drainage; topsoil piles; offsite haul/access roads; onsite haul/access roads constructed of waste rock/overburden if composed entirely of storm water and not combining with mine drainage; onsite haul/access roads not constructed of waste rock/overburden/spent ore except if mine drainage is used for dust control; runoff from tailings dams/dikes when not constructed of waste rock/tailings and no process fluids are present; runoff from tailings dams/dikes when constructed of waste rock/tailings and no process fluids are present if composed entirely of storm water and not combining with mine drainage; concentration building if no contact with material piles; mill site if no contact with material piles; office/administrative building and housing if mixed with storm water from industrial area; chemical storage area; docking facility except if excessive contact with waste product that would otherwise constitute mine drainage; explosive storage; fuel storage; vehicle/equipment maintenance area/building; parking areas (if necessary); power plant; truck wash areas except when excessive contact with waste product that would otherwise constitute mine drainage; unreclaimed, disturbed areas outside of active mining area; reclaimed areas released from reclamation bonds prior to December 17, 1990; and partially/inadequately reclaimed areas or areas not released from reclamation bond. Note: Discharges from overburden/waste rock and overburden/waste rock-related areas are not subject to 40 CFR Part 440 unless it: (1) Drains naturally (or is intentionally diverted) to a point source; and (2) combines with "mine drainage" that is otherwise regulated under the Part 440 regulations. For such sources, coverage under this permit is available if the discharge is composed entirely of storm water and does not combine with sources of mine drainage that are subject to 40 CFR Part 440, as well as meeting other eligibility criteria contained in Part I.B. of the permit.

3. The permit is amended to include a new section d. and Tables G–2 and G–3, which would have appeared in the third column of 60 FR 51161, to read as follows:

d. Additional Monitoring Requirements for Storm Water Discharges from Waste Rock and Overburden Piles.

Beginning July 1, 1998, the operator of an active ore mining and dressing facility covered by this permit must monitor the storm water discharges from waste rock and/or overburden piles resulting from mining activities. The operator must conduct analytic monitoring as described below at least twice annually (once between July 1 and December 31, and once between January 1 and June 30) for the duration of this permit. Samples shall be collected from separate storm events a minimum of 3 months apart, except as provided in paragraphs 5.a.(3) (Sampling Waiver), 5.a.(4) (Representative Discharge), and 5.a.(5) (Alternative Certification). Upon notification by the Director, permittees may be required to conduct additional monitoring as necessary to accurately characterize the quality and quantity of pollutants discharged from the waste rock/overburden pile.

All permittees must conduct analytic monitoring once for the parameters listed in Table G–2, and twice annually for any parameters measured above the benchmark value listed in Table G–2. Permittees must also conduct analytic monitoring twice annually for the parameters listed Table G–3 for each of the ore mine categories listed in Table G–3. The initial sampling conducted of Table G–2 pollutant parameters satisfies the requirement for the first sample for any pollutant measurement required by Table G–3.

Permittees must report monitoring results in accordance with paragraph 5.b. (Reporting). In addition to reporting the monitoring requirements for the parameters listed in Tables G–2 and G–3 below, the permittee must report the date and duration (in hours) of the storm event(s) sampled; rainfall measurements or estimates (in inches) of the storm event that generated the sampled runoff; the duration between the storm event sampled and the end of the previously measurable (greater than 0.1 inch) storm event; and an estimate of the total volume (in gallons) of the sampled discharge.

TABLE G–2.—INITIAL MONITORING REQUIREMENTS FOR STORM WATER DISCHARGES FROM WASTE ROCK AND OVERBURDEN PILES RESULTING FROM MINING ACTIVITY AT ACTIVE ORE MINING OR DRESSING OPERATIONS

Pollutants of concern	Benchmark values
Total Suspended Solids (TSS)	100 mg/L.
Turbidity (NTUs)	5 NTUs above background.
pH	6.0–9.0 standard units.
Hardness (as $CaCO_3$)	no benchmark value.
Antimony, Total	0.636 mg/L.
Arsenic, Total	0.16854 mg/L.
Beryllium, Total	0.13 mg/L.
Cadmium, Total (hardness dependent)	0.0159 mg/L.
Copper, Total (hardness dependent)	0.0636 mg/L.
Iron, Total	1.0 mg/L.
Lead, Total (hardness dependent)	0.0816 mg/L.
Manganese, Total	1.0 mg/L.
Mercury, Total	0.0024 mg/L.
Nickel, Total (hardness dependent)	1.417 mg/L.
Selenium, Total	0.2385 mg/L.
Silver, Total (hardness dependent)	0.0318 mg/L.
Zinc, Total (hardness dependent)	0.117 mg/L.

TABLE G–3.—ADDITIONAL MONITORING REQUIREMENTS (TWICE ANNUAL) FOR STORM WATER DISCHARGES FROM WASTE ROCK AND OVERBURDEN RESULTING FROM MINING ACTIVITY AT ACTIVE MINING OR DRESSING OPERATIONS BASED ON TYPE OF ORE HANDLED

Type of ore mined	Pollutant/parameter		
	Total suspended solids (TSS)	pH	Metals, total
Tungsten Ore	X	X	Arsenic, Cadmium (H), Copper (H), Lead (H), Zinc (H).
Nickel Ore	X	X	Arsenic, Cadmium (H), Copper (H), Lead (H), Zinc (H).
Aluminum Ore	X	X	Aluminum, Iron.
Mercury Ore	X	X	Nickel (H), Mercury.
Iron Ore	X	X	Iron (Dissolved).
Platinum Ore	.....	.....	Cadmium (H), Copper (H), Mercury, Lead (H), Zinc (H).
Titanium Ore	X	X	Iron, Nickel (H), Zinc (H).
Vanadium Ore	X	X	Arsenic, Cadmium (H), Copper (H), Lead, Zinc (H).
Copper, Lead, Zinc, Gold, Silver, and Molybdenum	X	X	Arsenic, Cadmium (H), Copper (H), Lead (H), Mercury, Zinc (H).
Uranium, Radium, and Vanadium	X	X	Chemical Oxygen Demand, Arsenic, Radium (Dissolved and Total), Uranium, Zinc (H).

NOTE: (H) indicates that hardness must also be measured when this pollutant is measured.

4. The permit is amended to include a new section e., which would have appeared in the third column of 60 FR 51161, to read as follows:

e. Additional Reporting Requirements for Storm Water Discharges from Waste Rock and Overburden Resulting from Mining Activities.

Permittees with active ore mining and dressing facilities shall submit monitoring results for each outfall discharging storm water discharges from waste rock and overburden piles resulting from mining activities, (or a certification in accordance with Sections (3)(a), (3)(b), (4), (5) above) obtained during the reporting period beginning July 1, 1998, and lasting for the duration of the permit. Permittees must submit such monitoring results on Discharge Monitoring Report (DMR) Form(s) postmarked no later than March 31 following the calendar year in which the samples were collected.

5. In addition to the conditions contained in Parts I–XI of this permit, the following requirements are incorporated into Part XII and are placed on permittees located in the listed States, Indian country lands (referred to as "Federal Indian Reservations" in the original permit), or Territories to meet applicable Clean Water Act section 401 or Coastal Zone Management Act certification requirements.

Part XII. Coverage Under This Permit

The provisions of this Part provide modifications or additions to the applicable conditions of Parts I through XI of this permit in order to reflect specific conditions required as part of a State, Tribal or Territory Clean Water Act section 401 certification process, or Coastal Zone Management Act certification process, or as otherwise established by the permitting authority. The additional revisions and requirements listed below are set forth in connection with, and only apply to, the following States, Indian country lands, and Federal facilities.

Region I

State of Massachusetts, Except Indian Country Lands (MAR05*###)

The following Massachusetts section 401 certification requirements revise the permit accordingly:

1. Part II.B.8. is added to the permit as follows:

Special Permit Eligibility Requirements for the State of Massachusetts. Discharges covered by the Multi-Sector General Permit must comply with the provisions of 314 CMR 3.00, 314 CMR 4.00, 314 CMR 9.00 and 310 CMR 10.00 and any related policies promulgated under the authority of the Massachusetts Clean Waters Act, M.G.L. c.21, ss.26–53, and Wetlands Protection Act, M.G.L. c.131, s. 40. Specifically, new facilities or the redevelopment of existing facilities subject to this permit must comply with applicable storm water performance standards prescribed by State regulation or policy. A permit under 314 CMR 3.04 is not required for existing facilities which meet State storm water performance standards; an application for a permit under 314 CMR 3.00 is required only when required under 314 CMR 3.04(2)(b) (designation of a discharge on a case-by-case basis) or is otherwise identified in 314 CMR 3.00 or Department policy as a discharge requiring a permit application. Department regulations and policies may be obtained through the State House Bookstore (617–727–2834) or on the Internet at "www.magnet.state.ma.us/dep".

2. Part VI.B.3. is added to the permit as follows:

Special Reporting Requirement for the State of Massachusetts. The results of any quarterly monitoring required by this permit must be sent to the appropriate regional office of the Department listed below when the monitoring identifies violations of State Surface Water Quality Standards, 314 CMR 4.00, for any parameter which requires monitoring under this permit. Monitoring results must also be submitted upon request to the Department.

Western Region

436 Dwight Street—Suite 402, Springfield, MA 01103, (413) 784–1100

Central Region

627 Main Street, Worcester, MA 01608, (508) 792–7650

Southeast Region

Lakeville Hospital—Route 105, Lakeville, MA 02347, (508) 946–2700

Northeast Region

10 Commerce Way, Woburn, MA 01801, (781) 932–7677

3. Part IV.B.2.a. is added to the permit as follows:

Special Storm Water Pollution Prevention Plan Availability Requirement for the State of Massachusetts. The Department may request a copy of the storm water pollution prevention plan for any facility covered by this permit to ensure compliance with State law requirements, including State water quality standards. The Department may enforce its certification conditions.

4. Part VII.Q.1. is added to the permit as follows:

Special Inspection Requirements for the State of Massachusetts. The Department may conduct an inspection of any facility covered by this permit to ensure compliance with State law requirements, including State water quality standards. The Department may enforce its certification conditions.

Region VI

State of New Mexico, except Indian Country Lands (NMR05*###)

The following State of New Mexico section 401 certification requirement revises the permit accordingly:

(a) Part I.B.8(a) is added to the permit as follows:

Special Water Quality Standard Requirement for the State of New Mexico. Storm water discharges associated with industrial activity that the New Mexico Environment Department (NMED)/Surface Water Quality Bureau has determined to be, or may reasonably be expected to be, contributing to a violation of a water quality standard are not authorized by this permit. Upon receipt of this determination, the NMED anticipates that the EPA will notify the general permittee within a reasonable period of time to apply for and obtain an individual NPDES permit for these discharges according to 40 CFR 122.28(b)(3).

Federal Indian Country Lands in the State of New Mexico (NMR05*##F)

1. *Pueblo of Isleta* The following Pueblo of Isleta section 401 certification requirements revise the permit accordingly:

(a) Part II.C.1. is added to the permit as follows:

Special NOI Requirement for the Pueblo of Isleta. Copies of NOIs shall also be submitted to the Pueblo of Isleta's Environment Department, Water Quality Program, at the following address concurrently with NOI submission to EPA: Isleta Environment Department, Water Quality Program, Pueblo of Isleta, PO Box 1270, Isleta, New Mexico 87022, Telephone (505) 869–6333 or 3111.

(b) Part IX.B.1. is added to the permit as follows:

Special NOT Requirement for the Pueblo of Isleta. Copies NOTs shall also be submitted to the Pueblo of Isleta's Environment Department, Water Quality Program, concurrently with NOT submission to EPA. Copies are to be sent to the address given in Part II.C.1.

(c) Part IV.F. is added to the permit as follows:

Special Storm Water Pollution Prevention Plan Requirement for the Pueblo of Isleta. Storm water pollution prevention plans must be submitted to the Pueblo of Isleta Environment Department, Water Quality Program, within 30 days of plan development. SWPPPs are to be sent to the address given in Part II.C.1.

2. *Pueblo of Pojoaque* The following Pueblo of Pojoaque section 401 certification requirements revise the permit accordingly:

(a) Part II.C.1. is added to the permit as follows:

Special NOI Requirement for the Pueblo of Pojoaque. Copies of NOIs shall also be submitted to the Pueblo of Pojoaque Environment Department at the following address concurrently with NOI submittal to EPA: Pueblo of Pojoaque, Environment Department, Route 11, P.O. Box 208, Santa Fe, New Mexico 87501, Telephone (505) 455–2087, Fax (505) 455–2177.

(b) Part IX.B.1. is added to the permit as follows:

Special NOT Requirement for the Pueblo of Pojoaque. Copies of NOTs shall also be submitted to the Pueblo of Pojoaque Environment Department concurrently with NOT submittal to EPA. Copies are to be sent to the address given in Part II.C.1.

(c) Part IV.F. is added to the permit as follows:

Special Storm Water Pollution Prevention Plan Requirement for the Pueblo of Pojoaque. Storm water pollution prevention plans must be submitted to the Pueblo of Pojoaque Environment Department at least 30 days before a project begins. Case-by-case determinations will be made by the Department to assure compliance with the Pueblo of Pojaque Water Quality Standards. SWPPPs are to be sent to the address given in Part II.C.1.

3. *Pueblo of Sandia* The following Pueblo of Sandia section 401 certification requirements revise the permit accordingly:

(a) Part II.C.1. is added to the permit as follows:

Special NOI Requirement for the Pueblo of Sandia. Copies of NOIs shall also be submitted to the Pueblo of Sandia Environment Department at the following address concurrently with NOI submittal to EPA: Pueblo of Sandia. Environment Department. Box 6008. Bernalillo. New Mexico 87004. Telephone (505) 867–4533; Fax (505) 867–9235.

(b) Part IX.B.1. is added to the permit as follows:

Special NOT Requirement for the Pueblo of Sandia. Copies of NOTs shall also be submitted to the Pueblo of Sandia Environment Department concurrently with NOT submittal to EPA. Copies are to be sent to the address given in Part II.C.1.

4. *Pueblo of Picuris* The following Pueblo of Picuris section 401 certification requirements revise the permit accordingly:

(a) Part II.C.1. is added to the permit as follows:

Special NOI Requirement for the Pueblo of Picuris. Copies NOIs shall also be submitted to both the Pueblo of Picuris Environment Department and Picuris Governor Manuel Archuleta at the following address concurrently with NOI submission to EPA: Pueblo of Picuris. P.O. Box 127. Penasco. New Mexico 87553. Telephone (505) 587–2519.

(b) Part IX.B.1. is added to the permit as follows:

Special NOT Requirement for the Pueblo of Picuris. Copies NOTs shall also be submitted to both the Pueblo of Picuris Environment Department and Picuris Governor Manuel Archuleta at the address given in Part II.C.1. concurrently with NOT submission to EPA.

(c) Part IV.F. is added to the permit as follows:

Special Storm Water Pollution Prevention Plan Requirement for the Pueblo of Picuris. Copies of storm water pollution prevention plans must be submitted to both the Pueblo of Picuris Environment Department and Picuris Governor Manuel Archuleta at the address given in Part II.C.1. concurrently with plan submission to EPA.

Region X

The State of Idaho, except Indian Country Lands (IDR05* ###)

The following State of Idaho section 401 certification requirement revises the permit accordingly:

1. Part IV.F. is added to the permit as follows:

Special Storm Water Pollution Prevention Plan Requirement for the State of Idaho. Storm water pollution prevention plan design and associated storm water discharge quality shall demonstrate compliance with applicable Idaho Water Quality Standards and Wastewater Treatment Requirements (IDAPA 16.01.02) through the selection and use of approved and/or reasonable Best Management Practices.

Federal Indian Country Lands in the State of Washington (WAR05* ##F)

1. *Confederated Tribes of the Chehalis Reservation.* The following Confederated Tribes of the Chehalis Reservation section 401 certification requirements revise the permit accordingly:

(a) Part I.B.8(a) is added to the permit as follows:

Special Water Quality Standard Requirement for the Confederated Tribes of the Chehalis Reservation. The permittee shall be responsible for achieving compliance with Confederated Tribes of Chehalis Reservation's Water Quality Standards.

(b) Part I.B.8(b) is added to the permit as follows:

Special Permit Eligibility Requirement for the Confederated Tribes of the Chehalis Reservation. Storm water pollution prevention plans shall be submitted to the Chehalis Tribal Department of Natural Resources at the following address for review and approval prior to discharge: Confederated Tribes of Chehalis Reservation, Department of Natural Resources 420 Howanut Road, Oakville, WA 98568.

2. *Puyallup Tribe of Indians.* The following Puyallup Tribe of Indians section 401 certification requirements revise the permit accordingly:

(a) Part I.B.8(a) is added to the permit as follows:

Special Water Quality Standard Requirement for the Puyallup Tribe of Indians. The permittee shall be responsible for achieving compliance with Puyallup Tribe's Water Quality Standards.

(b) Part I.B.8(b) is added to the permit as follows:

Special Permit Eligibility Requirement for the Puyallup Tribe of Indians. Storm water pollution prevention plans shall be submitted to the Puyallup Tribe Environmental Department at the following address for review and approval prior to discharge: Puyallup Tribe Environmental Department 2002 East 28th Street, Tacoma, WA 98404.

(c) Part II.C.1. is added to the permit as follows:

Special NOI Requirement for the Puyallup Tribe of Indians. Copies of NOIs shall also be submitted to the Puyallup Tribe Environmental Department at the address listed in Part I.B.8(b) at time of NOI submittal to EPA:

Federal Facilities in the State of Washington, Except Those Located on Indian Country Lands (WAR05* ###)

The following State of Washington section 401 certification requirement revises the permit accordingly:

(a) Part I.B.8(a) is added to the permit as follows:

Special Water Quality Standard Requirement for the State of Washington. The permittee shall be responsible for achieving compliance with the State of Washington's Water Quality Standards. These Standards are found in Chapter 173–201AWAC (Water Quality Standards for Surface Waters), Chapter 173–204 WAC (Sediment Management Standards), and the human health standards in the National Toxics Rule (57 FR 60848—60923).

[FR Doc. 98–21025 Filed 8–4–98; 8:45 am]

BILLING CODE 6560–50–P

CHEMICAL AND PHYSICAL PROPERTIES		Reference
Molecular Weight:	95.94	2028A
Melting Point (C):	2622	2028A
Boiling Point (C):	4825	2028A
Vapor Pressure @ T(C), Torr:	1 @ 3102	333A
Solubility in Water @ T(C), mg/L:	INSOLUBLE	333A
Log octanol/Water Partition Coefficient:		
Henry's Law Constant, atm x m3 mole-2:		

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Enviromental Data for MOLYBDENUM

Chronic Noncarcinogenic Systemic Toxicity:	
Risk Estimates for Carcinogens:	
Drinking Water Health Advisories/Standards:	
Water Quality Criteria:	
Quatic Toxicity Database:	5B

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Freundlich Isotherm Data for MOLYBDENUM

* No Frundlich Isotherm data on file *

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Aqueous Technology Data for MOLYBDENUM

Technology	Influent Concentration	Source Matrix	Scale	Effluent Concentration	Percent Removal	Reference
AS	0-100 ug/L	D --- NA	F58	25 (6) ug/L	7	1B-S-
AS	0-100 ug/L	D --- NA	F14	<59 (5) ug/L	>13	1B-S-
TF	0-100 ug/L	D --- NA	F11	99 (5) ug/L	0	1B-S-

GAC	0-100 ug/L	HL --- NA	F1	24 (1) ug/L	17	245B---
AS	0-100 ug/L	D --- NA	F7	22 (4) ug/L	12	1B-S-
AS	0-100 ug/L	D --- NA	F	<24 (8) ug/L	>23	201B-S-
Fil	0-100 ug/L	SF --- NA	F2	36 (1) ug/L	3	245B---
AS	0-100 ug/L	SF --- NA	F6	<10 (1) ug/L	>17	245B---
GAC	0-100 ug/L	SF --- NA	F4	18 (4) ug/L	0	245B---
AirS	0-100 ug/L	SF --- NA	F4	16 (2) ug/L	0	245B---
AS	0-100 ug/L	D --- NA	F7	10 (12) ug/L	50	86B-S-
AS	0-100 ug/L	D --- NA	F35	10 (6) ug/L	50	86B-S-
AS	0-100 ug/L	D --- NA	F30	10 (11) ug/L	50	86B-S-
Sed	0-100 ug/L	D --- NA	F36	10 (6) ug/L	50	86B-S-
AS	0-100 ug/L	D --- NA	F2	10 (12) ug/L	50	86B-S-
Sed	0-100 ug/L	D --- NA	F1	<50 (30) ug/L	>0	35E-S-
ChPt	0-100 ug/L	SF --- NA	F8	<10 (2) ug/L	>28	245B---
ChPt	0-100 ug/L	SF --- NA	F6	<10 (1) ug/L	>17	245B---
Sed+AS	0-100 ug/L	I --- 28	F28	<10 (1) ug/L	>0	87B---
SS	0-100 ug/L	I --- 28	F6	18 (1) ug/L	18	87B---
AS	0-100 ug/L	I --- 28	F31	93 (3) ug/L	0	87B---
GAC	0-100 ug/L	I --- 28	F9	49 (2) ug/L	0	87B---
GAC	0-100 ug/L	I --- 28	F10	100 (1) ug/L	0	87B---
SS	0-100 ug/L	I --- 28	F33	45 (3) ug/L	0	87B---
ChOx(Cl)	0-100 ug/L	I --- 28	F34	44 (3) ug/L	2	87B---
SS	0-100 ug/L	I --- 28	F22	32 (2) ug/L	20	87B---
AS	0-100 ug/L	D --- NA	F15	30 (1) ug/L	0	255B-S-
Sed	0-100 ug/L	D --- NA	F7	<10 (1) ug/L	>50	255B-S-
AS	0-100 ug/L	I --- 28	F13	<10 (2) ug/L	>38	87B---
AlkHyd	0-100 ug/L	I --- 28	F24	20 (2) ug/L	0	87B---
AS	0-100 ug/L	I --- 28	F25	<10 (1) ug/L	>41	87B---
ChOx(Cl)	0-100 ug/L	I --- 28	F26	56 (3) ug/L	0	87B---
SS+GAC	0-100 ug/L	I --- 28	F27	37 (3) ug/L	0	87B---
RO	0-100 ug/L	D --- NA	P	2.0 ug/L	71	144A---
GAC	0-100 ug/L	I --- 28	F4	<11 (2) ug/L	>45	87B---
RA	0-100 ug/L	I --- 28	F4	29 (1) ug/L	0	87B---
GAC	0-100 ug/L	I --- 28	F5	67 (3) ug/L	0	87B---
AS	0-100 ug/L	I --- 28	F5	58 (3) ug/L	41	87B---
AL	0-100 ug/L	I --- 28	F11	33 (2) ug/L	47	87B---
Fil	0-100 ug/L	I --- 28	F16	<10 (2) ug/L	>31	87B---
AL	0-100 ug/L	D --- NA	F11	10 (5) ug/L	90.0	86B-S-

GAC	0-100 ug/L	SF --- NA	F2	32 (1) ug/L	0	245B---
AS	>100-1000 ug/L	D --- NA	F57	160 (5) ug/L	33	1B-S-
AS	>100-1000 ug/L	D --- NA	F51	140 (5) ug/L	0	1B-S-
AS	>100-1000 ug/L	D --- NA	F54	180 (4) ug/L	0	1B-S-
GAC	>100-1000 ug/L	GW --- NA	F2	65 (1) ug/L	81	87B---
AS	>100-1000 ug/L	D --- NA	F3	150 (4) ug/L	0	1B-S-
ChPt	>100-1000 ug/L	SF --- NA	F2	37 (1) ug/L	76	245B---
ChPtwChOx(Cl)	>100-1000 ug/L	I --- 10	P2	600 ug/L	0	139E---
ChPt+Fil (B)	>1-10 mg/L	I --- 10	B1	230 (1) mg/L	97.0	66B---
ChOx(Cl) (B)	>1-10 mg/L	I --- 28	F18	3800 (3) mg/L	0	87B---
ChPtwChOx(Cl)	>1-10 mg/L	I --- 10	P2	600 mg/L	45	139E---
IE	>1-10 mg/L	I --- 10	P2	1100 mg/L	81	139E---
IE	>10-100 mg/L	I --- 10	P1	1300 (8) mg/L	94.1	139E---

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Solid Technology Data for MOLYBDENUM

Matrix	Technology	Concentration Before	Concentration After	% improvement	Scale	Reference	Analytical Method	Operational Parameters
ASH	Sol	240 ug/L	60 (1) ug/L	75	B1(B)	1988E-	EPT	Cement/Silic
ASH	Sol	240 ug/L	40 (1) ug/L	83	B2(B)	1988E-	EPT	Cement/Silic
DRYWST	Sol	440 ug/L	30 (1) ug/L	93.2	B3(B)	1988E-	EPT	Cement/Silic
SLUDGE	Sol	840 ug/L	110 (1) ug/L	87	B4(B)	1988E-	EPT	Cement/Silic
SLUDGE	Sol	230 ug/L	60 (1) ug/L	74	B5(B)	1988E-	EPT	Cement/Silic
SLUDGE	Sol	180 ug/L	82 (3) ug/L	54	B2(B)	266B-	TCLP	Port. Ceme
SLUDGE	Sol	180 ug/L	150 (3) ug/L	17	B3(B)	266B-	TCLP	Lime/Fly A
SLUDGE	Sol	180 ug/L	130 (3) ug/L	28	B4(B)	266B-	TCLP	Kiln Dust

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- View Chemical Information
- View Environmental Data
- View Freundlich Isotherm Data
- View Aqueous Technology Data

- **View Solid Technology Data**

Print Chemical Information | Save Chemical

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Search Menu | Print Report | Exit Search

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http://www.epa.gov/tdbnrml/SEARCH
This page last updated on September 1, 1998

CHEMICAL AND PHYSICAL PROPERTIES		Reference
Molecular Weight:	19.00	333A
Melting Point (C):		
Boiling Point (C):		
Vapor Pressure @ T(C), Torr:		
Solubility in Water @ T(C), mg/L:		
Log octanol/Water Partition Coefficient:		
Henry's Law Constant, atm x m3 mole-2:		

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Enviromental Data for FLUORIDE

Chronic Noncarcinogenic Systemic Toxicity:	
Risk Estimates for Carcinogens:	
Drinking Water Health Advisories/Standards:	
Water Quality Criteria:	
Quatic Toxicity Database:	

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Freundlich Isotherm Data for FLUORIDE

* No Frundlich Isotherm data on file *

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Aqueous Technology Data for FLUORIDE

Technology	Influent Concentration	Source Matrix	Scale	Effluent Concentration	Percent Removal	Reference
ChOx(Cl) (B)	0-100 ug/L	I --- 28	F18	<5 (1) ug/L	>42	87B---
RA	0-100 ug/L	I --- 28	F4	100 (2) ug/L	0	87B---
GAC	0-100 ug/L	I --- 28	F1	40 (1) ug/L	0	87B---

AS	0-100 ug/L	I --- 28	F30	85 (3) ug/L	0	87B---
ChPt	0-100 ug/L	D --- NA	P	0.68 ug/L	3	47B---
SS+GAC	>100-1000 ug/L	I --- 28	F27	200 (3) ug/L	25	87B---
ChOx(Cl)	>100-1000 ug/L	I --- 28	F26	250 (3) ug/L	0	87B---
AS	>100-1000 ug/L	I --- 28	F25	300 (3) ug/L	0	87B---
AS	>100-1000 ug/L	I --- 28	F13	500 (2) ug/L	12	87B---
RA (B) + Fil	>100-1000 ug/L	I --- 28	F20	140 (1) ug/L	0	87B---
RO	>100-1000 ug/L	D --- NA	P	50 ug/L	94.9	144A---
GAC	>100-1000 ug/L	I --- 28	F15	140 (3) ug/L	6	87B---
AS	>100-1000 ug/L	I --- 28	F5	670 (3) ug/L	0	87B---
Fil	>100-1000 ug/L	I --- 28	F16	140 (3) ug/L	0	87B---
SExt	>100-1000 ug/L	I --- 28	F8	190 (3) ug/L	0	87B---
SS	>100-1000 ug/L	I --- 28	F22	120 (2) ug/L	17	87B---
GAC	>100-1000 ug/L	GW --- NA	F2	260 (1) ug/L	0	87B---
AL	>100-1000 ug/L	GW --- NA	F2	540 (3) ug/L	16	87B---
GAC	>100-1000 ug/L	I --- 28	F3	120 (1) ug/L	0	87B---
RA	>100-1000 ug/L	I --- 28	F3	110 (1) ug/L	8	87B---
GAC	>100-1000 ug/L	I --- 28	F4	110 (2) ug/L	0	87B---
GAC	>100-1000 ug/L	I --- 28	F5	370 (3) ug/L	45	87B---
CAC (B)	>100-1000 ug/L	I --- 49	B2	200 (1) ug/L	60	638B---
CAC (B)	>100-1000 ug/L	I --- 49	B1	500 (1) ug/L	0	638B---
Sed+AS	>100-1000 ug/L	I --- 28	F28	900 (3) ug/L	0	87B---
SS	>100-1000 ug/L	I --- 28	F6	700 (3) ug/L	3	87B---
SS	>100-1000 ug/L	I --- 28	F7	430 (3) ug/L	31	87B---
ChPt (B) + Fil	>100-1000 ug/L	I --- 28	F19	120 (1) ug/L	0	87B---
GAC	>100-1000 ug/L	I --- 28	F14	620 (3) ug/L	0	87B---
AlkHyd	>100-1000 ug/L	I --- 28	F24	400 (1) ug/L	0	87B---
ChPt	>100-1000 ug/L	SF --- NA	F6	270 (5) ug/L	11	245B---
AnFF	>100-1000 ug/L	I --- 10	B	650 (5) ug/L	34	45E---
AS	>100-1000 ug/L	SF --- NA	F6	260 (5) ug/L	7	245B---
AirS	>100-1000 ug/L	SF --- NA	F6	280 (5) ug/L	0	245B---
Fil	>100-1000 ug/L	SF --- NA	F6	280 (5) ug/L	0	245B---
AS	>100-1000 ug/L	D --- NA	F15	300 (1) ug/L	0	255B-S-
AS	>100-1000 ug/L	D --- NA	F13	200 (1) ug/L	75	255B-S-
AS	>100-1000 ug/L	D --- NA	F12	200 (1) ug/L	60	255B-S-
AS	>100-1000 ug/L	D --- NA	F11	700 (1) ug/L	12	255B-S-
AS	>100-1000 ug/L	D --- NA	F10	400 (1) ug/L	33	255B-S-
Sed	>100-1000 ug/L	D --- NA	F8	500 (1) ug/L	17	255B-S-
Sed	>100-1000 ug/L	D --- NA	F7	300 (1) ug/L	70	255B-S-

Sed	>100-1000 ug/L	D --- NA	F5	300 (1) ug/L	50	255B-S-
GAC	>100-1000 ug/L	HL --- NA	F1	640 (1) ug/L	18	245B---
RO	>100-1000 ug/L	D --- NA	P	<210 (16) ug/L	>74	180A--$
CAC	>100-1000 ug/L	I --- 28	F2	230 (3) ug/L	46	261B---
GAC	>100-1000 ug/L	I --- 28	F1	1000 (3) ug/L	0	261B---
AS	>100-1000 ug/L	D --- NA	F18	100 (1) ug/L	67	255B-S-
AS	>100-1000 ug/L	D --- NA	F17	900 (1) ug/L	10	255B-S-
AS	>100-1000 ug/L	D --- NA	F16	600 (1) ug/L	0	255B-S-
AL	>100-1000 ug/L	D --- NA	F4	180 (1) ug/L	60	255B-S-
AL	>100-1000 ug/L	D --- NA	F3	140 (1) ug/L	53	255B-S-
AL	>100-1000 ug/L	D --- NA	F2	100 (1) ug/L	67	255B-S-
AL	>100-1000 ug/L	D --- NA	F1	150 (1) ug/L	57	255B-S-
GAC	>100-1000 ug/L	I --- 28	F14	620 (3) ug/L	0	87B---
Sed	>100-1000 ug/L	I --- 49	F1	500 ug/L	29	638B---
SS	>1-10 mg/L	I --- 28	F12	2800 (3) mg/L	42	87B---
AL+Fil	>1-10 mg/L	I --- 28	F29	1200 (3) mg/L	0	87B---
GAC	>1-10 mg/L	SF --- NA	F8	6,600 (5) mg/L	20	245B---
GAC	>1-10 mg/L	SF --- NA	F2	5,400 (1) mg/L	11	245B---
AAS	>1-10 mg/L	GW --- NA	F8	<200 mg/L	>95.2	1264B--$
RO	>1-10 mg/L	GW --- NA	F9	600 mg/L	86	1264B--$
ChPt (B)	>1-10 mg/L	GW --- NA	B	300 mg/L	92.5	1313E---
AL	>1-10 mg/L	I --- 28	F3	1400 (3) mg/L	0	261B---
AS	>1-10 mg/L	D --- NA	F19	200 (1) mg/L	83	255B-S-
AS	>1-10 mg/L	D --- NA	F14	1900 (1) mg/L	17	255B-S-
Sed	>1-10 mg/L	D --- NA	F6	10000 (1) mg/L	0	255B-S-
AS	>1-10 mg/L	I --- 28	F31	2900 (3) mg/L	0	87B---
WOx+Fil (B)	>1-10 mg/L	RCRA --- NA	B15	3500 (1) mg/L	2	266B-S-
RO	>1-10 mg/L	GW --- NA	F	340 mg/L	87	185A--$
AS	>1-10 mg/L	I --- 28	F17	1200 (3) mg/L	14	87B---
SExt (B)	>1-10 mg/L	I --- 28	F32	1200 (2) mg/L	0	87B---
AL	>10-100 mg/L	I --- 28	F11	23,000 (3) mg/L	0	87B---
SS	>10-100 mg/L	I --- 28	F33	16,000 (3) mg/L	4	87B---
ChOx(Cl)	>10-100 mg/L	I --- 28	F34	12,000 (3) mg/L	24	87B---
Fil	>10-100 mg/L	SF --- NA	F8	13,000 (5) mg/L	0	245B---
Fil	>10-100 mg/L	SF --- NA	F2	11,000 (1) mg/L	0	245B---
AAS	>10-100 mg/L	GW --- NA	F7	<200 mg/L	>98.8	1264B--$

CAC (B)	>10-100 mg/L	S --- NA	P4	2400 (1) mg/L	77	178B--$
RA	>10-100 mg/L	S --- NA	B8	1000 (16) mg/L	94.2	178B--$
WOx+Fil (B)	>10-100 mg/L	RCRA --- NA	B1	39000 (1) mg/L	0	266B-S-
GAC	>10-100 mg/L	I --- 28	F9	13,000 (3) mg/L	0	87B---
RA	>100-1000 mg/L	S --- NA	B7	0.56 (8) mg/L	99.53	178B--$
ChPt	>100-1000 mg/L	SF --- NA	F2	9.8 (1) mg/L	94.6	245B---
ChPt	>100-1000 mg/L	SF --- NA	F8	13 (5) mg/L	91.4	245B---
GAC	>1 g/L	I --- 28	F10	1700 (3) mg/L	0	87B---
ChPt (B)	>1 g/L	S --- NA	B1	6.4 (1) mg/L	99.994	178B--$
ChPt (B)	>1 g/L	S --- NA	P2	0.021 (1) mg/L	>99.999	178B--$
ChPt (B)	>1 g/L	S --- NA	P4	11 (1) mg/L	99.46	178B--$
ChPt (B)	>1 g/L	S --- NA	P3	0.16 (1) mg/L	99.988	178B--$
ChPt (B)	>1 g/L	S --- NA	P1	0.2 (1) mg/L	>99.999	178B--$
ChPt (B)	>1 g/L	S --- NA	B2	0.62 (1) mg/L	99.999	178B--$
ChPt (B)	>1 g/L	S --- NA	B3	29 (1) mg/L	99.82	178B--$
ChPt (B)	>1 g/L	S --- NA	B4	0.43 (1) mg/L	99.999	178B--$
ChPt (B)	>1 g/L	S --- NA	B5	0.76 (1) mg/L	99.966	178B--$
ChPt (B)	>1 g/L	S --- NA	B6	17 (1) mg/L	99.03	178B--$

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Solid Technology Data for **FLUORIDE**

Matrix	Technology	Concentration Before	Concentration After	% improvement	Scale	Reference	Analytical Method	Operati Paramet
SLUDGE	TD	64 mg/kg	100 (3) mg/kg	0	P1	1995B-	TCA	SCC = 1976 F

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- View Freundlich Isotherm Data
- View Aqueous Technology Data
- View Solid Technology Data

Print Chemical Information | Save Chemical

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EPA United States Environmental Protection Agency
Office of Water

OFFICE OF WASTEWATER MANAGEMENT

Overview
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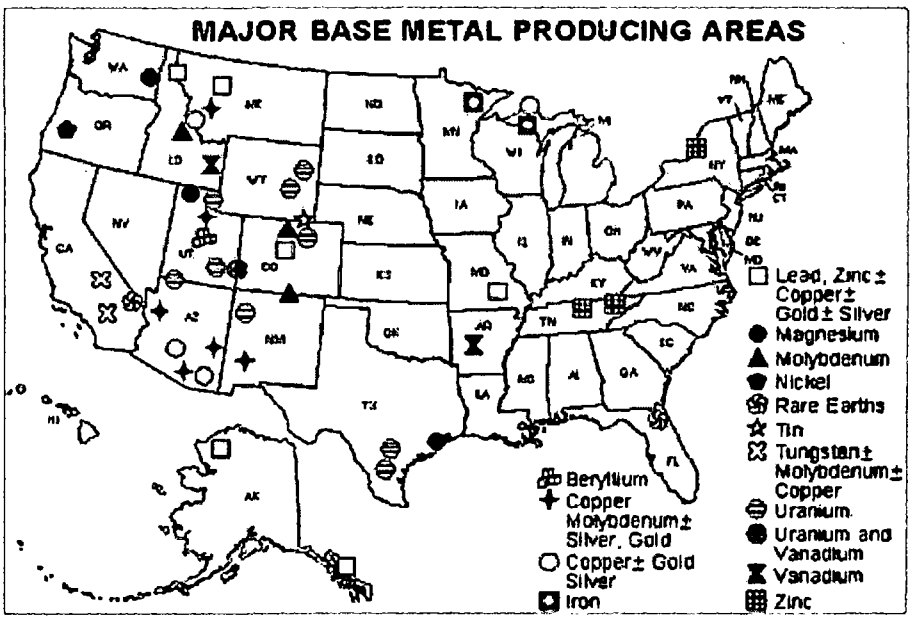
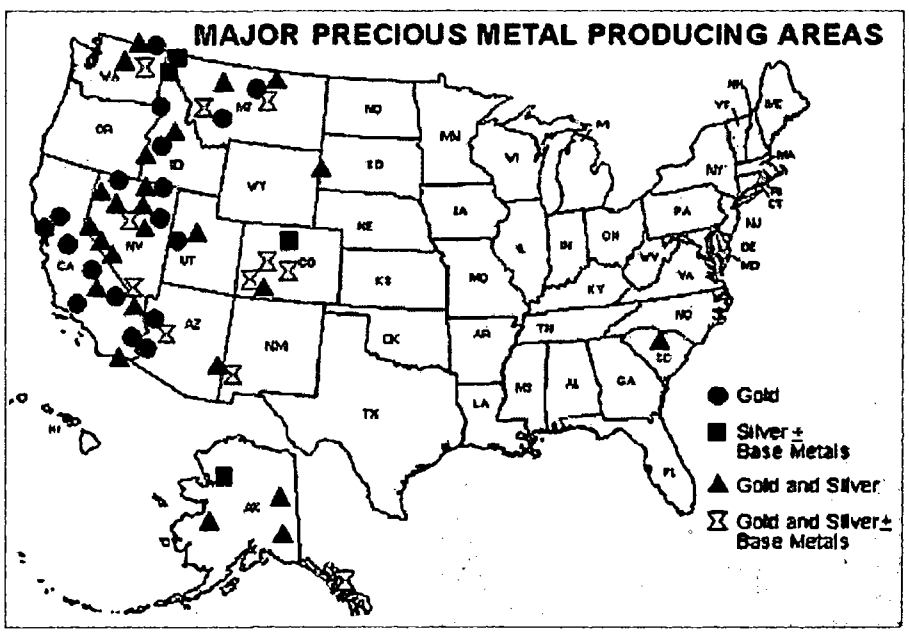
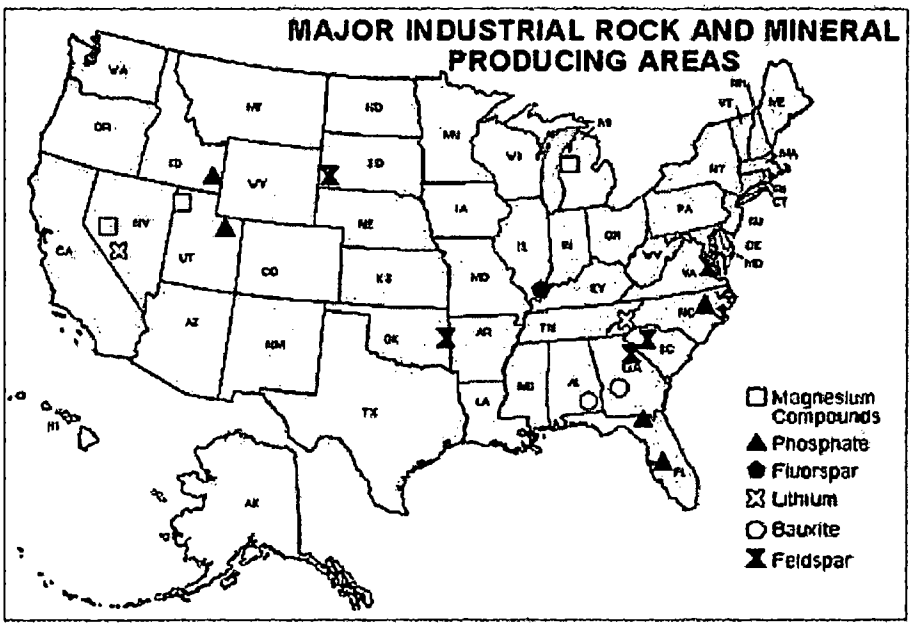
EPA Contacts
Mining Links

Hardrock Mining Maps

The following maps illustrate the location of major base metal, precious metal, and industrial rock and mineral producing areas in the United States. These maps are based on 1996 USGS data.







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The information contained on these pages is a general statement of policy. It does not establish or affect legal rights or obligations. It does not establish a binding norm and is not finally determinative of the issues addressed. Agency decisions in any particular case will be made by applying the law and regulations to the specific facts of the case.

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This page last modified: 08/09/99 13:12:44
http://www.epa.gov/owm/hrmining/maps.htm

Molycorp, Inc.
A Unocal Company
Questa Division
P.O. Box 469
Questa, New Mexico 87556
Telephone: (505) 586-0212
3 miles East of Questa on State Road 38

UNOCAL
MOLYCORP

FAX COVER SHEET

DATE: 12/10/97

TIME: 10:30 am

TO: Mr. David C. Abshire

COMPANY: USEPA

FAX NO: (214) 665-2191

FROM: Geyza I. Lorincsi

PHONE: (505) 586-7626

COMMENTS:
David - As a follow-up to our conversation earlier this morning, I am sending you a copy of a letter which we recently forwarded to the New Mexico Environment Department. I believe it will be of some interest to you.

Regards,
Geyza Lorincsi

We are transmitting 2 pages including this coversheet. Should you not receive all pages, please contact (505) 586-0212, ext. 617 or 618 immediately. Our fax number is (505) 586-0811. ( ) ORIGINAL WILL FOLLOW (✓) ORIGINAL WILL NOT FOLLOW

This message is intended only for the use of the individual or entity to which it is addressed, and may contain information that is privileged, confidential and exempt from disclosure under applicable law. If the reader of this message is not the intended recipient, or the employee or agent responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify the sender immediately by telephone and return the original message to the sender at the above address via the U. S. Postal Service. Thank you.

Molycorp, Inc.
A Unocal Company
Questa Division
P.O. Box 469
Questa, New Mexico 87556
Telephone: (505) 586-0212

December 5, 1997

UNOCAL 76
MOLYCORP

Mr. Ed Kelley, Director
Water & Waste Management Division
New Mexico Environment Department
Harold S. Runnels Building
1190 S. St. Francis Drive
Santa Fe, NM 87505-4182

Dear Ed:

I thought a follow up letter to our recent conversations on the Red River was appropriate at this time. I had discussed with you the possibility of a study on the current condition of the Red River which has improved substantially since the mine startup and you had suggested that you would want to see a study as to why our operations had improved the conditions of the river. In our last phone conversation, you mentioned that the ground water and surface bureaus were not particularly interested on a study of current conditions of the Red River.

The mine has made major efforts on reclamation and remediation and the quality of the Red River has significantly improved since the mine has resumed operations. What concerns us, is that there is a 1996 report "Red River Groundwater Investigation" published by the NM Environmental Department which is highly critical of the mine and eludes that the mine is a major source of contamination to the Red River. Molycorp would like to fund another study of the Red River which addresses the current condition of the river and would study the natural and manmade impacts on the river. We are willing to fund this study once we agree on a budget for the project. This study would be under the sole direction of the NM Environment Department.

Molycorp has worked hard to address possible impacts that the mine could have on the Red River and due to the changed conditions of the river, we believe another study is warranted. I look forward to hearing from you on this very important issue.

Sincerely,

David R. Shoemaker
Mine Manager

cc: Honorable Gary Johnson, Governor, State of NM
Mark Weidler, Secretary, NMED
Jennifer Salisbury, Secretary, NM Energy, Minerals & Natural Res. Dept.

Molycorp, Inc.
A Unocal Company
Questa Division
P.O. Box 469
Questa, New Mexico 87556
Telephone: (505) 586-0212

UNOCAL 76
MOLYCORP

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AUG 11 1997
GROUND WATER BUREAU

August 8, 1997

Ms. Karen McCormack
New Mexico Environment Department
Ground Water Protection & Remediation Bureau
Harold Runnels Building
1190 St. Francis Drive
Santa Fe, NM 87502

RE: Analytical Results on Samples from the Mine Monitoring Wells

Dear Ms. McCormack:

At your request, we are forwarding to you the most recent set of analytical results on ground water samples from monitoring wells in the Questa mine area.

Sincerely,

Geyza I. Lorinczi
Environmental Manager

Enclosure

xc: D. R. Shoemaker

6WQ-SG
DEC - 8 1997

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Molycorp, Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

RECEIVED
AUG 11 1997
GROUND WATER BUREAU

Lab Sample ID: *L14472-01*
Client Sample ID: *MMW-2*
Client Project ID:
ACZ Report ID: *RG46912*

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	97.2		mg/L	0.2	0.8	7/23/97	jaw
Antimony, dissolved	M204.2 GFAA		U	mg/L	0.002	0.01	7/13/97	sh
Arsenic, dissolved	M206.2 GFAA		U	mg/L	0.005	0.03	7/14/97	sh
Barium, dissolved	M200.7 ICP		U	mg/L	0.006	0.02	7/22/97	jaw
Beryllium, dissolved	M200.7 ICP	0.039		mg/L	0.004	0.02	7/22/97	jaw
Cadmium, dissolved	M213.2 GFAA	0.03	B	mg/L	0.01	0.05	7/14/97	fp
Calcium, dissolved	M200.7 ICP	337		mg/L	1	5	7/23/97	jaw
Chromium, dissolved	M200.7 ICP		U	mg/L	0.02	0.1	7/22/97	jaw
Cobalt, dissolved	M200.7 ICP	0.32		mg/L	0.02	0.1	7/22/97	jaw
Copper, dissolved	M200.7 ICP	0.38		mg/L	0.05	0.3	7/23/97	jaw
Iron, dissolved	M200.7 ICP	23.80		mg/L	0.02	0.1	7/22/97	jaw
Lead, dissolved	M239.2 GFAA	0.004	B	mg/L	0.001	0.005	7/10/97	sh
Magnesium, dissolved	M200.7 ICP	107		mg/L	0.4	2	7/22/97	jaw
Manganese, dissolved	M200.7 ICP	47.90		mg/L	0.01	0.05	7/22/97	jaw
Mercury, dissolved	M245.1 CVAA		U	mg/L	0.0002	0.001	7/11/97	bg
Molybdenum, dissolved	M200.7 ICP		U	mg/L	0.02	0.1	7/22/97	jaw
Nickel, dissolved	M200.7 ICP	0.70		mg/L	0.02	0.1	7/22/97	jaw
Potassium, dissolved	M200.7 ICP	8		mg/L	2	5	7/23/97	jaw
Selenium, dissolved	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	7/10/97	ch
Silica, dissolved	M200.7 ICP	84.2		mg/L	0.4	1	7/22/97	jaw
Silver, dissolved	M272.2 GFAA		U	mg/L	0.003	0.01	7/14/97	sh
Sodium, dissolved	M200.7 ICP	43		mg/L	2	5	7/23/97	jaw
Thallium, dissolved	M279.2 GFAA		U	mg/L	0.002	0.01	7/12/97	sh
Vanadium, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Zinc, dissolved	M200.7 ICP	9.68		mg/L	0.02	0.1	7/22/97	jaw

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	M310.1							
Bicarbonate as CaCO3			U	mg/L	2	10	7/9/97	gm
Carbonate as CaCO3			U	mg/L	2	10	7/9/97	gm
Hydroxide as CaCO3			U	mg/L	2	10	7/9/97	gm
Total Alkalinity			U	mg/L	2	10	7/9/97	gm
Cation-Anion Balance	Calculation							
Cation-Anion Balance		9.6		%			7/23/97	calc
Sum of Anions		35.90		meq/L	0.01	0.05	7/23/97	calc
Sum of Cations		43.60		meq/L	0.01	0.05	7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90):

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVPoulsen

Vice President of Operations: Ralph Poulsen

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-01*
Client Sample ID: *MMW-2*
Client Project ID:
ACZ Report ID: *RG46912*

Molycorp, Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Chloride	M325.2 - Colorimetric (RFA)	6	mg/L	1	5	7/20/97	lcj
Fluoride	M340.2 - ISE	17	mg/L	1	5	7/14/97	kr
Hardness as CaCO3	Calculation based on dissolved Ca & Mg	1280	mg/L	1	7	7/23/97	calc
Lab Filtration	***					6/30/97	laa
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	2600	mg/L	10	20	7/1/97	kr
Sulfate	M375.3 - Gravimetric	1660	mg/L	10	20	7/13/97	ac
TDS (calculated)	Calculation	2440	mg/L	10	50	7/23/97	calc
TDS (ratio - measured/calculated)	Calculation	1.07				7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90):

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RW

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-02*
Client Sample ID: *MMW-3*
Client Project ID:
ACZ Report ID: *RG46913*

Molycorp. Inc.
P.O. Box 469 Hwy. 38
Questa. NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Aluminum. dissolved	M200.7 ICP		U	mg/L	0.2	0.8	7/23/97	jaw
Antimony. dissolved	M204.2 GFAA		U	mg/L	0.002	0.01	7/13/97	sh
Arsenic. dissolved	M206.2 GFAA		U	mg/L	0.001	0.005	7/14/97	sh
Barium. dissolved	M200.7 ICP	0.032		mg/L	0.006	0.02	7/22/97	jaw
Beryllium. dissolved	M200.7 ICP		U	mg/L	0.004	0.02	7/22/97	jaw
Cadmium. dissolved	M213.2 GFAA	0.0005	B	mg/L	0.0005	0.003	7/13/97	fp
Calcium. dissolved	M200.7 ICP	482		mg/L	2	10	7/23/97	jaw
Chromium. dissolved	M200.7 ICP		U	mg/L	0.02	0.1	7/22/97	jaw
Cobalt. dissolved	M200.7 ICP		U	mg/L	0.02	0.1	7/22/97	jaw
Copper. dissolved	M200.7 ICP		U	mg/L	0.1	0.5	7/23/97	jaw
Iron. dissolved	M200.7 ICP		U	mg/L	0.02	0.1	7/22/97	jaw
Lead. dissolved	M239.2 GFAA		U	mg/L	0.001	0.005	7/10/97	sh
Magnesium. dissolved	M200.7 ICP	53.1		mg/L	0.4	2	7/22/97	jaw
Manganese. dissolved	M200.7 ICP	5.03		mg/L	0.01	0.05	7/22/97	jaw
Mercury. dissolved	M245.1 CVAA		U	mg/L	0.0002	0.001	7/11/97	bg
Molybdenum. dissolved	M200.7 ICP		U	mg/L	0.02	0.1	7/22/97	jaw
Nickel. dissolved	M200.7 ICP		U	mg/L	0.02	0.1	7/22/97	jaw
Potassium. dissolved	M200.7 ICP	7	B	mg/L	3	10	7/23/97	jaw
Selenium. dissolved	SM 3500-Se C. AA-Hydride		U	mg/L	0.001	0.005	7/10/97	ch
Silica. dissolved	M200.7 ICP	16.4		mg/L	0.4	1	7/22/97	jaw
Silver. dissolved	M272.2 GFAA		U	mg/L	0.003	0.01	7/14/97	sh
Sodium. dissolved	M200.7 ICP	115		mg/L	3	10	7/23/97	jaw
Thallium. dissolved	M279.2 GFAA		U	mg/L	0.002	0.01	7/12/97	sh
Vanadium. dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Zinc. dissolved	M200.7 ICP	0.12		mg/L	0.02	0.1	7/22/97	jaw

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	M310.1							
Bicarbonate as CaCO3		257		mg/L	2	10	7/9/97	gm
Carbonate as CaCO3			U	mg/L	2	10	7/9/97	gm
Hydroxide as CaCO3			U	mg/L	2	10	7/9/97	gm
Total Alkalinity		257		mg/L	2	10	7/9/97	gm
Cation-Anion Balance	Calculation							
Cation-Anion Balance		5.7		%			7/23/97	calc
Sum of Anions		30.40		meq/L	0.01	0.05	7/23/97	calc
Sum of Cations		34.10		meq/L	0.01	0.05	7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90):

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVPoulsen

Vice President of Operations: Ralph Poulsen

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-02*
Client Sample ID: *MMW-3*
Client Project ID:
ACZ Report ID: *RG46913*

Molycorp, Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Chloride	M325.2 - Colorimetric (RFA)	3	B	mg/L	1	5	7/20/97	lcj
Fluoride	M340.2 - ISE	3	B	mg/L	1	5	7/14/97	kr
Hardness as CaCO3	Calculation based on dissolved Ca & Mg	1420		mg/L	1	7	7/23/97	calc
Lab Filtration	***						6/30/97	laa
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	2070		mg/L	10	20	7/1/97	kr
Sulfate	M375.3 - Gravimetric	1190		mg/L	10	20	7/13/97	ac
TDS (calculated)	Calculation	2030		mg/L	10	50	7/23/97	calc
TDS (ratio - measured/calculated)	Calculation	1.02					7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVP

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-03*
Client Sample ID: *MMW-7*
Client Project ID:
ACZ Report ID: *RG46914*

Molycorp, Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	735		mg/L	0.3	2	7/23/97	jaw
Antimony, dissolved	M204.2 GFAA		U	mg/L	0.01	0.05	7/13/97	sh
Arsenic, dissolved	M206.2 GFAA		U	mg/L	0.03	0.1	7/14/97	sh
Barium, dissolved	M200.7 ICP	0.04	B	mg/L	0.03	0.1	7/22/97	jaw
Beryllium, dissolved	M200.7 ICP	0.08	B	mg/L	0.02	0.1	7/22/97	jaw
Cadmium, dissolved	M213.2 GFAA	0.08		mg/L	0.01	0.05	7/15/97	sh
Calcium, dissolved	M200.7 ICP	530		mg/L	10	50	7/23/97	jaw
Chromium, dissolved	M200.7 ICP	0.1	B	mg/L	0.1	0.5	7/22/97	jaw
Cobalt, dissolved	M200.7 ICP	3.4		mg/L	0.1	0.5	7/22/97	jaw
Copper, dissolved	M200.7 ICP	1.6		mg/L	0.1	0.5	7/23/97	jaw
Iron, dissolved	M200.7 ICP	259		mg/L	0.1	0.5	7/22/97	jaw
Lead, dissolved	M239.2 GFAA	0.014		mg/L	0.001	0.005	7/10/97	sh
Magnesium, dissolved	M200.7 ICP	815		mg/L	2	10	7/22/97	jaw
Manganese, dissolved	M200.7 ICP	46.90		mg/L	0.05	0.3	7/22/97	jaw
Mercury, dissolved	M245.1 CVAA		U	mg/L	0.0002	0.001	7/11/97	bg
Molybdenum, dissolved	M200.7 ICP		U	mg/L	0.1	0.5	7/22/97	jaw
Nickel, dissolved	M200.7 ICP	7.5		mg/L	0.1	0.5	7/22/97	jaw
Potassium, dissolved	M200.7 ICP	20	B	mg/L	20	50	7/23/97	jaw
Selenium, dissolved	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	7/10/97	ch
Silica, dissolved	M200.7 ICP	55		mg/L	2	5	7/22/97	jaw
Silver, dissolved	M272.2 GFAA		U	mg/L	0.005	0.03	7/14/97	sh
Sodium, dissolved	M200.7 ICP	137		mg/L	3	10	7/23/97	jaw
Thallium, dissolved	M279.2 GFAA		U	mg/L	0.002	0.01	7/12/97	sh
Vanadium, dissolved	M200.7 ICP	0.13	B	mg/L	0.05	0.3	7/22/97	jaw
Zinc, dissolved	M200.7 ICP	7.8		mg/L	0.1	0.5	7/22/97	jaw

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	M310.1							
Bicarbonate as CaCO3			U	mg/L	2	10	7/9/97	gm
Carbonate as CaCO3			U	mg/L	2	10	7/9/97	gm
Hydroxide as CaCO3			U	mg/L	2	10	7/9/97	gm
Total Alkalinity			U	mg/L	2	10	7/9/97	gm
Cation-Anion Balance	Calculation							
Cation-Anion Balance		-7.6		%			7/23/97	calc
Sum of Anions		231		meq/L	0.01	0.05	7/23/97	calc
Sum of Cations		199		meq/L	0.01	0.05	7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RV Poulsen

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-03*
Client Sample ID: *MMW-7*
Client Project ID:
ACZ Report ID: *RG46914*

Molycorp, Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Chloride	M325.2 - Colorimetric (RFA)	15	mg/L	1	5	7/20/97	lcj
Fluoride	M340.2 - ISE	160	mg/L	10	50	7/14/97	kr
Hardness as CaCO3	Calculation based on dissolved Ca & Mg	4670	mg/L	1	-	7/23/97	calc
Lab Filtration	***					6/30/97	laa
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	13800	mg/L	10	20	7/1/97	kr
Sulfate	M375.3 - Gravimetric	10600	mg/L	100	200	7/13/97	ac
TDS (calculated)	Calculation	13400	mg/L	10	50	7/23/97	calc
TDS (ratio - measured/calculated)	Calculation	1.03				7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90):

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RV Poulsen

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-04*
Client Sample ID: *MMW-8A*
Client Project ID:
ACZ Report ID: *RG46915*

Molycorp, Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP		U	mg/L	0.06	0.3	7/22/97	jaw
Antimony, dissolved	M204.2 GFAA		U	mg/L	0.002	0.01	7/13/97	sh
Arsenic, dissolved	M206.2 GFAA		U	mg/L	0.005	0.03	7/14/97	sh
Barium, dissolved	M200.7 ICP	0.041		mg/L	0.006	0.02	7/22/97	jaw
Beryllium, dissolved	M200.7 ICP		U	mg/L	0.004	0.02	7/22/97	jaw
Cadmium, dissolved	M213.2 GFAA		U	mg/L	0.0005	0.003	7/15/97	sh
Calcium, dissolved	M200.7 ICP	539		mg/L	2	10	7/23/97	jaw
Chromium, dissolved	M200.7 ICP		U	mg/L	0.02	0.1	7/22/97	jaw
Cobalt, dissolved	M200.7 ICP		U	mg/L	0.02	0.1	7/22/97	jaw
Copper, dissolved	M200.7 ICP		U	mg/L	0.1	0.5	7/23/97	jaw
Iron, dissolved	M200.7 ICP	1.10		mg/L	0.02	0.1	7/22/97	jaw
Lead, dissolved	M239.2 GFAA		U	mg/L	0.001	0.005	7/10/97	sh
Magnesium, dissolved	M200.7 ICP	101		mg/L	0.4	2	7/22/97	jaw
Manganese, dissolved	M200.7 ICP	4.46		mg/L	0.01	0.05	7/22/97	jaw
Mercury, dissolved	M245.1 CVAA		U	mg/L	0.0002	0.001	7/11/97	bg
Molybdenum, dissolved	M200.7 ICP		U	mg/L	0.02	0.1	7/22/97	jaw
Nickel, dissolved	M200.7 ICP		U	mg/L	0.02	0.1	7/22/97	jaw
Potassium, dissolved	M200.7 ICP	5	B	mg/L	3	10	7/23/97	jaw
Selenium, dissolved	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	7/10/97	ch
Silica, dissolved	M200.7 ICP	30.3		mg/L	0.4	1	7/22/97	jaw
Silver, dissolved	M272.2 GFAA		U	mg/L	0.003	0.01	7/14/97	sh
Sodium, dissolved	M200.7 ICP	40		mg/L	3	10	7/23/97	jaw
Thallium, dissolved	M279.2 GFAA		U	mg/L	0.002	0.01	7/12/97	sh
Vanadium, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Zinc, dissolved	M200.7 ICP		U	mg/L	0.1	0.5	7/23/97	jaw

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	M310.1							
Bicarbonate as CaCO3		186		mg/L	2	10	7/9/97	gm
Carbonate as CaCO3			U	mg/L	2	10	7/9/97	gm
Hydroxide as CaCO3			U	mg/L	2	10	7/9/97	gm
Total Alkalinity		186		mg/L	2	10	7/9/97	gm
Cation-Anion Balance	Calculation							
Cation-Anion Balance		4.2		%			7/23/97	calc
Sum of Anions		34.50		meq/L	0.01	0.05	7/23/97	calc
Sum of Cations		37.50		meq/L	0.01	0.05	7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RV Poulsen

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-04*
Client Sample ID: *MMW-8A*
Client Project ID:
ACZ Report ID: *RG46915*

Molycorp, Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Chloride	M325.2 - Colorimetric (RFA)	5		mg/L	1	5	7/20/97	lcj
Fluoride	M340.2 - ISE	3	B	mg/L	1	5	7/14/97	kr
Hardness as CaCO3	Calculation based on dissolved Ca & Mg	1760		mg/L	1	7	7/23/97	calc
Lab Filtration	***						6/30/97	laa
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	2400		mg/L	10	20	7/1/97	kr
Sulfate	M375.3 - Gravimetric	1450		mg/L	10	20	7/13/97	ac
TDS (calculated)	Calculation	2290		mg/L	10	50	7/23/97	calc
TDS (ratio - measured/calculated)	Calculation	1.05					7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90):

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RV Poulsen

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-05*
Client Sample ID: *MMW-8B*
Client Project ID:
ACZ Report ID: *RG46916*

Molycorp. Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	0.38		mg/L	0.03	0.2	7/22/97	jaw
Antimony, dissolved	M204.2 GFAA		U	mg/L	0.002	0.01	7/13/97	sh
Arsenic, dissolved	M206.2 GFAA		U	mg/L	0.005	0.03	7/14/97	sh
Barium, dissolved	M200.7 ICP	0.008	B	mg/L	0.003	0.01	7/22/97	jaw
Beryllium, dissolved	M200.7 ICP		U	mg/L	0.002	0.01	7/22/97	jaw
Cadmium, dissolved	M213.2 GFAA	0.0029	B	mg/L	0.0005	0.003	7/15/97	sh
Calcium, dissolved	M200.7 ICP	259		mg/L	1	5	7/23/97	jaw
Chromium, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Cobalt, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Copper, dissolved	M200.7 ICP		U	mg/L	0.05	0.3	7/23/97	jaw
Iron, dissolved	M200.7 ICP	0.01	B	mg/L	0.01	0.05	7/22/97	jaw
Lead, dissolved	M239.2 GFAA		U	mg/L	0.001	0.005	7/10/97	sh
Magnesium, dissolved	M200.7 ICP	71.4		mg/L	0.2	1	7/22/97	jaw
Manganese, dissolved	M200.7 ICP	0.027	B	mg/L	0.005	0.03	7/22/97	jaw
Mercury, dissolved	M245.1 CVAA		U	mg/L	0.0002	0.001	7/11/97	bg
Molybdenum, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Nickel, dissolved	M200.7 ICP	0.07		mg/L	0.01	0.05	7/22/97	jaw
Potassium, dissolved	M200.7 ICP	3	B	mg/L	2	5	7/23/97	jaw
Selenium, dissolved	SM 3500-Se C, AA-Hydride	0.004	B	mg/L	0.001	0.005	7/10/97	ch
Silica, dissolved	M200.7 ICP	40.3		mg/L	0.2	0.5	7/22/97	jaw
Silver, dissolved	M272.2 GFAA		U	mg/L	0.003	0.01	7/14/97	sh
Sodium, dissolved	M200.7 ICP	59.3		mg/L	0.3	1	7/23/97	jaw
Thallium, dissolved	M279.2 GFAA		U	mg/L	0.002	0.01	7/12/97	sh
Vanadium, dissolved	M200.7 ICP		U	mg/L	0.005	0.03	7/22/97	jaw
Zinc, dissolved	M200.7 ICP	0.32		mg/L	0.05	0.3	7/23/97	jaw

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	M310.1							
Bicarbonate as CaCO3		17		mg/L	2	10	7/9/97	gm
Carbonate as CaCO3			U	mg/L	2	10	7/9/97	gm
Hydroxide as CaCO3			U	mg/L	2	10	7/9/97	gm
Total Alkalinity		17		mg/L	2	10	7/9/97	gm
Cation-Anion Balance	Calculation							
Cation-Anion Balance		3.7		%			7/23/97	calc
Sum of Anions		20.00		meq/L	0.01	0.05	7/23/97	calc
Sum of Cations		21.50		meq/L	0.01	0.05	7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90):

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVPoulsen

Vice President of Operations: Ralph Poulsen

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-05*
Client Sample ID: *MMW-8B*
Client Project ID:
ACZ Report ID: *RG46916*

Molycorp. Inc.
P.O. Box 469 Hwy. 38
Questa. NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Chloride	M325.2 - Colorimetric (RFA)	17	mg/L	1	5	7/20/97	lcj
Fluoride	M340.2 - ISE	1.6	mg/L	0.1	0.5	7/14/97	kr
Hardness as CaCO3	Calculation based on dissolved Ca & Mg	941	mg/L	1	7	7/23/97	calc
Lab Filtration	***					6/30/97	laa
Residue. Filterable (TDS) @180C	M160.1 - Gravimetric	1450	mg/L	10	20	7/1/97	kr
Sulfate	M375.3 - Gravimetric	910	mg/L	10	20	7/13/97	ac
TDS (calculated)	Calculation	[illegible]	mg/L	10	50	7/23/97	calc
TDS (ratio - measured/calculated)	Calculation	[illegible]				7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RWP

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-06*
Client Sample ID: *MMW-10A*
Client Project ID:
ACZ Report ID: *RG46917*

Molycorp, Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Results	Quals	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	31.30		mg/L	0.03	0.2	7/22/97	jaw
Antimony, dissolved	M204.2 GFAA		U	mg/L	0.002	0.01	7/13/97	sh
Arsenic, dissolved	M206.2 GFAA		U	mg/L	0.005	0.03	7/14/97	sh
Barium, dissolved	M200.7 ICP	0.005	B	mg/L	0.003	0.01	7/22/97	jaw
Beryllium, dissolved	M200.7 ICP	0.008	B	mg/L	0.002	0.01	7/22/97	jaw
Cadmium, dissolved	M213.2 GFAA	0.027	B	mg/L	0.005	0.03	7/15/97	sh
Calcium, dissolved	M200.7 ICP	280		mg/L	1	5	7/23/97	jaw
Chromium, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Cobalt, dissolved	M200.7 ICP	0.15		mg/L	0.01	0.05	7/22/97	jaw
Copper, dissolved	M200.7 ICP	0.63		mg/L	0.01	0.05	7/23/97	jaw
Iron, dissolved	M200.7 ICP	0.01	B	mg/L	0.01	0.05	7/22/97	jaw
Lead, dissolved	M239.2 GFAA	0.001	B	mg/L	0.001	0.005	7/10/97	sh
Magnesium, dissolved	M200.7 ICP	80.1		mg/L	0.2	1	7/22/97	jaw
Manganese, dissolved	M200.7 ICP	14.000		mg/L	0.005	0.03	7/22/97	jaw
Mercury, dissolved	M245.1 CVAA		U	mg/L	0.0002	0.001	7/11/97	bg
Molybdenum, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Nickel, dissolved	M200.7 ICP	0.34		mg/L	0.01	0.05	7/22/97	jaw
Potassium, dissolved	M200.7 ICP	3	B	mg/L	2	5	7/23/97	jaw
Selenium, dissolved	SM 3500-Se C. AA-Hydride	0.002	B	mg/L	0.001	0.005	7/10/97	ch
Silica, dissolved	M200.7 ICP	31.1		mg/L	0.2	0.5	7/22/97	jaw
Silver, dissolved	M272.2 GFAA		U	mg/L	0.003	0.01	7/14/97	sh
Sodium, dissolved	M200.7 ICP	30.5		mg/L	0.3	1	7/23/97	jaw
Thallium, dissolved	M279.2 GFAA		U	mg/L	0.002	0.01	7/12/97	sh
Vanadium, dissolved	M200.7 ICP		U	mg/L	0.005	0.03	7/22/97	jaw
Zinc, dissolved	M200.7 ICP	2.57		mg/L	0.01	0.05	7/23/97	jaw

Wet Chemistry

Parameter	EPA Method	Results	Quals	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	M310.1							
Bicarbonate as CaCO3			U	mg/L	2	10	7/9/97	gm
Carbonate as CaCO3			U	mg/L	2	10	7/9/97	gm
Hydroxide as CaCO3			U	mg/L	2	10	7/9/97	gm
Total Alkalinity			U	mg/L	2	10	7/9/97	gm
Cation-Anion Balance	Calculation							
Cation-Anion Balance		5.5		%			7/23/97	calc
Sum of Anions		23.80		meq/L	0.01	0.05	7/23/97	calc
Sum of Cations		26.60		meq/L	0.01	0.05	7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RV Poulsen

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-06*
Client Sample ID: *MMW-10A*
Client Project ID: ..
ACZ Report ID: *RG46917*

Molycorp, Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Chloride	M325.2 - Colorimetric (RFA)	6	mg/L	1	5	7/20/97	lcj
Fluoride	M340.2 - ISE	14	mg/L	1	5	7/14/97	kr
Hardness as CaCO3	Calculation based on dissolved Ca & Mg	1030	mg/L	1	-	7/23/97	calc
Lab Filtration	***					6/30/97	laa
Residue, Filterable (TDS) @ 180C	M160.1 - Gravimetric	1660	mg/L	10	20	7/1/97	kr
Sulfate	M375.3 - Gravimetric	1090	mg/L	10	20	7/13/97	ac
TDS (calculated)	Calculation	1580	mg/L	10	50	7/23/97	calc
TDS (ratio - measured/calculated)	Calculation	1.05				7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RJP

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-07*
Client Sample ID: *MMW-10B*
Client Project ID:
ACZ Report ID: *RG46918*

Molycorp, Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	14.60		mg/L	0.03	0.2	7/22/97	jaw
Antimony, dissolved	M204.2 GFAA		U	mg/L	0.002	0.01	7/13/97	sh
Arsenic, dissolved	M206.2 GFAA		U	mg/L	0.005	0.03	7/15/97	sh
Barium, dissolved	M200.7 ICP	0.016		mg/L	0.003	0.01	7/22/97	jaw
Beryllium, dissolved	M200.7 ICP	0.010		mg/L	0.002	0.01	7/22/97	jaw
Cadmium, dissolved	M213.2 GFAA	0.05		mg/L	0.01	0.05	7/16/97	sh
Calcium, dissolved	M200.7 ICP	328		mg/L	1	5	7/23/97	jaw
Chromium, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Cobalt, dissolved	M200.7 ICP	0.11		mg/L	0.01	0.05	7/22/97	jaw
Copper, dissolved	M200.7 ICP	0.61		mg/L	0.01	0.05	7/23/97	jaw
Iron, dissolved	M200.7 ICP	0.17		mg/L	0.01	0.05	7/22/97	jaw
Lead, dissolved	M239.2 GFAA	0.048		mg/L	0.001	0.005	7/10/97	sh
Magnesium, dissolved	M200.7 ICP	82.5		mg/L	0.2	1	7/22/97	jaw
Manganese, dissolved	M200.7 ICP	9.440		mg/L	0.005	0.03	7/22/97	jaw
Mercury, dissolved	M245.1 CVAA		U	mg/L	0.0002	0.001	7/11/97	bg
Molybdenum, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Nickel, dissolved	M200.7 ICP	0.26		mg/L	0.01	0.05	7/22/97	jaw
Potassium, dissolved	M200.7 ICP	4	B	mg/L	2	5	7/23/97	jaw
Selenium, dissolved	SM 3500-Se C. AA-Hydride	0.001	B	mg/L	0.001	0.005	7/10/97	ch
Silica, dissolved	M200.7 ICP	34.8		mg/L	0.2	0.5	7/22/97	jaw
Silver, dissolved	M272.2 GFAA		U	mg/L	0.003	0.01	7/14/97	sh
Sodium, dissolved	M200.7 ICP	30.0		mg/L	0.3	1	7/23/97	jaw
Thallium, dissolved	M279.2 GFAA		U	mg/L	0.002	0.01	7/12/97	sh
Vanadium, dissolved	M200.7 ICP		U	mg/L	0.005	0.03	7/22/97	jaw
Zinc, dissolved	M200.7 ICP	2.29		mg/L	0.01	0.05	7/23/97	jaw

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	M310.1							
Bicarbonate as CaCO3		8	B	mg/L	2	10	7/9/97	gm
Carbonate as CaCO3			U	mg/L	2	10	7/9/97	gm
Hydroxide as CaCO3			U	mg/L	2	10	7/9/97	gm
Total Alkalinity		8	B	mg/L	2	10	7/9/97	gm
Cation-Anion Balance	Calculation							
Cation-Anion Balance		4.8		%			7/23/97	calc
Sum of Anions		24.50		meq/L	0.01	0.05	7/23/97	calc
Sum of Cations		27.00		meq/L	0.01	0.05	7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

R V Poulsen

Vice President of Operations: Ralph Poulsen

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-07*
Client Sample ID: *MMW-10B*
Client Project ID:
ACZ Report ID: *RG46918*

Molycorp. Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Chloride	M325.2 - Colorimetric (RFA)	26	mg/L	1	5	7/20/97	lcj
Fluoride	M340.2 - ISE	14	mg/L	1	5	7/14/97	kr
Hardness as CaCO3	Calculation based on dissolved Ca & Mg	1160	mg/L	1	7	7/23/97	calc
Lab Filtration	***					6/30/97	laa
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	1690	mg/L	10	20	7/1/97	kr
Sulfate	M375.3 - Gravimetric	1090	mg/L	10	20	7/13/97	ac
TDS (calculated)	Calculation	1640	mg/L	10	50	7/23/97	calc
TDS (ratio - measured/calculated)	Calculation	1.03				7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVP

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-08*
Client Sample ID: *MMW-10C*
Client Project ID:
ACZ Report ID: *RG46919*

Molycorp, Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Chloride	M325.2 - Colorimetric (RFA)	10	mg/L	1	5	7/20/97	lcj
Fluoride	M340.2 - ISE	8	mg/L	1	5	7/14/97	kr
Hardness as CaCO3	Calculation based on dissolved Ca & Mg	489	mg/L	1	-	7/23/97	calc
Lab Filtration	***					6/30/97	laa
Residue, Filterable (TDS) @ 180C	M160.1 - Gravimetric	760	mg/L	10	20	7/1/97	kr
Sulfate	M375.3 - Gravimetric	470	mg/L	10	20	7/13/97	ac
TDS (calculated)	Calculation	710	mg/L	10	50	7/23/97	calc
TDS (ratio - measured/calculated)	Calculation	1.07				7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90):

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVP

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-08*
Client Sample ID: *MMW-10C*
Client Project ID:
ACZ Report ID: *RG46919*

Molycorp, Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Metals Analysis

Parameters	EPA Method	Results	Qual	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	12.20		mg/L	0.03	0.2	7/22/97	jaw
Antimony, dissolved	M204.2 GFAA		U	mg/L	0.002	0.01	7/13/97	sh
Arsenic, dissolved	M206.2 GFAA		U	mg/L	0.005	0.03	7/15/97	sh
Barium, dissolved	M200.7 ICP	0.008	B	mg/L	0.003	0.01	7/22/97	jaw
Beryllium, dissolved	M200.7 ICP	0.004	B	mg/L	0.002	0.01	7/22/97	jaw
Cadmium, dissolved	M213.2 GFAA	0.012		mg/L	0.002	0.01	7/15/97	sh
Calcium, dissolved	M200.7 ICP	128		mg/L	5	30	7/23/97	jaw
Chromium, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Cobalt, dissolved	M200.7 ICP	0.03	B	mg/L	0.01	0.05	7/22/97	jaw
Copper, dissolved	M200.7 ICP		U	mg/L	0.3	1	7/23/97	jaw
Iron, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Lead, dissolved	M239.2 GFAA	0.001	B	mg/L	0.001	0.005	7/10/97	sh
Magnesium, dissolved	M200.7 ICP	41.2		mg/L	0.2	1	7/22/97	jaw
Manganese, dissolved	M200.7 ICP	5.630		mg/L	0.005	0.03	7/22/97	jaw
Mercury, dissolved	M245.1 CVAA		U	mg/L	0.0002	0.001	7/11/97	bg
Molybdenum, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Nickel, dissolved	M200.7 ICP	0.15		mg/L	0.01	0.05	7/22/97	jaw
Potassium, dissolved	M200.7 ICP		U	mg/L	8	30	7/23/97	jaw
Selenium, dissolved	SM 3500-Se C, AA-Hydride	0.001	B	mg/L	0.001	0.005	7/10/97	ch
Silica, dissolved	M200.7 ICP	17.4		mg/L	0.2	0.5	7/22/97	jaw
Silver, dissolved	M272.2 GFAA		U	mg/L	0.003	0.01	7/14/97	sh
Sodium, dissolved	M200.7 ICP	15	B	mg/L	8	30	7/23/97	jaw
Thallium, dissolved	M279.2 GFAA		U	mg/L	0.002	0.01	7/12/97	sh
Vanadium, dissolved	M200.7 ICP		U	mg/L	0.005	0.03	7/22/97	jaw
Zinc, dissolved	M200.7 ICP	1.57		mg/L	0.05	0.3	7/23/97	jaw

Wet Chemistry

Parameters	EPA Method	Results	Qual	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	M310.1							
Bicarbonate as CaCO3		2	B	mg/L	2	10	7/9/97	gm
Carbonate as CaCO3			U	mg/L	2	10	7/9/97	gm
Hydroxide as CaCO3			U	mg/L	2	10	7/9/97	gm
Total Alkalinity		2	B	mg/L	2	10	7/9/97	gm
Cation-Anion Balance	Calculation							
Cation-Anion Balance		7.2		%			7/23/97	calc
Sum of Anions		10.60		meq/L	0.01	0.05	7/23/97	calc
Sum of Cations		12.30		meq/L	0.01	0.05	7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVPoulsen

Vice President of Operations: Ralph Pouisen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-09*
Client Sample ID: *MMW-11*
Client Project ID:
ACZ Report ID: *RG46920*

Molycorp. Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Quals	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	56.80		mg/L	0.03	0.2	7/22/97	jaw
Antimony, dissolved	M204.2 GFAA		U	mg/L	0.002	0.01	7/13/97	sh
Arsenic, dissolved	M206.2 GFAA		U	mg/L	0.005	0.03	7/15/97	sh
Barium, dissolved	M200.7 ICP	0.013		mg/L	0.003	0.01	7/22/97	jaw
Beryllium, dissolved	M200.7 ICP	0.015		mg/L	0.002	0.01	7/22/97	jaw
Cadmium, dissolved	M213.2 GFAA	0.037		mg/L	0.005	0.03	7/16/97	sh
Calcium, dissolved	M200.7 ICP	251		mg/L	1	5	7/23/97	jaw
Chromium, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Cobalt, dissolved	M200.7 ICP	0.28		mg/L	0.01	0.05	7/22/97	jaw
Copper, dissolved	M200.7 ICP	0.98		mg/L	0.01	0.05	7/23/97	jaw
Iron, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Lead, dissolved	M239.2 GFAA	0.011		mg/L	0.001	0.005	7/10/97	sh
Magnesium, dissolved	M200.7 ICP	129		mg/L	0.2	1	7/22/97	jaw
Manganese, dissolved	M200.7 ICP	29.900		mg/L	0.005	0.03	7/22/97	jaw
Mercury, dissolved	M245.1 CVAA		U	mg/L	0.0002	0.001	7/11/97	bg
Molybdenum, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Nickel, dissolved	M200.7 ICP	0.67		mg/L	0.01	0.05	7/22/97	jaw
Potassium, dissolved	M200.7 ICP	4	B	mg/L	2	5	7/23/97	jaw
Selenium, dissolved	SM 3500-Se C, AA-Hydride	0.002	B	mg/L	0.001	0.005	7/10/97	ch
Silica, dissolved	M200.7 ICP	31.1		mg/L	0.2	0.5	7/22/97	jaw
Silver, dissolved	M272.2 GFAA		U	mg/L	0.003	0.01	7/14/97	sh
Sodium, dissolved	M200.7 ICP	27.4		mg/L	0.3	1	7/23/97	jaw
Thallium, dissolved	M279.2 GFAA		U	mg/L	0.002	0.01	7/12/97	sh
Vanadium, dissolved	M200.7 ICP		U	mg/L	0.005	0.03	7/22/97	jaw
Zinc, dissolved	M200.7 ICP	5.49		mg/L	0.01	0.05	7/23/97	jaw

Wet Chemistry

Parameter	EPA Method	Result	Quals	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	M310.1							
Bicarbonate as CaCO3			U	mg/L	2	10	7/9/97	gm
Carbonate as CaCO3			U	mg/L	2	10	7/9/97	gm
Hydroxide as CaCO3			U	mg/L	2	10	7/9/97	gm
Total Alkalinity			U	mg/L	2	10	7/9/97	gm
Cation-Anion Balance	Calculation							
Cation-Anion Balance		5.9		%			7/23/97	calc
Sum of Anions		29.40		meq/L	0.01	0.05	7/23/97	calc
Sum of Cations		33.10		meq/L	0.01	0.05	7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RPoulsen

Vice President of Operations: Ralph Poulsen

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-09*
Client Sample ID: *MMW-11*
Client Project ID:
ACZ Report ID: *RG46920*

Molycorp, Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Chloride	M325.2 - Colorimetric (RFA)	22	mg/L	1	5	7/20/97	lcj
Fluoride	M340.2 - ISE	21	mg/L	1	5	7/14/97	kr
Hardness as CaCO3	Calculation based on dissolved Ca & Mg	1160	mg/L	1	-	7/23/97	calc
Lab Filtration	***					6/30/97	laa
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	1970	mg/L	10	20	7/1/97	kr
Sulfate	M375.3 - Gravimetric	1320	mg/L	10	20	7/13/97	ac
TDS (calculated)	Calculation	1900	mg/L	10	50	7/23/97	calc
TDS (ratio - measured/calculated)	Calculation	1.04				7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90):

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVP

Vice President of Operations: Ralph Poulsen

ACZ

Analytical Results

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-10*
Client Sample ID: *MMW-13*
Client Project ID:
ACZ Report ID: *RG46921*

Molycorp. Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Aluminum, dissolved	M200.7 ICP	0.04	B	mg/L	0.03	0.2	7/22/97	jaw
Antimony, dissolved	M204.2 GFAA		U	mg/L	0.002	0.01	7/13/97	sh
Arsenic, dissolved	M206.2 GFAA		U	mg/L	0.005	0.03	7/15/97	sh
Barium, dissolved	M200.7 ICP	0.023		mg/L	0.003	0.01	7/22/97	jaw
Beryllium, dissolved	M200.7 ICP		U	mg/L	0.002	0.01	7/22/97	jaw
Cadmium, dissolved	M213.2 GFAA	0.0008	B	mg/L	0.0005	0.003	7/15/97	sh
Calcium, dissolved	M200.7 ICP	340		mg/L	1	5	7/23/97	jaw
Chromium, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/22/97	jaw
Cobalt, dissolved	M200.7 ICP	0.05		mg/L	0.01	0.05	7/22/97	jaw
Copper, dissolved	M200.7 ICP		U	mg/L	0.01	0.05	7/23/97	jaw
Iron, dissolved	M200.7 ICP	0.16		mg/L	0.01	0.05	7/22/97	jaw
Lead, dissolved	M239.2 GFAA		U	mg/L	0.001	0.005	7/10/97	sh
Magnesium, dissolved	M200.7 ICP	39.3		mg/L	0.2	1	7/22/97	jaw
Manganese, dissolved	M200.7 ICP	0.706		mg/L	0.005	0.03	7/22/97	jaw
Mercury, dissolved	M245.1 CVAA		U	mg/L	0.0002	0.001	7/11/97	bg
Molybdenum, dissolved	M200.7 ICP	0.05		mg/L	0.01	0.05	7/22/97	jaw
Nickel, dissolved	M200.7 ICP	0.01	B	mg/L	0.01	0.05	7/22/97	jaw
Potassium, dissolved	M200.7 ICP	7.0		mg/L	0.3	1	7/23/97	jaw
Selenium, dissolved	SM 3500-Se C, AA-Hydride	0.002	B	mg/L	0.001	0.005	7/10/97	ch
Silica, dissolved	M200.7 ICP	18.7		mg/L	0.2	0.5	7/22/97	jaw
Silver, dissolved	M272.2 GFAA		U	mg/L	0.003	0.01	7/14/97	sh
Sodium, dissolved	M200.7 ICP	30.5		mg/L	0.3	1	7/23/97	jaw
Thallium, dissolved	M279.2 GFAA		U	mg/L	0.002	0.01	7/12/97	sh
Vanadium, dissolved	M200.7 ICP		U	mg/L	0.005	0.03	7/22/97	jaw
Zinc, dissolved	M200.7 ICP	0.36		mg/L	0.01	0.05	7/23/97	jaw

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	M310.1							
Bicarbonate as CaCO3		201		mg/L	2	10	7/9/97	gm
Carbonate as CaCO3			U	mg/L	2	10	7/9/97	gm
Hydroxide as CaCO3			U	mg/L	2	10	7/9/97	gm
Total Alkalinity		201		mg/L	2	10	7/9/97	gm
Cation-Anion Balance	Calculation							
Cation-Anion Balance		1.7		%			7/23/97	calc
Sum of Anions		21.10		meq/L	0.01	0.05	7/23/97	calc
Sum of Cations		21.80		meq/L	0.01	0.05	7/23/97	calc

Laboratory Qualifiers (based on EPA CLP 3/90)

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RV Poulsen

Vice President of Operations: Ralph Poulsen

ACZ Laboratories, Inc.
30400 Downhill Drive
Steamboat Springs, CO 80487
(800) 334-5493

Lab Sample ID: *L14472-10*
Client Sample ID: *MMW-13*
Client Project ID:
ACZ Report ID: *RG46921*

Molycorp, Inc.
P.O. Box 469 Hwy. 38
Questa, NM 87556
Fred Martinez

Date Sampled: *6/25/97 00:00*
Date Received: *6/27/97*
Date Reported: *7/23/97*

Sample Matrix: *Surface Water*

Chloride	M325.2 - Colorimetric (RFA)	14	mg/L	1	5	7/20/97	lcj
Fluoride	M340.2 - ISE	1.6	mg/L	0.1	1.5	7/14/97	kr
Hardness as CaCO3	Calculation based on dissolved Ca & Mg	1010	mg/L	1	-	7/23/97	calc
Lab Filtration	***					6/30/97	laa
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	1450	mg/L	10	20	7/1/97	kr
Sulfate	M375.3 - Gravimetric	790	mg/L	10	20	7/13/97	ac
TDS (calculated)	Calculation	1360	mg/L	10	50	7/23/97	calc
TDS (ratio - measured/calculated)	Calculation	1.06				7/23/97	calc

Inorganic Qualifiers (based on EPA CLP 3/90):

U = Analyte was analyzed for but not detected at the indicated MDL

B = Analyte concentration detected at a value between MDL and PQL

PQL = Practical Quantitation Limit

RVP

Vice President of Operations: Ralph Poulsen

SOUDER, MILLER & ASSOCIATES
CIVIL/ENVIRONMENTAL SCIENTISTS & ENGINEERS

1201 Parkway Drive, Suite C
Santa Fe, NM 87505
(505)473-9211
Fax (505) 471-6675

July 17, 1997

#1239

Mr. Geyza I. Lorinczi, Chief Geologist
Molycorp, Inc.
PO Box 469
Questa, New Mexico 87556

RE: RECOMMENDED PRACTICES FOR GROUND WATER SAMPLING

Dear Mr. Lorinczi:

Enclosed is the final memorandum from Souder, Miller & Associates (SMA) discussing suggested improvements to Molycorp's ground water sampling protocol for discharge plan compliance. The memorandum is based from our observations of sampling of two of the mine area wells on June 24, 1997. We would be happy to discuss the suggestions further with you. Please call with any questions.

Sincerely,

SOUDER, MILLER & ASSOCIATES

Reid S. Allan
Senior Hydrogeologist

enc. Memorandum

MEMORANDUM

TO: GEYZA I. LORINCZI

FROM: REID ALLAN

DATE: JULY 17, 1997

RE: GROUND WATER SAMPLING RECOMMENDED PRACTICES

On June 24, 1997, I observed the sampling of two mine area monitoring wells at the Molycorp facility in Questa, New Mexico. The protocol used by the Molycorp staff is generally good. Field notes are kept, equipment is well maintained, and reasonable care is taken in the sample collection process. Souder, Miller & Associates (SMA) has the following suggestions which would serve to streamline the record keeping process and improve the accuracy of the sampling protocol:

1. **Well Sampling Form:** Use the form supplied by SMA to ease the taking of field notes. A hard copy of the form is enclosed as well as a floppy disc in Microsoft Excel format. SMA recommends that a computer file be created for each monitoring well, customized with the information specific to each well. Prior to each sampling event, the pertinent well forms would be printed out, giving a one page sheet to record all data for each well. The attached summary tables of monitoring well completion information should aid in filling out the Well Sampling Forms.

2. **Pump Depth:** Set the sampling pump at a depth of either 10 feet below the top of the screen or 10 feet below the water table, whichever is deepest. This will ensure water is sampled from the surrounding aquifer. Placing the pump at an inappropriate depth could result in purging and sampling stagnant water within the well bore. The Well Sampling Form includes a line for pump depth, so the depth will only have to be determined once and filled in on the form.

3. **Purge Rate:** While purging the wells until the conductivity, pH, and temperature stabilize, use a graduated 5 gallon bucket and a stopwatch to record the purging rate on the Well Sampling Form. Also continue to record the start and finish time of pumping, as is already done. This information will provide the total volume purged from each monitoring well for future reference.

4. **Stabilization of Conductivity, pH, and Temperature:** Use the chart on the Well Sampling Form to document the stabilization of these parameters. As Molycorp already periodically checks the meters for stabilization, simply

formalize this process by recording the time and meter readings on the table. SMA recommends recording the data on a 2-3 minute interval. This additional documentation will demonstrate the gradual stabilization of the parameters as the wells are purged. In general, wells should be purged until 3 to 4 consecutive readings are stable (a total of about 6-12 minutes of stable readings). "Stable" readings imply pH ±0.1, electrical conductivity ±10%, and temperature ±0.5°C.

5. **Filtration of Samples:** SMA observed that all samples were field filtered under the present Molycorp sampling protocol. Filtration for all parameters may not be an acceptable practice to NMED. SMA recommends verification of filtration practices for the various metals, cations, and anions. Molycorp's practice of using a new filter for each well sampled is more than adequate.

6. **Well Head Elevation Survey Points:** Verify that all depth to ground water data is collected from the surveyed points on the well heads in order to ensure accurate potentiometric surface maps.

7. **Sampling Protocol:** Molycorp may wish to develop a written sampling protocol in order to document their QA/QC procedures.

WELL SAMPLING FORM

WELL INFORMATION

Well #: _____

Total Depth: _____

Casing Diameter: _____

Casing Material: _____

TOC Elevation: _____

Screened Interval(s): _____

Samples to be Collected: _____

SAMPLING INFORMATION

Depth to Water: _____ ft.

Volume to purge: _____ gals.

Pump Depth: _____ ft.

Sample Date: _____

Sample Time: _____

Purge Rate: _____ gpm

Purge Time	Gals. Purged	Temp. °C	pH	Cond. mS/cm	Comments
0:00	0				
Total					

# of Bottles Collected: _____

Collected By: _____

Notes: (note odors, coloration, or any other pertinent information)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: 4-4-85 (1) ~~Humble~~ (*) (2) Slaven File

SUBJECT: MODIFICATION REQUEST FOR AN ISSUED PERMIT

12/10/84 Filing Process LB

FROM: JENAIE SLAVEN, 6W-PS

TO: Sam Becker, 6W-PI

The referenced application and/or letter (see attached copy) has been submitted to this office requesting a modification to their existing NPDES permit, NM0022306

Please return this form to 6W-PS initialing your desired course of action.

Name of Facility: Molycorp, Inc.

____ From the information submitted, it would appear that a new pwemit should be written and issued independently from the previously issued permit. A new NPDES number should be assigned to this request.

____ The information received requesting a modification to the permit does not include enough information to make a determination. Please request additional information from permittee in the form of a Short Form A, B, C, or D, or Standard Form A or C. (Please circle appropriate form.)

(*) ____ EPA staff will handle the request and modify the permit if necessary. Please refer to _____. (Optional)

____ EPA is in agreement with changing the permit. Send a copy of the request to the appropriate state agency for drafting of a new permit.

____ Send a copy of the request to the appropriate state agency to draft a new permit if the state agency determines that a change is warranted.

X The request does not warrant a change to the permit. Please place in permit file for future reference.

Attachment(s)

Company has not requested a modification to the discharge permit - see Page 3.

EPA Form 1320-6 (Rev. 3-76)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: 4-4-85

SUBJECT: MODIFICATION REQUEST FOR AN ISSUED PERMIT

12/10/84 (Filing Process?) FP (B or LD)

FROM: JENAIE SLAVEN, 6W-PS.

TO: Sam Becker, 6W-PI

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_____ EPA is in agreement with changing the permit. Send a copy of the request to the appropriate state agency for drafting of a new permit.

_____ Send a copy of the request to the appropriate state agency to draft a new permit if the state agency determines that a change is warranted.

_____ The request does not warrant a change to the permit. Please place in permit file for future reference.

Attachment(s)

EPA Form 1320-6 (Rev. 3-76)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: MAR 15 1985

Permit File
NM0022306
3/28/85
12/10/84 F.R.

SUBJECT: Existing Source Permit Application

FROM: Pamela K. Mintz, Chief Pamela K. Mintz
Federal Assistance Section

TO: Sam Becker, Chief 3/19
Industrial Permits Section (6W-PI)

The facility listed below has been determined to be an existing source. The file has been returned to the central file area awaiting your action:

Applicant	NPDES No./New Source No.
Molycorp, Inc.	NM0022306/NM9-29

RECEIVED
MAR 15 1985
6W-PS

EPA Form 1320-6 (Rev. 3-76)

mo·d

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: MAR 15 1985

SUBJECT: Existing Source Permit Application

mc3

FROM: Pamela K. Mintz, Chief Pamela K. Mintz
Federal Assistance Section

TO: Sam Becker, Chief
Industrial Permits Section (6W-PI)

The facility listed below has been determined to be an existing source. The file has been returned to the central file area awaiting your action:

Applicant	NPDES No./New Source No.
Molycorp, Inc.	NM0022306/NM9-29

ENTER - LOG BOOK
ENTER - INDEX FILE ✓
ENTER - FILE DATA
CORRESPONDENCE

EPA Form 1320-6 (Rev. 3-76)

NEW SOURCE REVIEW

Reviewer: Peña

NPDES No. NM-0022306

Review Date: 2-15-85

New Source No. NM9-29

Date Information Mailed: 11-26-84 Received: 11-30-84 To 6ES-FA: 2-4/8-85

Applicant: Molycorp, Inc. - Questa Division/Union 76

Product: Molybdenum oxide - mining and reduction milling

Location: Questa, New Mexico

1. Yes ____ No ✓ Additional Information Requested? Date: ____ Received: ____

2. Yes ✓ No ____ Clean Water Act-306 Category? 40 CFR Part 440 Subpart J

3. Yes ✓ No ____ New Source Performance Standards Proposed? Date: ____

4. Yes ✓ No ____ New Source Performance Standards Promulgated? Date: ____

5. Yes ✓ No ____ Potential Point Source Discharge?

6. Yes ✓ No ____ Construction Start per 40 CFR 122.66(b)(3)? Date: 11-30-84

7. Proposed Construction Activity:

____ New Facility

____ Expansion of a Facility

✓ Modification of a Facility

____ No Construction Activity Proposed

122.29(b)(1)(ii)(A) & (B)
(A) Is the process or production equipment that causes the discharge of pollutants totally replaced? No!
(B) Is the quantity/nature of the pollutants discharged changed? Slightly; ... the only constituent in the effluent discharge that will be increased from the present discharge levels is chloride. ... from 30 to 35 ppm .... The concentration of chlorides would (also) increase (if a baking step is added prior to leaching). The concentration would ... still remain well below the 250 ppm secondary maximum contaminant level for chloride in drinking water specified in the Federal Standards (40 CFR §143.3)

8. Determination:

____ New Source

____ New Discharger

✓ Existing Source

9. Comments:

Molycorp, Inc.

Questa Division
P. O. Box 469
Questa, New Mexico 87556
Telephone: (505) 586-0212

(issued 6-16-77)
NM0022306?
~~NM0022036?~~
NM9-29

union 76
MOLYCORP

November 26, 1984

Mr. Dick Whittington
Regional Administrator
U. S. Environmental Protection Agency
1201 Elm Street
Dallas, TX 75270
Attn: Myron O. Knudson, Director
Water Management Division

RECEIVED
NOV 30 1984
6W-EA

RE: NPDES Permit No. NM 022306

Dear Mr. Whittington:

As required under Part II, Section D of the company's NPDES Permit No. NM 0022306, Molycorp, Inc. hereby notifies the Environmental Protection Agency of a planned physical alteration to its Questa concentrate processing facility. For your information, I am enclosing a detailed description of this process change and an analysis of its impact on water quality.

In short, the steel industry has established specifications for molybdenum oxide (MoO_3) usage in alloying which Molycorp is unable to meet without further treatment of the mill concentrate. In order to provide a competitive and saleable product, it has become necessary to construct a facility to reduce lead content to specification levels. Construction of the facility has begun and it should be in operation by July of 1985.

Since this lead removal plant is so substantially integrated into the existing concentrate processing facility, Molycorp believes that this process change does not meet the necessary criteria for designation as a "new source" under 40 CFR 122.~~66~~29(b).

Please contact me or Lee Lockie if you have questions concerning this change.

Very truly yours,

C. R. Sacrison
General Manager

CRS:pcr

cc: Charles Nylander, EID
Enclosures

RECEIVED
NOV 30 1984
GW-EA

DESCRIPTION OF PROCESS CHANGE

I. BACKGROUND

Molycorp, Inc. operates an underground mining and milling operation near Questa, New Mexico. The product from the milling operation, molybdenum disulfide (MoS_2) concentrate is shipped by rail to a Molycorp roasting facility in Washington, Pennsylvania. At the roasting facility, the concentrate is converted to MoO_3 for use as an alloying agent in the steel industry. The steel industry has established specifications for MoO_3 usage in alloying which Molycorp is unable to meet without further treatment of the mill concentrate. Alloying specifications call for a MoO_3 product which contains less than 0.045% lead (Pb). Molycorp's concentrate (and roasted product) contains $\pm$ 0.10% Pb. In order to provide a competitive and saleable product, it has become necessary to construct a facility to reduce lead content to specification levels. For several years Molycorp has performed laboratory and pilot plant test work to establish the most feasible method for attaining desirable lead levels in Questa concentrate. In mid-1984 Molycorp contracted with Mountain States Engineering of Tucson, Arizona, to review all previous low lead test work, to perform additional testing deemed necessary, and design a lead removal facility for the Questa operations. Construction of the facility has begun and it should be in operation by July of 1985.

II. DESCRIPTION

The lead removal plant will utilize a 1.2N hydrochloric acid leach solution to treat the concentrate for approximately one hour at a tempurature of 80°C. The plant would be located at the Questa operations site and immediately adjacent to the existing concentrate drying facility. A flow sheet for the proposed leaching plant is attached. As indicated by the flow sheet, the plant's operations will be entirely integrated with those of the existing concentrate processing facilities.

Present plans are to subject 70% of the concentrates to low-lead leaching. However, for purposes of the discussion below, leaching of all concentrates is considered. The hydrochloric acid leach system would require a bleed system to control the spent acid, dissolved constituents from the acid leach, and filtrate wash water. A material balance for the leach system shows a total bleed stream entering the mill tailings of 15.6 gpm. The nominal liquid fraction of the mill tailings if 4,352 gpm. Thus, the dilution ratio of the bleed stream is approximately 280:1.

III. ANALYSIS

A series of laboratory leaching tests was performed on molybdenum concentrate to confirm calculated stoichiometric balances. A molybdenum concentrate containing 52% Mo, 0.31% Pb, 0.29% cu, and 1.51% Fe was subjected to locked cycle leach testing. The "bleed" effluent from this series of tests had the following analysis in Mg/ml (ppm): Mo = 193, Pb = 85, Cu = 44, Fe = 485. A simulated mill tailings sample was used for dilution to determine the effects of varying ratios of dilution. The following table summarizes the results:

Funny units again. Not ppm

MIXING EFFLUENT WITH MILL TAILINGS

Effluent Analysis Mg/Ml ~~(ppm)~~ (2) Mo: 1983 Pb: 85 Cu: 44 Fe: 485

This is not ppm in liquid it is a ratio of 1,0

		pH		Final Analysis g/ml (ppm) (3)				
Test	Ratio (1)	Initial	Final	Mo	Pb	Cu	Fe	Cl^-
161-86-1	Effluent (4)	8.7	8.7	1.1	0.02	0.04	0.01	7
161-86-2	40:1	8.5	7.5	4.1	0.05	0.04	0.01	245
161-86-3	80:1	8.5	7.7	2.6	0.02	0.04	0.01	131
161-87-1	100:1	8.7	7.7	2.3	0.02	0.04	0.01	102

(1) Mill tailings solution to effluent.

(2) Analysis by atomic absorption.

(3) Analysis by DC plasma except Cl^- determined by Cl^- electrode.

(4) Simulated mill tailings effluent.

Projecting this table to a 1:280 ratio as would be experienced in the leach plant, the calculated final analysis would be as follows:

This is suspect based on previous page which says "g/ml = ppm" looks more like parts per hundred

	pH		Final Analysis (ppm)				
Ratio	Initial	Final	Mo	Pb	Cu	Fe	Cl
280:1	8.6	8.0	1.54	0.02	0.04	] 0.01	40

The laboratory tests demonstrate that the heavy metal content (Pb, Cu, Fe) of the effluent will not be affected by the addition of the leach plant bleed stream to the mill tailings slurry. The heavy metals will precipitate as hydroxides and settle with tailings solids. The pH of the effluent will remain mid-range at about 8.0. Only a portion of the Mo will precipitate and overall Mo levels in the effluent would increase between 0.4 and 0.5 ppm. However, treatment of the effluent in the ion exchange plant prior to discharge will lower the Mo concentrations in the discharge (outfall 001) to current discharge levels (1.82 ppm, 1984 average concentration). In fact, the only constituent in the effluent discharge that will be increased from present discharge levels is chloride. Chloride levels will be increased from 30 to 35 ppm. It should be noted, however, that Molycorp's NPDES Permit does not contain an effluent limit for chloride and the 35 ppm discharge will be well below the 250 ppm secondary maximum contaminant level for chloride in drinking water specified in the Federal standards (40 C.F.R. § 143.3).

units are suspect

In the future, if a baking step is added prior to leaching, only one of the parameters making up the leach plant bleed stream would change. The concentration of chlorides would increase somewhat but still remain well below the Federal standards.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

MAR 6 1985

CERTIFIED MAIL - RETURN RECEIPT REQUESTED (P 423 868 806)

Mr. C. R. Sacrison
General Manager
Molycorp, Inc.
P.O. Box 469
Questa, New Mexico 87556

Re: NPDES Permit Application (NM-0022306)
New Source Determination (NM9-29)

Dear Mr. Sacrison:

We have reviewed the information dated November 26, 1984, for the proposed addition of a facility to further reduce the lead content from molybdemum concentrate produced at the Questa facility. The proposed action is an existing source and not a new source as defined at Section 306 of the Clean Water Act and 40 CFR Part 440, Subpart J. This is a preliminary determination which may be challenged by a request for an evidentiary hearing in accordance with 40 CFR 122.21(k)(4) (45 Federal Register 33444, May 19, 1980) within thirty (30) days of the issuance of the public notice.

If you need assistance in this matter, please contact Hector Pena at (214) 767-6661.

Sincerely yours,

Clinton B. Spotts
Chief, Federal Activities Branch (6ES-FA)

bcc: Becker (6W-PI)

6ES-FA:Pena:X6661:ba:X2716:3/1/85:FA-118

CONCURRENCES

SYMBOL	6ES-FA							
SURNAME	MINTZ							
DATE	3-5-85							

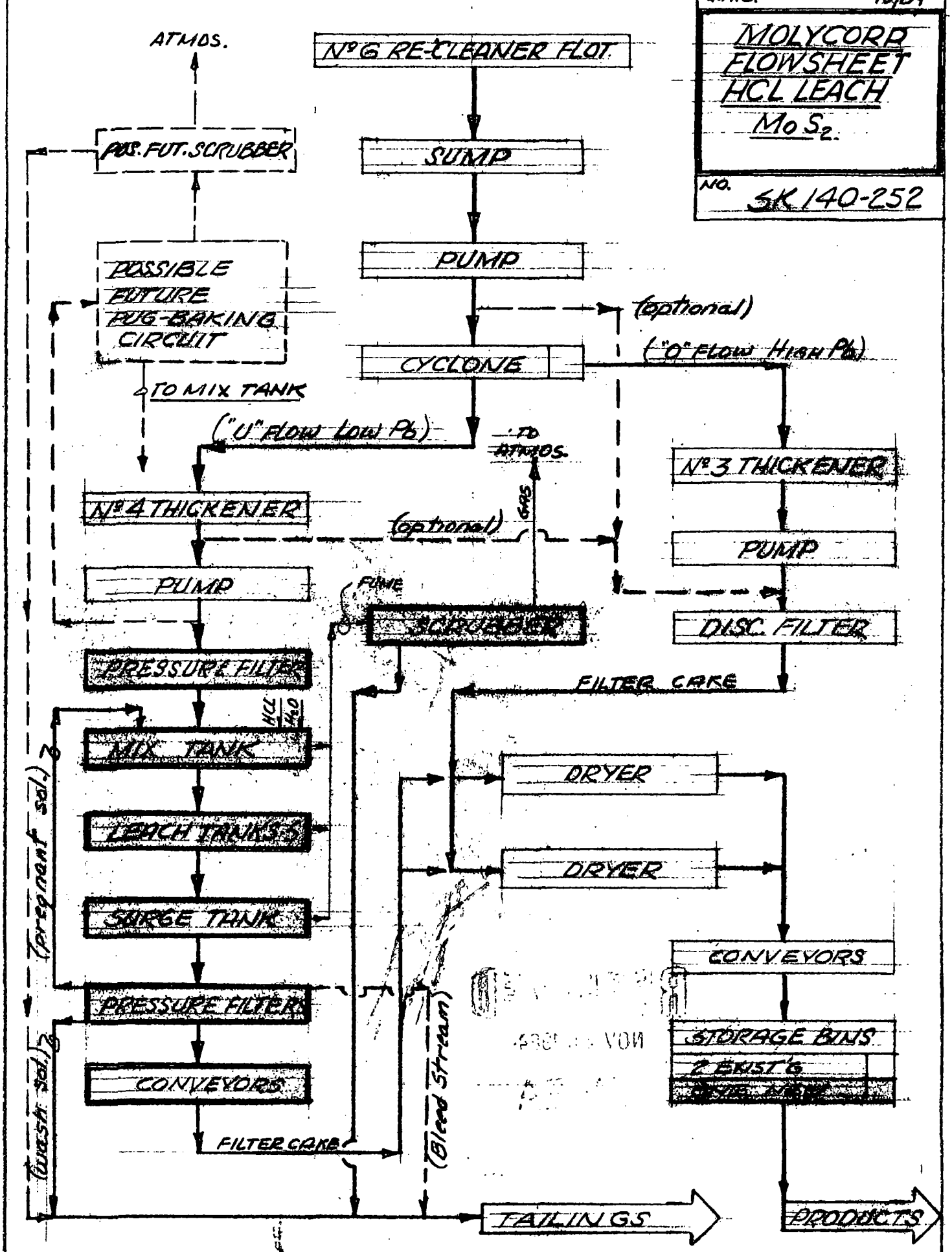
EPA Form 1320-1 (12-70) OFFICIAL FILE COPY

*U.S. GPO : 1984-436-836

G.H.O. 10/84

MOLYCORP FLOWSHEET HCL LEACH MoS_2.

NO. SK 140-252



NOTE: NEW EQUIPMENT SHOWN SHADED WITH DARK OUTLINE.

P 423 868 806

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL

(See Reverse)

Sent to	
Street and No.	
P.O., State and ZIP Code	
Postage	$
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to whom and Date Delivered	
Return Receipt Showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	$
Postmark or Date	

PS Form 3800, Feb. 1982

STICK POSTAGE STAMPS TO ARTICLE TO COVER FIRST CLASS POSTAGE, CERTIFIED MAIL FEE AND CHARGES FOR ANY SELECTED OPTIONAL SERVICES. (see front)

1. If you want this receipt postmarked, stick the gummed stub on the left portion of the address side of the article leaving the receipt attached and present the article at a post office service window or hand it to your rural carrier. (no extra charge)

2. If you do not want this receipt postmarked, stick the gummed stub on the left portion of the address side of the article, date, detach and retain the receipt, and mail the article.

3. If you want a return receipt write the certified-mail number and your name and address on a return receipt card, Form 3811, and attach it to the front of the article by means of the gummed ends if space permits. Otherwise affix to back of article. Endorse front of article **RETURN RECEIPT REQUESTED** adjacent to number.

4. If [illegible] the addressee, or to an authorized agent of the addressee endorse RESTRICTED DELIVERY on the front of the article.

5. Enter fees for the services requested in the appropriate spaces on the front of this receipt. If return receipt is requested, check the applicable blocks in Item 1 of Form 3811.

6. Save this receipt and present it if you make inquiry.

ROUTING AND TRANSMITTAL SLIP

Date 2-11-84

TO: (Name, office symbol, room number, building, Agency/Post)	Initials	Date
1. Namuh	MSR	2/11
2. ~~Hunke~~ Mintz 6E3-FA		
3. Hunke 6W-PI		
4. Permit File		
5.		

	Action		File		Note and Return
	Approval		For Clearance		Per Conversation
	As Requested		For Correction		Prepare Reply
	Circulate		For Your Information		See Me
	Comment		Investigate		Signature
	Coordination		Justify		

REMARKS

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

FROM: (Name, org. symbol, Agency/Post)	Room No.—Bldg.
S Nolen	Phone No.

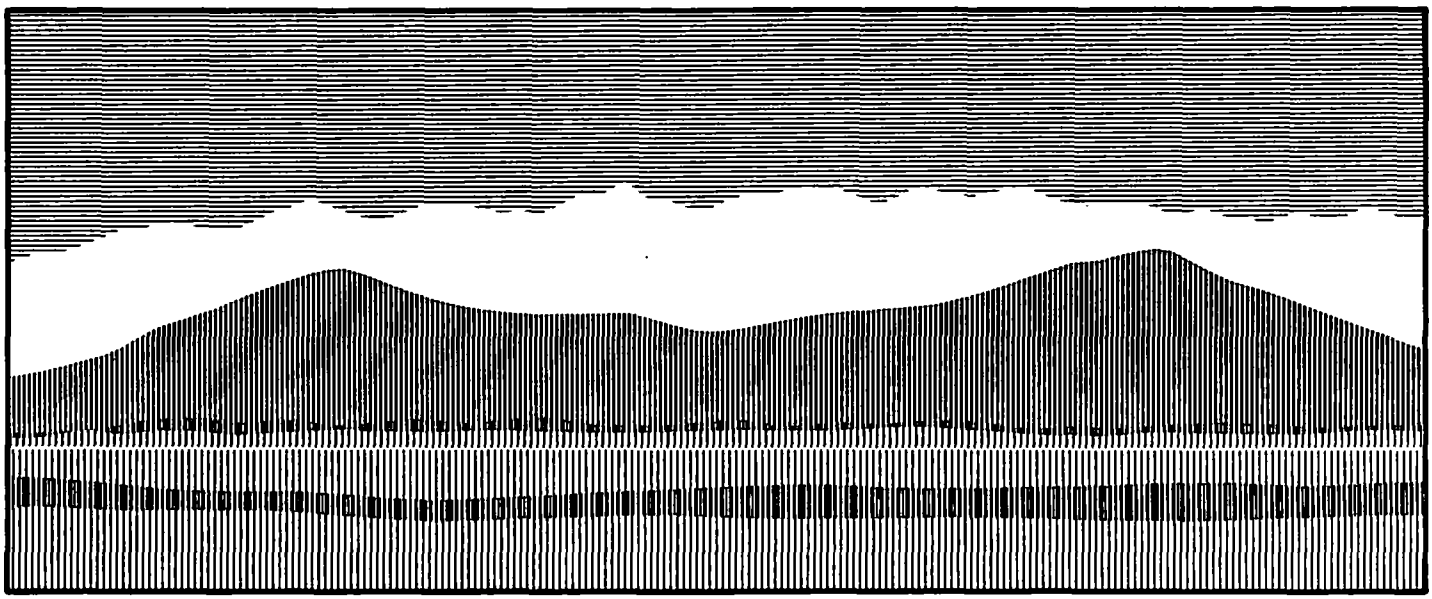
5041-102

OPTIONAL FORM 41 (Rev. 7-76)
Prescribed by GSA
FPMR (41 CFR) 101-11.206

☆ U.S.G.P.O.: 1984-421-529/412

DRAFT

ENVIRONMENTAL IMPACT STATEMENT



MOLYCORP GUADALUPE MOUNTAIN TAILINGS DISPOSAL FACILITY

Prepared for:

BUREAU OF LAND MANAGEMENT

ALBUQUERQUE, NEW MEXICO

BLM-NM-ES-89-003-4130

DECEMBER 1988

DRAFT ENVIRONMENTAL IMPACT STATEMENT

MOLYCORP GUADALUPE MOUNTAIN TAILINGS

DISPOSAL FACILITY

(x) Draft | Final ( )

Lead Agency: U.S. Department of the Interior
Bureau of Land Management

Counties Directly Affected: Taos County, New Mexico

Comments on this EIS should be directed to:

Robert T. Dale
Bureau of Land Management
Albuquerque District Office
435 Montana N.E.
Albuquerque, NM 87107
Telephone: (505) 761-4546
(FTS 474-4546)

Date Draft EIS made available to the Environmental Protection Agency and the public: December 2, 1988

Date by which comments on this Draft EIS must be received to be considered in the Final EIS: February 9, 1989

Abstract: Molycorp proposes to construct and operate a molybdenum tailings disposal facility on 1,230 acres of public land near Questa, New Mexico and has located mill site claims for this purpose in accordance with 30 U.S.C. Section 42. The project would consist of a 568-acre tailings pond in the saddle of Guadalupe Mountain. The pond would be formed by the construction of two rock-filled dams at either end of the saddle. Other facilities would include a tailings pump station, an extension of the tailings pipeline, tailings distribution lines, access roads and a patrol road, a powerline, a seepage collection pond, surface water diversion channels, and a decant water channel. The project would provide additional storage for approximately 200 million tons of tailings from Molycorp's molybdenum mine located approximately 12 miles east of Guadalupe Mountain. The Bureau of Land Management completed an Environmental Assessment (EA) for this project in February 1985. As a result of that EA, the BLM determined that an Environmental Impact Statement (EIS) would be required. This EIS analyzes and documents the environmental impacts of the proposed project through construction, operation, and closure.

Recommended:

Robert T. Dale, District Manager
Albuquerque District Office

Approved:

Larry L. Woodard, State Director
New Mexico State Office

Public Hearing Information

The Bureau of Land Management (BLM) will hold public hearings on this document during the 60-day public review period. The purpose of these hearings is to take oral testimony on the scope and adequacy of the Draft EIS. A BLM official will preside over each hearing. All testimony will be recorded and placed in the permanent project file. A summary of the substantive comments contained in the testimony will be included in the Final EIS (together with the written comments received on the Draft EIS). The Final EIS will present responses to comments made at the hearings and contained in the written comment letters.

Public hearings on this Draft EIS will be held at the following times and locations:

- January 20, 1989 St. Anthony Parish Hall Questa, New Mexico 7:00 p.m.
- January 21, 1989 Ramada Inn Conference Room Taos, New Mexico 10:00 a.m.

SUMMARY

Purpose and Need

Molycorp, Inc., a wholly owned subsidiary of Unocal Corporation, is proposing to construct and operate a molybdenum tailings disposal facility near Questa, New Mexico. Molycorp has filed millsite locations on public lands in the Guadalupe Mountain area just west of Questa, and the Bureau of Land Management (BLM) has determined that the proposed tailings disposal facility would constitute a valid use of the land for millsite purposes as provided under the General Mining Laws [U.S. Department of the Interior (U.S.D.I.) BLM 1985]. The BLM evaluated the impacts of construction and operation of the tailings facility in an Environmental Assessment (EA) dated February 1985. Because of continuing questions and concerns from the public and other reviewing agencies, the BLM concluded in their Record of Decision that an Environmental Impact Statement (EIS) would be required to complete the environmental analysis and documentation process for the project.

Molycorp has operated a molybdenum mining and milling operation near Questa, New Mexico since the 1920s. Mining operations expanded to open pit operations in 1964. Construction of a larger mill created a need for a sizable tailings disposal site for the operation. Initial construction for the existing tailings disposal site located west of Questa and 1.5 miles east of Guadalupe Mountain began in 1964. Currently, two impoundments (referred to as Sections 35 and 36) provide tailings storage capabilities. At the present time Molycorp's mining and milling operations have been temporarily stopped due to the depressed price of molybdenum.

The conversion of Molycorp's open pit mine to an underground mining operation and modernization of the mill has extended the potential life of the mine and will ultimately result in a greater amount of tailings than the existing facility can accommodate. At maximum designed production capacity of the Molycorp mine and mill, approximately 18,000 tons per day (tpd), or 6.5 million tons annually, would be milled and disposed of at the tailings disposal sites. A total of 250 million tons of storage is required to ensure continuous production from the Questa mining operation. The remaining storage in Sections 35 and 36

would provide for less than one-half of the needed long-term tailings storage; however, continued operation of Section 35 and the proposed Guadalupe tailings facility would provide design capacity for approximately 40 years of operation.

Molycorp expects to re-open, and expand, their existing operations as soon as the molybdenum market allows for production at profitable levels. Given the length of time involved in securing the new site, in addition to initial construction requirements, the company is proceeding with the permitting process to obtain the necessary approvals for use of the site to prudently plan for the future.

Project Description

The proposed Molycorp Tailings Disposal Facility Project would involve construction, operation, and eventual closure and reclamation of a tailings pond in the saddle on Guadalupe Mountain. The proposed project site is located approximately 3 miles northwest of the Village of Questa in Taos County, New Mexico, and borders the northwest side of Molycorp's existing tailings disposal area (Figure I). The project area encompasses a total of 1,230 acres. The project would provide additional storage for approximately 200 million tons of tailings from the company's molybdenum mine about 12 miles east of Guadalupe Mountain.

Development of the Guadalupe site would entail clearing, grading, and excavation of fill material for construction of two dams. Other ancillary facilities would include:

- a pumping (tails booster) station,
- an extension of the tailings pipeline,
- tailings distribution lines,
- an access road and a patrol road around the perimeter of the pond and dams,
- a powerline,
- a collection pond and dam (for dam seepage),
- surface water diversion channels, and
- a decant water channel or pipeline.

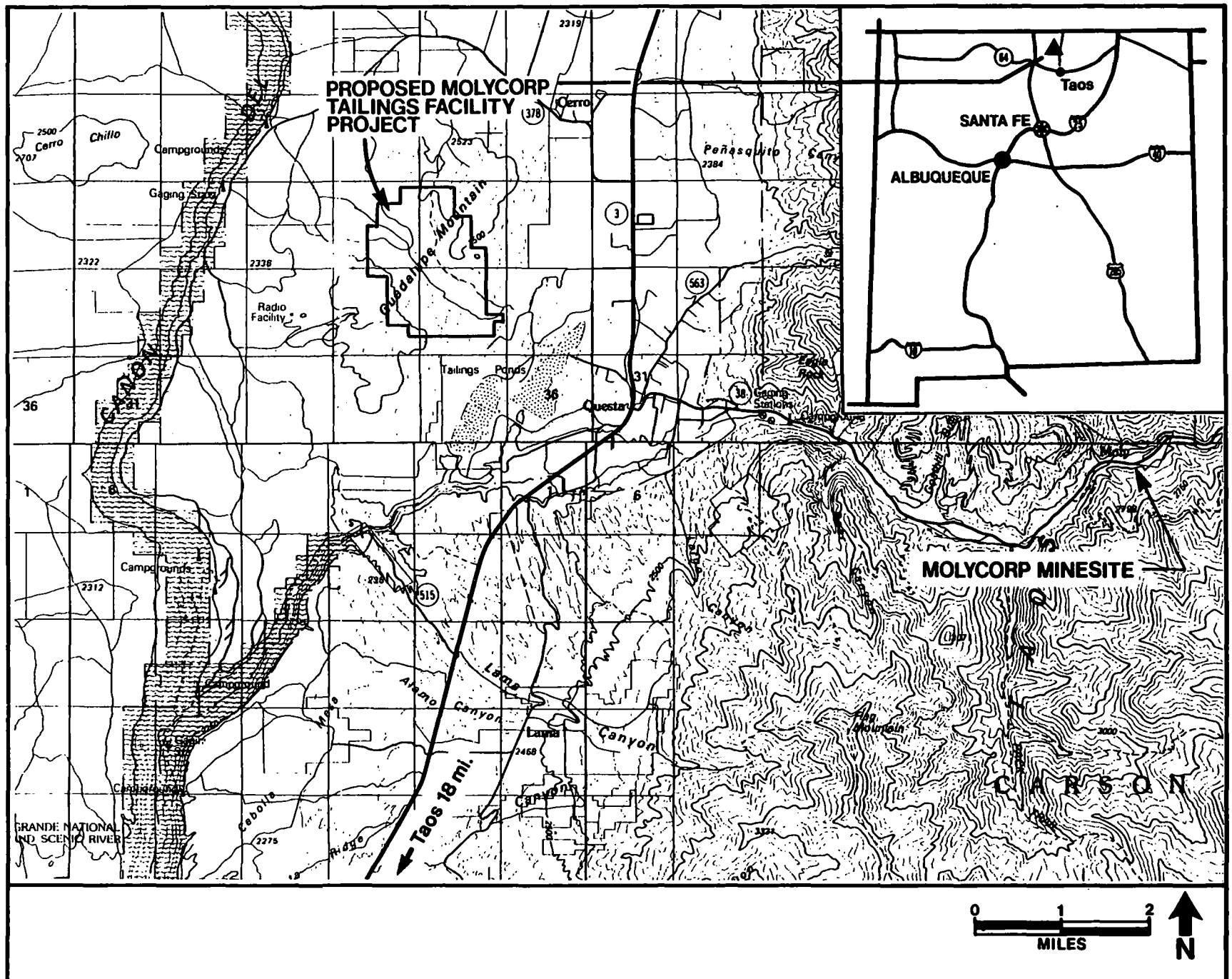


FIGURE I PROJECT LOCATION MAP

The entire site would be fenced to prevent unauthorized access to the tailings pond. Detailed specifications of these facilities will be developed during the detailed engineering phase of the project.

To form the tailings impoundment, two rock-filled dams would be constructed at opposite (east and west) ends of the saddle which separates the two peaks of Guadalupe Mountain. At full development, the tailings storage surface area would cover approximately 568 acres.

The design of the tailings dams would incorporate standard rock fill techniques based on accepted center line construction methods. The upstream faces of the dams would be sealed with soil and an impervious membrane to inhibit water flow through the dam. A drainage system would be installed within the dam and any seepage collected would be routed with the decant water to the existing ion-exchange plant. The outside faces of the dams would be revegetated following each development stage (50-foot development increments) to lessen visual contrasts.

A pumping station would be constructed at the east base of Guadalupe Mountain and a 3.5-mile pipeline extension would be constructed to transport the tailings slurry to the new impoundment. The access road would be approximately 60 feet wide and 1.5 miles long leading from the existing facility to the eastern edge of the saddle. In addition, a 20-foot wide patrol road would be required around the perimeter of the tailings pond and the dams. An electrical power distribution line would follow the proposed access road. Molycorp would tap the existing 69-kV transmission line on the western edge of the existing tailings facility and transmit 13.8-kV to the site via 40-foot "T" configuration wood distribution poles.

Depending upon demand for molybdenum, construction would begin after approval of the Plan of Operation and would continue in stages throughout the life of the project. Construction would require a workforce of about 30, all employees of Molycorp or a contractor. Equipment would include standard earth-moving equipment such as a grader, bulldozer, haul truck, crusher, scraper, drill, and shovel.

Ore from the underground mine would be similar to that encountered in the open pit, therefore the milling process, including reagents,

would not change over what has been used in the past. Most of these reagents are molybdenum collectors, and the bulk of the reagents adhere to the molybdenum disulfide concentrate. Therefore, only trace amounts remain in the tailings.

During operation, the tailings would be transported as a slurry via Molycorp's existing tailings pipeline to the existing impoundments, then through the pump station and up the slope to the Guadalupe Mountain impoundment. The slurry would consist of 60 percent by weight water and 40 percent solids.

Tailings would be distributed around the perimeter of the pond in a manner to provide an even distribution of the tailings and to provide a central location for impounded water (clarification pond). The topography of the proposed tailings pond, as compared to the existing ponds, would allow for multiple, simultaneous discharge points which will increase the amount of beach area that can be kept wet, and consequently reduce the potential for fugitive dust emissions. At full development, the surface area of the tailings storage facility would be approximately 568 acres. Of this area, less than 200 acres would be in dried tailings at any point in time. Dry areas of the tailings impoundment would be periodically sprayed with a chemically inert stabilizer to form a crust and reduce fugitive dust emissions. After the tailings solids settle out, the surface water and collected seepage from the dams would be transported via open, lined channel or pipeline to the existing ion-exchange plant where residual molybdenum would be removed prior to discharge to Pope Lake and the Red River.

Molycorp has committed to, and incorporated into their Plan of Operations, engineering design and operational practices for the tailings facility as described by Geocon (1988). These practices are summarized in Chapter 1 of the Draft EIS.

A closure plan must be approved by the State Engineer at the final stage of construction. The plan would describe specific measures to be taken to ensure long-term stability and to reclaim the site for future use. The Molycorp Tailings Disposal Facility is expected to operate for 40 years, based on full-scale mining. At the end of the operating period, all surface facilities would be removed and disturbed areas would be reclaimed. Topsoil would be spread over the surface of the

dried tailings to a minimum depth of 1 foot, and the area would be seeded with an approved seed mixture. Soils for capping the tailings would be taken from throughout suitable locations on Molycorp's property. Tree and shrub species would be planted within several years, or following establishment of the grasses.

Issues and Concerns

Several issues or concerns related to the proposed project were identified as a result of the 1985 EA and during the scoping meetings that were held in July 1986 prior to preparation of the EIS. Additional discussion about the scoping meetings is presented in Section 4.0, Consultation and Coordination and in Appendix A, Scoping Documentation.

The scoping process, as defined under the implementing regulations for NEPA (40 CFR Part 1501.7), is used not only to identify significant environmental issues deserving of study, but also to deemphasize insignificant issues, thus narrowing the scope of the EIS process accordingly.

In December 1986, the BLM distributed a public information document to approximately 225 interested persons. The public information document included a detailed summary of scoping results, BLM responses to selected comments received during scoping, and the BLM Field Solicitor's opinion on concerns regarding future patenting of the Guadalupe site. These items are attached as Appendix A to the Draft EIS.

The primary issues that were identified as appropriate to be addressed in the Draft EIS included:

- potential effects to surface and groundwater quality (e.g., effects on well users, the Rio Grande, and the Arsenic Springs System; seepage considerations),
- air quality issues associated with windblown dust,
- potential health hazards associated with windblown dust,
- visual impacts of the dams,
- effects on local recreation/tourism,
- effects on the local employment/economy,

- noise effects, and
- loss of archaeological values.

New issues that were identified during scoping resulted in the decision to include a discussion of health risks associated with inhalable silica and dust in the Draft EIS. It was also decided that additional data were required to assess impacts related with air quality, groundwater, and socioeconomic concerns. This additional data collection resulted in a delay in the original EIS schedule.

Impact Conclusions

A summary of impacts that would result from construction, operation, and abandonment of the proposed project are presented in Table I. Detailed discussion of impact analysis and mitigation can be found in Chapter 3 of the Draft EIS, Environmental Consequences.

TABLE I

SUMMARY OF IMPACTS

Resource	Type of Impact	Extent of Impact
Air Quality	During operation of the tailings pond, potential infrequent exceedances of the State of New Mexico total suspended particulate (TSP) standard may occur in the immediate vicinity of the tailings pond when dry and during periods of high winds	Long-term, potentially significant because of exceedance of standard unless properly mitigated
Water Resources	Downward seepage of the tailings solution to the regional water table	Long-term, no predicted exceedances of water quality standards
Topography/ Geology	Alteration of topography; displacement of geologic material for dam construction	Long-term
Soils	Disturbance of 825 acres of soil resources; loss of 97 acres of potentially salvageable topsoil	Long-term
Vegetation	Disturbance of 825 acres of vegetation (87 percent pinyon-juniper and upland forest types).	Long-term
Wildlife	Loss of 825 acres of terrestrial wildlife habitat with associated reduction in wildlife carrying capacity; no aquatic impacts	Long-term
Land Use	Prime and unique farmland	No impact
	Reductions in public land AUMs on two allotments (one of which is in active use)	Long-term
Recreation	Reduced access to a portion of the Guadalupe Mountain area	Long-term
Visual Resources	Construction of the dams and the inability to reclaim the dam faces to blend with surrounding terrain	Long-term, significant because of conflict with BLM VRM Class II objectives

TABLE I (CONTINUED)

Resource	Type of Impact	Extent of Impact
Noise	Construction-related noise (e.g., blasting) would be a noticeable increase over ambient levels at area campgrounds	Short-term, intermittent
Cultural Resources	Disturbance of 11 archaeological sites considered eligible for National Register of Historic Places	Long-term, no adverse effect if mitigated according to the data recovery plan
Socioeconomics	Economy and employment	Minimal impact
	Public fiscal conditions	Fiscal tax-related benefits to county
	Housing and public services	No impact
Health Risk	Public exposure to windblown tailings dust	Long-term, no predicted exceedance of PM-10 standard, and no health threat to the public

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1.0 DESCRIPTION OF THE PROPOSED ACTION

1.1 Background

Molycorp, Inc., a wholly owned subsidiary of Unocal Corporation, is proposing to construct and operate a molybdenum tailings disposal facility near Questa, New Mexico. The location of the proposed project is shown on Figure 1-1. Molycorp has filed millsite locations on public lands in the Guadalupe Mountain area just west of Questa, and the Bureau of Land Management (BLM) has determined that the proposed tailings disposal facility would constitute a valid use of the land for millsite purposes as provided under the General Mining Laws [U.S. Department of the Interior (U.S.D.I.) BLM 1985]. The BLM evaluated the impacts of construction and operation of the tailings facility in an Environmental Assessment (EA) dated February 1985. Because of continuing questions and concerns from the public and other reviewing agencies, the BLM concluded in their Record of Decision that an Environmental Impact Statement (EIS) would be required to complete the environmental analysis documentation process for the project.

Molycorp has operated a molybdenum mining and milling operation near Questa, New Mexico since the 1920s. The mine is located approximately 12 miles east of Guadalupe Mountain (Figure 1-1). Mining operations expanded to open pit operations in 1964. Construction of a larger mill created a need for a sizable tailings disposal site for the operation. Initial construction for the existing tailings disposal site located west of Questa and 1.5 miles east of Guadalupe Mountain began in 1964. Currently, two impoundments (referred to as Sections 35 and 36) provide tailings storage capabilities.

Mining operations in the pit have been phased out in favor of an underground mining operation that was begun in 1983. The mill has been renovated and modernized to increase efficiency and is designed to treat a maximum of 18,000 tons per day (tpd) of ore from the underground mine. Expansion of the tailings disposal capacity is required in conjunction with the increased life of the mining operations.

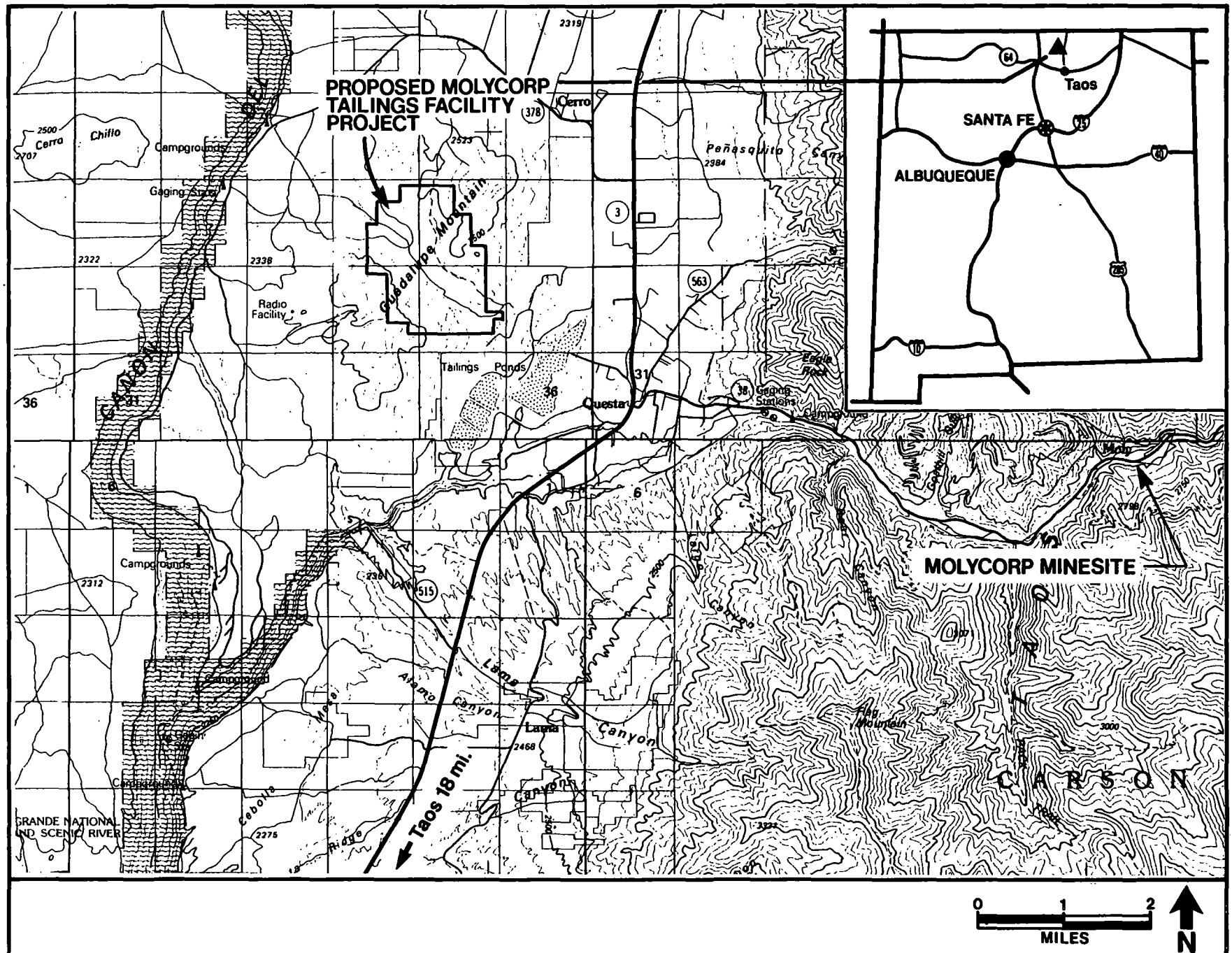


FIGURE 1-1 PROJECT LOCATION MAP

1.2 Purpose and Need

The conversion of Molycorp's open pit mine to an underground mining operation and modernization of the mill has extended the life of the mine and will result in a greater amount of tailings than the existing facility can accommodate. At designed production capacity of the Molycorp mine and mill approximately 18,000 tons of tailings per day, or 6.5 million tons annually, can be milled and disposed of at the tailings disposal sites. A total of 250 million tons of storage is required to ensure continuous production from the Questa mining operation. The remaining storage in Sections 35 and 36 would provide for less than one-half of the needed long-term tailings storage; however, continued operation of Section 35 and the proposed Guadalupe tailings facility would provide capacity for approximately 40 years of operation.

Molycorp expects to re-open and expand their existing operations as soon as the molybdenum market allows for production at profitable levels. Given the length of time involved in securing the new site, in addition to initial construction requirements, the company is proceeding with the permitting process to obtain the necessary approvals for use of the site to prudently plan for the future.

1.3 Project Description

The proposed Molycorp Tailings Disposal Facility Project would involve construction, operation, and eventual closure and reclamation of a tailings pond in the saddle on Guadalupe Mountain. The proposed project site is located approximately 3 miles northwest of the Village of Questa in Taos County, New Mexico, and borders the northwest side of Molycorp's existing tailings disposal area (Figure 1-2). A total of 1,230 acres are included within the project area. The project would provide additional storage for approximately 200 million tons of tailings from the company's molybdenum mine about 12 miles east of Guadalupe Mountain.

1.3.1 Construction

Development of the Guadalupe site would entail clearing, grading, and excavation of fill material for construction of two dams. Other ancillary facilities would include:

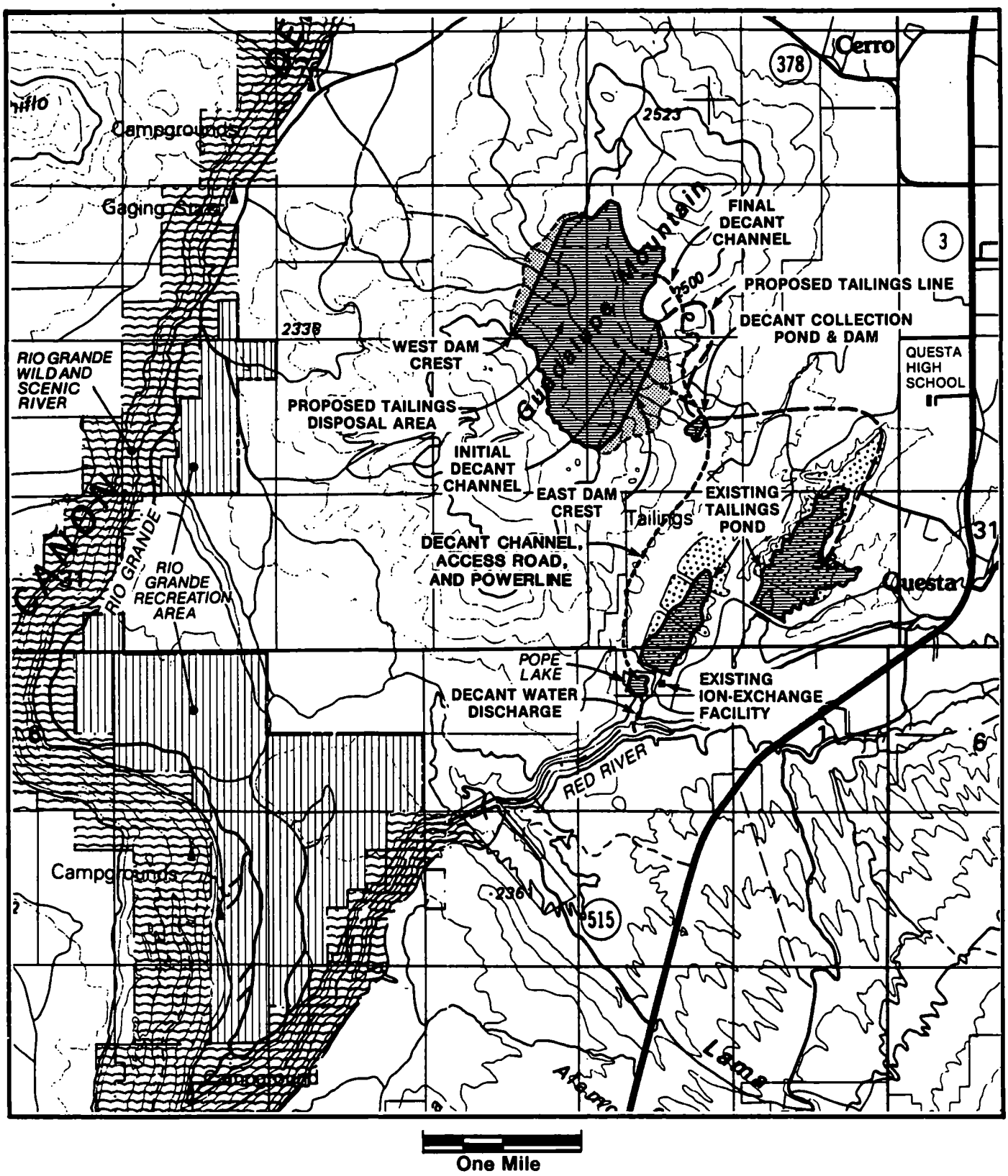


FIGURE 1-2 PRELIMINARY SITE LAYOUT

- a pumping (tails booster) station,
- an extension of the tailings pipeline,
- tailings distribution lines,
- an access road and a patrol road around the perimeter of the pond and dams,
- a powerline,
- a collection pond and dam (for dam seepage),
- surface water diversion channels, and
- a decant water channel or pipeline.

The entire site would be fenced (three-strand barbed wire) to prevent unauthorized access to the tailings pond. Detailed specifications of these facilities will be developed during the detailed engineering phase of the project. Estimated acreages of the disturbed areas associated with the project facilities are shown in Table 1-1.

To form the tailings impoundment, two rock-filled dams would be constructed at opposite (east and west) ends of the saddle which separates the two peaks of Guadalupe Mountain. Initial construction would require about 2 to 3 million cubic yards of material, giving an initial storage capacity of about 28 million tons (for 4 years of active operation, based on a mill capacity of 18,000 tons/day). The raising of the dam would be in 50-foot increments and would ultimately require 20 to 25 million cubic yards of material. The heights of the dams at total build-out would reach an elevation of 8,200 feet. Figures 1-3, 1-4, and 1-5 show the tailings disposal area at different stages of development and operation. At full development, the tailings storage surface area would cover approximately 568 acres.

The natural soils and overburden on the valley floor would act as a seepage barrier during the initial stages of operation and would be left in place. All rock fill for construction requirements would be quarried from the interior flanks of the north and south peaks within the 1,230-acre site (see Figure 1-5). Select borrow, if required, would come from other locations on Molycorp's property near the existing

TABLE 1-1

ESTIMATED DISTURBANCES ASSOCIATED WITH THE PROPOSED PROJECT AT FINAL DEVELOPMENT[1]

Project Component	Acres
Tailings Pond and Dams	717
Quarries	46
Collection Pond and Dam (dam seepage)	6
Equipment and Personnel Site	7
Access Road	11
Patrol Road	14
Perimeter Diversion Ditches	5
Tailings Line	5
Decant Channel	3
Powerline	5
Perimeter Fencing	6
Total	825

[1] Does not include additional disturbances outside of the claims area boundary on existing Molycorp property such as the tailings line extension, decant channel, access road, and powerline.

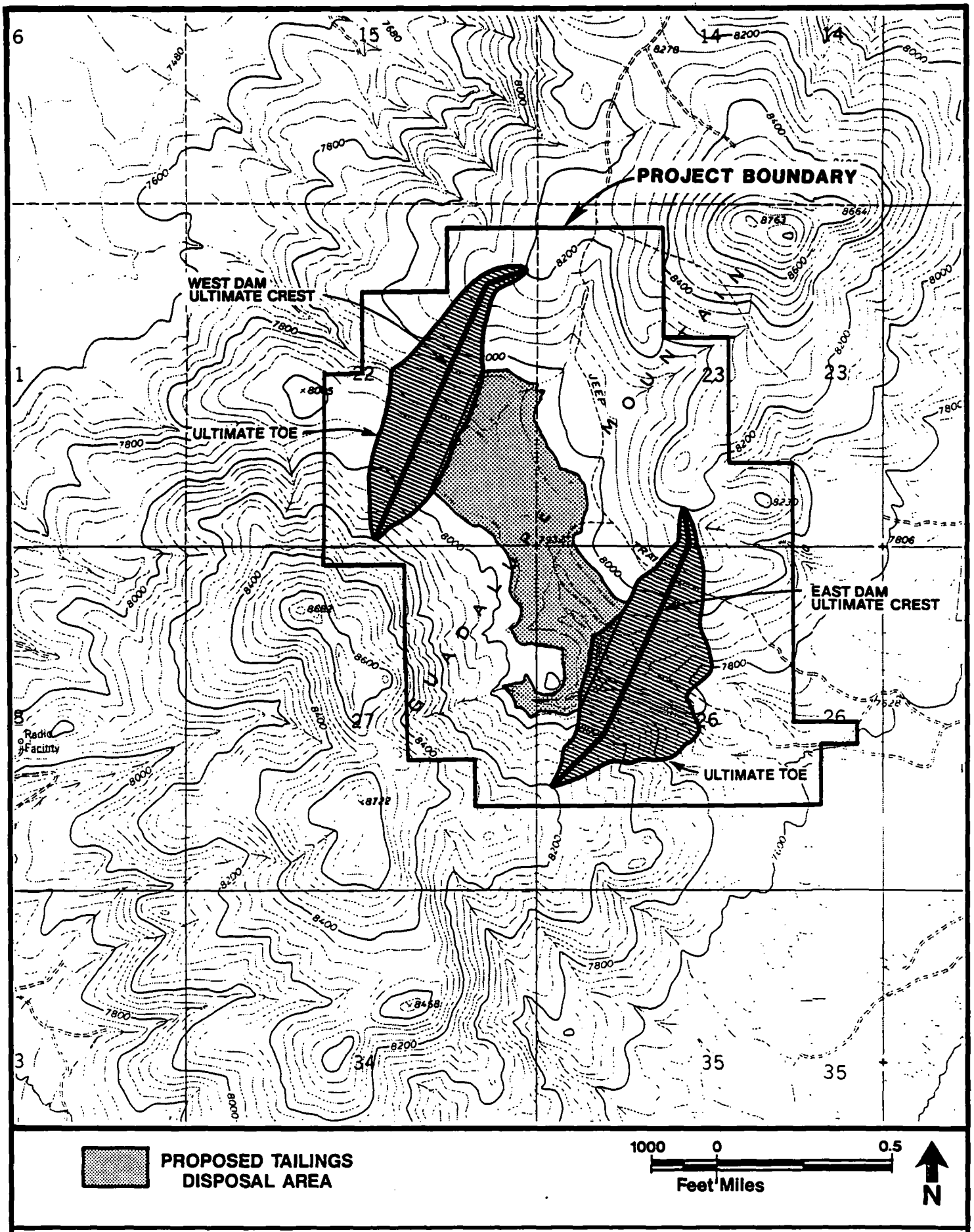


FIGURE 1-3 INITIAL DEVELOPMENT STAGE FOR THE TAILINGS FACILITY

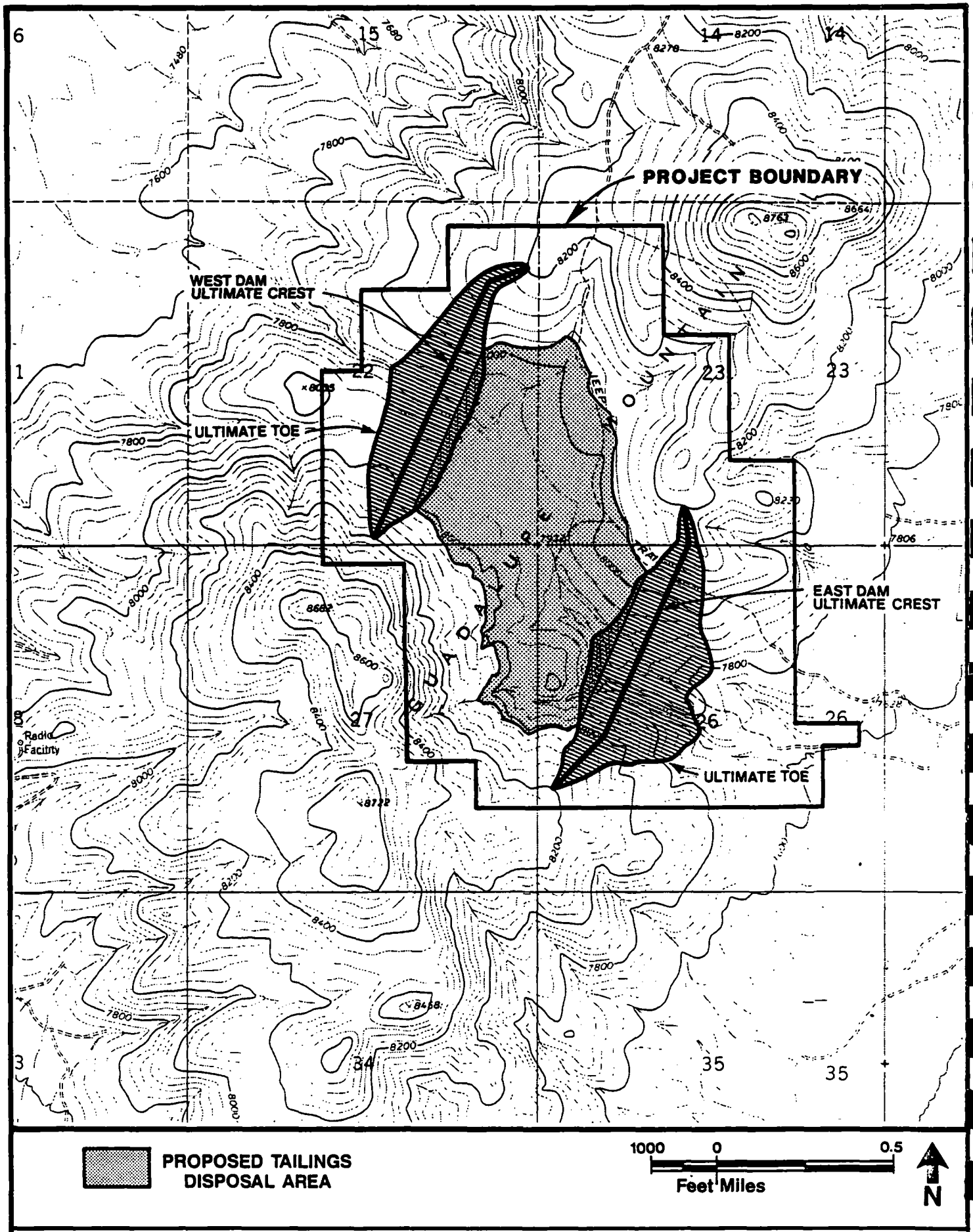


FIGURE 1-4 INTERMEDIATE DEVELOPMENT STAGE FOR THE TAILINGS FACILITY

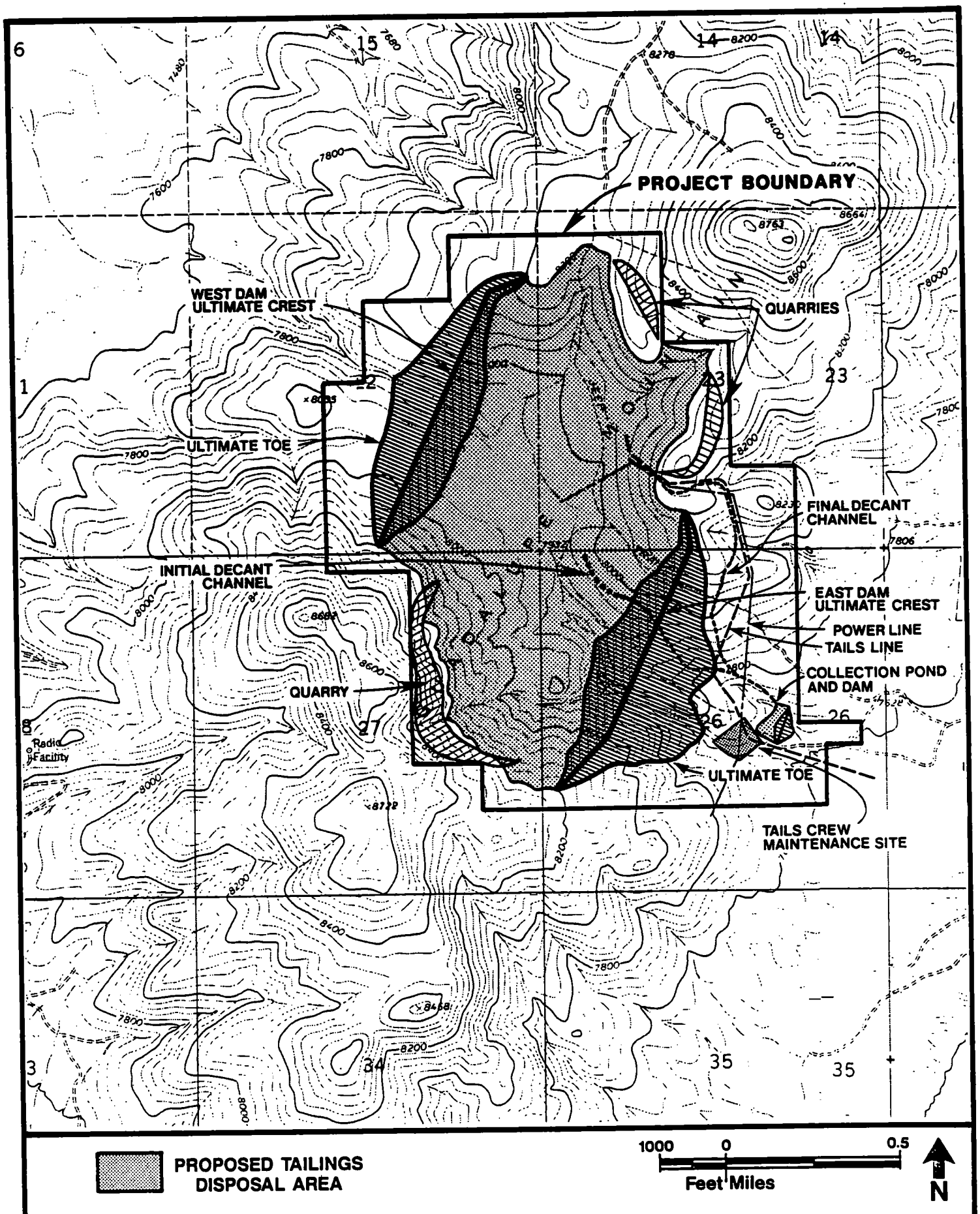


FIGURE 1-5 FINAL DEVELOPMENT STAGE FOR THE TAILINGS FACILITY

tailings ponds. Test drilling will be required prior to design of the structures to determine the structural strength and permeability of the construction materials.

At the present time, only conceptual dam designs have been reviewed by the State Engineer's Office. Preliminary and final design would be completed after BLM approval of the Plan of Operations. The design of the tailings dams would incorporate standard rock fill techniques based on accepted center line construction methods. The upstream faces of the dams would be sealed with soil and an impervious membrane to inhibit water flow through the dam. A drainage system would be installed within the dam and any seepage collected routed with the decant water from the clarification pond to the existing ion-exchange plant. The outside faces of the dams would be revegetated with seed mixtures and species acceptable to the BLM and State Engineer following each development stage (50-foot development increments) to lessen visual contrasts.

The construction and operation of impoundments are controlled by regulations established by the State Engineer. Sound engineering practices will be applied to the design of each facility. The State Engineer's office will be involved with the proposed impoundment from conception to final closing of the site. After a design is accepted and construction begins, monthly construction reports will be submitted to the State Engineer covering all activities on the site. Engineers representing the State Engineer may inspect and review the site at any time during construction and may require that any tests deemed necessary be performed. A completion report will be submitted by Molycorp, and a final inspection of the site will be performed by the State Engineer to verify completion of each construction stage and to review the overall plans prior to approval of additional construction.

Initial engineering design and representative tailings management practices were incorporated into the impact analysis in Chapter 3 of this Draft EIS. Molycorp has committed to following these practices as provided by Geocon (1988) and they have been included with Molycorp's Plan of Operations. A summary of practices is provided below:

- Molycorp will minimize sustained contact of open water from the clarification pond with the natural ground by locating the clarification pond and decant facility in the central portion

of the impoundment basin and by discharging tailings alternately from a number of strategically located points along the flanks of the valley between the main dams.

- Molycorp will limit the depth of any borrow pits developed within the impoundment basin to avoid exposing the more pervious fractured bedrock underneath the overburden.

- Molycorp will develop rock quarries from the impoundment basin in a manner that promotes free runoff of water towards the active tailings impoundment area, so that subsequent discharge of tailings slurry directly over such a quarry will enable deposition of tailings solids over the exposed rock surface without long-term ponding of clear water.

- Molycorp will minimize the area of the clarification pond. Subject to water depth and other operational details, it is believed that a 50-acre pond (or possibly less) would be sufficient for the planned operation.

A pumping station would be constructed at the east base of Guadalupe Mountain near the terminus of the existing tailings slurry line and a 3.5-mile pipeline extension would be constructed to transport the tailings slurry to the new impoundment.

An access road would be constructed approximately 60 feet wide and 1.5 miles long leading from the existing facility to the eastern edge of the saddle. In addition, a 20-foot wide patrol road would be required around the perimeter of the tailings pond and the dams. An electrical power distribution line would follow the proposed access road. Molycorp would tap the existing 69-kV transmission line on the western edge of the existing tailings facility and transmit 13.8-kV to the site via 40-foot "T" configuration wood distribution poles.

Any property developed as part of a mine operation, such as the Guadalupe tailings disposal area, is governed by safety regulations administered by the Mine Safety and Health Administration (MSHA). These regulations require safety equipment, special and general safety practices, as well as fire prevention and control. Any slash piles resulting from clearing activities would be burned in compliance with permits. Fire control equipment would be immediately available during burning activities. In addition, each vehicle operated by the mine is provided with a fire extinguisher as required by MSHA regulations. MSHA also requires fire-fighting equipment on the mine property to be strategically located, readily accessible, plainly marked, properly

maintained, and periodically inspected. Molycorp will comply with all applicable federal and state fire laws and regulations, and will take reasonable measures to prevent and suppress fires on the site.

All survey monuments would be protected as much as possible from unnecessary destruction. Any section corner that is destroyed by construction activity would be immediately reported to the BLM. To ensure that all section corners can be restored, witness corners would be located by a registered land surveyor outside of the project site.

Any archaeological and/or paleontological resources found on the project site would be recorded and recovered in cooperation with the BLM. Molycorp would continue to use all practicable methods to reduce the noise of equipment and protect employees from excessive noise levels.

Depending upon demand for molybdenum, construction would begin after approval of the Plan of Operations and would continue in stages throughout the life of the project. Construction would require a workforce of about 30, all employees of Molycorp or a contractor. Equipment would include standard earth-moving equipment such as a grader, bulldozer, haul truck, crusher, scraper, drill, and shovel.

1.3.2 Operation

Ore from the underground mine would be similar to that encountered in the open pit, therefore the milling process, including reagents, would not change. Reagents used in the mill include diesel, pine oil, methyl-isobutyl carbinol, Nokes reagent (a sulfide chemical compound), and Orfom, which replaced cyanide in the processing in 1983. Most of these reagents are molybdenum collectors, and the bulk of the reagents adhere to the molybdenum disulfide concentrate. Therefore, only trace amounts remain in the tailings.

During operation, the tailings would be transported as a slurry via Molycorp's existing tailings pipeline to the area of the existing impoundments, then through the pump station and up the slope to the Guadalupe Mountain impoundment. The slurry would consist of 60 percent by weight water and 40 percent solids. A chemical analysis of the tailings composition is presented in Table 1-2.

TABLE 1-2

TYPICAL ANALYSIS OF TAILINGS

	Dry Sample (in parts per million)
Aluminum (Al)	>10,000
Arsenic (As)	2.7
Barium (Ba)	740
Boron (B)	1.3
Cadmium (Cd)	0.3
Calcium (Ca)	>10,000
Chromium (Cr)	87
Cobalt (Co)	8.9
Copper (Cu)	94
Iron (Fe)	>10,000
Lead (Pb)	180
Magnesium (Mg)	10,000
Manganese (Mn)	490
Molybdenum (Mo)	130
Nickel (Ni)	5.6
Potassium (K)	>10,000
Selenium (Se)	4.7
Silver (Ag)	5.5
Sodium (Na)	10,000
Uranium (U)	2.3
Vanadium (V)	50
Zinc (Zn)	98
Chlorine (Cl)	24
Cyanide[1]	>0.4
Fluorine (F)	4,500
Silicon (Si)	>10,000
Sulfate (SO_4)	>1,000
Total Organic Carbon (TOC)	600

Source: Molycorp, Inc.

[1]Use of cyanide as a milling reagent was discontinued in 1983.

Tailings would be discharged around the perimeter of the pond in a manner to provide an even distribution of the tailings and to provide a central location for impounded water (clarification pond). The topography of the proposed tailings pond, as compared to the existing ponds, would allow for multiple, simultaneous discharge points which will increase the amount of beach area that can be kept wet, and consequently reduce the potential for fugitive dust emissions. At full development, the surface area of the tailings impoundment would be approximately 568 acres. Of this area, less than 200 acres would be dried tailings at any point in time. Dry areas of the tailings impoundment would be periodically sprayed with a chemically inert stabilizer (surfactant) to form a crust and reduce fugitive dust emissions. After the tailings solids settle out, the surface water and collected seepage from the dams would be transported via open, lined channel or pipeline to the existing ion-exchange plant where residual molybdenum would be removed prior to discharge to Pope Lake and the Red River. All discharges would be in accordance with Molycorp's National Pollution Discharge Elimination System (NPDES) Permit. Typical water quality of the current discharge into the Red River and current permit limits are shown in Table 1-3.

Natural drainage would be controlled by perimeter diversion ditches leading to existing arroyos. During operation of the tailings dams, monthly alignment and water level surveys will be performed and submitted to the State Engineer. The alignment survey will compare movement of permanent markers placed at various points on the dam face and throughout the impoundment. This survey will ensure that the movement does not exceed limits established by the stability analysis, which is part of the accepted design. The water level survey will provide information on the flow of water within the structure and will also ensure that the water level does not exceed the limits established by stability analysis.

A quarterly inspection report will also be developed and submitted to the State Engineer by a designated registered Professional Engineer. A review of the operational and construction activities will be included in the quarterly inspection report.

TABLE 1-3

TYPICAL WATER QUALITY DISCHARGED

FROM TAILINGS IMPOUNDMENT

Water Quality Parameter	Pope Lake Discharge		Seepage		NPDES Permit (Daily Maximum)	
pH	7.8		7.5		6.0 to 9.0	
Chemical Oxygen Demand	20	mg/l	6	mg/l	90	mg/l
Total Suspended Solids	10	mg/l	3	mg/l	30	mg/l
Cyanide[1]	>0.001	mg/l	>0.003	mg/l	0.05	mg/l
Fluoride	2.56	mg/l	2.10	mg/l	3.0	mg/l
Cadmium	0.01	mg/l	0.01	mg/l	0.15	mg/l
Iron	0.32	mg/l	0.21	mg/l	0.6	mg/l
Manganese	0.44	mg/l	1.1	mg/l	1.5	mg/l
Zinc	0.03	mg/l	0.03	mg/l	0.2	mg/l
Molybdenum	5.4	kg/day	5	kg/day	23	kg/day

Source: Molycorp, Inc.

[1]Use of cyanide as a milling agent was discontinued in 1983.

1.3.3 Closure

A closure plan must be approved by the State Engineer at the final stage of construction. The plan would describe specific measures to be taken to ensure long- term stability and to reclaim the site for future use. A final inspection would be performed by the State Engineer upon completion of work specified by the closure plan.

The Molycorp Tailings Disposal Facility is expected to operate for approximately 40 years, based on full-scale mining. At the end of the operating period, all surface facilities would be removed and disturbed areas would be reclaimed. Topsoil would be spread over the surface of the dried tailings to a minimum depth of 1 foot, and the area would be seeded with a mixture recommended by the BLM (see Vegetation under Section 3.15). Soils for capping the tailings would be taken from throughout suitable locations on Molycorp's property. Tree and shrub species would be planted within several years, or following establishment of the grasses.

1.4 Alternatives Considered but Eliminated from Detailed Analysis

In most EISs, the lead agency is required to consider and assess alternatives to a proposed action, i.e., No Action, alternate locations, and alternate methods of accomplishing the objectives of the proposed action. However, in the case of an action authorized under the mining laws, the BLM can only assess the impacts resulting from the proposed action, as described in the Plan of Operations, and must determine if the project meets BLM requirements for no unnecessary or undue degradation. There is no provision for a discussion of alternatives (43 CFR 3809 regulations). Consequently, this EIS will not address alternatives.

Prior to selecting the Guadalupe site, Molycorp undertook studies in 1974 to determine the most suitable location for additional tailings storage, with 15 potential sites investigated. An engineering feasibility study conducted in 1980 investigated eight sites in detail. As a result of these studies, the existing tailings ponds were expanded and the Guadalupe site was chosen for future development. The alternative sites considered are described, and their engineering and

environmental considerations discussed, in Molycorp's Plan of Operations. The other sites were eliminated from further study because they were determined to be unsuitable due to storage capacity, engineering feasibility, economic, or environmental limitations.

1.5 Regulatory Requirements

In accordance with BLM regulations for use of public land for mining purposes under the General Mining Laws (43 CFR 3809) and the implementing regulations (40 CFR 1505) for the National Environmental Policy Act (NEPA), BLM has prepared the EIS to determine if the proposed project would result in any unnecessary or undue degradation. If, after environmental analyses have been completed, it is determined that the proposal would not result in any unnecessary or undue degradation, then Molycorp's Plan of Operations must be approved [43 CFR 3809.1-6(a)(1)]. If it is determined that unnecessary or undue degradation would occur, then BLM must require conditions or mitigation measures as are necessary to ensure adequate environmental protection.

Following is a summary of major federal regulatory laws applicable to the Proposed Project.

- The General Mining Law of 1872, as amended, is the basic mining law governing the appropriation of federal mineral lands. It grants the right of an individual or company to use public land for mining and associated activities (e.g., milling or waste disposal). This is a statutory right granted by the U.S. Congress, and the BLM does not have the discretionary authority to deny these actions except where such actions would jeopardize a rare or endangered plant and/or animal species or would involve unnecessary or undue degradation of the environment. In these cases, denial of an action is also non-discretionary.

- The Mining and Mineral Policy Act of 1970 establishes the national policy of encouraging mineral development, especially strategic minerals, without undue hindrance.

- The Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701, et. seq.) amended the General Mining Law of 1872 to establish environmental protection requirements for any mining or mining-related activities on public land. Sections 302, 303, and 603 require the Secretary of the Interior to take any action, by regulation or otherwise, to prevent unnecessary or undue degradation of the federal lands, provide enforcement of those regulations, and to assure against pollution of streams and waters.

- The Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1280) established portions of the Rio Grande and Red River as instant rivers in Section 3 of the Act. The Wild and Scenic Rivers Act prohibits any federal agency or department from authorizing any water resources project (including the Proposed Project) that would have a direct and adverse effect on the values for which such river was established [Section 7(a)] and provides that regulations issued shall, among other things, provide safeguards against pollution of the rivers involved and unnecessary impairment of the scenery within the area designated for potential additions to, or an actual component of the national wild and scenic rivers system (Section 9). The values of the Rio Grande and Red River, for which they were established as wild and scenic rivers, include superior opportunities for outdoor recreational activity - sightseeing, camping, hiking, horseback riding, and nature study. Both rivers are also nationally renowned for their rainbow and brown trout fisheries.

- The Fish and Wildlife Coordination Act of 1934 (16 U.S.C. 661-666c) affects processes for federal approvals of water diversions and impoundments. The general purpose of the Coordination Act is to ensure that the authorizing agency give due consideration to fish and wildlife values and concerns prior to making an approval decision.

Currently, all wastes from the extraction, beneficiation, and processing of ores and minerals are conditionally excluded by the federal Resource Conservation and Recovery Act (RCRA), Section 3001 (b)(3)(A)(ii) from regulation as a hazardous waste under Subtitle C of RCRA. Thus, these mining wastes fall within the jurisdiction of Subtitle D of RCRA, which covers all solid wastes that are not regulated as hazardous wastes under Subtitle C.

In addition to approval of the Plan of Operations by BLM, other separate federal and state permits would also be required. Table 1-4 presents a summary of major federal and state permits and authorizations required for implementation of the Proposed Project.

Approval of Molycorp's Plan of Operations, including any required mitigation measures, would allow Molycorp to use federal lands associated with their mill site claims for construction and operation of the tailings disposal facility as discussed in this EIS. Under the General Mining Law, Molycorp would be allowed to file for patent of these lands at a future date. Patents, if they are applied for, would

TABLE 1-4

MAJOR PERMITS AND AUTHORIZING ACTIONS REQUIRED

FOR THE MOLYCORP TAILINGS DISPOSAL FACILITY

Agency	Required Permit or Authorization
Federal	
Bureau of Land Management (Coordinated with New Mexico - State Historic Preservation Office)	Approval of Plan of Operation Cultural Resources Mitigation Plan Section 106 Review
Fish and Wildlife Service	Compliance with Endangered Species Act Compliance with Eagle Protection Act Compliance with Fish and Wildlife Coordination Act [1]
Environmental Protection Agency	National Pollution Discharge Elimination System (NPDES) Permit
Department of Labor	Permit to Transport and Store Explosives
State	
State Historic Preservation Office (Coordinated with BLM)	Section 106 Review Cultural Resources Mitigation Plan
Environmental Improvement Division	Approval of Groundwater Discharge Plan
State Engineer	Permit Program for Construction, Operation, Maintenance, and Inspection of Dams

[1] The U.S. Fish and Wildlife Service has been sent a memo requesting a report as required under Section 2(b) of the Fish and Wildlife Coordination Act if they feel this project warrants a report. Recommendations from this report and other recommendations from U.S. Fish and Wildlife Service will be considered in developing mitigation in the Final EIS.

be prepared in the BLM state office. A patent would convey all title to the land from the BLM to Molycorp in fee simple. Application for patent is an entirely separate process from this EIS.

The possibility of filing an application for patent is at Molycorp's discretion since the law provides that an owner of a patented lode may file for an associated millsite that is to be used in connection with the lode. If the millsite claims were patented, the BLM would have no enforcement authority over the Plan of Operations; however, other regulatory agencies would control certain permits and monitoring related to the project as described in the previous paragraphs.

1.6 Issues and Concerns

Several issues or concerns related to the proposed project were identified as a result of the 1985 EA and during the scoping meetings that were held in July 1986 prior to preparation of the EIS. Additional discussion about the scoping meetings is presented in Section 4.0, Consultation and Coordination and Appendix A, Scoping Documentation. The primary issues that were identified as appropriate to be addressed in the Draft EIS included:

- potential effects to surface and groundwater quality (e.g., effects on well users, the Rio Grande, and the Arsenic Springs System; seepage considerations),
- air quality issues associated with windblown dust,
- potential health hazards associated with windblown dust,
- visual impacts of the dams,
- effects on local recreation/tourism,
- effects on the local employment/economy,
- noise effects, and
- loss of archaeological values.

The scoping process, as defined under the implementing regulations for NEPA (40 CFR Part 1501.7), is used not only to identify significant

environmental issues deserving of study, but also to deemphasize insignificant issues, thus narrowing the scope of the EIS process accordingly.

In December 1986, the BLM distributed a public information document to approximately 225 interested persons. The public information document included a detailed summary of scoping results, BLM responses to selected comments received during scoping, and the BLM Field Solicitor's opinion on concerns regarding future patenting of the Guadalupe site. These items are attached as Appendix A to the Draft EIS.

New issues that were identified during scoping resulted in the decision to include a discussion of health risks associated with inhalable silica and dust in the Draft EIS. It was also decided that additional data were required to assess impacts related with air quality, groundwater, and socioeconomic concerns. This additional data collection resulted in a delay in the original EIS schedule.

2.0 AFFECTED ENVIRONMENT

2.1 Introduction

This chapter describes the existing physical, biological, and social environment that would be affected by the proposed Molycorp project. Information summarized here was obtained from published sources including the EA (U.S.D.I. BLM 1985); consultants' reports for studies performed in connection with the existing and planned tailings facility; unpublished materials from site interviews with local, state, and federal agencies; and from site specific surveys of the proposed project location. The extent of the study area varies with different resources. For some resources such as vegetation and soils, the affected area was confined to the immediate area of the proposed tailings facility. For other resources, such as air and socioeconomics, a regional study area was delineated; these resources treat the affected environment in a regional context. The information in this chapter provides the basis for the assessment of impacts made in Chapter 3.

2.2 Air Quality and Meteorology

2.2.1 Climate

Questa is located against the western slope of the Sangre de Cristo range near the confluence of the Red River and Rio Grande. The climatology of the area is representative of a semi-arid location characterized by large annual variations in temperature and limited precipitation. No long-term temperature data are available from the site or immediate area, but meteorological data from an onsite monitoring program for the period November 1986 through July 1987 revealed a 9-month average temperature of 39.5°F. July was the warmest month with an average temperature of 65.2°F, whereas January was the coolest at 22.6°F. Table 2-1 presents a summary of temperatures for the 9-month period.

No precipitation data are available for Questa, but long-term data are available for Cerro, New Mexico, located 5 miles north of Questa. Table 2-2 summarizes these data. The region receives the majority of its precipitation in the spring and summer.

TABLE 2-1

MONTHLY TEMPERATURE SUMMARIES FOR THE GUADALUPE MOUNTAIN MONITORING SITE (°F)

	November 1986	December 1986	January 1987	February 1987	March 1987	April 1987	May 1987	June 1987	July 1987	9-Month Average
Average	32.4	24.5	22.6	27.7	31.0	41.7	49.5	61.3	65.2	39.5
Maximum	50.4	47.2	48.8	48.6	57.7	67.7	66.0	80.5	83.2	61.1
Minimum	7.4	-1.8	-4.7	4.5	-0.1	17.3	33.3	42.7	43.4	15.8

Source: ERT

TABLE 2-2

ANNUAL AVERAGE PRECIPITATION SUMMARY FOR CERRO, NEW MEXICO

(1931 - 1960)

Month	Precipitation (Inches)
January	0.64
February	0.60
March	0.58
April	0.97
May	1.34
June	0.87
July	1.70
August	1.92
September	1.43
October	1.19
November	0.61
December	0.61
Annual	12.46

Source: National Oceanic and Atmospheric Administration; Climates of the States, Volume 2.

Wind data from the Molycorp onsite meteorological monitoring study are summarized in Figure 2-1. These data show the observed frequency of winds by direction for the study area and indicate a strong predominance of northwesterly and southerly winds.

2.2.2 Air Quality

Present air quality at Questa can be defined using particulate data collected at the New Mexico Environmental Improvement Division (NMEID) monitoring site at Questa High School. Table 2-3 summarizes data collected from this site for the years 1979 through 1987. The Questa High School site is located along the northeast edge of the existing Molycorp tailings disposal area and is significantly impacted by windblown dust from the tailings during strong southwesterly winds. Observed annual means over the period ranged from 49 micrograms/cubic meter ($\mu g/m^3$) in 1981 to 18 $\mu g/m^3$ in 1986. The annual mean of 85 $\mu g/m^3$ in 1979 was based on only 9 samples and is therefore judged to be non-representative. Over this 9-year period, the New Mexico 24-hour standard of 150 $\mu g/m^3$ has been surpassed 10 times distributed over each year as follows: 1979 - 1, 1981 - 4, 1982 - 3, 1983 - 1, and 1984 - 1. During this same period the federal 24-hour standard of 260 $\mu g/m^3$ was surpassed 3 times, once each in 1981, 1982, and 1984. No exceedences of any standard have been observed in the last three years due to soils capping and improved pond management (e.g., application of surfactant). The New Mexico state and federal annual particulate standards have not been surpassed.

The area surrounding Questa has been designated as a Class II Prevention of Significant Deterioration (PSD) area. Class I areas are pristine areas such as national parks and national wilderness areas and are afforded stringent air quality protection. Class II PSD areas are allowed moderate deterioration of present conditions if they are in attainment status. Unless otherwise designated, all areas are Class II. The closest Class I area is the Wheeler Peak Wilderness located some 10 miles to the southeast.

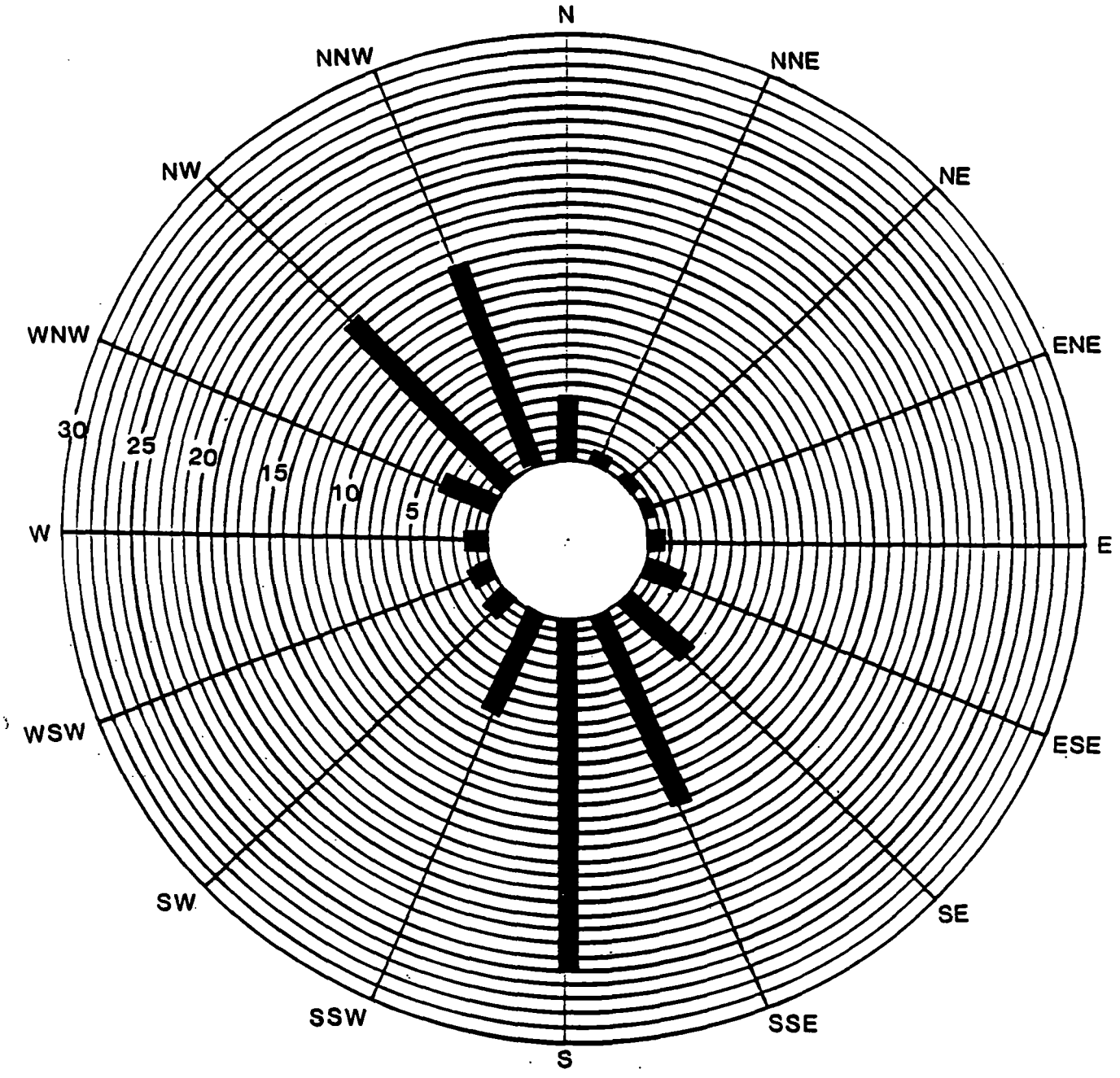


Figure 2-1 Windrose for Molycorp Guadalupe Mountain Monitoring Site
November 1986 Through July 1987

TABLE 2-3

TSP CONCENTRATION SUMMARIES FOR NMEID
(QUESTA HIGH SCHOOL) MONITORING SITE

Year	Number of Samples	Mean	Highest Concentration ($\mu g/m^3$)	Date	2nd Highest Concentration ($\mu g/m^3$)	Date
1979	9	85	216	6/18	145	7/3
1980	18	45	82	12/16	75	9/29
1981	54	49	399	2/21	180	1/22
1982	52	34	301	6/4	161	6/11
1983	48	38	186	11/2	136	5/31
1984	67	44	280	4/24	138	11/8
1985	37	36	119	8/23	83	1/22
1986	38	18	97	4/14	46	3/7
1987	49	22	80	4/27	75	5/21

Source: New Mexico Environmental Improvement Division

2.3 Topography/Geology

The proposed tailings disposal facility would be located in mountainous terrain in a broad, saddle-shaped valley situated between the two peaks of Guadalupe Mountain (Figure 1-1). These peaks rise to elevations of 8,763 feet and 8,722 feet for the northeast and southwest peaks, respectively. The long axis of the valley trends in a northwest-southeast direction and is flanked on the northeast and southwest by moderately steep (up to 30 percent gradient), well-dissected mountain slopes. The floor of the valley slopes gently (less than 5 percent) from about its center towards either end before it narrows abruptly to steep-sided arroyos that drain northwest to the Rio Grande plateau and southeast to the alluvial plain of the Sunshine Valley containing the existing Molycorp tailings facility. Local relief on the proposed facilities site is about 800 feet, with elevations varying from a low of 7,600 feet at the base of the planned decant collection dam to a high of about 8,400 feet along the valley sides on the quarry at maximum facilities development.

The study site lies within the confluence of the Rio Grande and Red River. Regionally, it is part of the Taos Plateau Volcanic Field (TPVF) and the Rio Grande rift zone. The TPVF is a high plateau region of gently eastward dipping flood basalts that are interbedded with and overlain by alluvial sediments (Dames & Moore 1986). The Rio Grande rift zone is a northeast-southwest trending depression from Socorro, New Mexico to the northern end of the San Luis Basin in southern Colorado. The rift zone consists of a series of structurally and topographically distant basins arranged in a "right-stepping echelon pattern" (Baltz 1978) from south to north. The study area is located in the southeast portion of the San Luis Basin, the most northern of the basins that make up the rift. The San Luis Basin is bounded on the east by the Sangre de Cristo Mountains. A series of north trending down-to-the-basin normal faults forms the boundary between the mountain range and the San Luis Basin. These faults are about 7 miles east of the study area.

The TPVF consists of several isolated volcanic features including the Guadalupe Mountain cone upon which the tailings facility is proposed to be located. Formation of Guadalupe Mountain during the late Miocene (3 to 15 million years ago) occurred by eruption of generally andesitic

to rhyodacitic structures. The andesite is highly fractured in all directions, however its permeability is unknown. Dacites erupted from a series of discrete vents, similar to the andesitic flows. The dacite flows occurred primarily during the late Tertiary (3 to 5 million years ago) and are described as fine-grained, irregularly jointed rock with poor crystalline structure. Permeability estimates for the dacites range from 10^{-6} to 10^{-4} centimeters/second; however, the anisotropic fracture permeability varies widely. Thickness ranges from 600 to 100 feet in the proposed tailings site (U.S.D.I. BLM 1985). The formation of the Rio Grande rift zone transpired concurrently with eruption of Guadalupe Mountain. While the rift zone and Guadalupe Mountain were believed to have been created by tectonic processes, seismic events at the present time are not considered to be of concern to the proposed tailings facility. Earthquake records have been of low incidence thereby placing the study area in a Seismic Risk Zone 1, minor damage expected (U.S.D.I. BLM 1985).

Flood basalts (the Servilleta basalt) began erupting during the onset of north-trending late Miocene faulting and continued until the late Quaternary (0.5 to 0.7 million years ago). The flood basalts interfinger complexly with the andesite and dacite flows while the younger flows overlap onto the mountain. These flood basalts are also inter-tongued with sedimentary rocks of the Santa Fe Formation derived from erosional material (sand, silt, weathered bedrock) from the Sangre de Cristo Mountains. Beneath the project site the basalt varies from 2 to 100 feet in thickness and is found at depths close to 1,000 feet (Dames & Moore 1986). Permeability estimates for the basalts range from 10^{-4} centimeters/second (under the proposed tailings pond) and 10^{-2} centimeters/second (between the west flank of Guadalupe Mountain and the Rio Grande Gorge) (U.S.D.I. BLM 1985). The basalt layers are characterized by a coarse-grained texture and extensive vertical and horizontal jointing. Total thickness of the volcanics and overlying sediments is greater than 5,000 feet. Alluvial sediment thickness is from 0 to 50 feet.

A major fault zone, which strikes northwest-southeast, exists approximately 2 miles southwest of Guadalupe Mountain. Vertical displacement of the fault in the basalts and alluvial sediments

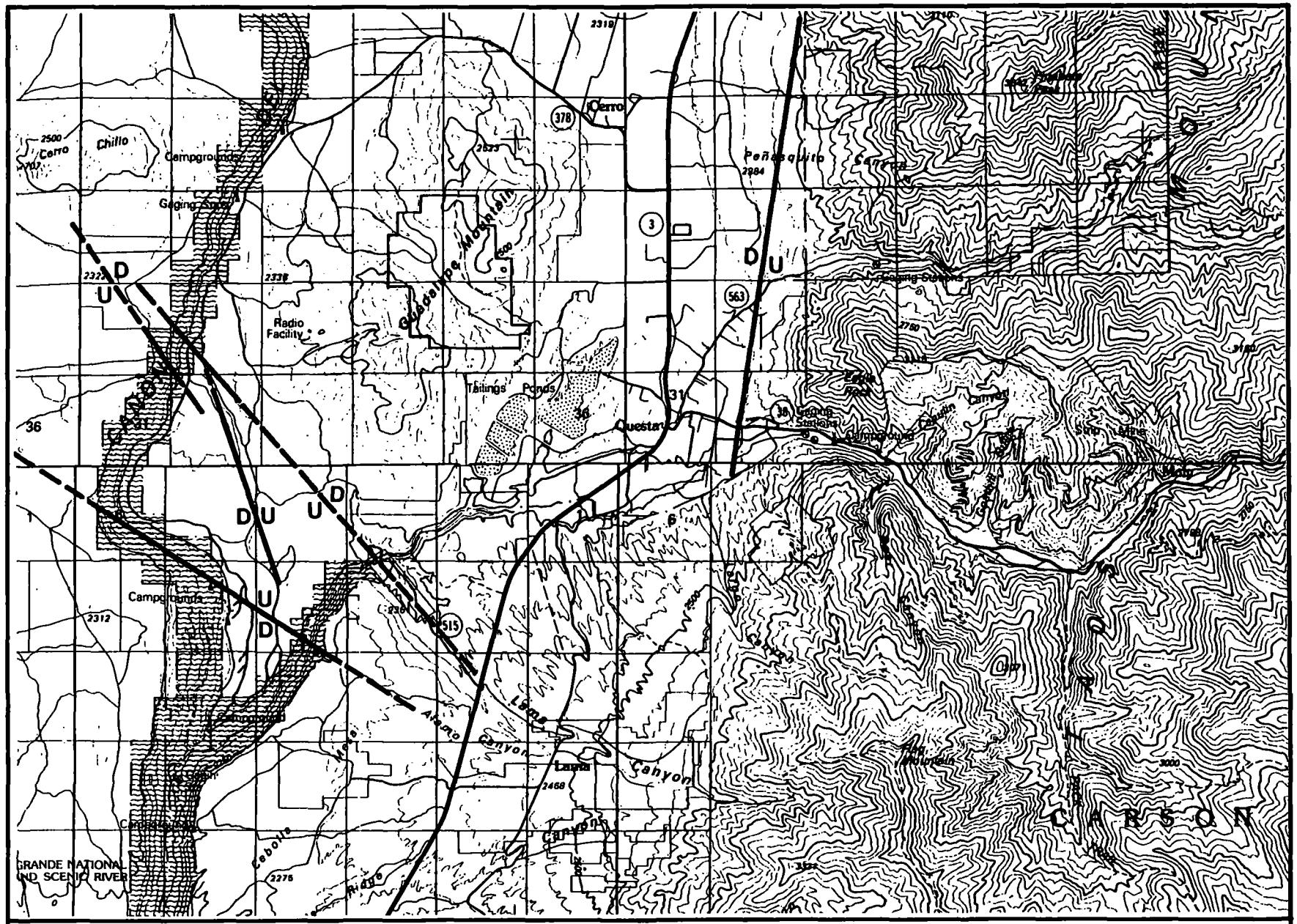
typically ranges from 30 to 100 feet. The post-faulting position of these two lithologies may deflect groundwater flow paths because of differing permeabilities (Menges 1984). One fault trace is mapped from about 1.75 miles south of Cerro gage to the vicinity of Red River fish hatchery. A major fault oriented north to south, exists approximately 2.5 miles east of Guadalupe Mountain, east of Questa. Evidence of several other faults exists in the confluence area of the Rio Grande and the Red River (Figure 2-2)(Dames & Moore 1986).

2.4 Water Resources

2.4.1 Surface Water

The two major river systems, the Rio Grande and the Red River, receive runoff in the project area from the perennial streams of the Sangre de Cristo Mountains. Some surface water recharge to these rivers is supplied by Guadalupe Mountain runoff; however, with limited precipitation (see Table 2-2) and a relatively small catchment basin, contribution from Guadalupe Mountain is minimal. Surface water runoff from Guadalupe Mountain occurs primarily during high intensity summer storms. Recharge is also provided from groundwater inflow from southern Colorado and from channeled deep groundwater systems within the area's volcanic rocks. Several springs along the Rio Grande and Red River provide groundwater recharge to these rivers. According to water quality data, flow measurement and radio-isotope dating, these spring waters probably come from groundwater sampled under Guadalupe Mountain. Water quality analyses of the spring water and the Rio Grande and Red River water were compared in a previous study (Water Resources Associates 1984) to determine whether a hydraulic connection was present. The analyses presented a strong correlation which indicates that the springs in the Red River that supply the fish hatchery and the accretions to the Red River below the fish hatchery have characteristics that are identical to those of the water in the Rio Grande near Cerro.

Rio Grande and Red River water is used for cold water fisheries, fish culture, livestock and wildlife watering, and for recreation. Table 2-4 presents a comparison of data from the Rio Grande and Red River to the New Mexico Water Quality Control Commission Standards.



LEGEND

FAULT

INFERRED FAULT

U UPTHROWN SIDE

D DOWNTHROWN SIDE

0 1 2 Miles

N

Source: Dames and Moore, 1986.

FIGURE 2-2 FAULT LOCATIONS WITHIN THE STUDY AREA VICINITY

TABLE 2-4

WATER QUALITY OF RIO GRANDE AND RED RIVER[1]

Parameter	Rio Grande Near Cerro	Red River[2] Below Questa	Red River Above[3] Fish Hatchery
Temperature (degrees Celsius)	11.1(51)	8.9(64)	9.5(54)
pH, field (median value)	8.2(49)	7.6(59)	7.9(51)
Sediment suspended (mg/l)	40.4(31)	201(45)	134(33)
Specific Conductance (μmhos)	233(51)	258(61)	403(53)
Hardness (mg/l as $CaCO_3$)	75(28)	117(32)	216(29)
Cadmium total (μg/l)	0.15(37)	0.64(43)	0.39(39)
Copper total (μg/l)	4.9(23)	25.2(29)	23.4(24)
Cyanide total (μg/l)	0.00(15)	0.04(18)	0.01(18)
Iron dissolved (μg/l)	66.2(45)	27.7(42)	17.7(32)
Sulfate dissolved (μg/l)	36.2(24)	78.2(27)	196(24)
Manganese dissolved (μg/l)	14.9(43)	361.3(49)	252.3(48)
Molybdenum total (μg/l)	5.1(33)	12.7(56)	156.4(53)
Nitrogen total (mg/l)	0.97(28)	0.59(32)	0.69(28)
Phosphorus total (mg/l)	0.12(28)	0.11(35)	0.06(28)
Zinc total (μg/l)	31.7(44)	121.0(58)	73.9(53)
Total Organic Carbon (mg/l)	5.06(44)	3.51(51)	2.49(42)

[1] Average of values for selected parameters, collected by the BLM, analyzed by the U.S. Geological Survey (Denver) from October 1978 to December 1986. Number of samples is in parentheses.

[2] Station located 1 mile above existing tailings discharge point.

[3] Station located 0.5 mile below existing tailings discharge point.

2.4.2 Groundwater

Groundwater is found in valley fill sediments derived from the Sangre de Cristo Mountains, in volcanic rocks found interbedded within and underlying the valley fill sediments, and in the Santa Fe Formation. Recharge to the groundwater systems in the Guadalupe Mountain vicinity results primarily from mountain runoff occurring in the Sangre de Cristo Mountains and to a lesser extent from precipitation occurring in the Guadalupe Mountain complex. This runoff infiltrates into the valley fill sediments and moves downward where it enters the interfingered and underlying volcanic rocks that join the sediments from the west. A description of geologic units is found in Section 2.3 of the Draft EIS. Groundwater flows west-southwest through both the sediments and the volcanics, eventually discharging to the Rio Grande and Red Rivers, which are regional line sinks draining the general Guadalupe Mountain area (Winograd 1959; Summers and Hargis 1984; Winograd 1985).

In the general vicinity of Guadalupe Mountain, groundwater flows south-southwest through dacite and olivine andesite flows of the Guadalupe Mountain complex and the sedimentary Santa Fe Formation (Dames & Moore 1988). The Red River Fault Zone bisects the area along the southwestern toe of the Guadalupe Mountain complex. West of the fault zone, the Santa Fe Formation has been uplifted, and the water table is below the volcanics and in the Santa Fe Formation (see Dames & Moore 1987). An exception to this condition can be found in the Big Arsenic Springs area where a lobate dacite flow followed and filled a paleo valley (possibly an ancestral Red River Valley) at a depth that is now a few hundred feet below the top of the Santa Fe sediments. East of the Red River Fault zone, the rock units are down-dropped several hundred feet relative to that west of the zone. As a result, the volcanics comprise an aquifer of high conductivity in this area.

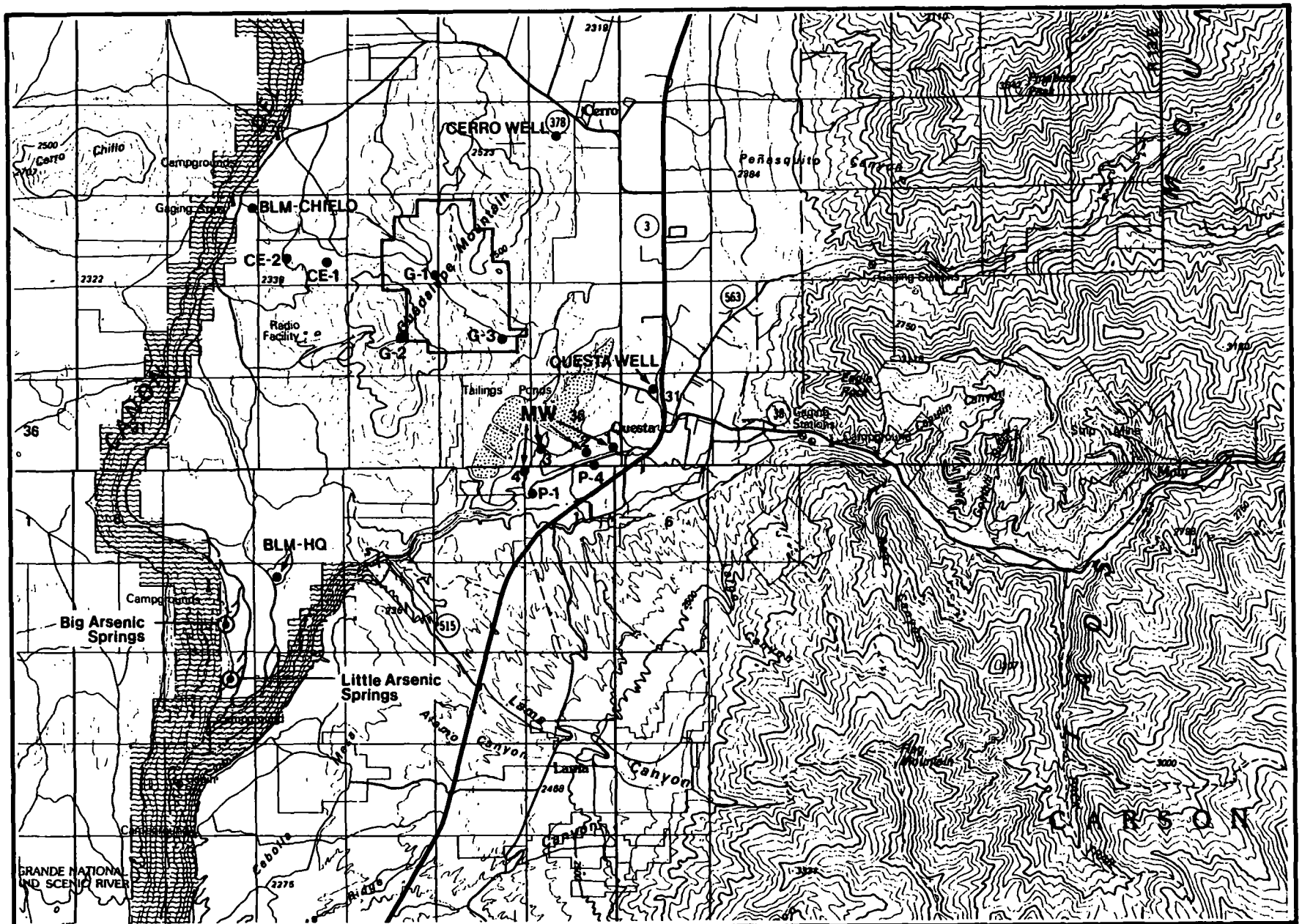
The Santa Fe Formation underlying the volcanics has a lower hydraulic conductivity than the overlying volcanics and acts as an aquitard restricting groundwater flow from volcanic aquifers east of the fault zone to the Rio Grande and to the lower 2 miles of Red River (Dames & Moore 1988). An exception is the dacite-filled paleo valley

within the Santa Fe Formation that crops out at the Big Arsenic Springs along the Rio Grande River Gorge. The dacite has a relatively high permeability and appears to be an avenue of higher flow through the Santa Fe Formation.

The Servilleta basalts extend from near ground surface to a depth of a few hundred feet over much of the plateau area west of Guadalupe Mountain and along the Rio Grande and Red River gorges. The Servilleta Basalts are generally located above the water table west of the Red River Fault Zone and have little or no influence on the groundwater flow in this area (Dames & Moore 1988).

Fifteen monitor and water supply wells were used to collect data on groundwater characteristics in the Guadalupe Mountain area. Locations of these wells are shown in Figure 2-3. Depth to groundwater beneath the proposed tailings disposal facility was determined to be 785 feet. The groundwater gradient beneath Guadalupe Mountain is on the order of 200 feet per mile based on water level data from five monitor wells (Dames & Moore 1986). A calculated hydraulic conductivity value for the deep aquifer is 2,400 feet per day (Dames & Moore 1988). Analysis of existing USGS data by Dames & Moore (1987), indicated that a substantial amount of groundwater flows under the proposed tailings pond site. It was concluded that an average groundwater flux of at least 50 cubic feet per second (cfs) occurs across a 5-mile distance along a line from Cerro Chiflo to the head of the Red River Canyon.

Dames & Moore sampled 10 springs and wells in 1983 and 1985 to characterize the ambient groundwater quality. Table 2-5 represents an average ambient groundwater quality for the Rio Grande and Red River areas combined. All average groundwater parameter values were less than the maximum allowable concentration as provided in the New Mexico State groundwater standards (Dames & Moore 1987). However, when reviewed individually, certain groundwater quality samples exceeded the maximum allowable State standards on a number of occasions as shown in Table 2-6. Cadmium and lead levels exceeded maximum allowable concentrations at the BLM headquarters (HDQ) sampling locations and at the Fish Hatchery Spring No. 1. Iron and manganese levels were significantly exceeded at the Fish Hatchery Spring No. 1 for all months in 1985 (Dames & Moore 1987).



LEGEND

• MONITORING WELL

CE – Corps of Engineers
G – Guadalupe
MW – Monitoring Well

0 1 2
Miles

N

FIGURE 2-3 MONITORING WELL LOCATIONS

TABLE 2-5

MEAN WATER QUALITY OF AMBIENT GROUNDWATER COMPARED TO NEW MEXICO GROUNDWATER STANDARDS

Parameter	New Mexico Groundwater Standards	Ambient Groundwater Quality[1]
pH	9	8.04
COD	—	ND
TSS	—	31.00
TDS	1,000	198.22
CN	0.2	ND
F	1.6	0.99
Cd	0.01	0.002
Fe	1.0	0.60
Mn	0.2	0.18
Mo	1.0	0.06
Zn	10.0	0.19
Pb	0.05	0.02
Cu	1.0	0.018
As	0.1	ND
Hg	0.002	0.0001
SO_4	600	38.92
Ba	1.0	ND
Cr	0.05	0.01
Ni	0.2	0.03
Ca	—	22.21
Ag	0.05	ND
Cl	250	8.90
Al	5	ND
Mg	—	6.72

Source: Dames & Moore 1987.

ND = Below detection limit.

— = No standard.

[1] Rio Grande and Red River Springs and 2 wells (10 locations).

TABLE 2-6

MONTHLY MEANS OF AMBIENT GROUNDWATER QUALITY VALUES EXCEEDING OR EQUIVALENT TO NEW MEXICO STATE GROUNDWATER STANDARDS (IN PARTS PER MILLION)

Location	Date	Cadmium	Iron	Manganese	Lead
BLM Headquarters Well (BLM-HDQ)	05/85	0.01			0.05
Red River Fish Hatchery Spring No. 1	12/84		2.94	0.48	0.05
	01/85			0.34	
	02/85	0.01		0.45	0.06
	03/85	0.01		0.46	0.05
	04/85	0.01	1.99	0.54	0.07
	05/85		2.6	0.48	
	06/85		4.2	0.34	0.07
	07/85	0.01	2.9	0.25	
	08/85			0.24	
	09/85	0.01	2.4	0.7	
	10/85	0.01	4.03	0.66	
New Mexico State Drinking Water Quality Standards		0.01	1.0	0.2	0.05

Source: Dames & Moore 1987.

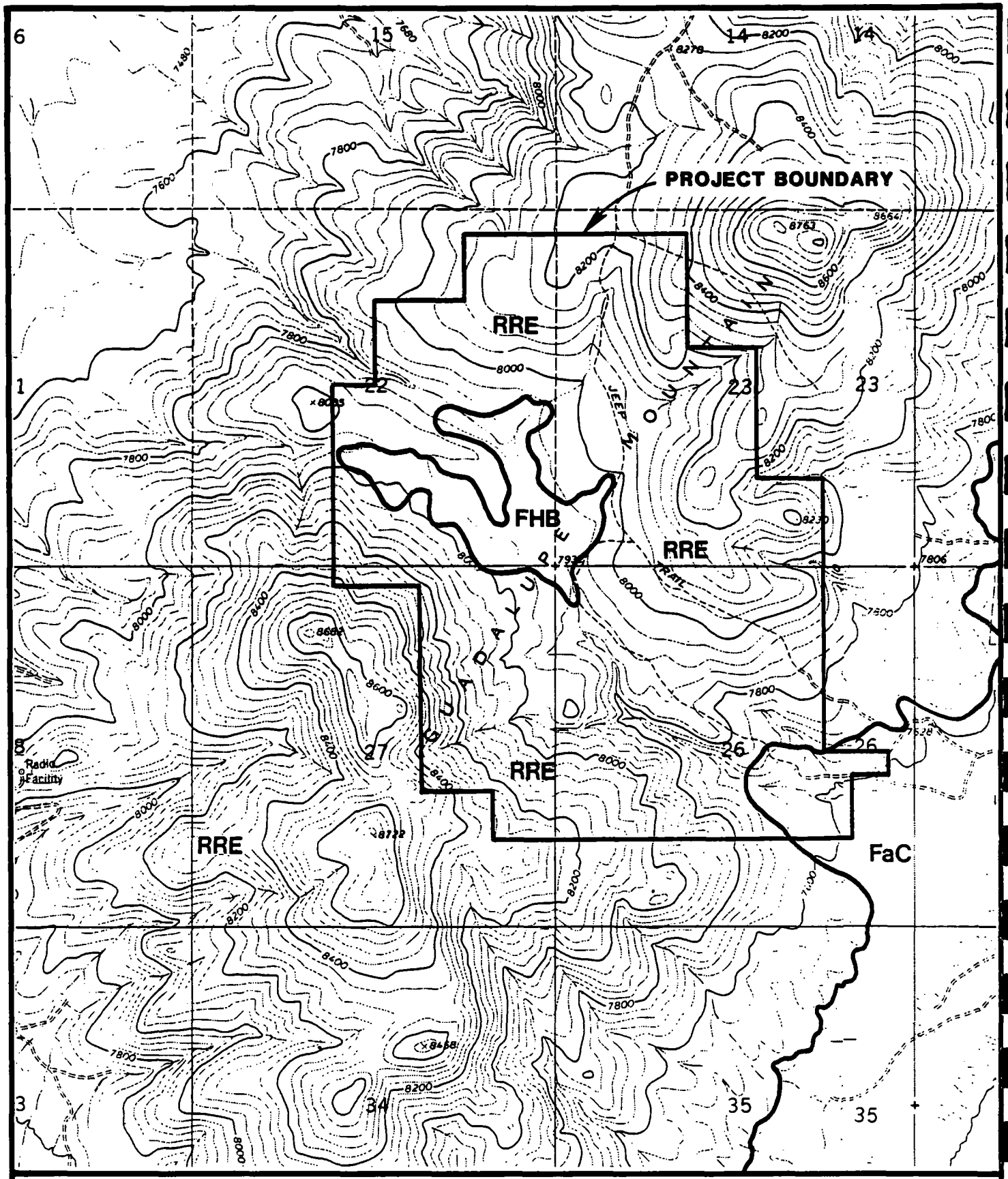
The deep aquifer in the Guadalupe Mountain area is a source of water supply for the BLM visitor center (3 miles southwest of the proposed site). The City of Questa is supplied by town groundwater wells which are north and east of Questa and are upgradient from the proposed tailings facility.

2.5 Soils

Soils on the Guadalupe site are of basaltic and mixed alluvial origin derived from the volcanic basalts of the mountain. There are two major soil units represented on the site: the Fernando-Hernandez association and the Rock Outcrop-Raton complex (see Figure 2-4). One other soil unit, the Fernando cobbly loam, occurs near the southeast border of the study area (U.S.D.A. SCS 1982). These soils are divided primarily by steepness of the slope, depth, and stage of development through the soil profile.

The Fernando-Hernandez association (FHB)occurs on the nearly level portion of the site along the center portion of the saddle valley and covers about 8 percent of the study area or about 14 percent of the proposed facilities area. The Fernando soil is deep and well-drained alluvium with textures ranging from clay loam at the surface to silt loam in the substratum. The available water capacity is high. Runoff is slow, and the erosion potential is moderate. The Hernandez soil is a deep and well-drained mixed alluvium with loam to clay loam textures. Water capacity and erosion potential is similar to that of the Fernando soil. Runoff is medium (U.S.D.A. SCS 1982). Both soils are notably calcareous. Inclusions of Tenorio, Silva, and Sedillo soils are present in this soil association.

A small area of the Fernando cobbly loam soil type (FaC) occurs in the southeast corner of the study area and accounts for about 47 acres (4 percent) of the 1,230-acre area. This is a deep, well-drained, nearly level to moderately sloping soil on alluvial fans at the base of mountains or cones (U.S.D.A. SCS 1982). It is formed in mixed alluvium. The surface layer is typically cobbly loam about 3 inches deep. The subsoil is a brown loam and clay loam to a depth of about 2 feet with a



LEGEND

FHB — FERNANDO-HERNANDEZ ASSOCIATION
RRE — ROCK OUTCROP - RATON COMPLEX
FaC — FERNANDO, COBBLY LOAM

1000 0 0.5
Feet Miles

N

FIGURE 2-4 SOILS IN THE VICINITY OF THE PROPOSED MOLYCORP TAILINGS POND

comparable substratum to 60 inches or more. The available water capacity is high with an effective rooting depth of 60 inches or more. Erosion potential is slight to moderate (U.S.D.A. SCS 1982).

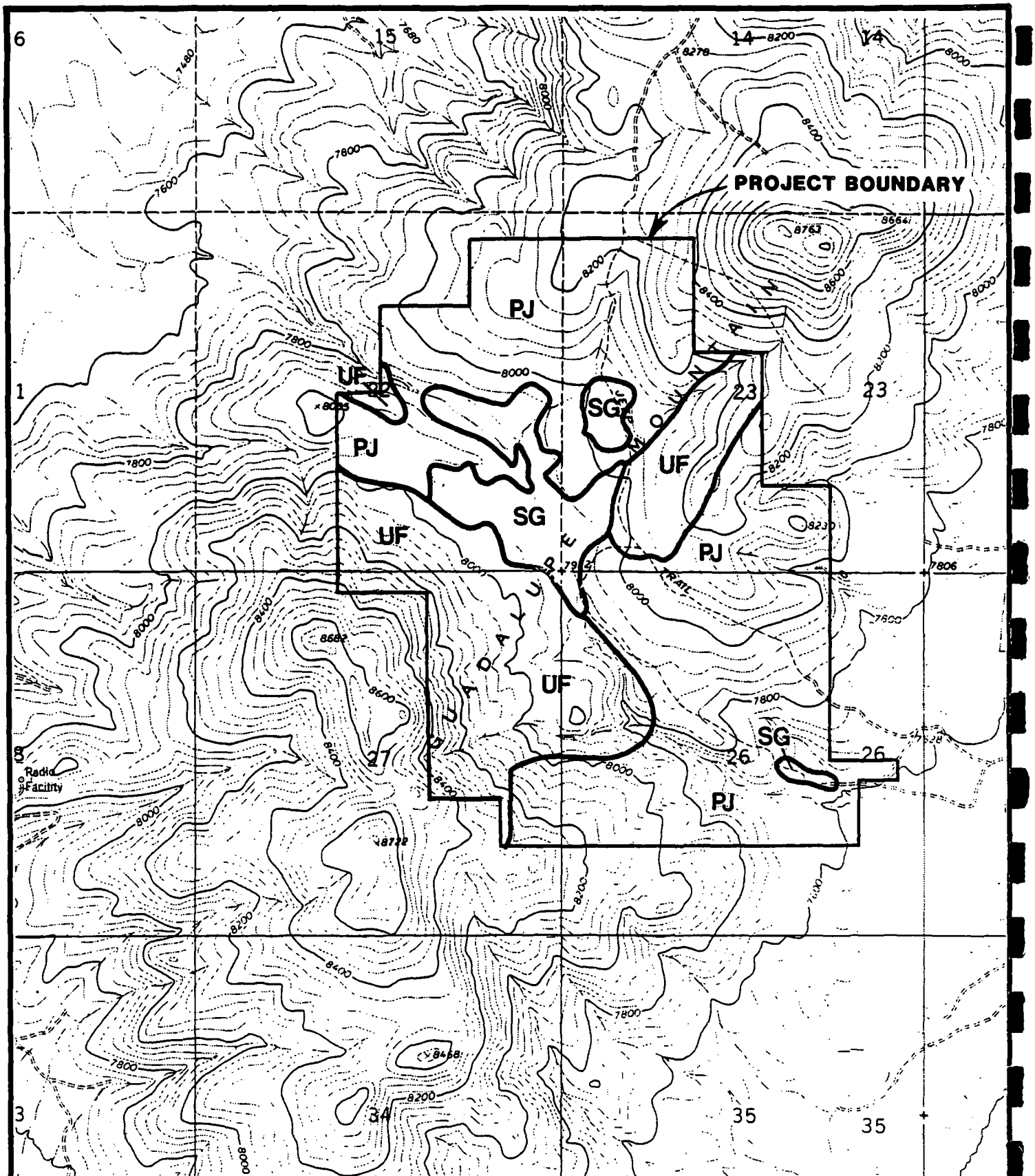
The remainder of the study area (approximately 88 percent) is covered by the Rock Outcrop-Raton complex on moderately steep slopes and is composed of the exposed basalts intermixed with shallow, rocky soils. The rock outcrops consist of the exposed basalt flows and are characterized by rapid runoff. The Raton soil type is shallow and well-mixed, formed as a residuum of the basalts and mixed eolian sediment. Depth to bedrock averages 18 inches. This shallow soil is well drained and slowly permeable. Soil texture ranges from very stony silt loam on the surface to a very stony clay subsoil. The available water capacity is very low, and runoff is rapid. The effective rooting depth is 10 to 20 inches (U.S.D.A. SCS 1982). Orthents and Stunner soils can make up approximately 15 percent of this complex.

Soil data interpretations indicate that native soil material that may be categorized as suitable for salvage include the Fernando and Hernandez soils which have favorable textures and depth for salvage. In general, the remaining soils in the facilities area are too shallow or rocky to be suitable for salvage. The Fernando cobbly loam soils of the southeastern corner of the study area will not be substantially disturbed by project construction.

2.6 Vegetation

Vegetation in the region of the Guadalupe site study area is typical of the High Intermountain Plateau of northern New Mexico. Soils and associated climatic factors support vegetative communities similar to those of the Great Basin Desert Shrub Formation and include big sagebrush, western wheatgrass/big sagebrush, and pinyon-juniper/big sagebrush at lower elevations and ponderosa pine/Douglas-fir associations at higher elevations (U.S.D.A. SCS 1982).

Detailed studies of vegetative communities and delineation of wildlife habitats were conducted by Eagle Environmental during 1984 as part of a special study of the Guadalupe Mountain area performed under BLM contract (Kennedy and Stahlecker 1986). Within the 1,230-acre study area there are three primary vegetation types: pinyon-juniper



LEGEND

SG — SAGEBRUSH/GRASSLAND
UF — UPLAND FOREST
PJ — PINYON-JUNIPER WOODLAND

1000 0 0.5
Feet Miles

N

FIGURE 2-5 VEGETATION TYPES IN THE AREA OF THE PROPOSED MOLYCORP TAILINGS POND

woodland, upland forest and sagebrush/grassland; a small area designated as agricultural is located in the southeast corner of the area adjacent to the existing tailings facility (Figure 2-5). Table 2-7 provides a summary of each site vegetation type, its relative extent, dominant woody species, average density, and average heights based on data collected within the study area and immediate vicinity. Each of the vegetation types are described briefly below:

- Pinyon-Juniper Woodland. The pinyon-juniper vegetation type is the most extensive community on the study area occupying about 62 percent of the area. It occupies well drained slopes with shallow, rocky soils of the Rock Outcrop-Raton complex. This habitat dominates the lower slopes of Guadalupe Mountain and grades into the upland forest conifers at higher elevations and on north-facing slopes. Pinyon-juniper typically supports a very dense growth of pinyon pine and juniper tree species with a less well-developed understory. This type was found to have a canopy cover of up to 75 percent in some areas and had the highest vegetative diversity of any of the vegetation communities in the area (Kennedy and Stahlecker 1986). Dominant understory species include big sagebrush, which is common, and mountain mahogany, which occurs in greater numbers at higher elevations. Grasses, including blue grama, western wheatgrass, galleta, Indian ricegrass, and bluebunch wheatgrass are major species of the sparse ground cover.

- Upland Forest. The upland forest type occurs on the higher slopes of the study area and occupies the mountaintops and strongly sloping to very steep slopes, particularly those with a north-facing aspect. It occurs on about 27 percent of the study area. As for the pinyon-juniper type, the upland forest exists on soils of the Rock Outcrop-Raton complex, differing slightly in that it occupies the cooler, moister sites. The community is characterized by a mixed conifer overstory composed of pinyon pine, junipers, ponderosa pine, and Douglas fir. A wide variety of shrub species occur in this community including big sagebrush, mountain mahogany, snowberry, snakeweed, and Gambel oak. Grasses and forbs are sparse, consisting primarily of mountain muhly and brome grass (Kennedy and Stahlecker 1986).

- Sagebrush/Grassland. The sagebrush/grassland type is concentrated in the center of the study area and proposed tailings facility. It primarily occupies the level to gently sloping soils of the Fernando-Hernandez association, characterized by deep, well-drained mixed alluvium. Big sagebrush is the most common shrub present with associated woody species including rabbit brush, broom snakeweed, and

TABLE 2-7

VEGETATION COMMUNITY DATA SUMMARY

Vegetation Type	Acreage (Within the Project Boundary)	Relative Percent	Dominant Woody Species	Average Density (No./Acre)	Average Height (Feet)
Pinyon-Juniper Woodland	759	62	Pinyon Pine	817	7.6
			Juniper	100	7.2
			Big Sagebrush	1,067	1.0
Upland Forest	338	27	Pinyon Pine	158	11.6
			Juniper	242	8.0
			Douglas Fir	158	11.2
			Ponderosa Pine	33	16.5
			Mountain Mahogany	83	3.7
Sagebrush/Grassland	111	9	Big Sagebrush	5,530	1.3
			Broom Snakeweed	210	<1.0
			Pinyon Pine	33	<1.0
			Rubber Rabbitbrush	33	<1.0
Agriculture (Fallow Fields)	22	2	Rubber Rabbitbrush	17	3.0
			Big Sagebrush	100	<1.0
Total	1,230				

Source: Kennedy and Stahlecker 1986

scattered pinyon pine. Common grasses are blue grama, western wheatgrass, needle-and-thread, and Indian ricegrass (U.S.D.I. BLM 1985). This type occupies approximately 9 percent of the study area.

A thorough threatened and endangered plant inventory of the study area was completed in 1984. No threatened and endangered plants were encountered during this survey (U.S.D.I. BLM 1985).

2.7 Wildlife

2.7.1 Aquatic

No aquatic resources are present on the proposed facility site. Water is currently available onsite from an inverted umbrella-type water catchment, providing water resources for wildlife species within an approximate 5-mile radius (Kuykendall 1988) and a small, gully plug reservoir which holds water for a short period after rains. In addition, the Big Arsenic and Little Arsenic Springs systems, located approximately 4 miles downgradient from the proposed site along the Rio Grande (see Figure 2-3), are considered important high quality tributaries to the Rio Grande and unique habitat for both aquatic and terrestrial organisms (U.S.D.I. BLM 1985). Both spring systems flow 25 to 50 feet above the eastern bank of the Rio Grande. An investigation of the aquatic organisms that inhabit the spring complexes has been completed, and a preliminary list of the benthic macroinvertebrates reported is provided in Appendix B. The overall water temperature consistency, flow stability, and water quality of the springs support a diverse aquatic invertebrae community providing a stable food source for fish in the Rio Grande.

The Rio Grande Gorge is located 2 miles west of the proposed project facility (see Figure 2-3), and the confluence of the Rio Grande and Red River is about 5 miles southwest of the site. These rivers support numerous aquatic species. Game fish include rainbow and brown trout, smallmouth bass, northern pike, and channel catfish. The Rio Grande cutthroat trout is native to these rivers and may be present in limited numbers or may be known to hybridize with rainbow trout

(Sandoval 1988; Kuykendall 1988). Other fish species that occur in this area include the Rio Grande sucker, carp, fathead minnow, longnose dace, and Rio Grande chub (U.S.D.I. BLM 1985).

2.7.2 Terrestrial

The proposed 1,230-acre tailings disposal site would be located within three primary vegetation types: pinyon-juniper woodland, upland forest, and sagebrush/grassland. The site contains a variety of vegetation species (see Section 2.6), affording quality cover and forage for many wildlife species.

A variety of mammals, birds, reptiles, and amphibians are associated with the project area. Game mammals or furbearers that may typically occur near the proposed tailings site include mule deer, elk, cottontail, bobcat, coyote, gray fox, raccoon, ringtail, mountain lion, and black bear. Mule deer occur year-round throughout most of the project area and comprise a stable population. The north aspect of the Guadalupe Mountain saddle provides optimal deer browse within the resource area; however, the area is not classified as mule deer critical winter range (Kuykendall 1988). Elk are also present in the area. A small resident population has grown steadily within the past several years, with an increase in reported observations. Optimal thermal cover for both winter and summer conditions occurs primarily in the area of the south edge of the proposed west dam (Kuykendall 1988).

Bobcat, coyote, gray fox, raccoon, and ringtail are all found within the project area. Bobcat, gray fox, and ringtail distribution would be intermittent in wooded and brushy areas surrounding the proposed facility site (Findley et al. 1975). The coyote is the most common medium-sized mammal found throughout the study area, and the raccoon would be expected along the the Rio Grande and Red River. Mountain lion and black bear occur in limited numbers in mountainous area and have been reported in the area surrounding Guadalupe Mountain (U.S.D.I. BLM 1987).

Numerous non-game or small-sized mammal species may occur onsite. Small mammal productivity varies considerably year-to-year, depending

upon habitat conditions and reproductive success. Small-sized mammal species on or near the project site include the whitetailed jackrabbit, Ord's kangaroo rat, deer mouse, and least chipmunk (U.S.D.I. BLM 1985).

Guadalupe Mountain and associated areas, including the adjacent riverine systems, support a broad diversity of both migrant and nesting bird species. Kennedy and Stahlecker (1986) recorded 133 avian species within the Guadalupe Mountain study area, which encompasses the proposed facility site, during their 1984 and 1985 studies. Additional bird species also occur within the project area (U.S.D.I. BLM 1985). Upland game birds could include the mourning dove, scaled quail, Merriam's turkey, bandtailed pigeon, and blue grouse. Waterfowl and shore birds utilize the riverine system as well as the existing impoundment areas. Common nesting species include the common merganser and mallard. Canada geese also nest in the upper Rio Grande Gorge (U.S.D.I. BLM 1987). The upper gorge provides significant habitat for raptor species. Table 2-8 lists raptors potentially occurring on or near the Guadalupe Mountain site. Verified nesting species on the site include the great-horned owl, saw-whet owl, red-tailed hawk, and American kestrel (U.S.D.I. BLM 1987).

Amphibians and reptiles typically found near the study area include the western spadefoot toad, leopard frog, collared lizard, great plains skink, bull snake, and prairie rattlesnake.

Wildlife species of concern either occurring within or adjacent to the project region or those species with a potential for occurring in the area include the bald eagle, American peregrine falcon, and whooping crane. The bald eagle is federally-listed as endangered in the conterminous United States, except for several northwest and Great Lake states, where it is listed as threatened (U.S.D.I. FWS 1987) and listed by the state of New Mexico as endangered (group 2). An estimated 350 bald eagles were recorded in New Mexico in 1982 during the mid-winter period. Within the Rio Grande Gorge in the vicinity of Guadalupe Mountain, the unique habitat supports approximately eight wintering eagles from December to March (U.S.D.I. FWS 1983, Kuykendall 1988) and incorporates a combination of cottonwood and willows, which are utilized extensively by the wintering eagles. Bald eagles feed mainly on fish and waterbirds near rivers, lakes, and reservoirs and feed to a lesser

TABLE 2-8

POTENTIAL RAPTOR OCCURRENCE ON OR NEAR
THE GUADALUPE MOUNTAIN SITE

Species	Season of Use
Goshawk	migrant
Sharp-shinned hawk	summer
Cooper's hawk	yearlong
Red-tailed hawk	yearlong
Swainson hawk	spring and summer
Rough-legged hawk	migrant/winter
Ferruginous hawk	yearlong
Golden eagle	yearlong
Bald eagle	migrant/winter
Osprey	migrant/summer
Prairie falcon	yearlong
Peregrine falcon	yearlong
Merlin	migrant
American kestrel	yearlong
Marsh hawk	migrant/winter
Barn owl	summer
Screech owl	winter
Great-horned owl	yearlong
Saw-whet owl	yearlong

Source: U.S.D.I. BLM 1985

extent on carrion and small prey species. The project site has not been shown to directly support bald eagles; however, an occasional individual may utilize the project area during foraging activities.

The American peregrine falcon is federally-listed as endangered (U.S.D.I. FWS 1987) and state-listed as endangered (group 1). The peregrine was formerly widespread throughout North American and now exists as a breeding bird only in disjunct populations, including locations in the southern Rocky Mountains (U.S.D.I. FWS 1983). The proposed project site is located within the anticipated hunting range of a peregrine eyrie. The eyrie has historically been utilized by breeding peregrines and is currently active (Kuykendall 1988). Reproduction from these birds is considered successful. Predominant prey items for the peregrine falcon are bird species representative of forest and riparian communities (U.S.D.I. FWS 1983).

The whooping crane is federally-listed as endangered, state-listed as endangered (group 2), and may potentially pass through the project area during migration. Crane presence near the Guadalupe Mountain site would likely be limited to overflights only (U.S.D.I. BLM 1985).

Other sensitive raptor species that may potentially forage within the project area include the ferruginous hawk, a yearlong resident, and the Swainson's hawk, a spring and summer resident. Both species are listed as federal candidate species - Category 2. This designation indicates that the species are proposed for federal listing as threatened or endangered; however, conclusive data on biological vulnerability and threat are not currently available to support these proposed rules (U.S.D.I. FWS 1985). In addition, the mountain plover and white-faced ibis have been reported in the project area (Kuykendall 1988, Kennedy and Stahlecker 1986). Both species are also listed as federal candidate species - Category 2. The occurrence of these species is considered rare, however, and individuals would not likely utilize the project site.

2.8 Land Use (including prime farmland and grazing)

2.8.1 Land Status and Land Use Plans

The proposed Molycorp tailings disposal facility site is located in Taos County, New Mexico on public lands administered by the BLM. Current use of the land is dominated by dispersed recreation, livestock grazing, and open space. Management of the area is addressed in the proposed Taos Resource Management Plan (U.S.D.I. BLM 1987).

The proposed site would become private land if the existing claims are patented (U.S.D.I. BLM 1987). Taos County does not currently have an adopted land use plan or zoning ordinance (Quintana 1988). The county is in the process of preparing a draft land use plan which will address the issue of private land development. Completion of a draft land use plan was anticipated by the Fall of 1988 (Quintana 1988); however, this effort has been placed on hold at this time (Cisneros 1988).

2.8.2 Prime and Unique Farmland

There is no prime or unique farmland on the project site. The nearest prime farmland is approximately 1 to 2 miles to the northeast of the proposed site (U.S.D.I. BLM 1985; Yonemoto 1988).

2.8.3 Livestock Grazing

The proposed Molycorp tailings site is located in the Northern Management Unit for livestock grazing. The permittees in this unit depend on public land for a great deal of their livestock pasturage. The Molycorp study area provides a total of approximately 69 Animal Unit Months (AUMs) per year. The primary use is for cattle during the spring, early summer, or fall use period. In most cases, the season of use is closely integrated with the entire livestock business on an annual scheduling basis (U.S.D.I. BLM 1985; Yonemoto 1988). Allotment 608 is currently being leased by one permittee. Allotment 609 has not been leased for two years.

Within the proposed site are two range improvements (as authorized under Section 4 of the Taylor Grazing Act of 1934), an earthen livestock reservoir that was constructed in 1977 (U.S.D.I. BLM 1985) and an inverted umbrella watering device.

2.9 Recreation

The proposed Molycorp tailings site is adjacent to and nearly surrounded by the Wild Rivers Recreation Area Special Management Area (SMA), as recommended by the BLM in the proposed Taos Resource Management Plan (RMP)(October 1987). The recommendation in the RMP specifically excludes the proposed Molycorp tailings site from the SMA as shown in Figure 2-6. The Wild Rivers Recreation Area SMA is made up of the Wild Rivers Recreation Area (previously called the Rio Grande Recreation Area) and the proposed Guadalupe Mountain Area of Critical Environmental Concern (ACEC). The total SMA consists of 20,310 acres.

The Wild Rivers Recreation Area SMA is located at the confluence of the Rio Grande and Red Rivers. The SMA contains a portion of the Rio Grande Wild and Scenic River, which was one of the first eight rivers federally designated on October 2, 1968 for inclusion in the "Wild and Scenic Rivers Act" (Public Law 90-542). In this Act, the U.S. Congress declared it "to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations".

The 48 miles of the Rio Grande from the Colorado/New Mexico border, south to Taos Junction, New Mexico, and the lower 3.25 miles of the Red River are classified and administered as a "Wild River". The upper 0.75 mile within the lower 4 miles of the Red River is classified and administered as a "Recreational River" due to its accessibility (BLM 1984). Both corridors include a 0.25-mile buffer on either side of the Rio Grande and Red Rivers.

The 1,880-acre Wild Rivers Recreation Area (formerly the Rio Grande Recreation Area) was developed following this designation. The recreation area is used by visitors for sightseeing, camping, picnicking, hiking, fishing (both the Rio Grande and Red Rivers are nationally renowned for their rainbow and brown trout fisheries), access to floatboating, and cross-country skiing during winter months. The area is becoming increasingly popular for wildlife viewing, both from vehicles and hiking trails (U.S.D.I. BLM 1987).

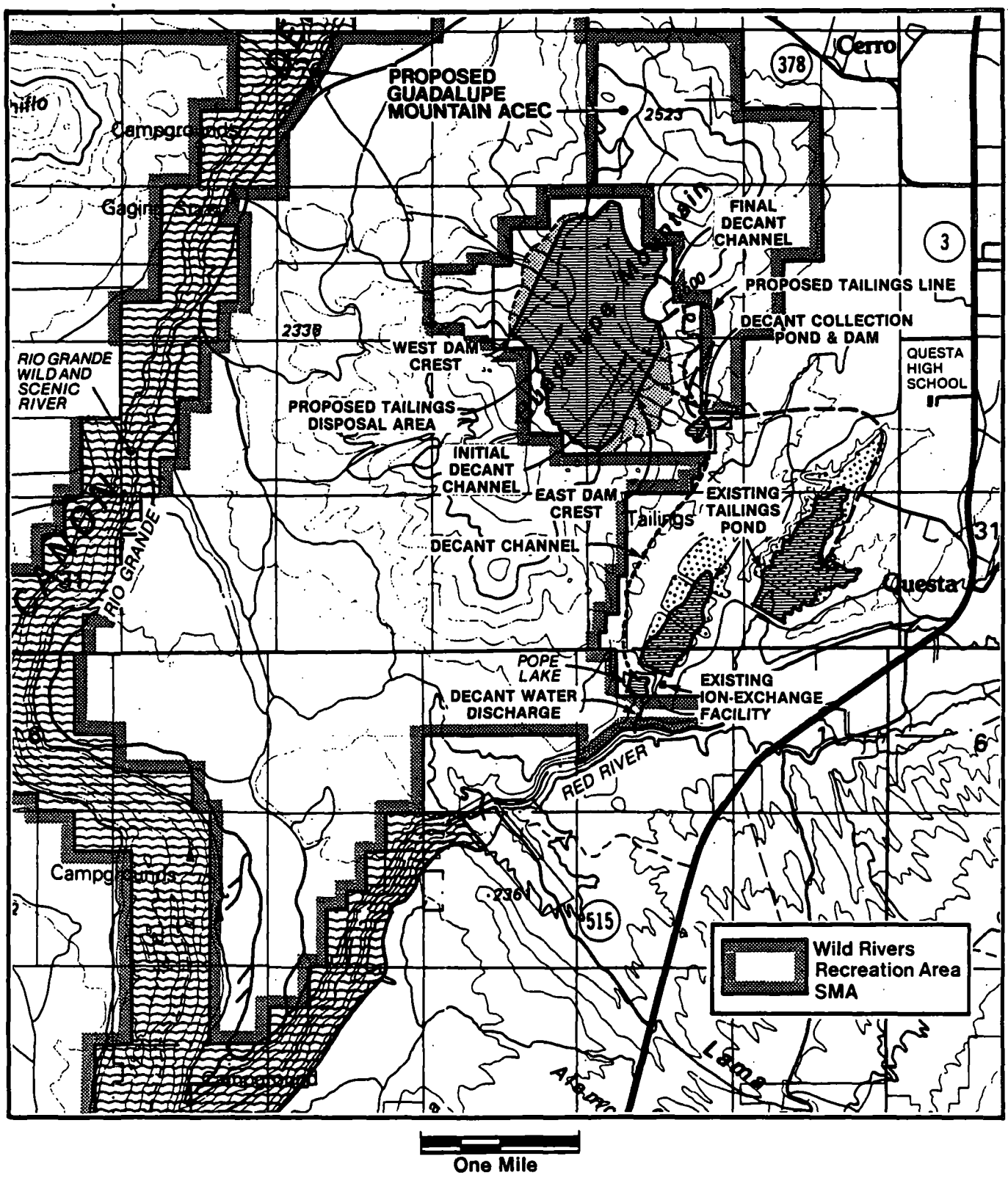


FIGURE 2-6 LAND STATUS MAP

Facilities at the Wild Rivers Recreation Area include a Visitor Center, 47 camping shelters, 7 picnic areas, 8 overlooks, and water and toilet facilities. There are 8 maintained trails (approximately 12 miles) which lead from the rim of the recreation area to the canyon bottoms along the Rio Grande and Red Rivers. These trails were officially designated as part of the National Recreation Trails System in 1981 (U.S.D.I. BLM 1987). Management of the area is covered in the Wild Rivers Recreation Area Management Plan (U.S.D.I. BLM 1988).

Accurate and reliable visitor use data for the entire recreation area are difficult to obtain because of the large land area involved and the lack of any standard visitor registration system or visitor counting procedures. However, based on historical records from the Visitor Center register book and BLM estimations, it is apparent that visitor use at the recreation area has been increasing steadily over the years. Table 2-9 illustrates estimated peak summer season visitor use at the Wild Rivers Recreation Area from 1975-1987. Peak summer season is May through September. BLM officials are anticipating an overall increase in visitor use during 1988 (Mottl 1988, Speegle 1988).

The proposed Guadalupe Mountain ACEC contains significant scenic and cultural values as well as important wildlife habitat (BLM 1987). Guadalupe Mountain is an important scenic feature for travelers on Highway 3 near Questa. The mountain is located near the highway and the entire eastern half of the mountain and associated hills are visible for several miles. The western half of the mountain is an important scenic feature for the entrance to the Wild Rivers Recreation Area (U.S.D.I. BLM 1987).

The Guadalupe Mountain area is not advertised by the BLM to the general public as a recreation area (Speegle 1988), however, the area offers opportunities for dispersed recreation, particularly hiking and hunting. There are no developed recreation facilities in this area. Although there are no official visitor use statistics available specifically for the Guadalupe Mountain area, the BLM has estimated that approximately 10 percent of the people who visit the developed Wild

TABLE 2-9

VISITOR USE AT THE WILD RIVERS RECREATION AREA (VISITORS)[1]

Year	May	June	July	August	Sept.	Total
1987	1,400	3,000	5,000	5,400	2,000	16,800
1986	1,060	2,272	3,786	4,089	1,514	12,721
1985	799	1,712	2,854	3,082	1,142	9,589
1984	827	1,771	2,952	3,188	1,181	9,919
1983	529	1,134	1,890	2,041	756	6,350
1982	554	1,187	1,978	2,136	791	6,646
1981	533	1,143	1,905	2,057	762	6,400
1980	494	1,058	1,763	1,904	705	5,924
1979	457	979	1,632	1,763	653	5,484
1978	433	929	1,548	1,671	619	5,200
1977	365	782	1,304	1,408	521	4,380
1976	357	766	1,277	1,379	511	4,290
1975	221	473	788	851	315	2,648

Source: U.S.D.I. BLM. Visitor Center count and estimations of use from locals and fishermen who do not come to the Visitor Center, and those who reach the Visitor Center after hours. Data was obtained during the peak summer season of May through September.

[1] Previously called the Rio Grande Recreation Area.

Rivers Recreation Area will also use the Guadalupe Mountain area (Mottl 1988, Speegle 1988). Most of the people who use the Guadalupe Mountain area for recreation are from the local area (e.g., Questa) (Speegle 1988).

2.10 Visual Resources

The BLM has implemented a visual inventory and analysis process to provide a systematic interdisciplinary approach to the management of aesthetic values on public lands. The Visual Resource Management (VRM) system inventories existing scenic quality and assigns visual resource inventory (VRI) categories based on a combination of scenic values, visual sensitivity, and viewing distance zones. Four visual resource classes have been established to serve two purposes: (1) as an inventory tool portraying relative value of existing visual resources, and (2) as a management tool portraying visual management objectives. Management objectives for each of the visual resource classes are listed in Table 2-10.

The immediate vicinity of the proposed Molycorp Tailings Disposal Facility includes lands that have been assigned three of the VRM classes. The Rio Grande Canyon is a Class I area by virtue of its Wild River designation. The Wild Rivers Recreation Area and the west face of Guadalupe Mountain are VRM Class II areas. The Guadalupe Mountain saddle, which is the area of Guadalupe Mountain that cannot be seen from the valley to the west or from State Route (SR) 533 to the east, is designated VRM Class III; the east face of Guadalupe Mountain is also designated VRM Class III (Speegle 1988). Table 2-10 contains the specific objectives associated with each of the applicable classes.

2.11 Noise

A description of the environment potentially affected by noise emissions from the proposed project includes identifying noise sensitive receptors and existing noise sources in the vicinity, characterizing terrain features that may affect noise transmission, and determining existing noise levels.

TABLE 2-10

VISUAL RESOURCE MANAGEMENT CLASSES

Class I Objective:	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II Objective:	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Class III Objective:	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV Objective:	The objective this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominant the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.
Rehabilitation Areas:	Areas in need of rehabilitation from a visual standpoint should be flagged during the inventory process. The level of rehabilitation will be determined through the resource management planning (RMP) process by assigning the VRM class approved for that particular area.

Source: BLM Manual 8411.

The proposed project would generate noise primarily from construction of the two dams. The noise analysis focused on the westerly dam, however, because existing tailings disposal activities and/or terrain barriers intervene between the easterly dam site and noise sensitive receptors.

Noise sensitive receptors near the westerly dam site include primarily the two campgrounds within the Wild Rivers Recreation Area, Sheep Crossing and Chiflo. The nearest is Sheep Crossing, slightly less than 2 miles from the proposed dam site.

Existing noise sources include natural sounds from wind, birds, and insects; noise from automobiles entering or leaving the wild Rivers Recreation Area (including noise from crossing steel cattle guard); and sounds of occasional aircraft overflights. Although the terrain is irregular, there are no substantive terrain barriers between the proposed dam site and the campgrounds.

Monitoring of existing noise levels was not deemed necessary because of the remote location of the project area and the low number of existing noise sources. Existing noise levels were instead estimated, based on EPA literature and ERT file data for similar sites. Existing noise levels are estimated to fall in a range of 40 to 50 decibels, A-weighted (dBA). The lower end of the range represents typical noise levels in rural areas. These estimates are consistent with the results of a brief noise sample collected by NMEID in 1982 that found ambient levels (L_{90}) of 41 dBA on the proposed project site and 42 dBA at the Chiflo Campground (Orton 1982). Noise levels could exceed 50 dBA during high wind episodes or for brief periods of high traffic.

2.12 Cultural Resources

A Class III cultural resource inventory of public land associated with the proposed construction of the Guadalupe Mountain tailings disposal area was conducted by the Research Section of the Laboratory of Anthropology in Santa Fe, New Mexico. Field work was performed during September and October of 1982. A total of 11 archaeological sites (LA-38422 - 38432) consisting of extensive lithic scatters were located during the survey (Seaman 1983).

In 1983, the New Mexico State Historic Preservation Officer (SHPO) concurred with the report's findings and the recommendations of the BLM that the 11 sites were eligible to the National Register of Historic Places (NRHP) under Criterion d, as defined in 35 CFR 60.6 (see Appendix D, Cultural Resources Consultation Correspondence). This determination was made because the sites were likely to yield significant information about Archaic and Basket Maker period sustenance in the region.

In 1984, at the BLM's request, a Cultural Resource Mitigation Plan for the 11 archaeological sites was prepared by the Laboratory of Anthropology (Vierra 1984). This Mitigation Plan outlined two phases of data collection and analysis. The first phase involved defining site boundaries, artifact collection, and subsurface testing. The second phase involved more extensive excavation of sites with buried features or stratified cultural deposits. The SHPO concurred with the BLM's recommendation that there would be no adverse effect to the archaeological sites, if they were mitigated according to this data recovery plan.

Preliminary data recovery was conducted by the Office of Contract Archaeology, University of New Mexico at one site, LA-38424, in October 1986. These activities included resurvey of the site, controlled surface artifact collection, and the excavation of a single hearth (Seaman 1987).

The Class III inventory and preliminary data recovery indicate that Guadalupe Mountain was inhabited by prehistoric people on a seasonal basis for over 6,000 years. Collected artifacts suggest that the area was visited continually from at least the early Archaic period (5500-4000 B.C.) through the Basket Maker period (1-700 A.D.). Sites LA-38422 - 38432 are considered to be highly significant because they appear likely to contain data important to the understanding of Southwestern prehistory. Research on the sites should provide information on site function, chronology, subsistence, technological organization, and the transition from mobile hunting and gathering based on the economy of the Archaic period to the sedentary agricultural economy of the Pueblo periods.

2.13 Socioeconomics

The primary study area for the socioeconomic assessment was Taos County in north-central New Mexico. The communities affected included Questa, Taos, and Cerro. Questa is 3 miles east of the proposed tailings site and 11 miles west of the existing mine. Taos is 28 miles southeast of the proposed site and Cerro is approximately 5 miles north of the proposed site.

Administrative functions within the study area are provided by local governments in Taos County, Taos, and Questa. Cerro is an unincorporated town and is governed by Taos County.

The population of Taos County has grown at a relatively low average rate of 2.1 percent per year from 1980 to 1986 (Kargacin 1987). The 1986 estimated population in Taos County was 22,000, up from the 1980 level of 19,456. The towns of Taos and Questa have grown at an average rate of 1.4 percent and 0.8 percent, respectively, with estimated 1986 populations of 3,670 and 1,260. From 1985 to 1986, no population increase is shown to have occurred in Taos County.

The economy in Taos County has traditionally been based on mining and tourism. In the past two years with the slowdown in the mining sector (with Molycorp as the largest employer), more importance has been placed on the tourist economy, which is centered in the Retail Trade and Services sectors.

2.13.1 Employment and Income

Due to the nature of the primary industry in Taos County, fluctuations in employment and income occur regularly. Only recently has the Taos County economy been almost totally dependent on the seasonal tourist-related activities that occur primarily in the summer, early fall, and winter. Table 2-11 shows nonagricultural wage and salary employment in Taos County from 1982 to 1986.

Agricultural employment has remained fairly stable for the past several years. The Services and Miscellaneous sector, which includes mining, personal, business, health and social services, and hotels and lodging is the largest employment sector in Taos County. In 1986, this sector supplied 35 percent of the nonagricultural wage and salary employment. Although the services sector is the major employer in the

TABLE 2-11

NONAGRICULTURAL WAGE AND SALARY EMPLOYMENT IN TAOS COUNTY

1982 TO 1986

Sector	1982	1983	1984	1985	1986	1986 % of Total
Manufacturing	389	396	396	364	335	5.0
Mining	*	*	*	*	*	NA
Contract Construction	407	432	428	437	292	4.0
Transportation & Public Utilities	191	221	248	276	235	4.0
Wholesale & Retail Trade	1,380	1,380	1,423	1,496	1,660	26.0
Finance, Insurance & Real Estate	250	298	335	350	318	5.0
Services & Miscellaneous	2,583	2,703	2,744	2,707	2,202	35.0
Government	1,285	1,322	1,298	1,293	1,308	21.0
TOTAL	6,485	6,752	6,872	6,923	6,350	100.0

Source: New Mexico Department of Labor, Economic Research and Analysis, Table B - Labor Information Series.

*Disclosure - Included in Services and Miscellaneous.

county, overall employment has declined by 15 percent over the period 1982 to 1986. Actual employment in the services sector declined by 505 persons from 1985 to 1986, which represents 8 percent of the 1986 total nonagricultural employment in Taos County.

The second most important sector in Taos County is Wholesale and Retail Trade which represents 26 percent of total nonagricultural wage and salary employment. Retail trade grew steadily from 1982 to 1986, with a 20 percent increase in employment throughout the period.

The Government sector also employs a large percentage (21 percent) of workers in Taos County. This sector fluctuated between 1982 and 1986, but showed an overall increase of 1.8 percent.

Unemployment rates in Taos County have remained among the highest in the state. Only Mora County has shown higher unemployment rates than Taos County. This implies that population out-migration has not kept pace with changing job opportunities. In addition, it appears that the appeal of living in Taos County brings in transient populations to fill seasonal jobs in the tourist industries.

Table 2-12 shows civilian labor force, employment and unemployment levels for Taos County and the State of New Mexico from 1983 to August 1987. The state average unemployment rate has ranged from a low of 7.5 percent in 1984 to a high of 10.1 percent in 1983. In Taos County the unemployment rate has generally remained high as compared to any standard. The range of rates shows a low unemployment rate of 16.8 percent in 1984 and a high rate of 27.8 percent in 1986. Monthly rates have reached as high as 32.0 percent unemployment. Unemployment is expected to remain high until economic conditions improve areawide.

2.13.2 Public Fiscal Conditions

Public fiscal resources of the study area refer to government revenue sources and expenditures in Taos County and the communities of Taos and Questa. From 1986 to 1987 assessed values decreased throughout Taos County (Medina and Nichols 1987). The 1986 taxable value for Taos County was $244,068,475 as compared to $195,806,114 in 1987. This decrease in valuation is primarily due to the slowdown in the mining

TABLE 2-12

LABOR FORCE, EMPLOYMENT, AND UNEMPLOYMENT

1983 TO 1987[1]

	1983	1984	1985	1986	1987[2]
State of New Mexico					
Civilian Labor Force	609,000	628,000	642,000	672,000	672,189
Employment	547,000	581,000	585,000	610,000	616,321
Unemployment	62,000	47,000	57,000	62,000	55,868
Rate	10.1%	7.5%	8.8%	9.2%	8.3%
Taos County					
Civilian Labor Force	10,346	10,306	10,428	10,220	10,034
Employment	8,411	8,578	8,289	7,381	7,621
Unemployment	1,935	1,728	2,139	2,839	2,413
Rate	18.7%	16.8%	20.5%	27.8%	24.0%

Source: New Mexico Department of Labor, Economic Research and Analysis, Table A - Civilian Labor Force, Employment and Unemployment.

[1] Annual Average

[2] Preliminary August Estimate

industry and the indirect impacts on other businesses. The decline in taxable value represents a 19.8 percent countywide decrease from 1986 to 1987.

In order to compensate for the decline in taxable value and tax revenues, mill levies have increased. These increases in the mill rate have caused significant increases in property taxes to both residents and businesses. The increased mill rates have made up taxing jurisdiction losses of $687,000 from lost property taxes and other lost Federal Revenue Sharing monies.

Taos County operates largely with funds generated from local and state sources. Budgeted general property taxes and gross receipts taxes represented 26 percent of county receipts in the 1986-1987 fiscal year. This represents an increase of 12.3 percent from 1985-1986. While property tax receipts have increased, revenue sharing monies and gross receipts taxes declined from 1986 to 1987.

Taos and Questa also depend heavily on state and local revenue sources. In Taos, property taxes, franchise, and gross receipts taxes (local and state shared) account for 88 percent of general fund revenues and 45 percent of total revenues. In Questa these taxes represent 59 percent of general fund revenues and 11 percent of total revenues. Federal revenue sharing monies have declined throughout the state. From 1986 to 1987 revenue-sharing funds have decreased by 63 percent in Taos and 69 percent in Questa.

Overall revenues increased by 32 percent from 1986 to 1987 in Questa due primarily to a $900,000 state grant. Gross receipts taxes have decreased substantially (22.0 percent) in Questa.

The overall budget in Taos declined from 1985-1986 to 1986-1987 (2.9 percent). Budget decreases have occurred across the board, especially in the General Fund, Other Funds, Enterprise Funds, and Revenue Sharing revenue sources.

County expenditures increased by 9.6 percent from 1985-1986 to 1986-1987. General fund disbursements represent 44 percent of total countywide expenditures, but decreased by 6 percent over the year.

In Taos and Questa, General Fund expenditures represented 50 percent and 16 percent, respectively, of total expenditures in 1986-1987. From 1986 to 1987 these expenditures increased by 35 percent in Taos and decreased by 16 percent in Questa.

2.13.3 Housing

Recent housing statistics for Taos County are not available, but interviews with the Housing Authority director and several realtors indicate that adequate housing is available in Taos County. As of November 1987, there were between 300 and 325 houses listed for sale in the Multiple Listing Service. The average price of a three-bedroom single-family house is $90,000 (Cowan 1987). Rental housing is less abundant, but still available. Rents in the Taos area range from $250 to $300 per month for a one-bedroom house, to $300 to $390 for a two-bedroom house. Availability of rental housing fluctuates on a seasonal basis. Vacancy rates are very sensitive to the type of units being rented. Vacancies range from 6 percent to 15 percent, with the more expensive units on the higher end of the average.

2.13.4 Public Services and Facilities

Many public facilities and services are provided within the study area. Existing design capabilities and staffing levels of public facilities and services in the region are generally considered adequate for demand and many have excess capacity.

Health care is provided by Holy Cross Hospital in Taos, which has 33 beds. Additional medical care can be acquired at the Family Practice Clinic in Taos and the Questa Health Center, which provides medical and dental care for Questa and Cerro residents.

Law enforcement in the region is provided by the Taos County Sheriff's Department, headquartered in Taos. The Sheriff's Department serves all of Taos County, including the Town of Questa. There are 12 officers, 4 dispatchers, and 3 secretaries; 2 officers are stationed in Questa. The Department feels that two to three officers working per day is not adequate to cover the entire Taos County area.

The Town of Taos also has a police force with a total of 17 officers. Captain Vidaurre (personal communication 1987) feels that the Department has adequate personnel and facilities to serve the existing population. The Town of Questa has three police officers.

Taos County has 5 full-time firefighters in the Town of Taos and 30 volunteer firefighters countywide. The Questa Village Volunteer Fire Department has 28 volunteer firefighters and 3 pumpers. The Questa and Taos departments are well equipped to serve the existing populations.

Public water supply and wastewater treatment facilities have adequate existing capacity to handle the demands of the current populations in the City of Taos and in Questa. The Village of Questa currently has 2 wells that supply water for approximately 650 families (1,800 population). Combined capacity is approximately 200,000 gallons storage and 381,600 gallons pumping capacity per 24-hour period. The average consumption is well below this level (Cisneros 1987).

The wastewater system in Questa has just recently been built and has the capacity to serve a population of between 4,000 and 5,000. Current treatment is approximately 40,000 gallons per day, design capacity is 70,000 gallons per day. Outlying areas are served by private or community wells and septic systems. Solid waste disposal in Questa is provided by the county; the landfill site is relatively new, and has adequate capacity to serve the Questa area.

Electricity in the study area is provided by Kit Carson Electric Cooperative, located in Taos. There is adequate generating capacity to service the existing population and future growth. The Gas Company of New Mexico provides service to the study area excluding Cerro; adequate capacity exists well into the future. Mountain Bell provides telephone service in the area.

2.13.5 Public Education

The public school systems within the study area include the Taos School District located in Taos, and the Questa School District which serves Questa and the surrounding towns of Cerro, Costillo, and Red River.

Enrollment in the Questa School District has fluctuated through the years, but has generally declined in the past 5 years, especially between the 1983-1984 and 1985-1986 school years (Abeyta 1987). Total enrollment in the Questa School District between 1981 and 1987 is shown below:

	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	% Change
Total Enrollment	842	792	839	763	788	723	(14.1)

Although enrollment has declined, the Cerro School serving K-2 is currently at capacity.

Last year the school district issued a new capital improvement bond that will initially be used to build a new high school. The $4-million bond issue contributed to an increase in the mill rate from $7/$1,000 assessed valuation to $13/$1,000. This increase is in addition to the county-imposed 3-mill increase. Taxpayers within the school district are experiencing a significant increase in property taxes due to the bond issue. The tax base for the school district has decreased which has required program and staff cuts in school district operations.

3.0 ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

Chapter 3 presents a discussion of the environmental consequences that would result from implementation of the proposed Molycorp Guadalupe Tailings Facility. In keeping with the directive of the National Environmental Policy Act (NEPA), this chapter focuses on impacts that are considered significant. The general approach followed throughout the chapter is to briefly describe the range of impacts that would occur and then provide a detailed discussion of those impacts that would be considered significant. Where appropriate for the discipline under consideration, impacts are discussed for the construction, operation, and closure phases of the project.

3.2 Air Quality

Relevant New Mexico federal and state air quality standards are summarized in Table 3-1. For particulate matter, the EPA has recently revised the National Ambient Air Quality Standards (NAAQS) to regulate only particulate matter sized 10 microns or below, generally referred to as PM-10. EPA's rationale for changing the standard is that particles must be sized below 10 microns in order to be inhaled into the lungs, thereby impacting human health. This federal rule change is not yet reflected at the state level, where particulate concentrations are still regulated based on total suspended particulate (TSP). It is expected that the State of New Mexico will at some point adopt a PM-10 based particulate standard, but the exact nature of a revised standard is currently under development. However, NMEID officials indicate at this time that they expect to retain the TSP standard in some form (Blankenship 1988). Exceedances of the TSP standard are viewed to be a nuisance only, while the PM-10 standard equates to human health effects.

Impacts to air quality resulting from the new tailings disposal area would be caused by entrainment of particulate matter off the dry surfaces of the tailings pond during high winds. Some of the particulate entrained into the atmosphere would remain suspended and be transported downwind, potentially increasing public exposure to particulate matter in the vicinity of the tailings site. However, since

TABLE 3-1

FEDERAL AND NEW MEXICO PARTICULATE STANDARDS

Federal: PM-10	
24-hour average	150 $\mu g/m^3$
Annual arithmetic mean	50 $\mu g/m^3$
State of New Mexico: TSP	
24-hour average	150 $\mu g/m^3$
7-day average	110 $\mu g/m^3$
30-day average	90 $\mu g/m^3$
Annual geometric mean	60 $\mu g/m^3$

Note: 24-hour standards may be exceeded one time per year by any location.

most of the particulate is comprised of large particles which quickly settle out of the plume due to turbulence and gravitation, the potential impacts would decrease rapidly as the emissions traveled downwind.

In this manner, the expected impacts from the new tailings disposal area would be very similar to those historically experienced from the existing tailings facility near Questa. However, since the proposed site is farther removed from critical impact receptors (such as the Questa High School, which is immediately downwind of the existing tailing site), the new location would not cause impacts to the same degree as presently experienced at these important receptors.

The potential air quality impacts of the proposed new tailings disposal facility were evaluated using an air pollution dispersion model. The EPA Industrial Source Complex (ISC) model was chosen for the study because of its ability to simulate large area emission sources and include the effects of gravitational settling and deposition of particulate matter. Meteorological inputs to the model were derived from an on-site measurement program. Valid meteorological data were collected for 237 days, or about 8 months, from the Guadalupe Mountain saddle. Emissions data were derived from a special monitoring study conducted by the NMEID around the existing tailings ponds. This derivation is explained more fully in the Air Quality Technical Report (ERT 1988). The estimated emission is about 2 lb/acre-hour which applies only to periods when winds exceed the threshold speed of 12 miles per hour (mph). Winds less than 12 mph are considered to be of insufficient velocity to generate dust from the tailings. Based on a maximum tailings area of 580 acres, this emission rate converts to 1,160 lb/hour. This compares to emissions of 900 lb/hour for the 450-acre existing tailings area.

Modeling was conducted for three stages of tailings pond development that are similar to that shown on Figures 1-2, 1-3, and 1-4; however, the development scenarios used in the air modeling were slightly more conservative in that larger areas of dry tailings were assumed. The first stage represents when the tailings level reaches the 8,000-foot contour. At this stage, the surface area of tailings would be slightly under 300 acres. The second stage represents when tailings would reach the 8,100-foot contour. At this time, the tailings would

cover about 450 acres. The third stage represents the maximum extent of the tailings, when the surface of the pond reaches the 8,200-foot contour. At maximum capacity, the tailings pond would cover about 580 acres. In calculating maximum concentrations for the various development stages, it was assumed that the entire surface acreage of the tailings would be dry and contribute to airborne dust concentrations. These acreages included the dam structures up to the dam centerline. This same assumption was also made during the derivation of a tailings emission factor, so the overall effect on the model results is believed to be minimal. In operational reality, approximately 25 to 30 percent of the area would be covered by open water. Of the remaining 70 to 75 percent of the beach area, approximately 50 percent would be kept wet due to the multiple discharge locations for tailings.

The modeling procedures are explained more fully in the Air Quality Technical Report (ERT 1988), which is on file supporting this EIS. The results of the ISC modeling for all three tailings pond development stages are given in Table 3-2. Maximum concentrations are reported for both TSP and PM-10. The predicted concentrations were for locations outside the Molycorp project boundary. Since the boundary would be fenced, locations within the project area would not be accessible to the public. The predicted impacts also include a 24-hour TSP and PM-10 background of 32 $\mu g/m^3$ and of 17 $\mu g/m^3$, respectively. Annual average background has been estimated at 50 percent of these levels, or 16 $\mu g/m^3$ and 9 $\mu g/m^3$, respectively.

The results in Table 3-2 show that maximum TSP concentrations are predicted to exceed the current State of New Mexico 24-hour average particulate standard of 150 $\mu g/m^3$ for all stages of tailings development. However, for PM-10, the predicted concentrations would be well within the present NAAQS for 150 $\mu g/m^3$. In addition, the exceedances of the New Mexico TSP limit would be infrequent and highly localized. For the first development stage, TSP concentrations would exceed the 150 $\mu g/m^3$ limit only in a very small area along the southern project boundary. A total of 3 days per year during high winds are predicted to be over the standard, with no more than 1 day per year at any given location over the standard. For the second stage, impacts

TABLE 3-2

SUMMARY OF MAXIMUM AIR QUALITY IMPACTS FROM THE GUADALUPE MOUNTAIN TAILINGS FACILITY

Pollutant	Averaging Time	Stage	Tailings Size (Acres)	Max. Concentrations ($\mu g/m^3$)			Days Exceeding Std.
				Tailings	Background	Total	
TSP	24-hour	First	300	129	32	161	1
		Second	450	156	32	188	2
		Third	580	187	32	219	5
TSP	Annual	First	300	5	16	21	-
		Second	450	7	16	23	-
		Third	580	7	16	23	-
PM-10	24-hour	First	300	41	17	58	0
		Second	450	50	17	67	0
		Third	580	60	17	77	0
PM-10	Annual	First	300	2	9	11	-
		Second	450	2	9	11	-
		Third	580	2	9	11	-

would be slightly larger and more extensive. TSP concentrations are predicted to exceed the State standard in an extremely small area along the northwest project boundary and extending out about 200 meters (650 feet) from the southern project area boundary. At the second stage, the model predicts a total of 5 days over the standard, with a maximum of 2 days at any one location. The third development stage, which represents the maximum level of tailings, would result in the greatest impacts, although these impacts would still be relatively minor in terms of duration and geographical extent. At the third stage, model predictions show small areas over the TSP standard along the north and northwest project area boundaries and concentrations over 150 $\mu g/m^3$ extending about 400 meters (1,300 feet) to the south of the project area boundary. A total of 7 days per year would result in concentrations over 150 $\mu g/m^3$, with no more than 5 days at any one location.

The predicted TSP and PM-10 concentrations at locations of potential public exposure to windblown dust from the tailings are given in Table 3-3. These sensitive receptors include the Wild Rivers Recreation Area, the communities of Buena Vista and Cerro, the town of Questa, and Questa High School. The model predictions show maximum impacts would be well below applicable air quality standards at these locations, which is most likely attributable to the distance to these receptors from the proposed tailings facility. These predictions also do not include the fact that a large percentage of area would be wet at all times.

The modeling results indicate that during periods of high winds, concentrations of TSP may exceed current State of New Mexico standards in the immediate vicinity of the tailings. However, since PM-10 impacts are within allowable limits, these impacts would be considered a nuisance rather than a public health hazard.

3.3 Water Resources

3.3.1 Surface Water

No impacts to surface water resources would occur during construction of the tailings facility; and no significant impacts by tailings pond seepage or discharge from the impoundment to surface water

TABLE 3-3

PREDICTED AIR QUALITY IMPACTS OF GUADALUPE MOUNTAIN TAILINGS FACILITY AT SENSITIVE RECEPTORS (MAXIMUM DEVELOPMENT STAGE)

(in $\mu g/m^3$)

	Pollutant	Maximum			2nd Maximum		
		Tailings	Background	Total	Tailings	Background	Total
Wild Rivers Rec Area	TSP (24-hour)	43	32	75	13	32	45
	TSP (Annual)	<1	16	16	—	—	—
	PM-10 (24-hour)	14	17	31	4	17	21
	PM-10 (Annual	<1	9	9	—	—	—
Buena Vista	TSP (24-hour)	<1	32	32	<1	32	32
	TSP (Annual)	<1	16	16	—	—	—
	PM-10 (24-hour)	<1	17	17	<1	17	17
	PM-10 (Annual	<1	9	9	—	—	—
Cerro	TSP (24-hour)	<1	32	32	<1	32	32
	TSP (Annual)	<1	16	16	—	—	—
	PM-10 (24-hour)	<1	17	17	<1	17	17
	PM-10 (Annual	<1	9	9	—	—	—
Questa High School	TSP (24-hour)	9	32	41	5	32	37
	TSP (Annual)	<1	16	16	—	—	—
	PM-10 (24-hour)	3	17	20	2	17	19
	PM-10 (Annual)	<1	9	9	—	—	—
Town of Questa	TSP (24-hour)	23	32	55	17	32	49
	TSP (Annual)	<1	16	16	—	—	—
	PM-10 (24-hour)	8	17	25	6	17	23
	PM-10 (Annual	<1	9	9	—	—	—

are expected, that is, the quality of stream, spring, or river discharges would not be modified as a result of tailings pond seepage to the extent that water used by established users (e.g., wild and scenic habitat) was measurably reduced; aquatic habitats supported reduced fish populations, or the water quality was in violation of State water quality standards/criteria because of the introduction of contaminants.

Existing water quality parameters for the Rio Grande and Red Rivers are shown in Table 2-4. Dames & Moore (1987 and 1988) and Geocon (1988) studies indicate that metals from tailings pond seepage should be attenuated in the unsaturated zone beneath the pond before reaching the water table. Therefore, groundwater discharge to both rivers would not be degraded by metals originating from the tailing pond seepage. The above cited reports also indicate that groundwater directly beneath the pond would probably show an increase in TDS and SO_4 within 5 years, but that the predicted TDS and SO_4 values would not exceed State standards. Mixing would occur through time and over the distance between the project area boundary and discharge points. Dispersion and dilution should continually occur along the flow route. By the time of discharge in a spring complex, effluent should have been further mixed and diluted. Thus, no significant impact by tailings pond seepage to surface water is predicted.

The proposed tailings disposal facility would employ the same surface water discharge point (Pope Lake) as the existing pond, and would contribute discharge that is chemically very similar to that discharged at Pope Lake (see Table 1-3) under Molycorp's existing NPDES permit. NPDES permit daily maximum limits are not expected to change, and no significant impact to surface water is expected as a result of additional discharge from the proposed impoundment.

Molycorp's diversion rights to water from the Red River are limited to 15 cfs; actual usage is 5 cfs. No adverse impacts to surface water quantity would result from the proposed project.

3.3.2 Groundwater

No impacts to groundwater resources would occur during construction of the tailings facility. Operation of the tailings facility is expected to result in some downward seepage of the tailings solution to the regional water table. Extensive groundwater studies performed by Dames & Moore (1986, 1987) and by Geocon (1988), as discussed below, indicate this impact would not be significant in that the quality of groundwater would not be modified as a result of tailings pond seepage to the extent that water used by established users (e.g., BLM visitor's center well, municipal wells) was measurably reduced or the water quality was in violation of State water quality standards because of the introduction of contaminants.

Two deep wells (1,207 and 632 feet below surface) were installed by Dames & Moore (1988) to assist in determining the amount of existing underflow in the vicinity of the proposed Guadalupe Mountain tailings impoundment and to assess the magnitude of contaminant transport in the saturated zone away from the pond. Pumping tests confirmed that the volcanic rocks beneath Guadalupe Mountain are capable of transmitting large volumes of groundwater. The wells were tested at flow rates of 125 and 175 gallons per minute (gpm) with no appreciable drawdown being observed. Based on accretion studies in the Rio Grande and Red River and discharge rates of springs issuing from the river canyons, it was previously estimated that at least 50 cubic feet per second (cfs) of underflow was present along a 5-mile line between Cerro Chiflo and the head of the Red River Canyon (Dames & Moore 1987). It was further concluded that this represented an underflow of approximately 10 cfs/mile along this transect. A value of transmissivity based on specific capacity from one of the wells was used to calculate an underflow of 51 cfs over a 5-mile distance. This results in approximately 10 cfs/mile which is comparable to the estimate given by the accretion study. Such corroboration indicates that the estimate of transmissivity based on the specific capacity relationship is the most representative of actual formation conditions.

The relationship between specific capacity (Q/s) and transmissivity (T) indicates that the T of the formations tested in the wells is on the order of 1.8×10^6 gal/day/ft (240,000 ft^2/day). Assuming an aquifer

thickness of 100 feet (i.e., the thickness of the test interval), a hydraulic conductivity of 2,400 ft/day (0.85 cm/sec) was calculated (Dames & Moore 1988).

In a separate study (Geocon 1988), seepage rates over time were predicted for the tailings disposal facility, which by design would control seepage and minimize impact on the environment. Geocon's estimated seepage rates are presented in Table 3-4. The study concluded that under normal operating conditions, the total seepage from the proposed tailings impoundment would range from 0.2 cfs in the early stages of operation to 0.5 cfs at the end of its operating life. During the first year start-up conditions, Geocon estimated that a maximum 0.31 to 0.98 cfs of seepage from the impoundment could occur.

The width of the tailings impoundment area was estimated to be approximately 6,000 feet (Geocon 1988). The seepage "footprint" at the water table beneath the tailings pond was estimated to be about 11,000 feet based on modeling studies conducted by Dames & Moore (1987). Using these two values (6,000 and 11,000), it was shown that the rate of underflow moving beneath the proposed tailings pond would be 11.7 and 21.4 cfs, respectively (Dames & Moore 1988). Typical water quality parameters of seepage water discharged from the existing impoundment are shown in Table 1-3.

A modeling analyses of flow and solute transport in the unsaturated zone beneath the proposed tailings pond (Dames & Moore 1987) predicted that molybdenum, manganese, and lead would take more than 30 years to travel to the water table, by which time they would be attenuated. Total dissolved solids (TDS) and SO_4 were predicted to take approximately 5 years to travel to the water table. Figures 3-1 and 3-2 depict mixing concentrations for underflows of 11.7 cfs and 21.4 cfs, respectively. In both of these figures, the seepage rate shown represents the maximum range of possibilities and varies from 0.0 cfs to 1.5 cfs. The TDS and SO_4 concentrations (as the seepage reaches the water table and mixes with the underflow) vary linearly with the seepage rate. The relationships between mixing concentrations and the long-term average seepage rate of 0.52 cfs and the maximum seepage rate of 0.98 cfs (Geocon 1988) are designated in both figures. In both cases, the predicted concentrations of SO_4 and TDS directly beneath the pond

TABLE 3-4

ESTIMATED SEEPAGE RATES AT THE

GUADALUPE MOUNTAIN TAILINGS FACILITY

Stage	Estimated Surface Elevation (feet)		Estimated Area (acres)			Q (cfs)[1]
	Water	Tailings	Total	Water	Tailings	
Initial Pond Development						
1 Month	7,915	7,905	21.5	21.5	10.1	0.31[2]
1 Year	7,960	7,955	143	13.8	129.2	0.98[3]
Normal Operation						
5 Years	8,010		267.7	50	217.7	0.28[4]
Ultimate	8,190		486.7	50	436.7	0.52[5]

Source: Geocon 1988.

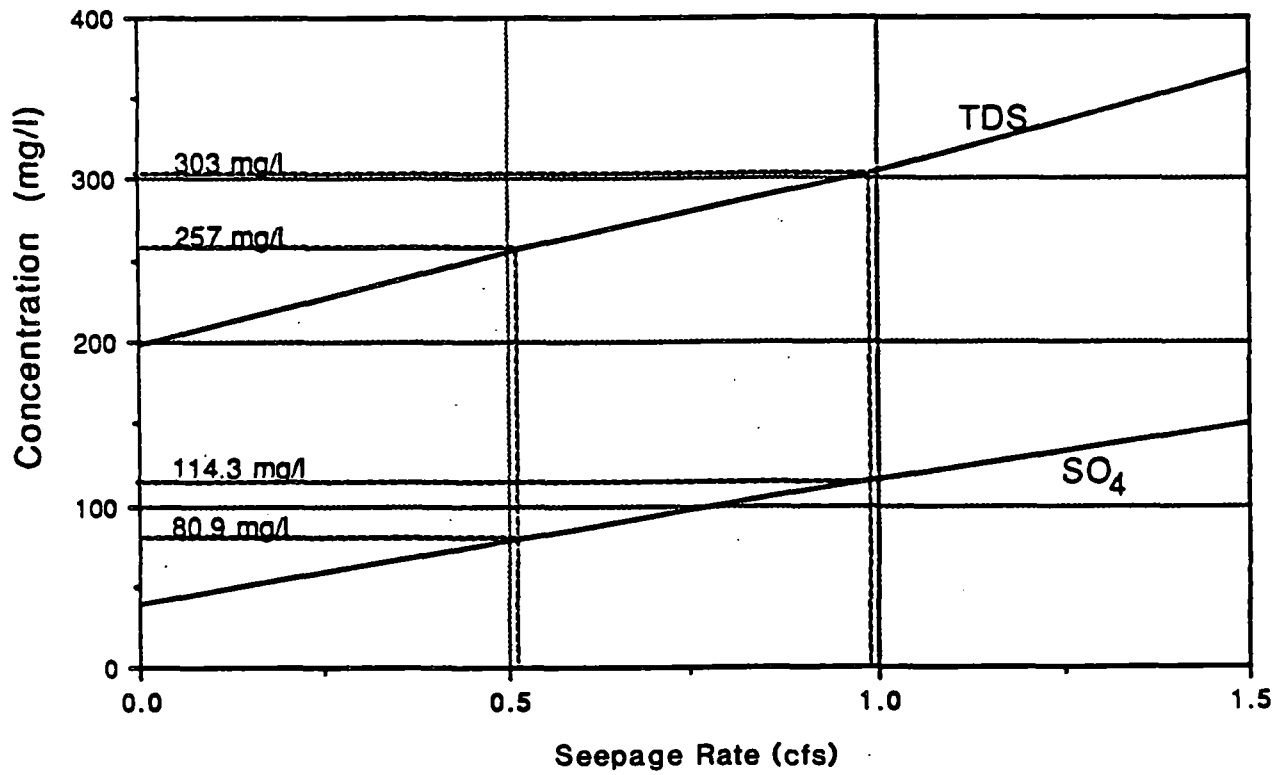
[1] Q = estimated total seepage.

[2] Assuming:
- 10 ft. clear water over settled tailings
- hydraulic gradient in tailings and overburden = 1
- vertical permeability of tailings = 1.0×10^{-5} cm/sec
- permeability of overburden = 1.0×10^{-5} cm/sec

[3] Assuming:
- hydraulic gradient in overburden and tailings = 1
- vertical permeability of tailings:
  slimes predominant zone (50 acres) 1.0×10^{-6} cm/sec
  balance of area 6.3×10^{-6} cm/sec

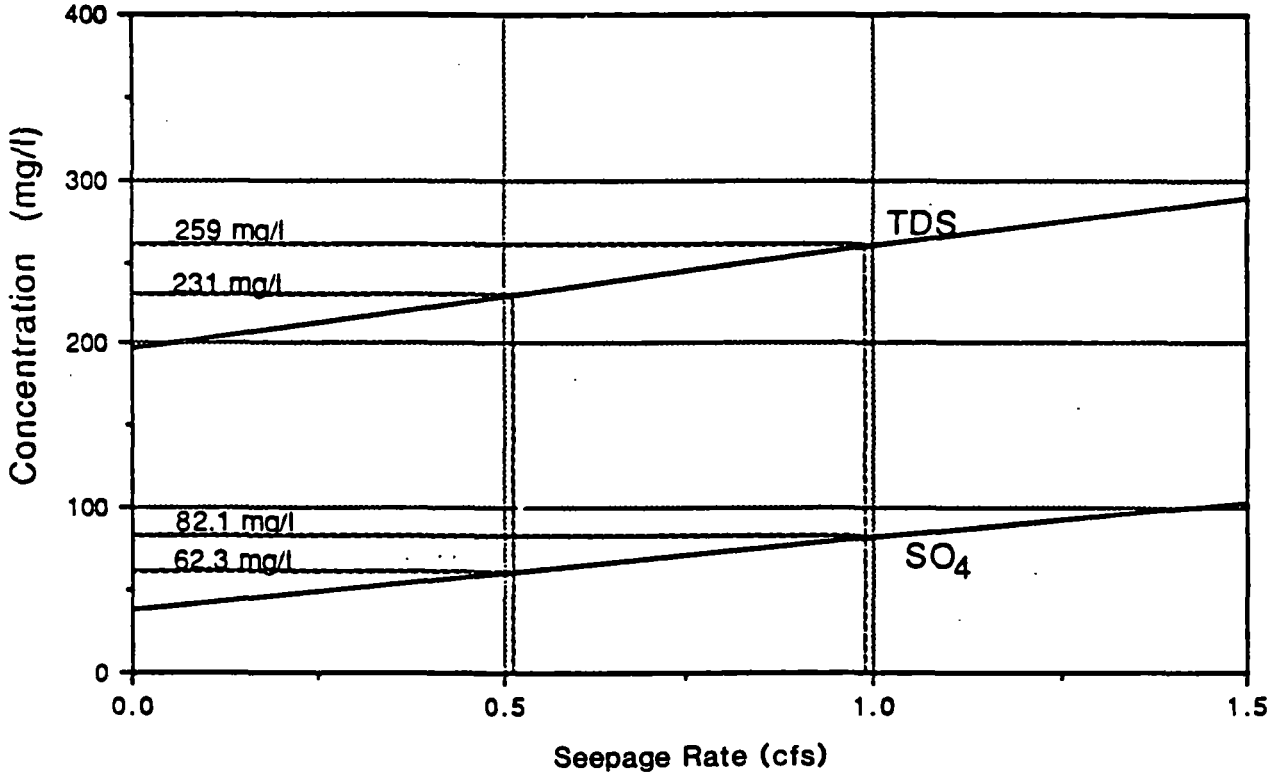
[4] Based on unit seepage rates (cfs/acre): pond = 0.00172
beach = 0.00087

[5] Based on unit seepage rates (cfs/acre): pond = 0.00145
beach = 0.00103



Source: Dames & Moore 1988

FIGURE 3-1 MIXING CONCENTRATIONS FOR UNDERFLOW OF 11.7 cfs



Source: Dames & Moore 1988

FIGURE 3-2 MIXING CONCENTRATIONS FOR UNDERFLOW OF 21.4 cfs

would be well below the New Mexico water standards of 600 and 1,000 mg/l, respectively. These findings are corroborated by results presented in Dames & Moore (1987), when a hydraulic conductivity similar to that determined through hydraulic testing (1×10^{-1} cm/sec) was used in model calculations.

Groundwater quality in the area, including water from the BLM visitor center well and wells serving the towns of Questa and Cerro, would not be significantly impacted.

3.4 Topography/Geology

Construction of the proposed tailings facility at maximum buildout would result in the permanent alteration of approximately 825 acres of land in the Guadalupe Mountain area. The two tailings dams would be located at the northwest and southeast ends of the saddle which separates the two peaks of Guadalupe Mountain. The saddle floor would ultimately be raised 300 to 380 feet (U.S.D.I. BLM 1985). This topographic modification is addressed further under visual resources (see Section 3.10).

Minor impacts to geologic resources would occur during construction and operation of the tailings facility. Impacts would include the displacement of a moderately large volume of geologic material to construct the dams and induced strain on bedrock with probable fracturing as a result of blasting. No unique geologic features or geologic units bearing paleontological resources are known for the proposed impact areas.

The low incidence of earthquakes places the study area in a Seismic Risk Zone 1, where minor damage is expected to occur in the event of an earthquake. Five major faults are located outside the study area, the closest is about 2 miles from the proposed tailings area (see Figure 2-2).

Some downward seepage of the tailings solution is expected to occur through the permeable underlying rhyodacite and basalt. This is expected to percolate downward to the regional water table, as discussed under groundwater (see Section 3.3).

3.5 Soils

Construction and operation of the proposed Molycorp tailings facility would result in the disturbance (i.e., burial, horizon mixing, compaction) of about 825 acres of soil resources. Approximately 97 acres of the total disturbance area include the Fernando-Hernandez soils which contain suitable salvageable topsoil (see Table 3-5). The remaining acreage contains soils not suitable for salvage. The topsoil material would be permanently lost as a result of the tailings pond excavation and construction of the dams. Although no topsoil would be stripped and stockpiled at the proposed tailings facility, topsoil would be retrieved from the Applicant's off-site reserves (properties) following dam construction and after closure of the facility. Sufficient volumes of suitable soil material would be applied to all disturbed areas to provide a seedbed for reseeding efforts. The Applicant has committed to providing one foot of topsoil cover (see Vegetation under Section 3.15).

Applicant-committed reclamation measures (i.e., erosion control and revegetation techniques) would minimize soil losses and expedite soil stabilization and revegetation.

3.6 Vegetation

Impacts associated with construction and operation of the proposed tailings facility include vegetation removal and loss or reduction of plant productivity. A total of approximately 825 acres would be affected. The majority of the disturbance (87 percent) would occur in the pinyon-juniper woodland and upland forest types which dominate the Guadalupe Mountain area (Table 3-6). About 110 acres of the sagebrush/grassland type would be affected, primarily in the saddle area. Minor impacts to agricultural land and previously disturbed areas would occur along the tailings line and access road.

All wood and timber within the proposed tailings area would be removed during construction. Based on BLM production estimates, the timbered areas (upland forest type) average 1,000 board feet/acre and the woodlands (pinyon-juniper type) contain on the average 7.4 cords of wood/acre. The proposed project would disturb 325 acres of upland forest and 390 acres of pinyon-juniper, which translates to 325,000 board feet of timber and 2,886 cords of wood. The wood would be

TABLE 3-5

SOIL TYPES AFFECTED BY THE PROPOSED PROJECT

Soil Type	Acres	Relative Percent
Fernando-Hernandez Association	97	12
Rock Outcrop-Raton Complex	712	86
Fernando, Cobbly Loam	16	2
Total	825	100

TABLE 3-6

VEGETATION TYPES AFFECTED BY THE PROPOSED PROJECT

Vegetation Type	Acres	Relative Percent
Pinyon-Juniper Woodland	390	47
Upland Forest	325	40
Sagebrush/Grassland	110	13
Total	825	100

Source: ERT, Inc.

salvaged but the loss of timber-producing lands would be a long-tem impact. Woodland product sales of fuel wood, posts, Christmas trees and wildlings, and commercial saw timber sales would maximize use of these resources removed from the proposed tailings facility (BLM 1985). Livestock grazing reductions for the 30-year life of the project would also occur (see Section 3.8).

Applicant-committed reclamation measures including topsoiling (from topsoil reserves off-site) to provide a seedbed, reseeding (following construction of the dam faces and after closure of the tailings facility), and implementing erosion control plans should increase the probability and rate of vegetative reestablishment.

Impacts to threatened and endangered federal or state-listed plant species would not occur as a result of the construction and operation of the tailings facility.

3.7 Wildlife

3.7.1 Construction

Aquatic. Facility construction would not affect the Big Arsenic and Little Arsenic spring systems, located approximately 4 miles southwest of the proposed project site, and would, therefore, avoid any disturbance to benthic macroinvertebrates currently inhabiting the springs (see Appendix B). Nor would any adverse impacts to aquatic species; specifically game fish species within the Rio Grande and Red River, result from construction activities on the Guadalupe Mountain site.

Terrestrial. Construction procedures for the proposed project would include vegetation removal for site clearance. Approximately 825 acres would be affected, with the majority of disturbance (87 percent) occurring in the pinyon-juniper woodland and upland forest types (see Table 3-6). The disturbance to the sagebrush/grassland type would affect about 110 acres, primarily in the saddle area of Guadalupe Mountain. Construction of the tailings facility would result in

long-term (greater than 30 years) removal of approximately 825 acres of wildlife habitat. Consequently, these acreages would be unavailable for wildlife utilization.

Grading of the site would require removal of the wildlife watering device (inverted umbrella) which would affect the wildlife species dependent upon the local water source. A small gully plug reservoir located on the property would also be removed during project construction. This would be particularly important during dry seasonal periods, when a greater number of species would be utilizing the water catchment (Kuykendall 1988).

Large and medium-sized mammals would be displaced during construction activities from the proposed facility site and surrounding habitat. No direct impacts are expected to occur to these species during project construction.

Construction of the tailings facility would result in the displacement or death of smaller, less mobile wildlife species found onsite. Small mammals, reptiles, and bird nestlings would be subject to direct mortality from construction; but many of the affected species, especially small mammals, have a high reproductive potential and are common in surrounding habitats.

Adult birds would avoid the area during project construction and would, therefore, not be directly impacted. However, nesting game or raptor species utilizing the site or surrounding habitat would be precluded from nesting. Waterfowl and shorebirds occurring in adjacent areas would not be affected during these activities.

The bald eagle, American peregrine falcon, ferruginous hawk, and Swainson's hawk potentially forage within the project area. These species would avoid the facility site during construction and would consequently not suffer direct impacts. The whooping crane, mountain plover, and white-faced ibis would not be expected to occur on the project site.

Project construction would also generate an increase in traffic, noise, and human activity, resulting in small, incremental increases in wildlife road kills, and harassment. The project site would be fenced to control access and would be closed to hunting.

3.7.2 Operation

Aquatic. No aquatic resources occur on the proposed project site. In addition, no detrimental effects would be expected for the Big and Little Arsenic spring complexes located approximately 4 miles southwest of the site (see Figure 2-3). According to Section 3.3, average seepage rates from the operation of the tailings pond have been projected to range from 0.28 gpm to 0.52 cfs (Geocon 1988). When compared to measured annual groundwater contribution to the Rio Grande, in the form of seepage, the additional seepage from the tailing pond would contribute a negligible amount to the total groundwater flow. Modeling efforts (Dames & Moore 1988; Geocon 1988) have also shown that the seepage from the proposed tailings pond will not result in exceedances of state or federal water quality standards. These standards include measurements for both TDS and metals. Noting these guidelines, the water temperature, flow stability, and water quality within the springs complexes should not be adversely affected, and no toxic effects to the benthic macroinvertebrates that currently inhabit the aquatic systems are expected to occur.

A mixture of surface water and collected seepage (decant) is proposed to be transported from the Guadalupe Mountain tailings facility back to the existing tailings facility. It would then be treated by an ion-exchange process to remove existing molybdenum and subsequently discharge into Pope Lake and the Red River (see Section 3.3).

Toxicity tests have been conducted on Daphnia by Analytical Biochemistry Laboratories using the tailings operations effluents taken at the Pope Lake outlet. The Daphnia organisms showed no acute effects during the bioassay tests following exposure to undiluted tailings effluent. As discussed, the seepage and decant from the proposed Guadalupe Mountain site would undergo substantial dilution before any potential exposure to aquatic organisms. No adverse effects to the species inhabiting the springs or rivers would be expected.

Terrestrial. The 825 acres proposed for facility site clearance would be unavailable for wildlife utilization for the life of the project (30 years) and possibly longer, depending upon selected

reclamation practices and procedures. Guadalupe Mountain provides high quality foraging habitat and is utilized yearlong by mule deer. The loss of this habitat would adversely affect the local mule deer population, requiring movement of individuals out of the area into adjacent habitats, which may already be at their carrying capacity. However, crucial mule deer range would not be affected. There would also be a loss of potential habitat for the small resident elk population reported in the area. The loss of optimal thermal cover for resident elk during the life of the project would be important, due to the limited amount available to area wildlife (Kuykendall 1988). The area is considered within the potential pronghorn range, and that potential for pronghorn occurrence would be lost for the area of disturbance of the life of the project.

The project would reduce the available habitat and prey base for bobcat, coyote, gray fox, and ringtail, but effects to regional populations are not expected. Following facility construction, these species would likely return and occupy adjacent areas of the project site. Mountain lion and black bear would be eliminated from the project site and would be less likely to occur in the surrounding areas for the life of the project.

No impacts would be expected for small-sized mammal and reptile species during project operation. Nor would amphibious species found in nearby aquatic systems be detrimentally affected during facility operation, since predicted water quality is not expected to exceed state or federal water quality standards (see Section 3.3.).

Upland game birds and raptor species would lose potential nesting and forage habitat during the life of the project. However, individuals would continue to utilize adjacent areas, and impacts from project operation are not expected. Waterfowl and shorebirds may occasionally use the tailings pond during project operation. A variety of species have been recorded visiting the current Molycorp tailings facility (NMGF 1983). Appendix B lists possible species likely to utilize the tailings pond.

Bald eagles wintering in the region and migrating whooping cranes may possibly use or fly over the project area during foraging. However, onsite occurrence would likely be sporadic. No impacts would be expected for this species.

There is concern that the locally breeding peregrine falcons would be impacted by the facility operation. Concerns include loss of habitat, reduction of prey availability, and a potential for decreased peregrine reproduction due to ingestion of pesticide-contaminated prey species. Peregrines may travel up to 17 miles from nesting locations to hunting areas (Benton 1987, U.S.D.I. FWS 1977) and a 10-mile radius from an active peregrine eyrie is generally considered to be important foraging habitat. The proposed tailings facility is located within the anticipated hunting range of the peregrine eyrie; therefore, peregrine foraging habitat could be affected. However, the project site represents less than 1 percent of the peregrine's hunting territory.

The concern regarding increased exposure to pesticide-contaminated prey species attracted to the tailings pond was considered by the U.S.D.I. FWS in preparation of their Biological Opinion (see Appendix C) required under Section 7 of the Endangered Species Act. The source of pesticide contamination of migratory waterbirds potentially occurring on the project site is currently unknown. Possible sources of chlorinated hydrocarbons for these prey species may originate from winter areas in agricultural and aquatic habitats in southern New Mexico as well as from wintering areas in Latin America (Kennedy and Stahlecker 1986).

Based on the agency's evaluation, it was considered unlikely that the project area would be highly utilized by the resident peregrines, due to the distance from the primary peregrine falcon use area. Although the possibility of onsite peregrine use may increase with the added presence of waterfowl and shorebird species on the project site, it is unlikely that concentrations of migratory waterbirds would be attracted to the proposed tailings facility to the extent necessary to constitute a substantial prey base for the peregrine. The U.S.D.I. FWS determined that the proposed project is not likely to jeopardize the continued existence of the bald eagle or peregrine falcon (U.S.D.I. FWS 1983).

The ferruginous hawk, Swainson's hawk, mountain plover, and white-faced ibis may sporadically occur within the project area; however, no nesting sites for these species have been delineated on or adjacent to the proposed facility site (Kuykendall 1988). No adverse impacts are expected for these species during project operation. Periodic contact with state and federal wildlife agencies has determined that no additional species in the project area have been listed or are proposed for listing. In summary, impacts to threatened and endangered federal and state wildlife species would not occur as a result of the construction and operation of the tailings facility.

Following facility closure, the tailings would be capped with a minimum of 1 foot of topsoil and reclaimed. There is a concern for potential uptake of toxic elements from the tailings material into vegetation and the terrestrial food web. Table 1-2 outlines the constituents of the tailings. Toxic elements such as lead, selenium, and molybdenum would be present in limited quantities. Although selenium and molybdenum are essential elements in the diets of livestock and many other animals, only very small amounts are required (0.1 mg/kg or less, dry matter basis) (Stoddart, Smith, and Box 1975). Selenium concentrations in forage exceeding approximately 3 to 5 parts per million (ppm) may cause animal toxicity; in addition, molybdenosis may occur in ruminants when molybdenum concentrations in forage exceeds approximately 5 ppm (Colorado School of Mines Research Institute 1981).

Studies have shown that vegetation grown on uranium tailings piles in New Mexico contains higher concentrations of selenium, arsenic, lead, and copper than vegetation growing on adjacent rangeland (Kelly 1979). Capping the tailings with topsoil should reduce uptake. The uptake of contaminants by vegetation and the consumption of this vegetation by wildlife or livestock may be important within the foodchain. However, the uptake by vegetation is probably a minor transport process when compared to the erosion of bare tailings (Dreesen 1978). Because of the nature of a tailings impoundment, such as that proposed by Molycorp, the likelihood of tailings erosion is very low. If the soil cover over the reclaimed tailings piles is deep enough to prevent significant root penetration into the tailings, no contamination uptake should occur.

Another concern is the contamination of small mammals or other animals burrowing into the tailings materials and in turn affecting other species. Data on this subject are not available; however, adequate capping of the tailings, as proposed, should also eliminate this problem.

Reclamation of the tailings facility would follow recommended BLM procedures. Minimum depth of topsoil would be 1 foot to aid revegetation and prohibit substantial root penetration. The fenced enclosure, surrounding the site, would remain during these studies to limit wildlife access (see Vegetation under Section 3.15).

3.8 Land Use

3.8.1 Land Status and Land Use Plans

The proposed project site is located on public lands administered by the BLM. Management of the area is covered in the Taos Resource Management Plan (RMP) that was approved July 26, 1988. The proposed development is compatible and consistent with this plan. A recommendation in the RMP specifically excludes the proposed Molycorp tailings site from the adjacent Wild Rivers Recreation Area Special Management Area (SMA) pending the completion of this EIS and a final decision regarding the proposed project.

The proposed site could become private land if the existing claims are patented. Taos County does not currently have an adopted land use plan or zoning ordinance. Private land development will be addressed at the time a county land use plan is prepared.

3.8.2 Prime and Unique Farmland

As the project is currently designed, no direct impact on prime or unique farmland may be expected from the Proposed Action as the nearest prime farmland is approximately 1 to 2 miles to the northeast of the proposed site.

3.8.3 Livestock Grazing

The BLM quantifies the capacity (i.e., stocking rate) of each grazing allotment in terms of Animal Unit Month (AUM) preference

numbers. The AUM preference number for a particular allotment does not change from year to year; however, the number of cattle permitted to graze on an allotment might vary from season to season depending on such factors as the condition of the resource and length of the grazing season (e.g., 3 months vs. 6 months). Consequently, impacts to livestock grazing allotments are quantified in numbers of AUMs affected, not by head of cattle. The actual impact upon each livestock operation would be contingent upon the existing level of use, and the individual permittee's ability to adjust to the reductions.

Two livestock grazing allotments would be directly affected by the Proposed Action. Reductions in public land AUMs ranging from 23 percent to 70 percent may be expected. Table 3-7 summarizes the public land AUM reductions that would occur.

The Proposed Action would reduce the number of AUMs on Allotment 608 by 23 percent, for a net loss of 48 AUMS. The affected area includes a drainage and saddle which have a good diversity of grasses and high forage value. In addition, two range improvements would be affected by the Proposed Action, an earthen livestock reservoir and an inverted umbrella located on this allotment. The earthen livestock reservoir would be buried beneath the west dam. The inverted umbrella will be dismantled and relocated to an alternate location to be determined by the BLM.

However, Allotment 608 represents only the BLM-permitted land that this individual permittee uses. In order to maintain this livestock operation on an annual basis, the permittee utilizes other grazing land in the area, including private, U.S. Forest Service, and State of New Mexico leased lands. This livestock operation totals approximately 90 head of cattle (Yonemoto 1988). A herd this size would require approximately 1,080 AUMs annually. Consequently, the 48 AUMs affected by the proposed project represent less than 5 percent of the total number of AUMs required annually for this livestock operation. The permittee on Allotment 608 would probably need to reduce the number of animals using this allotment (Yonemoto 1988).

Allotment 609, the most affected allotment in terms of percent loss of AUMs (70 percent), has not been permitted for two years. In addition, the BLM has indicated that this allotment probably would no

TABLE 3-7

REDUCTIONS IN GRAZING PRIVILEGES ON THE PROPOSED TAILINGS DISPOSAL SITE

Allotment Number	AUMs Before Construction	AUMSs After Construction	Percent Loss
608	210	162	23
609	30	9	70

Source: ERT, Inc.

longer be permitted for grazing due to the lack of an adequate water supply and sparse grazing vegetation (i.e., there is too much pinyon/juniper and not enough grasses) (Yonemoto 1988).

Farm credit agencies and/or banks base loan amounts, in part, on the number of AUMs a livestock operator has leased and will loan approximately $800 per animal unit. An animal unit is the equivalent of one grazing animal per month for one year (i.e., total number of AUMs/12 months = yearly animal units) (Yonemoto 1988). A reduction in the number of AUMs on an allotment will also decrease the potential loan value of that allotment. For example, Allotment 608 would lose approximately 48 AUMs under the Proposed Action. The reduction in potential loan value would be approximately $3,200 (48 AUMs/12 months = 4 animal units x $800 per animal unit = $3,200) (Yonemoto 1988). Allotment 609 would decrease approximately $1,400 in potential loan value.

Finally, the BLM would lose $106.26 for the 1988 grazing period in revenue (69 AUMs x $1.54 per AUM grazing fee = $106.26). The cost per AUM is based upon a fee formula which may change annually.

3.9 Recreation

The proposed Molycorp tailings site is not located within a designated recreation area. However, it is adjacent to and nearly surrounded by the Wild Rivers Recreation Area SMA which is made up of the Wild Rivers Recreation Area and the Guadalupe Mountain ACEC (see Figure 2-6). Management of these areas is covered generally in the Taos RMP (U.S.D.I. BLM 1988), and more specifically in the Wild Rivers Recreation Area Management Plan (U.S.D.I. BLM 1988). The Proposed Action is consistent and compatible with both plans.

The Proposed Action would result in a reduction, or restriction, of access to a portion of the Guadalupe Mountain area for recreation use, including day hiking, camping, ORV use, hunting, and cross-country skiing.

The Wild Rivers Recreation Area Management Plan recommends the area immediately to the west of the proposed tailings disposal site be managed as a low use recreation zone for both motorized and non-motorized backcountry camping and for wildlife viewing. This recreation plan includes most of the Guadalupe Mountains. Consequently,

people will still have access to most of the Guadalupe Mountain for recreation use (Speegle 1988).

Implementation of the Proposed Action would also result in noise (Section 3.11) and visual impacts (Section 3.10) in the vicinity of the Wild Rivers Recreation Area.

3.10 Visual Resources

Visual effects of the proposed Molycorp Tailings Disposal Facility were analyzed using the procedures outlined in the BLM Visual Resource Contrast Rating Handbook (U.S.D.I. BLM 1986). Visual impact significance was determined by comparing visual contrast ratings for the proposed facilities with visual resource management (VRM) class objectives for the respective management class affected (Table 2-10).

Visual contrast analyses were conducted from three numbered "key observation points" (KOPs): (1) at the entrance to the Sheep Crossing Campground, representing all motorist access to the Wild Rivers Recreation Area as well as campers and hikers using the campground as a base; (2) on the Rio Grande approximately 2 miles upstream from Sheep Crossing Campground, representing boaters on this "very difficult" rated section of the river; and (3) a point on State Route (SR) 533 (formerly SR 3) approximately 2 miles southwest of the SR 38 intersection in Questa, representing travelers on the highway, especially those approaching from the south. These locations are shown on Figure 3-3.

Development of the proposed tailings facility would result in a significant increase in visual contrast as viewed from KOP 1 and KOP 2. The visual effect of the westerly dam would be particularly strong as viewed from Sheep Crossing Campground (KOP 1) because the flat valley location of the viewer and the scarcity of interesting visual features in the near foreground encourages viewers to look outward into the middle distances and beyond, to the area where the dam would be located. The light color of the dam face, even when seeded to grasses, would contrast starkly with the dark green of the natural pinyon, juniper, and upland conifer woodlands on Guadalupe Mountain during much of the year. Figure 3-4 illustrates the view from KOP 1 with and without the dam at maximum development. The color contrast would be most noticeable during construction periods when the dam face would be completely

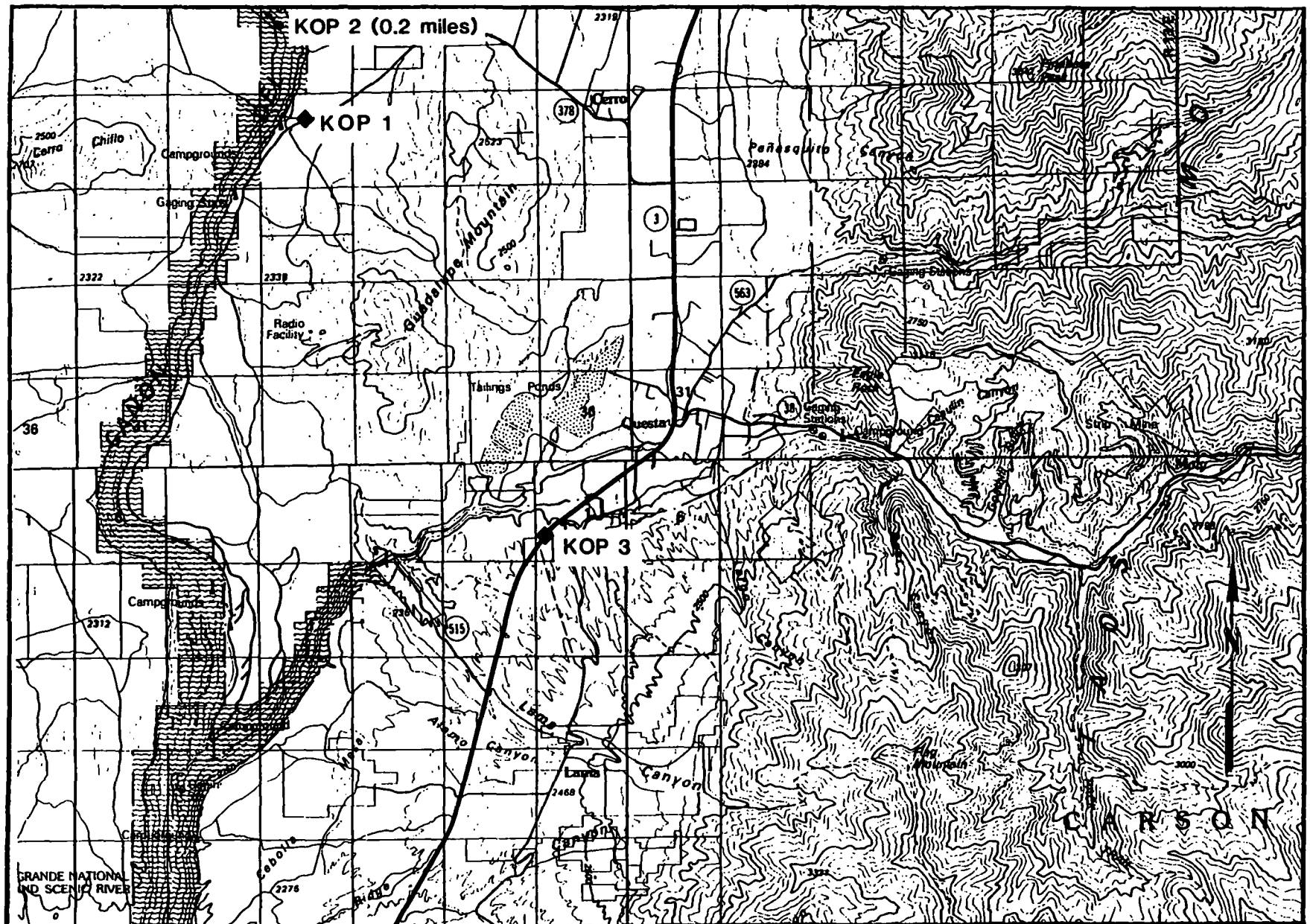
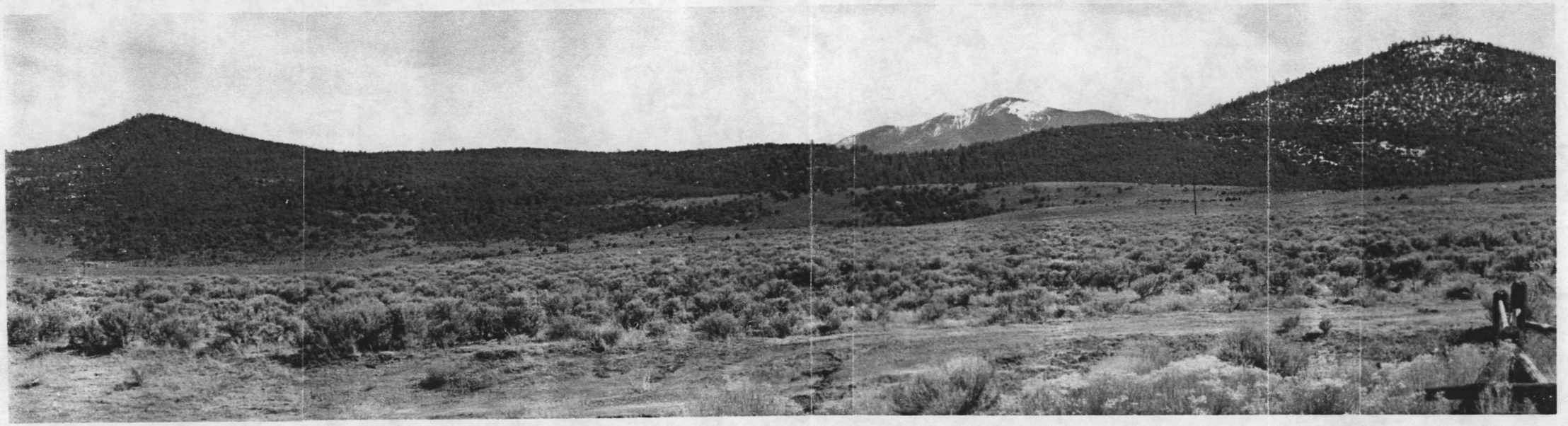


FIGURE 3-3 VISUAL RESOURCE KEY OBSERVATION POINTS (KOPs)



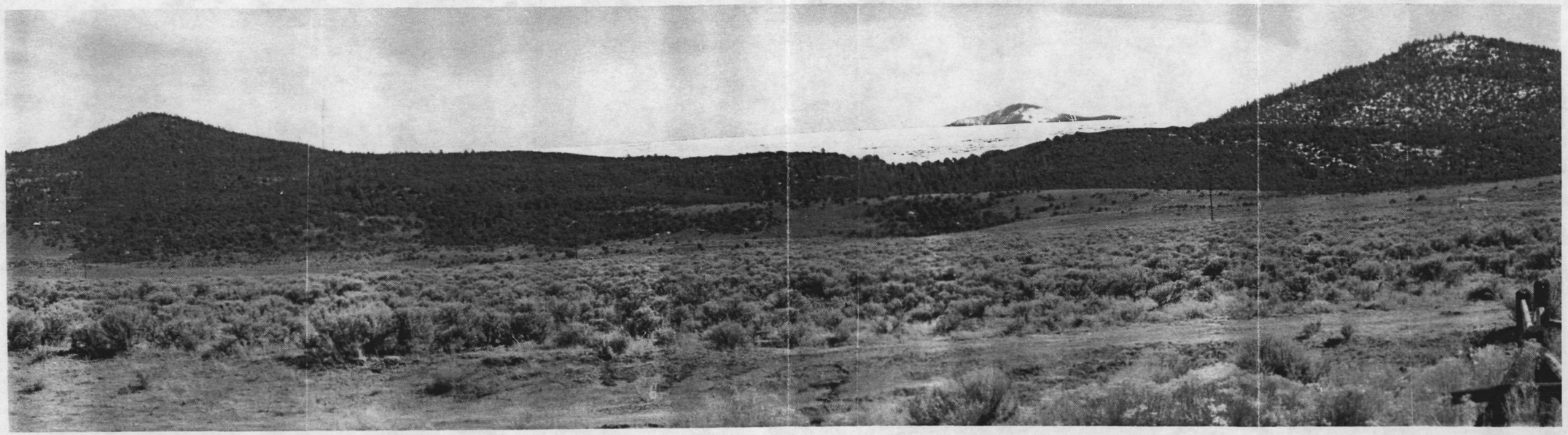


FIGURE 3-4 VISUAL COMPARISON OF VIEW FROM KOP 1 WITH AND WITHOUT THE DAM (AT MAXIMUM DEVELOPMENT)

unvegetated but would continue throughout the life of the project because of the type of grasses that thrive in the arid local climate. The strong color contrast would be reinforced by the flat-topped geometric shape of the dam. The color and shape together would demand the attention of even casual observers, forcing them to notice the dam as a man-made intrusion into a predominantly natural landscape. This would conflict with the VRM Class II visual objective.

The effects on views from the edge of the river canyon would also exceed the limits of the VRM Class II objective, primarily because of the color contrast noted above. Concern over the impacts would not be as great, however, for several reasons. Most important is the canyon itself. The strong visual drama of the canyon and the river demands the attention of viewers on the canyon floor and holds their visual focus predominantly within the canyon. This short visual focus effect is enhanced by the nature of the river which is rated "very difficult" (Class IV according to the Standard River Rating System) through the segment with views of the proposed westerly dam. Boaters would be concentrating on the river much more than on scenery outside the canyon. Nevertheless, the dam would be visible and the color contrast would attract some attention.

Effects on views from KOP 3, southwest of Questa, would not be considered significant. The easterly dam would be visible to viewers on SR 533 but would not dominate their views because of the visual strength of the existing tailings facilities and other obvious human activities. The elevation of the proposed dam some 800 feet above the existing facilities would attract viewer attention primarily because of color contrast with woodlands on Guadalupe Mountain. It would not violate the intent of the VRM Class III objective applicable on the east face of the mountain, however.

3.11 Noise

Sources of noise from construction of the proposed westerly dam would include rock drilling, blasting, loading and hauling of rock, rock placement and compaction, and watering to reduce dust emissions. It was assumed for analytical purposes that these activities would be clustered at the center of each dam, a conservative assumption as a substantial

TABLE 3-8

MAJOR NOISE SOURCES

Equipment Roster		Maximum Noise Emission Level Per Unit (dBA)	Total Units
Type	Size		
Front-end Loader	10 - 12 yards	88	1
Scraper	85 ton	88	3
Rotary Drill	7 to 9 inches	98	1
Dozer	330 HP	88	1
Water Truck	10,000-gallon	88	1
Miscellaneous Vehicle	3/4 ton	75	2

Sources: U.S. EPA 1971, CERL 1978, ERT file data.

TABLE 3-9

PROJECT-RELATED NOISE

Sensitive Receptor	Levels (dBA)	
	Background	With Project[1]
Sheep Crossing Campground	40	46.0
Chiflo Campground	40	45.3
Questa	40	43.2

[1]As defined in the text, these are estimated worst-case noise levels.

amount of activity is likely to take place higher in the saddle of Guadalupe Mountain. Table 3-8 provides a roster of major noise-emitting equipment for each dam, together with maximum noise emission levels for each unit of equipment. The combined noise emission level for the activity at each dam is estimated at slightly under 101 dBA at a reference distance of 50 feet.

Emission levels are considered to be conservative (worst-case) because they are based on the high end of measured ranges for each unit of equipment (U.S. EPA 1971). The combined emission level thus presumes that all equipment at each dam would be operating simultaneously and continuously at maximum output. These extreme conditions would rarely, if ever, occur. Consequently, the results of the noise analysis would be considered worst-case; the average project noise emissions would be less than the levels indicated in the analysis.

The noise impact analysis calculated noise attenuation (reduction) from two factors in the project area: spreading of sound waves over distance and atmospheric absorption. The results of the noise analysis are illustrated in Table 3-9. Assuming an ambient level of 40 dBA, the projected worst-case noise level from construction activity is estimated to 46.0 dBA at the Sheep Crossing Campground. This would be a noticeable increase but would not be sufficient to disrupt conversation at normal speech levels up to about 20 feet (Harris 1979). Construction activity would be limited to daytime hours so sleep disruption would not be an important consideration. Projected noise levels at Chiflo Campground and in the center of Questa would be slightly lower than at Sheep Crossing Campground.

The noise analysis does not quantitatively consider blasting noise beyond the work done by NMEID in 1982 because the impulsive nature of blasting noise and the limited amount of blasting required would have little if any effect on the quantitative noise results presented above. NMEID's work (Orton 1982) indicates blasting noise would be below ambient levels at the campgrounds. While this may be, it seems likely that some combination of noise and vibration would be perceptible at the campgrounds less than 2 miles away. Blast noise would be disruptive to some recreational activities in the area.

3.12 Cultural Resources

Criteria used to establish whether or not adverse impacts would occur at archaeological sites can be found at 36 CFR 800.9. These regulations which implement the National Historic Preservation Act elaborate upon the criteria of effect and adverse effect which are used to evaluate the impacts proposed actions might have upon cultural resources. These regulations state:

> "(a) An undertaking has an effect on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the National Register. For the purpose of determining effect, alteration of features of the property's location, setting, or use may be relevant depending on a property's significant characteristics and should be considered.
>
> (b) An undertaking is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties include,but are not limited to:
>
> (1) Physical destruction, damage, or alteration of all or part of the property;
>
> (2) Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register;
>
> (3) Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting;
>
> (4) Neglect of property resulting in its deterioration or destruction; and
>
> (5) Transfer, lease, or sale of the property.
>
> (c) Effects of an undertaking that would otherwise be found to be adverse may be considered as being not adverse for the purpose of these regulations:
>
> (1) When the historic property is of value only for its potential contribution to archaeological, historical, or architectural research, and when such value can be substantially preserved through the conduct of appropriate research, and such research is conducted in accordance with applicable professional standards and guidelines;

(2) When the undertaking is limited to the rehabilitation of buildings and structures and is conducted in a manner that preserves the historical and architectural value of affected historic property through conformance with the Secretary's "Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings"; or

(3) When the undertaking is limited to the transfer, lease, or sale of a historic property, and adequate restrictions or conditions are included to ensure preservation of the property's significant historic features.

Eleven archaeological sites (LA-38422 - 38432), located within the Guadalupe Mountain basin, are considered eligible for nomination to the National Register of Historic Places (NRHP). As a result of the construction of the tailings disposal facility, these sites would all be adversely affected from activities associated with construction, operation, and reclamation. Clearing, grading, topsoil removal, and excavation of fill material for construction of dams, pumping stations, pipelines, roads, and power lines are planned. This ground disturbance would physically damage individual artifacts and features and would destroy the spatial integrity of the archaeological sites. Those sites not immediately destroyed by construction activities would be buried by the tailings themselves. Thus, they would be sealed under a deep layer of sediments, and access to and study of these resources would be effectively denied. Long-term effects of the leaching action from the minerals placed on top of the archaeological sites would likely compromise archaeological paleosol, pollen, radiocarbon, and other types of analyses.

Determination of no adverse effect, however, can be reached if the sites are mitigated according to the data recovery plan (Vierra 1984). Phase I of this Mitigation Plan will be implemented in 1989. A description of this mitigation can be found in Appendix E.

At the conclusion of the mitigation in 1989, the necessity of Phase II excavation will be evaluated based on the results of Phase I data recovery. Phase II will be implemented if Phase I analysis determines that buried features and/or buried stratified cultural deposits exist beneath the surface of the archaeological sites.

3.13 Socioeconomics

This section evaluates the beneficial and adverse effects of the proposed Molycorp tailings disposal facility. The project-generated impacts are related to the present overall economic picture of the area, including the current high level of unemployment in Taos County (25 percent), the related low level of tax revenues to support local government jurisdictions, and low levels of personal incomes associated with low paying employment.

Population in Taos County is not expected to increase due to the proposed project. The projected construction workforce for the tailings dam site is approximately 30 workers. The construction schedule is dependent on improved conditions in the molybdenum market. Initial construction activity would require 18 months to complete. It is anticipated that the workforce would be comprised of some of the 15 current Molycorp employees. The remaining workforce would be made up of local labor including some persons employed in the mining sector prior to its slowdown in 1986. The operations of the tailings dam would require approximately 30 workers.

3.13.1 Economy and Employment

The direct economic effects of the construction of the tailings dam would be minimal. The 30 jobs associated with construction would reduce unemployment in Taos County by less than 1 percent. The tailings dam construction would extend the potential life of mining sector jobs; however, the economic conditions of the mining sector would have to improve and activate the potential for extended job life.

3.13.2 Public Fiscal Conditions

The capital expenditures for the proposed tailings dam are estimated at $8.3 million over a 36-month period. During the 18-month actual construction period, $7.3 million would be expended of which approximately $1.6 million would be payroll. The construction would contribute to the net revenue of Taos County and the Questa School District in the form of gross receipts taxes and personal property taxes. Gross receipts taxes are paid on labor and equipment during the

construction period. Personal property taxes are paid on equipment owned and operated by Molycorp during tailings disposal operations. County-wide assessed valuation would increase. The tailings dam construction would have little effect on local government expenditures and, consequently, would result in a net fiscal benefit to the county.

No new residential or commercial development is anticipated due to dam construction, however, the increase in payroll during construction would contribute to increased sales tax receipts within the towns of Taos and Questa.

3.13.3 Housing and Public Services

Adequate housing and public services and facilities exist throughout the region. No impacts from tailings dam construction are anticipated for schools, police, fire protection, social services, water and sewer systems, or other public services.

3.14 Health Risk Assessment

An initial health risk assessment was completed to address the potential health effects associated with exposure to windblown tailings dust from the Molycorp tailings facility on area residents and Questa High School students and faculty. This assessment focuses on the respirable-sized fractions of the tailings dust, which represents particulate matter less than 10 microns nominal diameter and is designated PM-10 (see also Section 3.2, Air Quality, for further discussion of the PM-10 standard). The federal PM-10 standard is 150 $\mu g/m^3$ (24-hour averaging time).

This conservative assessment is based on the predicted maximum air quality impact levels shown in Table 3-2 for the PM-10 material of 60 $\mu g/m^3$ (24-hour averaging time). This was the maximum concentration predicted to occur at the Molycorp property boundary surrounding the proposed tailings facility. The predicted PM-10 concentrations that would occur at Questa High School and the Town of Questa were 3 and 8 $\mu g/m^3$, respectively (Table 3-3). The 60 $\mu g/m^3$ level is 20 and 7.5 times the exposure levels predicted at these two receptors. The purpose of using the worst-case exposure level was to provide an additional margin of safety in the analysis.

The Threshold Limit Values (TLVs), which regulate occupational exposures, provide the basis of this risk assessment. The Occupational Health and Safety Administration (OSHA) has determined that TLVs are effective in protecting workers. OSHA's TLV protective criterium is to protect workers who are exposed to the TLV concentration 8 hours each day, for 5 days each week over a working life time (45 years). In order to account for differences between the general population and the work force, and for the potentially continuous exposure (24 hours/day), a thousand-fold safety margin was incorporated into the standard.

A second consideration in this risk assessment was a comparison of the chemical composition of the Molycorp tailings dust with the chemical composition of average soils present in the western United States. The data for this comparison are presented in Table 3-10. Only three chemicals that are associated with potential health effects (lead, molybdenum, and selenium) are present at higher concentrations in the tailings dust as compared to "average" soils. The other potentially harmful metals are not present at significant concentrations compared to average soils.

The maximum potential human exposure concentrations for areas immediately adjacent to the tailings facility are given in Table 3-11. It is important to recall that these concentrations are 20 and 7.5 times higher than the highest exposures that would be expected at Questa High School or the Town of Questa. The first column in Table 3-11 gives the concentration of specific metals in the tailings dust; the second column gives the maximum concentration in the air of each metal (e.g., the maximum exposure to molybdenum would be 0.08 $\mu g/m^3$). The OSHA TLV divided by 1,000, in the third column, shows that an acceptable "no effects" level for molybdenum as defined earlier would be 5.0 $\mu g/m^3$ of air. The last column gives the maximum exposure level as a percent of the TLV/1,000 for each specific chemical. In the case of molybdenum, the maximum exposure level from the tailings dust is only 1.6 percent of the TLV/1000. The same type of comparison can be made for any of the tailings dust constituents.

It is concluded from the risk assessment that the chemical constituents in the Molycorp tailings dust as listed in Table 3-10 are not present in high enough concentrations to pose a health threat to

TABLE 3-10

COMPARATIVE TRACE METAL CONCENTRATIONS

(IN PARTS PER MILLION)

	Molycorp Tailings	Soils of Western United States[1]	
		Mean	Normal Range Mean ± 1 SD[2]
Aluminum (Al)	>10,000	58,000	29,000-116,000
Arsenic (As)	2.7	5.5	2.8-10.9
Barium (Ba)	740	580	337-998
Cadmium (Cd)	0.3	0.2	0.1-0.5
Chromium (Cr)	87	41	19-90
Cobalt (Co)	8.9	7.1	3.6-14.0
Copper (Cu)	94	21	10-43
Iron (Fe)	>10,000	21,000	10,800-41,000
Lead (Pb)	180	17	9-31
Manganese (Mn)	490	380	192-752
Molybdenum (Mo)	130	0.85	0.39-1.85
Nickel (Ni)	5.6	15	7-32
Selenium (Se)	4.7	0.23	0.09-0.56
Silver (Ag)	5.5	0.2	0.1-0.5
Uranium (U)	2.3	2.5	1.7-3.6
Vanadium (V)	50	70	36-136
Zinc (Zn)	98	55	31-98

[1] Data from Shacklette, H. T., and Boerngen, J. G. 1984. Element Concentrations and Other Surficial Materials of the Coterminous United States. U.S. Geological Survey Professional Paper 1270. 105 pp. The means and standard deviations are geometric to account for log normal distributions.

[2] SD = Standard Deviation

TABLE 3-11

MAXIMUM POTENTIAL HUMAN EXPOSURE AT TAILINGS DISPOSAL FACILITY

Element	Concentration in Dry Tailings (ppm)	Concentration ($\mu g/m^3$) Maximum Concentration in Air PM-10 24-hr[1]	Occupational TLV/1,000[2]	Maximum Exposure as a % of TLV/1,000
Arsenic	2.7	0.0002	0.2	1.00
Cadmium	0.3	0.00002	0.05	0.40
Chromium	87	0.005	0.05	10.00
Cobalt	8.9	0.0005	0.1	0.50
Lead	180	0.01	0.15	6.67
Molybdenum	130	0.08	5.0	1.60
Selenium	4.7	0.0003	0.2	0.15
Uranium	2.3	0.0001	0.2	0.10
Vanadium	50	0.003	0.05	6.00
Cyanide	0.4	0.00002	5.0	0.0004
Silver	5.5	0.0003	0.1	0.30

[1] Table 3-2 shows that the maximum 24-hr PM-10 tailings contribution would be 60 $\mu g/m^3$. The maximum concentration in this column was calculated assuming the air contained 60 $\mu g/m^3$ of less than 10-micron tailings dust.

[2] The TLV divided by 1,000 is assumed to represent a conservative environmental exposure level for general populations.

humans at sensitive locations near the Guadalupe Mountain tailings facility. This conclusion is based on a comparison of the relative concentrations of trace metals in the tailings and typical western United States soils and OSHA's TLVs in conjunction with a 1000-fold safety factor. In addition, the worst-case exposure level was used in all calculations rather than the significantly lower exposures expected at "sensitive" locations.

3.15 Required Mitigation and Monitoring Measures

As a result of the impact analysis presented above, the following mitigation measures have been developed. These mitigation measures will be specific requirements of Molycorp as part of their Plan of Operations. Implementation of these mitigation measures will not completely eliminate all potential impacts. This will result in unavoidable adverse impacts that are discussed in Section 3.17. Monitoring measures that would be required as part of permit compliance are also provided below.

Air Quality

- Predicted TSP exceedances would be mitigated by use of a chemical surfactant or bonding agent applied to areas of dried tailings to reduce wind blown dust. Molycorp has specified the use of a surfactant in their Plan of Operations, however this mitigation measure requires that the surfactant be applied at frequent intervals to eliminate or minimize exceedances to the New Mexico state air quality standards.

Water Resources

- Requirements for protection of surface waters discharged by the project will be met as provisions of the U.S. Environmental Protection Agency's NPDES permit.

- Groundwater would be protected by construction and operation design considerations incorporated into the Plan of Operations (see Chapter 1). New Mexico Environmental Improvements Division (EID) must review and approve Molycorp's Groundwater Discharge Plan and would specify any necessary changes in construction or operation design.

Final Engineering

- Molycorp must submit detailed engineering design to the New Mexico State Engineer for approval prior to construction of the tailings impoundment and associated facilities (pipeline,

decant channel, etc.). In addition BLM will also require review and approval of final detailed engineering as a stipulation to approval of the Plan of Operations.

Vegetation

- Reclamation of the tailings area at facility closure will require capping with topsoil and planting with an appropriate seed mixture. Molycorp has committed to a minimum of 1 foot of topsoil for capping. This mitigation measure requires that Molycorp develop a revegetation plan prior to closure and cap tailings with sufficient topsoil so that revegetation with selected native plant species meets criteria for species composition and cover comparable to native vegetation in the area.

- In addition, Molycorp's final revegetation plan would require that sufficient topsoil be used and adequate testing be performed to ensure that there would be no detrimental uptake of potentially toxic material through the food chain.

- BLM will require a performance bond to ensure compliance with reclamation and other mitigation measures. The specific bonding requirements will be determined prior to approval of the Plan of Operations.

Wildlife

- The inverted umbrella wildlife watering device currently located on the project site will be dismantled, removed, and reinstalled by Molycorp. The new location will be selected by BLM and will be determined based upon proximity and need.

Visual Resources

- In order to reduce visual impacts and preserve habitat privacy, any unnecessary removal of trees or vegetation, or removal of construction material will not be allowed on the west side of Guadalupe Mountain.

- Visual impacts of the two rock-filled dams will be partially mitigated by seeding with native grasses and rapidly growing shrubs and forbs on the dam faces. Seeding with an approved mix will occur immediately following each dam lift stage. The purpose of the revegetation will be to minimize color and texture contrast with adjacent naturally wooded slopes. Trees and deep rooted plants will not be permitted for dam safety reasons but some shrub species (e.g., four-wing, rabbitbrush) would probably be acceptable (Ferns 1988). The seed mix will be approved by the BLM for color blending and the State Engineer's office for safety considerations. Molycorp will ensure that the revegetation effort is successfully established.

- Any man-made structures will be mitigated in accordance with Class II visual resource management guidelines, which require that any change in the basic elements (form,line, color, and texture) caused by a proposed activity will not be evident in the characteristic landscape. Contrasts may be seen, but will not attract attention. Earth-tone colors will be used in all necessary painting of structures, and placement will follow the natural contour of the terrain.

Noise

- In order to mitigate potential excessive noise that would impact visitors at the recreation area, a cooperative effort between the BLM and Molycorp will be in effect. Effort will be made to reduce, as much as possible, the noise levels at the recreation area to a recommended level of 50 decibels, and maintain the natural sounds of the wild river. This level will be monitored and maintained from the Chiflo campground. Specific mitigation measures to be used include the following:

  - All blasting and construction work at the site from May through October, will be done during weekday periods between the hours of 8 a.m. and 6 p.m.

  - During the fall and winter months, blasting will be done between 12 noon and 6 p.m. to avoid the sharp noise levels caused by air inversions over Guadalupe Mountain.

  - To reduce road surface wear and vehicle noise on the road to the recreation area (west side of Guadalupe Mountain), all access for construction vehicles to the new tailings disposal site will be limited to the east side of Guadalupe Mountain.

  - Vegetation disturbance between the west dam face and the recreation area will be minimized to maintain noise absorption between the source and the listeners.

Cultural

- A cultural resources mitigation implementation plan for the Guadalupe Mountain site has been developed by the BLM and New Mexico State Historic Preservation Office. This plan is attached to the Draft EIS as Appendix E. The objectives of the plan include site boundary definition, surface collection, subsurface examination, and analysis of collected materials.

Land Use

- Prior to site clearing, BLM will conduct timber or firewood sales to allow salvage of commercial wood products. During clearing Molycorp will cut and stack firewood-sized wood wastes and make that material available to the public.

3.16 Unavoidable Adverse Impacts

Following implementation of the mitigation measures described in Section 3.15, the following unavoidable adverse impacts associated with the construction, operation, and abandonment of the proposed project would remain. The impacts are considered significant in that they result in exceedances of established standards.

Air Quality

During periods of high winds, there is a potential for concentrations of TSP to infrequently exceed State of New Mexico short-term standards in the immediate vicinity of the tailings pond when dry. These impacts would be considered a nuisance rather than a public health hazard.

Visual Resources

Significant adverse visual effects from the proposed project would not be completely mitigable because of engineering safety prohibitions against tree planting on the dam faces and because the time period between construction of the series of dam lifts would not be sufficient to allow plant materials to mature.

3.17 Irreversible and Irretrievable Commitment of Resources

Construction and operation of Molycorp's proposed Guadalupe Mountain Tailings Facility project would result in the irreversible and irretrievable commitment of certain resources. An irreversible commitment of a resource is one that cannot be changed once it occurs; an irretrievable commitment means that the resource cannot be recovered or reused.

Topography/Geology

The changes in landforms due to the creation of the tailings dams and buildup of the tailings would be irreversible. While reconstruction of previous landforms is technically possible, such a measure would be economically unfeasible.

Soils

Approximately 717 acres of soils would be covered by the tailings facility. This soil would be irretrievably lost.

Vegetation

Productivity of the area covered by the tailings facility would be irreversibly lost for the life of the project. Approximately 325,000 board feet of timber and 2,886 cords of wood would be removed from the project area, but would be sold or made available to the public as fire wood.

Visual Resources

The proposed changes in land forms that would result from the dams and tailings pond would cause changes that would be economically unreasonable to reverse. These facilities would irreversibly change the visual character of the landscape.

Cultural Resources

Construction of the proposed project may result in the excavation or burial of cultural resources. The loss of integrity of the sites would be an irreversible and irretrievable commitment of resources.

3.18 Long-Term Versus Short-Term Uses of the Environment

Short-term is defined as the life span of the proposed project, plus one-year of final reclamation; this would equal approximately 41 years. Long-term is defined as the future after final reclamation.

Air Quality

The proposed project would involve short-term increases in total suspended particulate (TSP) levels in the region during operation of the project. Project emissions would not violate federal air quality (PM-10) regulations or standards. Exceedances of State TSP standards may occur infrequently. In the long-term, after closure, emissions due to the proposed project would cease and there would be no long-term effect on air quality.

Topography/Geology

The construction and operation of the tailings facility would permanently (long-term) alter the topography.

Water Resources

No significant short or long-term impacts to water resources are anticipated. Seepage of tailings liquid out of the tailings pond would occur, but available data and detailed impact analysis indicate that water quality of the groundwater and local surface water would not be significantly affected.

Soils

Soils that would be buried under the tailings facility would be lost over the long term; however, adequate soil resources are available elsewhere for use in reclamation. No significant short or long-term impacts to soil resources have been identified.

Vegetation

Vegetation production would be lost during the short-term on 825 acres and woodland would be harvested for timber. Assuming successful reclamation, no long-term impacts to vegetation resources have been identified.

Wildlife

Project-related impacts to vegetation and wildlife habitat would result in a short-term reduction in wildlife locally. Assuming successful reclamation, there would be no long-term effect on the productivity of wildlife resources. Wildlife species of concern or crucial habitats would not be adversely affected.

Land Use

Temporary loss of forage and change in grazing patterns could alter BLM grazing allotment plans. Long-term productivity would not be impaired. Removal of timber would be a short-term impact. Following abandonment and reseeding productivity would eventually be restored.

Recreation

During the short and long term, there would be a reduction in recreational access to the Guadalupe Mountain saddle area.

Visual Resources

Significant impacts to visual resources would result for both the short term and the long term as a result of the tailings facility dams.

Noise

The proposed project would result in short-term noise impacts during construction. No long-term noise impacts would occur.

Cultural Resources

Additional information gained during project surveys for cultural resources sites would add to knowledge of the area's history. Disturbance of cultural resource sites would result in a loss of site integrity.

Socioeconomics

Short-term (beneficial), socioeconomic impacts would result from the proposed project. No long-term impacts are anticipated.

4.0 CONSULTATION AND COORDINATION

4.1 Scoping Process

A public scoping document for the Guadalupe Mountain Tailings Facility EIS was prepared by the BLM in July 1986. The scoping document provided a brief description of the project, a summary of the scoping process, a preliminary identification of the issues, and a form that could be used for submittal of written comments. The scoping document was mailed out to approximately 65 interested individuals, groups, and agencies, and was also distributed to attendees at the public scoping meetings. It was requested in the scoping document that all written and verbal comments on the scope of the environmental analyses for the project be received by August 22, 1986.

Public scoping meetings were held at the following locations:

- Taos - Kachina Lodge, July 22, 1986
  1:00 to 3:00 p.m. - 32 attendees
  7:00 to 9:00 p.m. - 53 attendees

- Questa - Municipal Building, July 23, 1986
  1:00 to 3:00 p.m. - 52 attendees
  7:00 to 9:00 p.m. - 43 attendees

Representatives from the BLM, Molycorp, Unocal, and ERT were present at each of the scoping meetings. A total of 180 persons attended the four sessions of the scoping meetings. The BLM received 130 copies of a form letter in support of Molycorp's project. Subsequent to the meetings, 23 written comments were submitted to the BLM. Thirteen of the written comments were from private individuals; the following agencies and groups also provided written comments:

- State of New Mexico
  - Environmental Improvement Division
  - Department of Game and Fish
  - Energy and Minerals Department
- New Mexico Institute of Mining and Technology
- Town of Taos
- Taos County Commission
- Taos County Chamber of Commerce
- Village of Questa
- Kit Carson Electric Cooperative, Inc.
- Questa Health Center, Presbyterian Medical Services

The concerns and issues that were presented verbally at the scoping meetings or received in the written comments were assigned, as appropriate, to one of the following four categories:

1. Items to be addressed in the EIS;

2. Items that are determined to be outside the scope of the EIS;

3. General comments that will be considered in preparation of the EIS; and

4. Comments that will be addressed in a public information document to be prepared by the BLM.

In December 1986, the BLM distributed a public information document to approximately 225 interested persons. The public information document included a detailed summary of scoping results, BLM responses to selected comments received during scoping, and the BLM Field Solicitor's opinion on concerns regarding future patenting of the Guadalupe site. These items are attached as Appendix A to the Draft EIS. Correspondence for both Section 7 (U.S.D.I. FWS) and Section 106 (Cultural Resources) consultation are provided in Appendices C and D, respectively.

4.2 Interested Agencies, Groups, and Businesses

The following agencies, groups, and businesses have provided input and/or will receive copies of the Draft EIS.

Federal Agencies

Department of the Interior
- Bureau of Land Management
- Fish and Wildlife Service

State Agencies

New Mexico Employment Security Department
New Mexico Environmental Improvement Division
- Groundwater Section

New Mexico Game and Fish Department
New Mexico Health & Environment Department
New Mexico State Department of Economic Development and Tourism
New Mexico State Department of Finance and Administration
- Local Government Division

New Mexico State Department of Taxation and Revenue
University of New Mexico, Bureau of Business and Economic Research

County Agencies

- Taos County Assessor's Office
- Taos County Department of Economic Development
- Taos County Finance Director's Office
- Taos County Housing Authority
- Taos County Human Services Department
- Taos County Planning Department
- Taos County Sheriff Department

Local Agencies

- Questa School District
- Town of Taos Police Department
- Village of Questa
  - Mayor of Questa
  - Public Administrator's Office
  - Utilities Director's Office

Other

- CDK Contracting
- Pioneer Real Estate
- Rael Realty
- Sierra Club
- Taos Property Management

5.0 LIST OF PREPARERS FOR THE MOLYCORP TAILINGS DISPOSAL FACILITY EIS

Name	Education/Experience	EIS Responsibility
Bureau of Land Management		
Kent Hamilton Albuquerque District Office	B.S. Agricultural Economics 27 Years Professional Experience	BLM Team Leader Project Coordination Socio-Economics
Tim L. Sanders New Mexico State Office	B.S. Wildlife Biology M.S. Agricultural Economics 9 Years Professional Experience	Interdisciplinary Review Team State Office Coordination
Dan Wood Taos Resource Area Office	B.S. Forestry 15 Years Professional Experience	Interdisciplinary Review Team Taos Resource Area Coordination
Scott F. Archer Colorado State Office	B.S. Chemistry and Environmental Science 11 Years Professional Experience	Interdisciplinary Review Team Air Quality
Ben Kuykendall Taos Resource Area Office	B.S. Wildlife/Fisheries Biology 14 Years Professional Experience	Interdisciplinary Review Team Wildlife
Tom Mottl Taos Resource Area Office	B.A. Chemistry M.S. Watershed Science 11 Years Professional Experience	Interdisciplinary Review Team Recreation, VRM and Hydrology
Charles Pettee New Mexico State Office	B.S. Aeronautical Engineering M.S. Watershed Science 12 Years Professional Experience	Interdisciplinary Review Team Groundwater

LIST OF PREPARERS (CONTINUED)

Name	Education/Experience	EIS Responsibility
Paul Williams Taos Resource Area Office	B.A. Psychology M.A. Anthropology 7 Years Professional Experience	Interdisciplinary Review Team Cultural
Gary Wood Albuquerque District Office	B.S. Range Science 16 Years Professional Experience	Interdisciplinary Review Team Vegetation and Soil
Joe Mirabal Taos Resource Area Office	B.S. Geology 9 Years Professional Experience	Interdisciplinary Review Team Geology
Alan Hoffmeister Albuquerque District Office	B.S. Forest Science 12 Years Professional Experience	Interdisciplinary Review Team Public Participation
ERT		
Robert Sanz Project Manager	B.S. Zoology 15 Years Professional Experience	EIS Manager; Coordination, Planning, Quality Review, Agency Liaison
Sophie Sawyer Assistant Project Manager and Technical Editor	M.Ed. Science Education B.A. Biology 10 Years Professional Experience	EIS Preparation, Quality Review, Coordination of Technical Studies, Project Coordination, and Editing of EIS Sections
Jennifer Kathol Technical Specialist	B.S. Natural Resource Economics 11 Years Professional Experience	Socioeconomics

LIST OF PREPARERS (CONTINUED)

Name	Education/Experience	EIS Responsibility
Bill Theisen Technical Specialist	M.S. Recreation Resources B.S. Natural Resources 6 Years Professional Experience	Land Use/Recreation
Bernhard E. Strom Technical Specialist	M.C.R.P. City and Regional Planning B.S. Urban Planning 16 Years Professional Experience	Visual/Noise
Lori Langston Technical Specialist	B.S. Wildlife Ecology and Management 4 Years Professional Experience	Terrestrial and Aquatic Wildlife
Philip Hackney Technical Specialist	M.S. Candidate Range Ecology B.S. Botany 11 Years Professional Experience	Soils, Vegetation, and Geology
Christine Renda Technical Specialist	M.S. Hydrology B.S. Geology 8 Years Professional Experience	Hydrology
D. Howard Gebhart Technical Specialist	M.S. Meteorology B.S. Professional Meteorology 10 Years Professional Experience	Air Quality

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GLOSSARY

Alluvium - An unconsolidated terrestrial sediment composed of sorted or unsorted sand, gravel, and clay that had been deposited by water.

Andesite - Very finely crystalline extrusive rock of volcanic origin.

Animal Unit Month - The amount of forage required by a cow and a calf for 1 month. This unit is used to calculate carrying capacity and serves as a basis for grazing fees.

Anisotropic - Showing different properties as to velocity of light transmission, conductivity of heat or electricity, compressibility, etc., in different directions.

Aquitard - The less permeable beds in a stratigraphic sequence.

Arroyo - A water-carved gully or channel.

Basalts - Fine-grained, dark, molten rock composed largely of plagioclase feldspar and pyroxene.

Benthic - Bottom dwelling

Calcareous - Resembling, containing, or composed of calcium carbonate.

Carrying capacity - The number of individual organisms the resources of a given area can support, usually through the most unfavorable period of the year.

Dacites - Very fine crystalline or glassy rock of volcanic origin.

Decant - To draw off a liquid without disturbing the underlying sediment or precipitate, or the lower liquid layers.

Deionization - Removal of ions from solution by a chemical means.

Eolian - Pertaining to or deposited by wind.

Eyrie - The nest of a bird on a cliff or mountain top.

Hydraulic conductivity - The rate of water flow in gallons per day through a cross section of 1 square foot under a unit hydraulic gradient, at the prevailing temperature or at 60°F (16°C).

Inclusion - A portion of older rock enclosed in igneous rock.

Lithology - The systematic description of rocks, in terms of mineral composition and texture.

Loam - Soil mixture of sand, silt, clay, and humus.

Olivine - A greenish mineral that is a complex silicate of magnesium and iron.

Overburden - Material of any nature that overlies a mineral deposit or coal seam.

Perennial - Present at all seasons of the year; continuing to live from year to year.

Permeability - The ability of a formation to transmit groundwater or other fluids through pores and cracks.

Permeable - Having pores or small openings that permit liquids or gases to seep through.

Rhyodacite - A group of extrusive porphyritic igneous rocks containing a fine-grained to glassy groundmass composed of alkali feldspar and silica minerals. Also known as quartz lattice.

Spoil - The overburden or non ore-bearing material from a mine.

Tailings - The refuse material resulting from processing ground ore.

Tectonic - Pertaining to regional structural and deformational features of the earth's crust.

LIST OF ACRONYMS

ACEC - Area of Critical Environmental Concern
AUM - Animal Unit Month
BLM - Bureau of Land Management
cfs - cubic feet per second
dBA - decibels, A-weighted
EA - Environmental Assessment
EIS - Environmental Impact Statement
EPA - Environmental Protection Agency
ISC - Industrial Source Complex
KOP - Key Observation Point
μg - micrograms
MSHA - Mine Safety and Health Administration
NEPA - National Environmental Policy Act
NMEID - New Mexico Environmental Improvement Division
NPDES - National Pollution Discharge Elimination System
OSHA - Occupational Health and Safety Administration
PM - particulate matter
PPM - parts per million
PSD - Prevention of Significant Deterioration
Q/s - Specific capacity
RCRA - Resource Conservation and Recovery Act
RMP - Resource Management Plan
SCS - Soil Conservation Service
SHPO - State Historic Preservation Office
SMA - Special Management Area
SR - State Route
T - transmissivity
TDS - total dissolved solid
TLV - threshold limit value
TPD - tons per day
TPVF - Taos Plateau Volcanic Field
TSP - total suspended particulate
USDA - U.S. Department of Agriculture

USDI - U.S. Department of the Interior

USGS - U.S. Geological Survey

VRM - Visual Resource Management

APPENDIX A

SCOPING SUMMARY DOCUMENTATION

IN REPLY REF
3809 (014)

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
ALBUQUERQUE DISTRICT OFFICE
435 Montano N.E.
Albuquerque, New Mexico 87107

DEC 05 1986

Dear Reader:

This is the first of several public information documents planned to keep concerned parties informed regarding the Bureau of Land Management's efforts to analyze the impacts for Molycorp's proposed tailing disposal facility on Guadalupe Mountain located northeast of Questa, New Mexico. Molycorp, Inc. has filed a Plan of Operation to develop a molybdenum tailings disposal facility located on its 266 mill site claims. The BLM is currently preparing an Environmental Impact Statement (EIS) through the services of ERT, a Resource Engineering Company. This first information document will contain information on various aspects of the EIS, including:

-A scoping summary document,

-BLM's response to several questions raised during the public meetings,

-Discussions on where we are now and planned actions regarding this EIS, or

-Discussion on an extension of the EIS schedule.

All comments, thoughts and concerns received at the July, 1986, public meetings and during the written comment period were forwarded to ERT, the EIS contractor. ERT has prepared a scoping summary document which incorporates the verbal and written public scoping comments. The scoping summary document is attached (Enclosure 1). The public comments contained in the scoping summary document have been assigned to one of the following four categories:

1. Items to be addressed in the EIS;

2. Items that are determined to be outside the scope of the EIS;

3. General comments that will be considered in preparation of the EIS; or

4. Comments that will be addressed in a public information document to be prepared by the BLM.

Category four contains unanswered questions raised during the public meetings. Our responses to these questions are attached (Enclosure 2).

Also during the public meetings, a concern was expressed regarding BLM's enforcement authority and responsibilities after Plan of Operation approval, and subsequent patenting of the tailing disposal site. In response to this

question, we requested a Department of Interior Solicitor's Opinion. Our request and the Solicitor's Opinion are attached (Enclosure 3).

Following public scoping, the scoping comments were also analyzed to determine whether any new issues or concerns were raised which should be included in the EIS. Health risks associated with inhalable silica and fugitive dust is a public concern which was not previously considered for inclusion in the EIS. Analysis of this issue in the EIS is currently being considered. We will inform you of our decision in the next public information document.

Also following public scoping, the data to be used in the EIS analysis was compiled for review. Concerns regarding the data for three of the EIS issues have surfaced as a result of the data reviews. The available meteorological data for the air quality issue has been determined to be inadequate to quantitatively assess impacts in the EIS. Additional meteorological data is currently being collected from Guadalupe Mountain to provide additional data for the EIS analysis. Meteorological data collection will continue through April, 1987. An error in the calculation of the data to be used for the groundwater analysis was detected during the review. As result of the error, the independent contractor who prepared the ground water report will prepare an amendment to the initial report. The amended report will be reviewed for adequacy and inclusion in the EIS analysis. In addition, the available socio-economic data is currently being considered for revision. The decision on the revision of the socio-economic data, and an update on the groundwater data analysis will be presented in a future public information document.

To allow for the collection of the additional meteorological data and other data needs, the publication of the Draft EIS will be delayed for six to eight months. A BLM-Molycorp-ERT meeting is planned in the near future, to discuss the air quality, groundwater and socio-economic data, to decide whether additional data should be collected to analyze the health risk associated with fugitive dust and inhalable silica, and to discuss the revision of the time schedule for preparation of the EIS. Following the meeting, another public information document will be prepared and sent out to complete discussions initiated in this document.

Additional update documents will be prepared as needed to keep everyone informed with progress in the EIS preparation. If you would like to continue to receive the public information documents and EIS's, when published, please complete the attached form and return it to this office.

If you have any questions regarding these matters, contact Gene Tatum of my staff at the above address or telephone (505) 761-4504.

Sincerely,

L. Paul Applegate

L. Paul Applegate
District Manager

Enclosures (3)

SCOPING SUMMARY FOR THE MOLYCORP

TAILINGS DISPOSAL EIS

A scoping document was prepared by ERT in July and submitted to Gene Tatum, BLM, Albuquerque for approval. The scoping document provided a brief description of the project, a summary of the scoping process, a preliminary identification of the issues, and a form that could be used for submittal of written comments. The scoping document was mailed out to approximately 65 interested individuals, groups, and agencies, and was also distributed to attendees at the public scoping meetings. It was requested in the scoping document that all written and verbal comments on the scope of the environmental analyses for the project be received by August 22, 1986.

Public scoping meetings were held at the following locations:

- Taos - Kachina Lodge, July 22, 1986
  1:00 to 3:00 p.m. - 32 attendees
  7:00 to 9:00 p.m. - 53 attendees

- Questa - Municipal Building, July 23, 1986
  1:00 to 3:00 p.m. - 52 attendees
  7:00 to 9:00 p.m. - 43 attendees

Representatives from the BLM, Molycorp, Unocal, and ERT were present at each of the scoping meetings. A total of 180 persons attended the four sessions of the scoping meetings. The BLM received 130 copies of a form letter in support of Molycorp's project. Subsequent to the meetings, 23 written comments were submitted to the BLM. Thirteen of the written comments were from private individuals; the following agencies and groups also provided written comments:

- State of New Mexico
  - Environmental Improvement Division
  - Department of Game and Fish
  - Energy and Minerals Department
- New Mexico Institute of Mining and Technology
- Town of Taos
- Taos County Commission
- Taos County Chamber of Commerce
- Village of Questa
- Kit Carson Electric Cooperative, Inc.
- Questa Health Center, Presbyterian Medical Services

The concerns and issues that were presented verbally at the scoping meetings or received in the written comments are summarized below. The comments have been assigned, as appropriate, to one of the following four categories:

1. Items to be addressed in the EIS;

2. Items that are determined to be outside the scope of the EIS;

3. General comments that will be considered in preparation of the EIS; and

4. Comments that will be addressed in a public information document to be prepared by the BLM.

The comments and concerns that will be addressed in the EIS include:

- The EIS should consider the direct and indirect impacts on employment opportunity and local economies if Molycorp must shutdown due to lack of storage area. (No Action Alternative.)

- The EIS should address cumulative impacts to air quality and water quality from existing and proposed ponds.

- Further analysis should be conducted on the tailings to determine any health hazards resulting from fugitive dust.

- The EIS should address any health problems in the community that may be related to dust or associated with inhalable silica.

- The EIS should address any health, visual, or water quality effects from the windblown dust.

- The EIS should address the adequacy of Molycorp's proposed reclamation plan.

- The chemicals used in the processing of molybdenum ore should be identified in the EIS.

- The EIS should examine potential effects on domestic water wells.

- The EIS should address pollution of the Rio Grande River by seepage from the site.

- Will the new pipeline system have spill containment areas? a spill prevention program?

- How will seepage be prevented? Will seepage collection avoid percolation to the springs? Will bottom sealing be necessary to avoid seepage?

- The EIS should provide a biological analysis regarding the dilution factors of process chemicals.

- The EIS should address impacts to water quality and aquatic organisms within the hydrologic regime.

- The EIS should describe the existing water quality in the area and address potential impacts to groundwater and surface water quality, as well as the springs.

- The EIS should address potential changes in return flow to the Red River.

- Concern about visual impact of the dams and possible effect of the visual impact on tourism.

- The Wild and Scenic River and Rio Grande Gorge Recreation Area may be affected by the project and qualities may be lost that attract people to the area.

- The EIS should address potential economic losses resulting from fewer visitors to the recreation area.

- The EIS should address the definition of "unnecessary and undue degradation" as cited in the Wild and Scenic River Act. In light of these requirements, the EIS must quantify any degradation in order to protect and maintain the values of the Wild and Scenic River.

- The EIS should analyze different options for establishing vegetation on the dam face during construction to minimize visual impacts (i.e., shallow rooted trees or seed the total built-up dam face initially).

- Mitigation measures for wildlife concerns should include limited access to the site.

- The EIS should address noise and visual impacts from the project.

- The EIS should address the broader issues of BLM land management responsibilities (wildlife, water quality, air quality, visual resources, noise, etc.).

The comments identified as being outside the scope of the EIS are presented below:

- The positive and negative effects of the project on private land values should be addressed.

- The EIS should address conditions at the existing tailings ponds, including dust control.

- Molycorp should proceed with their state groundwater discharge plan application as the EIS is being prepared.

The following general comments will be taken into consideration during preparation of the EIS:

- The EIS should not be totally dependent upon Molycorp's data.
- The amount of air quality monitoring data collected to date is insufficient for the EIS.
- Concern about the adequacy of air and water quality data collected during wet years.
- Concern that local "protectionists" will interfere with "best use of federal land" (mining purposes).
- Concern that the available groundwater data is inadequate for the EIS.
- Concern regarding Molycorp's past record of pipeline spills and further degradation to streams from future spills.
- Numerical standards must be set to define "unnecessary and undue degradation" since state or federal standards may not be stringent enough to protect the Wild and Scenic River.
- Concern that there is a lack of wildlife baseline data, especially site-specific, for the EIS.
- Mitigation for wildlife concerns should include incremental removal of vegetation during construction.
- BLM should act as quickly as possible in approving the project.
- The Village of Questa recommends relocating the site.

A public information document will be prepared by the BLM to address the concerns and comments presented below:

- The EIS should provide a detailed analysis of alternative sites.
- Why should there be further development when the mine is scaling down? Provide a realistic estimate of the existing storage capacity.
- The monitoring and enforcement of mitigating measures should be addressed in the EIS.
- A time table for reclaiming Sections 35 and 36, and Molycorp's efforts to date should be provided.

- The EIS should provide summaries of reports on geology and groundwater.

- The EIS should examine the worst-case (seasonal) significant levels of toxic substances.

- What control does BLM or other agencies have on the site if the land goes to patent? What happens to the control of mitigating measures if Molycorp sells to someone else before or after patent?

- Will the bonding requirements consist of a reclamation bond or a certificate of financial responsibility? Please provide a comparative analysis of the two types of reclamation guarantees.

- Does BLM have any statutory, regulatory, or legal authority to require reclamation once a patent is issued?

RESPONSES TO PUBLIC CONCERNS

1. The EIS should provide a detailed analysis of alternative sites.

Alternative site locations for the Guadalupe Site proposal will not be considered or analyzed in the EIS. Usually, alternative site locations to a given proposal are analyzed in the EIS process. However, under 43 CFR 3809.2-1(d), the BLM can only analyze the impacts resulting from the proposed action as described in the Plan of Operations submitted by the company. The Plan of Operations for the Guadalupe Site, submitted by Molycorp, does contain an analysis of other site locations which were evaluated by the company.

2. Why should there be further development when the mine is scaling down? Provide a realistic estimate of the existing storage capacity.

Molycorp, Inc. fully expects to re-open, and expand, their existing operations as soon as the Molybdenum market allows for production at profitable levels. When this occurs, there is only limited storage capacity (4 to 6 years) available for Molycorp to use in their existing ponds. This factor, plus planned expansion, requires Molycorp to actively seek additional storage capacity in the form of a new tailings disposal facility. Given the length of time involved in securing this new site, in addition to initial construction requirements, the company is trying to acquire this site as early as possible in order to prudently plan for the future.

3. The monitoring and enforcement of mitigating measures should be addressed in the EIS.

Please refer to the attached (Enclosure 3) response by the Department of Interior's Field Solicitor to the State Director, BLM, dated September 15, 1986, for a response to this concern.

4. A time table for reclaiming Sections 35 and 36, and Molycorp's efforts to date should be provided.

Sections 35 and 36 of the existing tailing's facility and their schedule for reclamation are not within the scope of this EIS and will not be addressed. This is now private land belonging to Molycorp and any information pertaining to this concern should be directed to the company.

5. The EIS should provide summaries of reports on geology and ground water.

Reports on geology, hydrology or any other resource are part of the process records for the EIS and are available for review upon request. To avoid encyclopedic EIS's, which are expensive and cumbersome, these types of reports and information are not usually apart of the EIS itself.

6. The EIS should examine the worst case (seasonal) significant levels of toxic substances.

The EIS will discuss and present levels of any toxic substances found to be present in the tailings material.

7. What control does BLM or other agencies have on the site if the land goes to patent?

See response to No. 3 above.

8. Will the bonding requirements consist of a reclamation bond or a certificate of responsibility?

There are no bonding requirements that exist. See response to No. 3 above.

9. Does BLM have any statutory, regulatory, or legal authority to require reclamation once a patent is issued?

See response to No. 3 above.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
NEW MEXICO STATE OFFICE
Post Office and Federal Building
P.O. Box 1449
Santa Fe, New Mexico 87504-1449

3809 (934)

AUG 12 1986

Memorandum

To: Field Solicitor, USDI, Santa Fe, New Mexico

From: State Director, BLM, Santa Fe, NM

Subject: Concerns Regarding Future Patenting of Molycorp's Proposed Tailing Disposal Facility on Guadalupe Mountain

During the recent public scoping meetings for the EIS on Molycorp's proposed Molybdenum Tailings Disposal Facility, a great deal of public concern was expressed regarding BLM's enforcement authority on Molycorp's Plan of Operations, after its approval, and subsequent patenting of the tailing disposal site. Because of the sensitivity of this project, BLM shares many of the same concerns expressed by the public regarding our role in enforcing the Plan of Operations.

As you are aware, Molycorp, Inc., has claimed an area for tailings disposal on Guadalupe Mountain under the general mining laws. Molycorp prepared and submitted a Plan of Operations for this proposal to the BLM. The BLM subsequently prepared an Environmental Assessment on the proposal and determined that an EIS was needed to assess impacts and necessary mitigation to ensure the prevention of any unnecessary and undue degradation, prior to approval of the Plan of Operations. The existing Plan of Operations contains a description of the proposed project, mitigation measures, and eventual plans for reclamation. Upon completion of the EIS, a determination will be made to either approve, modify or deny the existing Plan of Operations. Upon approval of the Plan of Operations, Molycorp will begin construction of the tailings disposal facility on Guadalupe Mountain, which has an estimated life expectancy of 30 years.

Wording in the 43 CFR 3809 regulations implies that failure by an operator to follow an approved Plan of Operations, including mitigation and reclamation, would result in the issuance of a Notice of Noncompliance by the BLM. The regulations regarding noncompliance do not, however, distinguish between patented and unpatented lands.

In light of this direction, we are requesting an opinion on the following questions:

1. Upon BLM approval of Molycorp's Plan of Operations, how soon can Molycorp apply for patent? Do the patent procedures require Molycorp to apply for each of the 266 millsite claims individually, as they are used, or can Molycorp apply for the entire 1320-acre site at one time?

2. What enforcement authority, if any, does the BLM have over the Plan of Operations, including mitigation and reclamation, after patent? If BLM does possess enforcement authority over the approved Plan of Operations, would this authority apply to future mine owners upon Molycorp's divestment of its interests?

3. Finally, does the BLM have the authority to attach any covenants, reservations or reversionary clauses to the patent, in order to ensure full compliance with the Plan of Operations, including mitigation and reclamation?

MONTE G. JORDAN
ACTING

United States Department of the Interior

OFFICE OF THE SOLICITOR
Field Office, Southwest Region
P.O. Box 1042
Santa Fe, New Mexico 87504-1042

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3809 (934)

REFERENCE NO.
BLM.SA.0153

September 15, 1986

MEMORANDUM

TO: State Director, Bureau of Land Management, Santa Fe, New Mexico

FROM: Gayle E. Manges, Field Solicitor
Southwest Region

SUBJECT: Plan of Operations and Patenting of Molycorp's
Proposed Tailing Disposal Facilty on Guadalupe Mountain

As requested by memorandum dated August 12, 1986, concerns exist as to the enforceability of an approved Plan of Operations filed by Molycorp for associated millsite claims or locations near Questa after such date as a patent might issue for the millsites.

The questions and responses are as follows:

1. Upon BLM approval of Molycorp's Plan of Operations, how soon can Molycorp apply for patent? Do the patent procedures require Molycorp to apply for each of the 266 millsite claims individually, as they are used, or can Molycorp apply for the entire 1320-acre site at one time?

I am unaware of any requirement for the need of approval by the Bureau of a Plan of Operation prior to acceptance by the Bureau of an application for patent. The Plan of Operation is required under 43 CFR 3809.1-4(a) and (b) for operations on federal lands as set forth therein. The filing of a Plan of Operation by the claimant or locator is not a requirement for the filing of a patent application by the proprietor of a mineral deposit.

The statutes and regulations are silent as to the acreage and number of millsite claims for which applications for patent may be filed so long as no claim exceeds five acres. An owner of a patented lode may file for an associated millsite "if good faith is manifest in its use or occupation in connection with the lode. . . ." 43 CFR 3864.1-1(b). There is no limitation or requirement for total acreage, Utah International, Inc., 36 IBLA 219 (1980), nor that a particular distance must exist between the millsite claims and the associated lode claims. See United States v. Parsons, 33 IBLA 326, 327 (1978). There is a requirement that the total acreage in the millsite or millsites must be reasonable for the mining and processing of minerals from the associated lode mining claim or claims. United States v. Swanson, 81 I.D. 14 (1974), Suppl. 34 IBLA 25 (1978), rev'd other grounds, Swanson v. Andrus, Civ. No. 78-4045 (D.Idaho June 3, 1982).

2. What enforcement authority, if any, does the BLM have over the Plan of Operations, including mitigation and reclamation, after patent? If BLM does possess enforcement authority over the approved Plan of Operations, would this authority apply to future mine owners upon Molycorp's divestment of its interests?

In my opinion, after the millsite claims are patented the Bureau has no enforcement authority over the Plan of Operations. The plan is required "to prevent unnecessary or undue degradation of Federal lands which may result from operations authorized by the mining laws." 43 CFR 380.9.0-1. "Federal lands" are lands subject to the mining laws including, but not limited to, public lands as defined in Section 103 of the Act of October 21, 1976, 43 U.S.C. § 1702 and 43 CFR 3809.0-5(c). After patent, the former Federal lands are private or non-Federal lands and no longer subject to 43 CFR Subpart 3809.

3. Finally, does the BLM have the authority to attach any covenants, reservations or reversionary clauses to the patent, in order to ensure full compliance with the Plan of Operations, including mitigation and reclamation?

In my opinion, no authority exists to attach such covenants to the patent or include reservations or reversionary clauses in the patent as to mitigation and reclamations requirements. The mining laws, 30 U.S.C. §§ 22 et seq., provide no authority for including such conditions or reservations in patents, and I am unaware of any federal statute or interpretations of existing mining law authorizing such inclusion.

Gayle E. Manges

APPENDIX B

WILDLIFE SPECIES LISTING

TABLE B-1

BENTHIC MACROINVERTEBRATES KNOWN TO OCCUR IN THE BIG ARSENIC SPRINGS

Lepidoptera (aquatic moths)
- *Paragyractus* sp.

Plecoptera (stonefly)
- **Hesperoperla pacifica*

Ephemeroptera (mayfly)
- *Baetis* sp.

Trichoptera (caddisflies)
- *Hydropsyche* sp.
- **Brachycentrus* sp.
- **Micrasema* sp.
- **Chimarra* sp.
- **Wormaldia* sp.
- Hydroptilidae A and B
- **Hydroptila* sp.
- **Helicopsyche* sp.

Coleoptera (beetle)
- Elmidae

Hemiptera (true bugs)
- *Ambrysus mormon*
- Veliidae

Ostracoda (sea shrimp)

Amphipoda (scud/side swimmer)
- *Gammarus* sp.

Diptera (True flies)
- Snisononicae
- Simuliidae
- *Stratiomys* sp.
- *Odontomyia* sp.

Odonata (damselfly)
- Coenagrionidae

Turbellaria (flat worms)

Oligochaeta (round worms)
- Tubificidae
- Lumbriculidae

Mollusca (Snail)
- *Physa* sp.

Source: BLM 1985.

*Uncommon; all other taxa were common to abundant.

TABLE B-2

Bird Species Recorded on the Guadalupe Mountain Study Area, August and September 1984 and April through June 1985

Common Name	Scientific Name	Abundance[a]	Status[b]
Eared Grebe	Podiceps nigricollis	U	T
White-faced Ibis	Plegadis chihi	U	T
Canada Goose	Branta canadensis	U	SR
Green-winged Teal	Anas crecca	C	T
Mallard	Anas platyrhynchos	C	SR
Blue-winged Teal	Anas discors	C	T
Cinnamon Teal	Anas cyanoptera	U	T
Northern Shoveler	Anas clypeata	C	T
Gadwall	Anas strepera	C	T
American Wigeon	Anas americana	C	T
Redhead	Aythya americana	C	T
Ring-necked Duck	Aythya collaris	C	T
Lesser Scaup	Aythya affinis	U	T
Hooded Merganser	Lophodytes cucullatus	U	T
Common Merganser	Mergus merganser	C	T
Ruddy Duck	Oxyura jamaicensis	C	T
Turkey Vulture	Cathartes aura	C	SR
Osprey	Pandion haliaetus	U	T
Sharp-shinned Hawk	Accipiter striatus	U	R
Cooper's Hawk	Accipiter cooperii	U	R
Northern Goshawk	Accipter gentilis	U	R
Red-tailed Hawk	Buteo jamaicensis	C	R
Golden Eagle	Aquila chrysaetos	U	R
American Kestrel	Falco sparverius	C	R
Prairie Falcon	Falco mexicanus	U	R
American Coot	Fulica americana	C	T
Semi-palmated Sandpiper	Charadrius semipalmatus	U	T
Killdeer	Charadrius vociferous	C	SR
American Avocet	Recurvirostra americana	C	T
Greater Yellowlegs	Tringa melanoleuca	U	T
Willet	Catoptrophorus semipalmatus	U	T
Spotted Sandpiper	Actitiu macularia	C	SR
Marbled Godwit	Limosa fedoa	U	T
Long-billed Dowitcher	Limnodromus scolopaceus	U	T
Common Snipe	Gallinago gallinago	U	T
Wilson's Phalarope	Phalaropus tricolor	C	T
Ring-billed Gull	Larus delawarensis	C	SR
Rock Dove	Columba livia	C	R
Band-tailed Pigeon	Columba fasciata	U	SR
Mourning Dove	Zeniada macroura	C	SR
Flammulated Owl	Otus flammeolus	U	R
Western Screech Owl	Otus kennicottii	U	R
Great Horned Owl	Bubo virginianus	U	
Burrowing Owl	Athene cunicularia	U	R
Northern Saw-whet Owl	Aegolius acadicus	U	SR
Common Nighthawk	Chordeiles minor	U	SR
Common Poorwill	Phalaenoptilus nuttallii	U	SR
White-throated Swift	Aeronautes saxatalis	A	SR
Broad-tailed Hummingbird	Selasphorus platycercus	C	SR

TABLE B-2 (CONTINUED)

Common Name	Scientific Name	Abundance[a]	Status[b]
Belted Kingfisher	*Ceryle alcyon*	U	SR
Lewis' Woodpecker	*Melanerpes lewis*	U	R
Hairy Woodpecker	*Picoides villosus*	U	R
Northern Flicker	*Colaptes auratus*	C	R
Olive-sided Flycatcher	*Contopus borealis*	U	SR
Western Wood-Peewee	*Contopus sordidulus*	C	SR
Dusky Flycatcher	*Empidonax oberholseri*	C	SR
Gray Flycatcher	*Empidonax wrightii*	U	SR
Western Flycatcher	*Empidonax difficilis*	U	SR
Say's Phoebe	*Sayornis saya*	U	SR
Ash-throated Flycatcher	*Myiarchus cinerascens*	U	SR
Eastern Kingbird	*Tyrannus tyrannus*	U	SR
Horned Lark	*Eremophila alpestris*	A	R
Tree Swallow	*Tachycineta bicolor*	C	T
Violet-green Swallow	*Tachycineta thalassina*	A	SR
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	U	T
Cliff Swallow	*Riparia riparia*	A	SR
Barn Swallow	*Hirundo rustica*	U	SR
Steller's Jay	*Cyanocitta stelleri*	C	R
Scrub Jay	*Aphelacoma coerulescens*	C	R
Pinyon Jay	*Gymnorhinus cyanocephalus*	C	R
Clark's Nutcracker	*Nucifraga columbiana*	C	R
Black-billed Magpie	*Pica pica*	C	R
American Crow	*Corvus brachyrhychos*	U	R
Common Raven	*Corvus corax*	U	R
Black-capped Chickadee	*Parus atricapillus*	U	R
Mountain Chickadee	*Parus gambeli*	C	R
Plain Titmouse	*Parus inornatus*	C	R
Common Bushtit	*Psaltriparus minimus*	U	R
Red-breasted Nuthatch	*Sitta canadensis*	U	R
White-breasted Nuthatch	*Sitta carolinensis*	U	R
Pygmy Nuthatch	*Sitta pygmae*	U	R
Rock Wren	*Salpinctes obsoletus*	C	SR
Canyon Wren	*Catherpes mexicanus*	C	SR
House Wren	*Troglodytes aedon*	U	SR
American Dipper	*Cinclus mexicanus*	C	R
Ruby-crowned Kinglet	*Regulus calendula*	U	T
Blue-gray Gnatcatcher	*Polioptila caerulea*	U	SR
Western Bluebird	*Sialia mexicana*	C	R
Mountain Bluebird	*Sialia currucoides*	C	R
Townsend's Solitaire	*Myadestes townsendi*	U	R
Veery	*Catharus ustulatus*	R	T
Hermit Thrush	*Catharus guttatus*	U	SR
American Robin	*Turdus migratorius*	C	R
Gray Catbird	*Dumetella carolinesis*	U	SR
Northern Mockingbird	*Mimus polyglottos*	U	SR
Sage Thrasher	*Oreoscoptes montanus*	C	SR
Water Pipit	*Anthus spinoletta*	A	T
European Starling	*Sturnus vulgarus*	C	R
Solitary Vireo	*Vireo solitarius*	U	SR
Warbling Vireo	*Vireo gilvus*	U	SR
Virginia's Warbler	*Vermivora virginiae*	C	SR

TABLE B-2 (CONTINUED)

Common Name	Scientific Name	Abundance[a]	Status[b]
Yellow Warbler	Dendroica petechia	A	SR
Yellow-rumped Warbler	Dendroica coronata	A	T
Black-throated Gray Warbler	Dendroica nigresens	C	SR
Townsend's Warbler	Dendroica townsendi	U	T
Grace's Warbler	Dendroica graciae	U	SR
Yellow-breasted Chat	Icteria virens	U	SR
Hepatic Tanager	Piranga flava	U	SR
Western Tanager	Piranga ludoviciana	C	SR
Rose-breasted Grosbeak	Pheuctucus ludovicianus	U	T
Black-headed Grosbeak	Pheucticus melanocephalus	R	SR
Blue Grosbeak	Guiraca caerulea	U	SR
Lazuli Bunting	Passerina cyanea	U	SR
Green-tailed Towhee	Pipilo chlorurus	C	SR
Rufous-sided Towhee	Pipilo erythrophthalmus	C	R
Chipping Sparrow	Spizella passerina	C	SR
Brewer's Sparrow	Spizella breweri	C	SR
Vesper Sparrow	Pooecetes gramineus	C	SR
Sage Sparrow	Amphispiza belli	C	SR
Song Sparrow	Melospiza melodia	C	SR
White-crowned Sparrow	Zonotrichia leucophrys	U	WR
Dark-eyed Junco	Junco hymealis	C	R
Red-winged Blackbird	Agelaius phoeniceus	U	SR
Western Meadowlark	Sturnella neglecta	C	R
Brewer's Blackbird	Euphagus cyanocephalus	C	SR
Brown-headed Cowbird	Molothrus ater	C	SR
Pine Grosbeak	Pinicola enucleator	U	R
Cassin's Finch	Carpodacus cassini	A	R
Red Crossbill	Loxia curvirostra	C	R
Lesser Goldfinch	Carduelis psaltria	U	R
Pine Siskin	Carduelis pinus	C	R
American Goldfinch	Carduelis tristis	U	R
Evening Grosbeak	Coccothraustes vespertina	A	R

[a]Abundance Categories

A - species is almost always seen in large numbers.
C - species is usually seen in numbers in suitable habitat.
U - species is not often seen but is not out of range.
R - species is very infrequently seen in the study area or is out of normal range.

[b]Status Categories

R - species is resident in study area year-round.
SR - species is resident only during the summer; often a breeding species.
WR - species is resident only during the winter.
T - species only occurs in study area during periods of spring or fall migration; or a wandering species.

APPENDIX C

USFWS SECTION 7 CONSULTATION

IN REPLY REFER TO
6800 (018)

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Taos Resource Area
P. O. Box 1045
Taos, New Mexico 87571

2-2-82-F-270

July 23, 1982

Regional Director, Region 2
Attention: Gary Halvorson
U.S. Fish and Wildlife Service
P.O. Box 1306
Albuquerque, New Mexico 87103

Dear Mr. Halvorson:

This letter is concerning the submission and acceptance of a "Plan of Operation" by the Molycorp Division of Union 76. Submission of this document to our office was July 7, 1982. A brief summary of the proposed action is included in this letter along with maps of the area.

Our first request is for a formal list of T&E Species which might be affected by the proposed action. Two species are known to regularly occur in or frequent the area. They are wintering bald eagles and nesting peregrine falcons. The requested list is for species in addition to those named above.

This letter also serves as a request for formal consultation under Section 7 of the Endangered Species Act. This request is for the American peregrine falcon (Falco peregrinus anatum).

Our office has determined that a voluminous biological assessment is not necessary to declare a "may effect" situation. A brief biological assessment is, however, attached and the rationale for this determination is obvious. We believe that experts in the field of peregrine falcon/habitat relationships should examine and evaluate the possible impacts of a proposed action of this magnitude.

This office has not previously been involved in Section 7 consultation. Therefore, please advise us of any additional information we would need to provide, or of any required submissions by this office. A copy of the "Plan of Operations" is also enclosed.

Sincerely yours,

Richard C. Niemeyer

Richard C. Niemeyer
Taos Resource Area
Area Manager

FWS REG 2
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JUL 26 '82

Enclosures

SE

SE

2-2-82-F-276

August 10, 1982

MEMORANDUM

TO : Area Manager, Bureau of Land Management, Taos Resource Area, P.O. Box 1045, Taos, New Mexico 87571

FROM : Regional Director, Region 2 (SE)

SUBJECT: Formal Section 7 Consultation re. Molycorp Tailing Pond Proposal

This acknowledges receipt of your request to initiate formal Section 7 consultation with the Fish and Wildlife Service in regard to Molycorp's proposal to acquire land for construction of a 700-acre tailing pond as required by the Endangered Species Act of 1973, as amended. The consultation period began on July 26, 1982, the date your request was received.

To assist this consultation, please provide information that evaluates how this action may effect the peregrine falcon and bald eagle as well as the magnitude of this effect. It is the responsibility of the consultee to furnish this information to the Fish and Wildlife Service so we may fully evaluate the effect of your action upon threatened and endangered species. We will process your consultation request within 90 days receipt of this information.

As a reminder, the Endangered Species Act requires that after initiation of formal consultation the Federal agency and the permit or license applicant shall not make any irreversible or irretrievable commitment of resources with respect to the agency action which has the effect of foreclosing the formulation or implementation of any reasonable and prudent alternative measures which would avoid jeopardizing the continued existence of any endangered or threatened species or adversely modifying or destroying the critical habitat of any such species.

Thank you for assisting us to conserve listed species. If you have any questions, please call the Endangered Species Office at (505) 766-3972 or FTS 474-3972.

/s/ Michael J. Spear

cc: Area Manager, Phoenix Area Office, Phoenix, AZ
Field Supervisor, Ecological Services, Albuquerque, NM

Cons. # 83011

(4)

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Field Supervisor
Ecological Services, USFWS
Post Office Box 4487
Albuquerque, New Mexico 87196

December 2, 1982

Mr. Richard C. Neimeyer, Area Manager
Bureau of Land Management
Taos Resource Area
P. O. Box 1045
Taos, New Mexico 87571-1045

Dear Mr. Neimeyer:

This acknowledges receipt of your request to initiate formal Section 7 consultation with the Fish and Wildlife Service in regard to the Guadalupe Mountain Tailings Disposal Area as required by the Endangered Species Act of 1973, as amended. The 90-day consultation period began on November 24, 1982, the date your request was received.

We will process your consultation request as soon as possible within the 90-day time frame. If additional information or time is required, you will be contacted.

As a reminder, the Endangered Species Act requires that after initiation of formal consultation the Federal agency and the permit or license applicant shall not make any irreversible or irretrievable commitment of resources with respect to the agency action which has the effect of foreclosing the formulation or implementation of any reasonable and prudent alternative measures which would avoid jeopardizing the continued existence of any endangered or threatened species or adversely modifying or destroying the critical habitat of any such species.

Thank you for assisting us to conserve listed species. If you have any questions, please call this Office at (505) 766-3966 or FTS 474-3966.

Sincerely yours,

R. A. Hoppe

Field Supervisor

cc:
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Regional Director, FWS, AEV, SE, Albuquerque, New Mexico

Bureau of Land Management
Taos Resource Area

DEC 06 1982

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Field Supervisor
Ecological Services, USFWS
Post Office Box 4437
Albuquerque, New Mexico 87196

Cons. #2-22-83-F-011

February 18, 1983

Memorandum

To: Area Manager, Taos Resource Area, Bureau of Land Management, Taos, New Mexico

From: Field Supervisor, FWS, Ecological Services, Albuquerque, New Mexico

Subject: Section 7 Consultation Biological Opinion re: Bureau of of Land Management (BLM) Action to Allow Proposed Guadalupe Mountain Tailings Disposal Facility

This is in response to your July 23 request for formal Secton 7 consultation, as provided by the Endangered Species Act on your proposal to prepare an environmental Assessment, under the auspicies of the Federal Land Management and Policy Act (FR 43(242): 53764-53774), on the Molybdenum Corporation of America's proposed Guadalupe mountain tailings disposal area, Taos County, New Mexico.

On August 10, 1982, the Service requested information from the BLM on the effects of their action and also stated the biological opinion would be processed within 90 days receipt of this information. We received the Bureau's biological assessment dated November 24, 1982, on November 26, 1982.

The following background information and biological opinion are founded upon information furnished by the Bureau of Land Management, data in our files and discussion with personnel from the New Mexico Department of Game and Fish, Colorado Division of Wildlife and Colorado College. The proposed BLM action will result in the construction and operation of the Guadalupe Mountain tailings disposal facility, which is in proximity to the endangered bald eagle (Haliaeetus leucocephalus) and American peregrine falcon (Falco peregrinus anatum).

FWS REG 2
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FEB 22 '83
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BACKGROUND INFORMATION

The BLM's action of approval of the plan of operations will allow Molycorp, Inc., to construct and operate a 1,320-acre tailings facility approximately one half mile west of an exisiting disposal site or approximately three miles northwest of Questa, Taos County, New Mexico. This facility will serve the Molycorp Mine 12 miles east of Guadalupe Mountain and include a reservoir which will be created by constructing two dams, one each on opposite ends of a saddle separating the two peaks of the Guadalupe Mountain. The initial reservoir will be 700 acres ending with a final surface area of approximately 550 acres. A pumping station will be constructed on the east side of the facility to pump the tailings from the existing disposal site to the new tailings area. Decant of surface water and collected seepage will be transported to Pope Lake, part of the existing facility and then discharged to the Red River. In approximately 25-30 years the Guadalupe tailings area will be filled and then reclaimed through plantings of varied plants.

On March 16, 1978, the bald eagle was listed as endangered in the conterminous United States, except for several northwest and Great Lake States where it is designated as a threatened species. In 1982, an estimated 350 bald eagles were recorded in New Mexico during the mid-winter period. The Rio Grande, in vicinity of Guadalupe Mountain, supports 8 to 15 wintering bald eagles. The Guadalupe Mountains do not support the bald eagle, even though an occasional individual may fly in the vicinity of this area. It is doubtful if any activity from the tailings pond construction, or operation phase, or results of site reclamation will have an impact upon this eagle.

The peregrine falcon was listed as endangered on October 13, 1970. The anatum subspecies of this falcon, formerly widespread throughout North America, now exists as a breeding bird only in disjunct populations including the southern Rocky Mountains. Prior to widespread use of DDT in the late 1940's and 1950's, it is estimated that more than 300 pairs nested in the continental U.S. By 1970, as a result of pesticide contamination, the peregrine was extinct in the eastern U.S. and undergoing rapid declines throughout the rest of North America. Today, in the Rocky Mountain/Southwest region, less than 20 percent of the estimated historical (pre-DDT) breeding pairs exist.

The peregrine falcon is an inhabitant of the Questa area. This species was located in 1979 and even though data on their specific behavior is limited, it appears their prime foraging habitat is removed from the Guadalupe Mountain area. Reproduction from these falcons is good. The vast bulk of their prey items are bird species representative of forest and riparian communities.

Potential impacts to the peregrine falcon, as a result of the action include those human activities involving dam construction and maintenance (e.g., people and machinery moving around and resultant noise) and by creating pond conditions that will attract shore and other water birds to an area that was previously occupied by upland bird species--some species of which are prey for this falcon. There is some concern that these water birds may be highly pesticide contaminated and could pass this material on to the area peregrine falcons and eventually hurt their reproductive efforts.

I feel it is highly questionable if the project area will be used by the peregrines because of its distance to the primary peregrine falcon use area. Secondarily, there exists some question as to whether the pond area will actually serve as an attractant to water birds, much less the huge concentrations that might be needed to attract the peregrine falcon. I do not believe the peregrine falcon will be attracted to this area.

BIOLOGICAL OPINION

Based on this evaluation, it is my biological opinion that the proposed action is not likely to jeopardize the continued existence of the bald eagle or peregrine falcon.

Because it is questionable if your action will affect either species, I would recommend you implement a bald eagle and peregrine falcon record system that would help document the distribution of these species in the action area.

Further consultation is not required unless new information becomes available that discusses the bald eagle and peregrine falcon, new species are listed that may be affected by this action, or the proposed action is modified in a manner not considered in this biological opinion.

We appreciate your interest in endangered and threatened species. Please contact this office if you have any questions about this opinion.

Sincerely yours,

R. A. Hoppe

Richard A. Hoppe
Field Supervisor

cc:
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, FWS, (OES), Washington, D.C.
Regional Director, FWS, AEV, SE, Albuquerque, New Mexico

(8)

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Field Supervisor
Ecological Services, USFWS
Post Office Box 4487
Albuquerque, New Mexico 87196

Cons. #2-22-83-I-011

July 1, 1986

Memorandum

To: District Manager, Albuquerque District, Bureau of Land Management, Albuquerque, New Mexico

From: Acting Field Supervisor, FWS, Ecological Services, Albuquerque, New Mexico

Subject: Review and comment on prey base analysis by habitat site, Taos Resource Area near Questa in Taos County, New Mexico (BLM)

This responds to your request for our review of the subject document and determination if further consultation under Section 7 is needed on the proposed Molycorp mill tailing project. We have reviewed the subject final project report and find that it contains considerable information relative to the quantity, availability and quality of the local avian prey base for peregrine falcons. We support the management recommendations stated in the report. We do not believe that additional consultation under Section 7 of the Endangered Species Act is necessary.

If you have any questions please call Charles Ault at (505) 766-3966 or FTS 474-3966.

Thomas F O'Brien

Thomas F. O'Brien

Bureau of Land Management
Taos Resource Area

JUL 02 1986

cc:
Area Manager, Bureau of Land Management, Taos Resource Area
Attn: Ben Kuyhendal, Taos, New Mexico
Regional Director, FWS, Habitat Resources, Albuquerque, New Mexico

Area Office

2 Multiple Resources
Ben

Recreation

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APPENDIX D

CULTURAL RESOURCES CONSULTATION CORRESPONDENCE

713

8110.19(018)
Guadalupe Mtn.

TAOS RESOURCE AREA
P.O. Box 1045
Taos, New Mexico 87571-1045
(505) 758-8851

October 12, 1982

Thomas W. Merlan
State Historic Preservation Officer
Historic Preservation Bureau
505 Don Gaspar Avenue
Santa Fe, New Mexico 87503

Dear Mr. Merlan:

Please find enclosed a proposal for a cultural resource inventory of the Molycorp Guadalupe Mountain tailings disposal area near Questa, New Mexico. The proposal was prepared by Tim Seaman and David Snow of the Museum of New Mexico and agreed to by you, Cindy Stark of Molycorp, and B.L.M. archaeologist, Ben Phillips in a meeting at the labratory of Anthropology October 5, 1982.

I concur with the approach outlined in the proposal. Thank you for attending the meeting on such short notice. I expect field work to begin immediately if Molycorp and the Museum of New Mexico negotiate a contract.

Sincerely yours,

Richard C. Niemeyer
Taos Resource Area Manager

018:BPhillips:ema:10/12/82

7 C

8110.1(018)

TAOS RESOURCE AREA
P.O. Box 1045
Taos, New Mexico 87571-1045
(505) 758-8851

March 2, 1983

Ref: 2(II) 83-T

Mr. Thomas W. Merlan
State Historic Preservation Officer
Historic Preservation Bureau
505 Don Gaspar Avenue
Santa Fe, New Mexico 87503

Dear Mr. Merlan:

We have received a report from the Museum of New Mexico entitled: "Archaeological Investigations on Guadalupe Mountain, Taos County, New Mexico, Laboratory of Anthropology Note 309." The report describes cultural resources identified within the Guadalupe Mountain Tailings Disposal Area proposed by Molycorp, Inc.

We have accepted the report and concur with its recommendations. It is our opinion that the eleven archaeological sites recorded by the survey are eligible to the National Register of Historic Places as a group. The eleven sites (LA Nos. 38422, 38423, 38424, 38425, 38426, 38427, 38428, 38429, 38430, 38431, and 38432) are likely to yield important scientific information about Archaic and Basketmaker period subsistence in north central New Mexico. No architectural or heritage values were noted.

We will appreciate receiving your review of the report and opinion about the eligibility of the eleven archaeological sites.

Sincerely yours,

Richard C. Niemeyer
Taos Resource Area Manager

018:BPhillips:ema:3/2/83

7D

STATE OF NEW MEXICO

DEPARTMENT OF
FINANCE AND ADMINISTRATION

STATE PLANNING DIVISION

TONEY ANAYA
GOVERNOR

505 DON GASPAR AVENUE
SANTA FE, NEW MEXICO 87503
(505) 827-4950

March 7, 1983

Ref: CR Report 2(II)83

Richard C. Niemeyer
Area Manager
Taos Resource Area
Bureau of Land Management
P.O. Box 1045
Taos, New Mexico 87571-1045

Dear Mr. Niemeyer:

Thank you for your letter of March 2, 1983 about recent archeological investigations on Guadalupe Mountain in Taos County.

I concur with the report's finding that LA 38422, LA 38423, LA 38424, LA 38425, LA 38426, LA 38427, LA 38428, LA 38429, LA 38430, LA 38431 and LA 38432 are likely to yield significant information about Archaic and Basketmaker period subsistence in the region (north central New Mexico) and accordingly meet criterion (d) of National Register eligibility. I agree that these sites have no architectural significance, do not have value for preservation and interpretation in place, and have no apparent association with existing Indian groups. In my opinion, they meet only criterion (d).

Please inform me of your plans for treating these sites and recovering the significant information from them.

Sincerely,

Thomas W. Merlan
State Historic Preservation Officer
Historic Preservation Bureau

TWM:jmg

TAOS RESOURCE AREA
AIA — M-R
ACTG — 1
ADMIN — HYDR
CLERK — NRS
RECP — RCCN
— RCCN
LEG — RCCN
CONS — WLDL
— PRIM
— ENGR
— FCMN
RECORDS — MNMN
— FILE
— LDRY
— BLED

Bureau of Land Management
Taos Resource Area
MAR 09 1983

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8100

SEP 24 1984

Mr. Thomas W. Merlan
State Historic Preservation Officer
Historic Preservation Division
Villa River, Room 101
Santa Fe, New Mexico 87503

Dear Mr. Merlan:

Enclosed is a cultural resource mitigation plan for Molycorp's molybdenum tailing facility on Guadalupe Mountain near Questa, New Mexico. It outlines a two-phase plan to be implemented on eleven archaeological sites (LA 38422-32432). It is the opinion of the BLM that there will be no adverse effect if these sites are mitigated according to this plan.

I will appreciate your comments on the proposed mitigation plan.

Sincerely,

Richard C. Niemeyer
Taos Resource Area Manager

Enclosure

7F

STATE OF NEW MEXICO

OFFICE OF CULTURAL AFFAIRS
HISTORIC PRESERVATION DIVISION

VILLA RIVERA, ROOM 101
228 EAST PALACE AVENUE
SANTA FE, NEW MEXICO 87503
(505) 827-8320

TONEY ANAYA
GOVERNOR

THOMAS W. MERLAN
DIRECTOR

JILL Z. COOPER
CULTURAL AFFAIRS OFFICER

October 17, 1984

Mr. Richard C. Niemeyer
Area Manager, Taos Resource Area
Bureau of Land Management
Montevideo Plaza, P.O. Box 1045
Taos, New Mexico 87571

Re: Concurrence in determination of no adverse effect through data recovery, Guadalupe Mountain Project

Dear Mr. Niemeyer:

Thank you for your letter of September 24, 1984 regarding the proposed cultural resource mitigation plan for eleven archaeological sites (LA 38422-38432) located on the proposed Molycorp molybdenum tailings facility on Guadalupe Mountain, near Questa, New Mexico. This mitigation proposal was submitted by the Laboratory of Anthropology in Santa Fe (Laboratory of Anthropology, Note No. 337).

As outlined, the mitigation program will consist of two phases of data collection and analysis. The first phase involves defining site boundaries, site mapping, and subsurface testing. The second phase involves more extensive excavation of sites with subsurface remains. The extent of Phase II excavation will be determined on the basis of Phase I results. Each phase will include analysis of retrieved materials with preparation of a final report. Copies of the final report should be submitted to this office and to the Laboratory of Anthropology. As noted in previous correspondence, the data recovery program is anticipated to provide significant information pertaining in particular to late Paleo and Archaic utilization of higher altitude areas of the northern Rio Grande. Very little work has been completed to date on this aspect of prehistory.

Bureau of Land Mana
Taos Resource Are

I concur with BLM's recommendation that the strategy outlined should be adequate to support a determination of no adverse effect through data recovery. In accordance with Section IX (C) of the statewide PMOA (NMSO-168), BLM may elect to afford the Advisory Council on Historic Preservation further opportunity to comment on the data recovery program.

I look forward to reviewing the results of the data recovery program.

Sincerely,

Thomas W. Merlan
State Historic Preservation Officer

cc: John Ware, Laboratory of Anthropology, Contract Archaeology

APPENDIX E

CULTURAL RESOURCES MITIGATION PLAN IMPLEMENTATION

The following implementation plan outlines data recovery that will be completed in 1989, subject to minor changes based on field decisions. The objectives of this work include site boundary definition, surface collection, subsurface examination, and analysis of collected materials.

GUADALUPE MOUNTAIN PROJECT

Implementation Plan

Introduction

This implementation plan and budget reflects minor changes from the interpretation of the scope of services reflected in an earlier document dated 10 August 1988, based upon extensive discussions with John Roney, Paul Williams, and Stephen Fosberg (BLM) on 25 August 1988.

Research Objectives

In the mitigation plan document for Guadalupe Mountain, Vierra (1984) identified a number of research issues related to both regional settlement and subsistence organization, and site-specific contexts of occupancy at Guadalupe Mountain for the Paleoindian, Archaic, Anasazi, Jicarilla Apache and Historic time periods. Although the specific details of research questions identified for each major period of human adaptation vary somewhat in Vierra's (1984) research design, the following research themes are common to all: chronological studies, site structure and function studies, technological studies, and subsistence studies.

In essence, the research design, proposed by Vierra (1984) and the mitigation plan offered by Ware and Vierra (1984) are dependent upon a central set of interrelated assumptions about the character of the archeological record, and concomitant expectations about the manner in which that record can be interpreted through data recovery and analysis. Stated briefly, assumptions and expectations are as follows:

1) Archeological sites are made up of assemblages of artifacts and features which are deposited during *specific temporal episodes* of site occupancy.

2) The *spatial structure* or association of artifacts and features resultant from these temporally specific assemblages can be interpreted through analysis to provide information concerning residential group size, composition, and activity differentiation.

3) The *content* of such assemblages (feature type, artifact type, etc.) can be interpreted through analysis to provide information about the character of subsistence related activities involved in food and technological resource extraction, distribution, and consumption.

4) Although many archeological site locations can be expected to be composite, or *palimpsest* overlapping concatenations of many such temporally specific assemblages, these sites can be analytically dissected into their component parts, such that each assemblage can be subjected to chronological, structural, and content analyses independently of the other assemblages at the site.

Potential difficulties with several of these expectations were identified by Seaman (1987) as a result of the first phase of data recovery at LA 38424. Seaman's findings indicate that the previous expectations of considerable spatial structure in associations between features and artifacts may not be merited; that the content of assemblages may be quite redundant through time; and that taphonomic factors may preclude routinely successful "analytical dissections" of the composite archeological record at Guadalupe Mountain (Seaman 1987;

58-59). In response to these preliminary findings, and in response to preliminary analyses, Seaman proposed a set of data recovery procedures and analyses for further work which emphasize the following lines of investigations at the Guadalupe Mountain sites.

Taphonomic studies: Implementation of surface collection, stripping, subsurface excavations and a parallel geomorphological assessment of post-occupational factors leading to apparent patterning (or lack of patterning) in the distributional structure of the archeological record.

Criteria for targeting best case assemblages for intensive analysis: Seaman (1987: 56-57) identifies criteria through which assemblages offering best potential as single-episode occupations can be recognized during inventory stages; and suggests that a sample of these be targeted for intensive data recovery to insure that conventional assemblage analyses can be performed on those assemblages which do meet conventional expectations of integrity.

Topographic Analyses: Preliminary analysis of artifact density and content variation at LA 38424 (Seaman 1987: 55-57) suggest that while conventional expectations of structural integrity, and chronological association of artifacts may not typify the Guadalupe Mountain archeological record; intriguing patterns in artifact content could be identified at a larger, topographic scale of association. Seaman (1987:58-59) thus proposes that a major focus of continued research should be to identify the scale of site occupancy at which spatial patterning in the distribution of artifacts and features becomes interpretable against behavioral referents.

Technological Analysis: Previous research has provided clear evidence that the basalt outcrop at Guadalupe Mountain served as a major technological resource for a several thousand year term of human occupancy and visitation to the locale. Data recovery and analysis procedures will specifically address the question if stylistic variability in raw material procurement and stages of core reduction can be identified at different locales; or identified in the same spatial locales. Expectations of assemblage content differences under conditions of embedded procurement or logistical acquisition of this resource will be evaluated. Similarly, a suite of analytical procedures will be used to definitively assess whether the numerous formal tools (unifaces and bifaces) at the Guadalupe Mountain locale are manufacturing *discards*, or are functionally intact and discarded or lost as a consequence of use. Results of both analyses (core reduction and formal tool analysis) can be used to further evaluate whether raw material acquisition and tool manufacture at the locale is an embedded or logistical activity; and whether the character of tool manufacture is redundant or variable at different places within the locale.

Feature Analyses: Finally, a sample of features (possible hearths) will be intensively examined through excavation in hopes that chronological functional and economic information can be retrieved.

The following sections will outline the implementation plan and schedule proposed to achieve these basic research objectives.

Field Methods

The proposed field effort encompasses the following tasks:

1) Resurvey of the 11 archeological sites (LA 38422–LA 38432) for the purpose of:

   - redefinition and plotting of sites and artifact concentration boundaries
   - relocation and plotting of features such as hearths and artifact concentrations thought to represent discrete reduction episodes
   - collection and plotting of formal tools and obsidian artifacts
   - identification of areas within concentrations for controlled surface collection

2) Controlled surface collection of a 10% areal sample of the 20 artifact concentrations distributed among 10 of the 11 sites. A total of 6000 sq m will be targeted for collection, with ca. 60% of the area (or 3600 sq m) to be collected in 1 sq m units, and ca. 40% (or 2400 sq m) to be collected in larger "dogleash", quadrat, or transect units. Decisions as to unit size, shape and sample placement will be made in consultation with the BLM, based upon infield analysis of artifact distributions.

3) Hand excavation of five of the 10 identified features on sites LA 38422, LA 38424, LA 38431, and LA 38432.

4) Hand excavation of a total of 40 1 x 1 m test pits within the areas subjected to surface collection, or in the vicinity of features (subject to consultation with the BLM).

5) Mechanical excavation of approximately 100 linear m of trenches in support of studies conducted by a consulting geomorphologist.

Because of the wide variety of tasks that must be performed simultaneously among the 11 sites, 3 independent teams consisting of a crew leader and a single assistant archeologist will be employed. Site resurvey will, however, be performed by the entire crew of 6, plus the project director. The initial intensive resurvey will focus on each of the 11 sites as they are defined by Seaman (1983:Figure 2), and will maintain a transect spacing of 8 meters. All artifacts, discrete reduction events and hearth features will be marked by pin flags and survey tape in order to identify artifact concentrations and features appropriate for controlled surface collection and excavation. All lithic tools and obsidian artifacts will be uniquely marked during resurvey to facilitate subsequent collection and piece plotting of these items.

At this point, the three crews will begin three separate recording tasks. One crew will perform the tool and obsidian collections and plot each item's location on 1":200' scale contour maps, supplied by the BLM. This crew will also plot the locations and identification numbers of features, artifact concentrations and site boundaries, as defined by the limits of visible cultural material and/or topographic features. The second crew will begin the process of setting provenience controls for surface collection and excavation in areas identified by the Project Director, in consultation with the BLM. This crew will also complete a detailed topographic map of each collection area. On sites where one or more of the five features chosen by the Project Director (in consultation with the Project COAR) for excavation, a collection area will automatically be established surrounding the feature. The third crew will assist in the establishment of provenience controls and begin the task of surface collection within the 1 x 1 m grid system immediately. Excavation of test pits and/or features will be initiated only after completion of the surface collection and topographic map by one or two of the three crews, depending on the size of the collection area and number of features chosen for data recovery.

Decisions concerning the number and size of grid collection areas will be made based upon field analysis of survey sweep data, and in consultation with the BLM. The exact locations of all collection and excavation units will be recorded on the 1":200' map. Features and test pits will be excavated as separate units as described in section D. 3. a. and D. 3. b. of the Task Scoping Request. An area between 12–16 sq m will be surface stripped around each excavated feature, and this area will be expanded as required to encompass associated artifact distributions or additional features. If encountered, these features will be substituted towards the target of 5 features, and additional surface stripping (beyond a 4 x 4 m area) will be substituted for the targeted number of test pits within the collection unit.

A geomorphological study of the Guadalupe Mountain caldera will be conducted in conjunction with the archeological studies. This study will utilize a series of backhoe trenches, placed judgmentally by the geomorphologist, in describing the non–cultural stratigraphy of the caldera. If warranted, radiocarbon, pollen and other samples will be collected from the geomorphic trench profiles.

A total of 166 person days is required to complete the above tasks exclusive of travel PI and PD supervision, and anticipated weather down time. A breakdown of the proposed effort by project phase and line item is provided as an attachment. These estimates are largely based on experiences gained during field work conducted by OCA at LA 38424 in 1987. The following rates were used in computation of these estimates:

Activity	Estimated Units	Rate	# Person days
intensive site survey	131 linear miles	4.4 miles /person day	30
grid collection	6000 sq m	250 sq m/person day	24
feature excavation	5 features	7.6 person days/feat	38
test excavation	20 cu m (40x.5x1x1)	0.5 cu m/person day	40
site set up/infield analysis			34
Total			166

An additional 26.25 person days are needed for travel during the 3 10–day field sessions, and 15.25 person days have been allocated for inclement weather down time (to be allocated to other elements of the project if not needed during fieldwork). This results in a total field effort of 34 elapsed field days for a crew of 7 (PD, CCs, and CMs). The project schedule is illustrated in a milestone chart attached to this Task Scoping.

Laboratory Analysis and Report Preparation

As artifacts and samples are recovered during fieldwork through either excavation or surface collection, a field specimen catalog will be maintained associating each lot of items with a minimal provenience unit and a unique specimen number. At the end of each field session, collected archeological materials will be returned to OCA for processing and checking against the field catalog, which will be entered into the project data base system. After washing, artifact processing will involve sorting the items by general artifact class for distribution to the appropriate analysts. Samples will be appropriately processed and sent to specialists for analysis. Lithic artifacts recovered previously from LA 38424 by OCA (Seaman 1987) will also be included in the latter stages of artifact processing and all subsequent analyses.

Lithic analyses will focus on aspects of lithic technology as they relate to site function in the Guadalupe Mountain assemblages. Special attention will be given to identifying raw materials and analyzing this material in terms of these groups, as it can be assumed that all non-basalt lithic material was transported into the Guadalupe Mountain caldera. Thus, raw material variability among the assemblages should accurately reflect the geographic range of groups using Guadalupe Mountain, and it may be possible to isolate manufacture and maintenance strategies for introduced or "foreign" lithic tools from those manufactured from the local basalt and, possibly, used on Guadalupe Mountain. Special attention will also be given to separating out discarded and used tools from those discarded as manufacturing failures through lithic analysis.

Two separate but related lithic analyses aimed at site function are planned. The first will focus on the by-products of manufacture. While the use history of lithic tools themselves can be quite complex, the by-products of tool manufacture and maintenance generally remain where the manufacturing or maintenance occurred, thus providing a more accurate indication of the activities performed at a location. The second analysis will record additional attribute information on retouched lithic tools and ground stone implements. The emphasis in these studies will be on identifying patterns among objective measures of tool morphology, breakage patterns and utilization that may indicate whether tools were manufactured an/or used and discarded on the Guadalupe Mountain sites.

This analysis will record the following variables for all recovered artifacts:

- Material type (Warren coding system)
- Artifact type
- Condition/Portion
- Cortex % (dorsal cortex on flakes)
- Dimensions (length, width, thickness in mm)
- Weight (g)
- Platform type (flakes only)
- Heat treatment
- Utilization

For retouched and formal tools additional variables were recorded:

- Bifacial manufacture stage
- Functional completeness
- Utilization
- For each retouched edge:
  - Edge location
  - Edge completeness
  - Edge length
  - Edge shape
  - Direction of use/retouch
  - Retouch scar length
  - Edge angle

For ground stone tools additional data were recorded for:

- Burning
- Use location
- Edge/surface cross section
- Edge/surface preparation
- Number of impact scars

Predominant wear pattern
Surface dimensions (length, width, thickness in mm)

These and other excavation and analysis data will entered into a project data base, created and maintained at OCA. Including the 3667 items collected previously on LA 38424, it is estimated that a total of 15,000 pieces of debitage will be collected along with 1250 formal tools. An appropriate sample of these will be subjected to intensive analysis, as outlined above, after preliminary sorting; the size and nature of that sample will be determined in consultation with the BLM. After the completion of analysis, all artifacts will be curated at the Maxwell Museum of Anthropology, University of New Mexico. The draft final report will integrate the results of artifact analyses with excavation and surface collection data, and the results of specialized studies, and will address the research concerns outlined previously.

Approximately 424 person days are required to complete the analyses and draft report (Attachment A).

Project Schedule and Deliverables

The project will be completed within a period of 40 working weeks (see attached chart). Prefield and gear up activities will take approximately 2 weeks, and fieldwork will take an added 7 weeks. Three 10 day field sessions will be conducted on Guadalupe Mountain. Artifact processing, analyses, and report production are scheduled to take an additional 19 weeks, and after the receipt of BLM comments, 12 weeks will be needed for final report production. A catalog of all collected artifacts and samples will be delivered to the BLM prior to the 21th project week and the draft final report will be submitted at the 35th project week.

COMMENTS RECEIVED

NPDES Permit No. NM0022306

Upon issuance of one or more of the following actions, please mail copies of the indicated event to the party(s) listed below: Public Notice, Determination, Permit (circle appropriate event).

	NAME AND ADDRESS		NAME AND ADDRESS
Date Posted 4.24.98	Mr. Charles De Saillan	Date Posted	
Comm. Date	Office of Attorney General	Comm. Date	
	Env. Enforcement Div.		
Date Mailed	P.O. Drawer 1508,	Date Mailed	
	Santa Fe, NM 87504		

Date Posted		Date Posted	
Comm. Date		Comm. Date	
Date Mailed		Date Mailed	

Date Posted		Date Posted	
Comm. Date		Comm. Date	
Date Mailed		Date Mailed	

Date Posted		Date Posted	
Comm. Date		Comm. Date	
Date Mailed		Date Mailed	

UNIT STATES ENVIRONMENTAL PROTECTI AGENCY

OCT 22 1987

REPLY TO: 6W-PS

Mr. David Shoemaker
Mine Manager
Molycorp, Inc.
P.O. Box 469
Questa, New Mexico 87556

Re: NPDES Permit No. NM0022306 - Molycorp, Inc.

Dear Mr. Shoemaker:

The application for your expiring National Pollutant Discharge Elimination System (NPDES) permit was recently received in this office. In accordance with the Environmental Permit Regulations, (40 CFR 124.3(c), 48 FR 14153, April 1, 1983) your application has been reviewed and determined to be administratively complete. Please note that at the time your permit is processed for reissuance, we may request additional information including effluent testing.

All permits are issued in accordance with Federal and State priorities for water pollution abatement. Therefore, it is possible that the processing of this application for your expiring permit may take some time depending on the relative priority of the discharge in comparison to all others. During the interim, you should continue to meet your existing permit requirements until such time as a new permit is issued.

Thank you for your cooperation. If you have any questions concerning your submittal, please contact Ms. Jenaie Slaven at the above address or telephone (214) 655-7190.

Sincerely yours,

Jayne Watson
Chief
Permits Issuance Section (6W-PS)

cc: New Mexico Environmental Improvement Division

~~bcc: Reading File (6W-PS)~~

CONCURRENCES

SYMBOL	10/21/87:SLAVEN(6W-PS):tn:H-18#1:#072						
SURNAME							
DATE							

EPA Form 1320-1 (12-70) OFFICIAL FILE COPY

*U.S. GPO : 1986-159-319

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE
DALLAS, TEXAS 75202-2733

June 22, 1998

REPLY TO: 6WQ-C

Mr. David Shoemaker
Molycorp Inc. Questa Div.
P.O. Box 469
Questa, NM 87556

Re: NPDES Application No. NM0022306 - Molycorp

Dear Mr. Shoemaker:

Your application for a NPDES permit was received and, in accordance with the Environmental Permit Regulations, (40 CFR 124.3(c), 54 FR 18785, May 2, 1989), was reviewed and determined to be administratively complete. Please note that at the time your permit is processed for issuance, we may request additional information including effluent testing.

Thank you for your cooperation. If you have questions concerning this submittal, please contact me at (214) 665-7518.

Sincerely,

Jackie Greensage
Environmental Protection Assistant
Customer Service Branch

ROUTING AND TRANSMITTAL SLIP

Date 2-[illegible]-88

TO: (Name, office symbol, room number, building, Agency/Post)	Initials	Date
1. HOFFMAN	KEH	
2. ENGINEER - Hunke		
3. PERMIT FILE NO. NM223006		
4.		
5.		

X	Action		File		Note and Return
	Approval		For Clearance		Per Conversation
	As Requested		For Correction		Prepare Reply
	Circulate		For Your Information		See Me
	Comment		Investigate		Signature
	Coordination		Justify		

REMARKS

COMMENT LETTER - PN DATED: 1-16-88

ENGINEER HAS FILE

PERMIT FILE ATTACHED

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

FROM: (Name, org. symbol, Agency/Post)	Room No.—Bldg.
CALDWELL	Phone No.

5041-102

OPTIONAL FORM 41 (Rev. 7-76)
Prescribed by GSA
FPMR (41 CFR) 101-11.206

☆ GPO : 1982 O - 381-529 (209)

NMO 022306
DN 1-16-88
Humke 2-12-88

Molycorp, Inc.

Questa Division
P.O. Box 469
Questa, New Mexico 87556
Telephone: (505) 586-0212

UNOCAL 76
MOLYCORP

CERTIFIED MAIL

February 5, 1988

RECEIVED
FEB 11 1988
6W-PS

Mr. Fred Humpke
U. S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, Texas 75202

Dear Mr. Humpke:

In January, 1988, Molycorp received from your agency, a public notice Fact Sheet and a draft copy of our NPDES permit drafted under the authority of the National Pollutant Discharge Elimination System.

After reviewing this document, we find that the value used in the quantitive effluent characteristics for Outfall 001 and 002 are extremely high and certainly do not represent the actual effluent characteristics of our discharges. The values shown on the draft permit are results of analysis which were done in 1981, and subsequently submitted as documentation in our 1982 Permit application.

We requested from EPA that a deferral be granted us in our Permit application of October 1987, since our milling operations had been shutdown since February, 1986. As a result of this shutdown, we had no discharge from Outfall 001 to analyze and therefore, no results to send you for the previous twelve months. Outfall 002, which is currently discharging, has not been impacted by milling operations since February, 1986, and the discharge is not representative of our total effluent.

The abnormally high concentrations of Arsenic (.56) and Lead (.18)ppm on the Fact Sheet for Outfall 001, were sample analysis which were performed in August, 1981, and were based on only one composite sample sent out to a commercial laboratory. The same holds true for a high Lead value from Outfall 002 of .21 ppm. At that time we were not performing our own analysis of these two elements at Molycorp, and therefore, were not able to verify the results. All of the above analysis were done prior to the mill shutdown of August, 1981.

Because of the requirements imposed upon us by our 1983 NPDES Permit, we began analyzing our effluent samples. Since that time, we have never shown results with values above .025 ppm. for Arsenic, or any Lead values

that were consistently higher than .1 ppm. In 1984, our Ion Exchange Treatment Plant was placed in operation. This plant was designed to reduce molybdenum from our effluent from 4 ppm, which we were experiencing, to less than .6 ppm. The use of cyanide in our mill was drastically reduced and our effluent characteristic for cyanide is less than .01 ppm. All of this information is contained in our discharge monitoring reports (DMR's) from 1983, until the indefinite shutdown of February, 1986.

We agree that by using the 1983 Permit application data, we would, indeed, have to perform monthly biomonitoring. However, based on data which we have acquired since 1983, it is clear to us that we are not discharging pollutants in quantities which could have the potential to cause toxic conditions in the Red River. Further, data which was included in our 1987 Permit application, should indicate that biomonitoring is not necessary for Outfall 002.

Per your telephone conversation with Leroy Apodaca of my staff, enclosed for your review are appropriate portions of Section V for inclusion in our Permit application. We think that once you review the enclosed data, you will agree that biomonitoring should be done only on a quarterly basis for Outfall 001, and not at all for Outfall 002.

Your review of the new enclosed data and consideration of our postion will be appreciated. Call me at the telephone number listed herein if additional data is required, or if you have any questions regarding this proposal.

Very truly yours,

David R. Shoemaker

David R. Shoemaker
Mine Manager

cc: EID.

files

EPA I.D. NUMBER (copy from Item 1 of Form 1)	OUTFALL NUMBER
NM 002699094	001

CONTINUED FROM PAGE 3 OF FORM 2-C

Form Approved OMB No. 158-R0173

PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a *(secondary industries, non–process wastewater outfalls, and non–required GC/MS fractions)*, mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe to be absent. If you mark either columns 2-a or 2-b for any pollutant, you must provide the results of at least one analysis for that pollutant. Note that there are seven pages to this part; please review each carefully. Complete one table *(all seven pages)* for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE (1) CONCENTRATION	a. MAXIMUM DAILY VALUE (2) MASS	b. MAXIMUM 30 DAY VALUE (if available) (1) CONCENTRATION	b. MAXIMUM 30 DAY VALUE (if available) (2) MASS	c. LONG TERM AVRG. VALUE (if available) (1) CONCENTRATION	c. LONG TERM AVRG. VALUE (if available) (2) MASS	d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	a. LONG TERM AVERAGE VALUE (2) MASS	b. NO. OF ANALYSES
METALS, CYANIDE, AND TOTAL PHENOLS															
1M. Antimony, Total (7440-36-0)															
2M. Arsenic, Total (7440-38-2)						.013		.010		12	PPM				
3M. Beryllium, Total, 7440-41-7)															
4M. Cadmium, Total (7440-43-9)						.020		.013		12	PPM				
5M. Chromium, Total (7440-47-3)															
6M. Copper, Total (7550-50-8)						.075		.033		12	PPM				
7M. Lead, Total (7439-97-6)						< .100		< .100		12	PPM				
8M. Mercury, Total (7439-97-6)						< .0002		< .0002		12	PPM				
9M. Nickel, Total (7440-02-0)															
10M. Selenium, Total (7782-49-2)															
11M. Silver, Total (7440-22-4)															
12M. Thallium, Total (7440-28-0)															
13M. Zinc, Total (7440-66-6)						.032		.019		12	PPM				
14M. Cyanide, Total (57-12-5)						.0029		.0015		24	PPM				
15M. Phenols, Total															
DIOXIN															
2,3,7,8-Tetrachlorodibenzo-P-Dioxin (1764-01-6)				DESCRIBE RESULTS											

CONTINUE ON REVERSE

ITEM V-B CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. (if available)	2. MARK 'X' a. BELIEVED PRESENT	b. BELIEVED ABSENT	3. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	(2) MASS	b. MAXIMUM 30 DAY VALUE (if available) (1) CONCENTRATION	(2) MASS	c. LONG TERM AVRG. VALUE (if available) (1) CONCENTRATION	(2) MASS	d. NO. OF ANALYSES	4. UNITS a. CONCENTRATION	b. MASS	5. INTAKE (optional) a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	(2) MASS	b. NO. OF ANALYSES
g. Nitrogen, Total Organic (as N)														
h. Oil and Grease														
i. Phosphorus (as P), Total (7723-14-0)														
j. Radioactivity														
(1) Alpha, Total														
(2) Beta, Total														
(3) Radium, Total														
(4) Radium 226, Total														
k. Sulfate (as SO_4) (14808-79-8)														
l. Sulfide (as S)														
m. Sulfite (as SO_3) (14265-45-3)														
n. Surfactants														
o. Aluminum, Total (7429-90-5)														
p. Barium, Total (7440-39-3)														
q. Boron, Total (7440-42-8)														
r. Cobalt, Total (7440-48-4)														
s. Iron, Total (7439-89-6)					.323		.270		12	PPM				
t. Magnesium, Total (7439-95-4)														
u. Molybdenum, Total (7439-98-7)					.670		.600		12	PPM				
v. Manganese, Total (7439-96-5)					.293		.240		12	PPM				
w. Tin, Total (7440-31-5)														
x. Titanium, Total (7440-32-6)														

CONTINUE ON PAGE V-3

EPA I.D. NUMBER (copy from Item 1 of Form 1)	OUTFALL NUMBER
NM 002699094	002

CONTINUED FROM PAGE 3 OF FORM 2-C

Form Approved OMB No. 158-R0173

PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a *(secondary industries, non-process wastewater outfalls, and non-required GC/MS fractions)*, mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe to be absent. If you mark either columns 2-a or 2-b for any pollutant, you must provide the results of at least one analysis for that pollutant. Note that there are seven pages to this part; please review each carefully. Complete one table *(all seven pages)* for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NUMBER (if available)	2. MARK 'X'			3. EFFLUENT							4. UNITS		5. INTAKE (optional)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1M. Antimony, Total (7440-36-0)															
2M. Arsenic, Total (7440-38-2)						.010		.010		52	PPM				
3M. Beryllium, Total, 7440-41-7)															
4M. Cadmium, Total (7440-43-9)						< .010		< .010		52	PPM				
5M. Chromium, Total (7440-47-3)															
6M. Copper, Total (7550-50-8)						.014		.020		52	PPM				
7M. Lead, Total (7439-97-6)						< .100		< .100		52	PPM				
8M. Mercury, Total (7439-97-6)						< .0002		< .0002		52	PPM				
9M. Nickel, Total (7440-02-0)															
10M. Selenium, Total (7782-49-2)															
11M. Silver, Total (7440-22-4)															
12M. Thallium, Total (7440-28-0)															
13M. Zinc, Total (7440-66-6)						.018		.029		52	PPM				
14M. Cyanide, Total (57-12-5)						.002		.003		52	PPM				
15M. Phenols, Total															
DIOXIN															
2,3,7,8-Tetrachlorodibenzo-P-Dioxin (1764-01-6)				DESCRIBE RESULTS											

CONTINUE ON REVERSE

ITEM V-B CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. (if available)	2. MARK 'X' a. BELIEVED PRESENT	b. BELIEVED ABSENT	3. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	(2) MASS	b. MAXIMUM 30 DAY VALUE (if available) (1) CONCENTRATION	(2) MASS	c. LONG TERM AVRG. VALUE (if available) (1) CONCENTRATION	(2) MASS	d. NO. OF ANALYSES	4. UNITS a. CONCENTRATION	b. MASS	5. INTAKE (optional) a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	(2) MASS	b. NO. OF ANALYSES
g. Nitrogen, Total Organic (as N)														
h. Oil and Grease														
i. Phosphorus (as P), Total (7723-14-0)														
j. Radioactivity														
(1) Alpha, Total														
(2) Beta, Total														
(3) Radium, Total														
(4) Radium 226, Total														
k. Sulfate (as SO_4) (14808-79-8)														
l. Sulfide (as S)														
m. Sulfite (as SO_3) (14265-45-3)														
n. Surfactants														
o. Aluminum, Total (7429-90-5)														
p. Barium, Total (7440-39-3)														
q. Boron, Total (7440-42-8)														
r. Cobalt, Total (7440-48-4)														
s. Iron, Total (7439-89-6)					.125		.200		52					
t. Magnesium, Total (7439-95-4)														
u. Molybdenum, Total (7439-98-7)					2.65		2.83		52					
v. Manganese, Total (7439-96-5)					1.25		1.40		52					
w. Tin, Total (7440-31-5)														
x. Titanium, Total (7440-32-6)														

CONTINUE ON PAGE V-3

file

Hunke

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Ecological Services
Suite D, 3530 Pan American Highway NE
Albuquerque, New Mexico 87107

February 11, 1988

Ms. Ellen Caldwell, Permits Branch (6W-PS)
U.S. Environmental Protection Agency
Allied Bank Tower
1445 Ross Avenue
Dallas, Texas 75202-2733

RE: Public Notice of Draft NPDES Permit

Dear Ms. Caldwell:

This responds to the public notice dated January 16, 1988 for draft NPDES permits No. NM0000019, No. NM0028576, No. NM0022306 and No. NM0020303. We have reviewed the draft permits for resource issues of concern to our agency. We will take no action on these permits at this time.

Sincerely yours,

John C. Peterson
Field Supervisor

cc:
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Health and Environment Department, Environmental Improvement Division, Santa Fe, New Mexico
Regional Director, U.S. Fish and Wildlife Service, Fish and Wildlife Enhancement, Albuquerque, New Mexico

RECEIVED
FEB 16 1988
6W-PS

PERMITS TO PUBLIC NOTICE ON January 16, 1988

PERMIT NO.	ACTION	APPLICANT NAME	EFFECTIVE DATE OF PROPOSED PERMITS
NM0000019	REP	Arizona Public Service Company	February 26, 1988
NM0020303	REP	Village of Los Lunas	February 26, 1988
NM0022306	REP	Molycorp, Inc.(Questa Division)	February 26, 1988

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1580
ALBUQUERQUE, NEW MEXICO 87103-1580

REPLY TO
ATTENTION OF:

June 2, 1988

Construction-Operations Division
Regulatory Branch

Ms. Ellen Caldwell
Permits Branch (6W-PS)
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, Texas 75202-2733

Dear Ms. Caldwell:

This is in response to your request for an evaluation of the impact that the discharge described in the following permit applications will have on anchorage and/or navigation.

Applicant	Application Number
Homestake Mining Company	NM0020389
Bakum Resources Corporation	NM0028215
Molycorp, Inc.	NM0022306
Quivira Mining Company	NM0020532
Quivira Mining Company	NM0028207
Uranium King Corporation	NM0028169
City of Santa Fe	NM0022292
Mesilla Valley Enterprises	NM0029769
Twining Water & Sanitation District	NM0022101

RECEIVED
JUN 6 1988
6W-PS

The receiving waters are not subject to navigation. If the proposed work involves discharges of dredged or fill material into waters of the United States, a Department of the Army permit under Section 404 of the Clean Water Act may be required. The work may be permitted by the nationwide permit for utility lines including outfall and intake structures (33 CFR 330.5 (a)(7)) provided the applicant complies with all permit conditions. A summary of the provisions of this nationwide permit is enclosed. Activities which are not authorized by the nationwide permit may require an individual permit.

Sincerely,

Robert E. Meehan, P.E.
Chief, Construction-Operations Division

Enclosure

Humke 6W-P1

Permit File
NM0022306

MAY 1 6 1988

REPLY TO: 6W-P

MEMORANDUM

SUBJECT: Potential Human Health Criteria Exceedences - 304(l) Listings and Other Water Quality Criteria Exceedences

FROM: Jack V. Ferguson
Chief /s/ Jack V. Ferguson
Permits Branch (6W-P)

TO: Robert B. Elliott
Chief
Water Quality Branch (6W-Q)

In accordance with the Region 6 Third Round Permit Implementation Strategy, the discharge from the following facility has been evaluated. Our calculations show that an exceedence of EPA's Quality Criteria for Water may result in the receiving stream at low flow due to this discharge as follows:

Facility Name/NPDES No.

Molycorp, Inc NM0022306

Location

Questa, New Mexico

Receiving Stream/Segment No.

Red River 2-119

Fish Consumption

Parameter(s)	Criteria	Calculated Concentration
N/A	N/A	N/A

In accordance with our Regional Policy, we ask that you request that the State evaluate this stream segment for inclusion on their 304(l) listings with subsequent development of an appropriate control strategy for the parameter(s) in question.

In addition, our calculations for the following parameters show that an exceedence of EPA's Quality Criteria for Water and/or MCL's may result in the receiving stream at low flow due to this discharge as follows:

Fish and Water Consumption

Parameter(s)	Criteria	Calculated Concentration
N/A	N/A	N/A

MCLs

Parameter(s)	Criteria	Calculated Concentration
N/A	N/A	N/A

Aquatic Life

Parameter(s)	Criteria	Calculated Concentration
Cadmium	0.00066	0.0045
copper	0.0065	0.0169
lead	0.0013	<0.0225

Attached is a summary of our calculations.

Attachment

cc: Myron O. Knudson (6W)
304(l) Referral File

Kathleen Sisneros, NMEID

This is our response to the comments received on the subject draft NPDES permit in accordance with our regulations.

RESPONSE TO COMMENTS
DRAFT NPDES PERMIT

Permit No.:	NM0022306
Permittee:	Molycorp, Inc.
Facility Name/Location:	Questa, New Mexico
Draft Permit Public Notice Date:	February 16, 1988
Prepared by:	Fred Humke

Issue No. 1

Molycorp has submitted new analytical data for certain parameters which they present as representative of the effluent being discharged from Outfall 001 with the Ion Exchange Treatment plant in operation; and which they believe should justify 1/quarter rather than 1/month biomonitoring.

Response No. 1

EPA has reviewed and accepted this analytical data. The following table compares the new analytical data with MCL, human health and chronic aquatic biota criteria.

Where: Ce = effluent concentration
Cr = downstream river concentration
Df = 4.44 = dilution factor

Parameter/mg/l	Ce	Cr	MCL	Human* Health	Chronic* Aquatic Biota
Arsenic	0.013	0.0029	0.05	N/A	0.048
Cadmium	0.020	0.0045	0.010	0.010	0.00066
Copper	0.075	0.0169	N/A	N/A	0.0065
Cyanide	0.0029	0.0007	N/A	0.200	0.0052
Lead	<0.1	<0.0225	0.050	0.050	0.0013
Mercury	<0.0002	<0.00005	0.002	0.00014	0.0012
Zinc	0.032	0.0072	N/A	N/A	0.047

*Gold book values

This comparison shows that the instream concentrations, Cr, still exceed the chronic aquatic biota criteria for cadmium, copper and lead. However, based on the long retention time of the impoundment, 1/quarter biomonitoring is allowed.

Issue No. 2

Molycorp requests that biomonitoring not be required for Outfall 002.

Response No. 2

Independent biomonitoring was not required for Outfall 002. Under Part III.C.d. of the permit, flow weighted composite samples are required from Outfalls 001 and 002. Based on the analytical data submitted by Molycorp, this could actually be advantageous to Molycorp for some parameters, even with ion exchange treatment levels at Outfall 001. Composite biomonitoring is retained for Outfalls 001 and 002.

However, based on a subsequent agreement with Molycorp, a one-time biomonitoring requirement is established for Outfall 002 alone, to be initiated within 60 days of the effective date of the renewed permit. Based on a daily average discharge of 0.462 MGD from Outfall 002 and the stream low flow of 16 MGD, a dilution of 2.8% at low flow and 5.5% dilution at 1/2 low flow are applied in this test.

Issue No. 3

NMEID recommends that for Outfall 002, from the effective date and lasting until mill start-up that the permit requirements be clarified for manganese and molybdenum.

Response No. 3

EPA has modified the conditions on Page 2 of Part I for manganese and molybdenum. Effluent limitations are deleted for manganese and molybdenum, but monitoring and reporting are required.

Issue No. 4

NMEID recommends that on Page 2 and 4 of Part I, flow measurement requirements be re-evaluated. NMEID questions the sample type of "daily estimate" as being accurate enough to calculate loading values.

Response No. 4

"Daily estimate" applies only to Outfall 002, which is a relatively small seep and constitutes a small flow relative to the normal discharge from Outfall 001. Outfall 001 flow monitoring is based on continuous and totalized flow monitoring. Therefore, the loading values as listed on Page 4 of Part I for molybdenum (25 lbs/day daily average and 50 lbs/day daily maximum) must be achieved for the sum total of Outfalls 001 and 002. Based on the characteristics of the seep at Outfall 002, both NMEID and EPA previously had agreed that it would be very difficult to implement a more precise flow monitoring methodology, and the result on the sum total would not be significant.

ROUTING AND TRANSMITTAL SLIP

Date 2-16-88

TO: (Name, office symbol, room number, building, Agency/Post)	Initials	Date
1. ~~KIEFMAN~~	KLH	
2. ENGINEER - Humke		
3. PERMIT FILE NO. NM223026		
4.		
5.		

X	Action		File		Note and Return
	Approval		For Clearance		Per Conversation
	As Requested		For Correction		Prepare Reply
	Circulate		For Your Information		See Me
	Comment		Investigate		Signature
	Coordination		Justify		

REMARKS

COMMENT LETTER - PN DATED: 1-16-88.

ENGINEER HAS FILE ✓

PERMIT FILE ATTACHED

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

FROM: (Name, org. symbol, Agency/Post)	Room No.—Bldg.
CALDWELL	Phone No.

5041-102

OPTIONAL FORM 41 (Rev. 7-76)
Prescribed by GSA
FPMR (41 CFR) 101-11.206

★ GPO : 1982 O - 381-629 (208)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DEC 23 1987

REPLY TO: 6W-P

MEMORANDUM

SUBJECT: NPDES No. NM0022306, Molycorp

FROM: Jack Ferguson /s/ Jack V. Ferguson
Chief
Permits Branch (6W-P)

TO: Oscar Cabra
Chief
Water Supply Branch (6W-S)

The calculated in-stream concentration (ISC) of 0.103 mg/l for arsenic in the discharge from this facility exceeds the MCL of 0.05 mg/l under primary drinking water regulations. This facility discharges to the Red River in Segment 2-120 of the Rio Grande River Basin, for which domestic water supply is a designated use. However, no existing water supply intakes are located at or below this point in the stream segment. The lower stream segments do not have domestic water supply as a designated use.

bcc: Humke (6W-PI) 8/13/87

8/13/87:HUMKE(6W-PI):tn:T-78#1:#563

CONCURRENCES

SYMBOL	6W-PI							
SURNAME	Huffman							
DATE	11-16-87							

EPA Form 1320-1 (12-70) OFFICIAL FILE COPY

*U.S. GPO

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

March 16, 1988

Mr. Myron Knudson
U.S. Environmental Protection Agency
Allied Bank Tower
1445 Ross Avenue
Dallas, Texas 75202-2733

Re: State Certification

Dear Mr. Knudson:

Enclosed please find the state certification for the following permit:

Molycorp Inc., Permit No. NM0022306

Comments and conditions are enclosed on separate sheets.

Sincerely,

for

Kathleen M. Sisneros
Bureau Chief
Surface Water Quality Bureau

MS/ms

Enclosures

cc: NMEID District II Office
NMEID Taos Field Office
Fred Humke, U.S.EPA (6W-PI)
David Shoemaker, Molycorp Inc.

RECEIVED
MAR 18 1988
6W-PS

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

March 16, 1988

Mr. Myron Knudson
U.S. Environmental Protection Agency
Allied Bank Tower
1445 Ross Avenue
Dallas, Texas 75202-2733

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Enclosed please find the state certification for the following permit:

Molycorp Inc., Permit No. NM0022306

Comments and conditions are enclosed on separate sheets.

Sincerely,

for

Kathleen M. Sisneros
Bureau Chief
Surface Water Quality Bureau

MS/ms

Enclosures

cc: NMEID District II Office
NMEID Taos Field Office
Fred Humke, U.S.EPA (6W-PI)
David Shoemaker, Molycorp Inc.

RECEIVED
MAR 18 1988
6W-PS

03/17/88 12:39 HSD/ORS 988 4289 NO.001 002

RECEIVED
EPA REGION VI
1988 MAR 16 PM 1:57
OFFICE OF REGIONAL ADMINISTRATOR

HEALTH & ENVIRONMENT DEPARTMENT

STATE OF NEW MEXICO

ENVIRONMENTAL IMPROVEMENT DIVISION

P.O. Box 968, Santa Fe, New Mexico 87504-0968
(505) 827-2805

GARRY CARRUTHERS
Governor
LARRY GORDON
Secretary
CARLA L. MUTH
Deputy Secretary
MICHAEL BURKHART
Division Director

TELECOPIER TRANSMITTAL

DATE: 3/16/88 Time: 1231 pm Page 1 OF 7
(inc. transmittal)

PLEASE DELIVER THE FOLLOWING PAGES TO:

TO: Myron Knudson

LOCATION: USEPA Region VI Dallas, Texas (6W)

Telephone Number: 214 655-7100

Telecopier Number: 214 655 2142

FROM: Glenn Saums

LOCATION: NMEID Santa Fe NM

Telephone: (505) 827-2805

TELECOPIER NUMBER: (505 827-2402

Comments:

Attention Fred Hamke, NPDES Permits Branch (6W-PI)

Original will be sent to EPA via certified mail

RECEIVED
MAR 18 1988
6W-PS

EQUAL OPPORTUNITY EMPLOYER

03/17/88 12:38 HSD/ORS 988 4289 NO.001 001

FEB 2 6 1988

REPLY TO: 6W-PI

Ms. Kathleen M. Sisneros
Bureau Chief
Surface Water Quality Bureau
New Mexico Environmental
Improvement Division
P.O. Box 968
Sanfa Fe, New Mexico 87504-0968

Re: NPDES Permit No. NM0022306,
Molycorp

Dear Ms. Sisneros:

In response to your letter dated February 11, 1988, we agree to an extension of the certification period of the permit for NMEID until March 16, 1988.

The only significant change to this proposed permit is the addition of the third round biomonitoring. NMEID has previously been closely involved with EPA in the development of this Molycorp permit and has previously certified these permit conditions.

Please feel free to have your staff contact me at (214) 655-7180 to clarify conditions with which they may have questions.

Sincerely yours,

Fred Humke
Sr. Environmental Engineer

bcc: Reading file (6W-PI)
Fred Humke (6W-PI)

6W-PI:FHUMKE:wt:x7180:2/22/88:Disk WT-22:#12:260

6W-PI
Huffman

PN H6-88
Humke

HEALTH & ENVIRONMENT DEPARTMENT

STATE OF NEW MEXICO

ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87504-0968
(505) 827-2805

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

MICHAEL BURKHART
Division Director

February 11, 1988

Certified Mail
Return Receipt Requested

Mr. Myron Knudson
U.S. Environmental Protection Agency
Allied Bank Tower, 12th Floor
1445 Ross Avenue
Dallas, Texas 75202-2733

Re: State Certification of NPDES Permit NM0022306, Molycorp, Inc., Questa Division

Dear Mr. Knudson:

The State of New Mexico Environmental Improvement Division (NMEID) hereby requests an extension to provide certification pursuant to Section 401 of the federal Clean Water Act for the referenced draft permit. The permit is currently in the public notice period. The NMEID requests this additional time to adequately review the draft permit. The NMEID expects an extension of sixty (60) days beyond the current February 16, 1988 deadline will be sufficient to review this matter.

If you have any questions please contact Mike Saladen at (505) 827-2798.

Sincerely,

Kathleen M. Sisneros

Kathleen M. Sisneros
Bureau Chief
Surface Water Quality Bureau

MS/ms

cc: Fred Humke, USEPA (6W-PS)
Ellen Caldwell, USEPA (6W-PS)
David Shoemaker, Molycorp, Inc.

RECEIVED
FEB 16 1988
6W-PS

EQUAL OPPORTUNITY EMPLOYER

HEALTH & ENVIRONMENT DEPARTMENT

STATE OF NEW MEXICO

ENVIRONMENTAL IMPROVEMENT DIVISION

P.O. Box 968, Santa Fe, New Mexico 87504-0968

(505) 827-2805

GARREY CARRUTHERS
Governor

LARRY GORDON
Secretary

CARLA L.MUTH
Deputy Secretary

MICHAEL BURKHART
Division Director

February 11, 1988

Certified Mail
Return Receipt Requested

Mr. Myron Knudson
U.S. Environmental Protection Agency
Allied Bank Tower, 12th Floor
1445 Ross Avenue
Dallas, Texas 75202-2733

Re: State Certification of NPDES Permit NM0022306, Molycorp, Inc., Questa Division

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If you have any questions please contact Mike Saladen at (505) 827-2798.

Sincerely,

Kathleen M. Sisneros

Kathleen M. Sisneros
Bureau Chief
Surface Water Quality Bureau

MS/ms

cc: Fred Humke, USEPA (6W-PS)
Ellen Caldwell, USEPA (6W-PS)
David Shoemaker, Molycorp, Inc.

RECEIVED
FEB 16 1988
6W-PS

EQUAL OPPORTUNITY EMPLOYER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE 10.14.87

SUBJECT EXPIRING PERMIT

NPDES # IL0022306

EXPIRATION DATE 8.30.88

DATE APP REC'D 10.9.87

FROM Lorraine Slaver
~~JANE~~ WATSON, CHIEF
PERMITS ISSUANCE SECTION (6W-PS)

1) ~~Huffman~~
2) Slaver

TO Kenneth Huffman (6W-PI)

The attached application is for the expiring NPDES permit reference above.

As in accordance with the new consolidated regulations, a completness review is required and a response must be given to the applicatnt within 60 days from the receipt of this application.

In order to meet the 60-day response time, please follow the below timetable as closely as possible. Hopefully, this will allow sufficient time to review the application and make your determination whether the application is complete or deficient. If further time is necessary, please advise 6W-PS as soon as possible.

PROJECTED CLEARANCE DATE		COMPLETION DATE	INITIALS
10.14.87	6W-PI Completeness Review Completed	10/20/87	FOA
10.19.87	6W-PS Mailing of Completeness/ Deficiency Determination		

EPA Form 1320-6 (Rev. 3-76)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE 10.14.87

SUBJECT EXPIRING PERMIT

NPDES # NM0022306

EXPIRATION DATE 8.30.88

DATE APP REC'D 10.9.87

FROM Lorraine Slaver
WAYNE WATSON, CHIEF
PERMITS ISSUANCE SECTION (6W-PS)

1) Hum Kr
2) Slaver

TO Kenneth Huffman (6W-PI)

The attached application is for the expiring NPDES permit reference above.

As in accordance with the new consolidated regulations, a completness review is required and a response must be given to the applicatnt within 60 days from the receipt of this application.

In order to meet the 60-day response time, please follow the below timetable as closely as possible. Hopefully, this will allow sufficient time to review the application and make your determination whether the application is complete or deficient. If further time is necessary, please advise 6W-PS as soon as possible.

PROJECTED CLEARANCE DATE		COMPLETION DATE	INITIALS
10.14.87	6W-PI Completeness Review Completed		
10.19.87	6W-PS Mailing of Completeness/ Deficiency Determination		

EPA Form 1320-6 (Rev. 3-76)

MEMORANDUM OF CALL

Previous editions usable

TO: Fred Humke

[X] YOU WERE CALLED BY— [ ] YOU WERE VISITED BY—

Fred Martinez

OF (Organization) Molycorp

[X] PLEASE PHONE ▶ [ ] FTS [ ] AUTOVON

(505) 586-0212

[ ] WILL CALL AGAIN [ ] IS WAITING TO SEE YOU

[ ] RETURNED YOUR CALL [ ] WISHES AN APPOINTMENT

MESSAGE

Re: NMQ022306

Testing Jobs in N.M.

RECEIVED BY	DATE	TIME
	7/20	10:20

63-110 NSN 7540-00-634-4018 STANDARD FORM 63 (Rev. 8-81)
☆U.S. GPO: 1986—181-246/40022 Prescribed by GSA
FPMR (41 CFR) 101—11.6

Steve Fennoi

155-2217

GC/MS

Consulting - GB

Florence - farm that out

Assayi Labs - analytical only

Permit file

Molycorp.
NM0022306

KEN / FRED —

Mole said mine had been closed for 3-4 mos. They will send in a permit mod. request.

Jack 3/5

LW : — Jack

John Strieblig
molycorp

NPDES

authorized sig.

wants permit modification to sample once per month due to shut down of the plant — I said we'd agree "if" his long term data showed that eff. was consistent (KK) 3/4/86

Permit File

Molycorp, Inc.

Questa Division
P.O. Box 469
Questa, New Mexico 87556
Telephone: (505) 586-0212

union 76
MOLYCORP

March 4, 1986

Mr. Myron Knudson, P.E.
Director, Water Management Division (6W)
U.S. Environmental Protection Agency
Region VI
1201 Elm Street
Dallas, Texas 75270

RE: NPDES Permit #NM0022306

Dear Mr. Knudson:

In accordance with NPDES Permit #NM0022306, Section D Reporting Requirements, Part 11 A,B,C, Signatory Requirements, Molycorp herein advises the U.S. Environmental Protection Agency, Region VI, of the following change:

Due to the retirement of Mr. C. R. Sacrison, ultimate signatory requirement responsibilities turn to Mr. David R. Shoemaker, General Superintendent of Molycorp, Inc., Questa.

This letter is intended to serve as official notification of that change.

If you have any questions regarding the above information, please call me at (505) 586-0212.

Sincerely yours,

John Stribling
Environmental Coordinator

JS:em

cc: R.G. Dewey
D.R. Shoemaker
L.E. Apodaca
R. Ferland
F. Martinez
B. Renison
P. Howard

RECEIVED
MAR 11 1986
6W-PS

Molycorp, Inc.

Questa Division
P.O. Box 469
Questa, New Mexico 87556
Telephone: (505) 586-0212

mod. 4

union 76
MOLYCORP

March 6, 1986

Mr. Myron Knudson
Director, Water Management Divison (6W)
U.S. Environmental Protection Agency
Region VI
1201 Elm Street
Dallas, Texas 75270

RE: Molycorp/Questa
NPDES PERMIT NM0022306
Request for Modification

Dear Mr. Knudson:

The purpose of this letter is to request a minor modification to Molycorp's NPDES Permit for the Questa Operation. This request is being filed pursuant to 40 C.F.R. 122.62.

The current NPDES Permit became effective on August 6, 1985, and expires at midnight August 30, 1988. Although this permit is acceptable to Molycorp in almost all respects when operating under normal conditions, recent events have dictated the need to request a permit modification.

The portion of the Permit for which Molycorp requests modification, and the reason therefore, is set out below:

Molycorp requests that Part I of the Permit under monitoring requirements, measurement frequency once per week be amended to read once per month.

This is based on the following facts:

Due to continuing depressed molybdenum market conditions, Molycorp was forced to discontinue milling operations on 2-28-86. It is anticipated that the mill shutdown will be for an extended period of time (minimum of 1-2 years). However, this will be dictated by market conditions.

RECEIVED
MAR 17 1986
6W-PS

During the shutdown period no flow will occur at outfall 001 (surface discharge) and reduced flow will be observed at the 002 outfall (seepage discharge). In addition, the analytical concentration levels of the 002 discharge are extremely consistent as indicated below.

Outfall 002

Discharge Monitoring Report (DMR)
Information Submitted to EPA for 1985
All Values in mg/L, except PH units.

Parameter	Minimum Reported Value (Daily Averages)	Maximum Reported Value (Daily Averages)	Permit Limit (Daily Averages except when noted)
PH	7.1	8.2	6 - 9
C.O.D.	4	8	60 mg/L
T.S.S.	1	12	20 mg/L
Total Arsenic	<.01	<.01	.5 mg/L
Total Cadmium	<.01	.02	.05 mg/L*
Total Copper	.01	.06	.15 mg/L
Total Cyanide	<.001	.002	.025 mg/L
Flouride	2.0	2.3	3.0 mg/L*
Total Iron	.16	.18	.6 mg/L*
Total Lead	.03	.08	.3 mg/L
Total Manganese**	1.2	1.8	1.5 mg/L*
Total Mercury	<.0002	<.0002	.001 mg/L
Total Molybdenum**	2.0	2.8	2.0 mg/L*
Total Zinc	.02	.06	.2 mg/L*
Biomonitoring	No toxicity at 100% concentration		

*Daily Maximum
**Please note Manganese and Molybdenum concentration limits are suspended during periods of zero flow from outfall 001.

In summary, Molycorp requests sampling frequency to be reduced from once per week to once per month based on:

1. Mill shutdown, thus eliminating flow from outfall 001 and reducing flow from outfall 002.

2. Extremely consistent concentration levels for selected parameters on our NPDES permit at outfall 002.

3. Criteria set forth in 40 C.F.R. 122.62, Paragraph (A) Causes for Modification, Subparagraph (1). Alterations to Permitted Facility. Specifically, permits may be modified when there is substantial alterations to the permitted facility which occur after permit issuance which justify the application of permit conditions that are different or absent in the existing permit.

4. Costs incurred for analytical analysis for NPDES Permit compliance.

Thank you for your consideration of this modification request. We look forward to discussing it with you and your staff in the near future. Please call if you have any questions.

Very truly yours,

John Stribling
Environmmental Coordinator

JS:em

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: 3-21-86

mod

SUBJECT: MODIFICATION REQUEST FOR AN ISSUED PERMIT

FROM: Jenaie Slaven
JENAIE SLAVEN, 6W-PS.

~~1) Huffman Humke~~
2) SLAVEN

TO: Ken Huffman

The referenced application and/or letter (see attached copy) has been submitted to this office requesting a modification to their existing NPDES permit, NM0022306

Please return this form to 6W-PS initialing your desired course of action.

Name of Facility: Union Moly Corp.

_____ From the information submitted, it would appear that a new pwemit should be written and issued independently from the previously issued permit. A new NPDES number should be assigned to this request.

_____ The information received requesting a modification to the permit does not include enough information to make a determination. Please request additional information from permittee in the form of a Short Form A, B, C, or D, or Standard Form A or C. (Please circle appropriate form.),

✓ EPA staff will handle the request and modify the permit if necessary. Please refer to HUMKE. (Optional)

_____ EPA is in agreement with changing the permit. Send a copy of the request to the appropriate state agency for drafting of a new permit.

_____ Send a copy of the request to the appropriate state agency to draft a new permit if the state agency determines that a change is warranted.

_____ The request does not warrant a change to the permit. Please place in permit file for future reference.

Attachment(s)

EPA Form 1320-6 (Rev. 3-76)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: 3-21-86

SUBJECT: MODIFICATION REQUEST FOR AN ISSUED PERMIT

FROM: Jenaie Slaven
JENAIE SLAVEN, 6W-PS.

1) Weeks
2) Slaven

TO: Ken Huffman

The referenced application and/or letter (see attached copy) has been submitted to this office requesting a modification to their existing NPDES permit, NM0022306

Please return this form to 6W-PS initialing your desired course of action.

Name of Facility: Union McKee C.P.

_____ From the information submitted, it would appear that a new pwemit should be written and issued independently from the previously issued permit. A new NPDES number should be assigned to this request.

_____ The information received requesting a modification to the permit does not include enough information to make a determination. Please request additional information from permittee in the form of a Short Form A, B, C, or D, or Standard Form A or C. (Please circle appropriate form.)

_____ EPA staff will handle the request and modify the permit if necessary. Please refer to _____. (Optional)

_____ EPA is in agreement with changing the permit. Send a copy of the request to the appropriate state agency for drafting of a new permit.

_____ Send a copy of the request to the appropriate state agency to draft a new permit if the state agency determines that a change is warranted.

_____ The request does not warrant a change to the permit. Please place in permit file for future reference.

Attachment(s)

EPA Form 1320-6 (Rev. 3-76)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1201 ELM STREET
DALLAS, TEXAS 75270

April 21, 1986

John Stribling
Environmental Coordinator
Union Molycorp
Questa Division
P.O. Box 469
Questa, New Mexico 87556

Re: NPDES Permit No. NM0022306

Dear Mr. Stribling:

This is to acknowledge receipt of your permit modification request dated March 6, 1986, for Union Molycorp.

It is possible that processing of your request may require time as modification requests are reviewed in accordance with Federal and State priorities for water pollution abatement. Also, please be advised that a request for permit modification does not relieve your obligation meet current permit requirements. Therefore, you must attempt to meet all permit requirements to the best of your ability.

Should additional information be required to complete processing of your request, you will be contacted.

Sincerely,

Jayne Watson

Jayne Watson, Chief
Permits Issuance Section (6W-PS)

JUN 17 1987

REPLY TO: 6W-PI

Mr. David R. Shoemaker, General Superintendent
Molycorp Inc., Questa Division
P.O. Box 469
Questa, New Mexico 87556

Re: Application for NPDES Permit No. NM0022306

Dear Mr. Shoemaker:

On March 11, 1987, U.S. EPA Region 6 published the policy under which all future NPDES permits will be issued. This policy entitled the "Third Round Policy" states that no source will be allowed to discharge any wastewater which:

1. Endangers a drinking water supply;

2. Threatens human health through aquatic bioaccumulation;

3. Causes instream acute or chronic aquatic toxicity; or

4. Violates an applicable State water quality standard.

Copies of the policy and implementation strategy are enclosed. Region 6 is presently beginning to implement this policy by establishing additional conditions in reissued NPDES permits. These conditions include both specific chemical monitoring and biomonitoring in all cases, and effluent limits where necessary. Results of the monitoring will be used to determine if additional or more stringent effluent limits are necessary.

Your NPDES permit will be reissued within the next 16 months, and will include the considerations and provisions discussed above. The Region will be conducting a series of work sessions to explain the new requirements and to answer all questions. The session in your area will be at Room 341 of the Capitol Building in Santa Fe, New Mexico on June 30, 1987. The session will start at 9:30 am and should end by 12:00 noon. We request your attendance because this will be an excellent forum for us to discuss these new conditions.

The Region is looking forward to working with you in developing and discussing the necessary concerns of your next permit. If you have any questions, please contact me or James Pendergast or Craig Weeks of my staff at (214) 655-7180.

Sincerely yours,

Kenneth Huffman, Ph.D.
Chief
Industrial Permits Section (6W-PI)

Enclosures

cc: Glenn Saums
New Mexico Environmental Improvement Division

bcc: Reading File (6W-P)
Craig Weeks (6W-PI)

C.W. 6/15/87

6/15/87:WEEKS(6W-PI):TN:H-13#25:#474

CONCURRENCES

SYMBOL								
SURNAME								
DATE								

Molycorp, Inc.

Questa Division
P.O. Box 469
Questa, New Mexico 87556
Telephone: (505) 586-0212

UNOCAL 76
MOLYCORP

August 28, 1987

Mr. Robert E. Layton, Jr.
Regional Administrator
U. S. Environmental Protection Agency
Region VI
Allied Bank Tower At Fountain Place
1445 Ross Avenue
Dallas, Texas 75202

Dear Mr. Layton:

Pursuant to the requirements of 40 CFR 122.6 (b), this letter hereby authorizes the Mine Manager of the Molycorp, Inc., Questa Mine operations, to sign all reports required by an NPDES permit or other permits granted by EPA. The Mine Manager at the Questa Mine operations has responsibility for all operations at the Questa facility and is therefore, responsible for both the facility and activity regulated under NPDES Permit NM 0022306.

The current Mine Manager, Mr. David R Shoemaker, has been the signator on all correspondence relating to the existing NPDES Permit NM 0022306, and will continue to do so in the future.

Respectfully submitted,

R. Gene Dewey

R. Gene Dewey
President, Mining

cc: files

POWER OF ATTORNEY

"RESOLVED, That Molycorp, Inc., a Delaware corporation licensed to transact business in New Mexico, hereinafter called "Company", hereby names, constitutes and appoints its employee David R. Shoemaker, of Taos, New Mexico to act as the true, sufficient and lawful agent and attorney for the Company, and in its name, place and stead, and in its behalf said David R. Shoemaker is hereby empowered generally to do all things necessary concerning the business and activities of the Company in acquisition or transfer or rights for the exploring for and the mining, processing and milling of minerals and other substances within the territorial limits of the State of New Mexico, including the lands within said State that are owned or controlled by the United States of America or any agency thereof, or by the several Indian tribes, Nations or Native Corporations, or by the State of New Mexico or any political subdivision or agency within said State or any person or entity.

"Without limiting the generality of the foregoing, the said David R. Shoemaker is empowered in the name of the Company:

1. To do and perform all acts and things necessary to locate and maintain lode and placer mining claims, mill-site and tunnel site claims on the public domain, including the negotiation and execution of staking contracts, the execution, recording and filing of location notices and amendments and corrections thereto, of assessment and other affidavits and statements, the ordering of surveys and the hiring of surveyors as well as all other things necessary in the location, amending and maintenance of such claims.

2. To do and perform all acts and things requisite to acquisition or transfer of surface rights, water and water rights, claims, rights, permits, licenses, rights of way and leases for mining or minerals, other than oil, gas and geothermal rights, on the lands and waters within the State of New Mexico, of any of the several Indian Tribes or Nations and Native Corporations with reservations wholly or partly within the State of New Mexico, and of any person or entity.

3. To act for it and to proceed in the name of the Company and on its behalf in the presentation to the United States Bureau of Land Management of all applications for mineral patents with respect to unpatented mining and mill-site claims situated within the State of New Mexico and the performance of all acts required or involved in the prosecution and carrying to completion of proceedings to obtain such mineral and mill-site patents, and in its name and on its behalf: to sign and execute all applications, notices and other documents or instruments; to receive service of process; to institute and defend administrative actions and proceedings which may arise in connection therewith and to do and perform all such further legal and physical acts as may be required to carry any and all of such proceedings to final completion.

4. To act for and proceed in the name of the Company and on its behalf to present land exchange proposals to agencies of the United States including, but not limited to, the Bureau of Land Management and the Forest Service, and in the name of the Company and on its behalf to enter into land exchange agreements with such agencies and to pay or receive money to equalize any such exchanges and in its name and on its behalf to execute and deliver deeds with or without warranties and such other instruments that said David R. Shoemaker deems necessary to effect such land exchanges with the United States.

5. To make and agree upon and to apply for, accept, receive, execute and deliver all bonds up to and including a maximum amount of Twenty-Five Thousand Dollars ($25,000.00).

6. To represent the Company and appear before various federal, state and other governmental bodies, agencies and organizations, to file statements, affidavits and other instruments in connection therewith, and to make necessary statements and certification concerning the Company and its activities, including statements of interest and holdings that may be required by various federal, state or other governmental laws or regulations.

7. To execute in the name of the Company such instruments and other documents as are necessary to carry out the powers granted the said David R. Shoemaker, hereunder.

"The Company hereby agrees to be bound by such representations of said Attorney in Fact and waive any and all defenses which may be available to the Company to contest, negate or disaffirm the actions of said Attorney in Fact under this Power of Attorney.

"The said Power of Attorney shall remain in force until notice of revocation shall have been received by the said David R. Shoemaker; provided, however, that nothing herein contained shall prejudice or affect anything lawfully done or caused to be done by said David R. Shoemaker or the intended exercise of such powers aforesaid in the interval between such revocation and the time of the same becoming known to him; or with respect to lands lying within Indian Reservations, until written notice of such revocation shall have been filed with the Area Director, Bureau of Indian Affairs; or with respect to said power which is filed with a governmental authority, until written notice of such revocation has been filed with such an authority; or with respect to said power which is recorded in a recordation system, until written notice of such revocation has been recorded in such a system whichever is the latter, and the Company does hereby ratify and confirm everything lawfully done

or caused to be done by the said David R. Shoemaker in the exercise or intended exercise of such powers, including anything so done or caused to be done in such interval as aforesaid."

IN WITNESS WHEREOF, MOLYCORP, INC. has hereunder caused its seal to be affixed this 9th day of October, 1986.

ATTEST:

Assistant Secretary

MOLYCORP, INC.

By R. Gene Dewey
R. Gene Dewey, President

SECTION VI - Request for Alternative Molybdenum Test Procedures

REQUEST FOR

CONTINUED APPROVAL OF ALTERNATIVE MOLYBDENUM TEST PROCEDURE

On April 1, 1977, Mr. John C. White, Region VI EPA Administrator, approved the Molycorp thiocyanate colorimetric method for determination of molybdenum (letter attached). Molycorp had submitted data to demonstrate the comparability of the standard atomic absorption method and the thiocyanate colorimetric method. Since approval of the method, Molycorp's laboratory continues periodically to split samples with other labs to verify the molybdenum analyses.

Examples of the results are shown below:

	Molycorp Lab	AA Method
Water Well	.24	.25 CEP Lab
003	.01	0.001 CEP Lab
Pope Lake	2.50	2.55 Molycorp Louviers Plant
Pilot Plant Effluent	0.30	0.28 " " "
" " "	0.20	0.19 " " "

Values shown are in parts per million.

Molycorp, Inc., hereby requests a continued renewal of the approval for the alternative test procedure for determination of molybdenum. Enclosed for review are copies of the original request from Molycorp for approval of the procedure (without exhibits); a description of the procedure and the approval from the Regional Administrator.

Please be advised that all molybdenum values reported in our Discharge Monitoring Reports are results of analyses performed by the approved alternative method.

David R. Shoemaker
Mine Manager

9/25/87

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
FIRST INTERNATIONAL BUILDING
1201 ELM STREET
DALLAS, TEXAS 75270

April 1, 1977

Mr. C. R. Sacrison
General Manager
Molycorp, Inc.
Questa, New Mexico 87556

Dear Mr. Sacrison:

The data which you submitted on February 9, 1977 has been reviewed. The procedure for the analyses of molybdenum and the comparability testing data indicate that the method is very good. In fact, the standard deviations indicate greater precision for the alternate method than for the standard method in four of the five samples. The mean recovery for seven aliquots at the two discharge points was 96 percent.

In view of these data, the Molycorp thiocyanate colorimetric method is approved for NPDES Permit No. NM0022306 discharges No. 001 and 002. If during an inspection by the State of New Mexico, Environmental Improvement Agency or the U. S. Environmental Protection Agency, it is found that the test method is inappropriate, we reserve the right to withdraw approval.

Your efforts are appreciated. If you have any questions, please do not hesitate to call or write.

Sincerely,

John C. White

John C. White
Regional Administrator

cc: Joe Pierce, Chief
Water Quality Division
Environmental Improvement Agency
P. O. Box 2348
Santa Fe, NM 87503

Molycorp

Molycorp, Inc. · Questa, New Mexico 87556 · (505) 586-0212

February 9, 1977

Mr. John C. White
Regional Administrator
U.S. EPA
1201 Elm Street
Dallas, Texas 75270

Re: Application for Alternative Test Procedure (40 CFR 136.4)

Dear Mr. White:

Pursuant to Molycorp's December 6, 1976 request for an alternative test procedure for molybdenum for NPDES permit #NM 0022306, the EPA requested comparability testing to provide data on the equivalency of the standard and alternate methods.

For discharges 001 and 002, comparability data from analyses by Molycorp of effluent samples representative of normal operating conditions, and of effluent samples plus standard solution, is hereby submitted. For discharge 001, comparability data from analysis by the New Mexico Bureau of Mines and Mineral Resources of an effluent sample representative of normal operating conditions, is also presented. Since there is normally very little variation in the molybdenum concentration at each discharge, it was neither appropriate nor possible to obtain samples of varying concentrations from either discharge. It should be noted that the molybdenum concentration in discharge 001 is quite a bit different from that in 002. Therefore, although the methods are not compared on varying concentrations from the same source, they are compared at two different molybdenum concentrations. No data is included for discharge 003 because molybdenum is not detectable in that discharge. All comparability testing was performed according to the instructions provided by EPA. The Standard Method used was the EPA approved test procedure (digestion followed by atomic absorption) as specified in 40 CFT 136.3, and the Alternate Method used was the Colorimetric Determination of Molybdenum, as attached.

Table I: Effluent Sample From Discharge 001, Representative of Normal Operating Conditions, analysis by Molycorp.

Aliquot	Standard Method	Alternate Method
1	1.87	1.91
2	1.86	1.91
3	1.84	1.91
4	1.84	1.91
5	1.87	1.91
6	1.83	1.93
7	1.84	1.90
Avg ±	1.85 ± .02	1.91 ± .009

Table II: Discharge 001, Effluent Sample Plus Standard Solution, analysis by Molycorp.

Aliquot		Standard Method	Alternate Method
1		3.76	3.65
2		3.78	3.69
3		3.73	3.63
4		3.75	3.62
5		3.82	3.66
6		3.86	3.67
7		3.73	3.66
	Avg ±	3.78 ± .05	3.65 ± .02

Source of Standard Solution:
0.3752 grams of Climax high purity MoO_3 (99.5% MoO_3) was used to prepare 250 ml of 1000 ppm Mo standard solution. A portion of the 001 discharge sample analyzed as shown in Table I was spiked with this solution to approximately double the Mo concentration. The amount added was approximately 1.9 ppm.

Table III: Effluent Sample From Discharge 001, Representative of Normal Operating Conditions, analysis by New Mexico Bureau of Mines and Mineral Resources.

Aliquot		Standard Method	Alternate Method
1		1.9	2.0
2		2.0	2.0
3		2.1	2.0
4		2.1	1.9
5		2.0	2.0
6		1.8	2.0
7		1.9	2.0
	Avg ±	2.0 ± .11	2.0 ± .04

Table IV: Effluent Sample From Discharge 002, Representative of Normal Operating Conditions, analysis by Molycorp.

Aliquot		Standard Method	Alternate Method
1		3.27	3.26
2		3.23	3.16
3		3.29	3.11
4		3.26	3.15
5		3.26	3.18
6		3.23	3.18
7		3.19	3.32
	Avg ±	3.25 ± .03	3.19 ± .07

Table V: Discharge 002, Effluent Sample Plus Standard Solution, analysis by Molycorp.

Aliquot	Standard Method	Alternate Method
1	6.39	6.39
2	6.35	6.45
3	6.42	6.42
4	6.55	6.44
5	6.48	6.40
6	6.48	6.39
7	6.42	6.42
Avg ±	6.44 ± .07	6.42 ± .02

Source of Standard Solution:
0.3752 grams of Climax high purity MoO_3 (99.95% MoO_3) was used to prepare 250 ml of 1000 ppm Mo standard solution. A portion of the 002 discharge sample analyzed as shown in Table IV was spiked with this solution to approximately double the Mo concentration. The amount added was approximately 3.3 ppm.

The standard deviations, precision data, indicate greater precision for the alternate method in four of the five tables above.

With respect to accuracy data for the alternate method, a sample from discharge 001 was spiked with 2 ppm Mo, the mean recovery for seven aliquots was 99%.

For a sample from discharge 002 spiked with 4 ppm Mo, the mean recovery for seven aliquots was 99%.

Although additional statistical analyses of the above data could be performed, we feel that the above analyses demonstrate the precision and accuracy of the proposed alternative test procedure. This data should complete the requirements for the application for an alternative test procedure.

Respectfully submitted

C. R. Sacrison
General Manager

fa
Encl.

Bcc: R. G. Dewey
Carter Trimble
Howard Twitty

COLORIMETRIC DETERMINATION OF MOLYBDENUM
Molycorp, Inc.

Reagents:

1. Sulphuric acid solution: 2 parts H_2O - 1 part H_2SO_4.
2. Ferric chloride solution: Dissolve 35 grams of ferric ammonium sulfate in 6 lb. bottle of concentrated hydrochloric acid.
3. Butyl carbitol: Diethylene glycol mono-butyl ether (Dowanol DS)
4. Thiacyanate solution: 10% KCNS in H_2O.
5. Stannous chloride solution: 112 grams $SnCl_2.2\ H_2O$
   100 ml concentrated HCl
   Heat above mixture until all stannous chloride is dissolved and solution is clear. Dilute to 1 liter with H_2O.

Procedure for Water Samples:

1. Bring total molybdenum into solution with HNO_3 as described in Section 4.1.3 EPA manual entitled, *Methods for Chemical Analysis of Water and Wastes*, 1974.

2. Transfer an appropriate aliquot of the solution to a 100 ml volumetric flask. Select the aliquot size that it contains from 0.05 to 1.0 mg Mo. Prior concentratio of sample may be required to bring sample into this concentration range.

3. Add in succession the following reagents:

   A. Sulphuric acid solution to bring aliquot to approximately pH 7.
   B. 10 ml ferric chloride solution.
   C. 20 ml butyl carbitol - mix well.
   D. 10 ml KCNS solution - mill well for ½ a minute.
   E. 7 ml $SnCl_2$ solution - mix well.

   Dilute to the mark with H_2O. Mix well and allow to stand for 30 minutes. Read O.D. or % T at 465 mu. Use a reagent blank.

4. Prepare a calibration curve by transferring 0.1, 0.3, 0.5, 0.7, and 1.0 mg of Mo into 100 ml volumetric flasks and proceed as in step (3) for color development. Also prepare a blank in the same manner.

5. Determine sample Mo content using the standard curve.