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

Ref: 8EPR-SR

ACTION MEMORANDUM

DATE: April 7, 1997

SUBJECT: Request for Removal (Response) Action at the California Gulch National Priorities List Site, Leadville, Colorado: ACTION MEMORANDUM for a Time-Critical Removal Action for Removal of Tailings Pond No. 2 and Tailings Pond No. 3 of the Apache Tailings Impoundment (Operable Unit 7)

FROM: Mike Holmes, 8EPR-SR

TO: Max H. Dodson
Assistant Regional Administrator
Office of Ecosystems Protection
and Remediation

Final NPL Site ID # 29

CERCLIS ID # COD980717938

Category of Removal: Time-Critical

I. Purpose

This Action Memorandum documents the Agency's selection and implementation of the time critical removal (response) action described herein for the Apache Tailings Impoundments, an area contaminated with metal-laden tailings from historic mining and milling operations. The Apache Tailings Impoundment area comprises a small portion of the Superfund RI/FS Study Area of the California Gulch Superfund Site, located in the Leadville mining district of Lake County, Colorado.

The Time Critical Removal Action at the Apache Tailings Impoundments is consistent with the remedial activities which will be undertaken by EPA at OU 7. Final remedial alternatives for all areas of OU 7 will be evaluated in the Feasibility Study (FS) and Record of Decision (ROD) for OU7. The ROD for OU 7 will ultimately specify those remedial actions beyond those response actions implemented pursuant to this Action Memorandum that are required. The FS will

evaluate the effectiveness of a remedy to stabilize the tailings in place or if the main impoundment will need to be relocated out of the California Gulch flood plain. The primary goal of this Removal Action is to prevent exposure to human populations from tailings washed into California Gulch and degradation of downstream water quality. This removal action will also reduce the leaching and migration of metals from the tailings into surface and ground waters during storm events which occur prior to implemtation of remedial action under thel ROD for OU7. Regardless of the remedy selected by the ROD, the response actions taken under this Action Memorandum will allow for the consolidation into a smaller area and the drying out of the tailings.

Remedial action objectives were identified in the Final Screening Feasibility Study for Remediation Alternatives at the California Gulch NPL Site, Leadville, Colorado (SFS), (EPA, 1993a). Consistent with the SFS, removal action objectives for the Apache Tailings Impoundments are:

- Control water erosion of tailings material from the source locations
- Control leaching and migration of metals from tailings into surface water
- Control leaching and migration of metals from tailings into groundwater

Removal alternatives to directly remediate surface water or ground water in the vicinity of the Apache Tailings Impoundments have not been evaluated, and will be addressed under Operable Unit 12.

II. California Gulch - Site Conditions and Background

The California Gulch Site was listed on the National Priorities List on September 8, 1983. The Site is in a mining area covering 16 ½ square miles of a watershed that drains along California Gulch to the Arkansas River. Starting in 1859, the area was mined extensively for gold, lead, silver, copper, zinc, and manganese. California Gulch collects runoff that drains numerous abandoned mines and wastes from mining, milling and smelting. Miners built the Yak Tunnel to drain water from the mine workings and to make mineral exploration and development easier. This tunnel drains hundreds of miles of mine workings in its 4-mile underground course and discharges approximately 210 tons of metals each year into California Gulch. Seventy-five known mills dumped tailings into 5-6 miles of drainages. Six impounded tailings dumps surround the City of Leadville. Many smelters, which are located around the city, processed silver, lead and zinc at various times. Heavy metal residues are present in much of the City. The Arkansas River which receives water from the California Gulch, has been classified as a recreational resource, and

is used heavily for irrigation, livestock watering, public water supplies and fisheries. Approximately 4,000 live in nearby Leadville and Lake County (See Site Location Map - Figure 1)

III. Apache Tailings Impoundments

A. Background

The Apache Tailings Impoundment consists of a main tailings impoundment and two, smaller impoundments located along California Gulch, approximately 1,500 feet downstream of the Yak Tunnel Water Treatment Plant Surge Pond, as illustrated on the attached Site Plan. The main impoundment encompasses approximately 11.3 acres. The volume of tailings in the main impoundment has been previously estimated at approximately 630,000 cubic yards. The embankment slopes on the north and east side of the main impoundment range from 1.5:1 (H:V) to 1.75:1 and reach heights up to 15 feet. The embankment slope on the southwest side of the main impoundment approaches 1:1 and is up to 50 feet in height. The two smaller impoundments, TP2 and TP3 are located west of the main impoundment and directly north and adjacent to water flowing in the gulch. TP2 is located immediately west of the main impoundment and covers an area of approximately 1.5 acres. TP3 is located immediately west of TP2 and covers an area of 0.5 acres. The volume of tailings in TP2 and TP3 have been estimated previously at approximately 8,500 and 3,900 cubic yards, respectively. Impoundment berms for both ponds appear to have been constructed of native soil material from California Gulch. These berms range from 1:1 to 1.5:1, are approximately 10 feet in height and 10 feet wide across the top.

The majority of surface water flow in California Gulch is presently conveyed by the California Gulch channel located on the south side of the gulch in the vicinity of the Apache Tailings Impoundment. The channel intersects the southern edge of the main impoundment where the flow is carried by two 24-inch diameter clay-tile culverts installed beneath a portion of the main impoundment. Surface water flow from the area immediately upstream (approximately 1,000 feet) of the main impoundment and below the elevation of the constructed California Gulch channel are conveyed under the main impoundment through what appears to be a wooden box culvert. After exiting these culverts, surface water continues to flow to the northwest, west of and adjacent to the southwest embankment of the main impoundment, for approximately 300 feet before turning to the west and continuing down the gulch past the lower impoundments (TP2 and TP3).

A field investigation was conducted in November and December 1996 to supplement the existing data presented in the Remedial Investigation and Feasibility Study for the site. The purpose of this investigation was to gather data to enhance the evaluation of the interaction of surface water and groundwater in the immediate vicinity of the Apache Tailings Impoundments. As part of this supplemental field investigation, 11 new groundwater monitoring wells were installed at the site. Two rounds of groundwater and surface water sampling were planned at the site as part of the supplemental investigation; one sampling event was performed in November 1996 to coincide with low-flow conditions at the site involved the sampling of 18 groundwater wells, and surface water sampling at 22 locations. Additional details are provided in the Interim Removal Action Plan, Operable Unit 7, Cal Gulch Superfund Site, dated April 3, 1997 and a letter dated March 13, 1997 which transmits the monitoring data for the sampling event described above. Both these documents are attached to this Action Memorandum.

B. Site Characterization - Apache Tailings Impoundment

The results of previous investigations related to the Apache Tailings Impoundment are presented in various reports including the Tailings Disposal Area Remedial Investigation Report, California Gulch Site, Leadville, Colorado, January 1994, the Hydrogeologic Remedial Investigation Report (1995), and the Surface Water Remedial Investigation Report (1995). In January 1996, a Draft Feasibility Study (FS) was submitted for the Apache Tailings Impoundments. Subsequent to the submittal of the draft FS, additional site investigation activities have been initiated to supplement the previous investigations and to support completion of the FS.

The principal concerns specifically addressed by this Removal Action are:

* Impacts the tailings impoundments may have on surface water and groundwater quality in California Gulch; and

* Preparation of the tailings material, primarily through consolidation and dewatering, to facilitate the timely implementation of future, final response actions.

* A letter report dated March 13, 1997 which summarizes groundwater quality data from sampling events performed in the area of the Apache Tailings Impoundments, during November and December, 1996, is attached.

C. Other Actions to Date

* A Time Critical Removal Action was performed by EPA on the Apache Energy and Minerals Property which is included in Operable Unit 7. The action involved removal of drums and bags of pyrite and decontamination and demolition of buildings and equipment. This Removal Action was addressed in a separate Action Memorandum dated August 6, 1996.

* During the summer and fall of 1995, ASARCO installed approximately 6 horizontal drain pipes to passively drain water from the main impoundment. The demonstration project proved ineffective in draining the tailings and was abandoned. Over the past several years ASARCO has monitored water levels on top of the main impoundment and TPs 2 and 3 and as needed, the ponded water has been transferred to the Yak Treatment plant to prevent catastrophic release of the metal-laden water into California gulch.

D. State and Local Authorities' Roles

A cultural resource investigation of the Apache Tailings Area was conducted in 1995, and a site with potential archaeological significance was identified. This site contains structural remains and artifact scatter and is located immediately south of California Gulch below the culvert outfalls on the southwest side of the main impoundment. The proposed alignment of the diversion ditch will not impact this area and additional investigation or research on this cultural resource site may be necessary, prior to implementing the final actions. The initial focus of this removal action is to avoid any impacts on the area of archaeological significance.

IV. Threats to Public Health or Welfare or the Environment

A Final Baseline Aquatic Ecology Risk Assessment (FBAERA), California Gulch, Leadville, Colorado (Roy F. Weston, Inc.) identifies the Site-wide impact of mine waste contamination on the terrestrial and aquatic ecosystems at the Site. The FBAERA provides a conceptual model of Site-wide exposure for aquatic receptors.

This Time-Critical Removal Action is necessitated by the threat to public health, welfare and/or the environment posed by the direct contact, inhalation, and ingestion exposure routes to hazardous substances. The Action will also reduce releases of metals to the surface and groundwater.

V. Endangerment Determination

Actual and/or threatened releases of hazardous substances from the Apache Tailings Impoundments, if not addressed by implementing the removal action selected in this Action Memorandum, presents endangerment to public health, or welfare, or the environment. The public and environment will continued to be exposed to the release of significant quantities of contaminated materials.

VI. Proposed Actions/Schedule

A. Proposed Actions

1. The proposed interim actions are described in the Interim Removal Action Plan, Operable Unit 7, Apache Tailings Impoundments, California Gulch Superfund Site, dated April 3, 1997. A copy of this report is attached. The proposed interim actions include the following:

    1.1 Removal of TP 2 and TP3 and consolidation of the material on the main impoundment and either diverting California Gulch away from the southwest embankment of the main impoundment below the clay-tile culverts and wooden box culverts outfalls, or providing erosion protection along the toe of the tailings embankment area.

    The extent of tailings, berms material and native soil to be removed will be determined by visual observation during excavation. Confirmation samples of the impoundment berms will be taken to determine suitability for use as backfill material. Only material with a lead concentration below 3,500 ppm will be used.

    For this removal action, slope stability concerns will be addressed through the application of Best Management Practices (BMPs)

    1.2 Surface water that is currently ponded on TP2 and TP3 will be removed prior to initiating excavation by pumping the water to the existing pond on the main impoundment for ultimate transfer to the Yak Tunnel Water Treatment Plan (WTP), or by transporting it to the WTP using tanker trucks. The base of TP2 and TP3 may currently be below the groundwater table in this area and, therefore, dewatering during excavation may be required. Water removed during excavation will be pumped to the existing pond on the main impoundment. Following

excavation, clean fill will be placed to restore the area, promote surface drainage and prevent ponding. Proposed approximate final contours are shown on the figure entitled 1997 Proposed Interim Action.

1.3 The excavated tailings will be transported to the main impoundment using the temporary road from the west side of the impoundment near the old foundations to the new well installations near the center of the impoundment (AP1TMW12) and placed on the north side of this road, as indicated on the 1997 Proposed Interim Action Figure, attached. It is anticipated that placement may be achieved utilizing low ground pressure equipment without the use of geotextile or geosynthetic subgrade support. The installation of several settlement plates in the fill placement area is also proposed to monitor the settlement/consolidation of the underlying tailings as a results of loading from the fill.

1.4 Potentially contaminated surface run-off from the main impoundment will be directed through the area between TP2 and the main impoundment to a sediment control structure as indicated on Figure 4. The sediment control structure will consist of an earthen berm with a hay bale core and a rock or rip-rap lined discharge notch intended to intercept and retain sediment in storm water run-off. This structure will be maintained until the final remedy is implemented. Diversion of uncontaminated surface run-off along the north side of the main impoundment will also be maintained or upgraded to minimize potential contact with tailings material or other potentially contaminated flows.

1.5 The following activities involving the protection of the toe of the main impoundment embankment are proposed. These activities will include excavation of tailings, primarily at the knob which extends toward the channel approximately 100 feet below the clay-tile culvert outfalls, and the placement of clean fill and/or riprap for erosion protection at the toe of the embankment.

B. Applicable or Relevant and Appropriate Requirements (ARARs)

The ARARs listed on TABLE F.1 AND F.2 will be followed to the extent practicable. Copies of these Tables are attached.

C. Performance Standards

The ARARs were met through compliance with Performance Standards.

1. The designed and constructed response action included provisions to ensure that there are no visible emissions (dust) during removal activities at the Apache Tailings Impoundments. Dust control on the haul route, and other areas, will be maintained through water application, as necessary.

2. During the excavation, on-site transport, and placement of tailings material, appropriate engineering controls will be maintained to control storm water runoff and dust generation, silt fences, hay bales and/or other sediment control devices will be used to intercept and retain sediment in storm water runoff (both from the main impoundment and TP2/TP3). The sediment control structures will be left in place, as necessary following the completion of excavation. Un-contaminated surface water will be diverted away from the tailings to minimize contact with tailings.

3. A long-term maintenance program may be implemented if required by the Final Record of Decision for Operable Unit 7 (OU 7) to ensure the long-term effectiveness of the response action.

D. Project Schedule

April-May 1997 - California Gulch Below the Culverts

June-July 1997 - Removal of Ponded Water from TP@, TP3 and Main Impoundment

August-September 1997 - Removal of TP2 and TP3

E. Estimated Costs

This response action is being conducted by ASARCO, Inc.

VII. Expected Change in the Situation Should Action Be Delayed or Not Taken

If this Time-Critical removal action is delayed, or not taken, exposure of the public and environment to heavy metals contained in the mine waste located in the Apache Tailings Impoundments will continue. Without this time-critical response, release of contaminated tailings into California Gulch and the Arkansas River will continue to contaminate surface water and groundwater in the area around the Apache Tailings Impoundments.

VIII. Outstanding Policy Issues

A Record of Decision will be issued selecting the final remedial action for Operable Unit 7 (OU 7) of this Site.

IX. Enforcement

This Time-Critical Removal Action will be performed by ASARCO, Inc.

X. Recommendation

This decision document represents the selected Time-Critical removal action for the Apache Tailings Impoundments portion of OU 7 of the California Gulch Superfund Site, in the City of Leadville, County of Lake, State of Colorado. It was developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This decision is based on the Administrative Record for the Site.

Conditions at the Apache Tailings Impoundments meet the NCP Section 300.415(b)(2) criteria for a removal and I recommend approval of the removal action.

APPROVAL

Max H. Dodson
Assistant Regional Administrator
Office of Ecosystems Protection
and Remediation

DISAPPROVAL

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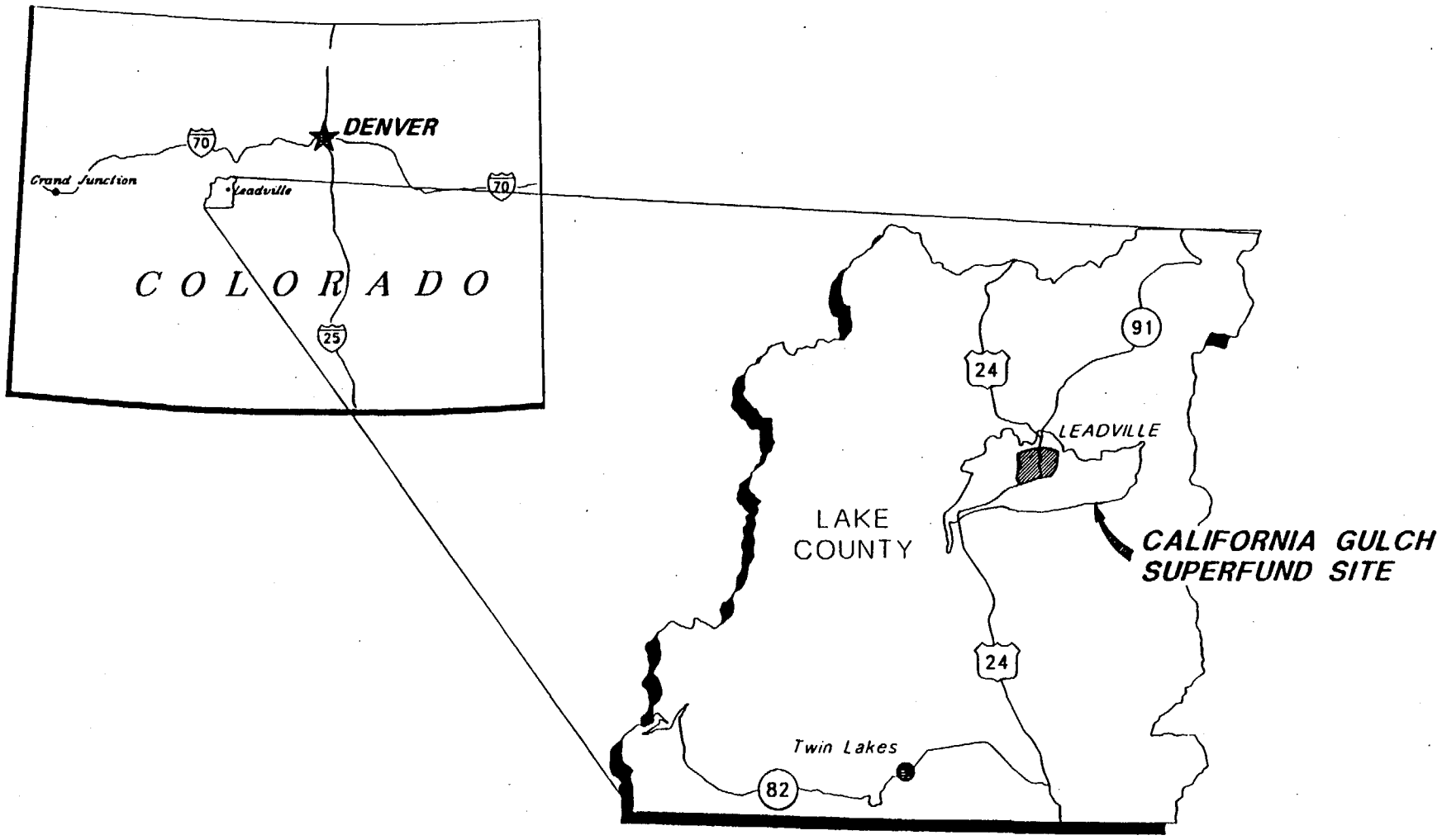
Max H. Dodson
Assistant Regional Administrator
Office of Ecosystems Protection
and Remediation



Project No.: 01-283	Design By: D.EVANS	Scale: N/A	CALIFORNIA GULCH SITE
File: RESWLOC.DWG	Drawn By: T.BOEHLER	Date: JUNE 1995	
RESURRECTION MINING COMPANY ONE UNITED BANK CENTER 1700 LINCOLN STREET DENVER, COLORADO 80203	FIGURE 1		GENERAL LOCATION

TABLE F.1
SUMMARY OF POTENTIAL FEDERAL AND STATE CHEMICAL-SPECIFIC ARARS

Standard, Requirement, Criteria, or Limitation	Citation	Potentially Applicable	Potentially Relevant and Appropriate	Description
FEDERAL				
Safe Drinking Water Act, Maximum Contaminant Levels	40 CFR Part 141	No	No	Not applicable because no community water supply system. Potentially relevant and appropriate for the final Site remedy, i.e., OU12.
Clean Water Act, Water Quality Criteria	40 CFR Part 131	No	No	Not applicable or relevant and appropriate for this removal action. Potentially relevant and appropriate for the final Site remedy, i.e., OU12.
Clean Air Act, National Primary and Secondary Ambient Air Quality Standards	40 CFR Part 50	Yes	---	These standards are applicable. NAAQS are met through the New Source Review Program and the State Implementation Plan.
RCRA Land Disposal Restrictions	40 CFR § 268.41	No	No	Not applicable because the materials to be managed have been identified as extraction or beneficiation waste that are specifically exempted from the definition of a hazardous waste. Not relevant and appropriate, see Superfund LDR Guide #7.
RCRA MCLs	40 CFR § 264.94	No	No	Not applicable because not a hazardous waste. Potentially relevant and appropriate for the final Site remedy, i.e., OU12.
STATE OF COLORADO				
Colorado Air Quality Control Act	5 CCR 1001-10 Part C (I) &(II) Regulation 8	Yes	--	Emission standards for lead and hydrogen sulfide. Potentially applicable, however it is not expected that at Site would ever violate these standards.

TABLE F.2
SUMMARY OF POTENTIAL FEDERAL AND STATE LOCATION-SPECIFIC ARARS

Standard, Requirement Criteria, or Limitation	Citation	Potentially Applicable	Potentially Relevant and Appropriate	Description
FEDERAL				
Endangered Species Act	16 USC § 1531 et seq. 50 CFR §§ 200 and 402	No	No	Provides protection for threatened and endangered species and their habitats. Site-specific studies did not document the presence of threatened or endangered species.
Fish and Wildlife Coordination Act	16 USC § 661 et seq. 40 CFR § 6.302	Yes	---	Requires coordination with federal and state agencies to provide protection of fish and wildlife in water resource development programs; regulates actions that impound, divert, control, or modify any body of water.
Wilderness Act	16 USC 1311, 16 USC 668 50 CFR 53, 50 CFR 27	No	No	Limits activities within areas designated as wilderness areas or National Wildlife Refuge Systems.
Executive Order No. 11988 Floodplain Management	40 CFR § 6.302 & Appendix A	Yes	---	Pertains to floodplain management and construction and impoundments in such areas.
Executive Order No. 11990 Protection of Wetlands	40 CFR § 6.302(a) and Appendix A	Yes	---	Minimizes adverse impacts on areas designated as wetlands.
Section 404, Clean Water Act (CWA)	33 USC 1251 et seq. 33 CFR Part 330	Yes	---	Regulates discharge of dredged or fill materials into waters of the United States. Substantive requirements of portions of Nationwide Permit No. 38 (General and Specific Conditions) are applicable to OU7 removal activities conducted within waters of the United States.

TABLE F.2
SUMMARY OF POTENTIAL FEDERAL AND STATE LOCATION-SPECIFIC ARARS

Standard, Requirement Criteria, or Limitation	Citation	Potentially Applicable	Potentially Relevant and Appropriate	Description
The Historic and Archaeological Data Preservation Act of 1974	16 USC 469 40 CFR § 6.301(c)	Yes	---	Establishes procedures to preserve historical and archeological data that might be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity program. A cultural resource survey was completed in OU7 to identify historic properties which may be affected by removal activity.
National Historic Preservation Act (NHPA)	16 USC § 470 et seq. 40 CFR § 6.301(b) 36 CFR Part 63, Part 65, Part 800	Yes	---	Expands historic preservation programs; requires preservation of resources included in or eligible for listing on the National Register for Historic Places.
Executive Order 11593 Protection and Enhancement of the Cultural Environment	16 USC § 470	Yes	---	Directs federal agencies to institute procedures to ensure programs contribute to the preservation and enhancement of non-federally owned historic resources. Consultation with the Advisory Council on Historic Preservation is required if removal activities should threaten cultural resources.
Historic Sites Act of 1935	16 USC § 461-467	No	No	Preserves for public use historic sites, buildings, and objects of natural significance.

TABLE F.2
SUMMARY OF POTENTIAL FEDERAL AND STATE LOCATION-SPECIFIC ARARS

Standard, Requirement Criteria, or Limitation	Citation	Potentially Applicable	Potentially Relevant and Appropriate	Description
The Archeological Resources Protection Act of 1979	16 USC §§ 470aa-47011	No	Yes	Requires a permit for any excavation or removal of archeological resources from public lands or Indian lands. Maybe relevant and appropriate if archeological resources encountered during removal activity.
Resource Conservation and Recovery Act (RCRA), Subtitle D	40 CFR Part 257	Yes	---	Provides general classification criteria for solid waste disposal facilities pertaining to floodplains and safety.
STATE OF COLORADO				
Nongame, Endangered or Threatened Species Act	CRS §§ 33-2-101 to 108	No	No	Standards for regulation of nongame wildlife and threatened and endangered species. Site-specific studies did not document the presence of threatened or endangered species.
Colorado Register of Historic Places	CRS §§ 24-80.1-101 to 108	Yes (see description)	---	Authorizes the State Historical Society to nominate properties for inclusion on the State Register of Historic Places. Applicable only if removal activities impact an area listed on the Register.
Colorado Historical, Prehistorical, and Archaeological Resources Act	CRS §§ 24-80-401 to 410 1301 to 1305	No	Yes	Concerns historical, prehistorical, and archaeological resources; applies only to areas owned by the State or its political subdivisions. May be relevant and appropriate if removal activities impact an archaeological site.

TABLE F.2
SUMMARY OF POTENTIAL FEDERAL AND STATE LOCATION-SPECIFIC ARARS

Standard, Requirement Criteria, or Limitation	Citation	Potentially Applicable	Potentially Relevant and Appropriate	Description
Colorado Species of Special Concern and Species of Undetermined Status	Colorado Division of Wildlife Administrative Directive E-1, 1985, modified	No	---	Protects species listed on the Colorado Division of Wildlife generated list. Urges coordination with the Division of Wildlife if wildlife species are to be impacted. No evidence of species of special concern have been identified at this site.
Colorado Natural Areas	Colorado Revised Statutes, Title 33 Article 33, Section 104	No	---	Maintains a list of plant species of "special concern." Although not protected by State statue, coordination with Division of Parks and Outdoor Recreation is recommended if activities will impact listed species.
Colorado Solid Waste Disposal Sites and Facilities Act, Colorado Revised Statutes, Title 30, Article 20, Sections 101-118	6 CCR 1007-2 6 CCR 1007-2, Part I	Yes	---	Establishes regulations for solid waste management facilities, including location standards. Establishes broad siting criteria and site evaluation procedures for individual storage and disposal units (i.e., impoundments, landfills, etc.).

TABLE F.3

SUMMARY OF POTENTIAL FEDERAL AND STATE ACTION-SPECIFIC ARARS

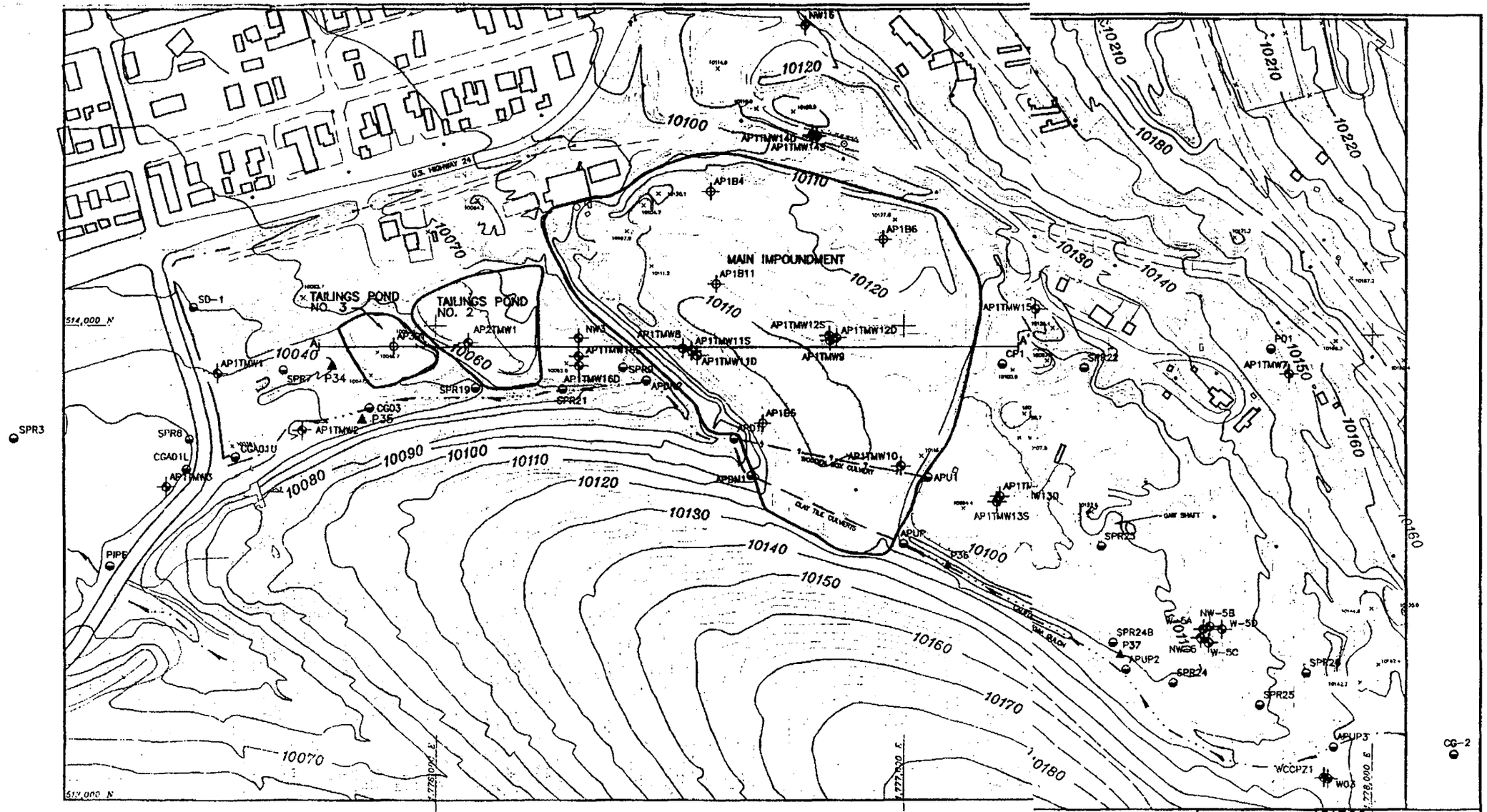
Standard, Requirement Criteria, or Limitation	Citation	Potentially Applicable	Potentially Relevant and Appropriate	Description
FEDERAL				
Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (RCRA)	42 USC § 6901-6987 40 CFR Part 257	Yes	---	Selected portions of Part 257 establish criteria for determining which solid waste disposal facilities and practices pose a reasonable probability of adverse effects on health. Applicable to land disposal of non-hazardous solid waste.
Hazardous Materials Transportation Act	49 USC § 1801-1813 49 CFR 107, 171-177	---	Yes	Regulates transportation of hazardous materials. Removal action within OU7 will not entail off-site transportation of hazardous materials but may involve use of public roads.
Occupational Health and Safety Act (OSHA)	29 USC § 651-678	No	No	Regulates worker health and safety. Regulations are not environmental requirements, but will be adhered to as appropriate.
Federal Mine Safety and Health Act (MSHA)	30 USC § 800-962	No	No	Establishes requirements to protect worker health and safety in and around mines. Regulations are not environmental requirements, but will be adhered to as appropriate.
STATE OF COLORADO				
Colorado Solid Waste Disposal Sites and Facilities Act	6 CCR 1007-2	Yes	---	Establishes standards for licensing, locating, constructing and operating solid waste facilities. Applicable only if removal actions will involve establishment of a solid waste disposal facility.
Colorado Water Quality Control Act, Storm Water Discharge Regulations	5 CCR 1002-2	Yes	---	Establishes requirements for storm water discharges (except portions relating to Site-wide Surface and Groundwater). Substantive requirements for storm water discharges associated with construction activities are applicable.

TABLE F.3

SUMMARY OF POTENTIAL FEDERAL AND STATE ACTION-SPECIFIC ARARS

Standard, Requirement Criteria, or Limitation	Citation	Potentially Applicable	Potentially Relevant and Appropriate	Description
Colorado Mined Land Reclamation Act	CRS 34-32-101 to 125 Rule 3 of Mineral Rules and Regulations	Yes	---	Regulates all aspects of land use for mining, including the location of mining operations and related reclamation activities and other environmental and socio-economic impacts. Substantive requirements of selected portions of Rule 3 regarding Reclamation Measures, Water General Requirements (except portions relating to Side-wide Surface and Ground Water), Wildlife, and Revegetation are applicable.
Colorado Air Quality Control Act	5 CCR 1001-3; Section III.D.1.a.(i) Sections II.D.2.b. and g. Regulation 1	Yes (see description)	---	Only provisions of Act under Regulation No. 1 concerning fugitive emissions for construction activities and tailing ponds are applicable (5 CCR 1001-3; Sections II.D.2.b and g.
Colorado Noise Abatement Act	CRS §§ 25-12-101 to 108	Yes	---	Established maximum permissible noise levels for particular time periods and land use related to construction projects.
Regulations on the Collection of Aquatic Life	2 CCR 406-8, Ch. 13, Article III, Sec. 1316	No	No	Requirements governing the collection of wildlife for scientific purposes. Removal activities within OU6 will not trigger biological monitoring.
Colorado Hazardous Waste Regulations	6 CCR 1007-3	No	Yes	Certain portions of RCRA Subtitle C requirements may be relevant and appropriate clean-up standards for conducting remedial or removal actions at certain portions of the Site if waste material fails TCLP, and/or if waste material is located so that it comes in contact with surface and/or groundwater.
Colorado Air Quality Control Act	5 CCR 1001-4 Regulation 2 Odors	Yes	--	Applicable if work in tailing impoundments cause odors.

Standard, Requirement Criteria, or Limitation	Citation	Potentially Applicable	Potentially Relevant and Appropriate	Description
Colorado Air Quality Control Act	5 CCR 1001-5 Regulation 3 APENs	Yes	---	Substantive provisions of APENs will be met.



NOTE: DASHED CONTOURS INDICATE APPROXIMATE ELEVATIONS AS DEFINED IN PARAGRAPH 7.1.3.6 OF THE MANUAL OF PHOTOGRAMMETRY, 4TH EDITION.

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS FOR TWO FOOT AND TWENTY FOOT CONTOUR INTERVAL MAPPING.

HYDROTEK, INC. PROJECT NO. 6-3000
RAPID CITY, SD 57709-3614

CONTOUR INTERVAL = 2 / 20 FOOT

NATIONAL GEODETIC VERTICAL DATUM OF 1929 BASED ON COLORADO CENTRAL ZONE PLANE COORDINATE SYSTEM

LEGEND

N

SCALE
0 200 400 FEET

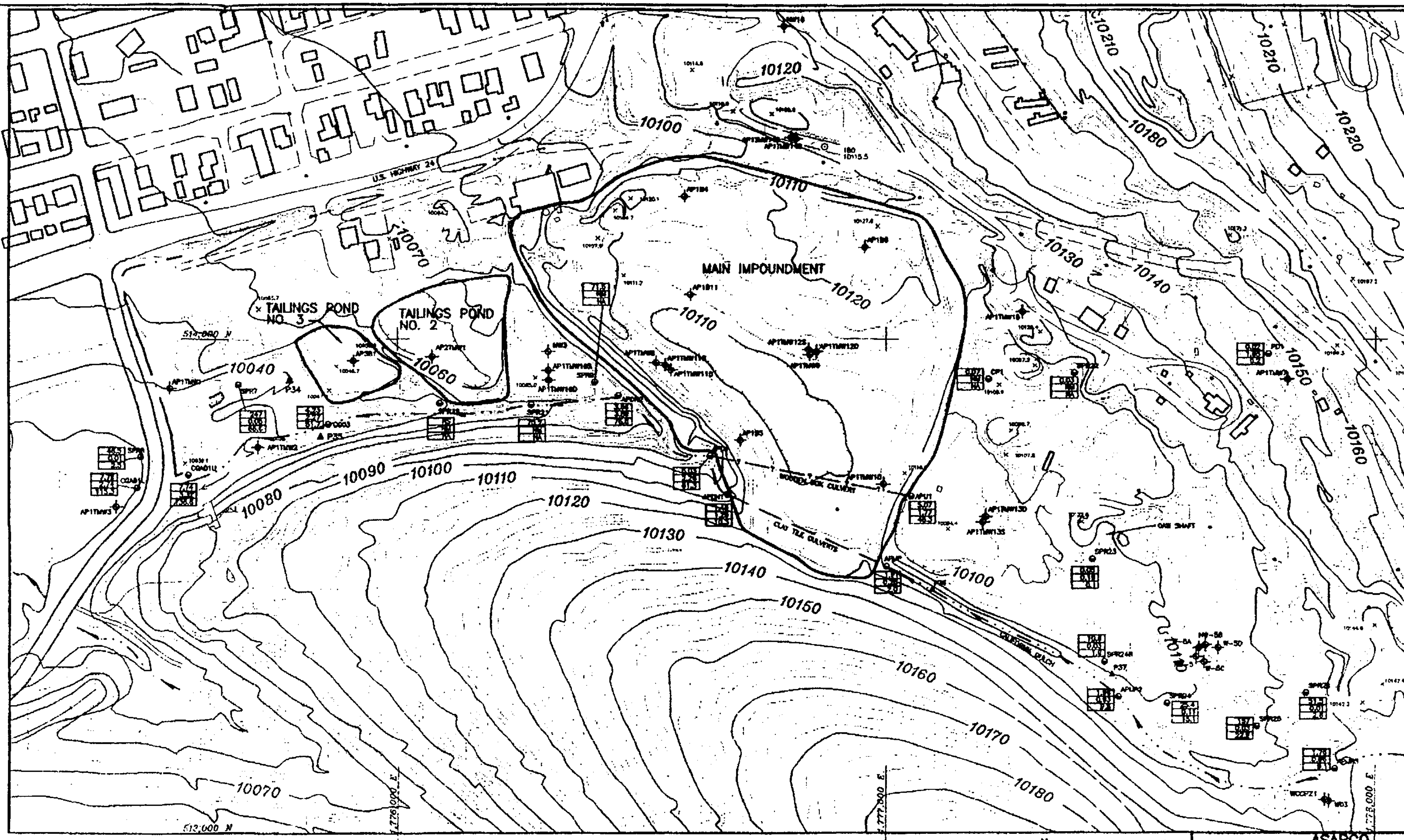
ASARCO
APACHE TAILINGS IMPOUNDMENTS

FIGURE 1

SITE PLAN SHOWING MONITORING LOCATIONS

PROJECT: 5344.0	DATE: FEBRUARY, 1997
REV:	BY: SCG CHECKED: DLL

McCULLEY, FRICK & GILMAN, INC.
providing environmental consulting and engineering services



NOTE: DASHED CONTOURS INDICATE APPROXIMATE ELEVATIONS AS DEFINED IN PARAGRAPH 7.1.2.9 OF THE MANUAL OF PHOTOGRAMMETRY, 4TH EDITION.

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS FOR TWO FOOT AND TWENTY FOOT CONTOUR INTERVAL MAPPING.

HORIZONS, INC. PROJECT NO. 4-3008
RAPID CITY, SD 57709-3134

CONTOUR INTERVAL – 2 / 20 FOOT

NATIONAL GEODETIC VERTICAL DATUM OF 1929 BASED ON COLORADO CENTRAL ZONE PLANE COORDINATE SYSTEM

Zn DISSOLVED IN mg/L
FLOW IN CFS
Zn IN lbs/DAY

NM – NOT MEASURED; FLOW TOO LOW TO MEASURE

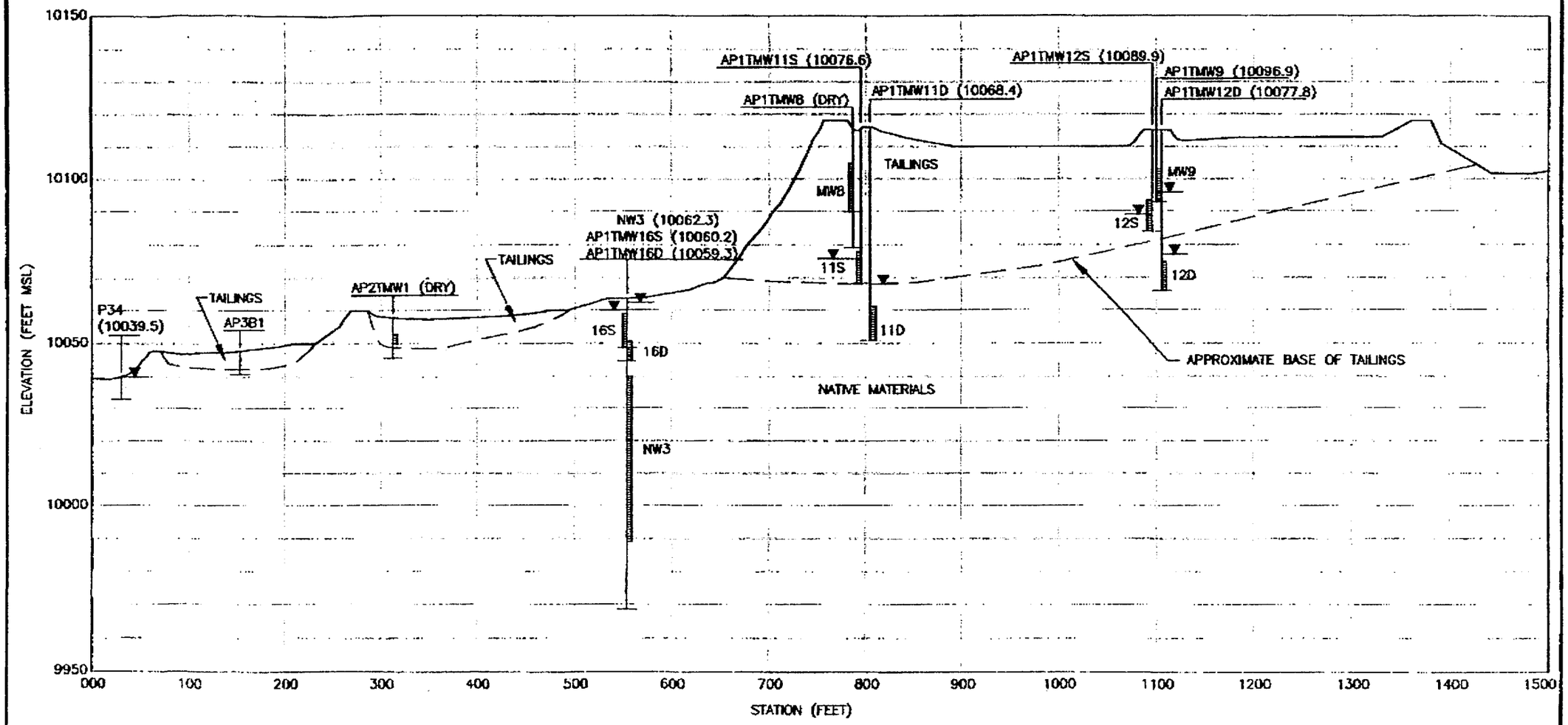
NA – NOT APPLICABLE

NS – LOCATION NOT SAMPLED

ASARCO
APACHE TAILINGS IMPOUNDMENTS
FIGURE 2
NOV. '96 – PRELIMINARY SURFACE WATER MONITORING DATA

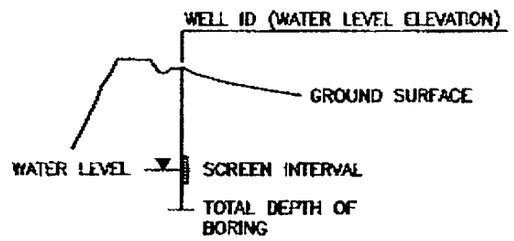
PROJECT: 5344.3	DATE: FEBRUARY, 1997
REV:	BY: SCG CHECKED: DLL

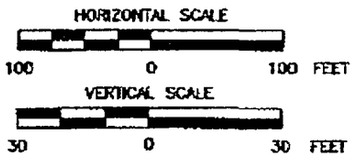
McCULLEY, FRICK & GILMAN, INC.
providing environmental consulting and engineering services



NOTES:

1. GROUNDWATER ELEVATION DATA FROM NOVEMBER 1996.
2. NATIVE MATERIALS REFERS TO GLACIAL OUTWASH, RECENT ALLUVIUM AND/OR FILL MATERIAL.
3. NW3 PROJECTED 50 FEET ONTO THE CROSS SECTION; P34 PROJECTED 30 FEET ONTO THE CROSS SECTION.





VERTICAL EXAGGERATION = 3.33

ASARCO
APACHE TAILINGS IMPOUNDMENTS

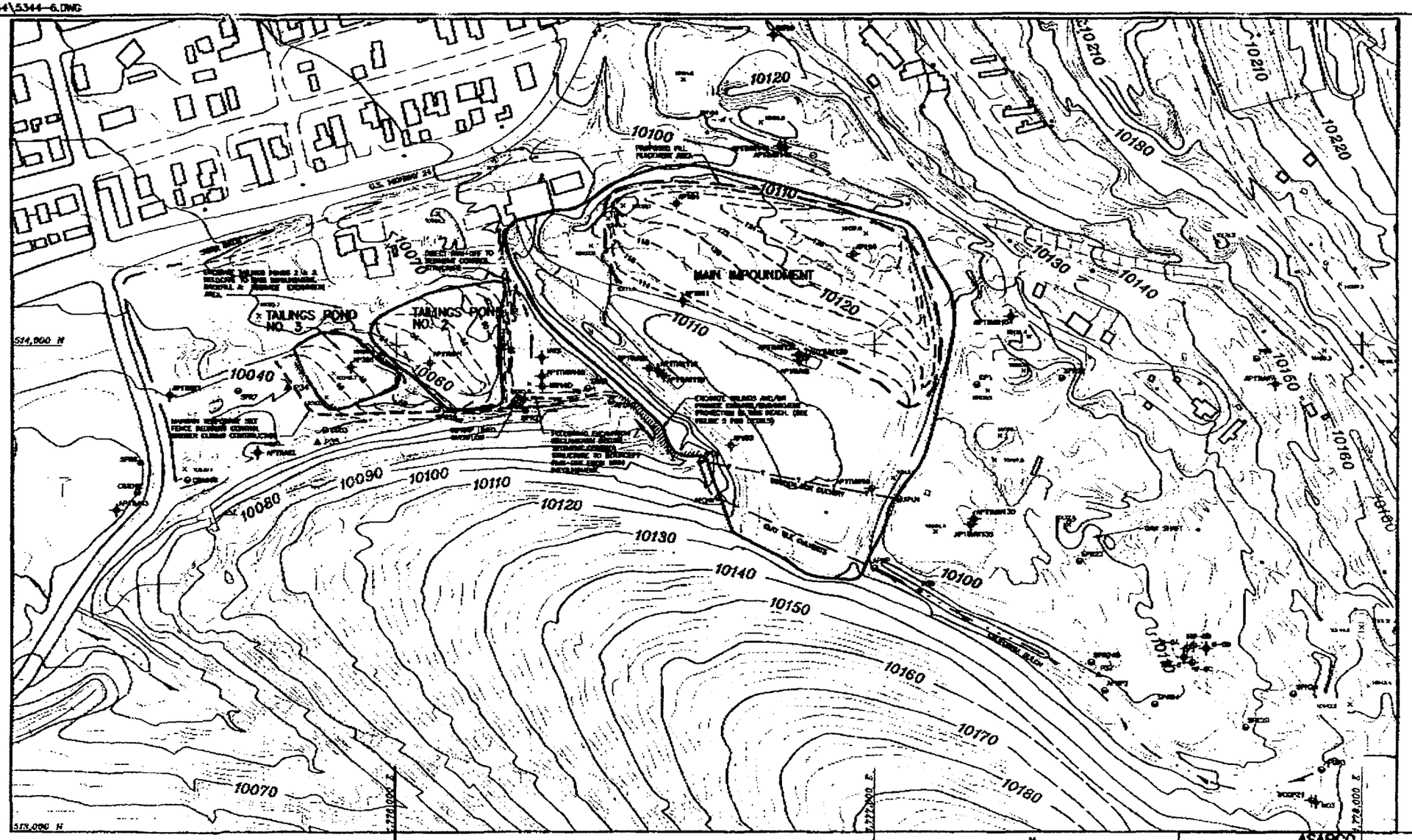
FIGURE 3

CROSS SECTION A–A'

PROJECT: 5344.0	DATE: MARCH, 1997
REV: 1	BY: RAB CHECKED: GSD

McCULLEY, FRICK & GILMAN, INC.
providing environmental consulting and engineering services

2/97 D:\5344\5344-6.DWG



LEGEND

ASARCO
APACHE TAILINGS IMPOUNDMENTS

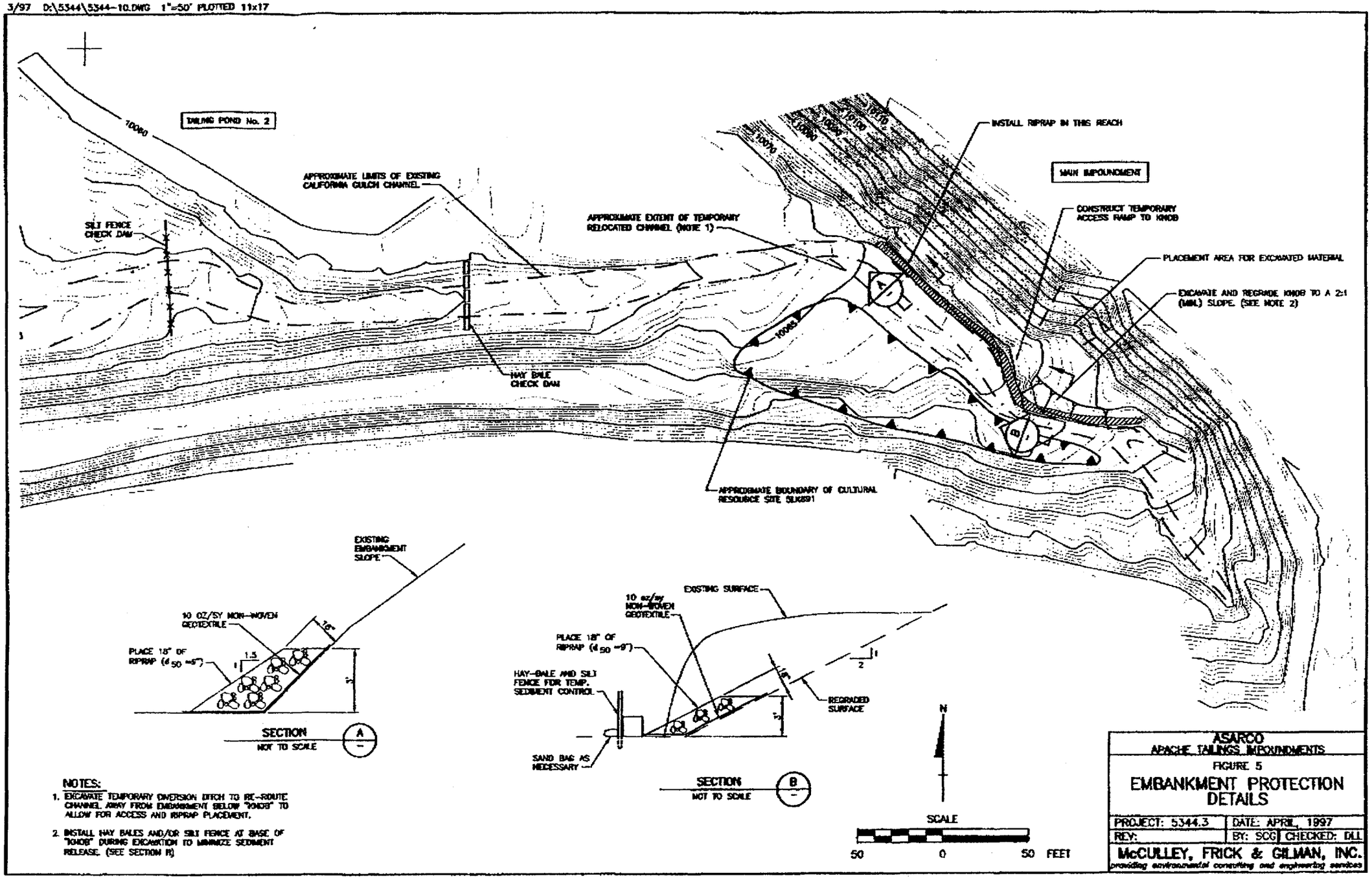
FIGURE 4

1997 INTERIM REMOVAL ACTION PLAN

PROJECT: 5344.3	DATE: FEBRUARY, 1997
REV:	BY: SCG CHECKED: DLL

McCULLEY, FRICK & GILMAN, INC.
providing environmental consulting and engineering services

3/97 D:\5344\5344-10.DWG 1"=50' PLOTTED 11x17



NOTES:

1. EXCAVATE TEMPORARY DIVERSION DITCH TO RE-ROUTE CHANNEL AWAY FROM EMBANKMENT BELOW "KNOB" TO ALLOW FOR ACCESS AND RIPRAP PLACEMENT.
2. INSTALL HAY BALES AND/OR SILT FENCE AT BASE OF "KNOB" DURING EXCAVATION TO MINIMIZE SEDIMENT RELEASE. (SEE SECTION R)

ASARCO
APACHE TAILINGS IMPOUNDMENTS

FIGURE 5

EMBANKMENT PROTECTION DETAILS

PROJECT: 5344.3	DATE: APRIL, 1997
REV:	BY: SCG CHECKED: DLL

McCULLEY, FRICK & GILMAN, INC.
providing environmental consulting and engineering services

providing environmental
consulting and
engineering services

4840 Pearl East Circle
Suite 200W
Boulder, Colorado 80301
303/447-1823
Fax: 447-1836

McCulley
Frick &
Gilman, Inc.

Via U.S. Mail

March 13, 1997
MFG Job No. 5344.2

Ms. Rebecca Thomas
Remedial Program Manager
U.S. EPA Region VIII
999 18th Street, Suite 500
Denver, CO 80202-2405

RE: TRANSMITTAL OF MONITORING DATA; OPERABLE UNIT 7 - APACHE TAILINGS

Dear Rebecca:

We are pleased to provide four copies of a draft table summarizing surface water and groundwater quality data from sampling events performed during November and December 1996 at the Apache Tailings area. The December monitoring included sampling at the inflow and outflow of the wooden box culvert (APU1 and APD1) during treatment plant shutdown. Flow did not occur at the adjacent California Gulch stations (APUP and APDN1) during the plant shutdown monitoring. Because the data validation process is not fully complete, the data and associated qualifiers should be considered preliminary. Also enclosed are a sample site location map and a table which summarizes construction details for new and pre-existing wells in the vicinity of Apache.

After the data validation process is complete, we will distribute a revised version of the data table, if necessary. If you have any questions, please do not hesitate to call.

Sincerely,
MCCULLEY, FRICK & GILMAN, INC.

Bence V. Close, P.E.
Senior Engineer/Geohydrologist
Associate

BVC:sjc

1c: Russ Allen, CDPHE
Austin Buckingham, CDPHE
Fern Daves, Asarco
Rod Grebb, WESTEC
Tom Hesemann, RMC
Mike Holmes, EPA
Paul Rosasco, EMS
Gary Slifka, Asarco
Sherm Worthington, SMI

J:\5344\COMM\RTHOMAS2.LTR

TABLE 1

OPERABLE UNIT 7 - APACHE TAILINGS
GROUNDWATER SAMPLING RESULTS
NOVEMBER 1996

SAMPLE LOCATION	AP1TMW1	AP1TMW2	AP1TMW7	AP1TMW9	AP1TMW11S	AP1TMW11D	AP1TMW12S
LAB NUMBER	L11863-20	L11819-07	L11808-02	L11863-22	L11863-15	L11863-17	L11863-18
SAMPLE NUMBER	M-AP1TMW1-01-112496	M-AP1TMW2-01-111996	M-AP1TMW7-01-111896	M-AP1TMW9-01-112496	M-AP1TMW11S-01-11249	M-AP1TMW11D-01-11246	M-AP1TMW12S-01-11246
SAMPLE DATE	11/24/96	11/19/96	11/18/96	11/24/96	11/24/96	11/24/96	11/24/96
Field Parameters							
pH (units)	3.22	6.41	7.46	6.55	6.5	5.84	6.17
Conductivity @25C (umhos/cm)	5480	803	736	9530	6670	1210	8430
Major Constituents and Inorganics							
Calcium (mg/L)	530	118	94.1	411	443	134	404
Chloride (mg/L)	9	3 B	9	11	6	1 B	14
Fluoride (mg/L)	0.1 U	0.1 U	0.1 U	0.9	0.3 B	0.1 B	0.8
Magnesium (mg/L)	400	49.6	39.8	2092	1228	67.1	1661
Nitrite as N (mg/L)	0.01 U	0.01 U	0.01 U	0.05	0.08	0.01 U	0.08
Nitrate as N (mg/L)	0.8 B	0.62	2.65	0.02 U	0.84	6.3	0.02 U
Nitrate/Nitrite as N (mg/L)	0.8 B	0.62	2.65	0.02 U	0.92	6.3	0.02 B
Potassium (mg/L)	20 U	1.8	1.3	70	70	2.8	87
Sodium (mg/L)	20 B	6.6	4.3	6 B	24	5.7	14
Sulfate (mg/L)	4400	450	250	9100	5600	600	7800
Phosphorus, dissolved (mg/L)	0.005 U	0.008 B	0.015 B	0.005 U	0.007 B	0.005 U	0.005 U
Phosphorus, ortho dissolved (mg/L)	0.032 J	0.005 U	0.005 U	0.025 J	0.005 U J	0.005 U J	0.005 U J
Metals, Dissolved							
Arsenic (mg/L)	0.02 U	0.005 U	0.001 U	0.02 U	0.02 U	0.005 U	0.05 U
Cadmium (mg/L)	0.256	0.002 B	0.0002 U	0.008 B	0.04	0.071	0.02 B
Copper (mg/L)	0.42	0.01 U	0.01 U	0.1 U	0.04 U	0.01 U	0.05 U
Iron (mg/L)	460	0.02 B	0.01 U	28.5	10.1	4.55	132
Lead (mg/L)	0.575	0.001 U	0.0002 U	0.004 U	0.004 U	0.086	0.01 U
Manganese (mg/L)	369	1.53	0.005 U	6.51	65.6	18.7	16.9
Zinc (mg/L)	217	0.93	0.01 U	0.1 U	65.1	30.6	2.82
Other Water Quality Parameters							
Total Alkalinity (mg/L)	2 U	47	121	101	383	57	122
Bicarbonate as CaCO3 (mg/L)	2 U	47	121	101	383	57	122
Carbonate as CaCO3 (mg/L)	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Cation-Anion Balance (%)	12.1	0.3 U	0.5	0.7	2.9	2.9	0.3
Dissolved Organic Carbon (DOC) (mg/L)	2 B	1 B	1 U	12	4 B	2 B	6
Hardness as CaCO3 (mg/L)	2970	499	399	9630	6150	611	7840
Hydroxide as CaCO3 (mg/L)	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Residue, Filterable (TDS) (mg/L)	6950	720	520	12160	7800	1000	10460
Residue, Non-Filterable (TSS) (mg/L)	6 B	5 U	5 U	8 B	52	8 B	58

Data validation not fully complete; data qualifiers may be added, modified or deleted upon completion of the data validation process.

U = not detected at the indicated method detection limit (MDL)
B = Analyte concentration detected at a value between the MDL and the practical quantitation limit (PQL)
J = estimated value
NR = not reported

TABLE 1

OPERABLE UNIT 7 - APACHE TAILINGS
GROUNDWATER SAMPLING RESULTS
NOVEMBER 1996

SAMPLE LOCATION	AP1TMW12D	AP1TMW13S	AP1TMW13D	AP1TMW14S	AP1TMW14D	AP1TMW15
LAB NUMBER	L11863-21	L11819-02	L11819-01	L11845-15	L11845-16	L11808-01
SAMPLE NUMBER	M-AP1TMW12D-01-11246	M-AP1TMW13S-01-11199	M-AP1TMW13D-01-11199	M-AP1TMW14S-01-11206	M-AP1TMW14D-01-11206	M-AP1TMW15-01-11896
SAMPLE DATE	11/24/96	11/19/96	11/19/96	11/20/96	11/20/96	11/18/96
Field Parameters						
pH (units)	5.49	6.88	7.19	2.17	4.65	6.61
Conductivity @25C (umhos/cm)	1780	688	938	28190	2430	826
Major Constituents and Inorganics						
Calcium (mg/L)	196.0	82.2	120	510	216	126
Chloride (mg/L)	2 B	2 B	3 B	6	23	8
Fluoride (mg/L)	0.1 U	0.1 U	0.1 U	0.1 U	0.4 B	0.1 U
Magnesium (mg/L)	101.0	33.5	51.3	510	137	39.8
Nitrite as N (mg/L)	0.02 B	0.01 U	0.01 U	0.01 U	0.48	0.01 U
Nitrate as N (mg/L)	6.5	0.04 B	0.26	0.4 U	1.79	2.28
Nitrate/Nitrite as N (mg/L)	6.5	0.04 B	0.26	0.4 U	2.27	2.28
Potassium (mg/L)	6.6	1.3	1.5	30 U	8 U	2.4
Sodium (mg/L)	9.9	2.5	6.4	30 U	28 B	9.1
Sulfate (mg/L)	1030	270	370	60800	1590	360
Phosphorus, dissolved (mg/L)	0.014 B	0.005 U	0.007 B	68.8	0.022 B	0.016 B
Phosphorus, ortho dissolved (mg/L)	0.005 U	0.005 U	0.005 U	49	0.005 U	0.005 U
Metals, Dissolved						
Arsenic (mg/L)	0.005 U	0.005 U	0.005 U	48.9	0.005 U	0.001 U
Cadmium (mg/L)	0.034	0.077	0.002 B	10.2	0.3	0.0008 B
Copper (mg/L)	0.04 B	0.01 B	0.01 U	47	0.11	0.01 U
Iron (mg/L)	23.7	0.01 U	0.01 B	27167	47.4	0.03 B
Lead (mg/L)	0.019	0.023	0.001 U	0.09 B	0.004 B	0.0002 U
Manganese (mg/L)	37.2	0.285	0.304	773	213	0.523
Zinc (mg/L)	19.0	11	0.01 U	1639	45.6	0.05
Other Water Quality Parameters						
Total Alkalinity (mg/L)	2 U	86	123	2 U	2 U	90
Bicarbonate as CaCO3 (mg/L)	2 U	86	123	2 U	2 U	90
Carbonate as CaCO3 (mg/L)	2 U	2 U	2 U	2 U	2 U	2 U
Cation-Anion Balance (%)	2.4	0.6 U	1	11.7	11.1	1.6
Dissolved Organic Carbon (DOC) (mg/L)	3 B	1 B	1 U	112	2 B	2 B
Hardness as CaCO3 (mg/L)	905	343	511	3370	1100	479
Hydroxide as CaCO3 (mg/L)	2 U	2 U	2 U	2 U	2 U	2 U
Residue, Filterable (TDS) (mg/L)	1550	460	670	103390	2550	640
Residue, Non-Filterable (TSS) (mg/L)	54	5 U	5 U	1128	10 B	28

Data validation not fully complete; data qualifiers may be added, modified or deleted upon completion of the data validation process.

U = not detected at the indicated method detection limit (MDL)
B = Analyte concentration detected at a value between the MDL and the practical quantitation limit (PQL)
J = estimated value
NR = not reported

TABLE 1

OPERABLE UNIT 7 - APACHE TAILINGS
GROUNDWATER SAMPLING RESULTS
NOVEMBER 1996

SAMPLE LOCATION	AP1TMW16S	AP1TMW16D	NW-16	NW3	W5A	W5C	W5D
LAB NUMBER	L11845-17	L11845-18	L11819-03	L11845-22	L11766-04	L11766-05	L11766-02
SAMPLE NUMBER	M-AP1TMW16S-01-11206	M-AP1TMW16D-01-11206	M-NW16-01-111996	M-NW3-01-112096	L-W5A-01-961112	L-W5C-01-961112	L-W5D-01-961112
SAMPLE DATE	11/20/96	11/20/96	11/19/96	11/20/96	11/12/96	11/12/96	11/12/96
Field Parameters							
pH (units)	6.11	6.21	6.07	8.19	6.64	7.61	7.50
Conductivity @25C (umhos/cm)	5090	3130	1850	264	3028	2102	1060
Major Constituents and Inorganics							
Calcium (mg/L)	390	290	336	30	473	360	160
Chloride (mg/L)	7	5	13	5	0.5 U	1.2 B	1.7 B
Fluoride (mg/L)	0.2 B	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Magnesium (mg/L)	400	234	74.4	11.7	285	171	694
Nitrite as N (mg/L)	0.02 B	0.02 B	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Nitrate as N (mg/L)	0.02 U	0.02 U	1.73	1.78	1.11	0.78	0.67
Nitrate/Nitrite as N (mg/L)	0.02 U	0.02 U	1.73	1.78	1.11	0.78	0.67
Potassium (mg/L)	14	10	2.1	1.1	3.02 B	2.15 B	1.52 B
Sodium (mg/L)	19	12	41.3	5.5 J	5.76	6.34	5.84
Sulfate (mg/L)	4280	2130	1080	10 B	2780	1340	495
Phosphorus, dissolved (mg/L)	0.035	0.021 B	0.009 B	0.024 B	NR	NR	NR
Phosphorus, ortho dissolved (mg/L)	0.015 B	0.007 B	0.006 B	0.007 B	0.006 B	0.005 B	0.007 B
Metals, Dissolved							
Arsenic (mg/L)	0.01 B	0.011 B	0.005 U	0.001 U	0.1 U	20 U	0.01 U
Cadmium (mg/L)	0.041	0.008	0.002 B	0.0002 U	1.5	0.008	0.002 U
Copper (mg/L)	0.03 U	0.02 U	0.01 U	0.01 U	0.1 U	0.03 B	0.01 B
Iron (mg/L)	513	220	0.01 U	0.05 U	0.017 B	0.01 U	0.01 U
Lead (mg/L)	0.234	0.019	0.003 B	0.0002 U	0.02 U	0.004 U	0.002 U
Manganese (mg/L)	265	122	0.024 B	0.005 U	1.19	0.005 U	0.005 U
Zinc (mg/L)	197	92	0.08	0.01 U	165	1.63	0.01 U
Other Water Quality Parameters							
Total Alkalinity (mg/L)	41	27	50	105	25	105	155
Bicarbonate as CaCO3 (mg/L)	41	27	50	105	25	105	155
Carbonate as CaCO3 (mg/L)	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Cation-Anion Balance (%)	7.7	12.1	1.2	2.9	-5.7	3.3	14
Dissolved Organic Carbon (DOC) (mg/L)	3 B	2 B	2 B	1 B	1 B	2 B	1 B
Hardness as CaCO3 (mg/L)	2620	1690	1150	123	2350	1600	685
Hydroxide as CaCO3 (mg/L)	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Residue, Filterable (TDS) (mg/L)	6220	3470	1700	150	3530	2110	890
Residue, Non-Filterable (TSS) (mg/L)	30	30	12 B	12 B	198	8 B	5 U

Data validation not fully complete; data qualifiers may be added, modified or deleted upon completion of the data validation process.

U = not detected at the indicated method detection limit (MDL)
B = Analyte concentration detected at a value between the MDL and the practical quantitation limit (PQL)
J = estimated value
NR = not reported

TABLE 2

OPERABLE UNIT 7 - APACHE TAILINGS
SURFACE WATER SAMPLING RESULTS
NOVEMBER 1996

SAMPLE LOCATION	APUP3	SPR26	SPR25	SPR24	APUP2	SPR24B
LAB NUMBER	L11845-05	L11863-03	L11863-10	L11863-06	L11845-03	L11863-09
SAMPLE NUMBER	M-CGA08-01-112296	M-SPR26-01-112396	M-SPR25-01-112396	M-SPR24-01-112396	M-CGA06-01-112296	M-SPR24B-01-112396
SAMPLE DATE	11/22/96	11/23/96	11/23/96	11/23/96	11/22/96	11/23/96
Field						
Flow (cfs)	0.96	0.01	0.03	0.11	0.93	0.03
pH (units)	7.19	7.51	7.40	7.55	6.28	7.97
Conductivity @25C (umhos/cm)	1150	2610	2980	1731	1160	1374
Major Constituents and Inorganics						
Calcium (mg/L)	195	433	454	242 J	195	223 J
Chloride (mg/L)	1.1 B	2.9	2.5	1.7 B	1.1 B	1.1 B
Fluoride (mg/L)	0.4 B	0.2 B	0.1 B	0.2 B	0.4 B	0.3 B
Magnesium (mg/L)	48.2	179	205	102	49.3	59.8
Nitrite as N (mg/L)	0.01 B	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Nitrate as N (mg/L)	0.27	1.3	0.88	0.23	0.26	0.21
Nitrate/Nitrite as N (mg/L)	0.28	1.3	0.88	0.23	0.26	0.21
Potassium (mg/L)	2.2	2.5	3.7	2.4	2.1	2
Sodium (mg/L)	3.8	8.1	7.6	7.4	3.8	4.6
Sulfate (mg/L)	614	1600	1870	890	610	690
Phosphorus, dissolved (mg/L)	0.007 B	0.005 U	0.015 B	0.005 U	0.005 U	0.005 U
Phosphorus, ortho dissolved (mg/L)	0.005 U	0.005 U J	0.005 U J	0.005 U J	0.005 U	0.005 U J
Metals, Dissolved						
Arsenic (mg/L)	0.005 U	0.005 U	0.01 U	0.002 U	0.005 U	0.01 U
Cadmium (mg/L)	0.009	0.293	0.706	0.115	0.009	0.049
Copper (mg/L)	0.01 U	0.02 U	0.03 B	0.01 U	0.01 U	0.01 B
Iron (mg/L)	0.2	0.11	0.16	0.01 U	0.21	0.02 B
Lead (mg/L)	0.002 B	0.155	0.281	0.0111	0.001 B	0.013
Manganese (mg/L)	0.496	1.25	5.58	0.083 J	0.556	0.505
Zinc (mg/L)	1.76	51.5	157	25.4	1.96	10.6
Metals, Total						
Arsenic (mg/L)	0.005 U	0.005 U	0.01 U	0.002 U	0.005 U	0.002 U
Cadmium (mg/L)	0.007	0.29	0.704	0.114	0.008	0.047
Copper (mg/L)	0.01 U	0.02 U	0.02 B	0.01 U	0.01 U	0.01 B
Iron (mg/L)	1.03	0.07 B	0.94	0.01 B	0.33	0.05
Lead (mg/L)	0.082	0.168	0.63	0.0147	0.014	0.017
Manganese (mg/L)	0.507	1.17	4.46	0.088	0.543	0.427
Zinc (mg/L)	1.8	49.2	134	22.9	1.94	9.13
Other Water Quality Parameters						
Total Alkalinity (mg/L)	12	141	110	160	12	49
Bicarbonate as CaCO3 (mg/L)	12	141	110	160	12	49
Carbonate as CaCO3 (mg/L)	2 U	2 U	2 U	2 U	2 U	2 U
Cation-Anion Balance (%)	3	2.5	4.2	0.7 U	3.7	3.5
Dissolved Organic Carbon (DOC) (mg/L)	1 B	1 B	2 B	1 U	1 B	1 U
Hardness as CaCO3 (mg/L)	686	1820	1980	1020	690	803
Hydroxide as CaCO3 (mg/L)	2 U	2 U	2 U	2 U	2 U	2 U
Residue, Filterable (TDS) (mg/L)	900	2460	2930	1450	910	1110
Residue, Non-Filterable (TSS) (mg/L)	5 U	12 B	20	20	5 U	28

Data validation not fully complete; data qualifiers may be added, modified or deleted upon completion of the data validation process.

cfs = cubic feet per second
NM = not measured; flow too low to measure
U = not detected at the indicated method detection limit (MDL)
B= Analyte concentration detected at a value between the MDL and the practical quantitation limit (PQL)
J= estimated value
NR= not reported

TABLE 2

OPERABLE UNIT 7 - APACHE TAILINGS
SURFACE WATER SAMPLING RESULTS
NOVEMBER 1996

SAMPLE LOCATION	APUP	APDN1	SPR23	APU1	APD1	APDN2
LAB NUMBER	L11845-02	L11845-01	L11863-01	L11845-25	L11845-23	L11845-13
SAMPLE NUMBER	M-ADUP-01-112296	M-APDN1-01-112296	M-SPR23-01-112396	M-APU1-01-112196	M-APD1-01-112196	M-CGA04-01-112196
SAMPLE DATE	11/22/96	11/22/96	11/23/96	11/21/96	11/21/96	11/21/96
Field						
Flow (cfs)	0.20	1.29	0.19	1.77	2.26	3.89
pH (units)	6.59	6.77	7.99	6.90	7.50	7.30
Conductivity @25C (umhos/cm)	1160	1150	864	550	560	819
Major Constituents and Inorganics						
Calcium (mg/L)	196	194	106	67.8	69.2	127
Chloride (mg/L)	1 B	1 B	4.5	1.4 B	1.7 B	1.4 B
Fluoride (mg/L)	0.4 B	0.4 B	0.1 U	0.1 U	0.1 U	0.3 B
Magnesium (mg/L)	50.1	48.9	49.6	28.8	26.5	38.5
Nitrite as N (mg/L)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Nitrate as N (mg/L)	0.26	0.25	0.46	0.17	0.15	0.22
Nitrate/Nitrite as N (mg/L)	0.26	0.25	0.46	0.17	0.15	0.22
Potassium (mg/L)	2.3	2.2	1.4	1.1	0.9 B	1.3
Sodium (mg/L)	4	3.9	5	2.5	2.6	3.2
Sulfate (mg/L)	604	630	263	170	175	405
Phosphorus, dissolved (mg/L)	0.009 B	0.006 B	0.007 B	0.021 B	0.017 B	0.01 B
Phosphorus, ortho dissolved (mg/L)	0.005 U	0.005 U	0.022 B J	0.007 B	0.005 U	0.005 U
Metals, Dissolved						
Arsenic (mg/L)	0.005 U	0.005 U	0.002 U	0.005 U	0.001 U	0.005 U
Cadmium (mg/L)	0.009	0.007	0.0004 U	0.031	0.0029	0.019
Copper (mg/L)	0.01 U	0.01 U	0.01 B	0.01 U	0.01 B	0.01 U
Iron (mg/L)	0.15	0.12	0.01 U	0.01 U	0.01 U	0.07
Lead (mg/L)	0.001 U	0.001 U	0.0004 U	0.005 B	0.0048	0.002 B
Manganese (mg/L)	0.57	0.4	0.005 U	0.199	0.21	0.425
Zinc (mg/L)	1.91	1.48	0.05	5.07	5.03	3.66
Metals, Total						
Arsenic (mg/L)	0.005 U	0.005 U	0.002 U	0.005 U	0.002 U	0.005 U
Cadmium (mg/L)	0.008	0.006	0.0004 U	0.029	0.0295	0.017
Copper (mg/L)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Iron (mg/L)	0.24	0.83	0.01 U	0.17	0.31	0.38
Lead (mg/L)	0.009	0.071	0.0005 B	0.017	0.0321	0.032
Manganese (mg/L)	0.551	0.415	0.005 B	0.213	0.232	0.411
Zinc (mg/L)	1.9	1.54	0.09	5.4	5.4	3.54
Other Water Quality Parameters						
Total Alkalinity (mg/L)	12	11	163	98	97	52
Bicarbonate as CaCO3 (mg/L)	12	11	163	98	97	52
Carbonate as CaCO3 (mg/L)	2 U	2 U	2 U	2 U	2 U	2 U
Cation-Anion Balance (%)	4.6	1.8	3.7	4.1	2.3	1.1
Dissolved Organic Carbon (DOC) (mg/L)	1 U	1 B	1 B	1 U	1 U	1 B
Hardness as CaCO3 (mg/L)	696	686	469	288	282	476
Hydroxide as CaCO3 (mg/L)	2 U	2 U	2 U	2 U	2 U	2 U
Residue, Filterable (TDS) (mg/L)	910	890	620	360	370	680
Residue, Non-Filterable (TSS) (mg/L)	5 U	6 B	5 U	5 U	6 B	22

Data validation not fully complete; data qualifiers may be added, modified or deleted upon completion of the data validation process.

cfs = cubic feet per second
NM = not measured; flow too low to measure
U = not detected at the indicated method detection limit (MDL)
B= Analyte concentration detected at a value between the MDL and the practical quantitation limit (PQL)
J= estimated value
NR= not reported

TABLE 2

OPERABLE UNIT 7 - APACHE TAILINGS
SURFACE WATER SAMPLING RESULTS
NOVEMBER 1996

SAMPLE LOCATION	SPR9	SPR21	CG03	SPR7	SPR8	CGA01U
LAB NUMBER	L11863-11	L11863-13	L11845-12	L11863-02	L11863-05	L11845-11
SAMPLE NUMBER	M-SPR9-01-112396	M-SPR21-01-112396	M-CG03-01-112196	M-SPR7-01-112396	M-SPR8-01-112396	M-CGA01U-01-112196
SAMPLE DATE	11/23/96	11/23/96	11/21/96	11/23/96	11/23/96	11/21/96
Field						
Flow (cfs)	NM	NM	2.27	0.05	0.01	3.32
pH (units)	5.63	6.24	7.28	3.24	3.17	7.33
Conductivity @25C (umhos/cm)	2610	2350	826	6360	1705	954
Major Constituents and Inorganics						
Calcium (mg/L)	274	194.0	131	406	227	137
Chloride (mg/L)	2.9	2.5	1.4 B	11.6	3	1.5 B
Fluoride (mg/L)	0.2 B	0.1 U	0.3 B	0.1 U	0.2 B	0.3 B
Magnesium (mg/L)	206	162.0	40.3	398	97.1	45.9
Nitrite as N (mg/L)	0.01 B	0.04 B	0.01 U	0.01 U	0.01 U	0.01 B
Nitrate as N (mg/L)	0.3	0.02 U	0.19	0.03 B	0.02 U	0.21
Nitrate/Nitrite as N (mg/L)	0.31	0.03 B	0.19	0.03 B	0.02 U	0.22
Potassium (mg/L)	5.1	7.1	1.6	5	2.5	1.5
Sodium (mg/L)	8.4	8.5	3.3	13	5.4	3.4
Sulfate (mg/L)	1630	1520	424	7140	1350	516
Phosphorus, dissolved (mg/L)	0.045	0.015 B	0.013 B	0.052	0.005 U	0.011 B
Phosphorus, ortho dissolved (mg/L)	0.012 B J	0.006 B J	0.005 U	0.055 J	0.006 B J	0.005 U
Metals, Dissolved						
Arsenic (mg/L)	0.01 U	0.01 U	0.005 U	0.02 U	0.005 U	0.005 U
Cadmium (mg/L)	0.034	0.035	0.019	0.207	0.058	0.02
Copper (mg/L)	0.04 B	0.02 U	0.01 U	0.28 B	0.1	0.01 U
Iron (mg/L)	43	105.0	0.61	1190	56.2	16.9
Lead (mg/L)	0.027	0.057	0.001 U	0.776	0.394	0.001 U
Manganese (mg/L)	55.4	77.9	0.975	371	60.8	6.17
Zinc (mg/L)	71.5	70.2	4.23	247	46.5	7.74
Metals, Total						
Arsenic (mg/L)	0.005 U	0.005 U	0.005 U	0.01 U	0.005 U	0.005 U
Cadmium (mg/L)	0.032	0.032	0.018	0.171	0.056	0.02
Copper (mg/L)	0.02 B	0.02 U	0.01 U	0.1 U	0.07	0.01 U
Iron (mg/L)	43.2	102.0	1	1110	53	17.1
Lead (mg/L)	0.074	0.110	0.027	0.718	0.391	0.053
Manganese (mg/L)	54	75.3	0.931	323	52.5	5.76
Zinc (mg/L)	69.8	67.9	4.11	230	42.8	7.46
Other Water Quality Parameters						
Total Alkalinity (mg/L)	5 B	15	50	2 U	2 U	18
Bicarbonate as CaCO3 (mg/L)	5 B	15	50	2 U	2 U	18
Carbonate as CaCO3 (mg/L)	2 U	2 U	2 U	2 U	2 U	2 U
Cation-Anion Balance (%)	7	6.8	1.5	0.4	0.1	4.7
Dissolved Organic Carbon (DOC) (mg/L)	2 B	2 B	1 B	3 B	2 B	1 B
Hardness as CaCO3 (mg/L)	1530	1150	493	2650	967	531
Hydroxide as CaCO3 (mg/L)	2 U	2 U	2 U	2 U	2 U	2 U
Residue, Filterable (TDS) (mg/L)	2540	2170	640	8950	1740	760
Residue, Non-Filterable (TSS) (mg/L)	18 B	56	5 U	62	6 B	36

Data validation not fully complete; data qualifiers may be added, modified or deleted upon completion of the data validation process.

cfs = cubic feet per second
NM = not measured; flow too low to measure
U = not detected at the indicated method detection limit (MDL)
B= Analyte concentration detected at a value between the MDL and the practical quantitation limit (PQL)
J= estimated value
NR= not reported

TABLE 2

OPERABLE UNIT 7 - APACHE TAILINGS
SURFACE WATER SAMPLING RESULTS
NOVEMBER 1996

SAMPLE LOCATION	CGA01L	PD1	SPR22	CP1
LAB NUMBER	L11845-10	L11845-06	L11845-07	L11863-07
SAMPLE NUMBER	M-CGA01L-01-112196	M-PD1-01-112296	M-SPR22-01-112296	M-CP1-01-112396
SAMPLE DATE	11/21/96	11/22/96	11/22/96	11/23/96
Field				
Flow (cfs)	3.32	1.65	NM	NM
pH (units)	7.02	7.52	6.96	8.31
Conductivity @25C (umhos/cm)	862	200	336	350
Major Constituents and Inorganics				
Calcium (mg/L)	129	24.7	42.9	40.2
Chloride (mg/L)	1.5 B	0.9 B	1.5 B	1.8 B
Fluoride (mg/L)	0.2 B	0.1 B	0.1 U	0.1 U
Magnesium (mg/L)	43	11.6	15.6	16.7
Nitrite as N (mg/L)	0.01 B	0.01 U	0.01 U	0.01 U
Nitrate as N (mg/L)	0.23	0.13	0.5	0.36
Nitrate/Nitrite as N (mg/L)	0.24	0.13	0.5	0.36
Potassium (mg/L)	1.6	0.7 B	1.7	3.5
Sodium (mg/L)	3.1	1.3	2.1	2.3
Sulfate (mg/L)	437	14.9	61	64
Phosphorus, dissolved (mg/L)	0.015 B	0.005 B	0.009 B	0.009 B
Phosphorus, ortho dissolved (mg/L)	0.005 U	0.006 B	0.005 U	0.005 U J
Metals, Dissolved				
Arsenic (mg/L)	0.005 U	0.005 U	0.005 U	0.001 U
Cadmium (mg/L)	0.024	0.002 B	0.002 B	0.0003 B
Copper (mg/L)	0.01 U	0.01 U	0.01 U	0.01 B
Iron (mg/L)	12.5	0.01 U	0.01 U	0.01 U
Lead (mg/L)	0.001 U	0.001 U	0.001 U	0.0002 U
Manganese (mg/L)	5.25	0.005 U	0.006 B	0.009 B
Zinc (mg/L)	7.79	0.02 B	0.03 B	0.07
Metals, Total				
Arsenic (mg/L)	0.005 U	0.005 U	0.005 U	0.002 U
Cadmium (mg/L)	0.024	0.001 U	0.001 U	0.0004 U
Copper (mg/L)	0.01 B	0.01 U	0.01 U	0.01 U
Iron (mg/L)	14.4	0.01 B	0.09	0.17
Lead (mg/L)	0.105	0.001 U	0.003 B	0.002
Manganese (mg/L)	5.07	0.005 U	0.023 B	0.026 B
Zinc (mg/L)	7.89	0.05	0.13	0.13
Other Water Quality Parameters				
Total Alkalinity (mg/L)	34	89	97	96
Bicarbonate as CaCO3 (mg/L)	34	89	97	96
Carbonate as CaCO3 (mg/L)	2 U	2 U	2 U	2 U
Cation-Anion Balance (%)	7.1	2.9	3.8	3.4
Dissolved Organic Carbon (DOC) (mg/L)	1 B	1 B	1 U	1 B
Hardness as CaCO3 (mg/L)	499	109	171	169
Hydroxide as CaCO3 (mg/L)	2 U	2 U	2 U	2 U
Residue, Filterable (TDS) (mg/L)	680	110	200	230
Residue, Non-Filterable (TSS) (mg/L)	44	5 U	12 B	5 U

Data validation not fully complete; data qualifiers may be added, modified or deleted upon completion of the data validation process.

cfs = cubic feet per second
NM = not measured; flow too low to measure
U = not detected at the indicated method detection limit (MDL)
B= Analyte concentration detected at a value between the MDL and the practical quantitation limit (PQL)
J= estimated value
NR= not reported

TABLE 3

OPERABLE UNIT 7 - APACHE TAILINGS
SURFACE WATER AND GROUNDWATER SAMPLING RESULTS
DECEMBER 1996

SAMPLE LOCATION	APD1	APU1	AP1TMW3
LAB NUMBER	L12135-01	L12135-02	L12145-01
SAMPLE NUMBER	M-APD1-01-121596	M-APU1-01-121596	M-AP1TMW3-01-121796
SAMPLE DATE	12/15/96	12/15/96	12/17/96
Field			
Flow (cfs)	0.38	0.438	NM
pH (units)	7.67	7.11	5.50
Conductivity @25C (umhos/cm)	515	624	441
Major Constituents and Inorganics			
Calcium (mg/L)	68.5	63.3	58.9
Chloride (mg/L)	1.3 B	1.3 B	9.4
Fluoride (mg/L)	0.1 U	0.1 U	0.1 U
Magnesium (mg/L)	26.9	24.2	22.2
Nitrite as N (mg/L)	0.01U	0.01 U	0.01 U
Nitrate as N (mg/L)	0.45	0.48	2.59
Nitrate/Nitrite as N (mg/L)	0.45	0.48	2.59
Potassium (mg/L)	0.6 B	0.7 B	1.2
Sodium (mg/L)	2.3	2.1	4.9
Sulfate (mg/L)	158	145	133
Phosphorus dissolved (mg/L)	0.016 B	0.005 B	0.005 U
Phosphorus, ortho dissolved (mg/L)	0.005 U	0.005 U	0.022 B
Metals, Dissolved			
Arsenic (mg/L)	0.002 U	0.002 U	0.002 U
Cadmium (mg/L)	0.0227	0.0215	0.0004 U
Copper (mg/L)	0.01 U	0.01 U	0.01 U
Iron (mg/L)	0.01 U	0.01 U	0.01 B
Lead (mg/L)	0.0039	0.0052	0.0004 U
Manganese (mg/L)	0.189	0.181	0.025
Zinc (mg/L)	4.36	3.85	0.06
Metals, Total			
Arsenic (mg/L)	0.002 B	0.002 U	NR
Cadmium (mg/L)	0.0215	0.0202	NR
Copper (mg/L)	0.01 U	0.01 U	NR
Iron (mg/L)	0.27	0.09	NR
Lead (mg/L)	0.0254	0.0134	NR
Manganese (mg/L)	0.177	0.161	NR
Zinc (mg/L)	4.02	3.65	NR
Other Water Quality Parameters			
Total Alkalinity (mg/L)	102	97	69
Bicarbonate as CaCO3 (mg/L)	102	97	69
Carbonate as CaCO3 (mg/L)	2 U	2 U	2 U
Cation-Anion Balance(%)	4.2	3.2	4.1
Dissolved Organic Carbon (DOC) (mg/L)	1 U	1 U	1 U
Hardness as CaCO3 (mg/L)	282	258	238
Hydroxide as CaCO3 (mg/L)	2 U	2 U	2 U
Residue, Filterable (TDS) (mg/L)	330	310	300
Residue, Non-Filterable (TSS) (mg/L)	10 B	14 B	8 B

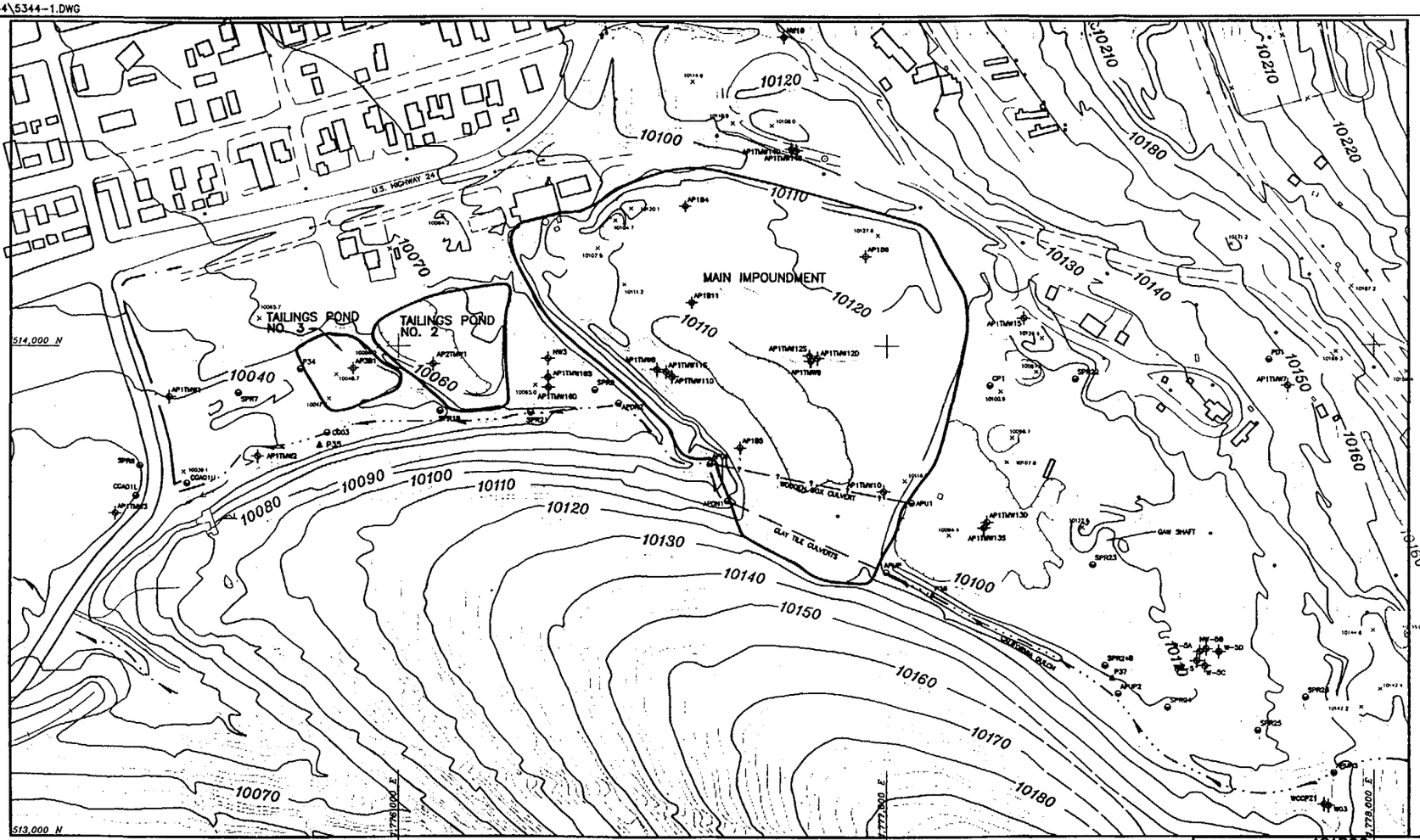
Data validation not fully complete; data qualifiers may be added, modified or deleted upon completion of the data validation process.

cfs = cubic feet per second
NM = not measured
NR = not reported
U = analyte not detected at the indicated method detection limit (MDL)
B = analyte concentration detected at a value between the MDL and practical quantitation limit
J = estimated value

MONITORING WELL CONSTRUCTION SUMMARY
APACHE TAILINGS

Well Identification	Date of Installation	Location		Elevation		Casing Diameter (in)	Well Screen Interval			Sand Pack Interval			Approximate Total Depth of Well Below Top of PVC (ft)
		Northing	Easting	Top of PVC Casing (ft)	Approximate Ground Surface (ft)		Length (ft)	Approximate Depth (ft)	Approximate Elevation (ft)	Length (ft)	Approximate Depth (ft)	Approximate Elevation (ft)	
AP1TMW1	09/24/91	513,898.76	1,775,525.87	**10,044.16**	10,041.80	4	10	12.0 - 22.0	10,029.8 - 10,019.8	14.5	9.0 - 23.5	10,032.8 - 10,018.3	26.0
AP1TMW2	09/17/91	513,779.72	1,775,709.29	**10,041.14**	10,039.69	4	5	9.0 - 14.0	10,030.7 - 10,025.7	9.5	5.5 - 15.0	10,034.2 - 10,024.7	16.3
AP1TMW3	09/18/91	513,660.83	1,775,414.13	**10,029.95**	10,029.10	4	10	13.4 - 23.4	10,015.7 - 10,005.7	15.5	9.5 - 25.0	10,019.6 - 10,004.1	25.4
AP1TMW7	10/09/91	513,917.83	1,777,822.94	**10,146.62**	10,144.95	4	10	62.2 - 72.2	10,082.8 - 10,072.8	21.5	56.0 - 77.5	10,089.0 - 10,067.5	77.6
AP1TMW8	10/23/91	513,951.56	1,776,525.35	**10,117.28**	10,115.45	4	15	20.5 - 35.5	10,095.0 - 10,080.0	21	16.0 - 37.0	10,099.5 - 10,078.5	38.1
AP1TMW9	10/21/91	513,968.91	1,776,843.25	**10,114.17**	10,112.83	4	10	9.3 - 19.3	10,103.5 - 10,093.5	14	6.0 - 20.0	10,106.8 - 10,092.8	21.8
AP1TMW10	10/22/91	513,704.74	1,776,993.72	**10,114.70**	10,112.70	4	10	9.0 - 19.0	10,103.7 - 10,093.7	13	7.0 - 20.0	10,105.7 - 10,092.7	21.7
AP1TMW11S	10/29/96	513,946.63	1,776,544.01	**10,117.80**	10,115.80	2	10	36.3 - 46.3	10,079.5 - 10,069.5	14	33.0 - 47.0	10,082.8 - 10,068.8	49.1
AP1TMW11D	10/23/96	513,936.70	1,776,555.86	**10,118.48**	10,116.48	2	10	54.8 - 64.8	10,061.7 - 10,051.7	12.2	52.9 - 65.1	10,063.6 - 10,051.4	67.6
AP1TMW12S	10/31/96	513,979.48	1,776,840.85	**10,116.97**	10,114.97	2	10	21.0 - 31.0	10,094.0 - 10,084.0	12.5	18.5 - 31.0	10,096.5 - 10,084.0	33.4
AP1TMW12D	10/30/96	513,974.85	1,776,857.18	**10,116.92**	10,114.92	2	10	38.8 - 48.8	10,076.1 - 10,066.1	16	33.0 - 49.0	10,081.9 - 10,065.9	51.0
AP1TMW13S	11/05/96	513,629.69	1,777,199.91	**10,099.41**	10,097.41	2	10	4.8 - 14.8	10,092.6 - 10,082.6	11.1	4.0 - 15.1	10,093.4 - 10,082.6	17.4
AP1TMW13D	11/07/96	513,640.82	1,777,206.39	**10,099.14**	10,097.14	2	10	29.0 - 39.0	10,068.1 - 10,058.1	13.1	27.0 - 40.1	10,070.1 - 10,057.1	41.6
AP1TMW14S	11/12/96	514,403.19	1,776,813.39	**10,116.03**	10,114.03	2	10	21.5 - 31.5	10,092.5 - 10,082.5	12.5	19.5 - 32.0	10,094.5 - 10,082.0	34.0
AP1TMW14D	11/11/96	514,405.98	1,776,803.70	**10,115.99**	10,113.99	2	5	47.4 - 52.4	10,066.6 - 10,061.6	8	45.0 - 53.0	10,069.0 - 10,061.0	55.1
AP1TMW15	11/13/96	514,056.37	1,777,281.76	**10,118.69**	10,116.69	2	10	19.0 - 29.0	10,097.7 - 10,087.7	13	16.5 - 29.5	10,100.2 - 10,087.2	31.1
AP1TMW16S	11/11/96	513,935.13	1,776,304.13	**10,065.93**	10,063.93	2	10	4.8 - 14.8	10,059.1 - 10,049.1	11	4.0 - 15.0	10,059.9 - 10,048.9	17.5
AP1TMW16D	11/14/96	513,915.00	1,776,304.89	**10,065.64**	10,063.64	2	5	13.0 - 18.0	10,050.6 - 10,045.6	9	11.0 - 20.0	10,052.6 - 10,043.6	20.5
NW5	10/25/84	513,358.50	1,777,636.34	**10,113.92**	10,111.92	6	60	48.0 - 108.0	10,063.9 - 10,003.9	76	32.0 - 108.0	10,079.9 - 10,003.9	108.0
W5A	11/02/84	513,377.06	1,777,642.07	**10,114.23**	10,112.23	4	20	15.0 - 35.0	10,097.2 - 10,077.2	25	10.0 - 35.0	10,102.2 - 10,077.2	35.5
NW5B	11/13/84	513,382.80	1,777,655.47	**10,114.78**	10,112.78	4	40	220.0 - 260.0	9,892.8 - 9,852.8	150	110.0 - 260.0	10,002.8 - 9,852.8	260.0
W5C	10/16/90	513,347.82	1,777,652.96	**10,115.13**	10,113.13	4	60	48.0 - 108.0	10,065.1 - 10,005.1	71.5	39.6 - 111.1	10,073.5 - 10,002.0	110.5
W5D	10/13/90	513,376.86	1,777,681.41	**10,117.39**	10,115.39	4	40	221.5 - 261.5	9,893.9 - 9,853.9	55.3	208.6 - 263.9	9,906.79 - 9,851.5	260.0
NW3	10/25/84			**10,067.15**	10,065.65	6	50	26.0 - 76.0	10,039.7 - 9,989.7	76	20.0 - 96.0	10,045.7 - 9,969.7	92.5
NW16	11/07/84			**10,124.84**	10,123.96	4	40	40.0 - 80.0	10,084.0 - 10,044.0	48	32.0 - 80.0	10,092.0 - 10,044.0	78.8

2/97 D:\5344\5344-1.DWG



NOTE: DASHED CONTOURS INDICATE APPROXIMATE ELEVATIONS AS DEFINED IN PARAGRAPH 7.1.3.6 OF THE MANUAL OF PHOTOGRAMMETRY, 4TH EDITION.

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS FOR TWO FOOT AND TWENTY FOOT CONTOUR INTERVAL MAPPING.

HORIZONS, INC. PROJECT NO. 9-3066
RAPID CITY, SD 57709-3134

CONTOUR INTERVAL = 2 / 20 FOOT

NATIONAL GEODETIC VERTICAL DATUM OF 1929
BASED ON COLORADO CENTRAL ZONE PLANE COORDINATE SYSTEM

LEGEND

N

SCALE
100 0 100 FEET

ASARCO
APACHE TAILINGS IMPOUNDMENTS
SITE PLAN
SHOWING MONITORING LOCATIONS

PROJECT: 5344.0	DATE: FEBRUARY, 1997
REV:	BY: SCG CHECKED: DLL

McCULLEY, FRICK & GILMAN, INC.

INTERIM REMOVAL ACTION PLAN
OPERABLE UNIT 7 - APACHE TAILINGS IMPOUNDMENTS

California Gulch Superfund Site
Leadville, Colorado

April 3, 1997

Prepared for:

ASARCO INCORPORATED
495 East 51st Avenue
Denver, Colorado 80216-2093

Prepared by:

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TABLE OF CONTENTS

LIST OF FIGURES

1.0 INTRODUCTION

Asarco is proposing to perform interim removal actions at the Apache Tailings Impoundments, Operable Unit 7 (OU-7) of the California Gulch Superfund Site (the Site) in Leadville, Colorado. In order to complete these actions in 1997, Asarco is proposing to undertake these actions as a *Time-Critical Removal Action under CERCLA*. The proposed interim actions are intended to be consistent with any proposed remedy evaluated under the revised Feasibility Study to be completed for the Site.

2.0 BACKGROUND

The results of previous investigations related to the Apache Tailings Impoundments are presented in various reports including the Tailings Disposal Area Remedial Investigation Report (1994), the Hydrogeologic Remedial Investigation Report (1995), and the Surface Water Remedial Investigation Report (1995). In January 1996, a draft Feasibility Study (FS) was submitted for the Apache Tailings Impoundments. Subsequent to the submittal of the draft FS, additional site investigation activities have been initiated to supplement the previous investigations and to support completion of the FS.

3.0 CURRENT SITE CONDITIONS

The Apache Tailings Impoundment consists of a main tailings impoundment and two smaller impoundments located along California Gulch, approximately 1,500 feet downstream of the Yak Tunnel Water Treatment Plant surge pond, as illustrated on the Site Plan (Figure 1). The main impoundment encompasses approximately 11.3 acres within an area zoned for industrial use by the City of Leadville. The volume of tailings in the main impoundment has been previously estimated at approximately 630,000 cubic yards. The embankment slopes on the north and east side of the main impoundment range from 1.5:1 (H:V) to 1.75:1 and reach heights of up to 15 feet. The embankment slope on the southwest side of the main impoundment approaches 1:1 and is up to 50 feet in height. The two smaller impoundments, Tailings Pond No. 2 (TP2) and Tailings Pond No. 3 (TP3) are located west of the main impoundment and directly north and adjacent to water flowing in the gulch. TP2 is located immediately west of the main impoundment and covers an area of approximately 1.5 acres. TP3 is located immediately west of TP2 and covers an area of approximately 0.5 acres. The volume of tailings material in TP2 and TP3 have been

estimated previously at approximately 8,500 and 3,800 cubic yards, respectively. Impoundment berms for both ponds (at the south and west sides of the impoundments) appear to have been constructed of native soil material from California Gulch. These berms range from 1:1 to 1.5:1, are approximately 10 feet in height and are approximately 10 feet wide across the top.

The majority of surface water flow in California Gulch is presently conveyed by the California Gulch channel located on the south side of the gulch in the vicinity of the Apache Tailings Impoundment. The channel intersects the southern edge of the main impoundment where the flow is carried by two 24-inch diameter clay-tile culverts installed beneath a portion of the impoundment. Surface water flow from the area immediately upstream (approximately 1,000 feet) of the main impoundment and below the elevation of the constructed California Gulch channel are conveyed under the main impoundment through what appears to be a wooden box culvert. After exiting these culverts, surface water flows continue to the northwest, west of and adjacent to the southwest embankment of the main impoundment, for approximately 300 feet before turning to the west and continuing down the gulch past the lower impoundments (TP2 and TP3).

A field investigation was conducted in November and December 1996 to supplement the existing data presented in the various Remedial Investigation reports and draft Feasibility Study for the Site. The purpose of the supplemental investigation was to gather data to enhance the evaluation of the interaction of surface water and groundwater in the immediate vicinity of the Apache Tailings Impoundments. As part of this supplemental field investigation, 11 new groundwater monitoring wells were installed at the Site. Two rounds of groundwater and surface water sampling are planned at the Site as part of the supplemental investigation; one sampling event to coincide with low-flow conditions and one to coincide with high-flow conditions. The first of these events was performed in November 1996 with the sampling of 18 groundwater wells, and surface water sampling at 22 locations. The locations of the groundwater monitoring wells and surface water sampling locations are presented on Figure 1. Surface water flow measurements were obtained at 21 locations. Selected data from this November 1996 event are presented on the attached Figure 2, entitled Nov. 1996 - Preliminary Surface Water Monitoring Data. Figure 3 presents a cross section (Cross Section A-A' indicated on the Site Plan) taken through the lower impoundments and extending through the main impoundment near the locations of monitoring well clusters AP1TMW11 and AP1TMW12.

4.0 OBJECTIVES

The following objectives have been established for implementation of interim removal actions at the site:

- Reduce the potential for impacts the tailings impoundments may have on surface water and groundwater in California Gulch; and
- Prepare portions of the tailings material, primarily through consolidation and dewatering, to facilitate the timely implementation of future final remedial actions.

5.0 PROPOSED INTERIM REMOVAL ACTIONS

The proposed interim actions to meet the objectives presented above include removal of Tailings Ponds 2 and 3 (TP2 and TP3) and consolidation of this material on the main impoundment, and providing erosion protection along the toe of the southwest embankment of the main impoundment below the clay-tile culverts and wooden box culvert outfalls.

5.1 REMOVAL OF TAILINGS PONDS 2 AND 3

The removal of TP2 and TP3 will involve the excavation of the tailings from these impoundments, placement of the material on the main impoundment, and recontouring the removal area to promote drainage (adding clean fill as necessary). The proposed interim removal action will eliminate potential contact with groundwater and eliminate future contact with surface water in California Gulch. Spreading the excavated material on the main impoundment will promote drainage and drying of the tailings material and improve their handling characteristics and trafficability, which will facilitate a future final remedy.

The tailings in TP2 and TP3 generally consist of yellow, orange, orangish brown and black silt and fine-grained sand tailings, and appear to contain abundant pyrite. Three subsurface tailings samples (two from TP2 and one from TP3), and two samples of the underlying soil (one from beneath each impoundment) were collected during the Tailings Disposal Areas Remedial Investigation (Asarco, 1994). A summary of the total metals concentrations of these samples is presented in Table 3-10 of the Tailings RI Report (Asarco, 1994). As indicated in this table, the samples of tailings from TP2 exhibit lead

concentrations of 1,930 mg/kg (4 - 5') and 7,410 mg/kg (8.8 - 9.8') and zinc concentrations of 6,700 mg/kg (4 - 5') and 15,400 mg/kg (8.8 - 9.8'). The sample of tailings from TP3 (4 - 5') exhibits a lead concentration of 2,680 mg/kg and a zinc concentration of 4,030 mg/kg. The two samples of underlying (foundation) soils exhibit lead concentrations of 694 mg/kg (TP3) and 2,060 mg/kg (TP2) and zinc concentrations of 992 mg/kg (TP2) and 1,600 mg/kg (TP3). The impoundment berms for both TP2 and TP3 appear to have been constructed of native soil material.

Surface water that currently is ponded on TP2 and TP3 will be removed prior to initiating excavation by pumping the water to the existing pond on the main impoundment for ultimate transfer to the Yak Tunnel Water Treatment Plant (WTP), or by transporting it to the WTP using tanker trucks. As indicated on the cross section, the base of TP2 and TP3 may currently be near or below the groundwater table in this area and, therefore, dewatering during excavation may be required. Water removed during excavation will be pumped to the existing pond on the main impoundment.

All tailings and a six- to twelve-inch layer of underlying native soil will be excavated and removed. The tailing/native soil interface, both vertically and horizontally, will be determined by visual observations during excavation. Excavation activities will begin at the lower impoundment berm of each impoundment and proceed toward the northeast. A sump will be created near the berm and any groundwater encountered during excavation will be pumped from this sump to the main impoundment to maintain water levels below the bottom of the excavation to the extent practicable. This method of excavation should produce conditions conducive to a visual determination of tailings removal. Following complete removal of all visually identifiable tailings and impacted subgrade soils, confirmation samples of the native underlying soil will be obtained. Four grab samples representative of the native soil underlying TP2 and two grab samples representative of the native soil underlying TP3 will be collected and analyzed for total lead and zinc, by field X-Ray Fluorescence (XRF) or appropriate wet chemistry methods (e.g., ICP analysis). The results of these analyses will be used to further document the metals concentrations in the underlying native soils. The material in the impoundment berms will also be sampled to determine it's suitability for use as backfill material. Although the interim action levels for lead in soils in a commercial or industrial setting are in the range of 6,100 to 7,700 mg.kg, only material with lead concentrations below 3,500 mg/kg will be used to backfill the excavations and recontour the area. Impoundment berm material found to contain greater than 3,500 mg/kg lead will be placed on the main impoundment. Monitoring well AP2TMW1

located in TP2, which has been dry and is not being sampled as part of the supplemental investigation, will be removed during excavation.

Following excavation, regrading and/or limited backfill placement will be performed in the removal areas to create a final ground surface above the groundwater table which will promote surface drainage and prevent ponding. Material from the impoundment berms with lead concentrations less than 3,500 mg/kg will be used as fill material and will be supplemented with import fill, as necessary, from either the Oregon Gulch or Hecla borrow areas. Regrading/recontouring will be performed to maintain current surface water flow conditions in California Gulch. The proposed approximate final contours are shown on Figure 4. Other reclamation activities, such as soil amendment or revegetation, will not be performed until the final remedy for this area of OU7 is selected.

Potentially contaminated surface water run-off from the main impoundment will be directed through the area between TP2 and the main impoundment to a sediment control structure as indicated on Figure 4. The sediment control structure will consist of an earthen berm with a hay bale core and a rock or riprap lined discharge notch intended to intercept and retain sediment in stormwater runoff. This structure will be maintained until the final remedy is implemented. Diversion of uncontaminated surface run-off along the north side of the main impoundment will also be maintained or upgraded to minimize potential contact with tailings material or other potentially contaminated flows.

During the excavation, on-site transport, and placement of tailings material, appropriate engineering controls will be maintained to control stormwater runoff and dust generation. Silt fence, or other temporary sediment control devices, will be installed at the base of the impoundment berms to intercept and retain sediment in stc .nwater runoff from TP2 and TP3 during construction activities. While dust control will not likely be required in the excavation area, dust control on the haul route will be maintained through water application, as necessary.

The excavated tailings will be transported to the main impoundment using the temporary road from the west side of the impoundment near the old foundations to the new well installations near the center of the impoundment (AP1TMW12) and placed on the north side of this road, as indicated on Figure 4. It is expected that placement may be achieved utilizing low ground pressure equipment without the use of

geotextile or geosynthetic subgrade support. Several settlement plates will be installed in the fill placement area to monitor the settlement/consolidation of the underlying tailings as a result of loading from the fill.

Water ponded on the main impoundment will be transferred to the Surge Pond at the WTP. This water will be pumped from the existing sump area near the southwest corner of the existing pond and conveyed to the Surge Pond via the existing high density polyethylene pipeline. Alternatively, prior to the initiation of excavation activities at TP2 and TP3, water may be transferred to TP2 and transported to the treatment plant using tanker trucks. The removal of this water is intended to reduce the potential for infiltration of ponded water through the main impoundment and to help prepare the tailings for final remedial actions.

5.2 EROSION PROTECTION

The California Gulch channel currently follows the embankment of the main impoundment (flowing in a northwesterly direction) for approximately 300 feet from the clay-tile culvert outfall before turning to the west and flowing away from the impoundment. Erosion of native soil underlying tailings at the base of this embankment is evident along this 300-foot reach. Activities involving the protection of the toe of this embankment are proposed to minimize further erosion, sediment loading and potential surface water contact with the tailings.

These activities will involve the limited excavation of tailings at the knob which extends toward the channel approximately 100 feet below the clay-tile culvert outfalls, and the placement of clean fill and/or riprap for erosion protection at the toe of the embankment. Currently, the upstream face (south side) of this knob is nearly vertical. This condition is unstable and there is evidence that, through erosion and undercutting of the underlying native soil, tailings material has sloughed off of this knob. Excavation of this knob would be performed to create a more stable surface with a maximum slope of 2H:1V. Excavated material will be placed directly in the erosion channel or slope failure area in the main impoundment embankment immediately to the north of the knob as shown on Figure 5, and compacted using non-vibratory compaction equipment. This placement location eliminates the need to haul material from the area and should provide additional stability to the main impoundment embankment. Erosion protection of the toe of the embankment from the upstream edge of the knob to the point where the channel

turns away from the main impoundment will be provided through the placement of riprap two to three vertical feet up the toe of the embankment.

To facilitate these activities and provide access to the work area, flow in the channel below the knob will be diverted, or moved, approximately 10 feet to the west of the embankment, and a ramp will be constructed to provide access for a small track excavator to the top of the knob, as indicated on Figure 5. Silt fence and/or hay-bales will be placed at the base of the knob during excavation to reduce the potential for excavated material falling into the channel. It is anticipated that short-term increases in sediment loading may be observed during construction activities in and around the channel. Several silt fence/hay-bale check dams will be installed across the channel in the vicinity of the lower impoundments to provide sediment control during construction.

A cultural resource investigation of the Apache Tailings Area was conducted in August 1995, and a site with potential archaeological significance was identified. This site is located immediately west of California Gulch below the culvert outfalls on the southwest side of the main impoundment, as outlined on Figure 5. The site contains structural remains and artifact scatter and was recommended as individually eligible for nomination to the National Register of Historic Places and contributing to the Leadville Mining District (Asarco, 1995). The site will be protected, as necessary, and avoided during the performance of work in this area.

6.0 TENTATIVE CONSTRUCTION SCHEDULE

The proposed schedule for the implementation of interim actions is as follows:

Removal of Ponded Water from TP2, TP3 and Main Impoundment	June-July '97
Erosion Protection (SW embankment toe)	April-May '97
Removal of TP2 and TP3	August-September '97

7.0 REFERENCES

Asarco, 1994. Tailings Disposal Area Remedial Investigation Report, California Gulch Site, Leadville, Colorado. Prepared by Woodward-Clyde Consultants, January.

Asarco, 1995. Cultural Resources Investigations of the Apache Tailings Area, Operable Unit 7, California Gulch Superfund Site, Leadville, Colorado. Prepared by Foothill Engineering Consultants, Inc., November.

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

Ref: 8EPR-SR

CONCURRENCE

ACTION MEMORANDUM

DATE: April 7, 1997

SUBJECT: Request for Removal (Response) Action at the California Gulch National Priorities List Site, Leadville, Colorado: ACTION MEMORANDUM for a Time-Critical Removal Action for Removal of Tailings Pond No. 2 and Tailings Pond No. 3 of the Apache Tailings Impoundment (Operable Unit 7)

FROM: Mike Holmes, 8EPR-SR

TO: Max H. Dodson
Assistant Regional Administrator
Office of Ecosystems Protection
and Remediation

Final NPL Site ID # 29

CERCLIS ID # COD980717938

Category of Removal: Time-Critical

I. Purpose

operable Unit 7 ("OU 7") of the California Gulch Superfund Site,

This Action Memorandum documents the Agency's selection and implementation of the time critical removal (response) action described herein for the Apache Tailings Impoundments, an area contaminated with metal-laden tailings from historic mining and milling operations. The Apache Tailings Impoundment area comprises a small portion of the Superfund RI/FS Study Area of the California Gulch Superfund Site, located in the Leadville mining district of Lake County, Colorado.

The Time Critical Removal Action at the Apache Tailings Impoundments is consistent with the remedial activities which will be undertaken by EPA at OU 7. Final remedial alternatives for all areas of OU 7 will be evaluated in the Feasibility Study (FS) and Record of Decision (ROD) for OU7. The ROD for OU 7 will ultimately specify those remedial actions, beyond those response actions implemented pursuant to this Action Memorandum, are required. The FS will

MH 4/7/97 SEMF-L R. Sisk w/ comments in blue 4/8/97 4/7/97

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The Time Critical Removal Action at the Apache Tailings Impoundments is consistent with the remedial activities which will be undertaken by EPA at OU 7. Final remedial alternatives for all areas of OU 7 will be evaluated in the Feasibility Study (FS) and Record of Decision (ROD) for OU7. The ROD for OU 7 will ultimately specify those remedial actions beyond those response actions implemented pursuant to this Action Memorandum that are required. The FS will

evaluate the effectiveness of a remedy to stabilize the tailings in place or if the main impoundment will need to be relocated out of the California Gulch flood plain. The primary goal of this Removal Action is to prevent exposure to human populations from tailings washed into California Gulch and degradation of downstream water quality. This removal action will also reduce the leaching and migration of metals from the tailings into surface and ground waters during storm events which occur prior to implemtation of remedial action under thel ROD for OU7. Regardless of the remedy selected by the ROD, the response actions taken under this Action Memorandum will allow for the consolidation into a smaller area and the drying out of the tailings.

Remedial action objectives were identified in the Final Screening Feasibility Study for Remediation Alternatives at the California Gulch NPL Site, Leadville, Colorado (SFS), (EPA, 1993a). Consistent with the SFS, removal action objectives for the Apache Tailings Impoundments are:

- Control water erosion of tailings material from the source locations
- Control leaching and migration of metals from tailings into surface water
- Control leaching and migration of metals from tailings into groundwater

Removal alternatives to directly remediate surface water or ground water in the vicinity of the Apache Tailings Impoundments have not been evaluated, and will be addressed under Operable Unit 12.

II. California Gulch - Site Conditions and Background

The California Gulch Site was listed on the National Priorities List on September 8, 1983. The Site is in a mining area covering 16 ½ square miles of a watershed that drains along California Gulch to the Arkansas River. Starting in 1859, the area was mined extensively for gold, lead, silver, copper, zinc, and manganese. California Gulch collects runoff that drains numerous abandoned mines and wastes from mining, milling and smelting. Miners built the Yak Tunnel to drain water from the mine workings and to make mineral exploration and development easier. This tunnel drains hundreds of miles of mine workings in its 4-mile underground course and discharges approximately 210 tons of metals each year into California Gulch. Seventy-five known mills dumped tailings into 5-6 miles of drainages. Six impounded tailings dumps surround the City of Leadville. Many smelters, which are located around the city, processed silver, lead and zinc at various times. Heavy metal residues are present in much of the City. The Arkansas River which receives water from the California Gulch, has been classified as a recreational resource, and

is used heavily for irrigation, livestock watering, public water supplies and fisheries. Approximately 4,000 live in nearby Leadville and Lake County (See Site Location Map - Figure 1)

III. Apache Tailings Impoundments

A. Background

The Apache Tailings Impoundment consists of a main tailings impoundment and two, smaller impoundments located along California Gulch, approximately 1,500 feet downstream of the Yak Tunnel Water Treatment Plant Surge Pond, as illustrated on the attached Site Plan. The main impoundment encompasses approximately 11.3 acres. The volume of tailings in the main impoundment has been previously estimated at approximately 630,000 cubic yards. The embankment slopes on the north and east side of the main impoundment range from 1.5:1 (H:V) to 1.75:1 and reach heights up to 15 feet. The embankment slope on the southwest side of the main impoundment approaches 1:1 and is up to 50 feet in height. The two smaller impoundments, TP2 and TP3 are located west of the main impoundment and directly north and adjacent to water flowing in the gulch. TP2 is located immediately west of the main impoundment and covers an area of approximately 1.5 acres. TP3 is located immediately west of TP2 and covers an area of 0.5 acres. The volume of tailings in TP2 and TP3 have been estimated previously at approximately 8,500 and 3,900 cubic yards, respectively. Impoundment berms for both ponds appear to have been constructed of native soil material from California Gulch. These berms range from 1:1 to 1.5:1, are approximately 10 feet in height and 10 feet wide across the top.

The majority of surface water flow in California Gulch is presently conveyed by the California Gulch channel located on the south side of the gulch in the vicinity of the Apache Tailings Impoundment. The channel intersects the southern edge of the main impoundment where the flow is carried by two 24-inch diameter clay-tile culverts installed beneath a portion of the main impoundment. Surface water flow from the area immediately upstream (approximately 1,000 feet) of the main impoundment and below the elevation of the constructed California Gulch channel are conveyed under the main impoundment through what appears to be a wooden box culvert. After exiting these culverts, surface water continues to flow to the northwest, west of and adjacent to the southwest embankment of the main impoundment, for approximately 300 feet before turning to the west and continuing down the gulch past the lower impoundments (TP2 and TP3).

A field investigation was conducted in November and December 1996 to supplement the existing data presented in the Remedial Investigation and Feasibility Study for the site. The purpose of this investigation was to gather data to enhance the evaluation of the interaction of surface water and groundwater in the immediate vicinity of the Apache Tailings Impoundments. As part of this supplemental field investigation, 11 new groundwater monitoring wells were installed at the site. Two rounds of groundwater and surface water sampling were planned at the site as part of the supplemental investigation; one sampling event was performed in November 1996 to coincide with low-flow conditions at the site involved the sampling of 18 groundwater wells, and surface water sampling at 22 locations. Additional details are provided in the Interim Removal Action Plan, Operable Unit 7, Cal Gulch Superfund Site, dated April 3, 1997 and a letter dated March 13, 1997 which transmits the monitoring data for the sampling event described above. Both these documents are attached to this Action Memorandum.

B. Site Characterization - Apache Tailings Impoundment

The results of previous investigations related to the Apache Tailings Impoundment are presented in various reports including the Tailings Disposal Area Remedial Investigation Report, California Gulch Site, Leadville, Colorado, January 1994, the Hydrogeologic Remedial Investigation Report (1995), and the Surface Water Remedial Investigation Report (1995). In January 1996, a Draft Feasibility Study (FS) was submitted for the Apache Tailings Impoundments. Subsequent to the submittal of the draft FS, additional site investigation activities have been initiated to supplement the previous investigations and to support completion of the FS.

The principal concerns specifically addressed by this Removal Action are:

* Impacts the tailings impoundments may have on surface water and groundwater quality in California Gulch; and

* Preparation of the tailings material, primarily through consolidation and dewatering, to facilitate the timely implementation of future, final response actions.

* A letter report dated March 13, 1997 which summarizes groundwater quality data from sampling events performed in the area of the Apache Tailings Impoundments, during November and December, 1996, is attached.

C. Other Actions to Date

* A Time Critical Removal Action was performed by EPA on the Apache Energy and Minerals Property which is included in Operable Unit 7. The action involved removal of drums and bags of pyrite and decontamination and demolition of buildings and equipment. This Removal Action was addressed in a separate Action Memorandum dated August 6, 1996.

* During the summer and fall of 1995, ASARCO installed approximately 6 horizontal drain pipes to passively drain water from the main impoundment. The demonstration project proved ineffective in draining the tailings and was abandoned. Over the past several years ASARCO has monitored water levels on top of the main impoundment and TPs 2 and 3 and as needed, the ponded water has been transferred to the Yak Treatment plant to prevent catastrophic release of the metal-laden water into California gulch.

D. State and Local Authorities' Roles

A cultural resource investigation of the Apache Tailings Area was conducted in 1995, and a site with potential archaeological significance was identified. This site contains structural remains and artifact scatter and is located immediately south of California Gulch below the culvert outfalls on the southwest side of the main impoundment. The proposed alignment of the diversion ditch will not impact this area and additional investigation or research on this cultural resource site may be necessary, prior to implementing the final actions. The initial focus of this removal action is to avoid any impacts on the area of archaeological significance.

IV. Threats to Public Health or Welfare or the Environment

A Final Baseline Aquatic Ecology Risk Assessment (FBAERA), California Gulch, Leadville, Colorado (Roy F. Weston, Inc.) identifies the Site-wide impact of mine waste contamination on the terrestrial and aquatic ecosystems at the Site. The FBAERA provides a conceptual model of Site-wide exposure for aquatic receptors.

This Time-Critical Removal Action is necessitated by the threat to public health, welfare and/or the environment posed by the direct contact, inhalation, and ingestion exposure routes to hazardous substances. The Action will also reduce releases of metals to the surface and groundwater.

V. Endangerment Determination

Actual and/or threatened releases of hazardous substances from the Apache Tailings Impoundments, if not addressed by implementing the removal action selected in this Action Memorandum, presents endangerment to public health, or welfare, or the environment. The public and environment will continued to be exposed to the release of significant quantities of contaminated materials.

VI. Proposed Actions/Schedule

A. Proposed Actions

1. The proposed interim actions are described in the Interim Removal Action Plan, Operable Unit 7, Apache Tailings Impoundments, California Gulch Superfund Site, dated April 3, 1997. A copy of this report is attached. The proposed interim actions include the following:

    1.1 Removal of TP 2 and TP3 and consolidation of the material on the main impoundment and either diverting California Gulch away from the southwest embankment of the main impoundment below the clay-tile culverts and wooden box culverts outfalls, or providing erosion protection along the toe of the tailings embankment area.

    The extent of tailings, berms material and native soil to be removed will be determined by visual observation during excavation. Confirmation samples of the underlying soils will be collected and soils exceeding 3,500 ppm lead will be removed.

    For this removal action, slope stability concerns will be addressed through the application of Best Management Practices (BMPs)

    1.2 Surface water that is currently ponded on TP2 and TP3 will be removed prior to initiating excavation by pumping the water to the existing pond on the main impoundment for ultimate transfer to the Yak Tunnel Water Treatment Plan (WTP), or by transporting it to the WTP using tanker trucks. The base of TP2 and TP3 may currently be below the groundwater table in this area and, therefore, dewatering during excavation may be required. Water removed during excavation will be pumped to the existing pond on the main impoundment. Following excavation, clean fill will be placed to restore the area,

promote surface drainage and prevent ponding. Proposed approximate final contours are shown on the figure entitled 1997 Proposed Interim Action.

1.3 The excavated tailings will be transported to the main impoundment using the temporary road from the west side of the impoundment near the old foundations to the new well installations near the center of the impoundment (AP1TMW12) and placed on the north side of this road, as indicated on the 1997 Proposed Interim Action Figure, attached. It is anticipated that placement may be achieved utilizing low ground pressure equipment without the use of geotextile or geosynthetic subgrade support. The installation of several settlement plates in the fill placement area is also proposed to monitor the settlement/consolidation of the underlying tailings as a results of loading from the fill.

1.4 Potentially contaminated surface run-off from the main impoundment will be directed through the area between TP2 and the main impoundment to a sediment control structure as indicated on Figure 4. The sediment control structure will consist of an earthen berm with a hay bale core and a rock or rip-rap lined discharge notch intended to intercept and retain sediment in storm water run-off. This structure will be maintained until the final remedy is implemented. Diversion of uncontaminated surface run-off along the north side of the main impoundment will also be maintained or upgraded to minimize potential contact with tailings material or other potentially contaminated flows.

1.5 The following activities involving the protection of the toe of the main impoundment embankment are proposed. These activities will include excavation of tailings, primarily at the knob which extends toward the channel approximately 100 feet below the clay-tile culvert outfalls, and the placement of clean fill and/or riprap for erosion protection at the toe of the embankment.

B. Applicable or Relevant and Appropriate Requirements (ARARs)

The ARARs listed on TABLE F.1 AND F.2 will be followed to the extent practicable. Copies of these Tables are attached.

C. Performance Standards

The ARARs were met through compliance with Performance Standards.

1. The designed and constructed response action included provisions to ensure that there are no visible emissions (dust) during removal activities at the Apache Tailings Impoundments. Dust control on the haul route, and other areas, will be maintained through water application, as necessary.

2. During the excavation, on-site transport, and placement of tailings material, appropriate engineering controls will be maintained to control storm water runoff and dust generation, silt fences, hay bales and/or other sediment control devices will be used to intercept and retain sediment in storm water runoff (both from the main impoundment and TP2/TP3). The sediment control structures will be left in place, as necessary following the completion of excavation and regrading of the removal area and until vegetation is established and the area is stabilized. Un-contaminated surface water will be diverted away from the tailings to minimize contact with tailings.

3. A long-term maintenance program may be implemented if required by the Final Record of Decision for Operable Unit 7 (OU 7) to ensure the long-term effectiveness of the response action.

D. Project Schedule

April-May 1997 - California Gulch Below the Culverts

June-July 1997 - Removal of Ponded Water from TP@, TP3 and Main Impoundment

August-September 1997 - Removal of TP2 and TP3

E. Estimated Costs

This response action is being conducted by ASARCO, Inc.

VII. Expected Change in the Situation Should Action Be Delayed or Not Taken

If this Time-Critical removal action is delayed, or not taken, exposure of the public and environment to heavy metals contained in the mine waste located in the Apache Tailings Impoundments will continue. Without this time-critical response, release of contaminated tailings into California Gulch and the Arkansas River will continue to contaminate surface water and groundwater in the area around the Apache Tailings Impoundments.

VIII. Outstanding Policy Issues

A Record of Decision will be issued selecting the final remedial action for Operable Unit 7 (OU 7) of this Site.

IX. Enforcement

This Time-Critical Removal Action will be performed by ASARCO, Inc.

X. Recommendation

This decision document represents the selected Time-Critical removal action for the Apache Tailings Impoundments portion of OU 7 of the California Gulch Superfund Site, in the City of Leadville, County of Lake, State of Colorado. It was developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This decision is based on the Administrative Record for the Site.

Conditions at the Apache Tailings Impoundments meet the NCP Section 300.415(b)(2) criteria for a removal and I recommend approval of the removal action.

APPROVAL

_____

Max H. Dodson
Assistant Regional Administrator
Office of Ecosystems Protection
and Remediation

DISAPPROVAL

_____

Max H. Dodson
Assistant Regional Administrator
Office of Ecosystems Protection
and Remediation

ROUTING AND TRANSMITTAL SLIP Date 4/7/97

TO: (Name, office symbol, room number, building, Agency/Post)	Initials	Date
1. ~~MIKE HOLMES, 8EPR-SR~~	MK	4/7/97
2. ~~RICHARD SISK, 8ENF-L~~		
3. ~~BARRY LEVENE, 8EPR-SR~~	BL	
4. ~~DALE VODEHNAL, 8EPR-SR~~	BL	
5. ~~MAX DODSON, 8EPR~~		
[redacted] and Return		
6. ~~MARCELLA GURULE, EPR-SR 65-3815~~		

	Comment		Investigate		Signature
	Coordination		Justify		

REMARKS

CONCURRENCE. Hand Carry

APACHE TAILINGS

SOIL GLCH OU7

INTERIM REMOVAL ACTION

RCRA 4/10/97

321833

Please call Mike Holmes of Jack Whyte when signed off for questions. ~~8ENF~~ 6607/6707

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.
MIKE HOLMES	Phone No. 6607

5041-102

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