COLORADO DEPARTMENT OF PUBLIC HEALTH
AND ENVIRONMENT

HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION

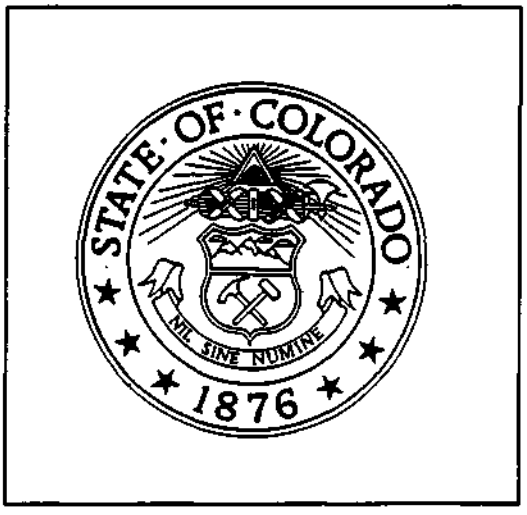
SITE INSPECTION

DRAFT PGS

ANALYTICAL RESULTS REPORT

UPPER ANIMAS WATERSHED (CERCLIS ID # CO0001411347)

SAN JUAN COUNTY, COLORADO



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1.0 INTRODUCTION

Under a Cooperative Agreement with the United States Environmental Protection Agency (EPA), the Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and Environment (CDPHE) conducted a Site Inspection (SI) of the Upper Animas River Watershed, located near Silverton, San Juan County, Colorado. The study was designed to evaluate the impact of mining in the Silverton Mining District. The work was performed under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or "Superfund"), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), for the EPA Region VIII Superfund Remedial Screening Program. The SI was designed to bridge with sampling efforts of the Colorado Division of Minerals and Geology's (DMG) Non Point Source *Animas River Targeting Continuation Project*, as possible under the Site Assessment Program.

This Comprehensive Analytical Results Report (ARR) presents the results of the sampling program which was conducted intermittently from August 11 through September 16, 1997. For background information the reader is referred to the *Animas Discovery Report* (CDPHE, 1995), the Upper Animas Watershed Sampling and Analysis Plan (SAP) (CDPHE, 1997a), and the Upper Animas Watershed Sampling Activities Report (SAR) (CDPHE, 1997b). The SAR is included as Appendix A.

The sampling conducted by CDPHE complimented the DMG sampling efforts: where DMG collected surface water samples, CDPHE collected collocated sediment samples (of which 10% were analyzed for cyanide and organic compounds); CDPHE analyzed 10% of DMG's surface water samples for cyanide and organic compounds. Where DMG collected aqueous samples, CDPHE collected solid source samples; additionally, CDPHE collected solid source samples where aqueous source samples were not collected by DMG. CDPHE also collected samples from three groundwater monitoring wells and opportunity residential soil samples from two locations.

Site reconnaissance and sampling of mine waste rock source characterization samples were conducted between August 11 and 14, 1997. Ground water sampling activities were carried out on September 15, 1997. Aqueous and sediment sampling activities occurred on September 15 and 16, 1997. Opportunity residential soil samples were collected on September 16, 1997. The sampling was performed in accordance with the Upper Animas Watershed Sample and Analysis Plan (CDPHE, 1997a), approved by EPA on July 29, 1997, *except as noted in Section 3.0 of the Upper Animas Sample Activities Report* (CDPHE, 1997b).

The CDPHE sampling activities in the Upper Animas included the collection of 100 samples. A total of 3 ground water, 8 surface water, 39 sediments, 39 solid source characterization samples, and 9 QA/QC samples were collected. Additionally, a sample from the Town of Silverton's municipal drinking water supply was collected (Composite of surface water from Boulder and Bear Creeks).

The 3 ground water samples were analyzed for total metals, cyanide and organic compounds [Pesticides/Polychlorinated Biphenyls (PCBs), Base/Neutral/Acid Extractable Organics (BNAs), and Volatile Organics (VOA)]. Eight aqueous samples (10% of DMG's surface water samples plus the four main gauging stations) were analyzed for total metals, organic compounds cyanide and Total Organic Carbon (TOC). Eight sediment samples collocated with the aqueous samples (10% of CDPHE sediment samples plus the four main gauging stations) were also analyzed for total metals, organic compounds and cyanide. The remaining 31 sediment samples, collocated with DMG's aqueous samples, were analyzed for total metals. Thirty-nine (39) mine waste rock source characterization samples were also analyzed for total metals. The Town of Silverton's drinking water sample was analyzed for organic compounds by a Lab certified to conduct such analyses. A duplicate surface water sample, one triple-volume (spike) surface water sample, two field blanks, one trip blank (VOA) and five equipment rinsate blanks (two for waste rock, two for sediments and one for opportunity soil samples) were collected for quality control samples.

Appendix A, SAR Tables I and II, list the samples collected, the analyses requested, location, rationale, and field measurements. The sample locations are illustrated on Figures 1-5 and the analytical results are summarized in Tables 1-17. The Town of Silverton's Drinking water analytical results are presented in Appendix D.

Analyses were performed by the EPA Contract Laboratory Program (CLP) Routine Analytical Services (RAS) and Unique Laboratory Sample Analyses (ULSA). All sample results are included in Appendix C: Validated Analytical Data.

The DMG sampling activities in the Upper Animas Watershed included the collection of 102 samples, including 36 surface water, and 28 aqueous sources (draining mines) and 4 field blank samples. Analytical results are summarized in Tables 2 through 9, herein. Validated analytical results are included in Appendix C.

Flow measurements were obtained for most surface water locations and mine drainages. Metals loading calculations were performed for each aqueous sample where flow measurements were obtained (Tables 3 & 5).

2.0 SITE DESCRIPTION

This investigation encompasses Upper Animas River and its tributaries: Burrows Gulch, Horseshoe Creek, California Gulch, Cinnamon Creek, Grouse Gulch, Picayune Gulch, Burns Gulch, Niagara Gulch, and the mainstem of the Animas River, from its headwaters to a point above Eureka Gulch. The Town of Silverton is situated at an elevation of 9,305 feet above mean sea level (M.S.L.). The Animas River originates about fourteen miles north and east of Silverton, near the San Juan County line at approximately 13,000 feet above M.S.L. Historic mining in the area took place throughout the upper basins.

The discovery of gold in Arrastra Gulch brought miners to the Silverton area in the early 1870's. The discovery of silver in the base-metal ores was the major factor in establishing Silverton as a permanent settlement. Between 1870 and 1890, the richer ore deposits were discovered and mined to the extent possible. Not until 1890 was any serious attempt made to mine and concentrate the larger, low-grade ore bodies in the area. The North Star mine constructed a mill on Sultan Mountain (approximately 1 mile southwest of Silverton) and

between 1894 and 1897; a nearby matte smelter processed up to 100 tons of ore per day (CDH, 1994a).

The Kendrick and Gelder (K&G) smelter was built near the mouth of Cement Creek in 1900 and operated during the summer months until 1905. Regional low-grade ores containing gold, silver, lead and zinc were processed at 12 concentration mills in the valley, and further refined at the K&G smelter. Mining and milling slowed down around 1905, and mines were consolidated into fewer larger operations with the facilities for milling large volumes of ore (CDH, 1994a).

The Upper Animas basin contains many historic mines. The London and Prairie Mines are located in Burrows Gulch Basin. The Mountain Queen, Bagley and Columbus Mines are located in the California Gulch Basin. The Gold Prince and Silver Queen Mines are located in the Placer Gulch Basin. The Silver Wing Mine is located on the main stem of the Animas River below Burns Gulch (Figure 1).

The Upper Animas Watershed was included in the *Animas River Targeting Project*, initiated by the CDPHE Water Quality Control Division in 1991. The project consisted of monitoring the chemical, physical and biological health of the Upper Animas River Basin to determine what improvements to aquatic life uses might be attained. Synoptic water quality monitoring at 200 sites within the Upper Animas, Cement and Mineral Creek basins was conducted on four occasions: September, 1991; June 1992; October 1992; and July 1993. Biological assessments, conducted at selected sites in the upper basin in October, 1992, found that aquatic life is not supported in the Cement Creek basin, the Animas River above Maggie Gulch, and the mainstem and Middle Fork of Mineral Creek. Lack of aquatic life is attributable to both natural and anthropogenic factors contributing to dissolved aluminum, cadmium, copper, and zinc present in the Animas River basin at concentrations acutely and chronically toxic to most forms of aquatic life. Additionally, ferric iron, coming from Cement Creek (and Mineral Creek) forms a deposit on the Cement Creek stream bed as well as in the Animas River between Cement Creek and Elk Creek, further inhibiting aquatic life (CDPHE, 1994).

The Bureau of Reclamation conducted Fish Tissue Analyses as part of their 1992 *Animas River Toxicity Study*. Fish were collected from the Animas River from approximately 1/4 mile

above Elk Creek (approximately 6 miles below Silverton) to the Colorado/New Mexico State line in April, 1992 and analyzed in June of 1992. Results of this study were included in the October, 1995 *Animas Discovery Report* prepared by CDPHE for EPA (CDPHE, 1995b).

The Mining Remedial Recovery Company (MRRC), implemented a privately funded Non-Point Source (NPS) demonstration project at the Sunbank Claims in Placer Gulch, a tributary to California Gulch. Remediation plans included installation of upland diversions; installation of bulkhead seals at 3 draining adits; removal (from Placer G. Stream bed), relocation and consolidation to higher ground, neutralization, cover with a minimum of 12 inches of borrow material and revegetation of 12 mine waste rock dumps; and installation of 3 passive mine drainage and natural seep treatment methods using limestone, calcareous country rock and a constructed sulfate-reducing biological (bog) system (Baum, 1995).

As a component of the Consent Decree between Sunnyside Gold Corporation (SSG) and the Colorado Department of Public Health and Environment to seal the American and Terry Tunnels, SSG agreed to remediate historic mine tailings piles, waste dumps and other mining debris at locations in tributaries which flow into the Animas River.

The Gold Prince Mill Tailings and mine portal, located in the headwaters of Placer Gulch are required to be mitigated by SSG as part of the Consent Decree. The existing bulkhead will be reinforced and the portal closed to create a water-retaining bulkhead. The surface mill tailings will be removed and consolidated with high pH material, capped and revegetated.

The London Mine, located in Burrows Gulch, and the Columbus Mine located at the terminus of California Gulch, may also be remediated. If required, both the London Portal and 2 adits at the Columbus Mine will be bulkhead sealed to prevent direct mine discharge in order to restore the hydrologic regime to near pre-mining conditions. Construction of upland diversion ditches around, and regrading, neutralizing and revegetating the affiliated mine dumps are also planned (CDPHE, 1997).

The Silver Wing Company has been awarded 1999 NPS funding to reduce the source of heavy metals loading from mining related effluents without creating a residual sludge disposal problem. The project is intended to demonstrate the effectiveness of a contained bioreactor

treatment technology in the environmentally extreme conditions of high altitude (10,400 ft.) and limited access (6 months per year) at the Silver Wing Mine (Silver Wing, 1998). The Silver Wing Mine is located on the mainstem of the Animas River below Burns Gulch.

3.0 DATA VALIDATION AND INTERPRETATION

The laboratory acquired data were validated by the EPA Environmental Services Assistance Team (ESAT). Validation reports and laboratory data forms can be found in Appendix C. The analytical results, qualifiers, and interpretations are presented in Tables 1 - 17. The following data qualifiers were assigned:

- "U" - The analyte was not detected. (Qualified by laboratory software).
- "J" - The assigned value is an estimate because the quality control criteria were not met.
- "UJ" - The analyte was not detected and the reported value is estimated because the quality control criteria were not met.
- "B" - The analyte was detected at a level below the contract required detection limit (CRDL) but above the method detection limit (MDL), therefore the associated value is an estimate. The presence of the compound is reliable.
- "BJ" - The value is estimated because the analyte was detected at a concentration below the CRDL and because the quality control criteria were not met.
- "R" - The data are rejected.
- "NA" - Indicates that the analyte was not sampled/analyzed for.

Analytes present at "elevated" concentrations are highlighted in the summary tables. A concentration is considered to be "elevated" if the following are true:

- The concentration of a particular analyte in a sample is three times greater than the background concentration; and greater than or equal to five times any blank sample concentrations.

- If the analyte is not detected in the background sample, the concentration is greater than the sample quantitation limit for both the sample and the background sample.

4.0 SOURCE CHARACTERISTICS

4.1 Solid Source Samples

A total of 39 solid source samples were collected by CDPHE from mine waste piles located throughout the study area along the Animas River and the upper tributaries. The 39 solid source samples were collected from the most prominent mine dumps in the district. The samples were collected from 0-6 inches below the ground surface for most sources. Sample locations are illustrated on Figure 2. The samples were analyzed for total metals and the results are summarized in Table 1.

Aluminum concentrations ranged from 703 to 12,000 mg/kg (at SO-3, the Mine Waste Pile below CG-2 in California Gulch) with the average being 3,557. Cadmium concentrations ranged from undetected to 150 mg/kg (SO-3), with the average being 22.8. Copper concentrations ranged from 10.2 to 2,080 mg/kg (SO-3), with the average being 527.5. Iron concentrations ranged from 3,350 to 185,200 (at SO-33, the Tom Moore Mine Waste Pile along the mainstem of the upper Animas) with the average being 30,532. Lead concentrations ranged from 45.6 to 100,000 mg/kg (at SO-34 Mine Waste Pile on the north side of Burrows Gulch), with the average being 10,738. Manganese concentrations ranged from 6.3 to 66,500 (SO-3), with the average being 3,624. Silver concentrations ranged form 2.6 to 109 mg/kg (at SO-28, mill tailings north of Grouse Gulch) with the average being 37. Zinc concentrations ranged from 7.7 to 53,300 mg/kg (at SO-22, the mine waste pile on the north side of Burrows Gulch), with the average being 4,017.

These data show that large volumes of source material containing high metals concentrations are available for release to surface waters.

4.2 Aqueous Source Samples

DMG collected 20 aqueous source samples from draining mines in the basin. These samples were analyzed for total and dissolved metals; total metals are presented in Table 2. Total metals loadings are presented in Table 3. Dissolved metals are presented in Table 9. Sample locations are illustrated on Figure 3. The results indicate that all of the adits exhibit high concentrations of several analytes.

Total Aluminum loading ranged from .32 to 806 grams per day (at DM-21, Silver Wing Mine) with the average being 96.8. Total Cadmium ranged from undetected to 12.77 (DM-21) with the average being 2.3 grams per day. Total Copper ranged from undetected to 3012.73 (DM-21) with the average being 153 grams per day. Total Iron ranged from .007 to 10730.4 (DM-24, the Draining Mine near the Eureka Mill) with the average being 959 grams per day. Total Lead ranged from undetected to 67.8 (DM-2, the Lucky Jack Mine Drainage) with the average being 7.23 grams per day. Total Manganese ranged from .02 to 6071.04 (DM-24, the Draining Mine near the Eureka mill) with the average being 734.6 grams per day. Total Zinc ranged from 1.64 to 3590 (DM-21) with the average being 568.7 grams per day.

5.0 SURFACE WATER PATHWAY

Previous studies have documented the release of metal contaminants to surface water in The Upper Animas and its tributaries. Primary targets within 15 downstream miles of known sources include fisheries, wetlands, and threatened and endangered species habitats.

The Upper Animas, including all tributaries, from the headwaters to its confluence with the Animas River are classified for recreation 2 and agriculture. Existing ambient metals standards (as of February 15, 1995) for these stream segments have been adopted by the Colorado Water Quality Control Commission (WQCC) until further consideration, scheduled for 2001.

Electro fishing California Gulch, and the Animas River below Burrows Gulch and above Eureka Gulch found no fish in 1992. The mean relative abundance of macroinvertebrates was low, ranging from one organism to 45 organisms per square meter (CDPHE, 1997c).

Silverton obtains its municipal drinking-water from Boulder Creek, a tributary to the Animas River, located approximately 1 mile north of the Cement Creek Confluence with the Animas River, and up gradient of the Sunnyside Gold Mill tailings (CDPHE, 1995).

Federally listed endangered species habitat that could occur at or visit the area include the Northern Goshawk (*Accipiter gentilis*) and the Boreal Toad (*Bufo borealis*) (USFWS, 1995).

Numerous large mine waste rock piles and smaller tailings pile sources have been identified throughout the basin which are not contained with respect to the surface water pathway. In addition, numerous draining mine adits discharge into the receiving streams in the basin.

5.1 Surface Water and Sediment Sample Locations

Sample locations are illustrated on Figures 3 and 4. Appendix A Tables I and II provide a summary of the samples collected and the analyses performed. A total of 39 aqueous (SW) and collocated sediment (SE) surface water samples were collected for this investigation by DMG and CDPHE, respectively. All aqueous samples were analyzed for total and dissolved metals. All sediment samples were analyzed for total metals. Eight pairs (SW and SE) of surface water samples were analyzed for organics and cyanide (Tables 10 & 12); eight surface water samples were also analyzed for Total Organic Carbon (Table 10).

5.2 Surface Water and Sediment Analytical Results

Surface water analytical results are summarized in Tables 4 through 9. Total (Table 4) and dissolved (Table 9) metals results for aqueous surface water samples compare favorably, i.e. total concentrations generally exceed dissolved concentrations. Table 11 presents the total metals concentrations for sediment samples. Tables 10 and 12 present the surface water and sediment organic analytes, respectively. Elevated concentrations (as defined in section 3.0) are highlighted in the tables.

For aquatic life, the primary metals of concern are cadmium, lead, and zinc. These metals are widespread and are frequently present at concentrations which greatly exceed the Ambient Water Quality Criteria for surface waters found in the Superfund Chemical Data Matrix (SCDM) (Cadmium 1.1, Lead 3.2, and Zinc 110, values in micrograms per liter).

5.3 Surface Water Analytical Results by Stream Segment

5.3.1 Upper Animas River (UA-SW/SE-01 through UA-SW/SE-12)

Relatively low concentrations of metals were detected in the headwaters of the mainstem of the Animas, increasing noticeably downstream of the confluence of Burrows Gulch. Metals concentrations decrease as the Animas River flows downstream to the sampling terminus, above the confluence with Eureka Gulch. Loading tends to increase as the Animas flows downstream past Burrows and California Gulch and then to tends to stabilize.

As identified in Table 4, total concentrations of aluminum, beryllium, cadmium, copper, iron, lead, manganese and zinc in the mainstem of the Upper Animas are elevated for every downstream sampling location. As presented in Table 9, dissolved concentrations of aluminum, cadmium and manganese were elevated for every downstream sampling location.

Table 5 contains total metal loading in the Upper Animas mainstem. A series of Bar Graphs, Figures 6a-g, graphically present total loadings calculations for these aluminum, cadmium, copper, iron, lead, manganese and zinc.

Metals Loading analyses, presented in Tables 5 and 6a-g, reveal that the Burrows and California Gulches contribute significantly to the metal loadings in the mainstem of the Animas river. The Animas River below the other tributaries, i.e., Cinnamon Creek, Grouse Gulch and Picayune Gulch, has lower metals loading than the Mainstem above these inflows. Burns Gulch contributes to the cadmium, copper, iron, lead, and zinc loading. Cadmium, copper, iron, and zinc loadings also increase below the Silver Wing Mine (UA-SW-10).

As presented in Table 11, antimony and silver concentrations in sediment samples were elevated downstream of Burrows Gulch (UA-SE-4). Chromium, copper, lead, manganese and silver sediment concentrations are elevated beginning at a location below the mine workings identified as SO24-27 and SO-43 (UA-SE-6) to the terminus of the sampling, i.e. above the confluence with Eureka Gulch (UA-SE-12). Antimony, beryllium, selenium and zinc were elevated below the confluence with California Gulch (UA-SE-7).

All surface water and sediment samples analyzed for cyanide were found to be non-detect. As presented in Table 10, surface water samples analyzed for organics in this segment were found to be non-detect, except that 2-Hexanone and 1,1,2,2-Tetrachloroethane was found on the mainstem of the Animas, downstream of Burrows Gulch (UA-SW-4). Trichlorethene, Toluene and the pesticide Dieldrin were detected in the mainstem of the Animas downstream of Burrows Gulch, below the Silver Wing Mine (UA-SW-10).

As presented in Table 12, sediments in the Animas River below the Silver Wing Mine (UA-SE-10) had concentrations of Fluoranthene and Pyrene detected.

5.3.2 Burrows Gulch (BG-SW/SE-1 through BG-SW/SE-5)

Total metal concentrations in Burrows Gulch were not elevated in any of the downstream locations, except for cobalt below the mineralized fault (BG-SW-5). Dissolved metal concentrations in Burrows Gulch were not elevated in any of the downstream locations.

Aluminum, barium, beryllium, cadmium, copper, iron, lead, manganese, nickel and zinc loadings increased below the London Mine and Prairie Mine workings (DM-4, 5 & 6 and SO-18 & 19) in Burrows Gulch. Review of Figures 7 a-g indicate that the draining mine sources do not contribute significantly to the metal loadings, whereas the associated waste rock piles may.

As presented in Table 11, sediment concentrations of cobalt and copper were elevated below the London and Prairie Mine workings (BG-SE-3). Selenium and zinc concentrations were elevated from a location below the Mine workings (BG-SE-3) to the location below the Intermittent Tributary (BG-SE-4). Beryllium, cadmium, manganese and nickel were elevated beginning at a location below the Mine Workings (BG-SE-3), to the point above Burrows Gulch confluence with the Animas River (BG-SE-5).

All surface water and sediment samples analyzed for cyanide were found to be non-detect. As presented in Tables 10 and 12, surface water and sediment, respectively, samples analyzed for organics in this segment were found to be non-detect.

5.3.3 California Gulch (CG-SW/SE-1 through CG-SW/SE-11)

As identified in Table 4, total concentrations of aluminum, cadmium, and zinc in California Gulch are elevated for every downstream sampling location below CG-SW-2. As identified in Table 9, dissolved concentrations of cadmium and iron in California Gulch are elevated for every downstream sampling location below CG-SW-2. Total and dissolved Manganese were elevated until a point above where Placer Gulch flows into California Gulch (CG-SW-7). Total Lead is elevated from a location below Tributary DM-17 to the confluence with the mainstem of the Animas (CG-SW-12), whereas dissolved lead is elevated at CG-SW-3 and CG-SW-5, and from below the confluence with Placer Gulch (CG-SW-8) to the confluence with the mainstem of the Animas (CG-SW-12) . Total Beryllium is elevated below the Mine Waste Pile SO-3 (CG-SW-4). Total silver is elevated above background below the confluence with Placer Gulch (CG-SW-8).

Aluminum, beryllium, and cadmium loadings increase from the headwaters to a location below the Mine workings (DM17/SO-6 & DM18/SO-7) immediately above the confluence with Placer Gulch (CG-SW-7), below which loadings decrease. Copper, iron, lead, manganese and zinc loadings increase from the headwaters to a location below the Bagley Tunnel (CG-SW-9). Barium, copper, and manganese loadings increase from the headwaters to point below the Bagley mill tailings (CG-SW-10). Review of Figures 8 a-g indicate that the draining mine sources do not contribute significantly to the metal loadings, whereas the associated waste rock piles may.

As presented in Table 11, sediment concentrations of antimony, cadmium, lead and silver were elevated from a location beginning below the confluence with Placer Gulch (CG-SE-8) to a point above the confluence with the Animas River (CG-SE-12). Manganese and selenium were elevated from a point below the confluence with Placer Gulch to a point below the Bagley Tunnel (CG-SE-9), and then again at the location above its confluence with the Animas. Copper and zinc sediment concentrations were elevated below the Bagley Tunnel.

All surface water samples analyzed for cyanide were found to be non-detect. The sediment sample at California Gulch above its confluence with the Animas (CG-SE-12) had cyanide detected at low concentrations. As presented in Table 10, surface water samples analyzed for organics at this segment were found to be non-detect, except that Toluene was found in the waters of California Gulch, above its confluence with the Animas River (CG-SW-12). Organic compounds were not detected in any of the sediments.

5.3.4 Animas River (UA-SW/SE-A68 and UA-SW/SE-A72)

The surface water in the Animas River below the Town of Silverton (UA-SW-A72), also below the confluence with both Cement and Mineral Creeks, exhibited elevated concentrations of total aluminum, copper, iron, and lead when compared to the Animas River above Cement Creek (UA-SW-A68). Loading at UA-SW-A72 should reflect the combined sources of the Animas River above Cement Creek (UA-SW-A68), Cement Creek (UA-SW-CC48) and Mineral Creek (UA-SW-M34). Although the flow at UA-SW-A72 is approximately 21% greater than the contributing sources, the aluminum loadings increased by 12%; barium loadings increased by 6%; cadmium loadings increased by 50%; cobalt by 24%; copper by 15%; iron by 11%; lead by 29%; manganese by 14%; and zinc by 3% relative to the combined loads from the contributing sources.

Sediment concentrations for aluminum, arsenic, cobalt, copper, iron, silver, sodium and vanadium were higher in UA-SE-A72 than the Animas River above Cement Creek (UA-SE-A68). With the exception of manganese and zinc, which were markedly higher in the upstream location, concentrations of the other metals were similar or slightly less than the upstream location. Concentrations of silver at UA-SE-A72 were elevated relative to the sample taken form the Animas River above Cement Creek (UA-SE-A68). Mercury was detected in low concentrations in the sediment sample taken from Mineral Creek above its confluence with the Animas River (UA-SE-M34).

All surface water and sediment samples analyzed for cyanide were found to be non-detect. As presented in Table 10, surface water samples analyzed for organics were found to be non-detect, except that Toluene was found in Cement Creek (UA-SW-CC48) and Mineral Creek (UA-SW-M34) above their confluence with the Animas River, and Trichlorethene was detected at low concentrations on the mainstem of the Animas below the confluence with Mineral Creek (UA-SW-A72).

As presented in Table 12, sediments in the Animas River above Cement Creek (UA-SE-A68) had Acetone, 2-Butanone and Dieldrin present. Sediments in Cement Creek above the Animas (UA-SE-CC48) had Acetone, Dieldrin and 4,4'-DDT present. Acetone was also found in sediments in the Animas River below Mineral Creek (UA-SE-A72).

6.0 SOIL EXPOSURE, AIR, AND GROUND WATER PATHWAYS

The risk posed to human health or the environment by the **on-site pathway** for the sources identified is considered to be minimal. There are no persons living on-site or within 200 feet of any of the identified sources. The sources located along the Upper Animas, Burrows Gulch and California Gulch and their tributaries are greater than 1-mile from the nearest residents.

"**Residential Soil** Opportunity Samples" were collected from two locations within the Town of Silverton. These properties did not have any residences on them, however. As presented in Tables 13 and 14, soils collected from vacant lots north of 857 Reese Street, and just north of the old railroad depot and immediately west of the railroad tracks, located at 10th and Bluff, were analyzed for Total Metals, Cyanide and Organic compounds.

With the exception of aluminum, beryllium, calcium, nickel, potassium selenium and sodium, the concentrations of metals in the soil adjacent to the railroad tracks were 1.5 to 11.6 times greater than those measured in the Reese Street soil. Cadmium was 9.5 times greater; chromium 11.6 times greater; lead 8.9 times greater; and, zinc 7.5 times greater than the concentrations measured in the Reese Street soil. Manganese and mercury are more than three times greater then the Reese St. Sample. RBS

Further, Toluene and the pesticide organics Aldrin, 4,4'DDE, and Endrin were found in both soils. Additionally, the soils adjacent to the railroad tracks had measurable concentrations of a number of semivolatile organic compounds, as presented in Table 14. Analysis of the Reese Street soil also reported the presence of the pesticide Methoxychlor.

The risk posed to human health or the environment by the **air pathway** for the sources identified is also considered to be minimal. Although the sources located along the Upper Animas, Burrows Gulch and California Gulch and their tributaries are uncovered and access is not restricted, these sources are located more than 1-mile from the nearest residents.

Four **ground water monitoring wells** were sampled as part of this SI. GW-1 well is located adjacent to the mainstem of the Animas River, above the confluence with Cement Creek, in the Town of Silverton' Campground. It is located approximately 1.5 miles downstream of the Sunnyside Tailings piles. This location was chosen to evaluate the groundwater from the upper Animas, before the effects of Cement Creek are introduced. GW-2 is located in Memorial Park, along Cement Creek, above its confluence with the Animas; this well was dry and therefore could not to be sampled. GW-3 is located North of Mineral Creek (and the Silverton Sewage Treatment Plant) above its confluence with the Animas River to evaluate the groundwater associated with Mineral Creek. GW-4 is located along the mainstem of the Animas, in the location of an old landfill, east of the railroad tracks.

The City of Silverton uses surface water as its municipal drinking water supply. There are no ground water wells used for drinking water within the city limits.

As presented in Table 15, monitoring well GW-1 had the highest concentrations of barium, cadmium, calcium, chromium, cobalt, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, thallium and zinc among the three wells. Chromium, cobalt, lead, nickel, selenium, silver and thallium were not detected in the other two wells, however. As presented in

Table 16, the organic compounds Methylene Chloride and Trichlorethene were detected at low concentrations in well GW-1. Although not used for drinking water, the groundwater concentrations for cadmium and manganese, exceed the Maximum Contaminant Level (MDL) or MDL Goal at this location. All other parameters met drinking water standards.

The groundwater monitoring well along the old landfill, east of the railroad tracks, GW-4, had the highest concentrations of aluminum and copper, as well as the lowest pH (4.59) amongst the three wells. Methylene Chloride was also detected at this location. Toluene was detected in well GW-3, north of Mineral Creek. Cyanide was not detected in any of the wells sampled.

7.0 SUMMARY AND CONCLUSIONS

Source samples collected from the major mine dumps located throughout the district indicate that both aqueous (draining mine adits) and solid source (mine waste piles) materials contain high metals concentrations which are available for release to surface waters.

A total of 39 aqueous (SW) and collocated sediment (SE) surface water samples were collected for this investigation by DMG and CDPHE, respectively. All aqueous samples were analyzed for total and dissolved metals. All sediment samples were analyzed for total metals. Eight pairs (SW and SE) of surface water samples were analyzed for organics and cyanide; eight surface water samples were also analyzed for Total Organic Carbon. DMG collected 20 aqueous source samples from draining mines, which were analyzed for total and dissolved metals. Stream flow measurements allowed for metals loading calculations for all surface water and aqueous source locations. 39 solid source characterization samples were collected by CDPHE and analyzed for total metals.

Three groundwater monitoring wells were sampled and analyzed for total metals, organic compounds, cyanide and TOC. Two residential soil "opportunity" samples were collected by CDPHE and analyzed for total metals, organic compounds and cyanide.
Relatively low concentrations of metals were detected in the headwaters of the **mainstem of the Animas**, but increased noticeably downstream of the confluence of Burrows Gulch. Metals concentrations decrease as the Animas River flows downstream to the sampling terminus, above the confluence with Eureka Gulch. Loading tends to increase as the Animas flows downstream

past Burrows and California Gulch and then to tends to stabilize. Total concentrations of aluminum, beryllium, cadmium, copper, iron, lead, manganese and zinc in the mainstem of the Upper Animas are elevated for every downstream sampling location.

Metals Loading analyses reveal that the Burrows and California Gulches contribute significantly to the metal loads in the mainstem of the Animas river. The Animas River below Cinnamon Creek, Grouse Gulch and Picayune Gulch, has lower metals loading than the mainstem above these inflows. Burns Gulch contributes to the cadmium, copper, iron, lead, and zinc loading. Cadmium, copper, iron, and zinc loadings also increase below the Silver Wing Mine.

Antimony and silver concentrations in sediment samples were elevated downstream of Burrows Gulch. Chromium, copper, lead, manganese and silver sediment concentrations are elevated beginning at a location below the mine workings identified as SO24-27 and SO-43 to the terminus of the sampling, above the confluence with Eureka Gulch. Antimony, beryllium, selenium and zinc sediment concentrations were elevated below the confluence with California Gulch.

Surface water and sediment samples in the mainstem analyzed for cyanide were found to be non-detect. Surface water samples analyzed for organics in this segment were found to be non-detect, except that 2-Hexanone and 1,1,2,2-Tetrachloroethane was found on the mainstem of the Animas, downstream of Burrows Gulch. Trichlorethene, Toluene and the pesticide Dieldrin were detected in the mainstem of the Animas downstream of Burrows Gulch, below the Silver Wing Mine. Sediments in the Animas River below the Silver Wing Mine had concentrations of Fluoranthene and Pyrene detected.

Total metal concentrations in **Burrows Gulch** were not elevated in any of the downstream locations, except for copper below the mineralized fault. Aluminum, barium, beryllium, cadmium, copper, iron, lead, manganese, nickel and zinc loadings increased below the London Mine and Prairie Mine workings (DM-4, 5 & 6 and SO-18 & 19) in Burrows Gulch. Draining mine sources do not contribute significantly to the metal loadings, whereas the associated waste rock piles may.

Sediment concentrations of cobalt and copper were elevated below the London and Prairie Mine workings. Selenium and zinc concentrations were elevated from a location below the Mine workings to the location below the Intermittent Tributary. Beryllium, cadmium, manganese and nickel were elevated beginning at a location below the Mine Workings, to the point above Burrows

Gulch confluence with the Animas River. All surface water and sediment samples analyzed for cyanide and organic compounds in Burrows Gulch were found to be non-detect.

Total concentrations of aluminum, cadmium, and zinc in **California Gulch** were elevated for every downstream sampling location. Manganese was elevated at each downstream location until a point above where Placer Gulch flows into California Gulch. Lead is elevated from a location below Tributary DM-17 to the confluence with the mainstem of the Animas. Beryllium is elevated above below the Mine Waste Pile SO-3. Silver is elevated below the confluence with Placer Gulch.

Aluminum, beryllium, cadmium, iron, and lead, loadings increase from the headwaters to a location below the Mine workings (DM17/SO-6 & DM18/SO-7) immediately above the confluence with Placer Gulch, below which loadings decrease. Copper, Iron, Lead, Zinc loadings increases to a location below the Bagley Tunnel. Barium, copper, and manganese loads increase from the headwaters to point below the Bagley mill tailings. The draining mine sources do not contribute significantly to the metal loadings, whereas the associated waste rock piles may.

Sediment concentrations of antimony, cadmium, lead, and silver were elevated in California Gulch from a location beginning below the confluence with Placer Gulch to a point above the confluence with the Animas River. Manganese and selenium were elevated from a point below the confluence with Placer Gulch to a point below the Bagley Tunnel, and then again at the location above its confluence with the Animas. Copper and zinc sediment concentrations were elevated below the Bagley Tunnel.

All surface water and sediment samples analyzed for cyanide were found to be non-detect. Surface water samples analyzed for organics at this segment were found to be non-detect, except that Toluene was found in the waters of California Gulch, above its confluence with the Animas River. Organic compounds were not detected in any of the sediments.

The surface water in the **Animas River below the Town of Silverton**, exhibited elevated concentrations of total aluminum, copper, iron, and lead when compared to the Animas River above Cement Creek. The flow in the Animas below Silverton is approximately 21% greater than the contributing sources. Aluminum loadings increased by 12%; barium loadings increased by 6%; cadmium loadings increased by 50%; cobalt by 24%; copper by 15%; iron by 11%; lead by 29%; manganese by 14%; and zinc by 3%, relative to the combined loads from the contributing sources.

Sediment concentrations for aluminum, arsenic, cobalt, copper, iron, silver, sodium and vanadium were higher in the Animas below Silverton than the sample taken from the Animas River above Cement Creek. With the exception of manganese and zinc, which were markedly higher in the upstream location, concentrations of the other metals were similar or slightly less than the upstream location. Concentrations of silver at in the river below Silverton were elevated relative to the sample taken from the Animas River above Cement Creek. Mercury was detected at low concentrations in the sediment sample taken from Mineral Creek above the confluence with the Animas River.

All surface water and sediment samples analyzed for cyanide were found to be non-detect. Surface water samples analyzed for organics were found to be non-detect, except that Toluene was found in Cement Creek and Mineral Creek above their confluence with the Animas River, and Trichlorethene was detected at low concentrations on the mainstem of the Animas below the confluence with Mineral Creek .

Sediments in the Animas River above Cement Creek had Acetone, 2-Butanone and Dieldrin present. Sediments in Cement Creek above the Animas had Acetone, Dieldrin and 4,4'-DDT present. Acetone was also found in sediments in the Animas River below Mineral Creek.

With the exception of aluminum, beryllium, calcium, nickel, potassium selenium and sodium, the concentrations of metals in the **soil** adjacent to the railroad tracks were 1.5 to 11.6 times greater than those measured in the Reese Street soil. Cadmium was 9.5 times greater; chromium 11.6 times greater; lead 8.9 times greater; and, zinc 7.5 times greater than the concentrations measured in the Reese Street soil. Further, Toluene and the pesticide Aldrin, 4,4'DDE, and Endrin were found in both soils. Additionally, the soils adjacent to the railroad tracks had measurable concentrations of a number of semivolatile organic compounds, as presented in Table 14. Analysis of the Reese Street soil also reported the presence of the pesticide Methoxychlor.

The risk posed to human health or the environment by the **air pathway** for the sources identified is also considered to be minimal. Although the sources located along the Upper Animas, Burrows Gulch and California Gulch and their tributaries are uncovered and access is not restricted, these sources are located more than 1-mile from the nearest residents.

The Ground water monitoring well on the Animas above Cement Creek had the highest

concentrations of barium, cadmium, calcium, chromium, cobalt, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, thallium and zinc among the three wells. Chromium, cobalt, lead, nickel, selenium, silver and thallium were not detected in the other two wells, however. The organic compounds Methylene Chloride and Trichlorethene were detected at low concentrations in this well. Although not used for drinking water, the groundwater concentrations for cadmium and Manganese, exceed the Maximum Contaminant Level (MDL) or MDL Goal at this location. All other parameters met drinking water standards.

The groundwater monitoring well along the old landfill, east of the railroad tracks, had the highest concentrations of aluminum and copper, as well as the lowest pH (4.59) amongst the three wells. Methylene Chloride was also detected at this location. Toluene was detected in well north of Mineral Creek.

Cyanide was not detected in any of the wells sampled.

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FIGURES

FIGURE 1 Upper Animas Watershed Study Area (USGS Quadrangle excerpt)

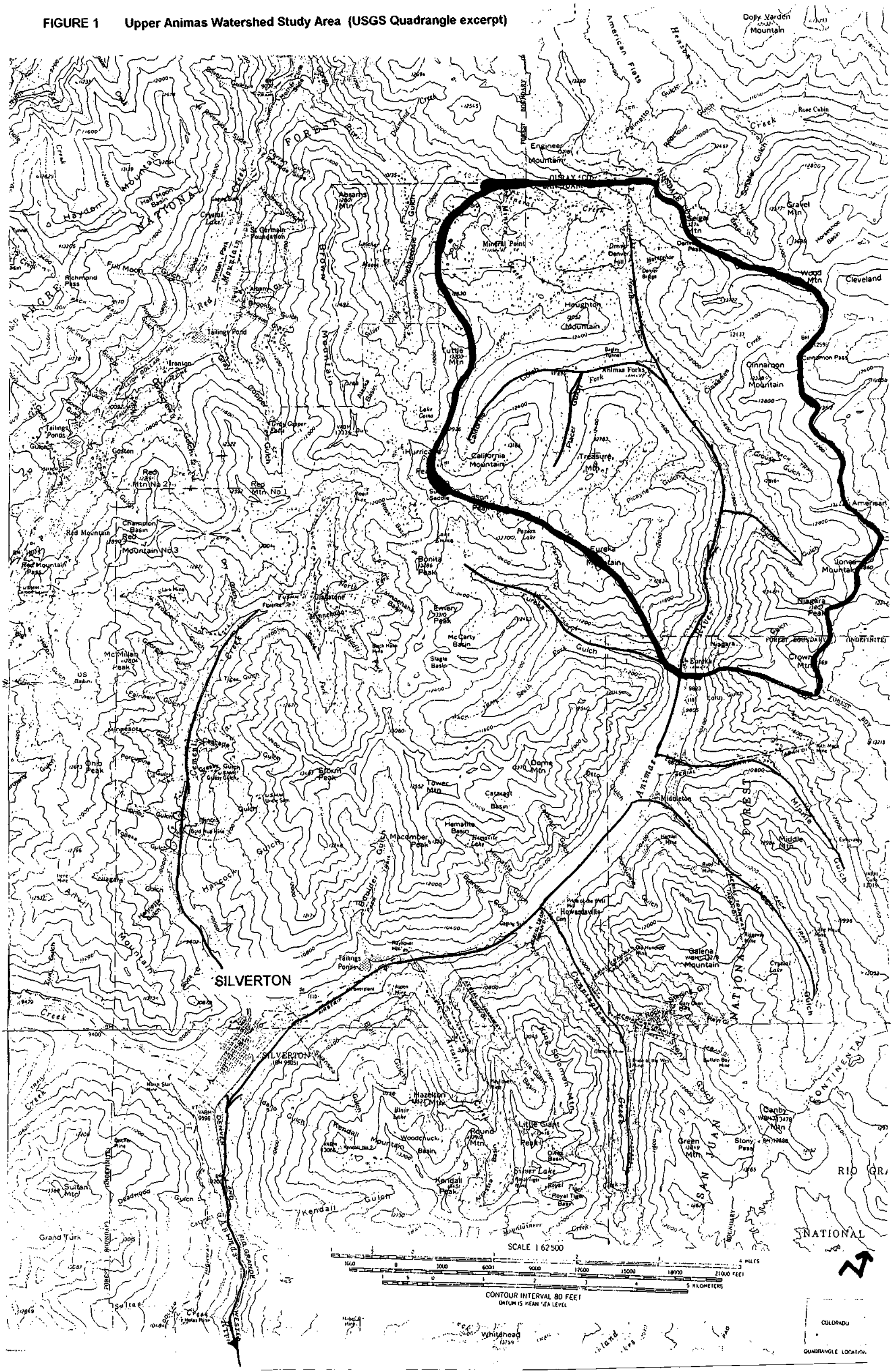


FIGURE 2 Mine Waste Sampling Locations

Note: "SO-" precedes each enumerated site

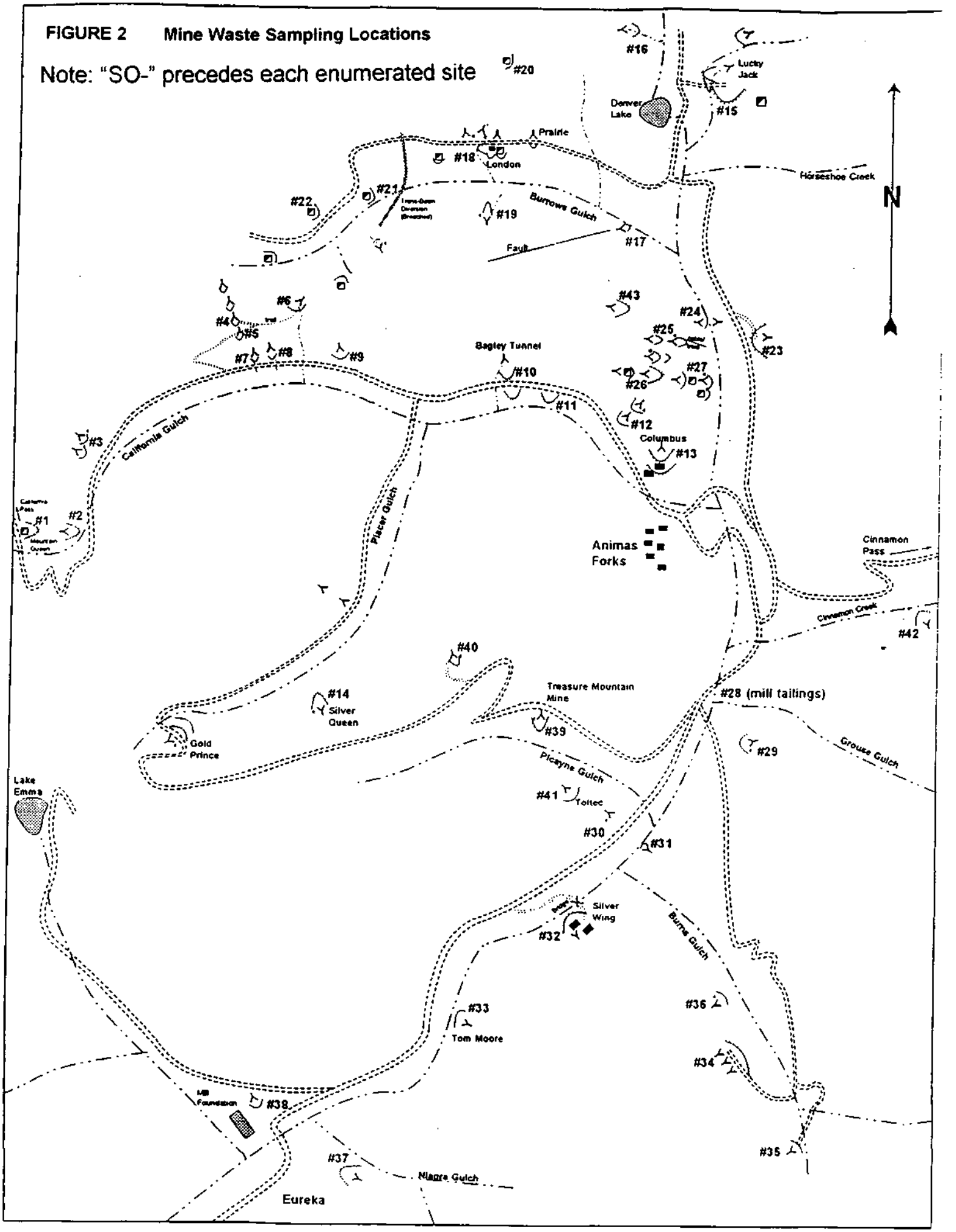


FIGURE 3 Water Quality Sampling Locations

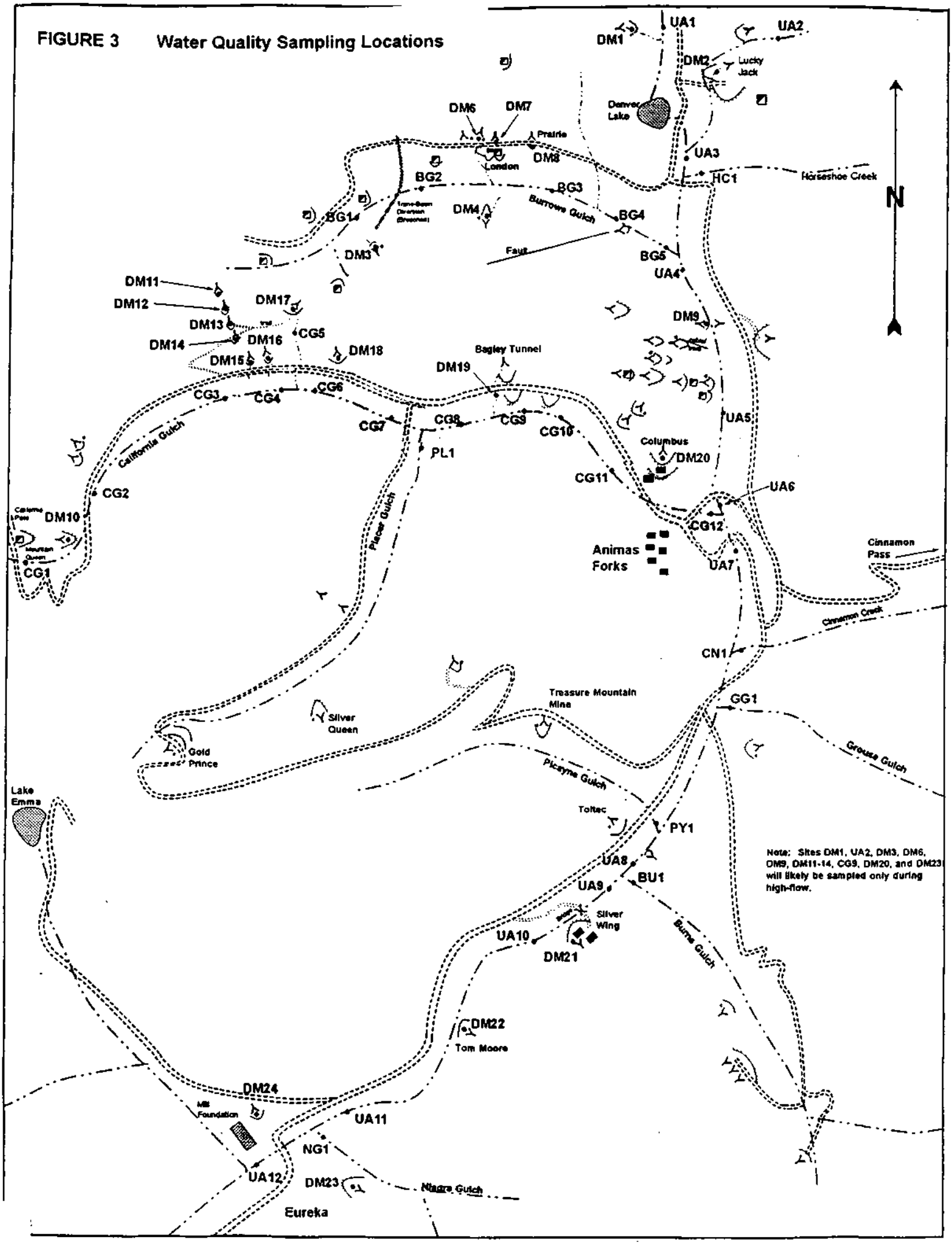


FIGURE 4 **Sediment Sampling Locations**

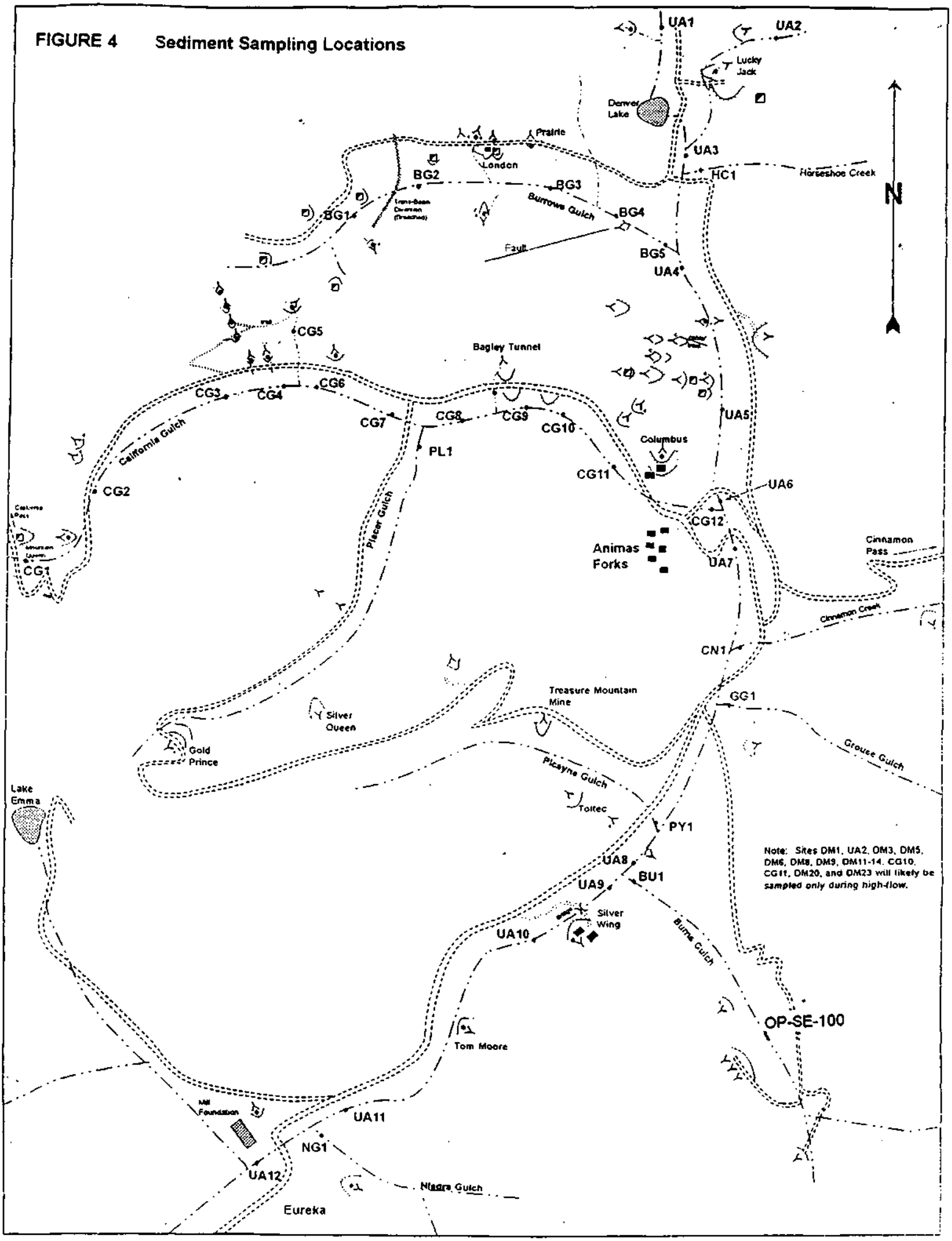
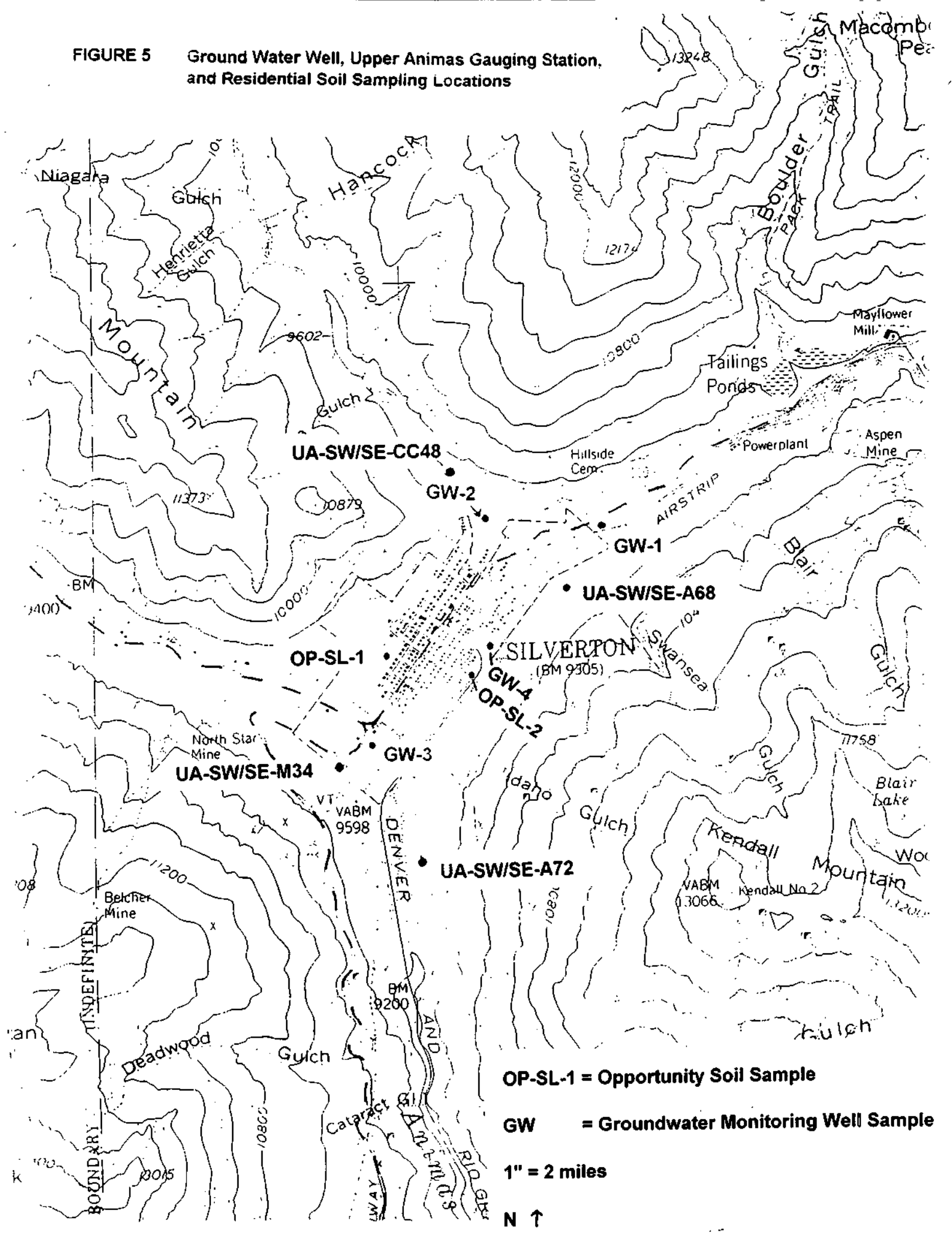


FIGURE 5 **Ground Water Well, Upper Animas Gauging Station, and Residential Soil Sampling Locations**



TABLES

TABLE 1

UPPER ANIMAS SOLID SOURCE SAMPLES
TOTAL METALS
Concentrations in milligrams per kilogram (mg/kg)

Location	SO-01	SO-02	SO-03	SO-04	SO-06	SO-07	SO-08	SO-09	SO-10	SO-11	SO-12
Analyte	Upper Mountian Queen Mine Waste Pile Upper Animas	Lower Mtn Queen Mine Waste Pile Upper Animas	Mine Waste Pile Below CG-2 California Gulch	Unknown Mine Waste Pile California Gulch	Unknown Mine Waste Pile California Gulch	Unknown Mine Waste Pile California Gulch	Unknown Mine Waste Pile California Gulch	Unknown Mine Waste Pile California Gulch	Bagley Tunnel Mine Waste Pile California Gulch	Mine Waste Pile Below Bagley California Gulch	Mine Waste Pile Above Columbus Mine California Gulch
Aluminum	6010	1270	12000	3230	2350	5430	2230	1960	740	2340	5790
Antimony	221	29	24.5	35.2	2.7 B	12.1 B	11.4 B	5.5 B	8.8 B	17.8	2.8 B
Arsenic	255	30.5	108	193	40.1	136	139	58	75.2	90.9	82.1
Barium	716	69.8	79.2	27 B	9.3 B	160	25.5 B	26.7 B	5.6 B	301	267
Beryllium	1 U	0.25 B	3.2	0.58 B	0.24 B	8 B	0.21 U	0.21 U	0.2 U	0.28 B	0.46 B
Cadmium	29.8	1.8	150	37	2.1	28.5	41.9	0.76 B	8.8	0.26 U	6
Calcium	295 B	203	8860	221 B	237 B	5810	2140	182 B	191 B	299 B	390 B
Chromium	4.5	0.42 B	18	1.8 B	0.33 B	2 B	1 B	0.51 B	0.2 U	0.7 B	1.1 B
Cobalt	2.3 B	0.64 B	3.6 B	3 B	0.42 U	5.5 B	0.43 B	0.42 U	0.41 U	0.52 U	0.54 B
Copper	687	148	2080	740	136	523	476	56.3	248	928	421
Iron	56200	9660	48100	29400	6180	27700	22600	8470	14600	31600	16300
Lead	27500	2140	11100	23000	2940	28100	25000	2460	13800	18400	5060
Magnesium	181 B	84.3 B	1590	161 B	119 B	3790	719 B	108 B	76.2 B	116 B	402 B
Manganese	58.5	23.4	66500	76.4	40.3	3850	296	15	54.6	31.3	170
Mercury	0.56 J	1.3 J	2.2 J	0.1 UR	1.8 J	0.11 U	0.1 U	0.62 J	2.1 J	1.2 J	0.77 J
Nickel	1.9 B	0.21 B	1.9 B	2.2 B	0.21 U	2.3 B	0.21 B	0.21 U	0.2 U	0.26 U	0.55 B
Potassium	2730	850 B	4230	2050	1960	1900	1680	1750	927 B	1610	2220
Selenium	28	3.5	24.5	2.3	1.4	2.3	1.8	1.3	1 U	1.3 U	1.1 U
Silver	83	71.7	62.2	62.2	22.5	27.4	27.2	29.3	29.5	54.2	19.1
Sodium	116 B	75.8 B	138	105 B	104 B	108 B	161 B	116 B	86.5 B	102 B	168 B
Thallium	1.3 U	1.3 U	1.4 UJ	1.6 B	2.2	41.7	3.7	1.3 U	1.2 UJ	1.5 U	2.8
Vanadium	5.1 B	0.21 U	10.3 B	4.9 B	0.21 U	8.6 B	6.1 B	0.88 B	0.2 U	0.26 U	11.3
Zinc	3950	660	20900	9290	489	6410	8780	242	2830	561	1270

TABLE 1

UPPER ANIMAS SOLID SOURCE SAMPLES
TOTAL METALS
Concentrations in milligrams per kilogram (mg/kg)
Page 2 of 4

Location	SO-13	SO-14	SO-15	SO-16	SO-17	SO-18	SO-19	SO-20	SO-21	SO-22	SO-24
Analyte	Columbus Mine Waste Pile California Gulch	Silver Queen Mine Waste Pile Placer Gulch	Lucky Jack Mine Waste Pile Upper Animas	Unknown Mine Waste Pile N. of Denver Lake	Unknown Mine Waste Pile Burrows Gulch	London Mine Waste Pile Burrows Gulch	Mine Waste Pile S. of London Mine Burrows Gulch	Mine Waste Pile N. of Prairie Mine Burrows Gulch	Mine Waste Pile N. of Diversion Burrows Gulch	Mine Waste Pile N. side of Burrows Gulch	Mine Waste Pile N. of Cable Tram Upper Animas
Aluminum	6550	2070	1190	2220	2480	1830	3580	4080	2140	919	3010
Antimony	1.1 B	187	109	4 B	12.1 B	24.3	7.9 B	41.9	8.8 B	331	7.3 B
Arsenic	73.3	183	93	57.1	57.5	77.4	50.1	313	98.2	118	167
Barium	289	285	76.2	151	100	26.6 B	34.1 B	36.4 B	65.5	165	65.1
Beryllium	1 B	0.33 B	0.21 U	0.29 B	0.38 B	0.25 B	0.45 B	0.29 B	0.22 B	0.29 B	0.31 B
Cadmium	4.3	19.7	26.3	0.22 U	25.3	10.1	0.85 B	29.2	0.69 B	308	0.22 U
Calcium	420 B	616 B	284 B	252 B	336 B	211 B	316 B	250 B	204 B	169 B	490 B
Chromium	1.1 B	0.81 B	0.63 B	1.6 B	0.21 U	0.21 U	3.5	0.42 B	0.37 B	0.58 B	0.7 B
Cobalt	0.56 B	0.49 B	0.43 U	0.44 U	0.42 U	0.43 U	0.43 U	6.2 B	0.41 U	0.45 B	0.61 B
Copper	282	1360	241	13.7	29.7	167	153	189	23.7	741	272
Iron	16300	57300	5760	8800	4340	9030	14400	49800	12200	10900	35500
Lead	4030	16500	5930	759	1290	3970	3750	8520	2740	42000	4040
Magnesium	257 B	255 B	75.9 B	114 B	129 B	111 B	185 B	144 B	155 B	49.8 B	1090
Manganese	38.7	635	11	12	12.7	11.7	12.3	23.6	22.2	80	363
Mercury	0.88 J	3.8 J	1.6 J	0.56 J	1 J	0.11 U	0.61	0.21 J	0.5 J	0.8 J	1.5 J
Nickel	0.75 B	0.37 B	2.1 U	0.22 U	0.21 U	0.21 U	0.23 J	3.1 B	0.21 U	0.35 B	0.5 B
Potassium	2570	1640	1170	2770	1650	1790	2810	5050	2420	1390	2680
Selenium	1.1 U	6.4	1.6	1.1 U	1 U	1.1 U	5.4	1.1 U	1 U	1.2	1.1 U
Silver	17.5	66.5	27.1	7.5	29.9	59.4	77.4	48.1	16	51.6	38.9
Sodium	125 B	107 B	127 B	95 B	85.7 B	88.5 B	118 B	119 B	113 B	72.2 B	103 B
Thallium	1.3 U	8.8	5.2	4	1.2 U	2.1 B	1.3 U	9.8	1.2 U	1.2 U	4.7
Vanadium	2.4 B	0.22 U	2 B	2 B	0.21 U	0.46 B	0.21 U	0.22 U	0.21 U	0.2 U	0.22 U
Zinc	986	5650	4670	82.6	2280	2320	165	5650	240	53300	184

TABLE 1

UPPER ANIMAS SOLID SOURCE SAMPLES
TOTAL METALS
Concentrations in milligrams per kilogram (mg/kg)

Location	SO-25	SO-26	SO-27	SO-28	SO-29	SO-30	SO-31	SO-32	SO-33	SO-34
Analyte	Mine Waste Pile North of Cable Tram	Mine Waste Pile Southwest of Cable Tram	Mine Waste Pile Southeast of Cable Tram	Mill Tailings North of Grouse Gulch	Mine Waste Pile South of Grouse Gulch	Toltec Mine Waste Pile Upper Animas	Mine Waste Pile East of Toltec Mine	Silver Wing Mine Waste Pile Upper Animas	Tom Moore Mine Waste Pile Upper Animas	Mine Waste Pile N. side of Burrows Gulch
Aluminum	5630	3580	7860	1560	9910	5380	2060	1270	2780	2070
Antimony	6.3 B	9.7 B	2.5 B	30.1	1.6 B	1.2 B	4.7 B	214	9.6 B	23
Arsenic	127	113	94.4	43.4	295	98.6	87.5	712	194	143
Barium	78.6	117	510	563	25.7 B	26.6 B	26.9 B	25.1 B	22.5 B	135
Beryllium	0.32 B	0.5 B	1 B	1.1 B	0.29 B	0.53 B	0.34 B	0.24 B	0.48 B	0.51 B
Cadmium	13.6	6.4	0.22 U	14.6	0.21 U	0.67 B	0.21 U	25.6	4.5	52.8
Calcium	1070 B	432 B	481 B	1390	1920	964 B	235 B	216 B	616 B	187 B
Chromium	3.1	1.5 B	2.9	16.1	3.2	6	0.63 B	2.7	2.8	1 B
Cobalt	2.2 B	0.44 U	0.45 U	2.8 B	4.4 B	10.4	0.42 U	0.69 B	0.53 B	0.41 U
Copper	647	303	86.6	1820	52.9	68.2	32.8	5760	60.3	216
Iron	38200	10300	6970	18500	35200	20800	10200	30000	185200	19500
Lead	9970	6000	1920	12800	1310	438	2580	7960	4650	100000
Magnesium	2090	231 B	176 B	17.7 U	6860	2840	225 B	138 B	420 B	151 B
Manganese	832	28.1	21.5	50400	1510	1510	43.3	50.6	410	91.9
Mercury	1.6 J	2.1 J	0.38 J	3.3 J	0.22 J	1.7 J	0.1 R	0.11 R	0.28 J	0.21 J
Nickel	1.7 B	0.53 B	0.33 B	2 B	2.1 B	2.3 B	0.21 U	1.6 B	0.63 B	0.24 B
Potassium	2840	1540	2210	1140 B	3300	2050	2520	1820	2460	2460
Selenium	1.1 U	1.5	1.1 U	18.3	1 U	1 U	1.4	4.3	1.9	2.5
Silver	46.8	49.8	16.4	109	4.2	2.6	10.2	48	19.7	48.7
Sodium	133 B	88 B	111 B	103 B	132 B	88.7 B	96.6 B	113 B	124 B	107 B
Thallium	7.8	1.3 U	1.3 U	1.6 U	1.2 U	1.2 U	1.3 U	2.8	3.3	4.7
Vanadium	9.4 B	0.22 U	0.22 U	0.26 U	25.3	8.1 B	0.21 U	0.21 U	1.7 B	0.98 B
Zinc	3160	1210	126	3040	162	330	93.4	4980	1230	1650

TABLE 1

UPPER ANIMAS SOLID SOURCE SAMPLES
TOTAL METALS
Concentration in milligrams per kilogram (mg/kg)

Location	SO-36	SO-37	SO-38	SO-39	SO-40	SO-41	SO-43
Analyte	Lower Mine Waste Rock Pile Burns Gulch	Mine Waste Pile in Niagara Gulch	Mine Waste Pile in Lower Eureka Gulch	Treasure Mountain Mine Waste Pile Picayune Gulch	Mine Waste Pile W. of Treasure Mtn Picayune Gulch	Mine Waste Pile West of Toltec Mine	Mine Waste Pile Northwest of Cable Tram
Aluminum	1800	8140	703	4770	1680	1400	4710
Antimony	250	1.7 B	1.8 B	6.2 B	1.1 U	5.5 B	25
Arsenic	324	40.4	10.2	125	79.2	28.3	361
Barium	83.1	75.9	60.3	80.5	27.4 B	16.1 B	44.1
Beryllium	0.23 B	0.56 B	0.2 B	1.3	0.45 B	0.3 B	0.72 B
Cadmium	5.6	5.1	0.66 B	23.6	0.22 U	0.22 U	3
Calcium	206 B	26300	244 B	36200	458 B	222 B	230 B
Chromium	0.39 B	1.3 B	0.21 B	5.8	0.79 B	0.51 B	2.2
Cobalt	0.44 U	1.2 B	12.2	8.6 B	0.43 U	0.44 U	1.5 B
Copper	368	395	208	168	12.7	10.2	448
Iron	11500	29000	119000	24000	13000	3350	47200
Lead	3170	2490	1940	2450	84.7	45.6	7950
Magnesium	155 B	962 B	85.1 B	2570	162 B	94 B	2310
Manganese	6.3	631	97.5	14300	268	7.9	301
Mercury	1.2 J	0.95 J	0.11 R	0.1 U	0.1 R	0.34 J	0.86 J
Nickel	0.22 U	0.38 B	3.8 B	5.5 B	0.7 B	0.22 U	1.4 B
Potassium	1640	3450	1020 B	1970	2320	1740	2070
Selenium	2.4	1 U	1.1	4.2	1.1 U	1.1 U	1 U
Silver	53.7	8.6	40.9	15.5	3.2	8	40.2
Sodium	108 B	352 B	83.7 B	124 B	96.4 B	75.8 B	98.8 B
Thallium	1.3 U	1.3 U	1.2 U	1.3 U	1.3 U	1.3 U	1.2 U
Vanadium	2.1 B	10.4 B	0.2 U	10.4 B	3.3 B	0.41 B	0.2 U
Zinc	1330	1290	564	5030	21.3	7.7	1330

TABLE 2

UPPER ANIMAS AQUEOUS SOURCE SAMPLES
TOTAL METALS PLUS CYANIDE
Concentrations in micrograms per liter (ug/L)

Location	DM-1	DM-2	DM-3	DM-4	DM-5	DM-6	DM-7	DM-8	DM-9
Analyte	SOURCE SAMPLE Draining Mine above Denver Lake	SOURCE SAMPLE Lucky Jack Mine Drainage	SOURCE SAMPLE Draining Mine in Upper Burrows G.	SOURCE SAMPLE Draining Mine S. of London Mine	SOURCE SAMPLE Draining Mine near London Mine West	SOURCE SAMPLE Draining Mine near London Mine East	SOURCE SAMPLE London Mine Drainage	SOURCE SAMPLE Prairie Mine Drainage	SOURCE SAMPLE Draining Mine Below Burrows G.
Flow (cfs)	0.0003	0.101	0.005	0.0003	0.0003	0.0003	0.002	0.001	0.003
pH	3.81	5.07	3.53	3.6	6.38	6.29	6.26	6.93	7.07
Conductivity	206	80.5	3.31	378	67.3	642	457	272	80.3
Hardness	77.6	30.2	59.8	110	35.3	49.5	176	120	43.1
Aluminum	659	307	10520	5994	U	419	924	U	U
Antimony	U	U	U	U	U	U	U	U	U
Arsenic	U	1.9	U	U	U	U	21.6	U	U
Barium	9	22	7	13	12	16	9	11	14
Berylium	1	U	2	3	U	1	1	U	U
Cadmium	33	3.3	36.1	18.9	U	28.3	NA	4	U
Calcium (D)	3910	1280	2700	6840	640	1290	4260	2970	1670
Chromium	U	U	U	U	U	U	U	U	U
Cobalt	7	U	26	31	U	U	14	U	U
Copper	58	17	247	254	U	114	184	U	U
Iron	1467	417	6017	3157	9	1907	10060	113	55
Lead	324	271	7.2	88.4	U	133.6	55.6	2	16.2
Magnesium (D	U	U	U	U	U	U	U	U	U
Manganese	414	127	10330	6618	1	1188	1659	82	117
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	U	U	11	14	U	U	U	U	U
Potassium (D)	580	840	300	320	690	1220	5570	2800	550
Selenium	U	U	U	U	U	U	U	U	U
Silver	0.2	U	0.4	0.5	0.3	0.4	U	U	U
Sodium (D)	4925	925	4760	2305	26	6050	9834	947	79
Thallium	U	U	U	U	U	U	U	U	U
Vanadium	U	U	U	U	U	U	U	U	U
Zinc	4459	919	6259	2184	22	5681	9713	861	70
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 2

UPPER ANIMAS AQUEOUS SOURCE SAMPLES
TOTAL METALS PLUS CYANIDE
Concentrations in micrograms per liter (ug/L)

Location	DM-10	DM-14	DM-15	DM-16	DM-17	DM-18	DM-19	DM-20	DM-21	DM-22	DM-24	DM-25
Analyte	SOURCE SAMPLE Mountain Queen Drainage	SOURCE SAMPLE Draining Mine S. of Stream (lower of 4)	SOURCE SAMPLE Draining Mine in Cal G. (old A17a)	SOURCE SAMPLE Draining Mine in Cal G.(old A17b)	SOURCE SAMPLE Draining Mine on Cal G. Tributary	SOURCE SAMPLE raining Mine w/Por in Cal G.	SOURCE SAMPLE Bagley Tunnel Mine Drainage	SOURCE SAMPLE Columbus Mine Drainage	SOURCE SAMPLE Silver Wing Mine Drainage	SOURCE SAMPLE Tom Moore Mine Drainage	SOURCE SAMPLE Draining Mine near Eureka Mill	SOURCE SAMPLE Draining Mine
Flow (cfs)	0.005	0.004	0.002	0.003	0.016	0.24	0.15	0.003	0.37	0.72	0.163	0.007
pH	3.66	7.2	5.66	5.41	3.09	6.33	6.42	3.28	6.52	7.32	6.59	3.25
Conductivity	313	99	120	167	996	574	650	1626	381	3487	1203	680
Hardness	43.5	46.9	38.7	68.2	65.4	250	326	114	310	197	683	155
Aluminum	3890	195	566	464	3091	U	80	18650	872	U	1741	1407
Antimony	U	U	U	U	U	U	U	U	U	U	U	U
Arsenic	3.5	U	U	U	16.2	1.6	1.7	24.7	15.1	U	2.1	2.1
Barium	17	2	30	9	6	19	12	5	22	6	11	9
Berylium	2	U	1	1	2	U	1	6	2	1	6	5
Cadmium	NA	3.5	25.1	19.7	211	2.8	10.8	1037	13.8	2.4	4	29.7
Calcium (D)	1700	1020	1270	1650	1820	5450	7610	9530	4890	2190	2460	5540
Chromium	U	U	U	U	U	U	18	U	U	U	U	U
Cobalt	U	U	U	U	13	U	6	224	U	U	56	29
Copper	2383	28	64	20	1362	U	U	7953	3257	U	U	2380
Iron	9558	69	6	37	20750	526	1046	77410	7125	37	26300	15800
Lead	160.1	42.2	505	4.6	1611	3.1	1.1	353	7.7	1.1	24.4	335
Magnesium (D	U	U	U	U	U	U	2100	U	U	U	3140	U
Manganese	3971	132	826	360	7256	1165	7342	13380	3369	534	14880	68640
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	15	U	U	U	U	U	U	70	U	U	18	18
Potassium (D)	460	780	480	980	320	1030	4770	930	3790	2350	6620	470
Selenium	U	U	U	U	U	U	U	U	U	U	U	U
Silver	0.7	U	0.2	U	1.2	U	U	0.2	U	U	U	0.8
Sodium (D)	6460	775	5718	6938	51660	1010	3669	247800	3855	845	1883	8414
Thallium	U	U	U	U	U	U	U	U	U	U	U	U
Vanadium	U	U	U	U	U	U	U	U	U	U	U	U
Zinc	6209	688	5243	6559	49190	972	3375	237300	3881	780	1687	7737
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 3

UPPER ANIMAS AQUEOUS SOURCE SAMPLES
TOTAL METALS LOADING
Reported in Grams per Day
Page 1 of 2

Location	DM-1	DM-2	DM-3	DM-4	DM-5	DM-6	DM-7	DM-8	DM-9
Analyte	SOURCE SAMPLE Draining Mine above Denver Lake	SOURCE SAMPLE Lucky Jack Mine Drainage	SOURCE SAMPLE Draining Mine in Upper Burrows G.	SOURCE SAMPLE Draining Mine S. of London Mine	SOURCE SAMPLE Draining Mine near London Mine West	SOURCE SAMPLE Draining Mine near London Mine East	SOURCE SAMPLE London Mine Drainage	SOURCE SAMPLE Prairie Mine Drainage	SOURCE SAMPLE Draining Mine Below Burrows G.
Flow (cfs)	0.0003	0.101	0.005	0.0003	0.0003	0.0003	0.002	0.001	0.003
pH	3.81	5.07	3.53	3.6	6.38	6.29	6.26	6.93	7.07
Conductivity	206	80.5	3.31	378	67.3	642	457	272	80.3
Hardness	77.8	30.2	59.8	110	35.3	49.5	176	120	43.1
Aluminum	0.49		131.5	4.5	U	0.32	4.62	U	U
Antimony	U	U	U	U	U	U	U	U	U
Arsenic	U	0.48	U	U	U	U	0.11	U	U
Barium	0.01	5.5	0.09	0.01	0.01	0.012	0.05	0.028	0.11
Berylium	0.001	U	0.03	0.002	U	0.001	0.005	U	U
Cadmium	0.025	0.83	0.45	0.014	U	0.02	NA	0.01	U
Calcium (D)	2.9	320	33.8	5.13	0.48	0.97	21.3	7.4	12.5
Chromium	U	U	U	U	U	U	U	U	U
Cobalt	0.001	U	0.33	0.002	U	U	0.07	U	U
Copper	0.04	4.25	3.1	0.19	U	0.09	0.92	U	U
Iron	1.1	104.3	75.2	2.37	0.007	1.4	50.3	0.28	0.414
Lead	0.24	67.8	0.09	0.066	U	1	0.28	0.005	0.12
Magnesium (D)	U	U	U	U	U	U	U	U	U
Manganese	0.31	31.8	129.1	4.96	0.001	0.89	8.3	0.2	0.88
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	U	U	0.14	0.11	U	U	U	U	U
Potassium (D)	0.44	210	3.8	0.24	0.52	0.92	27.9	7	4.13
Selenium	U	U	U	U	U	U	U	U	U
Silver	0.0002	U	0.005	0.0004	0.0002	0.0003	U	U	U
Sodium (D)	3.69	231.3	59.5	1.73U	0.02	4.5	49.2	2.4	0.59
Thallium	U	U	U	U	U	U	U	U	U
Vanadium	U	U	U	U	U	U	U	U	U
Zinc	3.34	229.8	78.2	1.64	0.02	4.3	48.6	2.2	0.53

TABLE 3

UPPER ANIMAS AQUEOUS SOURCE SAMPLES
TOTAL METALS LOADING
Reproted in Grams per Day

Location	DM-10	DM-14	DM-15	DM-16	DM-17	DM-18	DM-19	DM-20	DM-21	DM-22	DM-24	DM-25
Analyte	SOURCE SAMPLE Mountain Queen Drainage	SOURCE SAMPLE Draining Mine S. of Stream (lower of 4)	SOURCE SAMPLE Draining Mine in Cal G. (old A17a)	SOURCE SAMPLE Draining Mine in Cal G.(old A17b)	SOURCE SAMPLE Draining Mine on Cal G. Tributary	SOURCE SAMPLE raining Mine w/Por in Cal G.	SOURCE SAMPLE Bagley Tunnel Mine Drainage	SOURCE SAMPLE Columbus Mine Drainage	SOURCE SAMPLE Silver Wing Mine Drainage	SOURCE SAMPLE Tom Moore Mine Drainage	SOURCE SAMPLE Draining Mine near Eureka Mill	SOURCE SAMPLE Draining Mine
Flow (cfs)	0.005	0.004	0.002	0.003	0.016	0.24	0.15	0.003	0.37	0.72	0.163	0.007
pH	3.66	7.2	5.66	5.41	3.09	6.33	6.42	3.28	6.52	7.32	6.59	3.25
Conductivity	313	99	120	167	996	574	650	1626	381	3487	1203	680
Hardness	43.5	46.9	38.7	68.2	65.4	250	326	114	310	197	683	155
Aluminum	48.6	1.95	2.83	3.5	123.6	U	30	139.9	806.6	U	710.33	24.62
Antimony	U	U	U	U	U	U	U	U	U	U	U	U
Arsenic	0.04	U	U	U	0.65	0.96	0.64	0.19	13.97	U	0.86	0.04
Barium	0.21	0.02	0.15	0.068	0.24	11.4	4.5	0.375	20.35	10.8	4.49	0.16
Berylium	0.025	U	0.005	0.008	0.08	U	0.38	0.045	1.85	1.8	1.63	0.09
Cadmium	NA	0.04	0.13	0.15	8.4	1.7	4.1	7.8	12.77	4.32	2.45	0.52
Calcium (D)	21.25	10.2	6.35	12.38	72.8	3270	2853.75	71.48	4523.25	3942	1003.68	96.95
Chromium	U	U	U	U	U	U	6.75	U	U	U	U	U
Cobalt	U	U	U	U	0.52	U	2.25	1.68	U	U	22.85	0.51
Copper	29.8	0.28	0.32	0.15	54.5	U	U	59.7	3012.73	U	U	41.65
Iron	119.5	0.69	0.03	0.28	830	315.6	392.3	580.6	6590.63	66.6	10730.4	276.5
Lead	2	0.42	2.5	0.04	46.4	1.86	0.41	2.7	7.12	2.98	9.96	5.86
Magnesium (D)	U	U	U	U	U	U	787.5	U	U	U	1281.12	U
Manganese	49.6	1.32	4.13	2.7	290.2	699	2753.3	100.4	3116.33	961.2	6071.04	1201.2
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	0.19	U	U	U	U	U	U	0.525	U	U	7.34	0.32
Potassium (D)	5.75	7.8	2.4	7.35	12.8	6187	1877.75	6.98	3505.75	4230	2700.96	8.23
Selenium	U	U	U	U	U	U	U	U	U	U	U	U
Silver	0.008	U	0.001	U	0.048	U	U	0.0015	U	U	U	0.014
Sodium (D)	80.75	7.75	2.86	52.04	2066.4	606	1375.88	1858.5	3565.88	1521	768.26	147.25
Thallium	U	U	U	U	U	U	U	U	U	U	U	U
Vanadium	U	U	U	U	U	U	U	U	U	U	U	U
Zinc	77.63	6.88	26.2	49.2	1967.6	583.2	1265.6	1779.8	3589.93	1404	688.3	135.4
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4

UPPER ANIMAS SURFACE WATER SAMPLES
TOTAL METALS PLUS CYANIDE
Concentrations in micrograms per liter (ug/L)

Location	UA-SW-1	UA-SW-2	UA-SW-3	UA-SW-4	UA-SW-5	UA-SW-6	UA-SW-7	UA-SW-8	UA-SW-9	UA-SW-10	UA-SW-11	UA-SW-12
Analyte	BACKGROUND Upper Animas Above Denver Lake	BACKGROUND Upper Animas Below Lucky Jack	Upper Animas Below Draining Mines DM-1 and DM-2	Animas River Downstream of Burrows Gulch	Animas R. Below DM-9, SO-25-27 & 43	Animas R. Above California G.	Animas R. Below Confluence W/ California G.	Animas R. Above Confluenc With Burns G.	Animas R. Below Confluenc With Burns G.	Animas R. Below Confluenc W/ Silver Wing	Animas R. Above Confluence With Niagara G.	Animas R. Above Confluenc With Eureka G.
Flow (cfs)	0.67	0.29	0.926	2.568	1.957	2.446	5.512	11.18	14.387	14.407	15.115	14.09
pH	7.34	7.6	6.89	5.2	6.01	5.7	5.95	7.42	6.33	7.07	6.86	7.02
Conductivity	79.8	69.7	80	100.2	96.4	73	178	183	153	167	171	184.00
Hardness	35.5	32.2	34	38.4	38.4	39.2	75.8	86.2	77.9	80	83.7	81.70
Aluminum	239	46	U	1899	1323	997	1415	497	414	413	295	319.00
Antimony	U	U	U	U	U	U	U	U	U	U	U	U
Arsenic	4	1.9	U	U	U	U	U	U	U	U	U	U
Barium	13	8	8	13	14	14	15	14	13	13	12	12
Beryllium	U	U	U	1	1	1	2	1	1	1	U	1
Cadmium	U	0.9	0.6	5.6	5	4.5	4.8	2.2	2.2	2.7	2.3	2.2
Chromium	U	U	U	U	U	U	U	U	U	U	U	U
Cobalt	U	U	U	U	U	U	U	U	U	U	U	U
Copper	U	U	U	24	20	16	22	6	11	27	19	21
Iron	628	50	19	44	41	32	158	65	58	71	52	57
Lead	1.2	1.1	U	1.7	9.8	8.5	13	5.9	5.9	4.9	4.9	5
Manganese	80	2	8	999	746	614	3052	1262	986	995	794	790
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	U	U	U	U	U	U	U	U	U	U	U	U
Selenium	U	U	U	U	U	U	U	U	U	U	U	U
Silver	U	U	U	U	U	U	U	U	U	U	U	U
Thallium	U	U	U	U	U	U	U	U	U	U	U	U
Vanadium	U	U	U	U	U	U	U	U	U	U	U	U
Zinc	29	87	81	824	765	765	1198	553	570	589	528	536
Cyanide	NA	NA	NA	8 U	NA	NA	NA	NA	NA	8 U	NA	NA

TABLE 4

UPPER ANIMAS SURFACE WATER SAMPLES
TOTAL METALS PLUS CYANIDE
Concentrations in micrograms per liter (ug/L)

Location	HC-SW-1	BG-SW-1	BG-SW-2	BG-SW-3	BG-SW-4	BG-SW-5	PL-SW-1	CN-SW-1	GG-SW-1	PY-SW-1	BU-SW-1
Analyte	Horseshoe Creek Above Confluence w/ Animas River	BACKGROUND Burrows G. Above Mines	Burrows G. Below Breached Trans-basn diversn	Burrows G. Below London Mine	Burrows G. Below Intermittent Trib	Burrows G. Above Confluence w/Animas River	Placer Gulch Above California G.	Cinnamon Creek Above Confluence W/ Animas R.	Grouse Gulch Above Confluence with Animas R.	Picayune G. Above confluence with Animas R.	Burns G. Above Confluence With Animas R.
Flow (cfs)	0.94	0.268	0.23	0.76	0.788	0.579	0.954	1.832	1.309	2.256	3.645
pH	6.9	4.38	4.65	4.63	4.44	4.88	5.45	6.58	6.53	6.59	7.45
Conductivity	7.6	155	128.00	191	158	160	141	141	170	287	127
Hardness	37.2	28.7	29.7	45.3	43.1	44.5	49.2	78.2	95.5	155	NA
Aluminum	U	7005	3378	6509	5651	5360	1143	U	U	U	U
Antimony	U	U	U	U	U	U	U	U	U	U	U
Arsenic	U	U	U	U	U	U	U	U	U	U	U
Barium	6	18	32	24	22	21	20	8	10	33	8
Beryllium	U	1	1	3	2	2	1	U	U	U	U
Cadmium	U	11.6	11.2	20	14.5	14	2.7	U	U	U	3.4
Chromium	U	U	U	U	U	U	U	U	U	U	U
Cobalt	U	U	U	U	U	6	U	U	U	U	U
Copper	U	42	32	72	63	60	30	U	U	U	16
Iron	15	94	148	150	119	108	678	15	17	63	55
Lead	U	16	11.7	6	5.2	5	88.4	U	U	U	3.3
Manganese	1	3047	1969	3283	2919	2821	924	2	2	14	21
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	U	U	U	11	U	U	U	U	U	U	U
Selenium	U	U	U	U	U	U	U	U	U	U	U
Silver	U	0.2	U	U	U	U	0.4	U	U	U	U
Thallium	U	U U	U	U	U	U	U	U	U	U	U
Vanadium	U	U U	U	U	U	U	U	U	U	U	U
Zinc	31	1969	2265	2510	2196	2148.00	893		12	6	544
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8 U

TABLE 4

UPPER ANIMAS SURFACE WATER SAMPLES
TOTAL METALS PLUS CYANIDE
Concentrations in micrograms per liter (ug/L)

Location	CG-SW-2	CG-SW-3	CG-SW-4	CG-SW-5	CG-SW-6	CG-SW-7	CG-SW-8	CG-SW-9	CG-SW-10	CG-SW-11	CG-SW-12
Analyte	California G. Below Mountain Queen Mine	California G. Above Beginning of White Ppt.	California G. Below Large Group of Draining Mines	Tributary Below DM-17	California G. Below Tributary CG-5	California G. Above Confluence with Placer G.	California G. Below Confluence with Placer G.	California G. Below Bagley T. Mine Drainage	California G. Below Bagley T. Mill Tailings	California G. Below Mines	California G. Above Confluence w/ Animas R.
Flow (cfs)	0.818	1.137	2.099	0.031	2.572	2.524	4.229	5.26	5.145	4.195	4.212
pH	6.61	4.61	6.17	3.69	4.96	6.62	5.64	6.46	6.32	5.6	5.58
Conductivity	273	299	235	643	177	247	197	207	205	211	209
Hardness	151	117	NA	24.1	92.5	107	81.4	91.5	91.6	93.2	NA
Aluminum	1250	5055	4095	2743	4251	4675	2683	1872	1833	1620	1637
Antimony	U	U	U	U	U	U	U	U	U	U	U
Arsenic	U	U	U	U	U	U	U	U	U	U	U
Barium	26	21	16	19	16	17	18	16	17	16	16
Beryllium	3	9	7	1	7	7	4	3	3	3	3
Cadmium	0.9	6.1	4.4	21.5	4.8	5.2	3.9	4.3	4.3	4.9	4.6
Chromium	U	U	U	U	U	U	U	U	U	U	U
Cobalt	U	U	U	U	U	U	U	U	U	U	U
Copper	14	24	19	244	16	18	24	21	21	14	25
Iron	292	262	211	184	296	510	471	317	294	235	229
Lead	1.3	1.4	0.9	302	1.1	8.5	53.3	24.9	20	15.4	15.9
Manganese	1590	11120	8182	1801	8028	7355	4723	4337	4340	4306	4301
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	U	U	U	U	U	U	U	U	U	U	U
Selenium	U	U	U	U	U	U	U	U	U	U	U
Silver	U	U	U	U	U	U	0.2	U	U	U	U
Thallium	U	U	U	U	U	U	U	U	U	U	U
Vanadium	U	U	U	U	U	U	U	U	U	U	U
Zinc	232	1734	1296	4809	1279	1262	1116	1365	1225	1227	1440
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8 U

TABLE 4

UPPER ANIMAS SURFACE WATER SAMPLES
TOTAL METALS PLUS CYANIDE
Concentrations in micrograms per liter (ug/L)

UPPER ANIMAS GAUGING STATIONS				
Location	UA-SW-CC48	UA-SW-M34	UA-SW-A68	UA-SW-A72
Analyte	Cement Creek Above Confluence With Animas River	Mineral Creek Above Confluence With Animas R.	Animas River Above Cement Creek	Animas River Below Confluence With Mineral Creek
Flow (cfs)	18	92	75	234
pH	4.14	7.19	7.63	7.19
Conductivity	595	196.5	173.2	196.5
Hardness				
Aluminum	4320	1360	87.6 B	1000
Antimony	4 U	4 U	4 U	4 U
Arsenic	6 U	6.6 B	6 U	6 U
Barium	21.6 B	24 B	26.4 B	22.6 B
Beryllium	1 U	1 U	1 U	1 U
Cadmium	2 B	1 U	1.4 B	1.2 B
Calcium	138000	431000	42100	50000
Chromium	1 U	1 U	1 U	1 U
Cobalt	12.2 B	3.8 B	2 U	3.2 B
Copper	60.5	52.2	6.4 U	29.5
Iron	6690	2330	287	1720
Lead	25.7	7	3 U	6.6
Magnesium	7420	3630 B	2670 B	3440 B
Manganese	1470	249	981	612
Mercury	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	7.4 RT	1.5 U	1 U	1.2 U
Potassium	1280 B	329	449 B	465 B
Selenium	3 UJ	3 UJ	3 UJ	3 UJ
Silver	1 U	1 U	1 U	1 U
Sodium	3780 B	2090 B	1810 B	2110 B
Thallium	7.4 B	6 U	6 U	6 U
Vanadium	2.1 B	1 U	1 U	1 U
Zinc	646	238	411 RT	336
Cyanide	8 UJ	8 UJ	8 UJ	8 U

TABLE 5

UPPER ANIMAS SURFACE WATER SAMPLES
TOTAL METALS LOADING
Reported in Grams per Day

Location	UA-SW-1	UA-SW-2	UA-SW-3	UA-SW-4	UA-SW-5	UA-SW-6	UA-SW-7	UA-SW-8	UA-SW-9	UA-SW-10	UA-SW-11	UA-SW-12
Analyte	BACKGROUND Upper Animas Above Denver Lake	BACKGROUND Upper Animas Below Lucky Jack	Upper Animas Below DM-1 and DM-2	Animas River Downstream of Burrows Gulch	Animas R. Below DM-9, SO-25-27 & 43	Animas R. Above California G.	Animas R. Below Confluence W/ California G.	Animas R. Above Confluence With Burns G.	Animas R. Below Confluence With Burns G.	Animas R. Below Silver Wing	Animas R. Above Confluence With Niagara G.	Animas R. Above Confluence With Eureka G.
Flow (cfs)	0.67	0.29	0.926	2.568	1.957	2.446	5.512	11.18	14.387	14.407	15.115	14.09
pH	7.34	7.6	6.89	5.2	6.01	5.7	5.95	7.42	6.33	7.07	6.86	7.02
Conductivity	79.8	69.7	80	100.2	96.4	73	178	183	153	167	171	184.00
Hardness	35.5	32.2	34	38.4	38.4	39.2	75.8	86.2	77.9	80	83.7	81.70
Aluminum	392.32	33.35	U	12191.6	6469.47	6101.64	19498.7	13891.2	14891.6	14876.3	11148.1	11165.00
Antimony	U	U	U	U	U	U	U	U	U	U	U	U
Arsenic	6.57	1.378	U	U	U	U	U	U	U	U	U	U
Barium	21.34	5.8	18.52	83.46	68.46	85.68	206.7	391.3	467.61	468.26	453.48	422.76
Beryllium	U	U	U	6.42	4.89	6.12	27.56	27.95	35.97	36.02	U	35.23
Cadmium	U	3.55	1.39	35.95	24.45	27.54	66.14	61.49	79.13	97.25	86.92	77.51
Chromium	U	U	U	U	U	U	U	U	U	U	U	U
Cobalt	U	U	U	U	U	U	U	U	U	U	U	U
Copper	U	U	U	154.08	97.8	97.92	303.16	167.52	395.67	972.54	718.01	739.83
Iron	1051.9	13.78	8.8	282.48	200.49	195.84	2177.24	1816.75	2086.26	2557.42	1965.08	2008.11
Lead	3.304	0.79	U	10.91	47.92	52.02	179.14	164.91	212.22	176.5	185.17	176.15
Manganese	134	5.8	18.58	5062.93	3649.8	3754.6	42056.6	35272.9	35466.4	35893.9	30005.3	27831.7
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	U	U	U	U	U	U	U	U	U	U	U	U
Selenium	U	U	U	U	U	U	U	U	U	U	U	U
Silver	U	U	U	U	U	U	U	U	U	U	U	U
Thallium	U	U	U	U	U	U	U	U	U	U	U	U
Vanadium	U	U	U	U	U	U	U	U	U	U	U	U
Zinc	45.48	63.08	14.35	5290.08	3740.85	1064.88	16508.4	15456.4	20502.9	21215.8	19953.1	18883.28
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 5

UPPER ANIMAS SURFACE WATER SAMPLES
TOTAL METALS LOADING
Reported in Grms per Day
Page 2 of 4

Location	HC-SW-1	BG-SW-1	BG-SW-2	BG-SW-3	BG-SW-4	BG-SW-5	PL-SW-1	CN-SW-1	GG-SW-1	PY-SW-1	BU-SW-1
Analyte	Horseshoe Creek Above Confluence w/ Animas River	BACKGROUND Burrows G. Above Mines	Burrows G. Below Breached Trans-basn diversn	Burrows Gulch Below London Mine	Burrows G. Below Intermittent Trib	Burrows G. Above Confluence w/Animas River	Placer Gulch Above California G.	Cinnamon Creek Above Confluence W/ Animas R.	Grouse Gulch Above Confluence with Animas R.	Picayune G. Above confluence with Animas R.	Burns G. Above Confluence With Animas R.
Flow (cfs)	0.94	0.268	0.23	0.76	0.788	0.579	0.954	1.832	1.309	2.256	3.645
pH	6.9	4.38	4.65	4.63	4.44	4.88	5.45	6.58	6.53	6.59	7.45
Conductivity	7.6	155	128.00	191	158	160	141	141	170	287	127
Hardness	37.2	28.7	29.7	45.3	43.1	44.5	49.2	78.2	95.5	155	NA
Aluminum	U	4693.35	1942.35	12367.1	11132.5	7758.6	2731.77	U	U	U	U
Antimony	U	U	U	U	U	U	U	U	U	U	U
Arsenic	U	U	U	U	U	U	U	U	U	U	U
Barium	14.1	2.41	18.4	45.6	43.34	30.45	47.8	36.64	32.7	186.2	72.88
Beryllium	U	0.67	0.58	5.7	3.94	2.9	2.39	U	U	U	U
Cadmium	U	7.77	6.44	38	28.57	21.75	6.45	U	U	U	30.97
Chromium	U	U	U	U	U	U	U	U	U	U	U
Cobalt	U	U	U	U	U	8.7	U	U	U	U	U
Copper	U	27.14	18.4	136.8	124.11	87	71.7	U	U	U	145.76
Iron	7.05	62.98	85.1	285	234.43	156.6	1620.42	68.7	55.59	355.32	501.05
Lead	U	10.72	6.73	11.4	10.24	7.25	211.28	U	U	U	30.06
Manganese	2.35	2041.49	1132.18	6237.7	7299.5	4083.4	2208.36	9.16	6.54	78.96	191.31
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	U	U	U	20.9	U	U	U	U	U	U	U
Selenium	U	U	U	U	U	U	U	U	U	U	U
Silver	0.47	0.13	U	U	U	U	0.956	U	U	U	U
Thallium	U	U U	U	U	U	U	U	U	U	U	U
Vanadium	U	U U	U	U	U	U	U	U	U	U	U
Zinc	72.85	1319.23	1300.65	4769	4362.12	3114.60	2134.27	56.24	39.24	33.84	4955.84
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 5

UPPER ANIMAS SURFACE WATER SAMPLES
TOTAL METALS LOADING
Reproted in Grams per Day

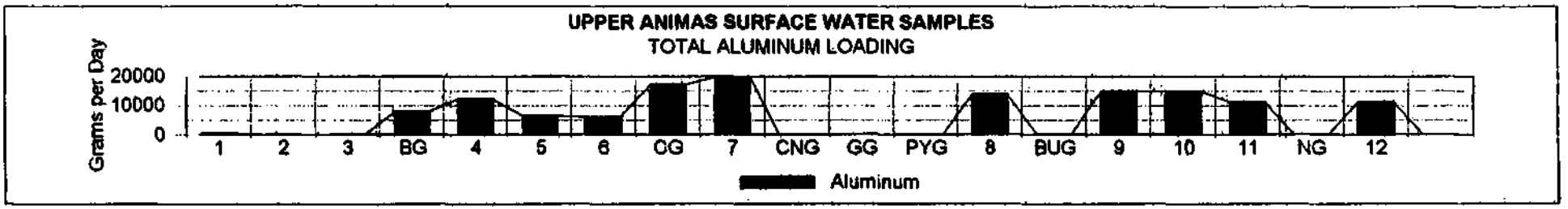
Location	CG-SW-2	CG-SW-3	CG-SW-4	CG-SW-5	CG-SW-6	CG-SW-7	CG-SW-8	CG-SW-9	CG-SW-10	CG-SW-11	CG-SW-12
Analyte	California G. Below Mountain Queen Mine	California G. Above Beginning of White Ppt.	California G. Below Large Group of Draining Mines	Tributary Below DM-17	California G. Below Tributary CG-5	California G. Above Confluence with Placer G.	Califronia G. Below Confluence with Placer G.	Califronia G. Below Bagley T. Mine Drainage	California G. Below Bagley T. Mill Tailings	California G. Below Mines	California G. Above Confluence w/ Animas R.
Flow (cfs)	0.818	1.137	2.099	0.031	2.572	2.524	4.229	5.26	5.145	4.195	4.212
pH	6.61	4.61	6.17	3.69	4.96	6.62	5.64	6.46	6.32	5.6	5.58
Conductivity	273	299	235	643	177	247	197	207	205	211	209
Hardness	151	117	NA	24.1	92.5	107	81.4	91.5	91.6	93.2	NA
Aluminum	2556.25	14368.8	21498.8	213.95	27269.6	29499	28359.3	24616.8	23572.4	16997.6	17237.61
Antimony	U	U	U	U	U	U	U	U	U	U	U
Arsenic	U	U	U	U	U	U	U	U	U	U	U
Barium	53.17	59.64	84	1.482	102.88	107.27	190.26	210.4	218.62	167.68	168.48
Beryllium	6.14	25.56	36.75	0.078	45.01	44.17	42.28	39.45	38.58	31.44	31.59
Cadmium	1.85	17.32	23.1	1.68	30.86	32.81	41.22	56.55	55.3	51.35	48.44
Chromium	U	U	U	U	U	U	U	U	U	U	U
Cobalt	U	U	U	U	U	U	U	U	U	U	U
Copper	28.7	68.16	99.75	19.03	102.88	113.58	253.68	276.15	270.06	146.72	263.25
Iron	598.6	744.08	1107.75	14.35	1903.28	3218.1	4978.47	4168.55	3780.84	2462.8	2411.37
Lead	2.67	3.98	4.73	23.56	7.07	53.64	563.38	327.44	257.2	161.39	167.43
Manganese	3259.5	31580.8	42955.5	140.8	51620	46410	49922.1	57031.55	55812.4	45126.88	45289.53
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	U	U	U	U	U	U	U	U	U	U	U
Selenium	U	U	U	U	U	U	U	U	U	U	U
Silver	U	U	U	U	U	U	2.114	U	U	U	U
Thallium	U	U	U	U	U	U	U	U	U	U	U
Vanadium	U	U	U	U	U	U	U	U	U	U	U
Zinc	475.6	4924.56	6800.8	375.1	8114.66	7963.2	11796.1	17949.75	15779.2	12858.96	15163.2
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 5

UPPER ANIMAS SURFACE WATER SAMPLES
TOTAL METALS LOADING
Reported in Grams per Day

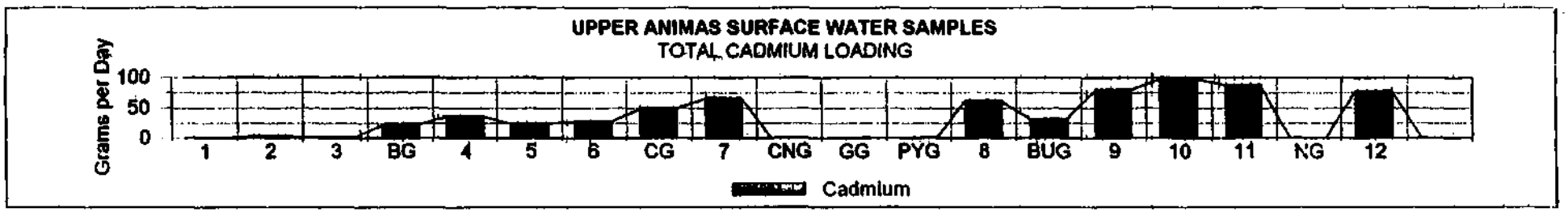
UPPER ANIMAS GAUGING STATIONS				
Location	UA-SW-CC48	UA-SW-M34	UA-SW-A68	UA-SW-A72
Analyte	Cement Creek Above Confluence With Animas River	Mineral Creek Above Confluence With Animas R.	Animas River Above Cement Creek	Animas River Below Confluence With Mineral Creek
Flow (cfs)	18	92	75	234
pH	4.14	7.19	7.63	7.19
Conductivity	595	196.5	173.2	196.5
Hardness				
Aluminum	194400	312800	16425	585000
Antimony	NA	NA	NA	NA
Arsenic	NA	1518	NA	NA
Barium	972	5520	4350	13221
Beryllium	NA	NA	NA	NA
Cadmium	90	NA	262.5	702
Calcium	6210000	99000000	7893750	2925000
Chromium	NA	NA	NA	NA
Cobalt	549	874	NA	1872
Copper	2722.5	12006	NA	17257.5
Iron	301050	535900	53812.5	1006200
Lead	1156.5	1610	NA	3861
Magnesium	333900	834900	500625	2012400
Manganese	66150	57270	183938	358020
Mercury	NA	0.2	NA	NA
Nickel	333	1.5	NA	NA
Potassium	57600	75670	84187.5	272025
Selenium	NA	3	NA	NA
Silver	NA	1	NA	NA
Sodium	170100	480700	339375	1234350
Thallium	333	6	NA	BA
Vanadium	94.5	1	NA	BA
Zinc	29070	54740	77062.5	196560
Cyanide	NA	NA	NA	NA

TABLE 6a



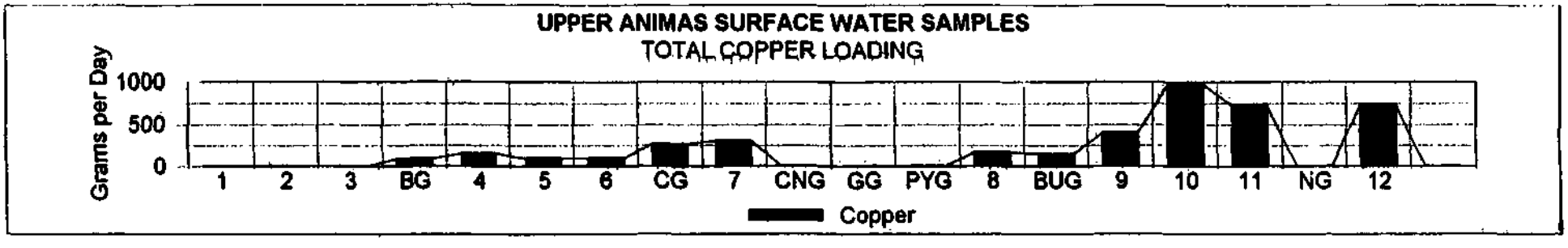
BG - Burns Gulch
CG - California Gulch
CNG - Cinnamon Gulch
GG - Grouse Gulch
PYG - Picayune Gulch
BUG - Burrows Gulch
NG - Niagara Gulch

TABLE 6b



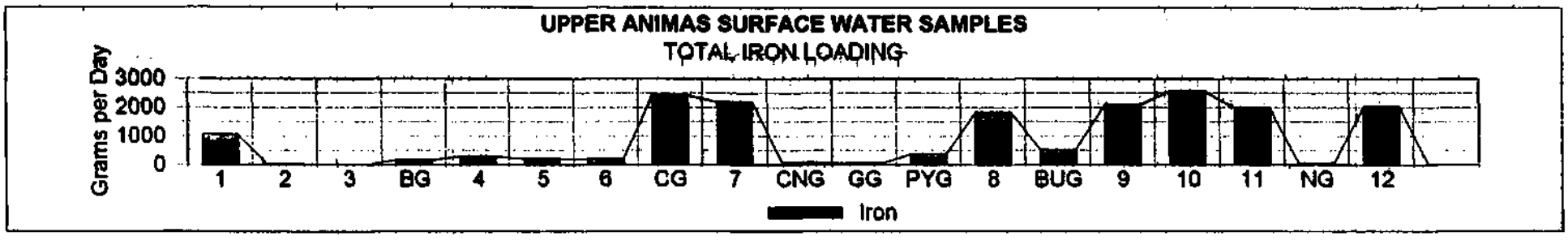
BG - Burns Gulch
CG - California Gulch
CNG - Cinnamon Gulch
GG - Grouse Gulch
PYG - Picayune Gulch
BUG - Burrows Gulch
NG - Niagara Gulch

TABLE 6c



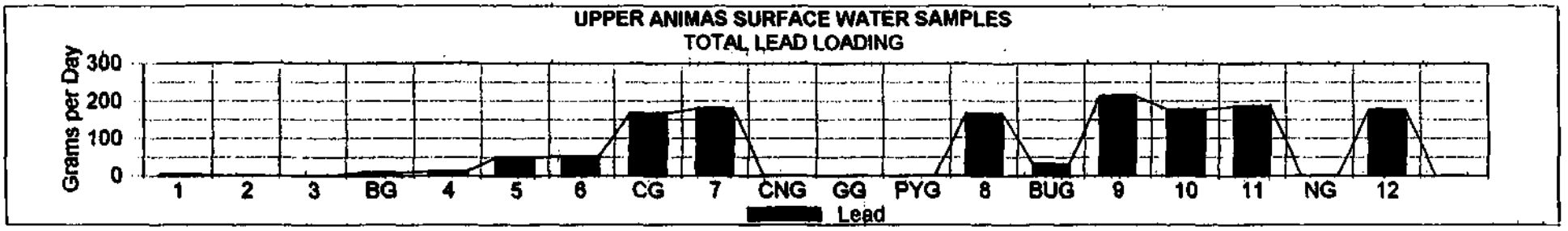
BG - Burns Gulch
CG - California Gulch
CNG - Cinnamon Gulch
GG - Grouse Gulch
PYG - Picayune Gulch
BUG - Burrows Gulch
NG - Niagara Gulch

TABLE 6d



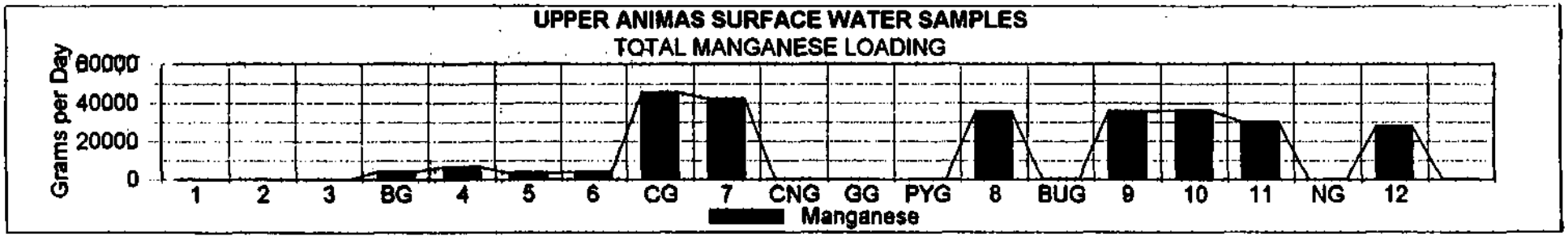
BG - Burns Gulch
CG - California Gulch
CNG - Cinnamon Gulch
GG - Grouse Gulch
PYG - Picayune Gulch
BUG - Burrows Gulch
NG - Niagara Gulch

TABLE 6e



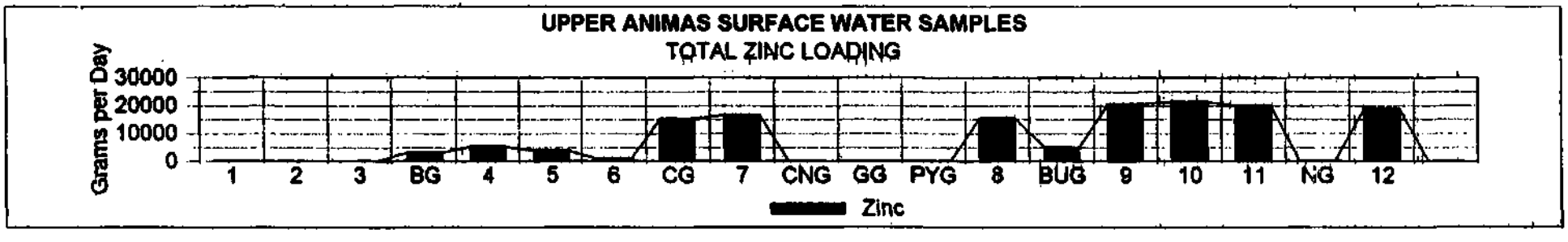
BG - Burns Gulch
CG - California Gulch
CNG - Cinnamon Gulch
GG - Grouse Gulch
PYG - Picayune Gulch
BUG - Burrows Gulch
NG - Niagara Gulch

TABLE 6f



BG - Burns Gulch
CG - California Gulch
CNG - Cinnamon Gulch
GG - Grouse Gulch
PYG - Picayune Gulch
BUG - Burrows Gulch
NG - Niagara Gulch

TABLE 6g



BG - Burns Gulch
CG - California Gulch
CNG - Cinnamon Gulch
GG - Grouse Gulch
PYG - Picayune Gulch
BUG - Burrows Gulch
NG - Niagara Gulch

TABLE 7a

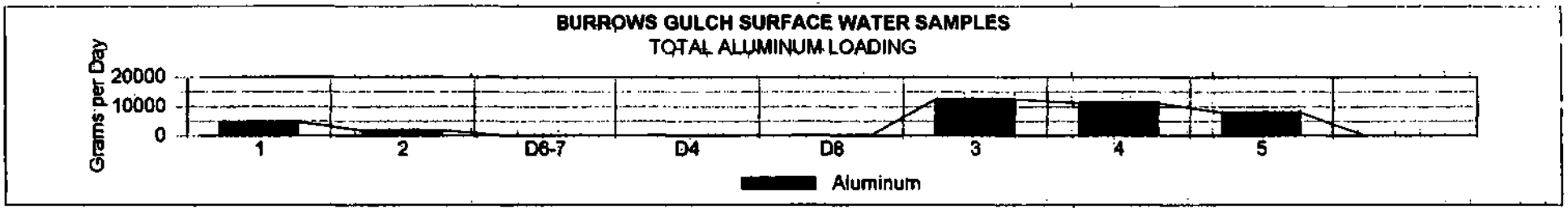

BURROWS GULCH SURFACE WATER SAMPLES
TOTAL ALUMINUM LOADING
Grams per Day
20000
10000
0
1
2
D6-7
D4
D8
3
4
5
Aluminum

TABLE 7b

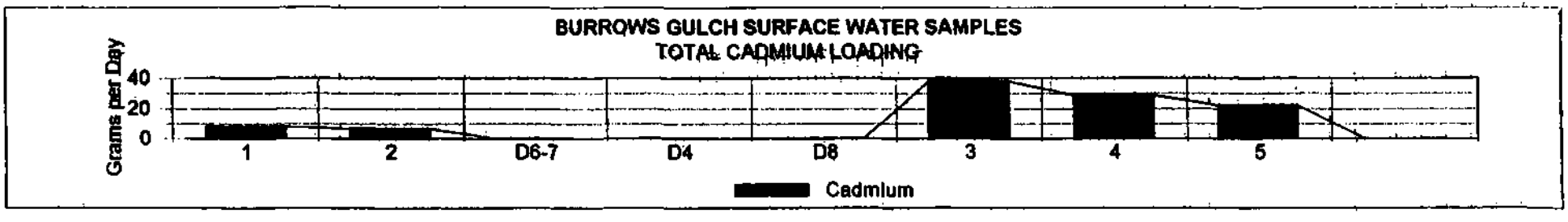

BURROWS GULCH SURFACE WATER SAMPLES
TOTAL CADMIUM LOADING
Grams per Day
40
20
0
1
2
D6-7
D4
D8
3
4
5
Cadmium

TABLE 7c

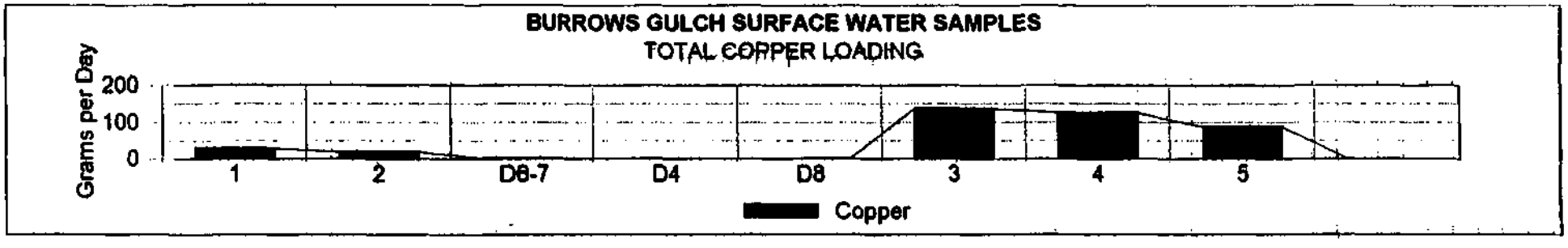

BURROWS GULCH SURFACE WATER SAMPLES
TOTAL COPPER LOADING
Grams per Day
200
100
0
1
2
D8-7
D4
D8
3
4
5
Copper

TABLE 7d

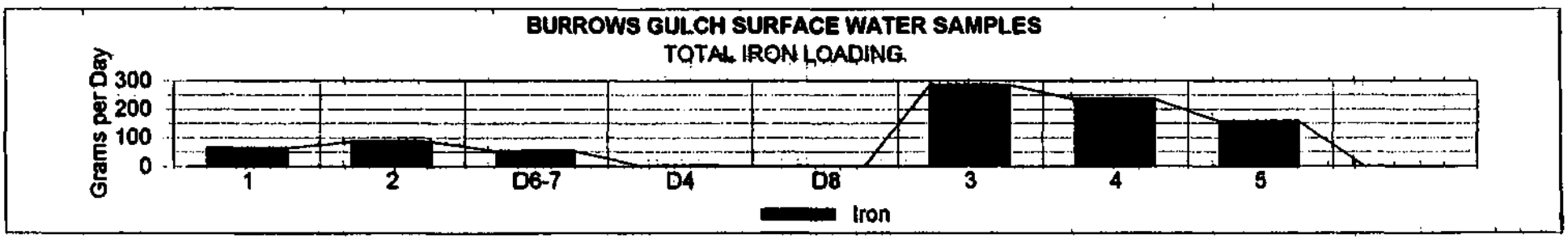

BURROWS GULCH SURFACE WATER SAMPLES
TOTAL IRON LOADING
Grams per Day
300
200
100
0
1
2
D6-7
D4
D8
3
4
5
Iron

TABLE 7e

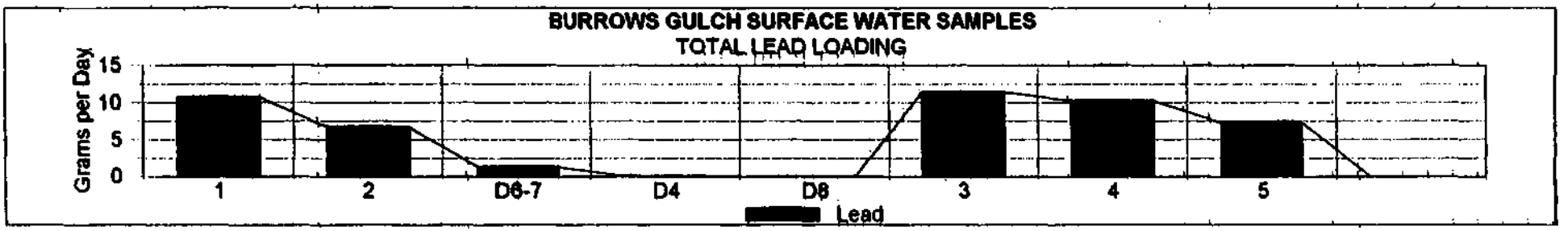

BURROWS GULCH SURFACE WATER SAMPLES
TOTAL LEAD LOADING
Grams per Day
15
10
5
0
1
2
D6-7
D4
D8
3
4
5
Lead

TABLE 7f

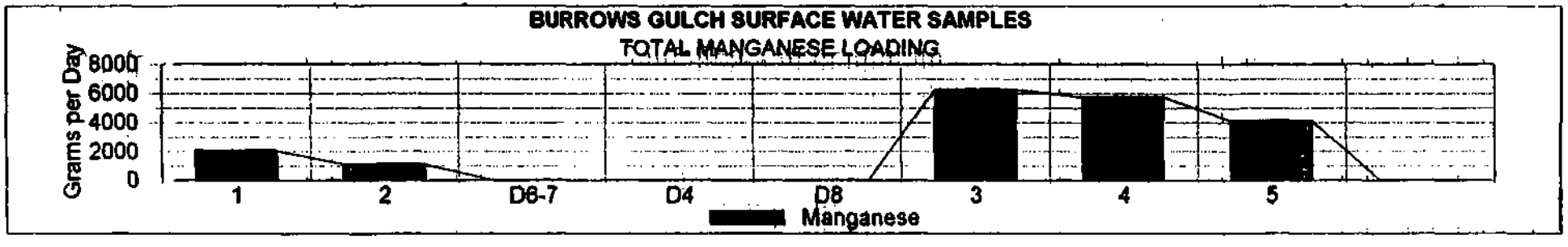

BURROWS GULCH SURFACE WATER SAMPLES
TOTAL MANGANESE LOADING
Grams per Day
8000
6000
4000
2000
0
1
2
D6-7
D4
D8
3
4
5
Manganese

TABLE 7g

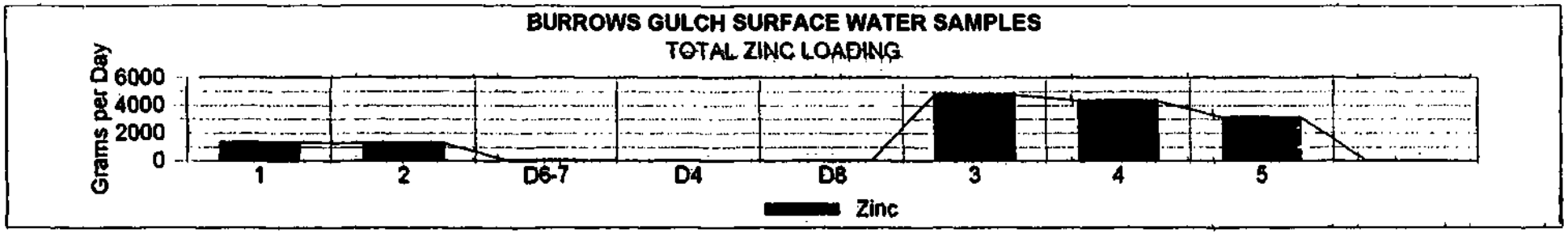
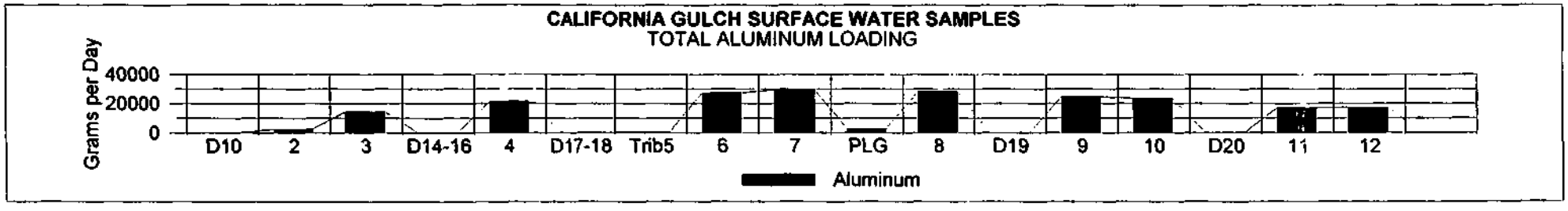
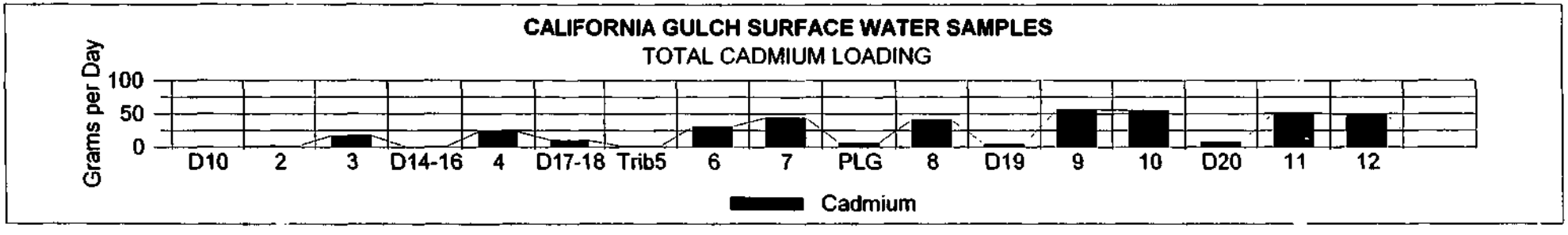

BURROWS GULCH SURFACE WATER SAMPLES
TOTAL ZINC LOADING
Grams per Day
6000
4000
2000
0
1
2
D6-7
D4
D8
3
4
5
Zinc

TABLE 8a



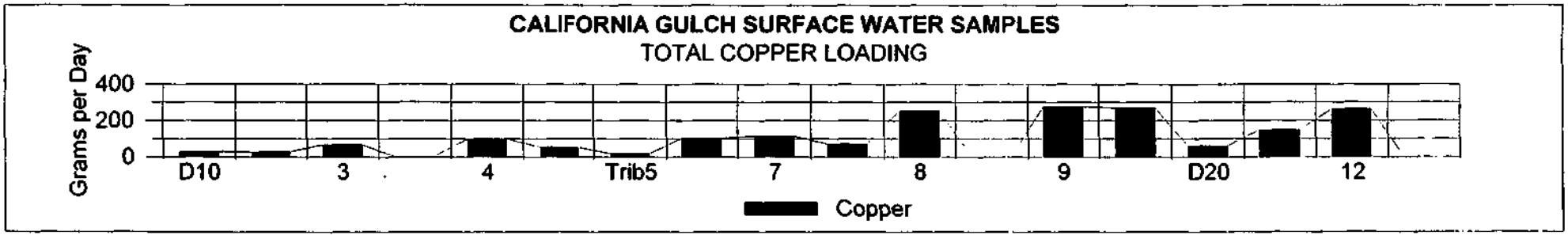
D10 - Draining Mine
2-12 - CG-SW-2 through 12
PLG - Placer Gulch

TABLE 8b



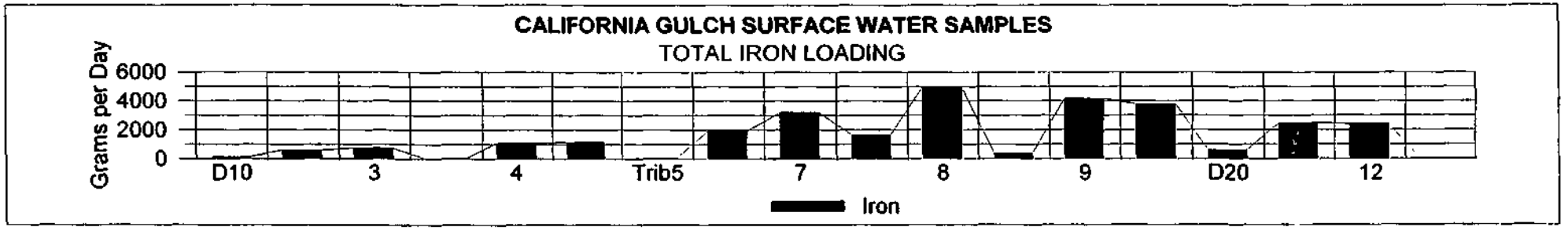
D10 - Draining Mine
2-12 - CG-SW-2 through 12
PLG - Placer Gulch

TABLE 8c



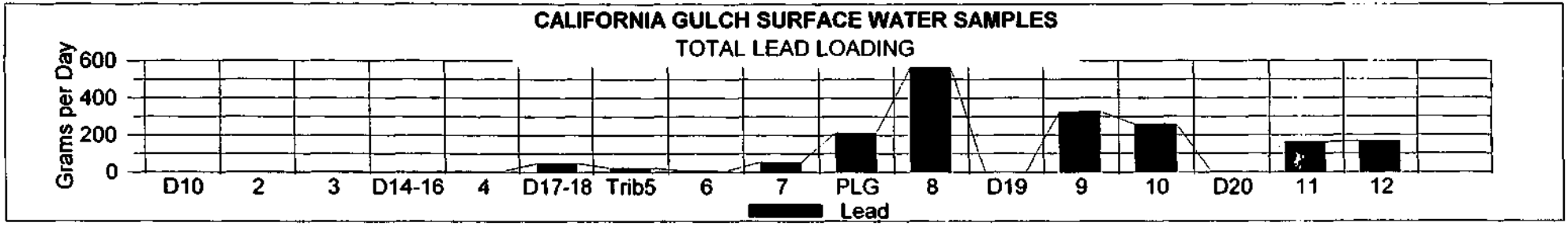
D10 - Draining Mine
2-12 - CG-SW-2 through 12
PLG - Placer Gulch

TABLE 8d



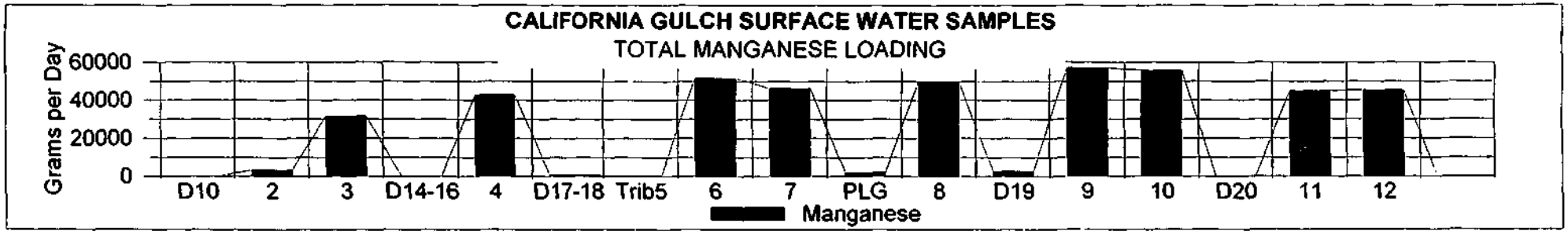
D10 - Draining Mine
2-12 - CG-SW-2 through 12
PLG - Placer Gulch

TABLE 8e



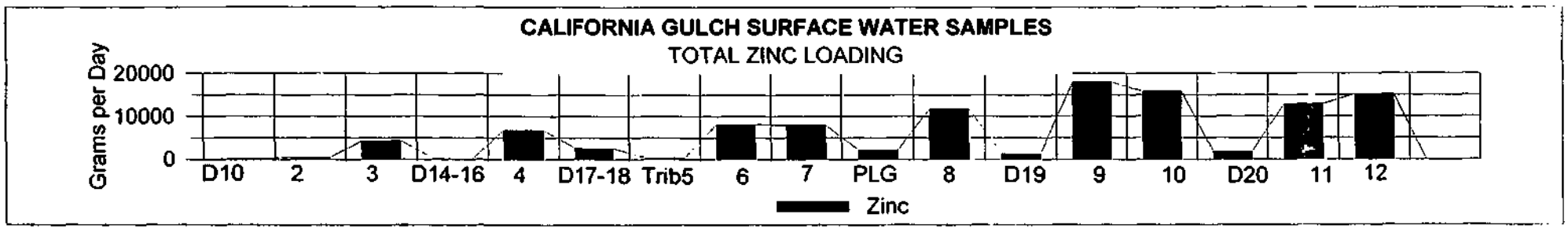
D10 - Draining Mine
2-12 - CG-SW-2 through 12
PLG - Placer Gulch

TABLE 8f



D10 - Draining Mine
2-12 - CG-SW-2 through 12
PLG - Placer Gulch

TABLE 8g



D10 - Draining Mine
2-12 - CG-SW-2 through 12
PLG - Placer Gulch

TABLE 9

UPPER ANIMAS SURFACE WATER SAMPLES
DISSOLVED METALS
Concentrations in micrograms per liter (ug/L)

Location	UA-SW-1	UA-SW-2	UA-SW-3	UA-SW-4	UA-SW-5	UA-SW-6	UA-SW-7	UA-SW-8	UA-SW-9	UA-SW-10	UA-SW-11	UA-SW-12
Analyte	BACKGROUND Upper Animas Above Denver Lake	BACKGROUND Upper Animas Below Lucky Jack	Upper Animas Below Draining Mines DM-1 and DM-2	Animas River Downstream of Burrows Gulch	Animas R. Below DM-9, SO-25-27 & 43	Animas R. Above California G.	Animas R. Below Confluence W/ California G.	Animas R. Above Confluenc With Burns G.	Animas R. Below Confluenc With Burns G.	Animas R. Below Confluenc W/ Silver Wing	Animas R. Above Confluence With Niagara G.	Animas R. Above Confluenc With Eureka G.
Flow (cfs)	0.67	0.29	0.926	2.568	1.957	2.446	5.512	11.18	14.387	14.407	15.115	14.09
pH	7.34	7.6	6.89	5.2	6.01	5.7	5.95	7.42	6.33	7.07	6.86	7.02
Conductivity	79.8	69.7	80	100.2	96.4	73	178	183	153	167	171	184.00
Hardness	35.5	32.2	34	38.4	38.4	39.2	75.8	86.2	77.9	80	83.7	81.70
Aluminum	U	U	U	473	1.3	U	107	40	U	U	42	U
Antimony	U	U	U	U	U	U	U	U	U	U	U	U
Arsenic	U	U	U	U	U	U	U	U	U	U	U	U
Barium	11	7	7	13	13	13	15	15	12	13	12	12
Beryllium	U	U	U	1	1	U	1	U	U	U	U	U
Cadmium	U	0.9	0.6	6.4	5.9	5.1	5.5	206	3	3.1	2.7	2.8
Calcium	1110	900	1160	1620	1620	1580	2760	2550	2180	2270	2260	2200
Chromium	U	U	U	U	U	U	U	U	U	U	U	U
Cobalt	U	U	U	U	U	U	U	U	U	U	U	U
Copper	4	U	U	20	16	10	10	U	4	12	10	9
Iron	174	U	6	23	18	6	56	U	U	U	U	U
Lead	U	U	U	1.5	7.7	5.2	3.1	U	5.9	U	U	5
Magnesium	U	U	U	U	U	U	U	U	U	U	U	
Manganese	60	1	8	956	722	590	2997	1251	947	963	765	746
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	U	U	U	U	U	U	U	U	U	U	U	U
Potassium	1010	950	440	490	540	500	940	8401	730	790	860	810
Selenium	U	U	U	U	U	U	U	U	U	U	U	U
Silver	U	U	U	U	U	U	U	U	U	U	U	U
Sodium	26	82	84	820	779	715	1217	534	547	566	514	514
Thallium	U	U	U	U	U	U	U	U	U	U	U	U
Vanadium	U	U	U	U	U	U	U	U	U	U	U	U
Zinc	12.4	11.4	11.7	12.7	12.7	13.1	25.8	30.3	27.6	28.3	29.8	29.1
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE9

UPPER ANIMAS SURFACE WATER SAMPLES
DISSOLVED METALS
Concentrations in micrograms per liter (ug/L)

Location	HC-SW-1	BG-SW-1	BG-SW-2	BG-SW-3	BG-SW-4	BG-SW-5	PL-SW-1	CN-SW-1	GG-SW-1	PY-SW-1	BU-SW-1
Analyte	Horseshoe Creek Above Confluence w/ Animas River	BACKGROUND Burrows G. Above Mines	Burrows G. Below Breached Trans-basn diversn	Burrows G. Below London Mine	Burrows G. Below Intermittent Trib	Burrows G. Above Confluence w/Animas River	Placer Gulch Above California G.	Cinnamon Creek Above Confluence W/ Animas R.	Grouse Gulch Above Confluence with Animas R.	Picayune G. Above confluence with Animas R.	Bums G. Above Confluence With Animas R.
Flow (cfs)	0.94	0.268	0.23	0.76	0.788	0.579	0.954	1.832	1.309	2.256	3.645
pH	6.9	4.38	4.65	4.63	4.44	4.88	5.45	6.58	6.53	6.59	7.45
Conductivity	7.6	155	128.00	191	158	160	141	141	170	287	127
Hardness	37.2	28.7	29.7	45.3	43.1	44.5	49.2	78.2	95.5	155	NA
Aluminum	U	6840	3474	6650	5695	5517	U	U	U	U	47
Antimony	U	U	U	U	U	U	U	U	U	U	U
Arsenic	U	U	U	U	U	U	U	U	U	U	U
Barium	7	17	32	24	21	21	17	8	12	33	8
Beryllium	U	1	1	3	3	3	1	U	U	U	U
Cadmium	U	12.9	12.2	17.7	15.2	15.4	2.7	U	U	U	3.3
Calcium	1200	1300	1180	2380	2160	2190	1630	1880	2080	4170	NA
Chromium	U	U	U	U	U	U	U	U	U	U	U
Cobalt	U	11	U	8	10	8	U	U	U	U	U
Copper	U	41	33	72	65	65	10	U	U	U	20
Iron	6	67	135	135	106	97	159	6	U	U	6
Lead	U	15.6	11.6	5.9	5.3	5	8.8	U	U	U	2.7
Magnesium	U	U	U	U	U	U	U	U	U	U	U
Manganese	1	2970	2016	3274	2919	2884	747	2	U	14	22
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	U	U	U	U	U	U	U	U	U	U	U
Potassium	270	200	350	810	800	800	620	560	380	1460	NA
Selenium	U	U	U	U	U	U	U	U	U	U	U
Silver	U	U	U	U	U	U	U	U	U	U	U
Sodium	30	2013	2401	2569	2284	2253	898	9	7	7	579
Thallium	U	U	U	U	U	U	U	U	U	U	U
Vanadium	U	U	U	U	U	U	U	U	U	U	U
Zinc	12.9	9.36	9.94	14.2	13.7	14.20	17	28.2	34.8	55.1	NA
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 9

UPPER ANIMAS SURFACE WATER SAMPLES
DISSOLVED METALS
Concentrations in micrograms per liter (ug/L)

Location	CG-SW-2	CG-SW-3	CG-SW-4	CG-SW-5	CG-SW-6	CG-SW-7	CG-SW-8	CG-SW-9	CG-SW-10	CG-SW-11	CG-SW-12
Analyte	California G. Below Mountain Queen Mine	California G. Above Beginning of White Ppt.	California G. Below Large Group of Draining Mines	Tributary Below DM-17	California G. Below Tributary CG-5	California G. Above Confluence with Placer G.	California G. Below Confluence with Placer G.	California G. Below Bagley T. Mine Drainage	California G. Below Bagley T. Mill Tailings	California G. Below Mines	California G. Above Confluence w/ Animas R.
Flow (cfs)	0.818	1.137	2.099	0.031	2.572	2.524	4.229	5.26	5.145	4.195	4.212
pH	6.61	4.61	6.17	3.69	4.96	6.62	5.64	6.46	6.32	5.6	5.58
Conductivity	273	299	235	643	177	247	197	207	205	211	209
Hardness	151	117	NA	24.1	92.5	107	81.4	91.5	91.6	93.2	NA
Aluminum	315	3581	2702	2702	2094	728	441	287	280	205	220
Antimony	U	U	U	U	U	U	U	U	U	U	U
Arsenic	U	U	U	U	U	U	U	U	U	U	U
Barium	26	19	18	18	15	15	16	16	16	16	16
Beryllium	3	9	1	1	5	4	2	2	2	2	2
Cadmium	1.2	8	3.9	21.3	6	5.7	4.5	5	5.1	4.9	3.8
Calcium	5240	5320	NA	9300	4100	3580	3100	3250	3270	3350	NA
Chromium	U	U	U	U	U	U	U	U	U	U	U
Cobalt	U	U	U	U	U	U	U	U	U	U	U
Copper	9	18	9	228	9	U	11	9	9	9	14
Iron	U	38	63	184	58	40	73	77	79	83	81
Lead	U	U	0.9	276	U	U	4.4	2.9	2.6	1.8	2.7
Magnesium	U	U	U	U	U	U	U	U	U	U	NA
Manganese	1538	11100	8044	1760	7982	7132	4451	4243	4326	4327	4303
Mercury	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	U	U	U	U	U	U	U	U	U	U	U
Potassium	9600	1120	NA	2600	1000	1300	1020	1130	1160	1180	NA
Selenium	U	U	U	U	U	U	U	U	U	U	U
Silver	U	U	U	U	U	U	U	U	U	U	U
Sodium	252	1776	1316	4915	1308	1232	1073	1289	1246	1255	1462
Thallium	U	U	U	U	U	U	U	U	U	U	U
Vanadium	U	U	U	U	U	U	U	U	U	U	U
Zinc	52	38	NA	8.13	30.3	35.8	17.5	31.3	31.3	31.8	NA
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 10

UPPER ANIMAS SURFACE WATER SAMPLES
ORGANIC COMPOUNDS
Concentrations in micrograms per kilogram (ug/kg)

Location	UA-SW-A68	UA-SW-CC48	UA-SW-M34	UA-SW-A72	UA-SW-4	UA-SW-10	CG-SW-12	SW-BU-1
Analyte	Animas River Above Confluence with Cement Creek	Cement Creek Above Confluence w/ Animas River	Mineral Creek Above Confluence w/ Animas River	Animas River Below Confluence w/ Mineral Creek	Upper Animas Downstream of Burrows Gulch	Animas River Below Silver Wing Mine	California Gulch Above Confluence w/ Animas River	Burns Gulch Above Confluence w/ Animas River
TOTAL ORGANIC CARBON (TOC)	U	U	1000	U	1000	1000	1000	U
VOLATILE ORGANIC COMPOUNDS								
Trichloroethene				0.6 J		0.4 J		
2-Hexanone					8 J			
1,1,2,2-Tetrachloroethane					3 J			
Toluene	0.2 J	0.2 J	0.5 J	0.6 J	0.2 J	0.4 J	0.3 J	0.6 J
PESTICIDE ORGANICS								
Dieledrin						0.0028 J		

TABLE 11

UPPER ANIMAS SEDIMENT SAMPLES
TOTAL METALS PLUS CYANIDE
Concentrations in milligrams per kilogram (mg/kg)

Location	UA-SE-1	UA-SE-2	UA-SE-3	UA-SE-4	UA-SE-5	UA-SE-6	UA-SE-7	UA-SE-8	UA-SE-9	UA-SE-10	UA-SE-11	UA-SE-12
Analyte	BACKGROUND Upper Animas Above Denver Lake	BACKGROUND Upper Animas Below Lucky Jack	Upper Animas Below DM-1 and DM-2	Animas River Downstream of Burrows Gulch	Animas R. Below DM-9, SO-25-27 & 43	Animas R. Above California G.	Animas R. Below Confluence W/ California G.	Animas R. Above Confluence With Burns G.	Animas R. Below Confluence With Burns G.	Animas R. Below Silver Wing	Animas R. Above Confluence With Niagara G.	Animas R. Above Confluence With Eureka G.
Aluminum	7380	5530	6970	6480	6620	8950	11500	10400	12400	8990	9420	7980.00
Antimony	1.2 U	1.2 U	1.2 U	1.3 B	1 U	1.2 U	1.5 B	1.1 U	1.5 B	1.2 U	2.3 B	2.1 B
Arsenic	61.5	68.9	58.2	30.6	39.5	43.6	34.5	29.5	48.2	33.6	43.8	59.9
Barium	82.6	67.3	60.8	28.2 B	34.4 B	60.1	114	112	79.9	50.7	81.7	66.2
Beryllium	0.65 B	1 B	0.91 B	0.92 B	1.2	1.9	3.2	2.1	2.2	1.6	1.9	1.7
Cadmium	1.4	4.5	5.6	2.7	8.6	15	11.2	4.8	10.3	4.2	10.9	8.2
Calcium	2740	2160	2250	1770	1570	1690	2530	2740	3060	2410	2320	2220
Chromium	7.2	1.2 B	2.8 U	4.1	6	308	6.1	7.2	7.8	5.9	6.2	4.8
Cobalt	10.4 B	7.9 B	8.1 B	6.4 B	11.2	18.4	19.7	12.6	15.4	10.8 B	12.4	115 B
Copper	24.1	24.5	26.6	54.4	74.8	134	236	177	225	145	313	287
Iron	28100	18500	21300	12100	13100	19300	23200	23400	27400	21800	19900	22300
Lead	85.8	109	91.1	86.5	363	527	1050	210	576	672	585	1370
Magnesium	4740	2410	4130	3490	3750	3990	5210	6700	7360	6250	5960	5270
Manganese	1280	1250	1930	1550	2850	4950	8950	4580	6400	3610	5850	4780
Mercury	0.12 UJ	0.12 UJ	0.11 UJ	0.11 UJ	0.1 UJ	0.13 UJ	0.12 U	0.1 UJ	0.13 UJ	0.12 UJ	0.11 UJ	0.12 UJ
Nickel	5 B	2.9 B	3.6 B	4.1 B	5.5 B	6.9 B	7.1 B	7.7 B	9.1 B	6.4 B	8.2 B	6.9 B
Potassium	1260	1210 B	1560	918 B	825 B	1370	1260	1090 B	1880	977 B	1240	1060 B
Selenium	1.2 U	1.2 U	1.2 U	1.2 U	1 U	1.2 U	2.6	1.1 U	1.3 U	1.2 U	1.9	1.2 U
Silver	1.1 B	0.58 B	0.81 B	3.3	1 B	2.6	3	1.4 B	2.2 B	1.1 B	2.3 B	2.2 B
Sodium	138 B	113 B	112 B	100 B	9.2 B	108 B	114 B	104 B	128 B	113 B	119 B	108 B
Thallium	1.4 U	1.5 U	1.4 U	1.4 U	1.2 U	2.1 B	1.5 U	1.3 U	1.6 U	1.4 U	1.4 U	1.4 U
Vanadium	35.8	22	22.3	11.5 B	18	12.7	19.4	27.1	31.8	22.6	2.2	20.3
Zinc	377	481	603	263	877	1080	1830	1060	1690	804	1650	1300
Cyanide	NA	NA	NA	0.47 UJ	NA	NA	NA	NA	NA	0.44 UJ	NA	NA

TABLE11

UPPER ANIMAS SEDIMENT SAMPLES
TOTAL METALS PLUS CYANIDE
Concentrations in milligrams per kilogram (mg/kg)

Location	HC-SE-1	BG-SE-1	BG-SE-2	BG-SE-3	BG-SE-4	BG-SE-5	PL-SE-1	CN-SE-1	GG-SE-1	PY-SE-1	OP-SE-100	BU-SE-1
Analyte	Horseshoe Creek Above Confluence w/ Animas River	BACKGROUND Burrows G. Above Mines	Burrows G. Below Breached Trans-basn diversn	Burrows G. Below London Mine	Burrows G. Below Intermittent Trib	Burrows G. Above Confluence w/Animas River	Placer Gulch Above California G.	Cinnamon Creek Above Confluence W/ Animas R.	Grouse Gulch Above Confluence with Animas R.	Picayune G. Above confluence with Animas R.	Bruns G. Above Mines SO-34 & SO-35	Burns G. Above Confluence With Animas R.
Aluminum	6720	6350	9950	14600	16500	14500	8070	10300 U	11600	9090	27000	6790
Antimony	1.2 U	3.2 B	1.8 B	2.4 B	1.1 U	1.1 U	3 B	1.2 U	1.2 U	1.2 B	2.8 B	32.3
Arsenic	29.2	114	68.9	72.6	49.3	32.5	30.3 U	16.8	46.1	34.2	113	117
Barium	36.4 B	61.3	48.5	77.8	78.9	57.7	448	29.7 B	42.8 B	206	46.3 B	53.9
Beryllium	0.77 B	0.69 B	1 B	2.7	3	2.3	3.1	0.77 U	1 B	0.92 B	5.5	1.5 RT
Cadmium	2.4	0.68 B	0.81 B	10.6	8.6	6.6	8.9	0.25 U	0.24 U	0.98 B	37.6	28.2
Calcium	3260	578 B	762 B	696 B	1080 B	963 B	1120 B	3230	3070	6570	1140 B	1640
Chromium	2.6	4	2.3 B	6.6	4.4	3.4	9	5.3	6.5	5.3	7.1	4
Cobalt	7.4 B	10.7 B	13.1	43.7	25	24.8	9.6 B	9.9 B	12 B	17.8	13.4	7.8 B
Copper	33.1	72.5	62.1	269	215	186	338	28.7	27.4	38.1	1520	2210
Iron	14700	32100	31600	30900	27400	20400	20100	24500	27100	24900	20800	25800
Lead	100	397	399	627	352	306	1050	44.6	33.7 U	60.3	10900	3750
Magnesium	4340	1330	1480	1540	2350	2430	3130	8810	9310	6040	3700	3070
Manganese	1290	1810	2540	15200	8880	7280	31500 J	1180	1310 J	4740 J	20700	7100 J
Mercury	0.13 U	0.12 UJ	0.12 UJ	0.11 UJ	0.11 U	0.11 UJ	0.12 U	0.11 U	0.12 U	0.11 U	0.11 U	0.11 U
Nickel	7.7 B	1.9 B	2 B	6.7 B	6.5 B	5.7 B	6.5 B	5.7 B	6.7 B	9 B	4.6 B	4.3 B
Potassium	1360	2040	1290	1260	1630	1180	544 B	937 B	1160 B	870 B	1750	1540
Selenium	1.2 U	1.3 U	1.2 U	4.4	2.2	1.2	8.8	1.2 U	1.2 U	1.2 U	6.1	2
Silver	0.63 B	2.1 B	1.6 B	3.3	2.3	1.9 B	18.9	0.49 U	0.53 B	3	15.6	14.2
Sodium	103 B	108 B	90.2 B	106 B	97.1 B	107 B	85.3 B	118 B	116 B	103 B	130	103 B
Thallium	1.4 U	1.5 U	1.5 U	1.4 U	1.4 U	1.4 U	1.5 U	1.5 U	1.5 U	1.6 B	1.4 U	1.5 U
Vanadium	13.3	13.4	8.3 B	8.6 B	10.9 B	8.5 B	11 B	27.8	30.3	21.1	21.8	9 B
Zinc	350	198	351 B	748	771	578	1150	94	126	266	3430	3480
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.49 U

TABLE 11

UPPER ANIMAS SEDIMENT SAMPLES
TOTAL METALS PLUS CYANIDE
Concentrations in milligrams per kilogram (mg/kg)

Location	CG-SE-2	CG-SE-3	CG-SE-4	CG-SE-6	CG-SE-7	CG-SE-8	CG-SE-9	CG-SE-10	CG-SE-11	CG-SE-12
Analyte	California G. Below Mountain Queen Mine	California G. Above Beginning of White Ppt.	California G. Below Large Group of Draining Mines	California G. Below Tributary CG-5	California G. Above Confluence with Placer G.	California G. Below Confluence with Placer G.	California G. Below Bagley T. Mine Drainage	California G. Below Bagley T. Mill Tailings	California G. Below Mines	California G. Above Confluence w/ Animas R.
Aluminum	16200	16000	15700	14800	16000	10300	14900	14500	14600	12500
Antimony	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	3.4 B	2.4 B	1.3 B	2.5 B	2.4 B
Arsenic	23.4	14.3	15.4	25.3	30.1	49.1	45.7	42.4	32	44.6
Barium	79.6	43.5 B	47.9 B	55	59.2	131	116	118	90	126
Beryllium	601	3.4	4.5	4.2	5.7	2.5	5	4.6	4.8	5.2
Cadmium	1.2 B	1 B	3.9	2.4	2	6	7.9	6.6	4.6	8.6
Calcium	2030	2390	1960	1520	1710	1210 B	1510	1870	1800	1550
Chromium	7.1	5.9	4.65	5.8	6.1	7.9	8.8	7.3	8.8	8.6
Cobalt	15.8	18	15.1	19.8	16.3	17.7	27.3	17.5	18.6	27.2
Copper	161	176	152	202	187	396	472	297	200	334
Iron	43400	33900	30000	30900	35100	24500	31200	31600	32000	28200
Lead	78.6	79.2	164	242	164	3020	1790	1380	1090	1590
Magnesium	8160	7910	6980	6270	7070	3380	4910	5920	6010	4620
Manganese	5460	3090	4080 J	5700 J	6570 J	22800 J	19900 J	11600 J	10700 J	20300 J
Mercury	0.12 UJ	0.13 U	0.13 U	0.12 U	0.11 U	0.12 U	0.13 U	0.13 U	0.12 U	0.12 U
Nickel	8.3 B	9.2 B	9.1 B	7.6 B	7.3 B	5.4 B	7.5 B	8.9 B	7.5 B	7.5 B
Potassium	1110 B	857 B	649 B	959 B	858 B	910 B	957 B	895 B	1010 B	1340
Selenium	1.2 U	1.2 U	1.2 U	1.2 U	1.6	6	4.6	2.8	2.8	5.3
Silver	1.2 B	0.58 B	0.87 B	1.4 B	1.7 B	8.2	6.8	3.8	4.4	6.2
Sodium	140 B	124 B	134 B	116 B	116 B	101 B	118 B	124 B	106 B	96.3 B
Thallium	1.5 U	1.5 U	1.5 U	1.5 U	1.4 U	1.5 U	1.6 U	1.6 U	1.5 U	1.5 U
Vanadium	54.8	37.4 U	29.9	26.9	27.6	12.8	21.5	24.2	24.6	16.2
Zinc	423	336	484	467	494	1040	1400	1020	989	1470
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.57 B

TABLE 11

UPPER ANIMAS SEDIMENT SAMPLES
TOTAL METALS PLUS CYANIDE
Concentrations in milligrams per kilogram (mg/kg)

	UPPER ANIMAS GAUGING STATIONS			
Location	UA-SE-CC48	UA-SE-M34	UA-SE-A68	UA-SE-A72
Analyte	Cement Creek Above Confluence With Animas River	Mineral Creek Above Confluence With Animas R.	Animas River Above Cement Creek	Animas River Below Confluence With Mineral Creek
Aluminum	8860	12500	7600	9720
Antimony	6.3 B	2.6 B	2.1 B	1.7 B
Arsenic	40	32.1	13.5	31.4
Barium	371	116 B	154	134
Beryllium	0.79 U	1.5	0.92 B	1.1 U
Cadmium	0.3 U	6.7	4.6	2.9
Calcium	1580	2590	2620	2250
Chromium	3.6	5.8	4.7	4.8
Cobalt	9.5 B	44.5	9.1 B	13.5
Copper	58.7	473	193	206
Iron	41900	40500	21600	39900
Lead	310	510	770	664
Magnesium	3760	2690	5020 B	4460 B
Manganese	744 J	4540 J	4090 J	2900
Mercury	0.15 U	0.33	0.11 U	0.13 UJ
Nickel	4.5 B	9.8 B	10.2	5.3 B
Potassium	1890	1780	1310	1550
Selenium	1.5 U	1.3 U	1.2 U	1.3 U
Silver	2.9 U	2.1 U	3 U	3.2
Sodium	173 B	251 B	117 B	166 B
Thallium	1.8 U	1.5 U	1.5 U	1.5 U
Vanadium	24.9	23.3	17.7	27.4
Zinc	176	620	1070	807
Cyanide	0.58 U	0.52 U	0.047 U	0.52 UJ

TABLE 12

UPPER ANIMAS SEDIMENT SAMPLES
ORGANIC COMPOUNDS
Concentrations in micrograms per kilogram (ug/kg)

Location	UA-SE-A68	UA-SE-CC48	UA-SE-M34	UA-SE-A72	UA-SE-10	CG-SE-12	SE-BU-1
Analyte	Animas River Above Confluence with Cement Creek	Cement Creek Above Confluence w/ Animas River	Mineral Creek Above Confluence w/ Animas River	Animas River Below Confluence w/ Mineral Creek	Animas River Below Silver Wing Mine	California Gulch Above Confluence w/ Animas River	Burns Gulch Above Confluence w/ Animas River
VOLATILE ORGANIC COMPOUNDS							
Acetone	48 B	230 J		73 J			
2-Butanone	3 J						
SEMIVOLATILE COMPOUNDS							
Fluoranthene					30 J		
Pyrene					27 J		
PESTICIDE ORGANICS							
Delta-BHC							0.11 J
Dieldrin	0.24 J	0.12 J					
Methoxychlor							0.49 J
4,4"- DDT		0.33 J					

TABLE 13

SILVERTON RESIDENTIAL SOIL SAMPLES
TOTAL METALS
Concentrations in milligrams per kilogram

Location	OP-SL-1	OP-SL-2
Analyte	Residential Soil North of Reese Street	Residential Soil East of 10th & Bluff
Aluminum	14000	7190
Antimony	1.4 U	4.8 B
Arsenic	13.4	27.9
Barium	264	395
Beryllium	0.87 B	0.8 U
Cadmium	0.39 B	3.7
Calcium	5410	4350
Chromium	8.8	102
Cobalt	5.6 B	11.8 B
Copper	95.8	264
Iron	21700	36100
Lead	205	1840
Magnesium	4100	2610
Manganese	575 J	3580 J
Mercury	0.14 U	0.51
Nickel	8.6 B	8 B
Potassium	2490	2220
Selenium	10.8	1.3
Silver	2.1 U	7.3
Sodium	166 B	147 B
Thallium	1.6 U	1.5 U
Vanadium	22.6	27.1
Zinc	126	939
Cyanide	NA	NA

TABLE 14

UPPER ANIMAS RESIDENTIAL SOIL SAMPLES
ORGANIC COMPOUNDS
Concentrations in Micrograms per Kilogram (ug/kg)

Location	OP-SL-1 Residential Soil North of 657 Reese Street	OP-SL-2 Residential Soil at 10th & Bluff
Analyte		
VOLATILE ORGANIC COMPOUNDS		
Toluene	0.9 J	0.4 J
SEMIVOLATILE ORGANIC COMPOUNDS		
Dibenzofuran		110 J
Fluorene		66 J
Anthracene		120 J
Carbazole		140 J
Fluoranthene		1200
Pyrene		1100
Benzo (a) anthracene		680 J
Chrysene		860
Benzo (b) fluoranthene		1400
Benzo (k) fluoranthene		460 J
Benzo (a) pyrene		790 J
Indeno (1,2,3 - cd- pyrene		900
Dibenz (a,h) anthrazene		260 J
Benzo (g,h,i) perylene		850
Napthalene		150 J
2-Methylnaphthalene		180 J
Acenaphthylene		130 J
PESTICIDE OGRANICS		
Heptachlor		2.3 J
Aldrin	0.32 J	1.2 J
Heptachlor epoxide		0.79 J
4,4' DDE	0.38 J	3.1 J
Endrin	0.18 J	4.5 J
4,4'DDT		4.1 J
Methoxychlor	1 J	

TABLE 15

ANIMAS RIVER GROUND WATER WELLS SAMPLES
TOTAL METALS
Concentrations in micrograms per liter (ug/L)

Location		GW-1	GW-3	GW-4
Analyte		Monitoring Well In Campground Along Animas R.	Monitoring Well Above Confluence With Mineral Cr.	Monitoring Well Near Old Landfill Along Animas R.
Flow (cfs)		NA	NA	NA
pH		6.15	5.88	4.59
Conductivity		1280	141	330
Hardness				
Aluminum		438	127 U	1350
Antimony		4 U	4 U	4 U
Arsenic		6 U	6 U	6 U
Barium		40.7 B	17.3 B	14.9 B
Berylium		1 U	1 U	1 U
Cadmium		29	1 U	4.7 B
Calcium		239000	26200	51000
Chromium		8.1 B	1 U	1 U
Cobalt		2.7 B	2 U	2 U
Copper		28	15.3 B	49.1
Iron		467	144	56.6 U
Lead		4.4	3 U	3 U
Magnesium		14100	2250 B	2870
Manganese		44800	27.5	273
Mercury		0.2 U	0.02 U	0.2 U
Nickel		23.4 B	1.7 U	3.1 U
Potassium		8290	368 B	1650 B
Selenium		20.1 J	3 UJ	3 UJ
Silver		7.4 B	1 U	1 U
Sodium		9820	1610	2200 B
Thallium		13.7	6 U	6 U
Vanadium		1 U	1 U	1 U
Zinc		5330	280	1010
Cyanide		8 U	8 U	8 U

TABLE 16

UPPER ANIMAS GROUND WATER MONITORING SAMPLES
ORGANIC COMPOUNDS
Concentrations in micrograms per kilogram (ug/kg)

Location	GW-1	GW-3	GW-4
	GW Monitoring Well in Silverton Campground	GW Monitoring Well North of Sewage Treatment Plant	GW Monitoring Well in Old Landfill Location
Analyte			
VOLATILE ORGANIC COMPOUNDS			
Methylene Chloride	0.5 J		1 J
Trichloroethene	0.2 J		
Toluene		0.6 J	

TABLE 17

UPPER ANIMAS QUALITY CONTROL SAMPLES
ORGANIC COMPOUNDS
Concentrations in Micrograms per Liter (ug/L)

Location	SW-400	SW-500	SW-700	SW-800
Analyte	Equipment Rinsate for Sediment Sampling	Duplicate for A-72	Equipment Rinsate for Soil Sampling	Field Blank Day 2
VOLATILE ORGANIC COMPOUNDS				
Methylene Chloride		0.4 J		2 J
Chloroform				0.4 J
Toluene	0.4 J			
PESTICIDE ORGANICS				
Dieldrin			0.0028 J	

APPENDIX A

Upper Animas Watershed Sampling Activities Report

Colorado Department
of Public Health
and Environment

HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION

SITE INSPECTION
SAMPLING ACTIVITIES REPORT

UPPER ANIMAS WATERSHED

SAN JUAN COUNTY, COLORADO

CO 0001411347

Prepared for:
U.S. Environmental Protection Agency
Region VIII

Prepared by:
Camille M. Farrell
State Project Officer

October 31, 1997

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1.0 INTRODUCTION

The Hazardous Materials and Waste Management Division (HMWMD) of the Colorado Department of Public Health and Environment (CDPHE) conducted sampling activities as part of a Site Inspection (SI) of the Upper Animas Watershed, located near the Town of Silverton, in San Juan County, Colorado. The SI was performed by CDPHE under a Cooperative Agreement with the U.S. Environmental Protection Agency, Region VIII (EPA). This SI was designed to bridge with sampling efforts of the Colorado Division of Minerals and Geology's (DMG) Non Point Source *Animas River Targeting Continuation Project*, as possible under a routine SI.

Site reconnaissance and sampling of mine waste rock source characterization samples were conducted between August 9 and 14, 1997. Inorganic aqueous and sediment sampling activities occurred on September 4; organic aqueous and sediment sampling activities occurred on September 16, 1997. Ground water sampling activities were carried out on September 15, 1997. Opportunity residential soil samples were collected on September 16, 1997. The sampling was performed in accordance with the Upper Animas Watershed Sample and Analysis Plan (CDPHE, 1997), approved by EPA on July 30, 1997, except as noted in Section 3.0, "Deviations from the Sample Plan", of this report.

This report documents activities conducted in the field including field observations, sample locations, and recorded field parameters. Deviations from the approved sample plan are documented as well as the rationale. For a more complete discussion of the site history or sampling rationale, the reader is referred to the Upper Animas Watershed Sample and Analysis Plan (CDPHE, 1997).

2.0 SAMPLING ACTIVITIES

Mine waste rock source characterization samples were collected by one CDPHE employee between August 11 and 14, 1997. Ground water samples were collected on September 15, 1997 by one CDPHE employee assisted by one Bureau of Reclamation employee. The inorganic sediment and aqueous component of the sampling activities were carried out in the Upper Animas Watershed by one CDPHE employee and volunteers on September 4, 1997. Sediments and aqueous samples collected for organic analyses, and aqueous samples collected for total organic carbon (TOC) analyses were collected by one CDPHE employee on September 15 and 16, 1997. Two opportunity residential soil samples were collected by one CDPHE employee on September 16, 1997. One vehicle was used to transport sampling equipment, sample containers, coolers, and personnel to the site.

Sample containers for aqueous metals, cyanide, and volatile organics analyses were preserved in the field. Sample containers for aqueous total organic carbon were preserved in the laboratory. Bottles used to contain aqueous samples for metals analyses were preserved with nitric acid, bottles used to contain aqueous samples for cyanide analyses were preserved with sodium hydroxide, while those for volatile organics analyses were preserved with hydrochloric acid. Bottles used to contain aqueous samples for total organic carbon analyses were preserved with sodium thiosulfate. Jars used to contain source, sediment and opportunity soil samples for analyses of the above constituents were not preserved.

All jars and bottles were labeled before sampling. Traffic Reports were completed before sampling. Upon collection, all samples were immediately placed in coolers with ice; prior to shipment, the coolers were drained of excess water and repacked with "blue ice". The samples were shipped via Federal Express overnight delivery in three shipments: Inorganic samples (sediments; source characterization; 10% of DMG aqueous sampling sites; aueous and sediments samples from the 4 USGS Gaging Stations; groundwater samples; and opportunity soil samples) were shipped on September 17, 1997, 1500 hours. Total organic carbon samples (10% of DMG aqueous sampling sites and aqueous samples from the 4 USGS gaging stations) were shipped on September 17, 1997, 1500 hours. Organic samples (10% of sediments collected by CDPHE; 10% of the aqueous samples (plus co-locacted sediment samples) collected by DMG; aqueous and sediment samples from the 4 USGS Gaging stations; groundwater samples; and opportunity residential soil samples) were shipped on September 18, 1997, 1500 hours.

Samples were shipped to:

Inorganic Samples
Chemtech Consulting Group
110 Route 4
Englewood, New Jersey 07631

Organic Samples
DataChem Labs, Inc.
960 W. LeVoy Dr.
Salt Lake City, Utah 84123

Total Organic Carbon
Acculabs Research
4663 Table Mountain Drive
Golden, Colorado 80403-1650

Following shipment of the organic samples to the laboratory, the lab contacted CLASS to inform them of two problems encountered: first, the samples arrived having temperatures of 10 - 17 degrees Celsius, and the following samples were received broken:

HS264 - Pest/BNA - SE-CC-48	Sediment from Cement Creek above Animas River
HS265 - FTCL - SE -M-34	Sediment from Mineral Creek above Animas River
HS267 - Pest/BNA - BU-SE-1	Sediment from Burns Gulch above Animas River
HS262 - Pest/BNA - SE-CG-12	Sediment from California Gulch above Animas River
HS261 - Pest/BNA - UA-SE-10	Sediment from Upper Animas below Silver Wing Mine
HS275 - FTCL - SW-A-72	Surface Water from Animas River below Mineral Cr.
HS260 - FTCL - UA-SE-4	Sediment from Animas downstream of Burrows Gulch
HS285 - FTCL - OP-SL-1	Residential soil sample north of Reese Street

However, the lab had enough volume using the VOA portions to conduct full analysis for all the samples except HS265, which would need to be canceled. CLASS called Steve Callio, TPO, to inform him of the temperature discrepancy as well as the broken organic samples for the case. Steve indicated for the lab to note the temperatures in the case narrative and to analyze all samples for full analysis using the VOA fraction available for each sample received and agreed that HS265 should be canceled. CLASS called the lab and gave them the preceding directions. (CLASS, 1997)

A total of 3 ground water; 8 surface water; 39 sediments; 39 solid source characterization; 2 opportunity soil samples and 9 QA/QC samples were collected as specified in the Upper Animas Watershed Sample and Analysis Plan (CDPHE, 1997). Additionally, a sample from the City of Silverton's municipal drinking water supply was collected (composit of surface water from Boulder and Bear Creeks).

The 3 ground water samples will be analyzed for Total Metals, cyanide and organic compounds [Pesticides/Polychlorinated Biphenyls (PCBs); Base/Neutral/Acid Extractable Organics (BNAs); and Volatile Organics (VOA)].

Eight (8) aqueous samples (10 % of DMG surface water samples plus the four main gauging stations) will be analyzed for total metals, organic compounds, cyanide, and total organic carbon analyses.

Eight (8) collocated sediment samples (10 % of DMG surface water samples plus the four main gauging stations) will be analyzed for total metals, organic compounds, cyanide. The remaining 31 sediment samples, collocated with DMG's aqueous samples, will be analyzed for total metals.

Thirty nine (39) mine dump source characterization samples will also be analyzed for total metals analyses.

The City of Siloverton's drinking water sample will be analyzed for organic compounds by a Lab certified to conduct such analyses.

One (1) duplicate surface water sample; 1 triple volume (spike) surface water sample; 2 field blanks; 1 trip blank (VOA); and 5 equipment rinsate blanks (2 for waste rock, 2 for sediments, and 1 for opportunity soil samples) were also collected for quality control samples.

Table I lists the samples collected, the analyses requested, location, rationale, and field measurements.

All surface water, and ground water samples were collected directly into the sample containers to minimize the potential for cross-contamination and to minimize the necessity for decontamination of the sample collection equipment. A stainless steel spoon was used for collecting the sediments and source characterization (mine waste rock) samples from a depth of 0 to 6 inches. Sampling equipment was decontaminated in accordance with the Upper Animas Watershed Sample and Analysis Plan (CDPHE, 1997).

Sample locations were photographed (APPENDIX A), and field observations are detailed in Table I. Figures 1 through 4 depict the sample locations.

2.1 Surface Water and Sediments Samples

A total of 39 sediment samples were collected. The sediment samples, co-located with the surface water samples collected by DMG, plus the four main gauging stations locations will be analyzed for Total Metals. Eight (8) of those sediment samples (4 of which represent approximately 10% of the total sediment samples collected; plus the 4 main gauging station locations) will also be analyzed for organic compounds and cyanide.

Four (4) surface water samples (SW-UA-4, SW-CG-12, SW-BU-1, and SW-UA-10), representing 10% of the total surface water samples collected by DMG, plus the 4 main gauging stations (SW-A-68, SW-CC-48, SW-M-34 and SW-A-72), were collected to be analyzed for total metals, organic compounds, cyanide and total organic carbon. (DMG will analyze aqueous samples for total and dissolved Metals).

One opportunity sediment sample (OP-SE-100) was collected in Burns Gulch below mine waste piles SO-34 and SO-35, to ba analyzed for total metals. Sediments at this location were coated with a white precipitate.

Table I provides the surface water and sediment sample descriptions; Figure 2 illustrates the sample site locations.

2.2 Groundwater Samples

Letters were mailed to Silverton area residents whose wells were tested in 1996 as part of the Cement Creek Watershed Site Investigation, as the groundwater well samples collected did not represent water quality after having been treated by in-home filtration systems. One party responded that they were interested in having the Lenore Load, a mine adit from which their drinking water is obtained during the two weeks they reside in their travel trailer. As the party contacted the CDPHE after the sampling had occurred, CDPHE was unable to collect the sample.

An advertisement announcing the free and voluntary groundwater well sampling (as well as residential soil sampling) opportunity offered by the CDPHE and EPA was published in the *Silverton Standard* newspaper for four consecutive weeks (August 7 through August 28, 1997) prior to conducting the 1997 groundwater sampling activities. The Bureau of Land Management contacted the CDPHE requesting four monitoring wells drilled in July of 1997 be tested (one of which turned out to be dry). The City of Silverton requested that their drinking water source be tested for organics.

On September 15, 1997, three groundwater samples (GW-1, GW-3 and GW-4) were collected. GW-1 is located on along the Animas River, upstream of Cement Creek, downstream of the Sunnyside Gold Company's Tailings piles, within the city of Silverton's campground, on the north bank of the river. GW-2 was not sampled, as it was dry; it is located on the east bank of Cement Creek, within the limits of the City of Silverton's Memorial Park. GW-3 is located on the north bank of the Animas River, immediately above tits confluence with Mineral Creek, located within the limits of the City of Silverton's Sewage Treatment Plant. GW-4 was added as an opportunity groundwater well sample, as it was drilled in the midst of an old dump site east of 10th street and north of the railroad tracks, approximately east of the center of town. The City of Silverton acquires its drinking water from Boulder and Bear creeks. City personnel collected a composite drinking water sample (GW-5 albeit it surface water), which is being analyzed using methods and detection limits which meet certified drinking water requirements.

Table I provides the well descriptions; Figure 4 illustrates the locations of the wells tested.

2.3 Source Characterization Samples

Thirty nine (39) samples were taken from source areas (mine waste rock piles) within the Upper Animas Watershed site for characterization purposes. Samples collected for total metals analysis were collected between August 11 and 14, 1997. Table I provides source area descriptions; Figure 3 illustrates sample site locations.

2.4 Quality Control Samples

An increased volume was taken of the water sample at SW-A-72 for laboratory quality control (spike) purposes. Three times the normal volume of water was taken for BNA and Pesticide/PCB, and VOA analyses; double the normal volume was collected for total metals and cyanide analyses.

Aqueous sample SW-500 was collected as a duplicate of SW-A-72. No duplicates were taken for sediments due to the inherent heterogeneities associated with those media.

One trip blank, SW-900, was submitted for VOA analysis only, one per cooler (shipment) containing samples for volatile organic analysis. Two field blanks, SW-600 and SW-800, were collected to assess field conditions at the time of sampling: SW-600 was submitted for total metals and cyanide analyses; SW-800 was submitted for Pesticide/PCB, BNA, VOA, and Total Organic Carbon analyses.

Two equipment rinsate blanks, SW-100 and SW-200, were collected from the stainless steel spoons used for collecting waste rock source samples following decontamination. Another two equipment rinsate blanks, SW-300 and SW-400, were collected from the stainless steel spoons used for collecting sediment samples following decontamination. One equipment rinsate blank, SW-700, was collected from the stainless steel spoon used for collecting residential soil samples following decontamination.

3.0 DEVIATIONS FROM THE SAMPLE PLAN

The Sample and Analysis Plan anticipated the analysis of three groundwater (GW-1 through GW-3 monitoring) wells drilled by the U.S. Bureau of Reclamation in July, 1997; however, GW-2 was not sampled, as it was dry. A fourth well, GW-4, was added as an opportunity sample analyze the groundwater in the vicinity of an old landfill/dump site. The City of Silverton requested that their drinking water be sampled and analyzed for organic compounds. A composite sample of Boulder Creek and Bear Creek surface drinking-water sources was collected by city personnel and sent to a lab certified for drinking water analyses.

The SAP planned for the collection and analysis of 43 source samples; however, only 39 were collected. Samples SO-5, So-23, So-35 and SO-42 were not sampled.

The SAP anticipated the collection of 40 sediment samples; however 38 of the original samples were collected and one opportunity sample (op-SE-10-0) was added; CG-1 and CG-5 were not collected.

An additional field blank was added to the QA/QC samples to accommodate for the additional days required to sample the organic samples.

The following Table outlines deviations from the Sampling Plan:

Sample Number:	Deviation:	From:	To:
GW-2	not sampled	1 mile upstream of American Tunnel on South Fork	Cement Creek approximately 1 mile downstream of confluence with Prospect Gulch.
GW-4	added	not originally included; opportunity sample	ground water well located along the Animas River, east of 10th strret, north of the railroad tracks.
GW-5	added	not originally included; opportunity sample	City of Silverton composite (surface water) drinking water source sample - analyzed for organic compounds by Lab certified for Drinking water Analyses.
SE-M-34	FTCL component of sediment sample not analyzed	sample container broke during shipment to the lab (HS265)	
OP-SE-100	sediment sample added	not originally included; opportunity sample	Burns Gulch, between SO-34 and SO-36 waste rock piles.
SO-5	source not sampled		Geology similar to SO-4 immediately north of and contiguous with SO-5.
SO-23	source not sampled		Geology similar to SO-25, across valley.
SO-35	source not sampled		Source completed buried beneath talus rock.
SO-42	source not sampled		Site inaccessible; waste rock pile small.
CG-SE-1	sediments not sampled		California Gulch DRY at this location.
CG-SE-5	sediments not sampled		Tributary DRY at this location.
OP-SL-1	residential soil added	opportunity sample	Simon property; lots north of 857 Reese.
OP-SL-2	residential soil added	opportunity sample	Simon property; E. 10th and Bluff, east of Railroad depot, north of railroad tracks.
SW-800	QA/QC sample added	field blank	added for second day of sampling.
SW-900	QA/QC sample added	VOA Blank	not originally included

4.0 REFERENCES

CLASS, 1997. Record of Communication, completed 10/7/1997.

Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division. *Sample and Analysis Plan: Upper Animas Watershed.* July, 1997.

Colorado Division of Minerals and Geology, Inactive Mine Program, 1997. Telephone conversations and personal meetings with Jim Herron. July, August, September.

TABLE I: SAMPLING ACTIVITIES SUMMARY
Upper Animas Watershed
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Sample	Location	Rationale	Date & Time Sample Taken	Analysis M=Metals C=Cyanide TOC = Total Organic Carbon B=BNA P=PCB/Pest V=VOA	Organic CLP Sample Number	Inorganic CLP Sample Number	EC (mS)	Temp (°C)	pH	Comments
SO-31	Mine waste pile across (east) Animas River from Toltec Mine.	**Source Characterization**	08/13/97, 1330	M	N/A	MHDW 86	-	-	-	
SO-32	Silver Wing Mine waste pile.		08/13/97, 1300	M	N/A	MHDW 87	-	-	-	
SO-33	Tom Moore Mine waste pile.		08/13/97, 1345	M	N/A	MHDW 88	-	-	-	
SO-34	Middle Mine waste pile in Burns Gulch.		08/13/97, 1500	M	N/A	MHDW 89	-	-	-	
SO-35	Upper Mine waste pile in Burns Gulch. **NOT SAMPLED**		**NOT SAMPLED**	NA	N/A	N/A	-	-	-	
SO-36	Lower mine waste pile in Burns Gulch.		08/13/97, 1600	M	N/A	MHDW 91	-	-	-	
SO-37	Mine waste pile in Niagara Gulch.		08/13/97, 1400	M	N/A	MHDW 92	-	-	-	
SO-38	Mine waste pile in lower Eureka Gulch.		08/13/97, 1430	M	N/A	MHDW 93	-	-	-	
SO-39	Treasure Mountain Mine waste pile, Picayune Gulch.		08/14/97, 0900	M	N/A	MHDW 94	-	-	-	
SO-40	Mine waste pile west of Treasure Mountain Mine, Picayune Gulch.		08/14/97, 0930	M	N/A	MHDW 95	-	-	-	
SO-41	Mine waste pile west of Toltec Mine, south of Picayune Gulch.		08/14/97, 1100	M	N/A	MHDW 96	-	-	-	
SO-42	Mine waste pile in Cinnamon Creek. **NOT SAMPLED**		**NOT SAMPLED**	N/A	N/A	N/A	-	-	-	
SO-43	Mine Waste pile northwest of cable tram, North Fork of the Animas.		08/12/97, 1500	M	N/A	MHDW 97	-	-	-	

TABLE I: SAMPLING ACTIVITIES SUMMARY
Upper Animas Watershed
Page 1 of 12

Sample	Location	Rationale	Date & Time Sample Taken	Analysis M=Metals C=Cyanide TOC = Total Organic Carbon B=BNA P=PCB/Pest V=VOA	Organic CLP Sample Number	Inorganic CLP Sample Number	EC (mS)	Temp (°C)	pH	Comments
SO-17	Burrows Gulch Mine waste pile, below fault.	**Source Characterization**	08/12/97, 1300	M	N/A	MHDW 73	-	-	-	
SO-18	London Mine waste pile, Burrows Gulch.		08/12/97, 1200	M	N/A	MHDW 74	-	-	-	
SO-19	Mine waste pile across Burrows Gulch from London Mine (DM4).		08/12/97, 1230	M	N/A	MHDW 75	-	-	-	
SO-20	Mine waste pile north of Prairie Mine, Burrows Gulch.		08/12/97, 1215	M	N/A	MHDW 76	-	-	-	
SO-21	Mine waste pile above trans-basin diversion, Burrows Gulch		08/12/97, 1115	M	N/A	MHDW 77	-	-	-	
SO-22	Mine waste pile north side of Burrows Gulch, above BG1.		08/12/97, 1130	M	N/A	MHDW 78	-	-	-	
SO-23	Mine waste pile east of cable tram, North Fork of the Animas. **NOT SAMPLED**		**NOT SAMPLED**	NA	N/A	N/A	-	-	-	
SO-24	Mine waste pile north of cable tram, North Fork of the Animas.		08/12/97, 1600	M	N/A	MHDW 80	-	-	-	
SO-25	Mine waste pile west of cable tram, North Fork of the Animas.		08/12/97, 1530	M	N/A	MHDW 81	-	-	-	
SO-26	Mine waste pile southwest of cable tram, North Fork of the Animas.		08/12/97, 1545	M	N/A	MHDW 82	-	-	-	
SO-27	Mine Waste pile southeast of cable tram, North Fork of the Animas.		08/12/97, 1500	M	N/A	MHDW 83	-	-	-	
SO-28	Mill tailings above Grouse Gulch.		08/14/97, 1030	M	N/A	MHDW 79	-	-	-	
SO-29	Mine waste pile south of Grouse Gulch.		08/13/97, 1130	M	N/A	MHDW 84	-	-	-	
SO-30	Toltec Mine waste pile, south of Picayune Gulch.		08/13/97, 1230	M	N/A	MHDW 85	-	-	-	

TABLE I: SAMPLING ACTIVITIES SUMMARY
Upper Animas Watershed
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Sample	Location	Rationale	Date & Time Sample Taken	Analysis M=Metals C=Cyanide TOC = Total Organic Carbon B=BNA P=PCB/Pest V=VOA	Organic CLP Sample Number	Inorganic CLP Sample Number	EC (mS)	Temp (°C)	pH	Comments
SO-1	Upper Mountain Queen waste pile.	Solid Source Characterization.	08/11/97, 1000	M	N/A	MHDK 48	-	-	-	
SO-2	Lower Mountain Queen waste pile.		08/11/97, 1020	M	N/A	MHDK 49	-	-	-	
SO-3	Mine waste pile below CG2, California Gulch.		08/11/97, 1100	M	N/A	MHDK 50	-	-	-	
SO-4	Unknown Mine waste pile (DM13), California G.		08/12/97, 1000	M	N/A	MHDK 54	-	-	-	
SO-5	Unknown Mine waste pile (DM14), California G. **NOT SAMPLED**		**NOT SAMPLED**	NA	N/A	NA	-	-	-	
SO-6	Unknown mine waste pile (DM17), California G.		08/12/97, 1100	M	N/A	MHDK 55	-	-	-	
SO-7	Unknown mine waste pile (DM15), California G.		08/11/97, 1130	M	N/A	MHDK 56	-	-	-	
SO-8	Unknown mine waste pile (DM16), California G.		08/11/97, 1145	M	N/A	MHDW 64	-	-	-	
SO-9	Unknown mine waste pile (DM18), California G.		08/11/97, 1200	M	N/A	MHDW 65	-	-	-	
SO-10	Bagley Tunnel mine waste pile.		08/11/97, 1245	M	N/A	MHDW 66	-	-	-	
SO-11	Mine waste pile below Bagley, below CG-9.		08/11/97, 1315	M	N/A	MHDW 67	-	-	-	
SO-12	Mine waste pile above Columbus Mine.		08/13/97, 0900	M	N/A	MHDW 68	-	-	-	
SO-13	Columbus Mine waste pile.		08/14/97, 1330	M	N/A	MHDW 69	-	-	-	
SO-14	Silver Queen Mine waste pile, Placer Gulch.		08/14/97, 0900	M	N/A	MHDW 70	-	-	-	
SO-15	Lucky Jack Mine waste pile.		08/14/97, 1000	M	N/A	MHDW 71	-	-	-	
SO-16	Unknown mine waste pile north of Denver Lake.		08/14/97, 0930	M	N/A	MHDW 72	-	-	-	

TABLE I: SAMPLING ACTIVITIES SUMMARY
Upper Animas Watershed
Page/ of /2.

Sample	Location	Rationale	Date & Time Sample Taken	Analysis M=Metals C=Cyanide TOC = Total Organic Carbon B=BNA P=PCB/Pest V=VOA	Organic CLP Sample Number	Inorganic CLP Sample Number	EC (mS)	Temp (°C)	pH	Comments
UA-1	Sediment sample taken from the Animas River above draining mine DM1.	To determine background sediment quality of the Animas River.	09/04/97, 1500	M	N/A	MHDX 00	NA	NA	NA	
UA-2	Sediment sample taken from the Animas River above the Lucky Jack Mine.	To determine background sediment quality for the Animas River.	09/04/97, 1424	M	N/A	MHDX 01	NA	NA	NA	
UA-3	Sediment sample taken form the Animas River downstream of draining mines DM1 and DM2.	To assess potential contribution of substances from draining mines and waste piles.	09/04/97, 1255	M	N/A	MHDX 02	NA	NA	NA	
UA-4	Sediment sample taken from the Animas River downstream of Burrows Gulch.	To assess potential contribution of substances from Burrows Gulch and Horseshoe Creek.	09/04/97, 1320 09/16/97, 1515	M, C TOC,B, P, V	N/A HS260	MHDX 03	NA	NA	NA	
UA-5	Sediment sample taken from the Animas River downstream of draining mine DM9.	To assess potential contribution of substances from draining mine DM9 and waste pile complex.	09/04/97, 1220	M	N/A	MHDX 04	NA	NA	NA	
UA-6	Sediment sample taken from the Animas River above the confluence with California Gulch.	To assess the potential contribution of substances from the mineralized canyon below site UA5.	09/04/97, 1200	M	N/A	MHDX 05	NA	NA	NA	
UA-7	Sediment sample taken from the Animas River below the confluence with California Gulch.	To assess potential contribution of substances form California Gulch.	09/04/97, 1100	M	N/A	MHDX 06	NA	NA	NA	
UA-8	Sediment sample taken from the Animas River upstream of Burns Gulch.	To assess potential contribution of substances from Cinnamon Creek, Grouse Creek and Picayune Gulch.	09/04/97, 1028	M	N/A	MHDX 07	NA	NA	NA	

TABLE I: SAMPLING ACTIVITIES SUMMARY
Upper Animas Watershed
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Sample	Location	Rationale	Date & Time Sample Taken	Analysis M=Metals C=Cyanide TOC = Total Organic Carbon B=BNA P=PCB/Pest V=VOA	Organic CLP Sample Number	Inorganic CLP Sample Number	EC (mS)	Temp (°C)	pH	Comments
UA-9	Sediment sample from the Animas River downstream of Burns Gulch.	To assess potential contribution of substances from Burns Gulch.	09/04/97, 1015	M	N/A	MHDX 08	NA	NA	NA	
UA-10	Sediment sample from the Animas River downstream of the Silver Wing Mine.	To assess potential contribution of substances from the Silver Wing Mine.	09/04/97, 0950 09/16/97, 1300	M, C, TOC, B, P, V	HS261	MHDX 09	NA	NA	NA	
UA-11	Sediment sample from the Animas River upstream of Niagara Gulch.	To determine potential contribution of substances from natural sources and the Tom Moore Mine.	09/04/97, 1025	M	N/A	MHDX 10	NA	NA	NA	
UA-12	Sediment sample from the Animas River upstream of Eureka Gulch.	To assess potential contribution of substances from Niagara Gulch, draining mines DM23 and DM24 and waste piles.	09/04/97,1340	M	NA	MHDX 11	NA	NA	NA	
HC-1	Sediment sample from Horseshoe Creek above the confluence with the Animas River.	To determine sediment quality in Horseshoe Creek above the confluence with the Animas River.	09/04/97, 1340	M	N/A	MHDX 12	NA	NA	NA	
BG-1	Sediment sample from Burrows Gulch above the draining mines.	To determine background sediment quality in Burrows Gulch.	09/04/97, 1621	M	N/A	MHDX 13	NA	NA	NA	
BG-2	Sediment sample from Burrows Gulch below breached trans-basin diversion.	To assess potential contribution of substances from draining Mine DM3 and natural sources to Burrows Gulch.	09/04/97, 1345	M	N/A	MHDX 14	NA	NA	NA	
BG-3	Sediment sample from Burrows Gulch below London Mine.	To assess potential contribution of substances from the London, Prairie, and unnamed Mines.	09/04/97, 1500	M	N/A	MHDX 15	NA	NA	NA	

TABLE I: SAMPLING ACTIVITIES SUMMARY
Upper Animas Watershed
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Sample	Location	Rationale	Date & Time Sample Taken	Analysis M=Metals C=Cyanide TOC = Total Organic Carbon B=BNA P=PCB/Pest V=VOA	Organic CLP Sample Number	Inorganic CLP Sample Number	EC (mS)	Temp (°C)	pH	Comments
BG-4	Sediment sample from Burrows Gulch below intermittent tributary.	To assess changes in sediment quality due to inflow from small tributary.	09/04/97, 1415	M	NA	MHDX 16	NA	NA	NA	
BG-5	Sediment sample from Burrows Gulch above its confluence with the Animas River.	To assess potential contribution of substances from a large fault, and in stream waste pile, plus the contribution from Burrows Gulch to the Animas.	09/04/97, 1325	M	N/A	MHDX 17	NA	NA	NA	
CG-1	Sediment sample from California Gulch above the Mountain Queen Mine. **NOT SAMPLED - DRY**	To determine background sediment quality in California Gulch.	**NOT SAMPLED - DRY**	NA	NA	NA	NA	NA	NA	
CG-2	Sediment sample from California Gulch downstream of the Mountain Queen Mine.	To assess potential contribution of substances from the Mountain Queen draining mine and waste pile.	09/04/97, 1600	M	N/A	MHDX 19	NA	NA	NA	
CG-3	Sediment sample from California Gulch above beginning of white precipitate on streambed.	To assess potential contribution of substances from a group of small waste piles and to serve as "background" fro a large group of mines.	09/04/97, 1545	M	N/A	MHDX 20	NA	NA	NA	
CG-4	Sediment sample from California Gulch downstream of large group of draining mines and waste piles.	To assess potential contribution of substances from a series of draining mines and associated waste rock piles..	09/04/97, 1500	M	N/A	MHDX 21	NA	NA	NA	
CG-5	Sediment sample from Perennial tributary to California Gulch downstream of draining mine DM17 and waste pile. **NOT SAMPLED - DRY**	To assess potential contribution of substances from the mine drainage and waste rock.	**NOT SAMPLED - DRY**	NA	NA	NA	NA	NA	NA	

TABLE I: SAMPLING ACTIVITIES SUMMARY
Upper Animas Watershed
Page 1 of 2

Sample	Location	Rationale	Date & Time Sample Taken	Analysis M=Metals C=Cyanide TOC = Total Organic Carbon B=BNA P=PCB/Pest V=VOA	Organic CLP Sample Number	Inorganic CLP Sample Number	EC (mS)	Temp (°C)	pH	Comments
CG-6	Sediment sample from California Gulch downstream of tributary CG-5.	To determine sediment quality in California Gulch below the confluence with tributary affected by draining mine and waste pile.	09/04/97, 1500	M	N/A	MHDX 23	NA	NA	NA	
CG-7	Sediment sample from California Gulch upstream of confluence with Placer Gulch.	To determine sediment quality in California Gulch above its confluence with Placer Gulch.	09/04/97, 1430	M	N/A	MHDX 24	NA	NA	NA	
CG-8	Sediment sample from California Gulch below its confluence with Placer Gulch.	To determine sediment quality of California Gulch below its confluence with Placer Gulch.	09/04/97, 1400	M	N/A	MHDX 25	NA	NA	NA	
CG-9	Sediment sample from California Gulch below Bagley Tunnel mine drainage.	To assess potential contribution of substances form the Bagley Tunnel mine drainage and waste pile to California Gulch.	09/04/97, 1400	M	N/A	MHDX 26	NA	NA	NA	
CG-10	Sediment sample from California Gulch below Bagley Mill tailings.	To assess potential contributions of substances from the Bagley Mill tailings.	09/04/97, 1330	M	N/A	MHDX 27	NA	NA	NA	
CG-11	Sediment sample from California Gulch below group of mine waste rock piles.	To assess potential contributions of substances from a group of mine waste rock piles during high flow period.	09/04/97, 1300	M	NA	MHDX 28	NA	NA	NA	

TABLE I: SAMPLING ACTIVITIES SUMMARY
Upper Animas Watershed
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Sample	Location	Rationale	Date & Time Sample Taken	Analysis M=Metals C=Cyanide TOC = Total Organic Carbon B=BNA P=PCB/Pest V=VOA	Organic CLP Sample Number	Inorganic CLP Sample Number	EC (mS)	Temp (°C)	pH	Comments
CG-12	Sediment sample from California Gulch above confluence with Animas River.	To determine sediment quality of California Gulch above its confluence with Animas River and to assess potential contributions of substances from the Columbus mine drainage and waste rock pile.	09/04/97, 1230 09/16/97, 1445	M,C TOC,B,P,V	HS262	MHDX 29	NA	NA	NA	
PL-1	Sediment sample from Placer Gulch above confluence with California Gulch.	To determine sediment quality of Placer Gulch above its confluence with California Gulch.	09/04/97, 1430	M	N/A	MHDX 30	NA	NA	NA	
CN-1	Sediment sample from ~~Cement~~ Cimarron Creek above its confluence with ~~Ohio Gulch~~ Animas R.	To determine sediment quality of ~~Cement~~ Cimarron Creek above its confluence with Ohio Gulch.	09/04/97, 1300	M	N/A	MHDX 31	NA	NA	NA	
GG-1	Sediment sample from Grouse Gulch above its confluence with the Animas River.	To determine sediment quality of Grouse Gulch above its confluence with the Animas River.	09/04/97, 1230	M	N/A	MHDX 32	NA	NA	NA	
PY-1	Sediment sample from Picayune Gulch above its confluence with the Animas River.	To determine sediment quality of Picayune Gulch above its confluence with Animas River.	09/04/97, 1128	M	N/A	MHDX 33	NA	NA	NA	
BU-1	Sediment sample from Burns Gulch above the confluence with the Animas River.	To determine sediment quality of Burns Gulch above its confluence with the Animas River.	09/04/97, 1059 09/16/97, 1415	M,C TOC,B,P,V	HS267	MHDX 34	NA	NA	NA	

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TABLE I: SAMPLING ACTIVITIES SUMMARY
Upper Animas Watershed
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Sample	Location	Rationale	Date & Time Sample Taken	Analysis M=Metals C=Cyanide TOC = Total Organic Carbon B=BNA P=PCB/Pest V=VOA	Organic CLP Sample Number	Inorganic CLP Sample Number	EC (mS)	Temp (°C)	pH	Comments
NG-1	Sediment sample from Niagara Gulch above the confluence with the Animas River.	To determine sediment quality of Niagara Gulch above its confluence with the Animas River.	09/04/97, 1039	M	NA	MHDX 35	NA	NA	NA	
SE-A-68	Sediment sample from the Animas River above the confluence with Cement Creek.	To determine sediment quality (metals, organics and cyanide) of the USGS gaging stations.	09/04/97, 0930 09/15/97, 1350	M, C TOC,B,P,V	HS263	MHDX 36	NA	NA	NA	
SE-CC-48	Sediment sample from Cement Creek above its confluence with the Animas River.	To determine sediment quality (metals, organics and cyanide) of the USGS gaging stations.	09/04/97, 1135 09/15/97, 1415	M, C TOC,B,P,V	HS264	MHDX 37	NA	NA	NA	
SE-M-34	Sediment sample from Mineral Creek above the confluence with the Animas River.	To determine sediment quality (metals, organic, and cyanide) of the USGS gaging stations. **Organics Not Analyzed - jars broken during shipment**	09/04/97, 1110 09/15/97, 1330	M, C TOC,B,P,V	HS265 **Not analyzed - jars broken**	MHDX 38	NA	NA	NA	
SE-A-72	Sediment sample from Animas River below the confluence of Mineral Creek.	To determine sediment quality (metals, organic, and cyanide) of the USGS gaging stations.	09/04/97, 1030 09/15/97, 1300	M, C TOC,B,P,V	HS266	MHDX 39	NA	NA	NA	
OP-SE-100	Opportunity sample from Burns Gulch below mine waste rock piles SO-34 and SO-35.	To assess composition of white coating on sediments below these waste rock piles.	08/13/97, 1330	M	NA	MHDW98	NA	NA	NA	

TABLE I: SAMPLING ACTIVITIES SUMMARY
Upper Animas Watershed
Page 1 of 2

Sample	Location	Rationale	Date & Time Sample Taken	Analysis M=Metals C=Cyanide TOC = Total Organic Carbon B=BNA P=PCB/Pest V=VOA	Organic CLP Sample Number	Inorganic CLP Sample Number	EC (mS)	Temp (°C)	pH	Comments
SW-UA-4	Surface water sample from the Animas River downstream of Burrows Gulch.	To determine potential contribution of organic substances from Burrows Gulch and Horseshoe Creek	09/16/97, 1515	M,C,TOC,B,P,V	HS268	MHDX 40	NM	NM	NM	
SW-CG-12	Surface water sample from California Gulch above its confluence with the Animas River.	To assess potential contribution of organic substances from California Gulch.	09/16/97, 1445	M,C,TOC,B,P,V	HS269	MHDX 41	NM	NM	NM	
SW-BU-1	Surface water sample from Burns Gulch above the confluence with the Animas River.	To assess potential contribution of organic substances from Burns Gulch.	09/16/97, 1415	M,C,TOC,B,P,V	HS270	MHDX 42	NM	NM	NM	
SW-UA-10	Surface water sample from the Animas River downstream of the Silver Wing Mine.	To assess potential contribution of organic substances from the Silver Wing mine.	09/16/97, 1300	M,C,TOC,B,P,V	HS271	MHDX 43	NM	NM	NM	
SW-A-68	Surface water sample from the Animas River above the confluence with Cement Creek.	To determine surface water quality from the USGS gaging stations.	09/04/97, 0930 09/15/97, 1350	M,C TOC,B,P,V	HS272	MHDX 44	NM	NM	NM	
SW-CC-48	Surface water sample from Cement Creek above its confluence with the Animas River.	To determine surface water quality from the USGS gaging stations.	09/04/97, 1135 09/15/97, 1415	M,C TOC,B,P,V	HS273	MHDX 45	NM	NM	NM	
SW-M-34	Surface water sample from Mineral Creek above its confluence with the Animas River.	To determine surface water quality from the USGS gaging stations.	09/04/97, 1110 09/15/97, 1330	M,C TOC,B,P,V	HS274	MHDX 46	NM	NM	NM	
SW-A-72	Surface water sample from the Animas River below its confluence with Mineral Creek.	To determine surface water quality from the USGS gaging stations.	09/04/97, 1030 09/15/97, 1300	M,C TOC,B,P,V	HS275	MHDX 47	NM	NM	NM	

TABLE I: SAMPLING ACTIVITIES SUMMARY
Upper Animas Watershed
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Sample	Location	Rationale	Date & Time Sample Taken	Analysis M=Metals C=Cyanide TOC = Total Organic Carbon B=BNA P=PCB/Pest V=VOA	Organic CLP Sample Number	Inorganic CLP Sample Number	EC (mS)	Temp (°C)	pH	Comments
GW-1	Groundwater sample obtained from monitoring well drilled in the Silverton Town Campground.	To determine groundwater quality from the Upper Animas Groundwater plume.	09/15/97, 0945	M,C,TOC,B,P,V	HS277	MHDX 49	1275	11.2	6.15	PVC pipe with 2 inch inner diameter Total Depth : 18.6 ft. Top of Casing (TOC): 2.2 ft. above ground surf Depth to Water: 7.03 ft. from TOC ; or 4.83 ft. below ground surfa
GW-2	Groundwater sample **NOT SAMPLED - DRY** from well drilled in Town of Silverton's Memorial Park.	To determine groundwater quality from the Cement Creek Groundwater plume.	**NOT SAMPLED**	**NOT SAMPLED**	NA	NA	NA	NA	NA	PVC pipe with 2 inch inner diameter Total Depth : 17.9 ft. Top of Casing (TOC): Not determined Depth to Water: Greater than 17.9 ft. NOTE: bottom of well is 9 ft. below creek elev
GW-3	Groundwater sample obtained from monitoring well drilled north of the Silverton Sewage treatment plant.	To determine groundwater quality from the Mineral Creek Groundwater plume.	09/15/97, 1122	M,C,TOC,B,P,V	HS279	MHDX 51	178	9.1	5.88	PVC pipe with 2 inch inner diameter Total Depth : 18.7 ft. Top of Casing (TOC): 2.0 ft. above ground surf Depth to Water: 10.2 ft. from TOC ; or 8.2 ft. below ground surface
GW-4	Groundwater sample obtained from monitoring well drilled in old landfill/dump location (approximately 10th St., north of railroad tracks).	To determine groundwater quality in the vicinity of an old landfill location.	09/15/97, 1022	M,C,TOC,B,P,V	HS288	MHDX 62	330	10.1	4.59	PVC pipe with 2 inch inner diameter Total Depth : 16.8 ft. Top of Casing (TOC): 2.7 ft. above ground surf Depth to Water: 12.85 ft. from TOC ; or 10.15 ft. below ground surfa
GW-5	Opportunity drinking water sample obtained from the City of Silverton's treated drinking water supply: a composite from Boulder and Bear Creeks (surface water).	To determine the organic component of drinking water quality of Silverton's municipal drinking water supply.	09/15/97,	Certified Drinking water organic analytes	NA	NA	NM	NM	NM	Sample collected by City of Silverton personne sent to Acculabs research, a lab certified to conduct drinking water analyses.
OP-SL-1	Opportunity soil sample	To determine metal and organic compound concentration in residential soils.	09/16/97, 1715	M,C,P,P,V	HS285	MHDX59	NM	NM	NM	Sample collected from Simon property, west o Reese St.
OP-SL-2	Opportunity soil sample.		09/16/97, 1645	M,C,P,V	HS286	MHDX60	MN	NM	NM	Sample collected from Simon property, east of Buff, west of the railroad tracks.

TABLE I: SAMPLING ACTIVITIES SUMMARY
Upper Animas Watershed
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Sample	Location	Rationale	Date & Time Sample Taken	Analysis M=Metals C=Cyanide TOC = Total Organic Carbon B=BNA P=PCB/Pest V=VOA	Organic CLP Sample Number	Inorganic CLP Sample Number	EC (mS)	Temp (°C)	pH	Comments
SW-100	Equipment rinsate blank for waste pile sampling.	Quality control sample to determine field decontamination procedures.	08/13/97, 0900	M	N/A	MHDX 52	-	-	-	
SW-200	Equipment rinsate blank for waste pile sampling.		08/14/97, 0900	M	N/A	MHDX 53	-	-	-	
SW-300	Equipment rinsate blank for sediment sampling.		09/04/97, 1300	M, C	N/A	MHDX 54	-	-	-	
SW-400	Equipment rinsate blank for sediment sampling.		09/04/97, 1627 09/16/97, 1300	M, C TOC,B,P,V	HS281	MHDX 55	-	-	-	
SW-500	Duplicate of SW-A-72	Quality control sample to assess accuracy and precision.	09/04/97, 1030 09/15/97, 1300	M, C TOC,B,P,V	HS282	MHDX 56	-	-	-	
SW-600	Field blank for Day 1 sampling.	Quality control sample to assess potential field contamination.	09/04/97, 1600	M, C	N/A	MHDX 57	-	-	-	
SW-700	Equipment rinsate blank for soil sampling.	Quality control sample to determine field decontamination procedures.	09/16/97, 1645	M,C,TOC,B,P,V	HS284	MHDX 58	-	-	-	
SW-800	Field Blank for Day 2 sampling.	Quality control sample to assess potential field contamination.	09/16/97, 1345	M,C,TOC,B,P,V	HS289	MHDX 63	-	-	-	
SW-900	Trip blank for volatile organics sampling.	Quality control sample to assess sampling handling/shipping procedures.	09/15/97, 1415	V	HS290	N/A	-	-	-	

FIGURES

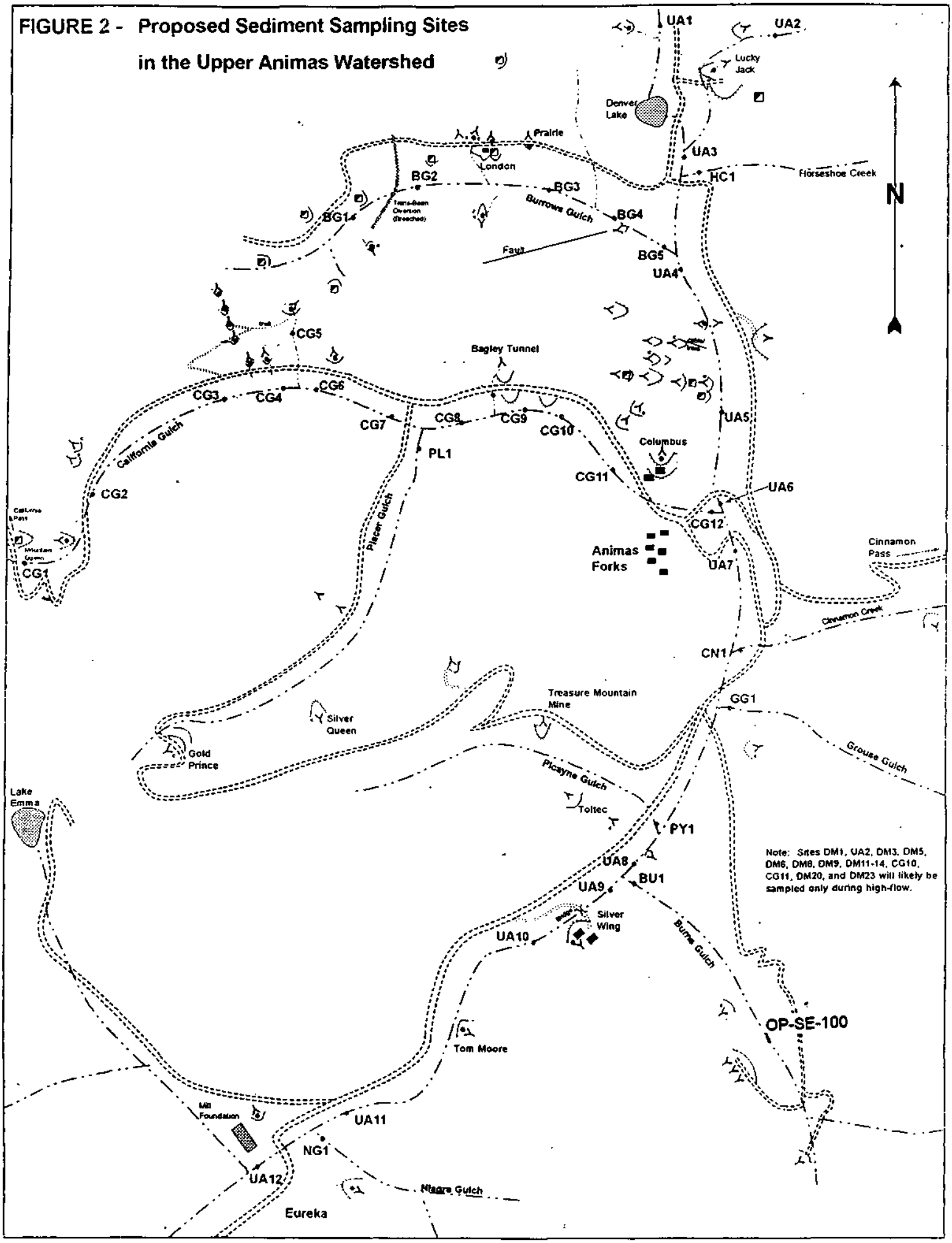


FIGURE 2 - Proposed Sediment Sampling Sites
in the Upper Animas Watershed
UA1
UA2
Lucky Jack
Denver Lake
Prairie
London
UA3
HC1
Horseshoe Creek
N
BG1
BG2
BG3
BG4
BG5
Burrows Gulch
Fault
UA4
CG5
Bagley Tunnel
CG3
CG4
CG6
CG7
CG8
CG9
CG10
UA5
California Gulch
PL1
Columbus
CG11
UA6
CG2
Placer Gulch
CG12
Animas Forks
UA7
CG1
Cinnamon Pass
Cinnamon Creek
CN1
Treasure Mountain Mine
GG1
Silver Queen
Gold Prince
Grouse Gulch
Picayne Gulch
Toltec
Lake Emma
PY1
UA8
BU1
UA9
Silver Wing
UA10
Burns Gulch
OP-SE-100
Tom Moore
Mill Foundation
UA11
NG1
UA12
Niagra Gulch
Eureka
Note: Sites DM1, UA2, DM3, DM5, DM6, DM8, DM9, DM11-14, CG10, CG11, DM20, and DM23 will likely be sampled only during high-flow.

FIGURE 1 - Portion of the Upper Animas Watershed to be Sampled

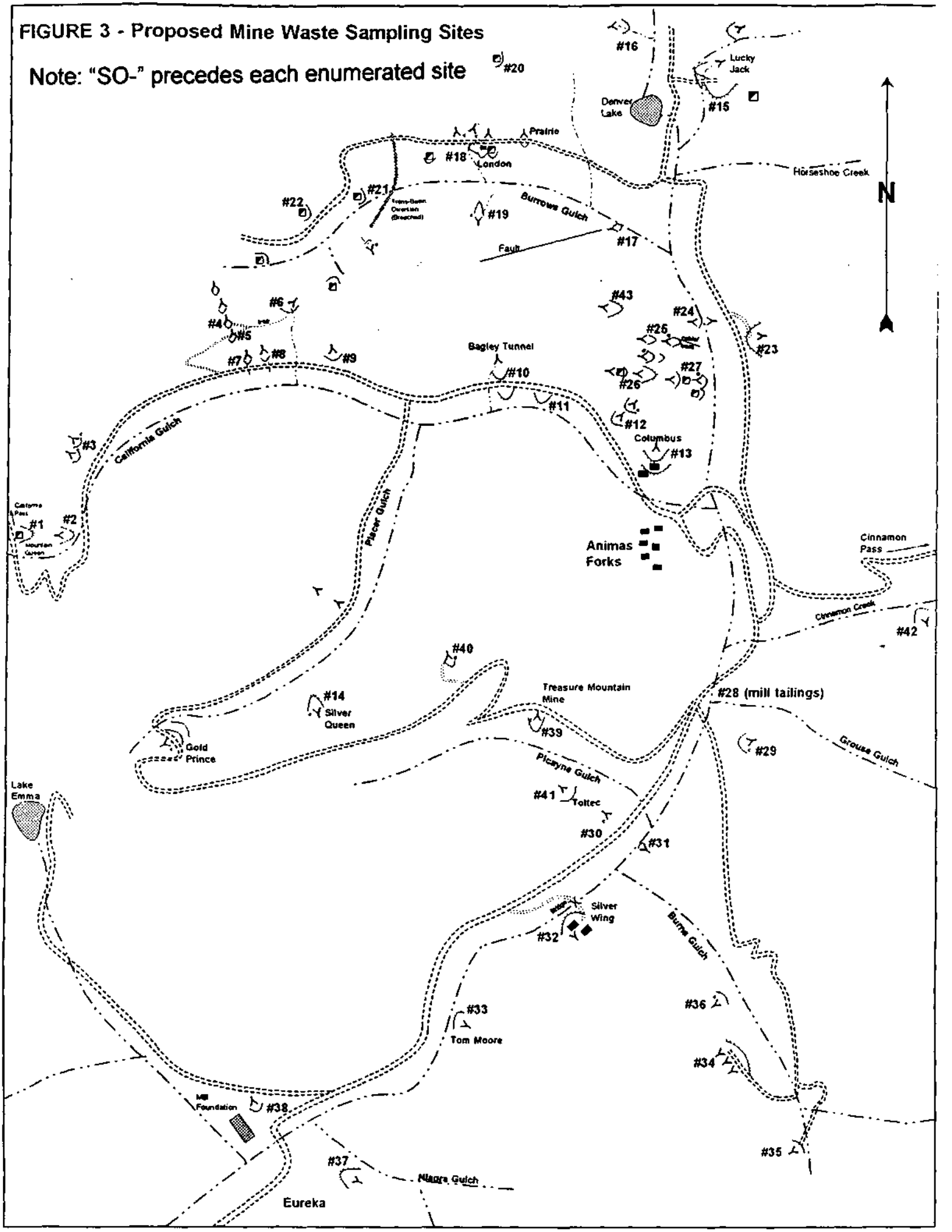
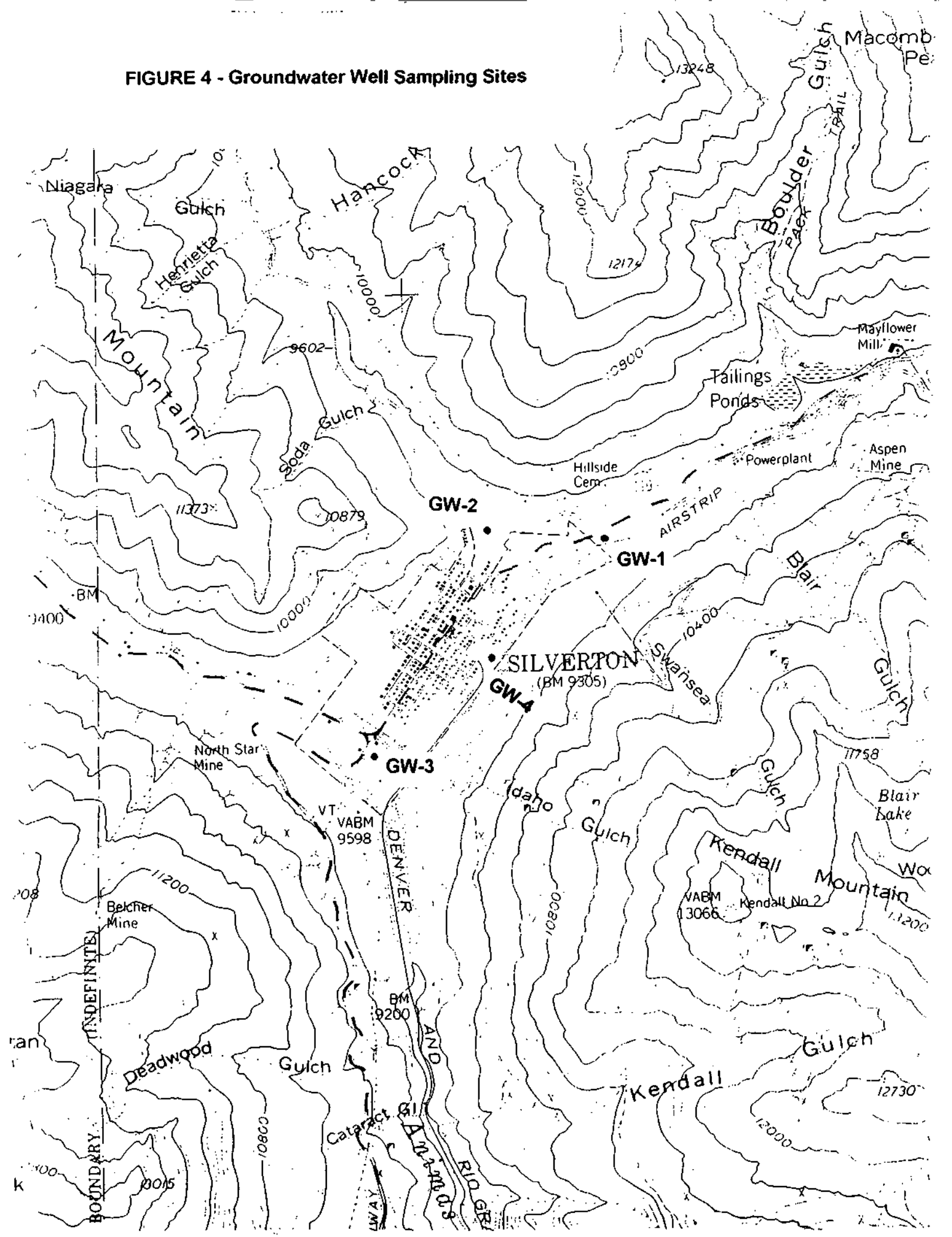


FIGURE 3 - Proposed Mine Waste Sampling Sites
Note: "SO-" precedes each enumerated site
#16
#20
Lucky Jack
#15
Denver Lake
Prairie
#18
London
Horseshoe Creek
N
#22
#21
#19
Burrows Gulch
#17
Fault
#43
#24
#6
#4
#5
#25
#23
#7
#8
#9
Bagley Tunnel
#10
#27
#26
#11
#12
Columbus
#13
#3
California Gulch
#1
#2
Placer Gulch
Animas Forks
Cinnamon Pass
Cinnamon Creek
#42
#40
#14
Silver Queen
Treasure Mountain Mine
#28 (mill tailings)
#39
Gold Prince
#29
Grouse Gulch
Picayne Gulch
Lake Emma
#41
Toltec
#30
#31
Silver Wing
#32
Burrow Gulch
#36
#33
Tom Moore
#34
Mill Foundation
#38
#35
#37
Niagra Gulch
Eureka

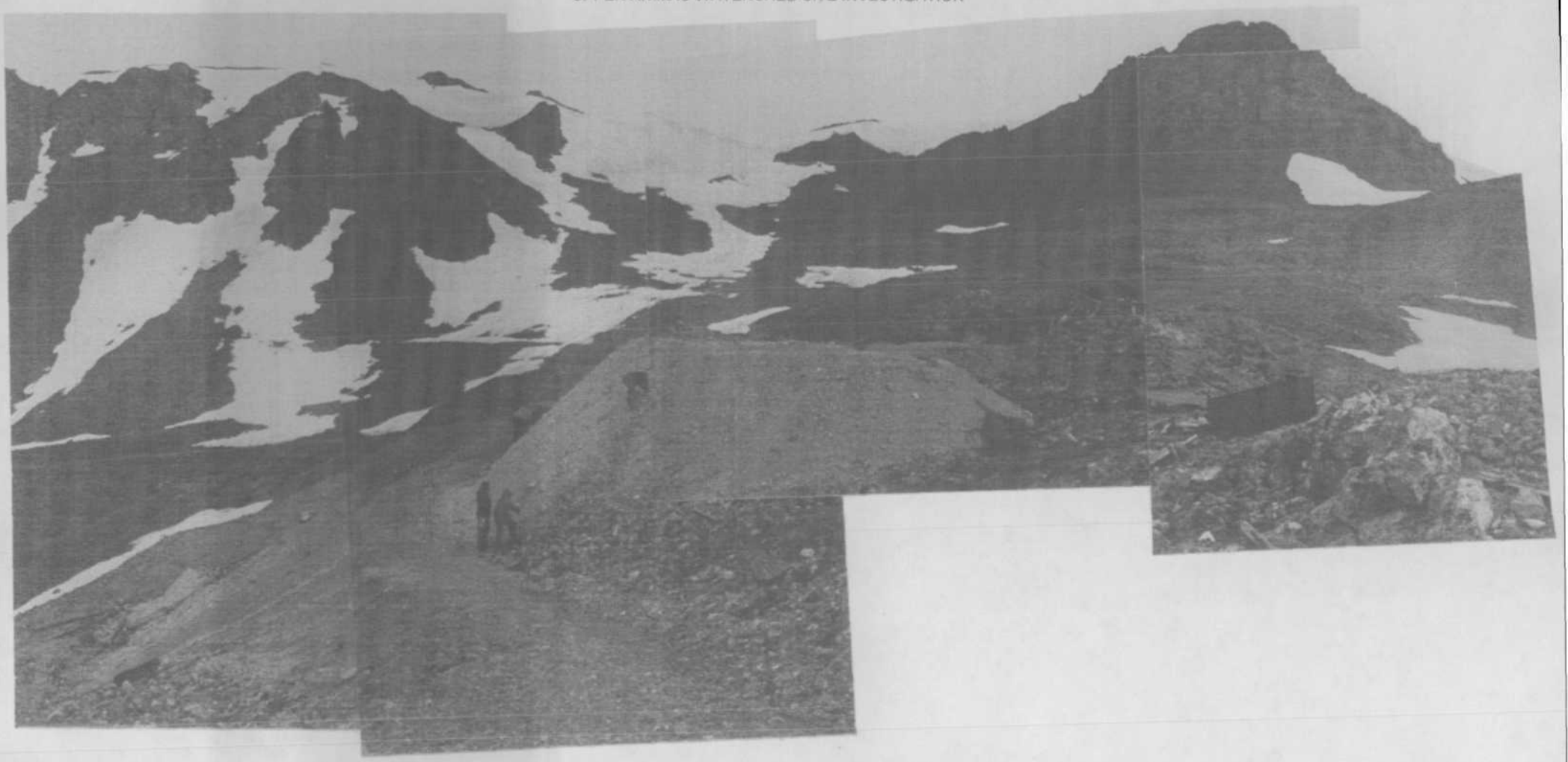
FIGURE 4 - Groundwater Well Sampling Sites



APPENDIX A

SITE PHOTOGRAPHS

OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION



Description of Photo: SO-1 Upper Mountain Queen Waste Pile

Date: August 11, 1997 Time: 1000

Direction facing: South (35mm film)

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HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-1 Waste Rock Sample

Date: August 11, 1997 Time: 1000

Direction facing: Unknown (35mm film)

Description of Photo: Looking West into California Gulch at SO-2.

Date: August 11, 1997 Time: 1000

Direction facing: West (35mm film)

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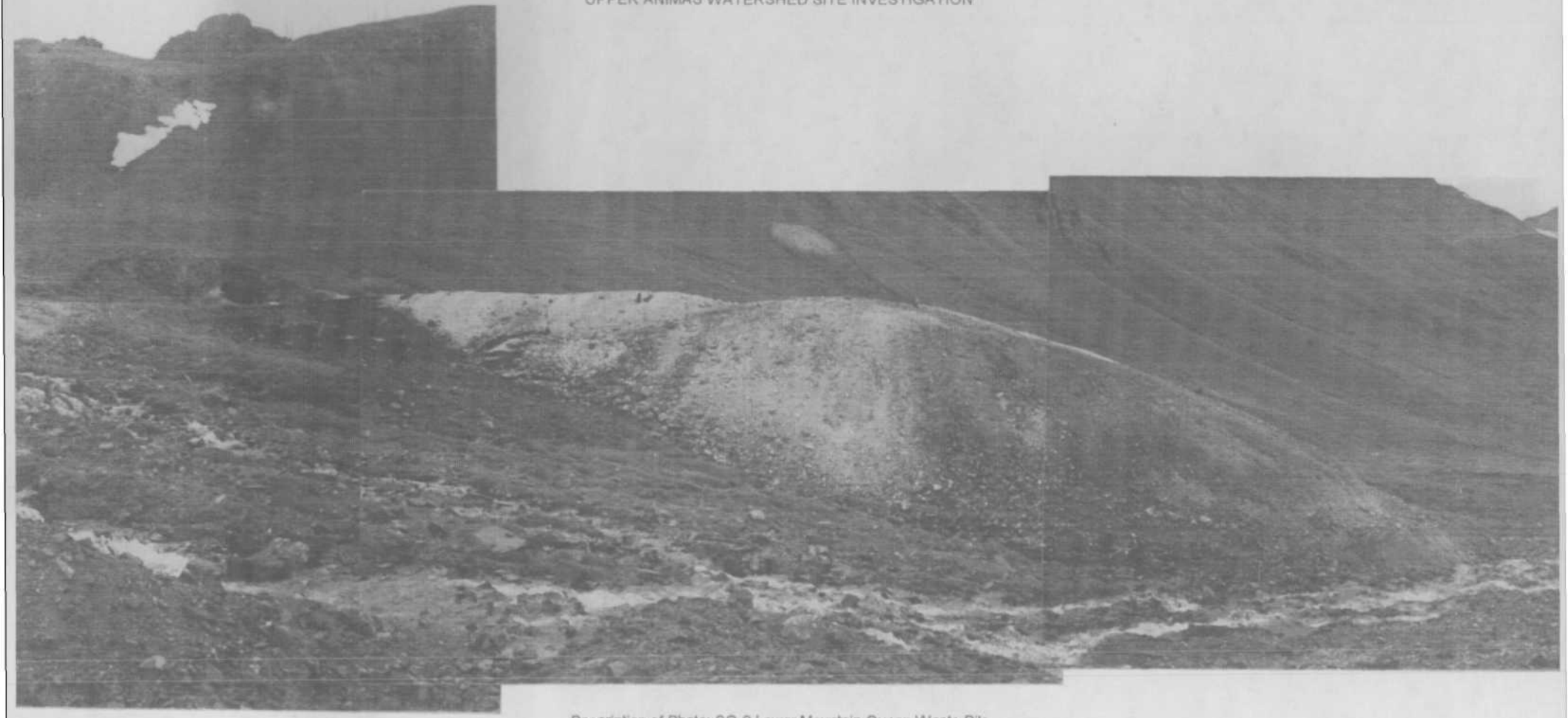
UPPER ANIMAS WATERSHED SITE INVESTIGATION



Description of Photo: SO-2 Lower Mountain Queen Waste Pile.
Date: August 11, 1997 Time: 1020
Direction facing: North (35mm film)

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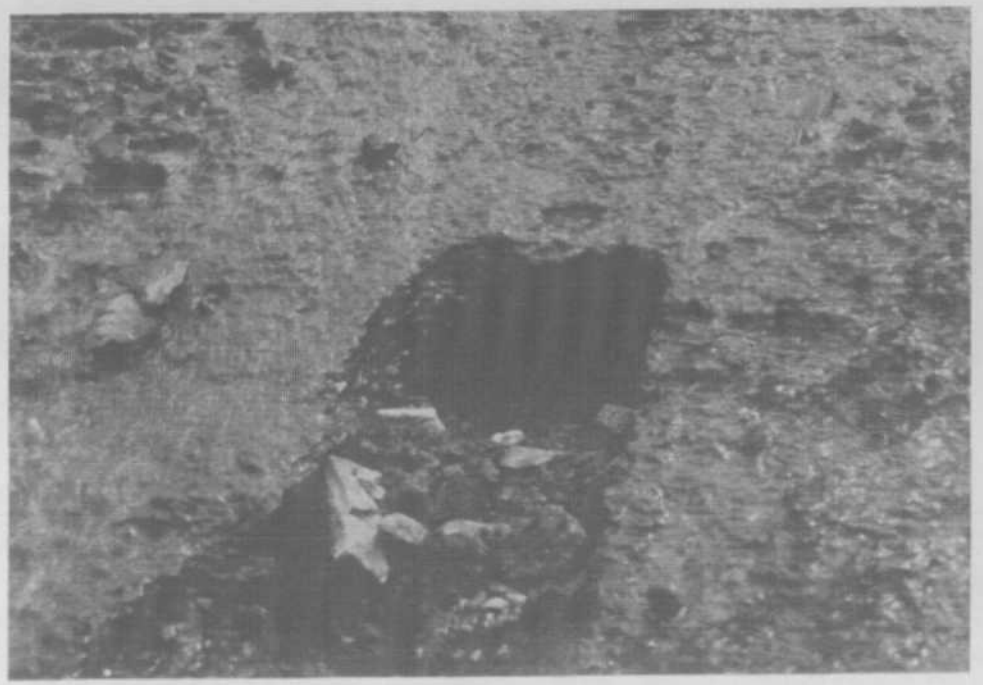
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER AMIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-2 Portal and Mine drainage (note ferricrete).

Date: August 11, 1997 Time: 1020

Direction facing: West (35mm film)



Description of Photo: SO-2 Portal and Mine drainage.

Date: August 11, 1996 Time: 1020

Direction facing: West (35mm film)

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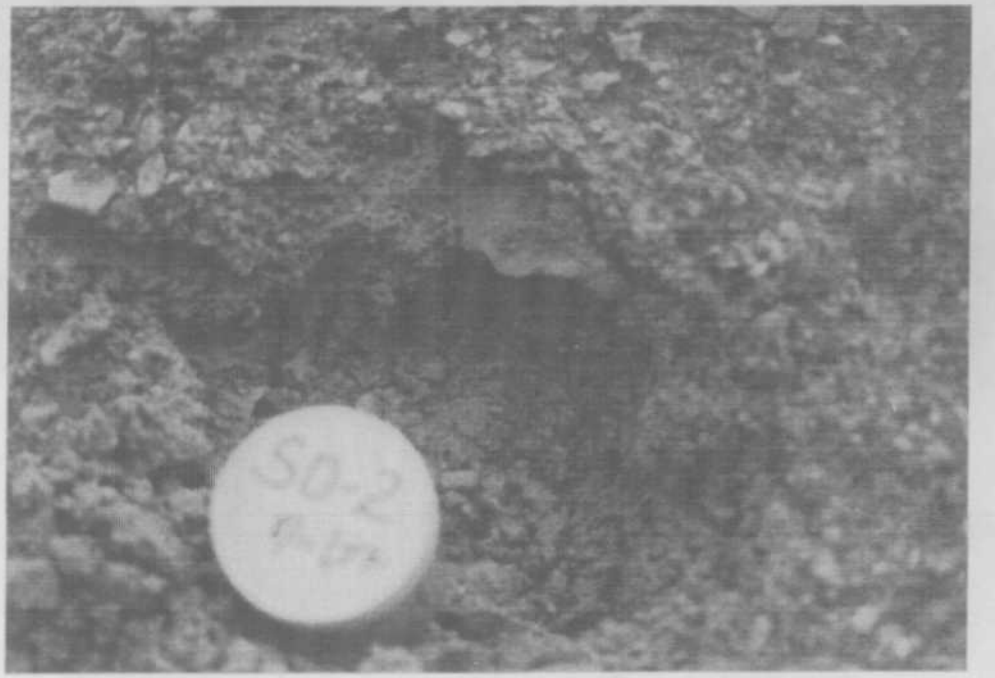
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: Vegetative "kill zone" below SO-2.

Date: August 11, 1997 Time: 1020

Direction facing: East (35mm film)



Description of Photo: SO-2 Waste Rock Sample.

Date: August 11, 1997 Time: 1020

Direction facing: Down (35mm film)

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HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: Looking at SO-3 (upper dump) from SO-2.
Date: August 11, 1997 Time: 1100
Direction facing: Northeast (35mm film)

Description of Photo: SO-3 Portal and mine drainage.
Date: August 11, 1997 Time: 1100
Direction facing: North (35 mm film)

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HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: Vegetative "kill zone" below SO-3.

Date: August 11, 1997 Time: 1100

Direction facing: South (35mm film)

Description of Photo: SO-3 Waste Rock Sample.

Date: August 11, 1997 Time: 1100

Direction facing: Down (35mm film)

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UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: Looking west into California Gulch at SO-7, SO-5 and SO-4.
Date: August 11, 1997
Direction facing: West (35mm film)

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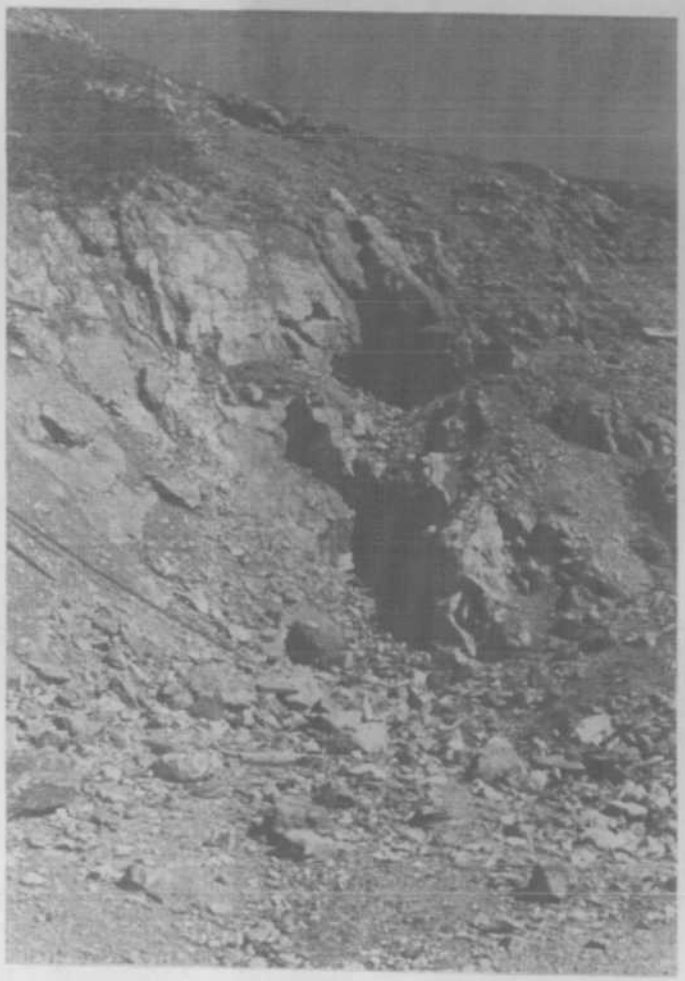
UPPER ANIMAS WATERSHED SITE INVESTIGATION



Description of Photo: SO-4 Portal.
Date: August 12, 1997 Time: 1000
Direction facing: North (35mm film)

Description of Photo: SO-4 Mine dump sample.
Date: August 12, 1997 Time: 1000
Direction facing: North (35mm film)

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UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-5 Mine Portal
Date: August 12, 1997 Time: 1115
Direction facing: North (35mm film)

Description of Photo: SO-5 Mine Draionage (DM-14).
Date: August 12, 1997 Time: 1115
Direction facing: North (35mm film)

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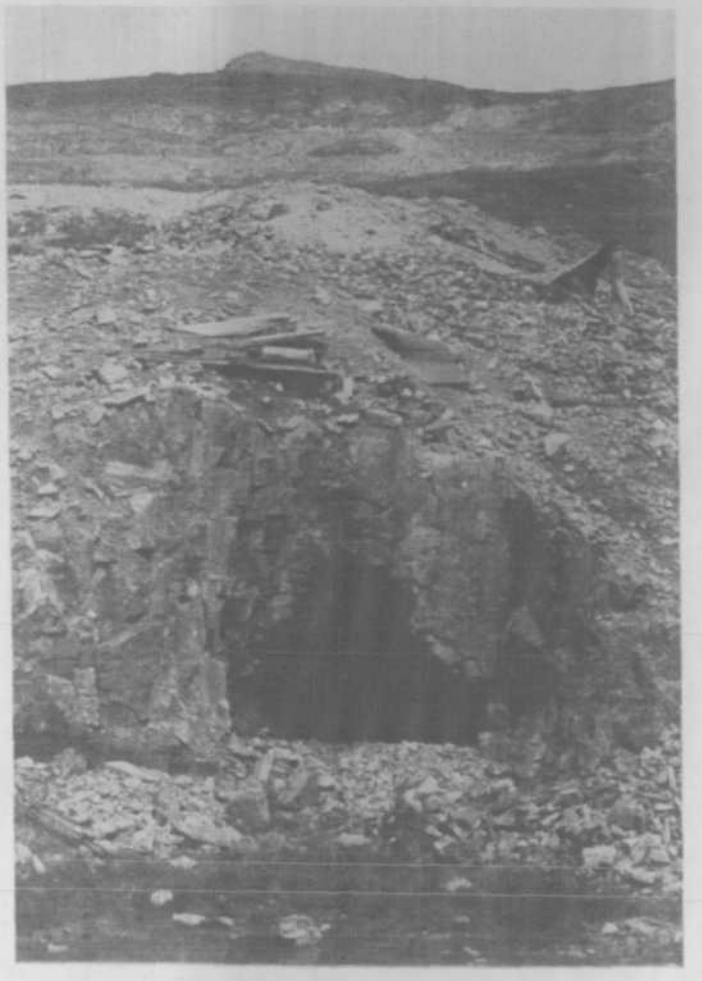

Description of Photo: SO-7 Mine Portal.
Date: August 12, 1997 Time: 1130
Direction facing: North (35mm film)

Description of Photo: SO-7 Mine Waste sample.
Date: August 12, 1997 Time: 1130
Direction facing: North (35mm film)

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HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-9 Mine waste pile.
Date: August 11, 1997
Direction facing: Southeast (35mm film)

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HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-8 Mine Portal
Date: August 11, 1997 Time: 1130
Direction facing: North (35mm film)

Description of Photo: SO-9 Mine Portal
Date: August 11, 1997
Direction facing: North (35mm film)

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HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: Seepage from below SO-9 Mine Waste Pile/pond
Date: August 11, 1997 Time: 1200
Direction facing: Southeast (35mm film)

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UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-8 Mine Waste Pile.
Date: August 11, 1997 Time: 1145
Direction facing: South (35mm film)

Description of Photo: SO-8 Mine waste sample.
Date: August 11, 1997 Time: 1145
Direction facing: South (35mm film)

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UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-10 Bagley Tunnel Portal and Mine Drainage (DM-19).
Date: August 11, 1997
Direction facing: North (35mm film)

Description of Photo: SO-10 Bagley Tunnel Mine Dump.
Date: August 11, 1997
Direction facing: South (35mm film)

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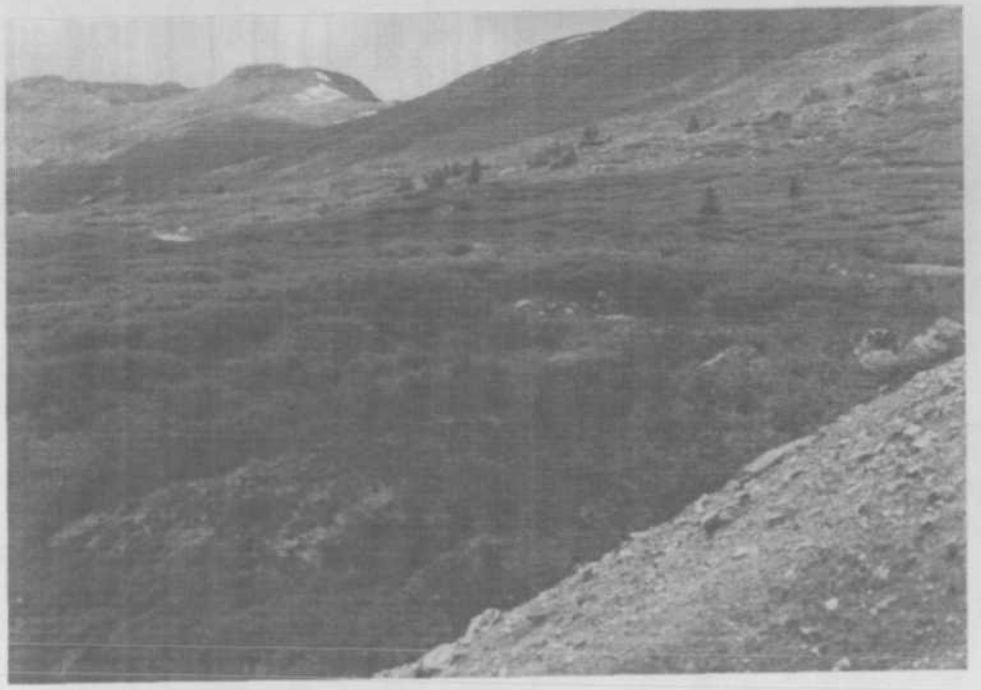
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-10 Bagley Tunnel Portal Mine Drainage (DM-19).

Date: August 11, 1997 Time: 1315
Direction facing: South (35mm film)



Description of Photo: SO-10 Bagley Tunnel Mine Drainage into wetlands south of dump.
Date: August 11, 1997 Time: 1315
Direction facing: Southwest (35mm film)

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UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-10 Looking west at Bagley T. Waste Pile.
Date: August 11, 1997 Time: 1315
Direction facing: West (35mm film)

Description of Photo: SO-10 Looking east at Bagley T. Waste Pile.
Date: August 11, 1997 Tiime: 1315
Direction facing: East (35mm film)

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Description of Photo: SO-10 Looking south at California Gulch's proximity to the toe of the Bagley Tunnel Waste pile.
Date: August 11, 1997 Tiime: 1315
Direction facing: South (35mm film)

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HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-10 Looking west of Bagley T. Waste Pile.
Date: August 11, 1997 Time: 1315
Direction facing: West (35mm film)

Description of Photo: SO-10 Looking east of Bagley T. Waste Pile.
Date: August 11, 1997 Tiime: 1315
Direction facing: East (35mm film)

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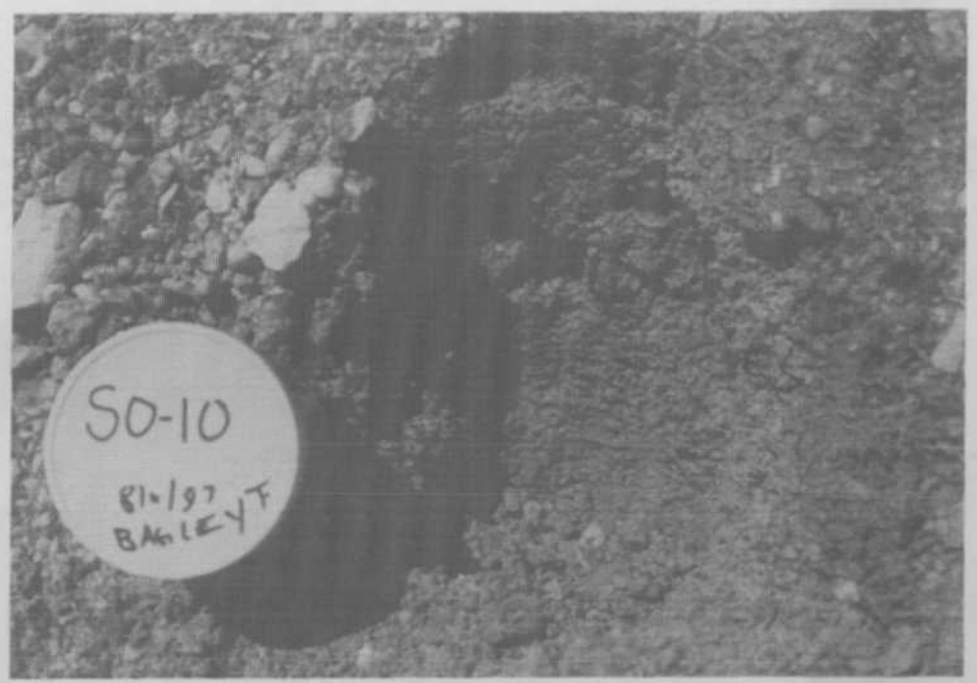
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION



Description of Photo: SO-10 Bagley Tunnel Waste pile sample.
Date: August 11, 1997 Tiime: 1315
Direction facing: South (35mm film)

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UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-11 Looking east at Bagley T. Tailing Pile.
Date: August 11, 1997 Time: 1315
Direction facing: East (35mm film)

Description of Photo: SO-11 Bagley T. Tailing Pile sample.
Date: August 11, 1997 Tiime: 1315
Direction facing: East (35mm film)

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UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-13 Columbus Mine Waste pile.
Date: August 11, 1997 Time: 1315
Direction facing: Southeast (35mm film)

Description of Photo: SO-13 Columbus Mine Waste Pile at Animas Forks.
Date: August 11, 1997 Tiime: 1315
Direction facing: North (35mm film)

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UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-18 London Mine
Date: August 12, 1997 Tiime: 1200
Direction facing: North (35mm film)

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HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-18 London Mine.
Date: August 12, 1997 Time: 1200
Direction facing: North (35mm film)

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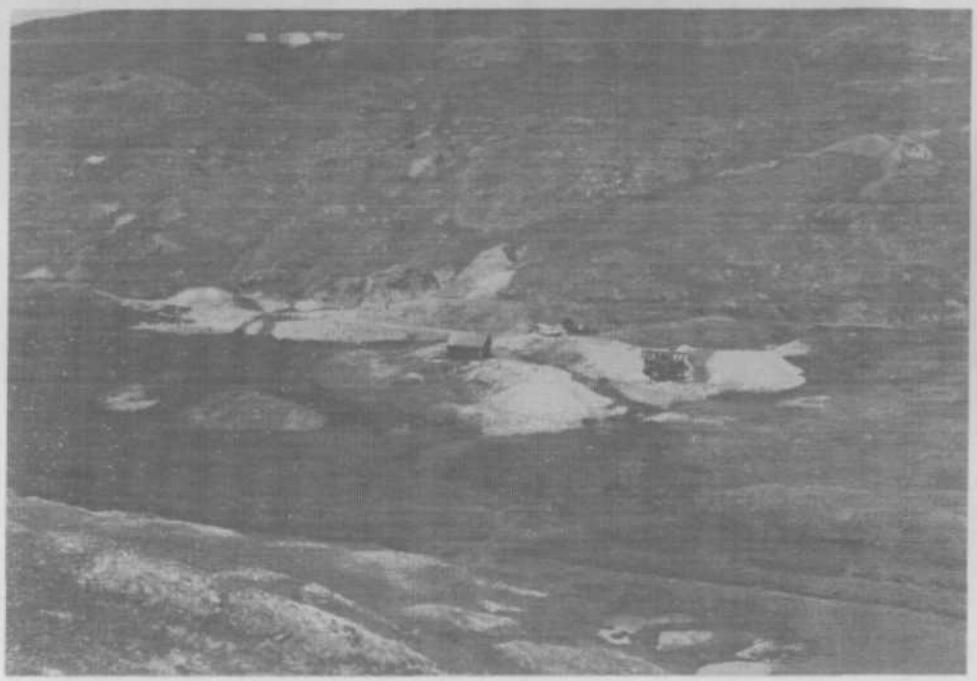
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-18 London Mine Waste pile.
Date: August 12, 1997 Time: 1200
Direction facing: North (35mm film)



Description of Photo: SO-18 London Mine Waste Pile.
Date: August 12, 1997 Time: 1200
Direction facing: North (35mm film)

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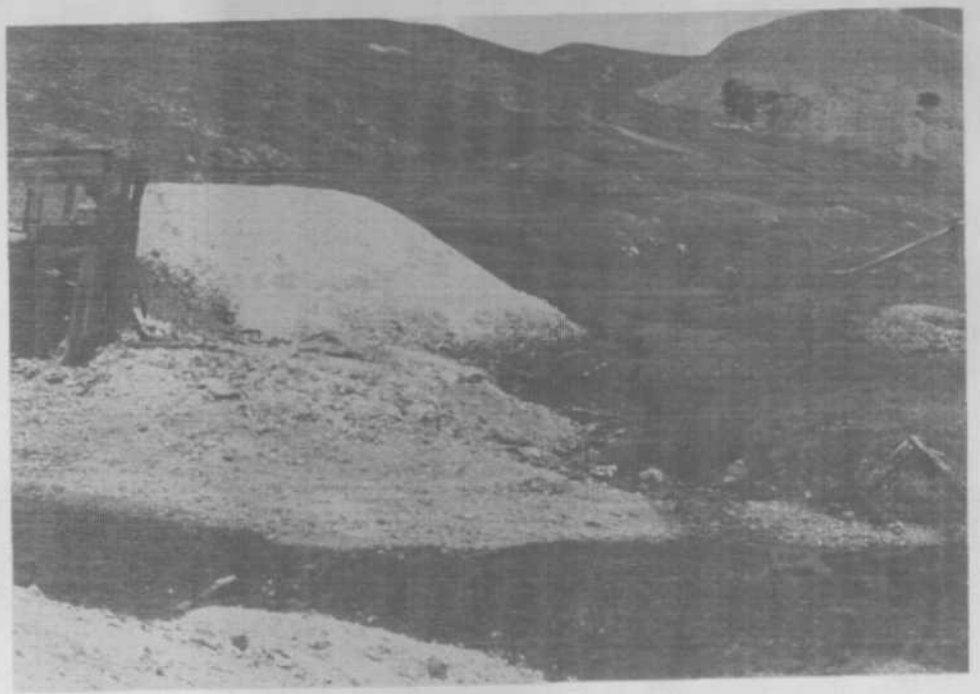
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION



Description of Photo: SO-18 London Mine Waste pile drainage.
Date: August 12, 1997 Time: 1200
Direction facing: North (35mm film)

Description of Photo: SO-18 London Mine Waste Pile drainage .
Date: August 12, 1997 Tiime: 1200
Direction facing: North (35mm film)

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HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-18 London Mine and wetlands to the east

Date: August 12, 1997 Time: 1200

Direction facing: North (35mm film)

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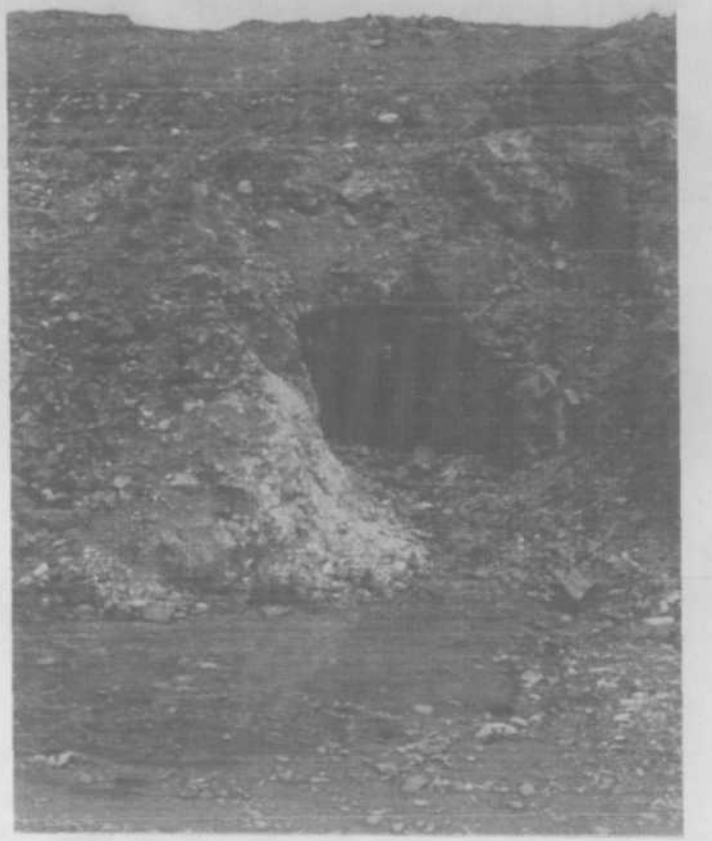
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-18 London Mine Waste pile sample.
Date: August 12, 1997 Time: 1200
Direction facing: North (35mm film)



Description of Photo: SO-18 London Mine Portal.
Date: August 12, 1997 Time: 1200
Direction facing: North (35mm film)

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HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-19 Portal

Date: August 12, 1997 Time: 1230

Direction facing: South (35mm film)

Description of Photo:SO-19 Mine waste sample.

Date: August 12, 1997 Time: 1230

Direction facing: South (35mm film)

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UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-19 from LondonMine Waste pile sample.
Date: August 12, 1997 Time: 1200
Direction facing: South (35mm film)

Description of Photo: SO-20 Mine Waste Pile (upper center)
Date: August 12, 1997 Tiime: 1215
Direction facing: North (35mm film)

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UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-19 Waste Pile from the London Mine.
Date: August 12, 1997 Tiime: 1200
Direction facing: South (35mm film)

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UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-21 and 22 Mine Waste Piles in Burrows Gulch.
Date: August 12, 1997 Time: 1200
Direction facing: West (35mm film)

Description of Photo: SO-21 and SO-22 Mine Waste Piles in Burrows Gulch.
Date: August 12, 1997 Tiime: 1215
Direction facing: West (35mm film)

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HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-21 Mine Shaft in Burrows Gulch
Date: August 12, 1997 Time: 1115
Direction facing: Northwest (35mm film)

Description of Photo: SO-21 Mine Waste Sample.
Date: August 12, 1997 Time: 1115
Direction facing: West (35mm film) 00

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HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: Vegetation "kill zone" below SO-22 Mine waste.

Date: August 12, 1997 Time: 1130

Direction facing: East (35mm film)

Description of Photo: SO-25, 26 and 27.

Date: August 12, 1997 Time: 1600

Direction facing: South (35mm film)

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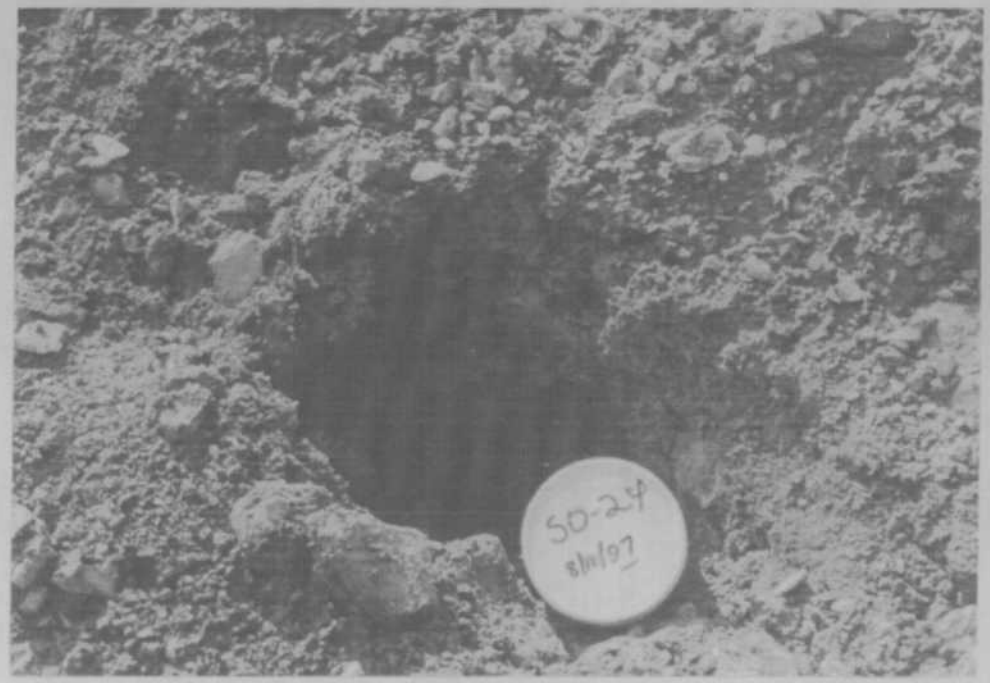
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER AMIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-24 Mine waste pile.
Date: August 12, 1997 Time: 1600
Direction facing: North (35mm film)



Description of Photo: SO-24 Mine waste sample.
Date: August 12, 1997 Time: 1600
Direction facing: North (35mm film)

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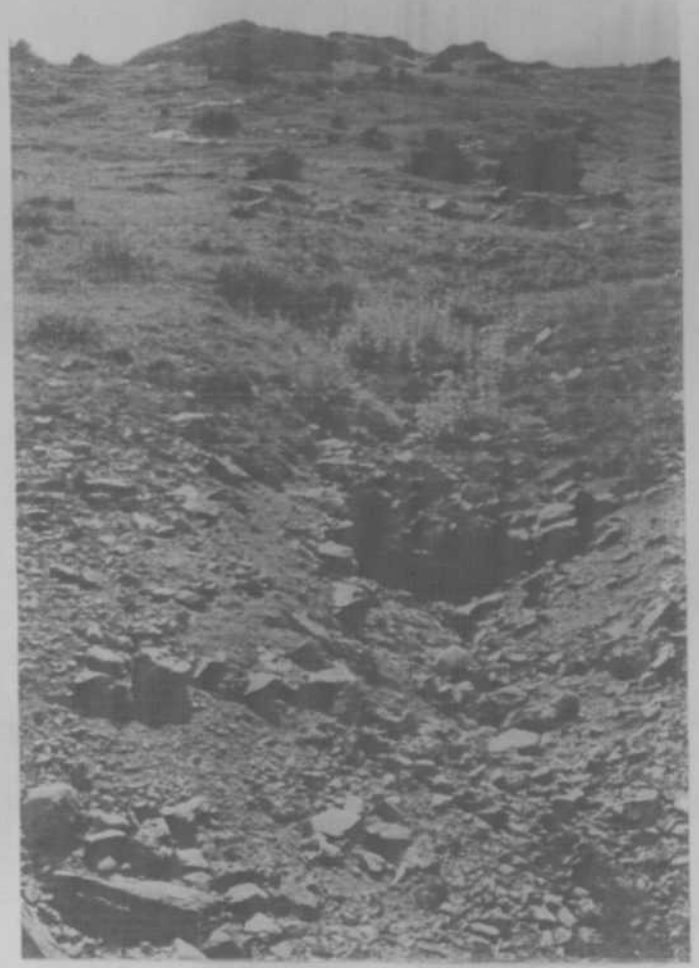
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER AMIMAS WATERSHED SITE INVESTIGATION



Description of Photo: SO-24 Mine Portal.
Date: August 12, 1997 Time: 1600
Direction facing: West (35mm film)

Description of Photo: SO-26 Mine portal.
Date: August 12, 1997 Time: 1545
Direction facing: West (35mm film)

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HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER AMIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-27 Mine Portal.
Date: August 12, 1997 Time: 1500
Direction facing: West (35mm film)

Description of Photo: SO-27 Mine waste sample.
Date: August 12, 1997 Time: 1500
Direction facing: West (35mm film)

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UPPER AMIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-29 Mine Portal.
Date: August 13, 1997 Time: 1130
Direction facing: Northeast (35mm film)

Description of Photo: SO-29 Mine waste sample.
Date: August 13, 1997 Time: 1130
Direction facing: East (35mm film)

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UPPER AMIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-29 Mine Waste Pile.
Date: August 13, 1997 Time: 1130
Direction facing: Southeast (35mm film)

Description of Photo: SO-30 Mine Waste Pile.
Date: August 13, 1997 Time: 1230
Direction facing: Northwest (35mm film)

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HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER AMIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-30 Mine Waste Pile.
Date: August 13, 1997 Time: 1230
Direction facing: Southeast (35mm film)

Description of Photo: SO-30 Mine Waste Sample.
Date: August 13, 1997 Time: 1230
Direction facing: Northwest (35mm film)

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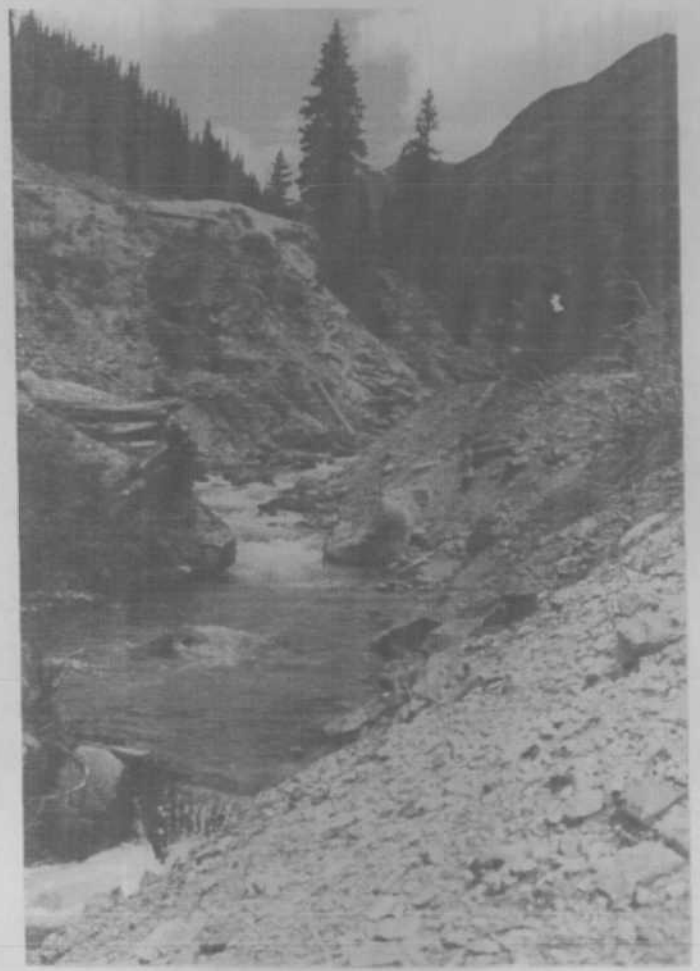
UPPER AMIMAS WATERSHED SITE INVESTIGATION



Description of Photo: SO-31 Mine Waste Pile.
Date: August 13, 1997 Time: 1230
Direction facing: Southeast (35mm film)

Description of Photo: SO-31 Mine Waste Sample.
Date: August 13, 1997 Time: 1230
Direction facing: Northwest (35mm film)

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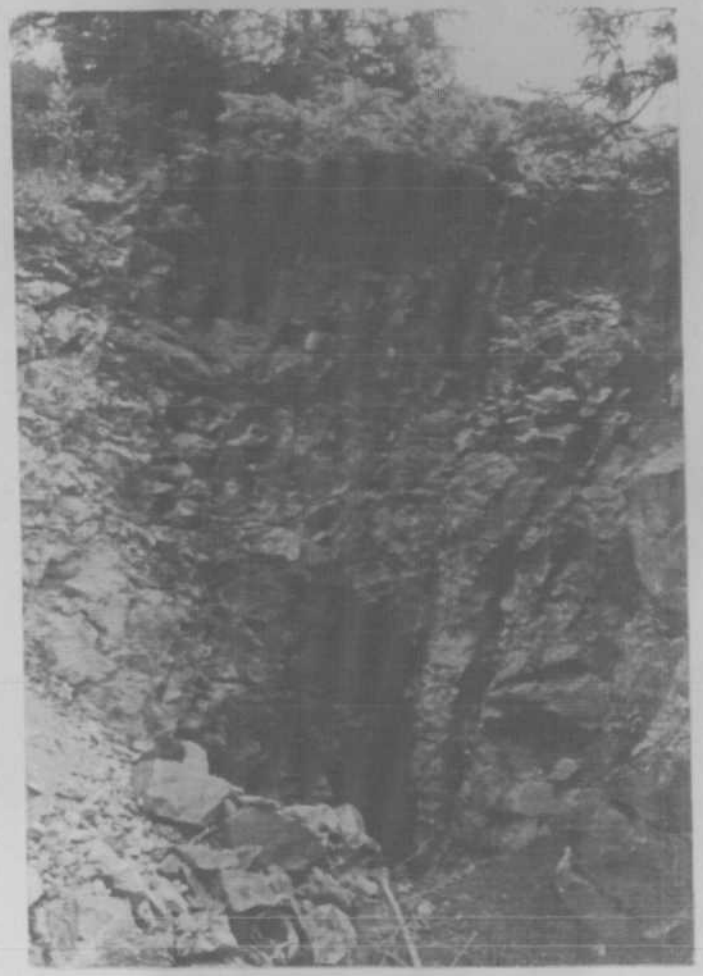
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER AMIMAS WATERSHED SITE INVESTIGATION



Description of Photo: SO-31 Mine Portal
Date: August 13, 1997 Time: 1330
Direction facing: Southeast (35mm film)

Description of Photo: SO-33 Mine Portal
Date: August 13, 1997 Time: 1345
Direction facing: Southeast (35mm film)

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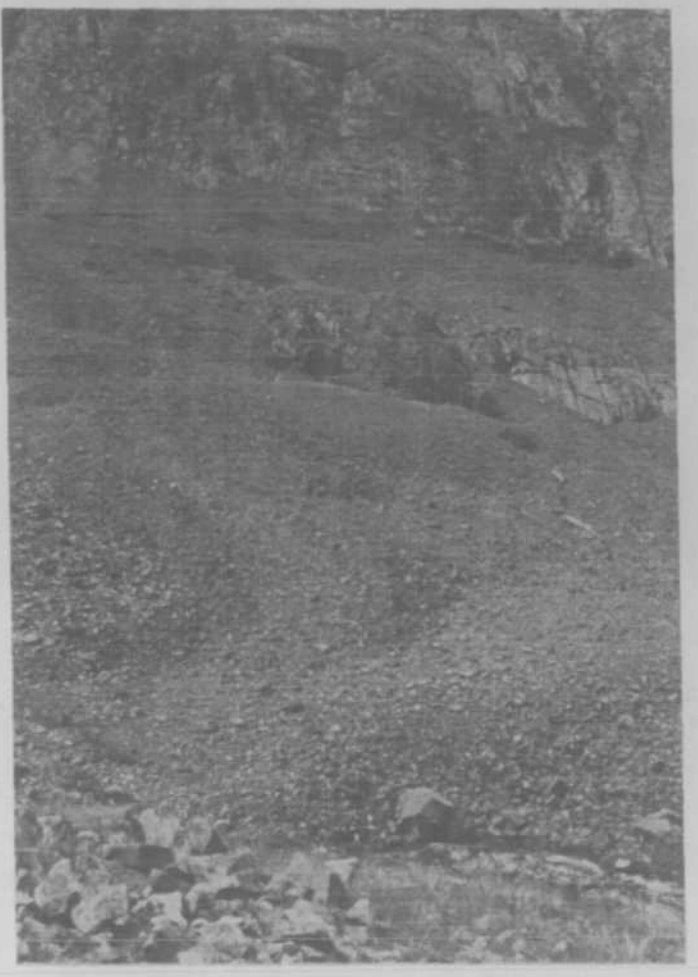
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER AMIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-34 Mine Waste in Burns Gulch.
Date: August 13, 1997 Time: 1500
Direction facing: Northwest (35mm film)



Description of Photo: SO-35 Mine Waste covered with talus (not sampled)
Date: August 13, 1997 Time: 1500
Direction facing: West (35mm film)

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HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER AMIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-36 Mine Waste in Burns Gulch (far right).
Date: August 13, 1997 Time: 1600
Direction facing: Southwest (35mm film)

Description of Photo: OP-SE-100 Spring with white precipitate in Burns G.
Date: August 13, 1997 Time: 1330
Direction facing: Northwest (35mm film)

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UPPER AMIMAS WATERSHED SITE INVESTIGATION

Description of Photo: OP-SE-100 Talus slope from which spring originates.
Date: August 13, 1997 Time: 1330
Direction facing: Southwest (35mm film)

Description of Photo: OP-SE-100 Talus slope materials.
Date: August 13, 1997 Time: 1330
Direction facing: Southwest (35mm film)

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COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER AMIMAS WATERSHED SITE INVESTIGATION

Description of Photo: OP-SE-100 Spring with white precipitate.
Date: August 13, 1997 Time: 1330
Direction facing: Southwest (35mm film)

Description of Photo: OP-SE-100 Spring on left, Burns G. on right.
Date: August 13, 1997 Time: 1330
Direction facing: Southwest (35mm film)

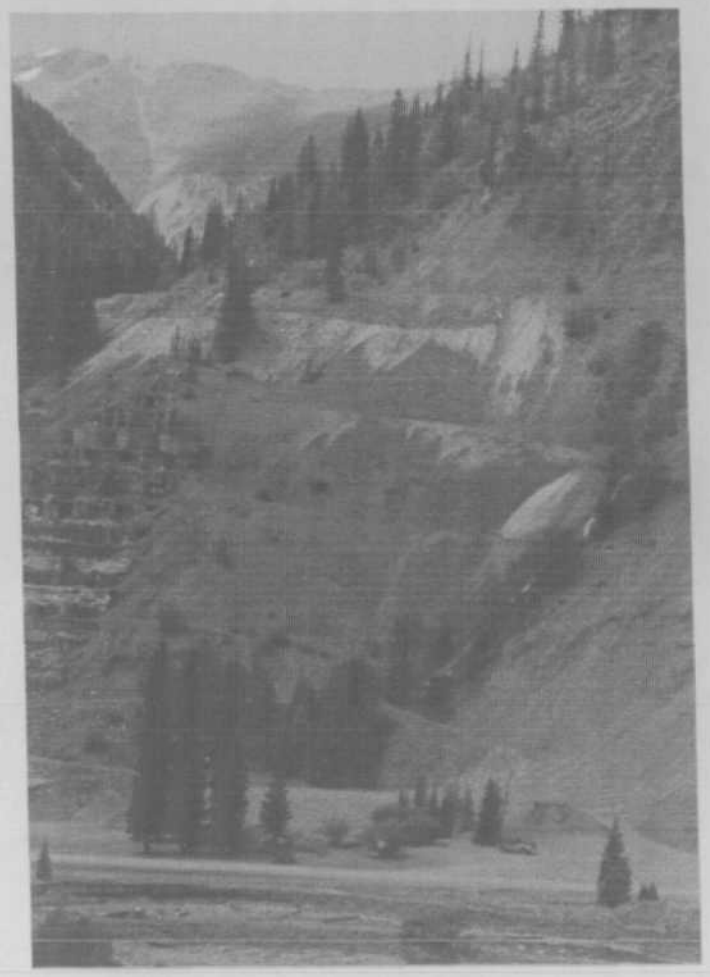
OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER AMIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-37 Mine waste pile south of Niagara G
Date: August 13, 1997 Time: 1400
Direction facing: Southeast (35mm film)

Description of Photo: SO-37 Mine Waste sample.
Date: August 13, 1997 Time: 1400
Direction facing: Southeast (35mm film)

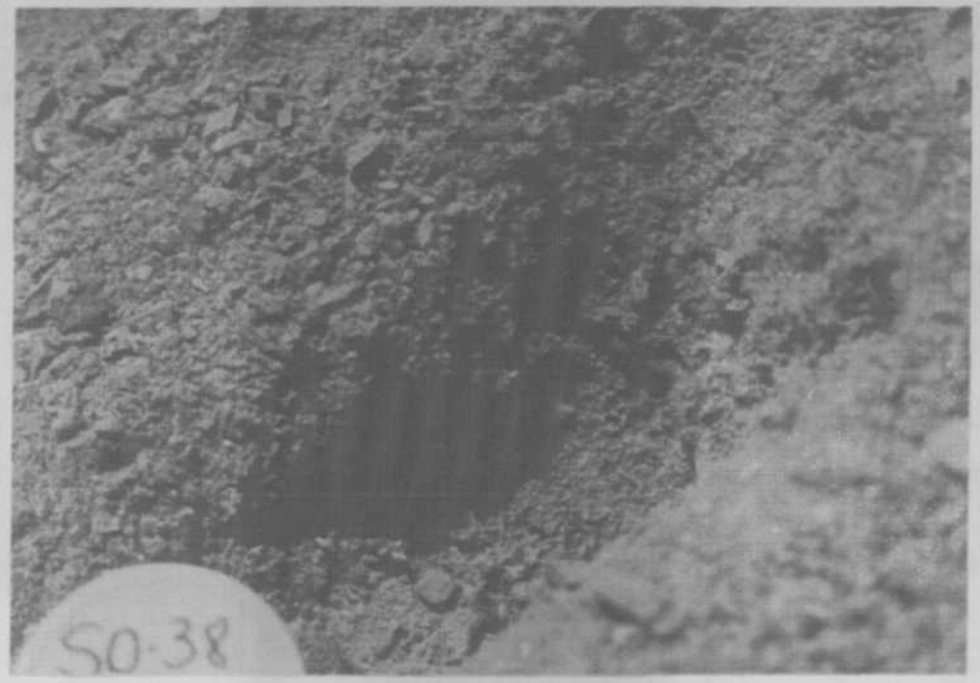
OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER AMIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-38 Eureka Mill Mine waste pile.
Date: August 13, 1997 Time: 1430
Direction facing: Northwest (35mm film)

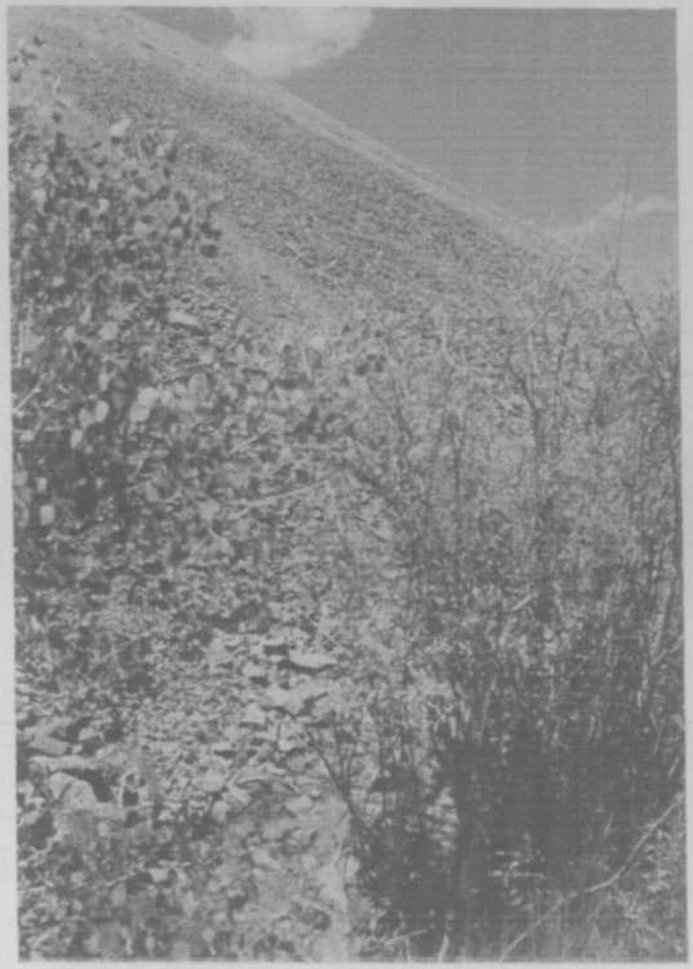


Description of Photo: SO-38 Eureka Mill Mine Waste pile .
Date: August 13, 1997 Time: 1430
Direction facing: Northwest (35mm film)

OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER AMIMAS WATERSHED SITE INVESTIGATION



Description of Photo: SO-38 Eureka Mill Mine waste sample
Date: August 13, 1997 Time: 1430
Direction facing: Northwest (35mm film)



Description of Photo: SO-38 Eureka Mill Mine drainage .
Date: August 13, 1997 Time: 1430
Direction facing: Northeast (35mm film)

OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: SO-38 Eureka Mill Mine drainage.
Date: August 13, 1997 Time: 1600
Direction facing: Northeast (35mm film)

Description of Photo: SO-38 Eureka Mill Mine drainage.
Date: August 13, 1997 Time: 1600
Direction facing: Northeast (35mm film)

OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER AMIMAS WATERSHED SITE INVESTIGATION

Description of Photo: GW-1 Silverton City Campground
Date: June 19, 1997 Time: 1430
Direction facing: Southwest (35mm film)

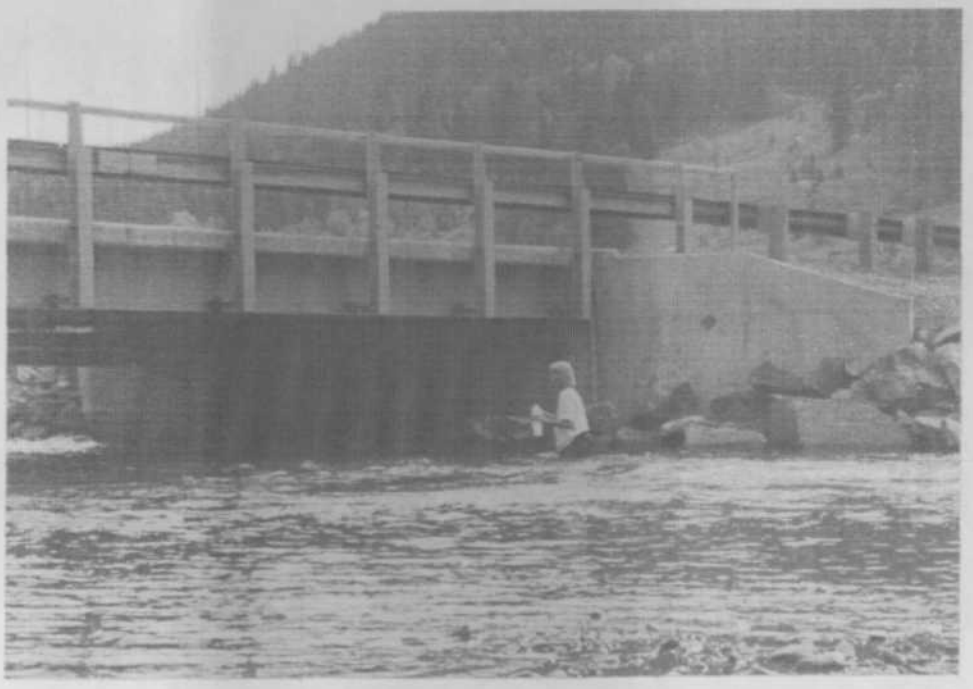
Description of Photo: GW-1 Silverton City Campground
Date: September 15, 1997 Time: 0945
Direction facing: Northwest (35mm film)

OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER AMIMAS WATERSHED SITE INVESTIGATION

Description of Photo: GW-2 Silverton Memorial Park (Cement Creek)
Date: June 19, 1997 Time: 1430
Direction facing: Northwest (35mm film)

Description of Photo: GW-3 Silverton Sewage Treatment Plant (Mineral Cr)
Date: June 19, 1997 Time: 1430
Direction facing: Southwest (35mm film)

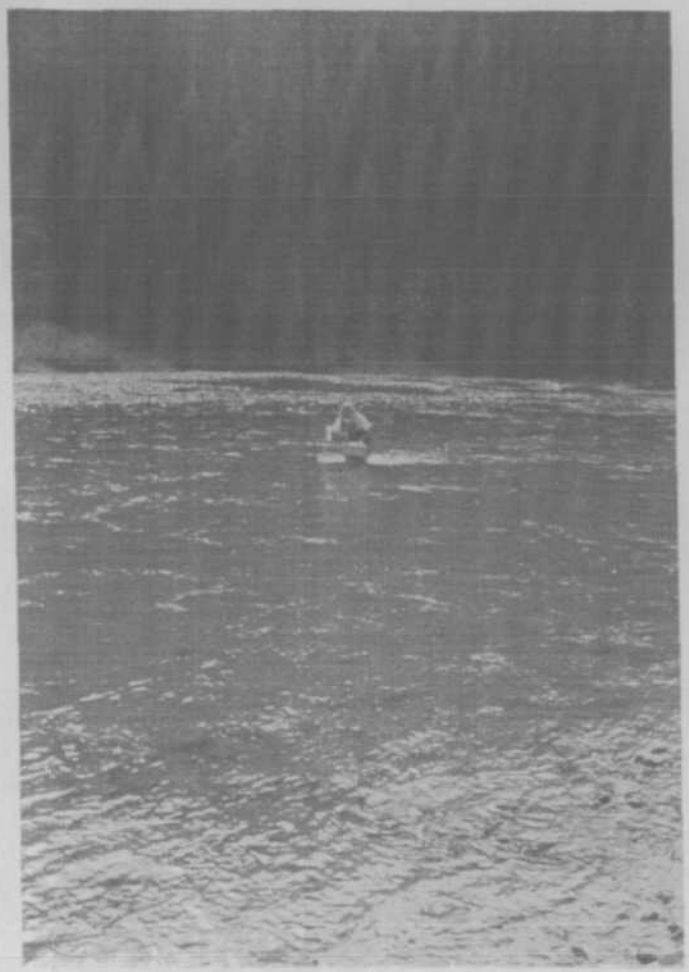
OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION.



Description of Photo: SW/SE A-68 Animas River above Cement Cr.
Date: September 4, 1997 Time: 0930
Direction facing: Northeast (35mm film)

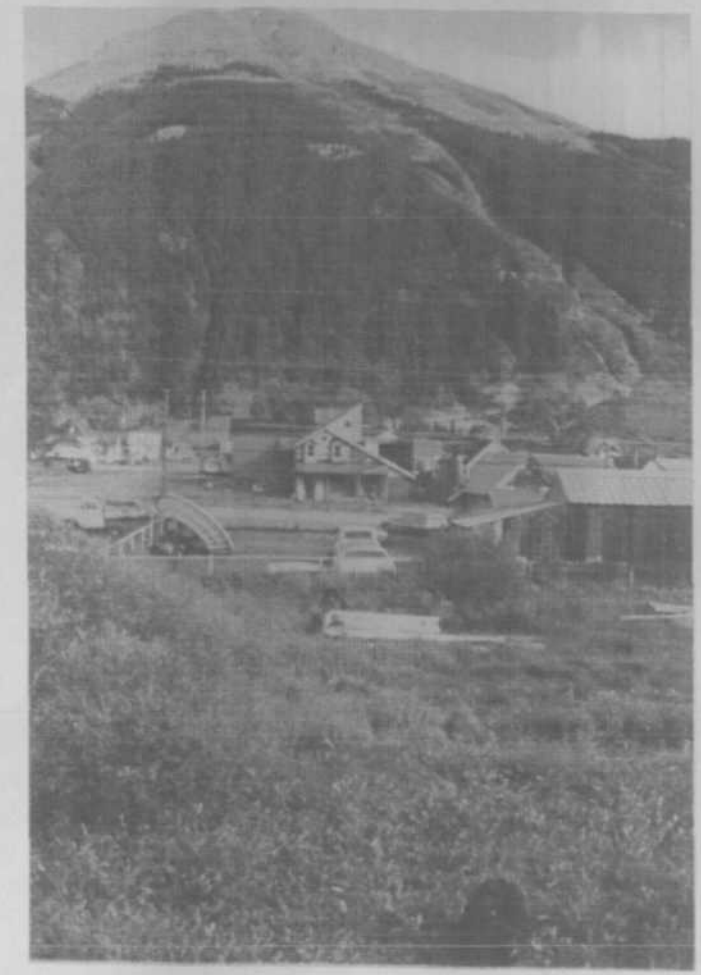
Description of Photo: SW/SE A-68 Animas River above Cement Cr. a
Date: September 4, 1997 Time: 0930
Direction facing: Northeast (35mm film)

OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION



Description of Photo: SW/SE-A-72 Animas River below Mineral Creek
Date: September 4, 1997 Time: 1030
Direction facing: Southeast (35mm film)

OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

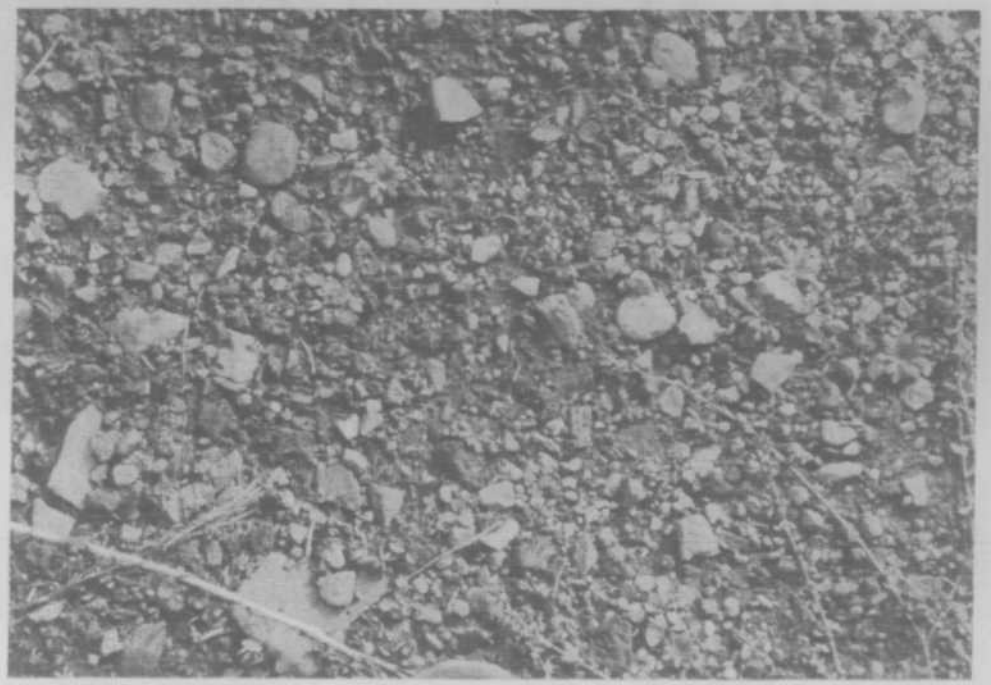


Description of Photo: OP-SL-1 Residential Soil N.of 857 Reese
Date: September 16, 1997 Time:1715
Direction facing: East (35mm film)

Description of Photo: OP-SL-1 Residential Soil N. Of 857 Reese
Date: September 16, 1997 Time: 1715
Direction facing: West (35mm film)

OFFICIAL PHOTOGRAPHS
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION
UPPER ANIMAS WATERSHED SITE INVESTIGATION

Description of Photo: OP-SL-2 Residential Soil @10th and Bluff
Date: September 16, 1997 Time:1645
Direction facing: Southwest (35mm film)



Description of Photo: OP-SL-2 Residential Soil @10th and Bluff
Date: September 16, 1997 Time: 1645
Direction facing: Southwest (35mm film)

TARGET SHEET

EPA REGION VIII

SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOCUMENT NUMBER: 380091

SITE NAME: UPPER ANIMAS MINING DISTRICT

DOCUMENT DATE: 03/01/1999

DOCUMENT NOT SCANNED

Due to one of the following reasons:

- ☐ PHOTOGRAPHS
- ☐ 3-DIMENSIONAL
- ☐ OVERSIZED
- ☐ AUDIO/VISUAL
- ☐ PERMANENTLY BOUND DOCUMENTS
- ☐ POOR LEGIBILITY
- ☐ OTHER
- ☐ NOT AVAILABLE
- ☑ TYPES OF DOCUMENTS NOT TO BE SCANNED
  (Data Packages, Data Validation, Sampling Data, CBI, Chain of Custody)

DOCUMENT DESCRIPTION:

APPENDIX B DMG LABORATORY ANALYTICAL RESULTS
APPENDIX C VALIDATED ANALYTICAL DATA

Contact the Superfund Records Center to view available document.
(303) 312-6473