SITE CHARACTERIZATION

WALKER MINE ABATEMENT ACTIVITIES PROJECT W1E SITE CHARACTERIZATION WRCB NO. 1-703-150-0

Prepared for:

Regional Water Quality Control Board
Central Valley Region

Submitted by:

WESTEC™
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

FIGURES

WESTEC®
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

March 22, 1993

Mr. Bill Croyle
Central Valley Regional Board
3443 Routier Road
Sacramento, California 95827-3098

RE: WESTEC Project No. 19902

Dear Bill:

Enclosed please find three copies of the Walker Mine Abatement Activities, Project W1E, Site Characterization. This is the final draft with your comments incorporated as follows:

1. The complete water quality database was incorporated into the text. Average values were changed as required in tables, figures, and text.

2. Text was clarified to tie in Phase 1 of W1E with Phases II and III.

3. The possibility of windblown tailings impacting portal area background samples was included in text.

As required under the contract, 10 copies and a camera ready master of the final will be submitted upon approval by you.

Sincerely,

Welsh Engineering Science & Technology, Inc.

Carol Oberholtzer
Division Manager
Groundwater Services

CO:jah/19902/9178

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3443 Routier Road
Sacramento, California 95827-3098

Prepared by:

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WESTEC Project No. 19902

Report No. 684

March 1993

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1.0 EXECUTIVE SUMMARY

The following report summarizes the work performed for Phase I of the Walker Mine project. Phase I consisted of an extensive site characterization study to supply needed information to propose remediation alternatives to prevent metals discharge into Dolly Creek. Phase II will consist of proposing several remediation alternatives for the site. Phase III is the preparation of biddable design specifications for the remediation alternative selected under Phase II. Phases II and III work is ongoing and will be summarized in subsequent reports.

The Phase I site characterization was performed to evaluate the potential water quality threat to Dolly Creek from two contaminant sources at the Walker Mine portal. The two sources of contaminants to the Creek are a point discharge from the Walker Mine tunnel to the creek via an on-site unlined settling pond and surface runoff and seepage from mine wastes located adjacent to the creek. The point source from the Walker Mine tunnel has been characterized through monitoring and sampling for many years. The focus of this investigation was to characterize the mine waste piles and estimate the potential loading of acid waters and metals to the creek from the waste piles and pond. The mine waste area was characterized by extensive sampling of mine waste rock, pond water, pond sludge, and background soil samples to estimate the total and soluble metals in the material, as well as the pH, acid-generating capacity, and sulfate content. The results of the analyses indicate that several waste piles and the pond sludge contain total and soluble copper in concentrations that suggest the waste should be classified as hazardous Group A or B under California State regulations. Concentrations of soluble metals were also sufficiently elevated in samples from the waste piles to pose a threat to water quality and fresh water aquatic life in Dolly Creek. Several waste piles were found to exhibit a net acid-generating capacity. In general, the most acidic waste was located in the upper 10 feet of the waste piles. Sulfate was elevated in the upper 10 feet of waste as well, suggesting most acid generation is occurring in this zone. Background soil samples exhibited elevated soluble metals which were above fresh water aquatic life standards. However, the background soil samples were not found to be acid generating and would not be expected to leach metals in these concentrations under normal conditions.

Additional work was performed to supply information that would aid in preparing and evaluating alternative remediation designs for the site. To evaluate the potential effectiveness of a wetlands

treatment system to remediate the point source from the Walker Mine tunnel, soil samples were collected and tested to characterize in situ bacterial populations. Plants at the portal and in the Dolly Creek watershed were identified and samples collected to test for metals concentrations. The bacteria sampling results indicated that bacterial populations that would normally be present at a mine waste site of this type were found sporadically and in low concentrations, suggesting that 6 years of drought may be causing limited acid generation and bacterial populations relative to those that would be present during normal precipitation years. The plant survey and metals analysis indicated that there are several indigenous plants, specifically willow and grasses, that may be effective in concentrating metals and should be considered for inclusion in a wetlands treatment system. The surface hydrologic features of the Dolly Creek watershed and specifically the mine portal and waste piles area were characterized to provide information to design a surface water diversion channel around the mine wastes. The minimum and maximum flows occurring from the spring snowmelt and the 100-year flood were calculated and surface water run-on and runoff patterns for the portal and waste area were determined.

2.0 INTRODUCTION

The following report is submitted to the California Central Valley Regional Water Quality Control Board (CVRWQCB) to meet the requirements of the Phase I scope of work outlined in Welsh Engineering Science & Technology Inc.'s (WESTEC's) proposal for the Walker Mine Site Characterization contract W1E (CVRWQCB Contract No.1-703-150-0). The work performed for W1E was to characterize the mine waste, hydrology, bacteria, and plant populations at the Walker Mine portal area. The purpose of the characterization is to determine the most effective method of remediating the site to prevent discharge of contaminated waters to nearby Dolly Creek.

The Walker Mine is located in the Sierra Nevada approximately 20 miles north of Portola, California (Figure 2-1). The Walker Mine was an active copper mine between the years of 1915 and 1941 (D'Appolonia, 1979). The mine at one time employed more than 360 people. The portal area site contained housing for the mine employees as well as a general store and a post office. A tram carried ore from the mine portal area to Spring Garden, approximately 8 miles east of Quincy, California. During the active period of the mine, tailings were discharged to an area approximately 1 mile west of the site at the confluence of the Dolly Creek and Grizzly Creek stream channels. The tailings area is approximately 95 acres in size and is located on U.S. Forest Service (USFS) land. The site is being investigated by the USFS in cooperation with the CVRWQCB. The following report presents the results of the portal area site characterization only. The results of the tailings investigation presently being performed by WESTEC will be presented in a separate report to be submitted to the USFS.

There are two main sources of contaminants to Dolly Creek.

1. Water discharging from the mine tunnel to the adjacent pond and ultimately Dolly Creek.

2. Seepage and surface runoff coming into contact with mine wastes near the portal and discharging to Dolly Creek.

Little is known about the groundwater conditions at the site and in the area. If groundwater is present it is assumed that the groundwater contribution to Dolly Creek is minor.

WATER FROM THE TUNNEL

A 2,700-foot access tunnel, referred to as the main 700 level haulage, extends from the ore body located in the inner workings of the mine to the south facing slope of the Dolly Creek drainage where the tunnel entrance is located (referred to hereafter as the portal). Prior to 1987 water from the inner workings of the mine discharged from the interior of the mine through the tunnel to the portal area and ultimately to Dolly Creek. The pH of this water ranged from 3.7 to 7.0. Copper and zinc were present in concentrations as high as 69 mg/l and 3.4 mg/l, respectively. Flows from the mine ranged from 0.01 to 2.433 cubic feet per second (cfs) and averaged 0.52 cfs. Adverse impacts to vegetation and aquatic life in Dolly Creek were observed during this period. On November 13, 1987, a seal was placed in the innermost part of the tunnel to prevent discharge of the poor quality water to Dolly Creek. The seal has now been in place for approximately 5 years. Water no longer flows from the inner workings behind the seal but discharge of water from the mine continues due to seepage through the outer 1,300 feet of the tunnel. This water ultimately discharges to Dolly Creek as well. Flows have been substantially reduced from the pre-mine seal average flow conditions of 0.52 to 0.01 cfs. Water quality monitoring data indicate the pH has become less acidic (averaging 7.13) and metal concentrations have been reduced to 0.246 and 0.01 mg/l, respectively, for copper and zinc.

WATER FROM THE WASTE PILES

A total of six waste pile types are located at the mouth of the portal area. In addition a 0.97 acre settling pond is located near the portal. Water from the mine tunnel discharges to the pond, which discharges to Dolly Creek when the pond level rises above an outlet elevation of approximately 6,085 feet. Seepage is evident in some of the piles. The source of water for the seepage is not known but is assumed to be surface water runoff from the upgradient watershed area as well as direct precipitation. During periods of high precipitation and spring snowmelt, water runs onto the site, contacts waste, and in some cases mobilizes metals, which are then discharged to the creek.

The present investigation focuses on the water contaminant source from the waste piles. The work was designed to address three key questions.

1. Is the waste considered hazardous under Title 22, Chapter 11 of the California Code of Regulations?

2. What is the appropriate waste group classification under Title 23, Chapter 15, Article 7 of the California Code of Regulations?

3. Does the waste generate acidic waters and metals in concentrations that will impact aquatic life in Dolly Creek?

In addition, the following information was obtained as part of Contract W1E to allow a thorough evaluation of remediation alternatives for the site.

- Surface hydrology and minimum and maximum flow rates including spring snowmelt and run-on and runoff patterns were estimated to provide sufficient information to design surface water diversion channels around the portal area if required.

- Bacteria and plants were surveyed, classified, and tested for metals to evaluate feasibility of wetlands to treat the continuing low volume discharge from the mine tunnel.

The Phase I report summarizes the characterization work performed and develops a conceptual model of the site. Phase II will consist of proposed alternatives to remediate the site. Phase III will consist of preparation of final biddable design drawings to implement the remediation alternative selected by the CVRWQCB from the Phase II report.

2.1 W1E SCOPE OF WORK

The scope of work for the Phase I Site Assessment was divided into two main tasks.

- Task 1.1 - Mapping
- Task 1.2 - Site Characterization

Task 1.1 consisted of preparing site maps of the topography, geology, and soils at the portal site. This work also included additional land surface surveying, field investigations to identify waste pile type and location, verification of geologic maps, and mapping of surficial soils.

Task 1.2 consisted of three main tasks.

- Subtask 1.2.1 consisted of characterization of the mine wastes at the portal area to determine the regulatory status of the waste and the potential for the waste to leach metals to Dolly Creek.

- Subtask 1.2.2 consisted of characterization of the bacterial populations to evaluate which waste areas may be acid generating and surveying plant populations to determine if there are indigenous wetland plants that may be used in a wetlands remediation system.

- Subtask 1.2.3 involved characterizing the surface hydrology of the Dolly Creek watershed.

Each task is described in detail in the following sections, followed by analysis of the data, a discussion on the fate and transport of key constituents, development of the site conceptual model, a proposed monitoring program, and conclusions.

3.0 TASK 1.1 - MAPPING RESULTS

WESTEC evaluated the information available on the Walker Mine site topography, geology, and soils and conducted the necessary tasks to provide the baseline data for the site. These tasks included obtaining topographic maps of the portal and sinkholes area and evaluating the regional and site geology including waste pile types and soils mapping. Each of these tasks is described in the following sections.

3.1 TOPOGRAPHY - SUBTASK 1.1.1

WESTEC examined the topographic coverage of the Walker Mine area and obtained a map and AutoCAD file from the USFS covering the Walker Mine portal and the Walker Mine tailings located downstream along Dolly Creek (Figures 3-1 and 3-2). The map supplied by the USFS was adequate for the work around the mine portal but it did not include coverage of the sinkhole areas. The map of the sinkholes area is needed to complete work proposed under contract W3E. WESTEC contracted Great Basin Aerial Surveys to produce a map of the sinkholes area shown in Figures 3-1 and 3-3. Prior to the area being flown by Great Basin, WESTEC surveying personnel placed location panels on the ground at locations to tie in topography and elevation. Great Basin flew roughly the entire area covered by Figure 3-1, but to reduce costs only the sinkholes map was produced. If at a later date further topographic coverage is needed, Great Basin Aerial Surveys can produce the map or maps needed. The USFS map is drawn with 2-foot contours while the map of the sinkholes was drawn with 5-foot contours.

3.2 GEOLOGY - SUBTASK 1.1.2

3.2.1 Regional and Structural Geology

The Walker Mine is located in the northern portion of the Sierra Nevada physiographic province. This area is composed of deformed and weakly metamorphosed Paleozoic and Mesozoic sedimentary and volcanic rocks which were intruded by late Mesozoic plutonic rocks of the Sierra Nevada batholith. These rocks were then overlain by Cenozoic volcanics and fluvial river sediments.

The Paleozoic and Mesozoic rocks of the area are composed of weakly metamorphosed sediments, volcanic rocks, and intrusives. In the Walker Mine area the pre-bathlothic rocks include the Kettle and Trail formations. The Jurassic Kettle Formation is composed of andesitic to dacitic breccias, conglomerates, sills, and flows. The Jurassic Trail Formation is composed of metasediments and minor tuff.

These Mesozoic rocks were then intruded, deformed, and weakly metamorphosed by Cretaceous granitic intrusives. These intrusives are composed of granodiorite to quartz monzonite plutons, dikes, and veins. Andesitic to basaltic volcanic flows, breccias, and tuffs along with glacial deposits and alluvium were deposited over the Mesozoic rocks.

There are two dominant sets of faults around the Walker Mine site (Figure 3-4). One set trends north to northwest and dips 50 to 80 degrees to the northeast. The other fault set trends northeast and dips 50 to 80 degrees to the southeast (D'Appolonia, 1979). These faults displace Tertiary units but have not been recognized to displace Quaternary deposits. Previous work in identifying the structural geology in the portal area performed by D'Appolonia (D'Appolonia, 1989) was reviewed and field verified by WESTEC.

The ore deposit has been described as a deep vein system (Ewing, 1927), an epigenetic shear zone with quartz vein filling (Smith, 1970), and a volcanogenic exhalative (Prochnau, 1985). The ore "vein" consists of a lenticular quartz zone hosted in the Jurassic metasediments and metavolcanics. The ore zone is up to 75 feet thick, 8,000 feet long, and through a vertical range of 1,200 feet (Prochnau, 1986). The ore deposits consisted of massive chalcopyrite-pyrite stringers and seams in quartz gangue. The mine produced approximately 5,300,000 tons of ore grading 1.55 percent copper, 0.70 ounce per ton silver, and 0.04 ounce per ton gold and operated from approximately 1915 to 1941 (Prochnau, 1986).

3.2.2 Surficial Geology

The surficial geology around the portal was examined and classified according to mine waste and soil type (Figure 4-1). Mine waste included any soil, rock, and wood material that was not naturally occurring. Soils are described in the following section.

The waste material is composed of mined waste, ore material, wood from historic sawmill-operations, and any fill material that was not deposited naturally. The waste material is classified into six categories which are described below in rough stratigraphic order.

- *Hornfels Waste* - Dark gray hornfels to metasediment weakly foliated, from silt to 2-foot blocks with 50 percent of the material on the surface greater than 3 inches.
- *Oxide Waste* - Red to brown quartz "vein" and silicified country rock with weak to strong hematite, trace to 50 percent pyrite/chalcopyrite and trace of magnetite.
- *Granitic Sand* - White to tan sand, fine- to coarse-grained, with plus/minus 10 percent rock fragments.
- *Wood* - Partly decomposed woodchips and sawdust.
- *Fill* - Granitic sand and soil fill around pond with plus/minus 10 percent rock fragments of granitic, oxide waste, hornfels, and basalt.
- *Processed Waste* - Light to dark gray to brown to green silty-sand tailings, sulfur salt, and copper salt crystals locally on the surface, minor wood fragments.

The hornfels waste, oxide waste, and the granitic sand are located in the dumps just below the mine portal. The wood is located at the base of the mine dumps to the east of the pond. The fill and processed waste are located west and south of the pond (Figure 4-1).

3.3 SOILS - SUBTASK 1.1.3

Soils were mapped to differentiate areas of naturally deposited soils from waste material (Figure 4-1). Soils were generally grouped according to geologic origin and field classified according to the ASTM field standard test method for classification of soils.

The five soil groupings are listed below:

- *Sandy-silt with gravel* - Red-brown sandy silt with basalt gravel to cobbles, nonplastic.
- *Sandy-silt* - White to light brown sandy-silt, granitic origin, nonplastic, numerous muscovite flakes.
- *Sandy-silt* - Tan to brown sandy-silt with 5 to 10 percent hornfels clasts, nonplastic, numerous muscovite flakes.
- *Organic sandy-silt* - Black organic silty soil plus/minus 10 percent roots and organic material, damp to marshy.

- *Clayey soil* - Red, tan, gray, brown variable soil weakly to moderately plastic, 5 to 10 percent cobbles of granitic material.

Also located on Figure 4-1 are points of reference and key structures as follows:

- Portal
- Limestone Flume
- Settling Pond
- Iron and Oxide Staining
- Sample Locations (Discussed in Section 4.0)
- Springs and Seeps
- Dolly Creek
- Running Water

4.0 TASK 1.2 - SITE CHARACTERIZATION RESULTS

4.1 WASTE, TRENCH, POND, AND BACKGROUND CHARACTERIZATION - SUBTASK 1.2.1

One hundred and thirty-seven waste samples, 16 trench samples, 12 pond sludge and water samples, and 45 background soil samples were collected. Of these, 123 waste samples and all of the trench, pond, and background samples collected were analyzed as described below. Sample locations are shown on Figure 4-1.

4.1.1 Waste Drilling and Sampling

Sample locations were selected to provide optimal information on the areal distribution of metals and acid-generating tendencies of the six waste piles identified under Task 1.1. The waste material samples were collected through drilling and downhole sampling using a hollow stem auger drill rig. The 137 samples were collected by driving or pushing a split-spoon sampler into the waste ahead of the drill steel. The nature of the waste material was highly variable, with clay to boulder sized fragments throughout the piles. To reduce the likelihood of plugging the sampler with gravel to cobble size pieces of waste, a sampler with an inside diameter of 3 inches was used. The samples were collected in 3-inch-diameter by 6-inch-long brass tubes. Each sampling yielded 1 to 3 brass tubes. The drill holes were sampled roughly every 5 feet starting at 5 feet below the surface and continuing approximately 5 feet into the native soil. Variations from the 5-foot sample interval depended on the ease of sampler penetration at each sample site. When no sample or only a partial sample was collected the sample interval was reduced to 2½ feet. Nine of the 137 samples were duplicates.

After sample collection the tubes were capped, sealed with tape, labeled, sealed in plastic bags, and placed in a cooler for storage and shipping. At least one tube from each sample interval was placed in a separate cooler to be shipped to the analytical laboratory.

A total of 17 composite samples of the total of 137 samples were obtained (one from each borehole except WM-4) by collecting the cuttings from the outside of the augers. These cuttings were collected on a washed and rinsed sheet of geomembrane, mixed, quartered, and placed in

a double set of gallon plastic bags. The bags were labeled and placed into coolers for storage and shipping to the laboratory.

4.1.2 Trench Sampling

A series of trenches were excavated and samples collected along the contact of the waste piles and the native soils using a cleaned and washed scoop. The samples were placed in a double set of plastic bags, labeled, and placed in coolers for storage and shipping to the laboratory. The trench sites and sample locations (Figure 4-1) were selected by CVRWQCB and WESTEC personnel after the geologic mapping and drilling were completed. If the trench was greater than 5 feet deep, samples were collected from the bucket of the trackhoe. Otherwise samples were collected by entering the trench. Three of the 16 trench samples were native soils underlying the waste piles and two samples were duplicates.

4.1.3 Pond Sampling

Five samples of pond sludge and seven samples of pond liquid were collected. The sludge and liquid samples were collected at four separate locations in the pond (Figure 4-1). Four discreet sludge samples were collected by using a washed and rinsed scoop to place sludge material in nalgene containers provided by the analytical laboratory. One sludge sample was collected as a duplicate. The liquid samples were collected by filling nalgene containers provided by the laboratory with water from the pond. Two pond samples were filtered and preserved. Two samples were preserved but not filtered. One duplicate of each of the nonfiltered samples was collected and not preserved. One additional duplicate was preserved but not filtered like the original sample.

4.1.4 Background Soil Sampling

Forty-five soil samples were collected for background analysis in June 1992, by Cereus Exploration Technologies, Inc., WESTEC's subcontractor hired to conduct bacterial and plant metal analyses. Sample locations are shown in Figure 4-1. Sixteen of the samples were from waste areas and could not be used as background. Soils were collected at 4 to 6 inch depths, placed in plastic vials, and immediately stored on ice. Two of the 45 samples were replicates collected 5 feet from the original sample location.

4.1.5 Sample Handling Procedures and QA/QC

Once sampling was completed, sample labels were checked for completeness and all sample seals were checked. All samples were placed in coolers. Coolers containing samples to be analyzed for metals also contained blue-ice during storage and transit to the laboratory. The samples were enclosed in plastic bags and therefore did not come in direct contact with each other. The coolers were sealed with strapping tape and a signed and dated custody seal was placed in the cooler. Prior to transport coolers were placed behind the main portal gate no more than 5 feet beyond the main entrance into the tunnel. Laboratory personnel from the CKY, Inc. laboratory collected the samples directly from the sampling personnel. Samples shipped to Pintail Systems, Inc. (WESTEC subcontractor) for static and kinetic testing were sealed in coolers and shipped via Federal Express. All sampling was conducted under strict chain of custody procedures. A sample is considered under custody if it is:

- in the sampler's actual possession;
- in the sampler's view, after being in the sampler's actual possession;
- in the sampler's physical possession and is then locked up to prevent tampering; and
- in a designated and identified secured area.

Chain of custody documentation contained sampler's name (with signature), sample numbers, sample type, date and time of sampling, number of containers, and analyses requested. To transfer possession of the samples, the individuals who relinquished and received the samples signed, dated, and noted the time on the chain of custody record. This record transferred the custody of the samples from the sampler to the laboratory.

The chain of custody record included a sample analysis request section. This section identified which parameters were to be analyzed, which sample containers had been designated for each requested parameter, and any preservatives used.

All samples were recorded on a sample log book containing a project name and number, sample number, sample location, type of sample, sample description, and the name of the sampler. A field report was filled out daily. Chain of custody records and daily field logs are included in Appendix A.

An area was selected on-site for decontamination procedures, including steam cleaning. The drill rig was steam cleaned upon entering the site, and the drill steel and samplers were steam cleaned following the drilling of each hole. During drilling and between sampling, split-spoon samplers, the geomembrane, and the scoop were washed in a mixture of Alconox and distilled water and rinsed in a series of three rinse buckets containing distilled water.

Quality assurance/quality control (QA/QC) samples were periodically collected and submitted for analysis with the field samples to ensure that data generated are technically sound. A total of 15 duplicate samples from boreholes, trenches, the pond, and pond sludge areas were collected and analyzed in the same manner as the other samples. Nine duplicates were collected from the waste pile sampling, two from the trenches, three from the pond, and one from the pond sludge. Two of the pond duplicates were not preserved to allow analysis of the effects of preservation. Three field blank samples were collected from the last in the series of distilled water rinses to provide a check on inter-sampling decontamination.

4.2 SAMPLE ANALYSES

A total of 210 samples of waste rock, trench, pond water, pond sludge, and background soil were collected and analyzed to estimate metals, acid generation, pH, and sulfate. Table 4-1 summarizes the samples analyzed and the testing procedures used. Table 4-1 lists a total of 271 analyses performed which includes duplicate analyses for QA/QC purposes. Twenty samples including waste rock samples from boreholes, pond water, and pond sludge were initially analyzed to screen for total metals using a total acid digestion (EPA Method 3050) and Inductively Coupled Plasma Atomic Emissions Spectroscopy and Atomic Absorption (EPA Methods 6010 and 7000). The analytical results for the 20 screening samples which consist of estimates of the total metal concentrations are shown in Table 4-2 along with the Total Threshold Limit Concentrations (TTLC's). The metals to be tested were selected from the list of metals in Title 22, Chapter 11, Article 3, Section 66261.24, Table I of the California Code of Regulations. The purpose of characterizing the 20 samples for these metals was to obtain estimates of the total metals to classify the waste under Title 22 as well as to select four key metals from the total list of Title 22 metals for further analysis.

Four key metals (cadmium, copper, iron, and zinc) were selected by the CVRWQCB for further analysis for soluble metals based on the analytical results for the total metals. In addition, a subset of samples were analyzed for lead and mercury. The results for the lead and mercury

analyses will be reported under the Phase II Summary Report. The Title 22 Waste Extraction Test (WET) was performed on 161 samples of waste rock from boreholes and trenches, surface soils, pond water, pond sludge, and field blanks and on an additional 29 background soil samples collected outside the area of mine disturbance. Samples were analyzed for cadmium, copper, iron, and zinc. Additionally, pH was analyzed using EPA Method 9045, and sulfate using EPA Method 300. Testing results for the four metals, sulfate, and pH are shown in Table 4-3 along with Soluble Threshold Limit Concentrations (STLC's), TTLC's, Freshwater Aquatic Life (FWAL) standards, and receiving water standards for Dolly Creek at the point of compliance. Table 4-4 shows WET results for the four metals and sulfate concentrations for the background soil samples.

Static testing for acid generation potential was conducted on 46 mine waste borehole samples and seven background samples collected from nondisturbed areas adjacent to the mine site. Table 4-5 shows the static test results including percent of sulfur, acid-generating potential (AGP) in pounds $CaCO_3$/ton, neutralization potential (NP) in pounds $CaCO_3$/ton, the NP to AGP ratio and prediction of acid formation based on the value of the NP to AGP ratio. If the ratio is less than 1 the sample is considered to be acid generating (oral communication, Leslie Thompson, Pintail Systems, Inc., 1992). If the ratio is greater than 1 but less than 3, the sample may be acid generating, and a ratio greater than 3 indicates the sample is not acid generating. An exception to this rule was made for sample WM-3-2.5, which has a ratio of -3 but has sulfur content of only 0.04 percent. Sulfur contents less than 0.2 percent are not considered great enough to cause acid generation.

Kinetic tests to characterize acid generation are presently being performed on 15 samples identified in Table 4-1. The results are not presently available but will be included in the Phase II work. Appendix B contains the laboratory data sheets for the metals, pH, sulfate, and static acid-generating tests.

4.3 BACTERIA CHARACTERIZATION - SUBTASK 1.2.2

One hundred and thirty-five soil and 17 water/sediment samples were collected for microbial analysis in June 1992, by Cereus Exploration Technologies, Inc. Sample locations are shown in Figure 4-2. Soils were collected at 4 to 6 inch depths, placed in plastic vials, and immediately stored on ice. At some sites, field replicates were collected 5 feet from the sample location to monitor local variance. Water and water sediment samples were collected in areas of running or standing water by submerging a plastic vial into the water and scooping water and approximately

20 grams of sediment into the container. Replicate samples were collected at each site. Microbial analyses were performed only on the sediments.

Heterotrophic bacteria were isolated from the samples in pour-plates using half-strength nutrient agar containing 1.5 g/l beef extract, 2.5 g/l peptone, 15.0 g/l agar, and 0.07 g/l cycloheximide. The detection limit for heterotrophic bacteria was 1 x 10^2 colony forming units per gram of soil (CFU/gram). Acidophilic bacteria, fungi, and autotrophic bacteria (*Thiobacillus ferrooxidans*) were isolated on spread plates using agar containing a 1:14:5 combination of ferrous sulfate (20 percent $FeSO_4 \times 7H_2O$ acidified to pH 2.0, filter sterilized), basal salts/tryptone soya broth (1.8 g/l $(NH_4)_3SO_4$, 0.7 g/l $MgSO_4 \times 7H_2O$, 0.35 g/l tryptone soya broth (Oxoid) acidified to pH 2.5, autoclave sterilized), and gelling solution (0.5 percent agarose type I (Sigma) with no pH adjustment, autoclave sterilized). A 10 mM $ZnSO_4$ solution (0.1 mM final) and 0.05 percent solution of trace element solution were added. The trace element solution contained 10 g/l $ZnSO_4 \times 7H_2O$, 1.0 g/l $CuSO_4 \times 5H_2O$, 1.0 g/l $MnSO_4 \times 4H_2O$, 1.0 g/l $CoSO_4 \times 7H_2O$, 0.5 g/l $Cr_2(SO_4)_3 \times 15H_2O$, 0.5 g/l $Na_2B_4O \times 10H_2O$, 0.5 g/l $NaMoO_4 \times 2H_2O$, and 0.1 g/l $NaVO_3$. The detection limit for the acidophilic bacteria and fungi isolation was 1 x 10^3 CFU/gram and for autotrophic *Thiobacillus ferrooxidans* the detection limit was 10 x 10^2 CFU/gram.

Soil pH was measured after mixing a 1:1 slurry of soil and deionized water and stirring for 30 minutes. Soil moisture was measured by weighing 5 g of material, microwave drying the sample, measuring the final dry weight, and calculating the percent of moisture. Table 4-6 contains a summary of the bacterial samples that were collected. Table 4-7 shows the bacteria analytical results. Appendix C contains the laboratory data sheets.

4.4 PLANT SURVEY AND METAL ANALYSIS - SUBTASK 1.2.2

Vegetation types within and surrounding the mine area were mapped in June 1992, by Cereus Exploration, Inc. Five major communities were identified: (1) wetland, graminoid dominant, (2) wetland, woody species dominant, (3) aspen woodland, (4) mountain chaparral, and (5) mixed conifer forest. Figure 4-3 locates the species described.

The wetland, graminoid community is located above the mine to the southeast in a natural spring, in seep locations at the base of the mine tailings, adjacent to the pond, and along Dolly Creek. Predominant species in the wetland, graminoid community include: spike rush (*Heleocharis palustris*), wire rush (*Juncus balticus*), beaked sedge (*Carex languinosa*), corn lily (*Veratrum*

californicum), drummonds cinquefoil (*Potentilla drummondii*), and horsetail (*Equisetuum sp.*). Sierra crane orchid (*Habernaria dilatata*) occurs in the spring above the mine and along the upper portions of Dolly Creek. The wetland, graminoid community occurs in areas that are water-saturated, which promotes anoxic soil conditions. The soils also have high organic content. Plants growing on these sites depend upon sediments and water for nitrogen.

The wetland, woody community contains one species, Lemon's willow (*Salix lemonii*), and occurs in waterway corridors throughout the mine area. The wetland, graminoid community is present as an understory throughout the willow community. Willows are phreatophytes with long tap roots. They do not require saturated soils but need a relatively high water table with fresh flowing water. Willows prefer aerated soils but can tolerate anoxic soil conditions caused by flooding and use soil nitrate as their nitrogen source.

The aspen woodland community also contains only one species: *Populus tremuloides*. It is found to the northeast of the mine portal and in a small area west of the pond. Aspens are phreatophytes and can tap deep water tables but are limited to areas where large quantities of groundwater are available. Aspens are not able to tolerate heavy disturbance or contaminated water sources. They prefer aerated soil but can tolerate short to intermediate periods of flooding. Aspen grove soils are high in organic content with very little clay.

The mountain chaparral community is found along road banks and along the entire eastern portion of the property where the old town was located and in small patches where other buildings were torn down and burned. It occurs in heavily disturbed areas as an early predecessor to the mixed conifer community. Species in the mountain chaparral community include bitter cherry (*Prunus emarginata*), mountain whitehorn (*Ceanothus cordulatus*), greenleaf manzanita (*Arctostaphylos patula*), gooseberry (*Ribes sp.*), and some grass species. These species have a high degree of drought tolerance and little tolerance for saturated soil conditions.

The mixed conifer community surrounds the entire mine area and includes: Jeffrey pine (*Pinus jeffreyi*), white fir (*Abies concolor*), and Sierra cedar (*Libocedrus decurrens*). The soils in this community have high organic content and are buried under 8 to 12 inches of pine duff. Small stands of mixed conifer are intermittently dispersed throughout the mountain chaparral community.

To analyze metal uptake by plants in the mine area, 18 plants were collected from seven sample sites (Figure 4-4). *Salix* (willow) leaves and 5-year twigs and the aboveground portions of *Carex* (sedge, grass) and *Juncus* (tube grass) were sampled, washed, ground, and ashed. Cadmium, copper, iron, and zinc concentrations were analyzed by AA/ICP. Table 4-8 shows the plant metals analytical results. Appendix C contains laboratory data sheets.

4.5 SURFACE HYDROLOGY - SUBTASK 1.2.3

4.5.1 Review of Climatological Data

The project site is located approximately 18 miles northwest of Portola, California and approximately 15 miles east-northeast of Quincy, California, the two closest temperature and precipitation recording stations. Table 4-9 summarizes the measured climatological data for these two sites over 44 years of record. These data are based on information available from the National Climatic Data Center (NCDC) and were retrieved by using CD-ROM software entitled "NCDC Summary of the Day" by Earthinfo, Inc.

The precipitation for the 100-year 24-hour, the 10-year 24-hour, and the 2-year 24-hour storm events are estimated to be 8, 6, and 4.5 inches, respectively (NOAA, 1983).

4.5.2 On-Site Runoff Characterization

In order to estimate runoff characteristics for the portal area, the U.S. Geological Survey (USGS) 7.5 minute topographic map was used to determine the extent of the basin that would contribute to the area. This basin was found to encompass an area of 1.15 square miles. The extents of this basin are shown in Figure 4-5.

Considering the elevation of the area, runoff could come in the form of rainfall or snowmelt. Given this situation, both possibilities were modeled. A computer assisted hydrological model, "TR-20," developed for the Soil Conservation Service (SCS), was used to estimate the ensuing runoff peak discharge that could occur within the limits of the project area as the result of a rain storm event. The following were used to define the data needed as input in the computer model.

- An SCS curve number of 66 and antecedent moisture condition II were assigned to the basin to quantify the amount of runoff losses.

- The time of concentration for the basin was estimated using the procedures outlined by the SCS in "TR-55, Hydrology for Small Watersheds."

- The storm event associated with a 100-year 24-hour recurrence interval was used.

- The standard SCS 24-hour type II cumulative rainfall distribution was used to generate synthetic storm data.

Output from the computer model indicated that the portal area could experience a peak runoff of approximately 1,188 cfs during the 100-year 24-hour storm event.

Runoff from snowmelt was modeled using procedures outlined in the U.S. Army Corps of Engineers (Corps) "Runoff from Snowmelt" EM 110-2-1406. This manual details procedures for estimating snowmelt caused by spring thaw and snowmelt caused by rain on snow. Inputs needed for the runoff from snowmelt caused by spring thaw model include:

- Daily average temperature data. Daily minimum and maximum temperature data for the 44 years of record were retrieved for the Portola, California recording station using CD-ROM software entitled "NCDC Summary of the Day" by Earthinfo, Inc. The average daily temperature was then calculated as the arithmetic average of the two. The temperature data were then adjusted for the difference in elevation between Portola and the project site, between 2,000 and 3,000 feet, using relationships outlined in "Runoff from Snowmelt."

- Estimation of the length of snowmelt season. Analysis of snow-course data provided by the California Cooperative Snow Surveys for the Grizzly number 359 site, located immediately south of the project site, indicated the snowmelt season is on average about 2 months in duration, lasting from approximately May 1st through the end of June for each year.

- Estimation of the snow areal coverage versus time relationship for the snowmelt season. This is affected by the orientation of the drainage basin, which in this case is facing mostly to the southwest. A basin having the same type of orientation throughout leads to a snow areal coverage versus time relationship that is estimated to be linear. In other words, the areal extent of the snow will be reduced the same amount each day once melting has started. This relationship becomes most important when estimating the volume of water available for runoff.

- Estimation of snowmelt lost to infiltration. Based on information provided by the "Runoff from Snowmelt" manual, 0.3 inches per day snowmelt is estimated to be lost to infiltration.

Analysis of runoff from snowmelt caused by spring thaw indicated that a base flow type of phenomenon would peak at approximately 7.3 cfs.

As previously stated, estimation of runoff was also analyzed for rain on snow conditions. In addition to the four items outlined above as needed for input, the daily precipitation data were also needed for the area. These data were also retrieved for the Portola, California recording station using CD-ROM software entitled "NCDC Summary of the Day" by Earthinfo, Inc.

To determine the climatic conditions that would result in 1 percent exceedence probability snowmelt, synthetic probability distributions were modeled on a daily basis for both the daily average temperature data and the daily precipitation data using the 44 years of record as a data base. This allowed for the 10 percent exceedence probabilities to be estimated on a daily basis for both daily average temperature and daily precipitation. The rain on snow event is a conditional probability event which requires that the daily average temperature be high enough to induce melting in an existing snowpack and that precipitation occurs in the form of rain. The final 1 percent probability of the "rain on snow" event is then the product of the exceedence probabilities of each discrete event (a temperature high enough to produce melt and rain and the occurrence of precipitation) at a 10 percent exceedence level. The combination of these data when used in the Corps generalized snowmelt from rain on snow equation resulted in the amount of snowmelt that would occur at the 1 percent exceedence probability for each day. This model was used for days when the daily average temperature at the project site was above 35 °F. This temperature is the breakpoint between a rain on snow event. Temperatures below 35 °F will result in snowfall.

An addition to the runoff caused by rain on snow is the runoff caused by the rain event itself. This runoff was estimated using the "TR-20" program in a manner similar to that stated above, with the following difference.

- An SCS curve number of 99 and antecedent moisture condition III were assigned to the basin to quantify the amount of runoff losses. These values were used to ensure that the model not allow infiltration from the rain event since infiltration requirements were met by the snowmelt.
- The storm event associated with a 10 percent exceedence probability was used.

Analysis was undertaken to determine the critical combination of runoff from snowmelt and runoff from rainfall. Peak discharge was found to be controlled by the magnitude of the rain event which is estimated to be 148 cfs. This peak discharge is composed of 14 cfs of base-flow from snowmelt and 134 cfs peak discharge from the rainfall.

4.5.3 French Drain Evaluation

A French drain provided a water supply to the mine from Dolly Creek. An attempt to locate the French drain was made to evaluate the drain's contribution to water entering the mine dumps, but efforts to locate it were inconclusive. Aerial photographs were examined and a field check was conducted with few conclusive results.

Both historical and current aerial photographs were examined in an effort to identify linear features extending from Dolly Creek to the mine portal area such as lines of vegetation indicating a linear water source or linear depressions indicating an excavated trench, which might locate the drain. No such features were found either on the historical photograph taken in 1941 or the 1992 aerial photograph stereo pair.

Field examination to locate the French drain consisted of walking the area east of the portal and walking the mine dumps to Dolly Creek to locate linear features similar to those described above and any other anomalous feature that could indicate the presence of a French drain. Two features were located as potential sites for the French drain. One area is just east of the mine portal area and consists of a spring/marsh swale with a linear depression extending approximately 200 feet to the east where it ends in a 40-foot circular clearing. The linear depression does not appear to continue past this clearing. The second possible area was a linear arrangement of hornfels gravels and boulders east of the flume. These boulders and gravels are anomalous for the area, which contains basaltic soil, and may represent gravels of the French drain. WESTEC does not feel that this is the drain because it slopes toward Dolly Creek, not toward the mine site. Also, the historical photograph shows a road located in this area.

The French drain could be located at the area east of the mine portal, but the evidence is inconclusive. If the French drain needs to be decommissioned WESTEC recommends trenching in the area east of the portal and also further east to bisect and open the drain between Dolly Creek and the mine portal.

5.0 DATA ANALYSIS

5.1 EVALUATION OF WASTE ROCK, SLUDGE, POND WATER, AND BACKGROUND SAMPLES

The waste rock, sludge, pond water, and background samples have been tested to evaluate:

1. The appropriate waste classification to aid in selecting remediation alternatives (i.e., hazardous or nonhazardous and Group A, B or C).

2. The potential for these materials to leach metals and poor quality water to Dolly Creek relative to waste discharge requirements (Order No. 90-030) and Fresh Water Aquatic Life Standards.

Total metals in the waste rock and sludge were tested as described in Section 4.2 to determine the appropriate waste classification. Soluble metals were tested in the waste rock, pond water, sludge, and background samples to aid in classification of the waste as well as to characterize the waste materials tendency to leach soluble metals and sulfate and the tendency to generate acid.

TOTAL AND SOLUBLE METALS

The total and soluble metals data for the waste rock indicate that certain waste units have elevated metals relative to background soluble metals. These units are the processed waste, the granitic waste, the oxide waste, the wood, and the sludge at the bottom of the settling pond. Total metals are primarily elevated in the oxide waste, the processed waste, and the pond sludge. Soluble metal concentrations are highest in the processed waste and the wood. These waste areas may be considered hazardous as discussed in Section 5.1.1.

Soluble metals determined by the WET procedure and analysis of the extract (Tables 4-3 and 4-4) are depicted in plan view in the waste and background samples (Figures 5-1 through 5-4). Each metal value per borehole represents the average metal concentration per sample site followed by the range in concentration. Only copper exceeds the soluble metals standard (STLC) and would be considered hazardous under Title 22 (see Section 5.1.1 for expanded discussion). Soluble cadmium concentrations range from not detected to 0.08 mg/l in the background soils and from not detected to 0.38 mg/l in the mine wastes (Figure 5-1). Waste units that contain soluble

cadmium above background levels include the wood, the processed waste, two pond sludge samples, and sandy soil under the hornfels waste. The mine wastes are not significantly enriched with soluble cadmium compared to the background soils. Soluble copper values in the background soils range from 0.29 to 15 mg/l and in the waste piles from 0.03 to 280 mg/l (Figure 5-2). The highest soluble copper values occur to the northeast of the pond in the granitic and oxide waste. The processed waste contains the minimum and maximum soluble copper values found (0.03 to 130 mg/l). This is not surprising as the processed waste is copper ore from which most, but not all, of the copper has been extracted. Four of the five pond sludge samples have soluble copper concentrations well above background (41 to 490 mg/l). Soluble iron concentrations in the background soils range from 0.96 to 370 mg/l (Figure 5-3). Waste units with soluble iron concentrations above the background levels include the processed waste and wood. Other high soluble iron concentrations occur in soils under the processed waste and under the wood. Two of the five pond sludge samples have elevated soluble iron. Figure 5-4 shows the distribution of soluble zinc. Background values for soluble zinc range from 0.11 to 4.3 mg/l. Waste units that have soluble zinc above background concentrations include the wood, one shallow sample of granitic waste, some processed waste samples, and some clay, sandy silt, and organic soil under the wastes. Metals concentrations in the boreholes were reviewed to find any regular variation with depth. No clear metals trend with depth through the waste is evident. Figures 5-5 through 5-7 show cross sections through the waste piles with soluble trace metal concentrations indicated. Locations of the cross section lines are shown on Figure 4-1.

The total metals analyses (Table 4-2) include concentrations of lead and mercury. In Phase II, waste rock samples will be analyzed for soluble lead and mercury to be consistent with other mine waste investigations. Table 4-2 indicates that sample WM-9-5 (granitic waste) and the pond sludge have a lead concentration greater than ten times the STLC. No samples contain mercury concentrations greater than ten times the STLC, and no samples contain lead or mercury at concentrations above the TTLC.

MATERIAL pH AND SULFATE

The pH of the mine waste, sludge, pond water, and background samples was characterized in all samples collected. The results of the analyses indicate pH is found generally in the range of 3.0 to 6.9 in the upper 10 feet of the mine waste. In most boreholes the pH increases with depth to values ranging from 4.6 to 8.0. Background soil samples pH's range from 5.93 to 7.23 and are generally similar to the pH of mine waste below a depth of about 10 feet. The pond pH is 6.3 to

7.5 and sludge material pH ranges from 6.4 to 7.0 (Figures 5-5 through 5-7). Sulfate usually varies inversely with pH, indicating that acid generation primarily occurs in the upper zone of the waste.

POND WATER

Pond water was analyzed for the key metals. The two filtered samples had concentrations similar to the unfiltered samples indicating that the key metal cations occur as dissolved species. Cadmium was not detected in the pond water (detection limit equals 0.01 mg/l). Copper concentrations ranged from 0.16 to 0.36 mg/l; iron values varied from less than 0.05 mg/l to 0.36 mg/l; and zinc varied from 0.18 to 0.25 mg/l.

5.1.1 Relative to Status as Hazardous/Nonhazardous Under Title 22 and Waste Group Classification Under Title 23

Of the waste samples that were subjected to total metals extraction, only four exceed the TTLC for copper. No other TTLC's are exceeded (Table 4-2). The samples exceeding the TTLC for copper are WM-6-5 (oxide waste), WM-17-10 (processed waste), WM-18-5 (processed waste), and a pond sludge sample. These samples are considered hazardous under Title 22 and would be included in Group A or B wastes under Title 23, Chapter 15, Article 7. The only metal whose STLC was exceeded was copper. Values that exceed the STLC are shaded in Table 4-3 and are indicated by bold typeface on the cross sections (Figures 5-5 through 5-7). The copper STLC is exceeded in wood in boreholes 2, 3, and 6 and in trench 3; in oxide waste in boreholes 4A and 9 and in trenches 3 and 6; in granitic waste in boreholes 5 and 9 and trench 2; in hornfels waste in borehole 7; in processed waste in boreholes 10, 11, 14, 15, 16, and 17; in processed waste and wood in borehole 11; in sandy silt in boreholes 1 and 5; in sandy soil in trenches 2 and 4; in organic soil in trench 3; in red clay/soil in trench 6; in silty sand pond sludge; and in orange silty clay pond sludge. These samples are considered hazardous waste under Title 22 and would be classified as either Group A or B waste under Title 23.

5.1.2 Relative to Waste Discharge Requirements and Aquatic Life Standards

The 1990 Waste Discharge Requirements (Order No. 90-030) for Walker Mine order that the receiving water standard at the point of compliance in Dolly Creek for the 1-hour average is 0.0018 mg/l for cadmium, 0.009 mg/l for copper, 1 mg/l for iron, and 0.065 mg/l for zinc. The 4-day average is 0.0006 for cadmium, 0.006 for copper, none for lead, and 0.058 mg/l for zinc.

The remaining metals listed in the order are not included in the analyses as the CVRWQCB has determined the four metals described are the key indicators to be used. Nearly all of the soluble cadmium, copper, iron, and zinc concentrations in the waste rock and background soils as determined by the WET analyses exceed these limits.

The Freshwater Aquatic Life standards for cadmium, copper, and zinc at water hardness of 50 mg/l as $CaCO_3$ is the same as the receiving water standard for the 4-day average (Table 4-3). As was the case for the receiving water standard, most of the soluble metal concentrations of all types of waste rock, pond water, and pond sludge exceed the FWAL standards. Background soluble metal concentrations were also compared to the FWAL standards (Table 4-4). Concentratients in every background sample exceed the FWAL standards.

The effluent limitations for the mine discharge point source are 24-hour maximum of 0.3 mg/l for copper, and 1.5 mg/l for zinc. The average copper and zinc concentrations in the mine discharge since the portal was sealed are below the effluent limitations; since the sealing of the portal, the copper limitation at discrete sampling times was exceeded four times and the zinc limitation was never exceeded (see Appendix D).

5.1.3 Acid Generation

Static tests measure the balance between potentially acid-generating minerals and acid-neutralizing minerals in a sample. Steps in the static test process include measurement of total sulfur, analyses to estimate the potential acidity, measurement of the neutralization potential, and prediction of whether or not acid could potentially form based on the ratio of the neutralization potential to the acid-generating potential. Kinetic tests are used to confirm the potential to generate acidity and to determine rates of reactions such as acid generation, sulfide oxidation, neutralization, and metal depletion. They involve weathering of samples under laboratory-controlled or on-site conditions for long time periods.

Forty-six static tests were performed on waste samples and six on background samples collected from nondisturbed areas adjacent to the mine (Table 4-5). The units that were found to be acid generating are the oxide waste, the granitic waste, and the processed waste. These units are indicated by shading on the cross sections (Figures 5-5 through 5-7). Within these units 13 samples were found to be acid generating based on their ratio of neutralization potential to acid-generating potential. Nine samples were determined to be possibly acid generating (indicated as

MAYBE in Table 4-5). No background samples were found to be acid generating. The results from the static acid generation tests were compared to pH and soluble sulfate and metals concentrations in the waste material. Ranges of pH's and concentrations in the non-acid-generating samples generally overlap the ranges in the acid-generating and possibly acid-generating samples, so no correlation can be made.

Six of the acid-generating samples, six of the possibly acid-generating samples, and three composite samples were selected for kinetic tests (now in progress). The acid-generating samples chosen were oxide waste and processed waste. Composite samples were selected from the oxide waste, the processed waste, and the granitic waste. The kinetic tests will provide a more realistic estimate of the acid-generating capacity of the materials than the static tests and are expected to predict less acid-generating capacity relative to the static acid-generating test results.

5.1.4 QA/QC Analytical Results

The sample rinse water described in Section 4.1.5 was collected after boreholes 3, 5, and 17. Table 4-3 shows the results of the chemical analyses of the rinse water. The pH was in the neutral range; cadmium and sulfate were not detected; and copper and iron concentrations were low. These concentrations most likely represent the ionic constituents of the distilled water and indicate sample decontamination procedures between soil sample collection adequately decontaminated the sampling equipment. Duplicate borehole samples were analyzed for boreholes 1, 2, 10, 11, 13, 14, 16, 17, and 18. Table 4-3 shows the soluble metal concentrations for the initial samples and the duplicates. The duplicate soil samples were obtained by analyzing the second sample tube collected per sampling interval at a given sample location and depth. As a result, the duplicates do not represent an exact re-analysis of the same sample but an estimate of the metal concentration variation within a given sampling interval. The duplicate data suggest that metal concentrations within a given interval are generally within an order of magnitude in concentration, with the exception of iron, which varies more widely within the sampling interval.

5.2 EVALUATION OF BACTERIA DATA RESULTS

One hundred and thirty-five mine waste and soil samples and 17 water and sediment samples were collected and tested for the following bacterial populations:

- *Neutral Heterotrophic Bacteria* - bacteria that prefer neutral pH soils and consume carbon based material.

- *Acidophilic Heteroptrophs* - bacteria and fungi that prefer acid soils and consume carbon based materials.

- *Acid-generating Autotrophic Bacteria* - bacteria that prefer acid soils and oxidize sulfur and iron based minerals, thereby generating acid and mobilizing sulfur and iron. *Thiobacillus ferrooxidans* is one of the most important members of this group.

The analytical results are summarized in Table 4-7. Appendix C contains the laboratory data sheets. In general, all bacterial populations were suppressed in the areas of mine disturbance. The microbial analysis showed that the largest populations of neutral heterotrophic soil bacteria ($>5.0 \times 10^6$ CFU) occur away from mine disturbance in marshy areas and in organic-rich soils. The lowest populations ($<1.0 \times 10^6$ CFU) are found in acidic soils such as in the mine waste area. Organic-poor soils with pH values less than 5.0 also generally have neutral heterotrophic populations less than 100×10^3. Replicate sample sites (e.g., F17 and F17R) show that differences in soil pH can cause a major difference in the neutral heterotrophic populations with these populations lower in more acidic soils. Water sediment samples have low heterotrophic bacteria counts compared to soils due to anoxic conditions in the sediments. These results are consistent with the expectation that neutral heterotrophic bacteria thrive in neutral pH soils.

Acidophilic heterotrophic bacteria are found throughout the Walker Mine site with the highest counts for acidophilic microbes ($>100 \times 10^3$) found outside of the area disturbed by mining. To evaluate the overall population distribution of neutral and acidophilic bacteria, the ratio of acidophilic to neutral bacteria was calculated. As the neutral heterotrophic bacteria appear to be most sensitive to the presence or absence of acid soils, the ratio of the two will indicate areas of high acid soils (Figure 5-8). The ratios range from 5×10^{-6} to 40,000 with the highest ratios located in the area disturbed by mining.

Two soils and one water sediment (F3, F11, and PW1) contain concentrations of *Thiobacillus ferrooxidans* above the detection limit of 10×10^2 CFU/gram. Colony counts range from 70×10^2 to 460×10^2 CFU/gram. This range is low compared to population counts generally found at acid-generating mine sites (10^6 - 10^8). Six years of drought in the Walker Mine area may have suppressed the *Thiobacillus ferrooxidans* population. Some of the soil samples (OSS1, OSS2, OSS3, OSS4, OSS5, DCS1, DCS2, DCS4, and G3) contained discrete zones of ferric iron deposition (1 to 3 cm across) within the agar, which could not be attributed to visible colony formation. *Thiobacillus ferrooxidans* communities are typically accompanied by diffuse zones of ferric iron, so these zones may represent microscopic colony formation. It is possible that the

moderate to high moisture content of the soil samples, along with elevated pH and high organic matter, resulted in an inhibition of colony formation in the agar plates. Locations of samples containing *Thiobacillus ferrooxidans* and those with zones of iron deposition in the agar plates are shown in Figure 5-8. In general, most of the samples that contain *Thiobacillus ferrooxidans*, and those that probably do based on iron deposition in the agar, are located near areas of seepage from the waste piles. The occurrence of *Thiobacillus ferrooxidans* south of Dolly Creek indicates a possible source of acid on that side of the creek.

5.3 EVALUATION OF PLANT DATA

The plant metals data (Table 4-8) can be analyzed by comparing metal uptake in the mining area to uptake in undisturbed areas and by comparing relative metal uptake of the three wetland species (*Salix, Carex and Juncus*). Of the samples from the undisturbed areas east of the portal and in Upper Dolly Creek, only those east of the portal have low metal concentrations relative to those in the mining area. The Upper Dolly Creek samples have metal content similar to those from the mining areas, which may suggest a source of metals upstream. Comparing values from plants near Dolly Creek upstream to values from plants near the creek downstream, willows (*Salix*) have lower metal content downstream while the sedges (*Carex*) have higher metal content downstream.

The data from the disturbed areas indicate that willows take up relatively more cadmium and zinc than the grasses (*Carex and Juncus*). The grasses consistently take up more iron than the willows as evidenced by higher iron concentrations in the grasses than in the willows at every location. The copper data are inconsistent. *Juncus* (tube grass) takes up more copper than *Carex* (sedge, grass) or *Salix* (willow) at the side of the pond and in the seepage area northeast of the pond but the samples from the area north of Dolly Creek and south of the processed waste show *Salix* and *Carex* uptake to be greater than *Juncus* uptake.

The implications of these results for wetland remediation design are that willows may be efficient at taking up cadmium and zinc in disturbed areas and grasses may be efficient concentrators of iron. No conclusions about copper uptake can be drawn from these data. Analysis of additional plant species may provide better characterization of plant copper uptake. Also, comparison between plants and the soils associated with them will provide information on metal loading capacities for each species.

6.0 WATER QUALITY AND KEY METALS CHEMISTRY

6.1 WATER QUALITY DATA

Surface water quality has been periodically measured at three sites in the Walker Mine portal area since 1957. Figure 6-1 shows the locations of the sites. Site 1 (PS-A) is the mine discharge from the portal, site 2 (R-1) is Dolly Creek upstream of the mine, and site 3 (R-2) is Dolly Creek below the mine access road. The water quality standards for evaluating impacts are specified in Order No. 90-030. Receiving water standards apply to data collected at R-1 and R-2 in Dolly Creek. Effluent limitations apply to data collected at the mine portal discharge point PS-A. Table 6-1 shows water quality parameters for the dates on which all three sites were sampled. Appendix D includes the historic water quality database supplied by the CVRWQCB.

Dolly Creek water upstream of the mine at R-1 has pH in the neutral range and concentrations of aluminum, copper, iron, and zinc are low to not detected. Dolly Creeks' water can be classified as a calcium magnesium bicarbonate type based on the data in Table 6-2. The mine discharge has pH ranging from 3.7 to 6.6 prior to 1987 when the portal was sealed and pH in the neutral range after the portal was sealed. Before 1987, copper concentrations were as high as 69 mg/l and zinc concentrations ranged up to 3.4 mg/l. After 1987, copper concentrations range from 0.14 to 0.45 mg/l and zinc concentrations range from less than 0.001 to 0.046 mg/l. Dolly Creek upgradient water quality remains consistent before and after the mine seal was installed.

Below the mine access road at R-2, before the mine portal was sealed, Dolly Creek water exhibited pH ranging from 5.5 to 8.2, copper concentrations ranging from 0.04 to 12.7 mg/l, and zinc concentrations ranging from 0.01 to 7.6 mg/l. When the concentrations in Dolly Creek below the mine access road are compared to those in Dolly Creek above the mine for the same date, it is evident that drainage to Dolly Creek from the mine area causes increases in metal concentrations in the creek. The pH values were generally, but not always, 0.5 to 1.0 pH unit below the mine and the copper, iron, and zinc concentrations were generally higher. After the mine portal was sealed, copper concentrations in Dolly Creek below the mine were lower than before the seal, ranging from below a detection limit of 0.01 metal to 0.32 mg/l, and were generally higher than the concentrations upstream of the mine. Zinc concentrations ranged from

less than 0.001 to 0.64 mg/l, and were usually, but not always (e.g., 8/3/88), higher than the concentrations upstream.

For the data collected after the portal was sealed, the mine discharge water sampled at PS-A is below the effluent limit standards for copper and zinc of 0.3 mg/l and 1.5 mg/l, respectively, at all sampling events except 5/23/91 for copper. The portal exceeds the FWAL standards for copper but does not exceed the standard for zinc. Dolly Creek upstream of the mine had copper and zinc concentrations below the detection limits which were below the FWAL standard. Dolly Creek below the mine had copper concentrations generally above the FWAL standards. Zinc concentrations were above the FWAL standards only in January and June of 1989. As the 4-day average waste discharge requirements are the same as the FWAL standards for the point of compliance at Dolly Creek below the mine access road, the same evaluation applies as for the FWAL standards.

After the portal was sealed, copper exceeded the 1-hour average waste discharge requirements at the mine discharge point and at the point of compliance but not in the upstream Dolly Creek background data. The zinc requirement was exceeded only in 1989 at the point of compliance.

6.2 KEY METALS CHEMISTRY

The key metals analyzed as part of this study in the Walker Mine area are cadmium, copper, iron, and zinc. Acid generation in the mine and waste piles tends to mobilize these metals because they are soluble at low pH. As pH increases, their solubility decreases. Figure 6-2 summarizes the precipitation, adsorption, and solubility characteristics of the key metals with increasing pH. The following discussion was derived from published literature and includes some specific details about the behavior of the metals.

CADMIUM

Cadmium is adsorbed on hydrous MnO_2 and adsorption increases with increasing pH (Fu et al., 1991). Cadmium is also adsorbed on clays but the presence of crystalline iron oxides can block access of cadmium to the clay adsorption sites (Zachara et al., 1992). The iron oxides do not adsorb cadmium. Cadmium is approximately 100 percent adsorbed at pH equals 7.0. Dolly Creek has an average pH of 7.7 below the mine, so cadmium is expected to be adsorbed and concentrations in solution should be very low.

COPPER

Copper is adsorbed on clays, iron oxides, and organic matter. Adsorption maxima are found with high clay, free iron oxides, high organic carbon, high cation exchange capacity, and high $CaCO_3$ (Joshi, 1986). Copper solubility is high at low pH, is lowest at pH equals 10, and is reduced to 1 mg/l at pH equals 6.2 (Rose, 1989). In Dolly Creek, with average pH of 7.7, copper concentrations are expected to be less than 1 mg/l but they would not be zero unless the pH was raised to 10. A pH lower than 7.7 will generally cause higher copper concentrations. Copper concentrations are all below 1 mg/l in Dolly Creek at this time.

IRON

Lowering pH from 4.2 to 3.2 in an acidic, metal-enriched mountain stream by injection of sulfuric acid caused dissolution of amorphous iron oxides on the streambed and a rapid increase in the dissolved iron concentration in the stream (McKnight and Bencala, 1989). When sulfate concentrations are high, precipitation of jarosite ($KFe_3(SO_4)_2(OH)_6$) controls the concentration of dissolved iron (Karathanasis et al., 1988). In anoxic groundwater that became oxygenated, precipitation of $Fe(OH)_3$ occurs rapidly once the conditions became oxidizing (Stollenwerk and Eychaner, 1989). In the conditions found in Dolly Creek iron would be expected to precipitate as iron oxides because the pH is in the neutral range and the stream water is oxidized.

ZINC

Zinc is adsorbed on clays, iron and manganese oxides, and organic matter (Shuman, 1988). Between pH of 6.0 and 7.9, zinc solubility is controlled by adsorption. Below pH of 6.0, adsorption is reduced. Above pH of 7.9 zinc precipitates as $Zn(OH)_2$ or $ZnCO_3$ (Singh and Abrol, 1985). In Dolly Creek at pH equals 7.7, zinc concentrations should be low because most zinc is adsorbed. Zinc is presently detected in Dolly Creek in concentrations ranging from 0.005 to 0.64 mg/l. Lower pH would cause less adsorption and higher concentration in solution. If Dolly Creek's pH goes above 7.9, soluble zinc concentration should go to zero due to precipitation of solids.

7.0 CONCEPTUAL SITE MODEL

The water quality data from Dolly Creek, portal discharge water data, pond data, waste, sludge, and background data were used to develop a conceptual model of the site with metals and pH inputs and outputs to and from Dolly Creek. Figure 7-1 depicts the site with copper, zinc, and pH data at key locations. Upper Dolly Creek (monitoring point #2 and location R-1) is considered to represent background water quality for the Dolly Creek watershed through March 1992. After March 1992, the background monitoring point will be a seep behind the portal area. As no data for the seep was provided by the CVRWQCB the Dolly Creek location was used for this discussion. The copper, zinc, and pH data depicted in Figure 7-1 represent the average values for these constituents after the mine seal was installed in 1987. Averages were used because the post-seal monitoring data values have been fairly consistent. The average value in Upper Dolly Creek for copper is 0.006 mg/l, zinc is 0.019 mg/l, and pH is 7.8. The background water quality as represented by Dolly Creek upstream of the site was compared to the soluble metals, pH, and sulfate of the background soil samples collected outside the area of mine disturbance. The background soluble copper is on average 1.7 mg/l, zinc is 0.76 mg/l, and pH is 6.4 mg/l. It should be noted that the background soil samples were not found to be acid generating as evidenced by six samples tested for static acid generation with no acid generation found, the average soils pH of 6.4 and low sulfate average concentration detected in the WET extract of 8.2 mg/l. Therefore, although these background soil soluble metals values are above the FWAL standards and the receiving water standard at R-2, acid waters would not be expected to be generated to mobilize the metals. The presence of elevated metals in the background samples could be due to the influx of wind blown material from the tailings impoundment downstream.

Inputs to Dolly Creek occur from two sources at the portal area: (1) direct discharge from the portal via the pond and directly to Dolly Creek via a pipe from the pond, and (2) nonpoint source runoff from the waste piles. Post-seal portal discharge data (monitoring point #1 and PS-A) are represented by average values for copper, zinc, and pH of 0.254 mg/l, 0.017 mg/l, and 7.89 mg/l, respectively. The portal discharge water is routed first to the settling pond. Data obtained from this investigation indicate the pond contains copper in average concentration of 0.32 mg/l, zinc in average concentration of 0.21 mg/l, and an average pH of 7.09. The pond data represent a one time sampling event whereas the portal discharge is based on an average of 13 samples over

a 5-year period. Based on the limited pond water data copper and zinc appear to increase slightly in the pond relative to the portal direct discharge while pH is very similar.

The nonpoint source discharge that has been the main focus of this investigation has been characterized by tests to determine the soluble metals that leach from the wastes as well as the acid-generating potential, pH, and sulfate concentrations. The estimates of the soluble metals obtained by the numerous tests performed vary greatly depending on the waste area and depth. The waste piles with the greatest tendency to leach soluble metals and generate acid are the processed waste, the oxide waste, the granitic waste, and the wood waste. A review of these waste piles suggests that the concentrations of metals and the pH of waters that may leach from these materials may range from 30 to 100 mg/l for copper, 1 to 5 mg/l for zinc, 0.02 to 0.1 mg/l for cadmium, 10 to 500 mg/l for iron, and pH from 4.0 to 7.0. Clearly, under the right conditions such as during normal to high rain years the waste piles would be expected to be a major source of metals and acid waters to Dolly Creek.

An indicator of the overall impact to Dolly Creek from the two major sources of contaminants, the direct portal discharge via the pond and the nonpoint source runoff, is the water quality data obtained from the monitoring point located downstream of the sources south of the access road (monitoring point #3 and R-2, the point of compliance). These data also represent averaged post seal monitoring data. The average value for copper is 0.076 mg/l, for zinc is 0.125 mg/l, and for pH is 7.8. A comparison of the water quality data upstream and downstream of the portal area indicate copper and zinc increase approximately an order of magnitude as it flows past the portal area. The concentrations of copper and zinc at the downstream sampling location are well below the average soluble metals estimated to be leached under acid conditions in the laboratory from the background soils, supporting the argument that background soils probably do not leach these metals in the field as there is no background acid source. If they did, metals concentrations both upstream and downstream in Dolly Creek would be expected to be closer to the background soluble metals values. It should also be noted that the monitoring periods for Dolly Creek data after the mine seal was installed coincide with a period of drought in the Sierra Nevada. As a result, the contribution of metals and acid waters that may occur under normal rain years from the two sources at the portal and from the mine waste may be underrepresented by the available data.

8.0 CONCLUSIONS

The results of the Phase I site characterization performed under Contract W1E indicate specific areas in four of the six waste piles located at the Walker Mine portal which should be classified as hazardous under Title 22 due to total and soluble copper. Analysis of the list of Title 22 metals on 20 screening samples indicated that copper exceeded the TTLC in only three samples. All other metals were below the TTLC hazardous waste standard. Based on the results of the 20 screening samples the CVRWQCB selected cadmium, copper, iron, and zinc to be further analyzed to determine the soluble concentration in the mine waste materials. Of these four key metals tested to determine the soluble metals in the waste, only copper exceeded the STLC in approximately 40 samples. Soluble cadmium, copper, and zinc concentrations also exceeded the FWAL and receiving water standards for Dolly Creek. Sampling and testing the waste piles with depth indicated that acid generation is generally occurring in the top 10 feet of waste when it is present. This is indicated by the waste pH and sulfate concentration and is consistent with the generally accepted theory that acid generation occurs in areas with high oxygen content. Static testing results indicated that the potential for acid generation exists throughout the oxide, granitic, and processed waste piles. If the upper 10 feet of these waste piles was removed, the deeper waste would be exposed to oxygen and acid would be produced. Metals distribution through the piles did not exhibit any clear spatial trends, suggesting that metals are available for release by acid waters throughout the waste piles. Some of the soils beneath the waste piles have elevated metals concentrations and may require remediation along with the waste piles. Soluble metals detected in background samples also indicate that metals are present both in the disturbed and undisturbed portions of the mine but will be released to the environment only in the presence of acid waters.

Bacterial population distributions obtained from this investigation can be used to develop a site picture of the distribution of the acid-generating tendency of the materials. There was also a clear correlation between the presence of bacteria that thrive in acidic soil conditions and soil pH, with the highest acid bacterial populations found in the most acidic soils. The overall low levels of *Thiobacillus ferroxidans* indicate that drought conditions have resulted in a decrease in acid generation relative to a typical acid mine waste site. With increased precipitation, an increase in both acid generation and *Thiobacillus ferroxidans* populations is expected. The plant survey results indicate that there are several indigenous plant species in the area, such as willows and

grasses, that concentrate metals and may be useful in removing metals from the portal discharge in a wetlands remediation system.

Analysis of hydrologic and topographic data has resulted in estimates of minimum and maximum flows of spring snowmelt and the 100-year flood as well as development of surface runoff and run-on patterns. This information can be used in Phase II to design surface water diversion channels around the portal area.

Review of the various concentrations of copper and zinc found in Dolly Creek, the portal discharge water, the settling pond water and sludge, and the waste and background samples suggests that since the seal was installed in 1987, and coincident with a period of prolonged drought, metal concentrations in Dolly Creek are increasing approximately an order of magnitude as Dolly Creek flows past the mine waste and the portal discharge point in the creek. During this period of drought the contribution of metals from the mine waste piles to the creek has probably been minimal as there have not been normal amounts of water in contact with the mine waste piles. The waste characterization information indicates that there is a significant potential for mine wastes to contribute metals and acid waters to Dolly Creek if sufficient water is available from precipitation and surface run-on and runoff to generate runoff from the waste piles The waste pile source has the potential to contribute significantly higher metals to Dolly Creek than the portal discharge.

Additional work to be performed under contract W1E is Phase II and III. Phase II of this project will involve formulation of remediation alternatives to prevent discharges to Dolly Creek such as landfilling, capping in-place, or slurrying the waste into the mine interior. Phase III will be the final design of the remediation alternative selected by CVRWQCB.

9.0 REFERENCES

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TABLES

Table 4-1. SUMMARY OF SAMPLE TYPE, NUMBER AND ANALYSES PERFORMED

BORE HOLE	DEPTH	SAMPLE TYPE	EPA 3050/6010/7000 TTLC METALS TOTAL SCREENING METALS	EPA 300 SULFATE EPA 9045 pH TITLE 22 WET STLC METALS	BACKGROUND TITLE 22 WET	STATIC TESTS	KINETIC TESTS
1	2.5(DUP)	SANDY SILT		X			
1	5	SANDY SILT		X		X	
1	10	SANDY SILT		X			
1	15	GRANITIC SAND					
1		COMPOSITE					
2	2.5	WOOD		X			
2	5	WOOD	X	X			
2	5(DUP)	WOOD		X			
2	10	WOOD/CLAY/PW?		X			
2	15	CLAY		X		X	
2		COMPOSITE					
3	2.5	WOOD		X		X	
3	5	WOOD		X			
3	10	WOOD	X	X			
3	15	SANDY SILT/PW?		X			
3	20	DG		X			
3		COMPOSITE					
4	2.5	OXIDE		X		X	X
4	5	OXIDE	X	X			
4A	7.5	OXIDE				X	
4A	15	OXIDE		X			
5	2.5	GRANITIC		X		X	
5	5	OXIDE (?)		X		X	X
5	10	GRANITIC	X	X			
5	15	GRANITIC		X			
5	20	GRANITIC		X			
5	25	GRANITIC		X		X	
5	30	SANDY SILT		X		X	
5	35	SANDY SILT		X		X	
5		COMPOSITE					X

Table 4-1. SUMMARY OF SAMPLE TYPE, NUMBER AND ANALYSES PERFORMED

BORE HOLE	DEPTH	SAMPLE TYPE	EPA 3050/6010/7000 TTLC METALS TOTAL SCREENING METALS	EPA 300 SULFATE EPA 9045 pH TITLE 22 WET STLC METALS	BACKGROUND TITLE 22 WET	STATIC TESTS	KINETIC TESTS
6	2.5	OXIDE		X		X	
6	5	OXIDE	X	X		X	
6	10	OXIDE		X			
6	12.5	OXIDE				X	X
6	15	OXIDE				X	X
6	17.5	OXIDE		X			
6	20	WOOD		X			
6	22.5	WOOD/SANDY SOIL		X			
6	25	WOOD / SANDY SOIL		X			
6	27.5	DG		X			
6		COMPOSITE					
7	2.5	HORNFELS		X			
7	5	OXIDE		X		X	
7	10	OXIDE		X			
7	12.5	HORNFELS		X			
7	15	HORNFELS				X	
7	17.5	HORNFELS		X			
7	20	HORNFELS	X	X			
7	22.5	HORNFELS		X			
7	27.5	HORNFELS		X			
7	32.5	WOOD / SANDY SOIL		X			
7	35	SANDY SOIL		X			
7	37.5	DG		X		X	
7		COMPOSITE					

Table 4-1. SUMMARY OF SAMPLE TYPE, NUMBER AND ANALYSES PERFORMED

BORE HOLE	DEPTH	SAMPLE TYPE	EPA 3050/6010/7000 TTLC METALS TOTAL SCREENING METALS	EPA 300 SULFATE EPA 9045 pH TITLE 22 WET STLC METALS	BACKGROUND TITLE 22 WET	STATIC TESTS	KINETIC TESTS
8	2.5	HORNFELS				X	
8	5	HORNFELS	X	X			
8	7.5	HORNFELS		X			
8A	10	SANDY SOIL		X		X	
8A	12.5	SANDY SOIL		X			
8A	15	SANDY SOIL		X		X	
8		COMPOSITE					
9	5	GRANITIC	X	X		X	
9	7.5	GRANITIC		X			
9	10	GRANITIC				X	
9	17.5	OXIDE		X			
9	25	OXIDE		X		X	X
9	27.5	OXIDE		X			
9	30	OXIDE		X			
9	37.5	DG		X			
9		COMPOSITE					X
10	2.5	PW	X	X		X	
10	2.5(DUP)	PW		X			
10	5	PW		X		X	
10	10	PW		X		X	X
10	15	PW		X			
10	20	PW/SANDY SOIL		X			
10	25	DG		X			
10		COMPOSITE					

Table 4-1. SUMMARY OF SAMPLE TYPE, NUMBER AND ANALYSES PERFORMED

BORE HOLE	DEPTH	SAMPLE TYPE	EPA 3050/6010/7000 TTLC METALS TOTAL SCREENING METALS	EPA 300 SULFATE EPA 9045 pH TITLE 22 WET STLC METALS	BACKGROUND TITLE 22 WET	STATIC TESTS	KINETIC TESTS
11	5	PW / WOOD		X			
11	7.5	PW	X	X		X	
11	7.5(DUP)	PW		X			
11	10	PW		X			
11	15	PW		X		X	X
11	20	PW		X			
11	25	PW / DG		X			
11		COMPOSITE					X
12	2.5	PW / FILL		X			
12	5	PW	X	X		X	
12	10	PW		X			
12	15	PW/SANDY SOIL		X			
12	25	SANDY SOIL		X			
12	27.5	DG		X		X	
12		COMPOSITE					
13	2.5	PW	X	X		X	X
13	2.5(DUP)	PW		X			
13	5	PW		X			
13	10	PW		X			
13	15	PW		X			
13	20	DG		X		X	
13		COMPOSITE					
14	2.5	PW		X		X	
14	5	PW		X			
14	10	PW		X		X	X
14	15	PW		X			
14	20	DG	X	X			
14	20(DUP)	DG		X			
14		COMPOSITE					

Table 4-1. SUMMARY OF SAMPLE TYPE, NUMBER AND ANALYSES PERFORMED

BORE HOLE	DEPTH	SAMPLE TYPE	EPA 3050/6010/7000 TTLC METALS TOTAL SCREENING METALS	EPA 300 SULFATE EPA 9045 pH TITLE 22 WET STLC METALS	BACKGROUND TITLE 22 WET	STATIC TESTS	KINETIC TESTS
15	2.5	PW		X		X	X
15	5	PW		X			
15	10	PW		X		X	
15	17.5	PW / WOOD	X	X			
15	20	DG		X			
15		COMPOSITE					
16	2.5	PW	X	X		X	X
16	2.5(DUP)	PW		X			
16	5	PW		X		X	
16	10	PW		X		X	
16	15	PW/WOOD		X		X	
16	20	SANDY SILT/DG		X		X	
16		COMPOSITE					
17	2.5	PW		X			
17	5	PW		X		X	X
17	10	PW	X	X			
17	10(DUP)	PW		X			
17	15	PW		X		X	
17	20	CLAY		X			
17	22.5	CLAY SOIL		X		X	
17	25	DG		X			
17		COMPOSITE					
18	2.5	PW		X		X	
18	5	PW	X	X			
18	5(DUP)	PW		X			
18	10	PW		X			
18	15	PW		X		X	
18	20	SANDY SOIL		X			
18	25	DG		X			
18		COMPOSITE					

Table 4-1. SUMMARY OF SAMPLE TYPE, NUMBER AND ANALYSES PERFORMED

BORE HOLE	DEPTH	SAMPLE TYPE	EPA 3050/6010/7000 TTLC METALS TOTAL SCREENING METALS	EPA 300 SULFATE EPA 9045 pH TITLE 22 WET STLC METALS	BACKGROUND TITLE 22 WET	STATIC TESTS	KINETIC TESTS
TP-1	1	PW		X			
TP-2	1	GRANITE		X			
TP-2	2	SANDY SOIL		X			
TP-2	3	DG		X			
TP-3	1	OX.WASTE/SOIL		X			
TP-3	2	WOOD		X			
TP-3	3	CLAY-SILT		X			
TP-3	3(DUP)	CLAY-SILT		X			
TP-3	5	GRAV. SAND		X			
TP-3	6	ORGANIC SOIL		X			
TP-4	1	OXIDE		X			
TP-4	2	SANDY SOIL		X			
TP-6	1	YELLOW SILT		X			
TP-6	2	OX.SOIL/WASTE		X			
TP-6	2(DUP)	OX.SOIL/WASTE		X			
TP-6	4	RED CLAY/SOIL		X			
POND1	SURFACE	WATER F,P		X			
POND2	SURFACE	WATER F,P	X	X			
POND3	SURFACE	WATER P		X			
POND4	SURFACE	P-3(DUP) WATER,P		X			
POND5	SURFACE	WATER P		X			
POND6	SURFACE	P-3(DUP) WATER,U		X			
POND7	SURFACE	P-5(DUP) WATER,U		X			
SL-1	SLUDGE	SILTY SAND		X			
SL-2	SLUDGE	SL-1(DUP)		X			
SL-3	SLUDGE	SILTY SAND		X			
SL-4	SLUDGE	SLT/CLY(ORANGE)	X	X			
SL-5	SLUDGE	SILTY SAND		X			

Table 4-1. SUMMARY OF SAMPLE TYPE, NUMBER AND ANALYSES PERFORMED

BORE HOLE	DEPTH	SAMPLE TYPE	EPA 3050/6010/7000 TTLC METALS TOTAL SCREENING METALS	EPA 300 SULFATE EPA 9045 pH TITLE 22 WET STLC METALS	BACKGROUND TITLE 22 WET	STATIC TESTS	KINETIC TESTS
3		QA/QC RINSE WATER		X			
5		QA/QC RINSE WATER		X			
17		QA/QC RINSE WATER		X			
SSG-1	SURFACE	SNDY SLT/GRAVEL			X		
SSG-2	SURFACE	SNDY SLT/GRAVEL			X		
SSG-4	SURFACE	SNDY SLT/GRAVEL			X		
SSG-7	SURFACE	SNDY SLT/GRAVEL			X		
SSG-8	SURFACE	SNDY SLT/GRAVEL			X		
SSG-9	SURFACE	SNDY SLT/GRAVEL			X		
SSG-13	SURFACE	SNDY SLT/GRAVEL			X		
SSG-14	SURFACE	SNDY SLT/GRAVEL			X		
SSH-1	SURFACE	TAN SANDY SILT			X		
SSH-2	SURFACE	TAN SANDY SILT			X		
SSH-4	SURFACE	TAN SANDY SILT			X		
SSH-6	SURFACE	TAN SANDY SILT			X		
SSH-10	SURFACE	TAN SANDY SILT			X		
SS-1	SURFACE	WHITE SANDY SILT			X		
SS-2	SURFACE	WHITE SANDY SILT			X		
SS-3	SURFACE	WHITE SANDY SILT			X		
SS-4	SURFACE	WHITE SANDY SILT			X		
SS-9	SURFACE	WHITE SANDY SILT			X		
SS-11	SURFACE	WHITE SANDY SILT			X		
SS-14	SURFACE	WHITE SANDY SILT			X		
SS-16	SURFACE	WHITE SANDY SILT			X		
SS-19	SURFACE	WHITE SANDY SILT			X		
SS-20	SURFACE	WHITE SANDY SILT			X		

Table 4-1. SUMMARY OF SAMPLE TYPE, NUMBER AND ANALYSES PERFORMED

BORE HOLE	DEPTH	SAMPLE TYPE	EPA 3050/6010/7000 TTLC METALS TOTAL SCREENING METALS	EPA 300 SULFATE EPA 9045 pH TITLE 22 WET STLC METALS	BACKGROUND TITLE 22 WET	STATIC TESTS	KINETIC TESTS
SDC-1	SURFACE	SILTY SOIL			X		
SDC-2	SURFACE	SILTY SOIL			X		
SDC-2R	SURFACE	SILTY SOIL			X		
SDC-3	SURFACE	SILTY SOIL			X		
SDC-4	SURFACE	SILTY SOIL			X		
SDC-5	SURFACE	SILTY SOIL			X		
F-1	SURFACE	FILL			X		
F-2	SURFACE	FILL			X		
F-3	SURFACE	FILL			X		
F-4	SURFACE	FILL			X		
F-5	SURFACE	FILL			X		
F-6	SURFACE	FILL			X		
F-7	SURFACE	FILL			X		
F-8	SURFACE	FILL			X		
F-9	SURFACE	FILL			X		
F-10	SURFACE	FILL			X		
2F-1	SURFACE	PROCESSED WASTE			X		
2F-2	SURFACE	PROCESSED WASTE			X		
2F-3	SURFACE	PROCESSED WASTE			X		
2F-4	SURFACE	PROCESSED WASTE			X		
2F-4R	SURFACE	PROCESSED WASTE			X		
25-5	SURFACE	PROCESSED WASTE			X		
TOTAL SAMPLES ANALYZED			20	145	45	46	15

TABLE 4-2

MINE WASTE AND POND TOTAL METALS

PARAMETERS	STLC	TTLC	WM-1-2.5	WM-2-5	WM-3-10	WM-4-5	WM-5-10	WM-6-5	WM-7-20	WM-8-5	WM-9-5
UNITS	mg/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SAMPLE TYPE			SNDY SLT	WOOD	WOOD	OXIDE	GRANITIC	OXIDE	HORNFELS	HORNFELS	GRANITIC
ANTIMONY	15	500	8.2	ND	ND	15	9.8	6.7	12	6.2	150
ARSENIC	5	500	34	11	11	29	45	31	44	30	47
BARIUM	100	10000	210	5.2	3.7	2400	1300	1100	610	880	1100
BERYLLIUM	0.75	75	ND	ND	ND	0.50	ND	ND	0.54	0.85	ND
CADMIUM	1	100	6.2	0.78	1.4	16	15	13	13	12	12
CHROMIUM	5	2500	16	1.6	ND	8.5	6.0	21	7.8	7.3	4.9
COBALT	80	8000	10	1.8	3.0	12	15	18	14	13	8.3
COPPER	25	2500	650	1500	1700	2300	2300	3900	1700	1300	1900
IRON			21000	410	2400	58000	58000	47000	48000	48000	51000
LEAD	5	1000	ND	ND	ND	36	8.0	14	14	21	430
MERCURY	0.2	20	ND	0.07	ND	0.97	0.72	0.59	1.2	0.85	1.7
MOLYBDENUM	350	3500	ND	0.90	0.60	2.1	1.6	0.80	0.80	2.4	1.5
NICKEL	20	2000	7.2	ND	ND	3.8	3.2	7.5	6.6	2.9	2.1
SELENIUM	1	100	ND	ND	ND	15	15	19	14	7.9	18
SILVER	5	500	ND	ND	8.3	8.9	1.0	8.9	ND	3.2	31
THALLIUM	7	700	24	ND	ND	ND	ND	14	10	ND	ND
VANADIUM	24	2400	35	3.1	1.1	50	42	40	47	47	22
ZINC	250	5000	78	16	13	100	130	150	98	110	110

TABLE 4-2

MINE WASTE AND POND TOTAL METALS

PARAMETERS	STLC	TTLC	WM-10-2.5	WM-11-7.5	WM-12-5	WM-13-2.5	WM-14-20	WM15-17.5	WM-16-2.5	WM-17-10	WM-18-5
UNITS	mg/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SAMPLE TYPE			PW	PW	PW	PW	DG	PW/WOOD	PW	PW	PW
ANTIMONY	15	500	6.1	7.8	5.4	ND	6.4	6.6	7.5	12	11
ARSENIC	5	500	32	18	33	20	31	39	19	32	46
BARIUM	100	10000	700	1900	210	110	260	150	2900	1600	1200
BERYLLIUM	0.75	75	0.72	0.59	0.66	ND	0.85	0.94	0.83	0.96	ND
CADMIUM	1	100	7.3	11	4.3	2.9	8.3	4.8	14	17	11
CHROMIUM	5	2500	19	4.4	37	9.8	39	27	3.2	3.0	3.4
COBALT	80	8000	10	6.2	8.1	56	18	7.6	17	38	53
COPPER	25	2500	2100	390	590	220	5.6	26	2500	4800	5500
IRON			32000	48000	17000	8600	33000	22000	62000	71000	48000
LEAD	5	1000	24	11	18	ND	ND	1.6	11	25	29
MERCURY	0.2	20	0.31	0.31	0.09	0.05	ND	0.06	0.54	0.46	1.4
MOLYBDENUM	350	3500	2.3	8.8	0.80	0.90	ND	ND	4.6	16	3.8
NICKEL	20	2000	6.4	ND	7.0	3.9	12	12	ND	1.7	1.6
SELENIUM	1	100	9.1	13	ND	ND	ND	ND	11	13	9.0
SILVER	5	500	0.58	11	ND	ND	ND	ND	2.3	10	12
THALLIUM	7	700	20	ND	25	16	72	16	ND	ND	ND
VANADIUM	24	2400	40	32	35	16	47	56	55	63	22
ZINC	250	5000	160	23	56	41	49	24	54	180	150

TABLE 4-2

MINE WASTE AND POND TOTAL METALS

PARAMETERS	STLC	TTLC	SLUDGE-4	POND-2	DETECTION LIMIT FOR SOLID SAMPLES	DETECTION LIMIT FOR LIQUID SAMPLES
UNITS	mg/l	mg/kg	mg/kg	mg/l	mg/kg	mg/l
SAMPLE TYPE			SLTY CLY	WATER F,P		
ANTIMONY	15	500	7.5	ND	5.0	0.10
ARSENIC	5	500	13	ND	5.0	0.20
BARIUM	100	10000	90	0.06	2.5	0.05
BERYLLIUM	0.75	75	ND	ND	0.50	0.01
CADMIUM	1	100	5.9	ND	0.50	0.01
CHROMIUM	5	2500	2.4	ND	0.50	0.01
COBALT	80	8000	1.5	0.02	1.0	0.02
COPPER	25	2500	5600	0.16	0.50	0.01
IRON			27000	ND	2.5	0.05
LEAD	5	1000	70	ND	5.0	0.10
MERCURY	0.2	20	0.28	ND	0.05	0.0002
MOLYBDENUM	350	3500	1.1	ND	0.50	0.01
NICKEL	20	2000	ND	ND	2.5	0.05
SELENIUM	1	100	ND	ND	10	0.20
SILVER	5	500	1.2	ND	0.50	0.01
THALLIUM	7	700	ND	ND	10	0.20
VANADIUM	24	2400	3.3	ND	1.0	0.02
ZINC	250	5000	48	ND	0.50	0.01

2500 EXCEEDS TTLC

250 EXCEEDS 10 TIMES STLC

STLC = SOLUBLE THRESHOLD LIMIT CONCENTRATION

TTLC = TOTAL THRESHOLD LIMIT CONCENTRATION

PW = PROCESSED WASTE

DG = DECOMPOSED GRANITE

F = FILTERED

P = PRESERVED

ND = NON DETECT

Table 4-3. MINE WASTE AND POND KEY METALS, pH AND SULFATE

DRILL HOLE	DEPTH	SAMPLE TYPE	pH	CADMIUM	COPPER	IRON	ZINC	SULFATE
UNITS	ft		pH units	mg/l	mg/l	mg/l	mg/l	mg/l
STLC				1.0	25		250	
TTLC				100	2500		5000	
FWAL*				(0.00066)	(.006)		(0.058)	
WDR**		1 HOUR AVG.		0.0018	0.009	1	0.065	
WDR**		4 DAY AVG.		0.0006	0.006	N/A	0.058	
DETECT.LIM. WET				0.01	0.01	0.05	0.01	10
DETECT.LIM. TOTAL				0.5	0.5	2.5	0.5	

* hardness = 50 mg/l as $CaCO_3$

** Receiving water limitation at Point of Compliance (R-2)

1 WET	2.5	SANDY SILT	4.4	(0.03)	60	60	(0.93)	63
1 WET(DUP)	2.5	SANDY SILT	4.1	(0.02)	35	34	(0.94)	53
1 WET	5	SANDY SILT	5.7	(0.02)	25	26	(0.89)	11
1 WET	10	SANDY SILT	6.8	(0.01)	(0.27)	9.9	(0.38)	ND
1 TOTAL	2.5	SANDY SILT		6.2	650	21000	78	
2 WET	2.5	WOOD	5.3	(0.02)	110	21	(10)	13
2 WET	5	WOOD	5.5	(0.02)	89	2.9	(5.5)	14
2 WET(DUP)	5	WOOD	4.1	ND	99	8.5	(5.2)	12
2 WET	10	WOOD/CLY/PW?	5.3	(0.03)	(0.19)	85	(6.5)	16
2 WET	15	CLAY	7.4	ND	(0.07)	17	(0.15)	11
2 TOTAL	5	WOOD		0.78	1500	410	16	
3 WET	2.5	WOOD	5.9	(0.03)	92	12	(6.8)	10
3 WET	5	WOOD	5.6	(0.03)	97	82	(6.4)	33
3 WET	10	WOOD	5.3	(0.03)	40	51	(7.3)	60
3 WET	15	SNDY SLT/PW?	5.8	(0.05)	(1.3)	170	(3.7)	ND
3 WET	20	DG	7.0	(0.02)	(4.4)	62	(12)	17
3 TOTAL	10	WOOD		1.4	1700	2400	13	
4 WET	2.5	OXIDE	4.3	(0.03)	(11)	69	(2.0)	73
4 WET	5	OXIDE	4.1	(0.03)	(11)	85	(1.4)	91
4A WET	15	OXIDE	4.9	(0.03)	35	87	(3.3)	35
4 TOTAL	5	OXIDE		16	2300	58000	100	
5 WET	2.5	GRANITIC	3.1	(0.04)	(15)	140	(6.6)	370
5 WET	5	OXIDE (?)	3.0	(0.07)	(12)	270	(3.7)	230
5 WET	10	GRANITIC	4.6	(0.03)	(12)	65	(4.0)	96
5 WET	15	GRANITIC	4.6	(0.03)	(24)	84	(3.4)	60
5 WET	20	GRANITIC	5.0	(0.03)	38	130	(2.8)	65
5 WET	25	GRANITIC	6.1	(0.01)	(6.3)	8.1	(0.76)	13
5 WET	30	SANDY SILT	4.9	(0.02)	37	39	(0.98)	41
5 WET	35	SANDY SILT	6.4	(0.01)	(0.09)	5.2	(0.15)	37
5 TOTAL	10	GRANITIC		15	2300	58000	130	

Table 4-3. MINE WASTE AND POND KEY METALS, pH AND SULFATE

DRILL HOLE	DEPTH	SAMPLE TYPE	pH	CADMIUM	COPPER	IRON	ZINC	SULFATE
UNITS	ft		pH units	mg/l	mg/l	mg/l	mg/l	mg/l
STLC				1.0	25		250	
TTLC				100	2500		5000	
FWAL*				(0.00066)	(.006)		(0.058)	
WDR**		1 HOUR AVG.		0.0018	0.009	1	0.065	
WDR**		4 DAY AVG.		0.0006	0.006	N/A	0.058	
DETECT.LIM. WET				0.01	0.01	0.05	0.01	10
DETECT.LIM. TOTAL				0.5	0.5	2.5	0.5	

* hardness = 50 mg/l as $CaCO_3$

** Receiving water limitation at Point of Compliance (R-2)

6 WET	2.5	OXIDE	4.3	(0.03)	(20)	100	(2.8)	170
6 WET	5	OXIDE	5.9	(0.03)	(20)	65	(1.8)	97
6 WET	10	OXIDE	5.8	(0.03)	(22)	110	(3.0)	190
6 WET	17.5	OXIDE	6.5	(0.03)	(22)	91	(1.5)	160
6 WET	20	WOOD	6.4	(0.38)	280	1500	(4.4)	460
6 WET	22.5	WOOD/SNDYSOIL	5.7	(0.04)	65	78	(5.0)	43
6 WET	25	WOOD/SNDYSOIL	6.2	(0.04)	(24)	82	(3.3)	15
6 WET	27.5	DG	6.9	(0.01)	(0.26)	15	(1.6)	ND
6 TOTAL	5	OXIDE		13	3900	47000	150	
7 WET	2.5	HORNFELS	7.9	(0.02)	(12)	27	(1.5)	11
7 WET	5	OXIDE	7.7	(0.03)	(13)	78	(1.8)	22
7 WET	10	OXIDE	7.8	(0.03)	(21)	62	(1.5)	19
7 WET	12.5	HORNFELS	7.6	(0.04)	(11)	140	(1.9)	46
7 WET	17.5	HORNFELS	7.9	(0.03)	(14)	96	(1.5)	39
7 WET	20	HORNFELS	7.7	(0.03)	(19)	83	(1.2)	17
7 WET	22.5	HORNFELS	7.9	(0.03)	(12)	91	(1.2)	50
7 WET	27.5	HORNFELS	8.0	(0.04)	28	62	(1.3)	18
7 WET	32.5	WOOD/SNDYSOIL	8.0	(0.1)	(5.5)	490	(2.6)	32
7 WET	35	SANDY SOIL	6.3	(0.01)	(1.1)	25	(3.4)	22
7 WET	37.5	DG	6.2	(0.03)	(15)	77	(1.7)	21
7 TOTAL	20	HORNFELS		13	1700	48000	98	
8 WET	5	HORNFELS	5.9	(0.02)	(13)	47	(1.7)	43
8 WET	7.5	HORNFELS	5.4	(0.03)	(17)	82	(2.0)	32
8A WET	10	SANDY SOIL	6.0	(0.11)	(12)	570	(2.1)	33
8A WET	12.5	SANDY SOIL	6.9	(0.02)	(0.38)	36	(1.3)	10
8A WET	15	SANDY SOIL	7.2	ND	(0.19)	9.7	(0.71)	ND
8 TOTAL	5	HORNFELS		12	1300	48000	110	
9 WET	5	GRANITIC	12.0	(0.02)	(20)	38	(0.76)	360
9 WET	7.5	GRANITIC	8.2	(0.03)	100	30	(2.6)	37
9 WET	17.5	OXIDE	7.7	(0.03)	54	54	(2.1)	32
9 WET	25	OXIDE	6.8	(0.05)	(22)	180	(3.4)	160
9 WET	27.5	OXIDE	6.7	(0.05)	(15)	160	(3.7)	160
9 WET	30	OXIDE	4.5	ND	(4.1)	27	(0.9)	38
9 WET	37.5	DG	6.4	ND	(0.53)	40	(0.46)	15
9 TOTAL	5	GRANITIC		12	1900	51000	110	

Table 4-3. MINE WASTE AND POND KEY METALS, pH AND SULFATE

DRILL HOLE	DEPTH	SAMPLE TYPE	pH	CADMIUM	COPPER	IRON	ZINC	SULFATE
UNITS	ft		pH units	mg/l	mg/l	mg/l	mg/l	mg/l
STLC				1.0	25		250	
TTLC				100	2500		5000	
FWAL*				(0.00066)	(.006)		(0.058)	
WDR**		1 HOUR AVG.		0.0018	0.009	1	0.065	
WDR**		4 DAY AVG.		0.0006	0.006	N/A	0.058	
DETECT.LIM. WET				0.01	0.01	0.05	0.01	10
DETECT.LIM. TOTAL				0.5	0.5	2.5	0.5	

* hardness = 50 mg/l as $CaCO_3$

** Receiving water limitation at Point of Compliance (R-2)

10 WET	2.5	PW	4.2	(0.04)	59	110	(3.8)	22
10 WET(DUP)	2.5	PW	4.0	(0.03)	48	85	(4.1)	220
10 WET	5	PW	4.3	(0.03)	(24)	66	(2.8)	83
10 WET	10	PW	5.5	(0.02)	110	30	(2.4)	150
10 WET	15	PW	6.8	(0.10)	(0.05)	450	(0.23)	130
10 WET	20	PW/SANDY SOIL	7.8	ND	(0.07)	11	0.07	ND
10 WET	25	DG	7.6	ND	(0.30)	9.5	(0.92)	ND
10 TOTAL	2.5	PW		7.3	2100	32000	160	
11 WET	5	PW / WOOD	5.2	(0.06)	130	88	(5.7)	88
11 WET	7.5	PW	4.3	(0.01)	(12)	47	(2.3)	140
11 WET(DUP)	7.5	PW	3.9	(0.05)	(7.9)	280	(0.59)	130
11 WET	10	PW	5.3	ND	30	7.2	(3.7)	55
11 WET	15	PW	6.1	(0.02)	54	23	(1.6)	25
11 WET	20	PW	6.0	ND	62	22	(1.6)	38
11 WET	25	PW / DG	6.9	(0.01)	(0.87)	56	(0.44)	ND
11 TOTAL	7.5	PW		11	390	48000	23	
12 WET	2.5	PW / FILL	6.3	(0.02)	(14)	73	(1.6)	14
12 WET	5	PW	6.2	(0.04)	(13)	110	(1.5)	16
12 WET	10	PW	6.9	(0.06)	(21)	170	(3.9)	14
12 WET	15	PW/SANDY SOIL	5.1	(0.07)	(0.57)	360	(1.2)	19
12 WET	25	SANDY SOIL	7.0	ND	(0.49)	8.6	(0.72)	13
12 WET	27.5	DG	7.1	ND	(0.05)	4.2	(0.27)	18
12 TOTAL	5	PW		4.3	590	17000	56	
13 WET	2.5	PW	4.6	(0.13)	(21)	37	(12)	110
13 WET(DUP)	2.5	PW	3.5	(0.05)	(6.6)	170	(3.2)	480
13 WET	5	PW	5.5	(0.03)	(5.3)	23	(2.5)	41
13 WET	10	PW	6.7	(0.1)	(0.14)	530	(0.90)	18
13 WET	15	PW	6.7	(0.08)	(0.04)	440	(1.4)	19
13 WET	20	DG	7.1	(0.01)	(0.61)	30	(0.85)	10
13 TOTAL	2.5	PW		2.9	220	8600	41	

Table 4-3. MINE WASTE AND POND KEY METALS, pH AND SULFATE

DRILL HOLE	DEPTH	SAMPLE TYPE	pH	CADMIUM	COPPER	IRON	ZINC	SULFATE
UNITS	ft		pH units	mg/l	mg/l	mg/l	mg/l	mg/l
STLC				1.0	25		250	
TTLC				100	2500		5000	
FWAL*				(0.00066)	(.006)		(0.058)	
WDR**		1 HOUR AVG.		0.0018	0.009	1	0.065	
WDR**		4 DAY AVG.		0.0006	0.006	N/A	0.058	
DETECT.LIM. WET				0.01	0.01	0.05	0.01	10
DETECT.LIM. TOTAL				0.5	0.5	2.5	0.5	
14 WET	2.5	PW	4.7	(0.01)	34	8.9	(1.1)	88
14 WET	5	PW	5.5	ND	40	6.8	(3.5)	87
14 WET	10	PW	5.8	ND	45	14	(2.0)	54
14 WET	15	PW	6.8	(0.02)	(21)	63	(2.5)	49
14 WET	20	DG	6.1	(0.03)	(0.08)	92	0.07	ND
14 WET(DUP)	20	DG	6.3	(0.03)	(0.02)	110	(0.10)	ND
14 TOTAL	20	DG		8.3	5.6	33000	49	
15 WET	2.5	PW	6.3	(0.02)	35	29	(4.0)	34
15 WET	5	PW	5.8	(0.09)	(0.04)	420	(2.9)	45
15 WET	10	PW	6.8	(0.09)	(0.03)	470	(1.3)	31
15 WET	17.5	PW / WOOD	6.3	(0.05)	(0.03)	200	(0.49)	12
15 WET	20	DG	7.1	(0.04)	(0.37)	150	(0.2)	ND
15 TOTAL	17.5	PW/WOOD		4.8	26	22000	24	
16 WET	2.5	PW	4.6	(0.02)	30	60	(6.3)	95
16 WET(DUP)	2.5	PW	5.5	(0.01)	39	6.1	(0.74)	44
16 WET	5	PW	4.9	(0.02)	(0.05)	400	(4.2)	50
16 WET	10	PW	5.1	ND	(0.03)	200	(1.9)	45
16 WET	15	PW/WOOD	6.7	ND	(0.04)	150	(1.5)	30
16 WET	20	SANDY SILT/DG	7.2	ND	(0.04)	42	(0.5)	16
16 TOTAL	2.5	PW		14	2500	62000	54	
17 WET	2.5	PW	4.8	(0.02)	37	67	(8.9)	200
17 WET	5	PW	5.5	(0.15)	(0.11)	680	(14)	37
17 WET	10	PW	5.7	(0.05)	(0.08)	150	(4.5)	34
17 WET(DUP)	10	PW	5.3	(0.08)	(0.23)	150	(4.8)	32
17 WET	15	PW	4.5	(0.03)	(0.59)	110	(0.56)	53
17 WET	20	CLAY	5.6	(0.01)	(2.5)	34	(4.5)	42
17 WET	22.5	CLAY SOIL	6.0	(0.01)	(0.54)	17	(1.6)	150
17 WET	25	DG	5.7	ND	(0.43)	23	0.05	ND
17 TOTAL	10	PW		17	4800	71000	180	

* hardness = 50 mg/l as $CaCO_3$

** Receiving water limitation at Point of Compliance (R-2)

Table 4-3. MINE WASTE AND POND KEY METALS, pH AND SULFATE

DRILL HOLE	DEPTH	SAMPLE TYPE	pH	CADMIUM	COPPER	IRON	ZINC	SULFATE
UNITS	ft		pH units	mg/l	mg/l	mg/l	mg/l	mg/l
STLC				1.0	25		250	
TTLC				100	2500		5000	
FWAL*				(0.00066)	(.006)		(0.058)	
WDR**		1 HOUR AVG.		0.0018	0.009	1	0.065	
WDR**		4 DAY AVG.		0.0006	0.006	N/A	0.058	
DETECT.LIM. WET				0.01	0.01	0.05	0.01	10
DETECT.LIM. TOTAL				0.5	0.5	2.5	0.5	

* hardness = 50 mg/l as $CaCO_3$

** Receiving water limitation at Point of Compliance (R-2)

18 WET	2.5	PW	5.4	(0.33)	(2.1)	54	(5.2)	55
18 WET	5	PW	5.4	(0.16)	(0.03)	850	(3.1)	62
18 WET(DUP)	5	PW	5.0	(0.21)	(0.05)	1000	(2.3)	58
18 WET	10	PW	6.1	(0.15)	(0.04)	710	(0.91)	42
18 WET	15	PW	6.3	(0.03)	(4.5)	99	(0.63)	29
18 WET	20	SANDY SOIL	5.3	(0.34)	(0.05)	1800	(0.57)	24
18 WET	25	DG	6.2	(0.15)	(0.05)	860	(0.25)	14
18 TOTAL	5	PW		11	5500	48000	150	
3	QA/QC	RINSE WATER	7.2	ND	(0.06)	0.80	(0.14)	ND
5	QA/QC	RINSE WATER	7.7	ND	(0.06)	0.28	(0.13)	ND
17	QA/QC	RINSE WATER	7.6	ND	(0.11)	0.64	(0.18)	ND
TOTAL	QA/QC			0.54	0.79	ND	1.7	
TP-1	1	PW	4.2	(0.05)	(16)	200	(0.21)	140
TP-2	1	GRANITE	2.8	(0.03)	41	96	(2.8)	250
TP-2	2	SANDY SOIL	2.5	(0.11)	77	490	(1.3)	850
TP-2	3	DG	4.9	ND	(5.4)	8.7	(0.32)	14
TP-3	1	OX.WASTE/SOIL	4.4	(0.05)	91	170	(0.9)	150
TP-3	2	WOOD	6.0	(0.21)	690	700	(6.6)	22
TP-3	3	CLAY-SILT	6.3	ND	(0.30)	10	(0.36)	29
TP-3	4	DUP OF TP-3-3	6.1	(0.01)	(1.0)	31	0.06	ND
TP-3	5	GRAV. SAND	6.4	(0.01)	(2.0)	29	(0.15)	14
TP-3	6	ORGANIC SOIL	6.1	(0.07)	150	120	(7.9)	46
TP-4	1	OXIDE	3.9	(0.03)	(16)	93	(0.27)	140
TP-4	2	SANDY SOIL	4.1	(0.02)	35	77	(0.38)	89
TP-6	1	YELLOW SILT	5.9	(0.02)	(23)	59	(0.25)	35
TP-6	2	OX.SOIL/WASTE	4.4	(0.10)	64	450	(0.90)	130
TP-6	3	DUP OF TP-6-2	4.6	(0.11)	130	450	(1.1)	170
TP-6	4	RED CLAY/SOIL	5.5	(0.05)	95	140	(1.5)	14

Table 4-3. MINE WASTE AND POND KEY METALS, pH AND SULFATE

DRILL HOLE	DEPTH	SAMPLE TYPE	pH	CADMIUM	COPPER	IRON	ZINC	SULFATE
UNITS	ft		pH units	mg/l	mg/l	mg/l	mg/l	mg/l
STLC				1.0	25		250	
TTLC				100	2500		5000	
FWAL*				(0.00066)	(.006)		(0.058)	
WDR**		1 HOUR AVG.		0.0018	0.009	1	0.065	
WDR**		4 DAY AVG.		0.0006	0.006	N/A	0.058	
DETECT.LIM. WET				0.01	0.01	0.05	0.01	10
DETECT.LIM. TOTAL				0.5	0.5	2.5	0.5	
F-1	SURFACE	FILL	4.5	(0.02)	51	44	(1.5)	130
F-2	SURFACE	FILL	3.75	(0.03)	110	63	(0.93)	160
F-3	SURFACE	FILL	3.87	(0.04)	120	64	(2.1)	310
F-4	SURFACE	FILL	5.23	(0.03)	37	41	(1.6)	26
F-5	SURFACE	FILL	4.61	(0.04)	84	35	(2.2)	85
F-6	SURFACE	FILL	4.9	(0.02)	37	47	(0.7)	79
F-7	SURFACE	FILL	4.76	(0.03)	59	61	(1.1)	50
F-8	SURFACE	FILL	5.72	(0.02)	(17)	39	(0.58)	19
F-9	SURFACE	FILL	4.93	(0.03)	57	61	(0.97)	21
F-10	SURFACE	FILL	4.98	(0.02)	33	42	(1.8)	29
2F-1	SURFACE	PW	4.59	(0.02)	31	57	(0.47)	120
2F-2	SURFACE	PW	4.83	(0.03)	(17)	100	(0.37)	160
2F-3	SURFACE	PW	4.62	(0.03)	(24)	85	(0.51)	73
2F-4	SURFACE	PW	5.53	(0.03)	32	69	(1.2)	20
2F-5	SURFACE	PW	5.07	(0.03)	38	56	(0.76)	43
2F-4R	SURFACE	PW		(0.05)	82	77	(2.8)	48
POND #1	SURFACE	WATER F,P	6.8	ND	(0.22)	0.36	(0.20)	120
POND #2	SURFACE	WATER F,P	6.3	ND	(0.23)	0.24	(0.18)	97
P#2 TOTAL	SURFACE	WATER F,P		ND	0.16	ND	0.22	
POND #3	SURFACE	WATER P	7.2	ND	(0.34)	0.19	(0.22)	120
POND #4	SURFACE	POND 3(DUP) P	7.2	ND	(0.35)	0.16	(0.25)	110
POND #5	SURFACE	WATER P	7.3	ND	(0.36)	0.15	(0.21)	110
POND #6	SURFACE	POND 3(DUP) U	7.3	ND	(0.27)	0.14	(0.19)	94
POND #7	SURFACE	POND 5(DUP) U	7.5	ND	(0.30)	0.11	(0.21)	110
SLUDGE-1		SILTY SAND	6.4	(0.01)	53	33	(0.84)	19
SLUDGE-2		SLUDGE-1(DUP)	6.4	(0.02)	41	30	(0.78)	21
SLUDGE-3		SILTY SAND	6.6	(0.03)	87	87	(1.3)	22
SLUDGE-4		SLT/CLY(ORNG)	7.0	(0.14)	490	560	(3.3)	430
S-4 TOTAL		SLT/CLY(ORNG)		5.9	5600	27000	48	
SLUDGE-5		SILTY SAND	6.4	(0.09)	(2.3)	450	(.71)	31

* hardness = 50 mg/l as $CaCO_3$

** Receiving water limitation at Point of Compliance (R-2)

DG=DECOMPOSED GRANITE, PW=PROCESSED WASTE, F=FILTERED, P=PRESERVED, U=UNPRESERVED

53 indicates Soluble Threshold Limit Concentration (STLC) exceeded

5600 indicates Total Threshold Limit Concentration (TTLC) exceeded

(0.01) indicates Freshwater Aquatic Life (FWAL) Standard exceeded

Table 4-4. BACKGROUND SOILS KEY METALS, pH AND SULFATE

SAMPLE #	SAMPLE TYPE	pH	CADMIUM	COPPER	IRON	ZINC	SULFATE
UNITS		pH units	mg/l	mg/l	mg/l	mg/l	mg/l
STLC			1.0	25		250	
FWAL*			(0.00066)	(.006)		(0.058)	
WDR**	1 HOUR AVG.		0.0018	0.009	1.0	0.065	
WDR**	4 DAY AVG.		0.0006	0.006	N/A	0.058	
DETECTION LIMIT			0.01	0.01	0.05	0.01	10

* hardness = 50 mg/l as $CaCO_3$

** Receiving water limitation at Point of Compliance (R-2)

SSG-1	SSG	5.98	(0.08)	(15)	370	(1.5)	8.3
SSG-2	SSG	6.26	(0.03)	(2)	78	(1.1)	47
SSG-4	SSG	7.23	(0.06)	(2.3)	190	(2.7)	8.3
SSG-7	SSG	6.41	(0.03)	(0.98)	77	(0.42)	8.4
SSG-8	SSG	6.61	(0.06)	(0.62)	200	(0.56)	7.6
SSG-9	SSG	6.5	(0.06)	(0.91)	190	(1.7)	8.5
SSG-13	SSG	6.47	(0.03)	(0.6)	100	(0.66)	8.4
SSG-14	SSG	6.44	(0.03)	(1.1)	0.96	(0.93)	7.9
ARITH. AVG.		6.48	(0.0475)	(2.94)	150.75	(1.2)	13.05
GEOM. AVG.		6.48	(0.044)	(1.5)	79.15	(1.01)	10.19
SSH-1	SSH	6.56	(0.02)	(4.3)	49	(0.74)	8.6
SSH-2	SSH	6.43	(0.02)	(1.6)	37	(0.52)	7.3
SSH-4	SSH	5.93	(0.04)	(2.1)	41	(1.2)	11
SSH-6	SSH	6.76	(0.05)	(1.2)	55	(4.3)	10
SSH-10	SSH	6.38	(0.02)	(0.29)	47	(0.16)	9.1
ARITH. AVG.		6.41	(0.03)	(1.9)	45.8	(1.38)	9.2
GEOM. AVG.		6.41	(0.028)	(1.38)	45.37	(0.795)	9.11
SS-1	SS	6.5	(0.02)	(0.58)	42	(0.2)	6.2
SS-2	SS	6.34	(0.01)	(1.4)	34	(0.24)	4.9
SS-3	SS	6.65	(0.02)	(1.8)	49	(0.11)	4.6
SS-4	SS	6.52	ND	(0.5)	25	(0.13)	5.2
SS-9	SS	6.08	(0.02)	(4.5)	36	(0.21)	6.6
SS-11	SS	6.05	(0.01)	(0.74)	42	(0.21)	3.5
SS-14	SS	6.25	(0.02)	(1.4)	62	(0.29)	7.4
SS-16	SS	6.12	(0.03)	(1.9)	82	(0.13)	6.5
SS-19	SS	6.44	(0.02)	(0.99)	92	(0.49)	7.7
SS-20	SS	6.62	(0.02)	(0.4)	54	(0.13)	5.6
ARITH. AVG.		6.36	(0.017)	(1.42)	51.8	(0.21)	5.82
GEOM. AVG.		6.35	(0.005)	(1.1)	48.14	(0.19)	5.68
SDC-1	SDC	6.56	(0.03)	(0.35)	120	(0.16)	5.4
SDC-2	SDC	6.44	(0.03)	(0.39)	120	(0.17)	4.5
SDC-3	SDC	6.13	(0.04)	(0.38)	150	(0.4)	4.5
SDC-4	SDC	6.32	(0.04)	(1)	120	(0.5)	4.2
SDC-5	SDC	6.21	(0.03)	(0.88)	86	(0.27)	4.9
SDC-2R	SDC	6.52	(0.04)	(0.37)	110	(0.16)	4.5
ARITH. AVG.		6.36	(0.035)	(0.56)	117.67	(0.28)	4.67
GEOM. AVG.		6.38	(0.034)	(0.51)	117.23	(0.25)	4.67

53 indicates Soluble Threshold Limit Concentration (STLC) exceeded

(0.01) indicates Freshwater Aquatic Life (FWAL) Standard exceeded

Table 4-5. STATIC ACID GENERATING TESTS

DRILL HOLE	DEPTH ft	SAMPLE TYPE	%S	AGP lbs/ton	NP lbs/ton	NP:AP RATIO	ACID FORMATION
BKGRND		PONDSLUDGE	0.00	0.0	40	>3	NO
BKGRND	SURFACE	SAND	0.02	1.2	45	36.0	NO
WM-1	5	SANDY SILT	0.02	1.2	40	32.0	NO
WM-2	15	CLAY	0.00	0.0	45	>3	NO
WM-3	2.5	WOOD	0.04	2.5	-7	-3.0	NO
WM-4	2.5	OXIDE	1.26	78.7	40	0.5	YES
WM-4A	7.5	OXIDE	0.14	8.7	55	6.3	NO
WM-5	2.5	GRANITIC	4.48	279.7	13	0.0	YES
WM-5	5	OXIDE (?)	0.47	29.3	40	1.4	MAYBE
WM-5	25	GRANITIC	0.01	0.6	43	68.1	NO
WM-5	30	SANDY SILT	0.02	1.2	47	38.0	NO
WM-5	35	SANDY SILT	0.01	0.6	38	60.1	NO
WM-6	2.5	OXIDE	0.94	58..7	47	0.8	YES
WM-6	5	OXIDE	0.55	34.3	120	3.5	NO
WM-6	12.5	OXIDE	0.61	38.1	47	1.2	MAYBE
WM-6	15	OXIDE	1.10	68.7	43	0.6	YES
WM-7	5	OXIDE	0.21	13.1	78	5.9	NO
WM-7	15	HORNFELS	0.17	10.6	70	6.6	NO
WM-7	37.5	DG	0.01	0.6	32	52.0	NO
WM-8	2.5	HORNFELS	0.12	7.5	70	9.3	NO
WM-8A	10	SANDY SOIL	0.10	6.2	55	8.8	NO
WM-8A	15	SANDY SOIL	0.00	0.0	45	>3	NO
BCKGRND	SURFACE	SAND	0.01	0.6	40	64.1	NO
WM-9	5	GRANITIC	0.20	12.5	1150	92.1	NO
WM-9	10	GRANITIC	0.07	4.4	55	12.6	NO
WM-9	25	OXIDE	1.20	74.9	43	0.6	YES
WM-10	2.5	PW	1.81	113.0	40	0.4	YES
WM-10	5	PW	0.14	8.7	43	4.9	NO
WM-10	10	PW	1.17	73.1	50	0.7	YES
BCKGRND	SURFACE	SAND	0.01	0.6	43	68.1	NO
WM-11	7.5	PW	0.20	12.5	32	2.6	MAYBE
WM-11	15	PW	0.88	54.9	45	0.8	YES
WM-12	5	PW	0.09	5.6	47	8.5	NO
WM-12	27.5	PW	0.01	0.6	38	60.1	NO
WM-13	2.5	PW	0.41	25.6	30	1.2	MAYBE
WM-13	20	PW	0.00	0.0	43	>3	NO

Table 4-5. STATIC ACID GENERATING TESTS

DRILL HOLE	DEPTH ft	SAMPLE TYPE	%S	AGP lbs/ton	NP lbs/ton	NP:AP RATIO	ACID FORMATION
WM-14	2.5	PW	0.17	10.6	53	4.9	NO
WM-14	10	PW	0.66	41.2	50	1.2	MAYBE
WM-15	2.5	PW	0.27	16.9	43	2.5	MAYBE
WM-15	10	PW	0.68	42.5	57	1.4	MAYBE
BCKGRND	SURFACE	SAND	0.01	0.6	1233	>3	NO
WM-16	2.5	PW	1.71	106.8	50	0.5	YES
WM-16	5	PW	0.43	26.8	65	2.4	MAYBE
WM-16	10	PW	0.93	58.1	45	0.8	YES
WM-16	15	PW/WOOD	0.05	3.1	30	9.6	NO
WM-16	20	SNDY SLT/DG	0.04	2.5	53	21.0	NO
BCKGRND	SURFACE	SAND	0.02	1.2	28	22.0	NO
WM-17	5	PW	0.50	31.2	47	1.5	MAYBE
WM-17	15	PW	0.94	58.7	47	0.8	YES
WM-17	22.5	CLAY SOIL	0.02	1.2	32	26.0	NO
BCKGRND	SURFACE	SAND	0.01	0.6	50	80.1	NO
WM-18	2.5	PW	1.47	91.8	25	0.3	YES
WM-18	15	PW	1.00	62.4	50	0.8	YES

BCKGRND indicates background samples collected from non-disturbed areas adjacent to the mine

Table 4-6. SUMMARY OF BACTERIAL SAMPLES COLLECTED

SAMPLE CODE	# OF SAMPLES	DESCRIPTION
SOIL SAMPLES		
F	22	FINE SANDY FILL MATERIAL
2F	8	FINE GRAINED PROCESSED WASTE
P	19	FILL SEDIMENTS AROUND PERIMETER OF POND
OSS	5	ORGANIC-RICH SANDY SILTS IN AN AREA OF SEEPAGE
G	3	MOIST GRANITIC SAND IN AN AREA OF SEEPAGE
CS	3	CLAYEY SILT
FW	2	SANDY FILL MATERIAL ADJACENT TO RUNNING WATER
OS	5	ORGANIC-RICH SANDY SILTS
DCN	6	SANDY SILT WITH GRAVEL NORTH OF DOLLY CREEK
DCS	6	SANDY SILT SOUTH OF DOLLY CREEK
SDC	6	SANDY SILT SOUTH OF DOLLY CREEK
SS	21	SANDY SILT
SSG	20	SANDY SILT WITH GRAVEL
SSH	10	SANDY SILT
WATER/SEDIMENT SAMPLES		
MS	4	MINE SEEPAGE
OSS	2	MARSHY AREA, FOOT OF ROCK TAILINGS NEAR SEEPAGE
DCN	1	DOLLY CREEK
DCS	4	DOLLY CREEK
FWW	2	RUNNING WATER ON UNIT FW
GW	2	SEEPAGE AREA AT FOOT OF TAILINGS
PW	2	POND WATER AND SEDIMENTS

TABLE 4-7

BACTERIA ANALYTICAL RESULTS

SAMPLE NUMBER	pH	HAC/HET	T. ferrooxidans
F1	4.50	10.0000	460 CFU's/gram
F2	3.75	21000.0000	
F3	3.87	40000.0000	
F4	5.23	0.5231	
F4R	5.56	0.1219	
F5	4.61	85.7143	
F6	4.90	12.3000	
F7	4.76	2.8500	
F8	5.72	0.3400	
F9	4.93	0.3579	
F10	4.98	0.4672	20 CFU's/gram
F11	5.27	0.3500	
F12	4.45	1.3667	
F13	5.76	0.0483	
F14	6.18	0.0970	
F15	6.03	0.1970	
F16	5.21	0.4943	
F17	4.97	3.7000	
F17R	6.14	0.2138	
F18	5.50	0.1867	
F19	5.75	0.2917	
F20	5.07	3.3333	
2F1	4.59	2240.0000	
2F2	4.83	63.7500	
2F3	4.62	20.0000	
2F4	5.53	0.3689	
2F5	5.07	0.4750	
2F5R	5.20	0.5000	
2F6	4.89	74.0000	
2F7	5.09	210.0000	
P1	3.81	165.0000	
P2	5.05	10.0000	
P3	6.09	1.5000	

TABLE 4-7

BACTERIA ANALYTICAL RESULTS

SAMPLE NUMBER	pH	HAC/HET	T. ferrooxidans
P4	6.11	0.3750	
P5	4.77	0.3563	
P6	4.71	10.0000	
P7	4.41	1000.0000	
P8	5.29	0.6944	
P9	4.29	17000.0000	
P10	5.18	0.6593	
P10R	4.60	4.9000	
P11	6.46	0.0086	
P12	6.09	0.0685	
P13	5.67	0.0806	
P14	5.60	0.0231	
P15	6.51	0.0000	
P16	6.55	0.0286	
P17	6.11	0.0095	
P18	5.12	0.2549	
OSS1	5.10	0.0219	5Z
OSS2	6.57	0.0400	2Z
OSS3	6.35	0.0052	3Z
OSS4	6.36	0.0205	4Z
OSS5	6.15	0.0014	1Z
OS1	6.48	0.0039	
OS2	6.31	0.0086	
OS3	6.12	0.0039	
OS4	6.47	0.0015	
OS5	6.57	0.0035	
CS1	6.73	0.0488	
CS2	6.99	0.0042	
CS3	7.32	0.0072	
G1	5.79	0.0291	
G2	6.95	0.0000	
G3	6.40	0.0010	3Z
FW1	6.72	0.0529	

TABLE 4-7

BACTERIA ANALYTICAL RESULTS

SAMPLE NUMBER	pH	HAC/HCT	T. ferrooxidans
FW2	5.96	0.0417	
DCN1	6.19	0.0045	
DCN2	6.72	0.0017	
DCN3	6.08	0.0162	
DCN4	6.35	0.0293	
DCN5	6.36	0.0987	
DCN5R	6.12	0.0447	
DCS1	6.58	0.0264	6Z
DCS1R	6.44	0.0747	
DCS2	6.97	0.0006	1Z
DCS3	6.35	0.0019	
DCS4	6.19	0.0043	1Z
DCS5	6.21	0.0197	
SDC1	6.56	0.0103	
SDC2	6.44	0.0044	
SDC2R	6.52	0.0027	
SDC3	6.13	0.0141	
SDC4	6.32	0.0025	
SDC5	6.21	0.0027	
SS1	6.50	0.0436	
SS2	6.34	0.0215	
SS3	6.65	0.1006	
SS4	6.52	0.1459	
SS5	5.71	0.1843	
SS5R	6.35	0.2194	
SS6	6.43	0.2267	
SS7	6.22	0.2356	
SS8	6.95	0.0312	
SS9	6.08	0.1992	
SS10	6.12	0.0644	
SS11	6.05	0.0965	
SS12	6.31	0.2804	
SS13	6.35	0.1311	

TABLE 4-7

BACTERIA ANALYTICAL RESULTS

SAMPLE NUMBER	pH	HAC/HET	T. ferrooxidans
SS14	6.25	0.0742	
SS15	6.21	0.0500	
SS16	6.12	0.1825	
SS17	5.93	0.1169	
SS18	6.26	0.2227	
SS19	6.44	0.0793	
SS20	6.62	0.0208	
SSG1	5.98	0.0129	
SSG2	6.26	0.0067	
SSG3	6.21	0.0029	
SSG4	7.23	0.0019	
SSG5	6.37	0.0035	
SSG7	6.41	0.0076	
SSG8	6.61	0.0296	
SSG9	6.50	0.0281	
SSG10	6.51	0.0626	
SSG11	6.34	0.0590	
SSG12	5.98	0.0709	
SSG13	6.47	0.0059	
SSG14	6.44	0.0018	
SSG15	6.43	0.0382	
SSG16	6.42	0.0038	
SSG17	6.52	0.0031	
SSG18	6.49	0.0191	
SSG19	6.34	0.0248	
SSG20	6.61	0.0019	
SSH1	6.56	0.0025	
SSH2	6.43	0.0295	
SSH3	6.29	0.0213	
SSH4	5.93	0.0600	
SSH5	6.14	0.0009	
SSH6	6.76	0.0045	
SSH7	7.10	0.1875	

TABLE 4-7

BACTERIA ANALYTICAL RESULTS

SAMPLE NUMBER	pH	HAC/HET	T. ferrooxidans
SSH8	6.38	0.1071	
SSH9	6.81	0.0895	
SSH10	6.38	0.0556	
OSS1*	6.93	0.0226	
OSS2*	7.08	0.0000	
DCN1*	7.09	0.0060	
DCS1*	7.06	0.0569	
DCS2*	6.95	0.0308	
DCS3*	7.06	0.0151	
DCS4*	6.68	0.0116	
FWW1*	6.89	0.0045	
FWW2*	6.91	0.0054	
GW1*	7.12	0.0437	
GW2*	7.11	0.1040	
PW1*	6.64	9.8000	70 CFU's/gram
PW2*	7.02	0.0417	
MS1*	6.41	0.0059	
MS2*	6.65	0.0067	
MS3*	6.73	0.0048	
MS4*	6.45	0.0060	

HET = Neutral heterotrophic counts

HETAC = Acidophilic heterotrophic counts

HAC/HET = Ratio of acidophilic and neutral counts

CFU's/gram = Colony forming units per gram (calculated on a wet weight basis)

Z = Zones of ferric iron deposition within the agar (see text)

* = Water/sediment sample

Table 4-8. SUMMARY OF PLANT SAMPLES COLLECTED AND ANALYTICAL RESULTS

SAMPLE NUMBER	LOCATION	CADMIUM (mg/l)	COPPER (mg/l)	IRON (mg/l)	ZINC (mg/l)	DISTURBED AREA?
Salix-WM	east of portal	0.570	5.6	40	185	UNDISTURBED
Carex-WM		0.170	2.6	205	16	
Juncus-WM		0.220	2.4	55	34	
Salix-UDC	upper Dolly	2.500	15.0	60	380	UNDISTURBED
Carex-UDC	Creek	0.250	3.4	70	17	
Salix-P	side of pond	6.000	11.0	85	215	DISTURBED
R-Salix-P		3.200	10.0	85	200	
Carex-P		0.090	10.0	90	19	
Juncus-P		0.670	185.0	165	32	
Salix-PP	pond discharge	1.100	17.0	105	230	DISTURBED
Carex-PP	pipe	0.170	40.0	290	22	
R-Carex-PP		0.200	29.0	240	17	
Salix-S	seepage NE of	9.400	14.0	55	490	DISTURBED
Carex-S	pond	0.090	11.0	150	13	
Juncus-S		0.410	18.0	120	24	
Salix-NDC	N of Dolly	8.000	24.0	145	235	DISTURBED
Carex-NDC	Creek, S of	0.200	24.0	580	15	
Juncus-NDC	processed	0.180	16.0	200	24	
R-Juncus-NDC	waste	0.185	4.0	205	46	
Salix-CONDC	Dolly Creek,	2.300	8.8	75	145	DISTURBED
Carex-CONDC	downstream	0.360	21.0	325	40	

Salix = willow
Carex = sedge, grass
Juncus = tube grass
WM = Walker Mine east of portal
UDC = upper Dolly Creek
P = Pond
PP = Pond discharge pipe
S = Seepage
NDC = North of Dolly Creek
CONDC = Dolly Creek downstream

TABLE 4-9
SUMMARY OF CLIMATOLOGICAL DATA
1948 - 1991 AT PORTOLA STATION

Station:	PORTOLA	Latitude:	N39:48:00	ID:	7085
County:	PLUMAS	Longitude:	W120:28:00	Begin Date:	7/1948
State:	CA	Elevation:	4850	End Date	2/1991

	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	YEAR
MAXIMUM DAILY TEMPERATURE (Fahrenheit)													
Day Average	41.7	46.6	51.2	59.3	67.9	77.4	86.0	84.4	78.3	67.6	52.7	44.1	63.4
Maximum for Month	51	57	60	68	76	85	91	92	86	76	63	55	66
Maximum for Year	1961	1991	1972	1949	1954	1977	1959	1981	1951	1952	1949	1958	1959
Minimum for Month	31	36	43	45	58	71	80	77	65	58	44	35	60
Minimum for Year	1949	1956	1952	1967	1977	1953	1987	1976	1986	1984	1985	1990	1989
MINIMUM DAILY TEMPERATURE (Fahrenheit)													
Day Average	17.4	20.2	24.0	27.4	32.5	37.6	40.6	39.1	34.9	28.9	24.0	19.1	29.0
Maximum for Month	28	30	32	33	37	43	47	45	39	34	31	29	33
Maximum for Year	1986	1963	1978	1990	1963	1977	1988	1958	1967	1979	1950	1981	1986
Minimum for Month	1	10	17	21	27	30	36	33	29	24	15	7	26
Minimum for Year	1949	1949	1952	1975	1976	1976	1961	1957	1971	1951	1959	1990	1949
DAILY & MONTHLY PRECIPITATION (Inches)													
Day Average	0.12	0.11	0.09	0.04	0.04	0.02	0.01	0.01	0.02	0.04	0.09	0.11	0.06
Maximum for Month	12.05	11.94	8.94	4.57	2.59	2.59	2.54	2.09	2.85	9.70	8.64	14.36	39.75
Maximum for Year	1969	1986	1974	1963	1971	1969	1952	1965	1986	1962	1983	1955	1983
Minimum for Month	0.08	0.04	0.23	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.60
Minimum for Year	1991	1988	1988	1952	1974	1986	1989	1988	1987	1986	1959	1989	1976
Monthly Average	3.80	3.04	2.91	1.27	1.09	0.60	0.34	0.36	0.58	1.18	2.51	3.35	21.89

TABLE 4-9
SUMMARY OF CLIMATOLOGICAL DATA
1948 - 1991 AT PORTOLA STATION

Station:	**PORTOLA**	**Latitude:**	**N39:48:00**	**ID:**	**7085**
County:	**PLUMAS**	**Longitude:**	**W120:28:00**	**Begin Date:**	**7/1948**
State:	**CA**	**Elevation:**	**4850**	**End Date**	**2/1991**

	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	YEAR
DAILY & MONTHLY SNOWFALL (Inches)													
Day Average	0.58	0.48	0.31	0.11	0.03	0.00	0.00	0.00	0.00	0.01	0.17	0.49	0.17
Maximum for Month	69.00	80.30	64.00	61.00	7.50	0.00	0.00	0.00	4.00	5.00	24.00	71.70	185.60
Maximum for Year	1952	1969	1967	1982	1971	1990	1990	1990	1971	1948	1985	1971	1952
Minimum for Month	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00
Minimum for Year	1991	1991	1988	1990	1988	1990	1990	1990	1990	1990	1990	1990	1986
Monthly Average	17.81	13.38	9.63	3.11	0.89	0.00	0.00	0.00	0.10	0.30	5.12	15.24	74.76

TABLE 4-9
SUMMARY OF CLIMATOLOGICAL DATA
1948 - 1991 AT QUINCY STATION

Station:	QUINCY	Latitude:	N39:58:00	ID:	7195
County:	PLUMAS	Longitude:	W120:57:00	Begin Date:	7/1948
State:	CA	Elevation:	3410	End Date	2/1991

	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	YEAR
MAXIMUM DAILY TEMPERATURE (Fahrenheit)													
Day Average	45.7	52.4	56.7	65.1	74.1	83.2	91.0	89.8	84.0	72.8	56.1	46.0	69.5
Maximum for Month	55	67	64	74	82	90	95	96	91	84	65	55	71
Maximum for Year	1991	1991	1959	1959	1969	1987	1985	1967	1987	1988	1959	1976	1959
Minimum for Month	36	43	47	49	64	77	84	81	75	63	50	40	66
Minimum for Year	1949	1949	1952	1967	1977	1953	1983	1976	1986	1957	1964	1971	1955
MINIMUM DAILY TEMPERATURE (Fahrenheit)													
Day Average	21.4	24.9	27.9	30.6	36.0	41.2	42.5	40.4	36.1	30.4	27.5	23.6	32.4
Maximum for Month	30	35	34	37	43	46	48	49	43	38	36	32	34
Maximum for Year	1956	1963	1983	1965	1963	1969	1952	1990	1963	1963	1950	1955	1963
Minimum for Month	1	16	23	26	32	37	38	33	29	24	18	12	29
Minimum for Year	1949	1949	1955	1975	1953	1984	1955	1955	1954	1949	1959	1976	1955
DAILY & MONTHLY SNOWFALL (Inches)													
Day Average	0.53	0.33	0.27	0.11	0.02	0.00	0.00	0.00	0.00	0.00	0.05	0.27	0.12
Maximum for Month	90.90	58.50	45.00	32.00	8.00	1.00	0.00	0.00	0.00	1.00	14.00	49.50	167.20
Maximum for Year	1950	1969	1967	1982	1950	1967	1990	1990	1990	1948	1955	1971	1952
Minimum for Month	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Minimum for Year	1991	1991	1990	1990	1990	1990	1990	1990	1990	1990	1990	1990	1990
Month Average	16.06	9.36	8.55	3.37	0.51	0.03	0.00	0.00	0.00	0.03	1.54	8.25	57.69

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TABLE 4-9
SUMMARY OF CLIMATOLOGICAL DATA
1948 - 1991 AT QUINCY STATION

Station:	QUINCY	Latitude:	N39:58:00	ID:	7195
County:	PLUMAS	Longitude:	W120:57:00	Begin Date:	7/1948
State:	CA	Elevation:	3410	End Date	2/1991

	JAN	FEB	MAR	APR	MAY	JUN	JULY	AUG	SEP	OCT	NOV	DEC	YEAR
DAILY & MONTHLY PRECIPITATION (Inches)													
Day Average	0.25	0.22	0.18	0.10	0.05	0.02	0.01	0.01	0.03	0.09	0.20	0.23	0.11
Maximum for Month	22.77	20.18	17.38	10.65	5.43	3.05	1.89	2.47	5.51	17.05	18.70	25.57	77.53
Maximum for Year	1969	1986	1989	1982	1957	1967	1974	1965	1986	1962	1973	1955	1983
Minimum for Month	0.41	0.22	0.82	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.15
Minimum for Year	1991	1971	1956	1985	1954	1987	1989	1987	1988	1978	1959	1989	1949
Month Average	7.38	6.13	5.50	2.83	1.52	0.71	0.18	0.35	0.86	2.84	5.59	6.97	43.42

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TABLE 6.1
DOLLY CREEK METALS, PH, AND FLOW DATA

DATE	MINE DISCHARGE PS-A						DOLLY CREEK UPSTREAM R-1						DOLLY CREEK BELOW MINE ACCESS ROAD (POINT OF COMPLIANCE) R-2					
	pH	Al mg/l	Cu mg/l	Fe mg/l	Zn mg/l	Flow CFS	pH	Al mg/l	Cu mg/l	Fe mg/l	Zn mg/l	Flow CFS	pH	Al mg/l	Cu mg/l	Fe mg/l	Zn mg/l	Flow CFS
5/27/58	4.3	---	21	---	2.1	---	6.4	---	---	---	---	---	5.5	---	8.2	---	.48	---
7/4/60	5.2	---	9.7	.13	1.3	.5	7.7	---	.03	.13	---	2.0	8.0	---	.37	.48	.05	5.0
7/18/60	4.6	---	.97	---	.2	.011	---	---	.05	---	---	---	7.7	---	.21	---	.04	1.5
6/19/79	---	---	24.3	---	1.02	---	---	---	<.005	---	<.002	---	---	---	7.5	---	.435	---
8/20/79	---	---	20.1	---	.82	---	---	---	.0004	---	.0004	---	---	---	6.29	---	.302	---
9/27/83	---	---	13.3	---	.66	.03	7.4	---	<.02	---	<.01	---	6.0	---	.85	---	.13	---
6/13/85	5.0	---	19	---	---	.55	7.0	---	.02	---	---	.011	6.0	---	7.65	---	---	.5
6/25/85	4.4	---	19	---	---	.1	6.4	---	<.02	---	<.02	---	5.8	---	7.65	---	---	.5
4/7/86	3.7	5.2	26	.35	.9	1.48	---	<.02	<.025	<.01	.025	---	---	---	9.7	---	.44	---
6/11/86	5.1	---	23	---	.89	1.39	---	---	<.025	---	<.02	---	---	---	5.8	---	.25	---
8/1/86	---	---	10.4	---	.5	.07	---	---	<.1	---	<.1	---	---	---	3.4	---	.1	---
1987	Mine portal sealed																	
8/3/88	---	---	0.22	---	<.05	.01	---	---	.008	---	.023	---	---	---	.045	---	.005	---
11/3/88	---	---	.229	---	.007	.01	---	---	.0062	---	.0028	.011	---	---	.023	---	.005	.223
1/29/89	---	---	.25	---	.014	.041	---	---	<.002	---	<.005	.003	---	---	.17	---	.64	.167
6/20/89	---	---	.28	---	.01	.01	---	---	<.001	---	<.01	.044	---	---	.07	---	.3	.446
8/17/89	7.3	---	.28	---	<.05	.01	---	---	<.005	.05	<.05	.1	8.1	.06	.012	.41	<.05	.001
11/14/89	6.9	---	.23	---	<.001	.01	6.9	---	<.03	---	<.001	---	7.3	---	.12	---	<.001	.18
5/10/90	7.2	---	.23	---	<.03	.01	7.7	---	<.01	---	<.03	.004	7.6	---	<.03	---	<.03	.67
7/17/90	---	---	.255	---	.005	---	---	---	<.001	---	<.001	0	---	---	.0295	---	.0175	---

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TABLE 6.1
DOLLY CREEK METALS, PH, AND FLOW DATA (continued)

DATE	MINE DISCHARGE PS-A						DOLLY CREEK UPSTREAM R-1						DOLLY CREEK BELOW MINE ACCESS ROAD (POINT OF COMPLIANCE) R-2					
	pH	Al mg/l	Cu mg/l	Fe mg/l	Zn mg/l	Flow CFS	pH	Al mg/l	Cu mg/l	Fe mg/l	Zn mg/l	Flow CFS	pH	Al mg/l	Cu mg/l	Fe mg/l	Zn mg/l	Flow CFS
5/27/58	4.3	---	21	---	2.1	---	6.4	---	---	---	---	---	5.5	---	8.2	---	.48	---
5/23/91	8.6	ND	.36	ND	ND	.008	6.5	.06	ND	.06	ND	.067	7.5	.16	.13	.3	.01	1.0
7/31/91	9.5	<.05	.21	<.03	.046	.008	9.5	<.05	<.008	.21	<.01	.003	9.5	<.05	.024	.5	<.01	.167
6/11/92	---	---	.2	.03	<.03	---	---	---	.0086	.04	.001	---	---	---	<.03	.62	<.03	---
10/5/92	6.76	<.4	.198	.045	<.03	0.004	7.58	---	<.001	.110	<.02	.095	7.7	---	.013	.55	<.02	.28
12/1/92	---	---	.18	<.10	<.02	.004	---	---	<.001	<.1	<.02	---	---	---	.012	.41	<.02	---
Effluent Limitations	6.5 - 8.5		0.3		1.5		Fresh Water Aquatic Life Standards						6.5-8.5		0.006		0.058	
							Receiving Water Standard						(1-hr avg.)		0.009		0.065	
													(4-day avg.)		0.006		0.058	

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Table 6-2. Stream Water Quality in the Walker Mine Area.

"Typical" selected water quality parameters for streams in the Walker Mine area	
	mg/l
Ca	5.8
Na	2.8
K	0.7
Mg	2.2
SO4	5
HCO3	23
CO3	—
pH	7.6
NO3	0.7
NH3	0.01
Cl	—
Cu	0.03
Zn	0.01
Fe	0.15

(Kaback, 1978, referenced in SRK, 1985)

FIGURES

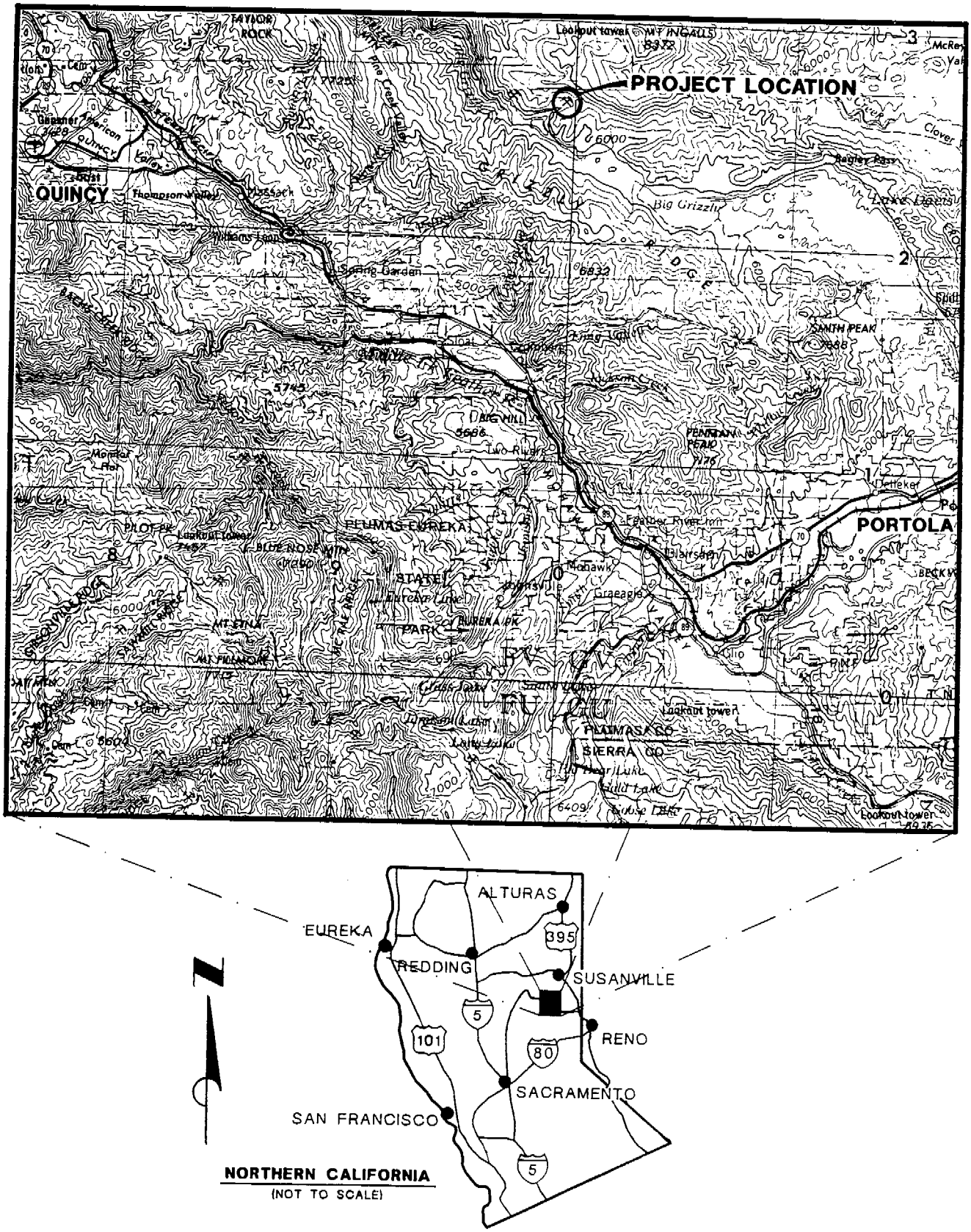

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FIGURE 2-1

PROJECT LOCATION MAP

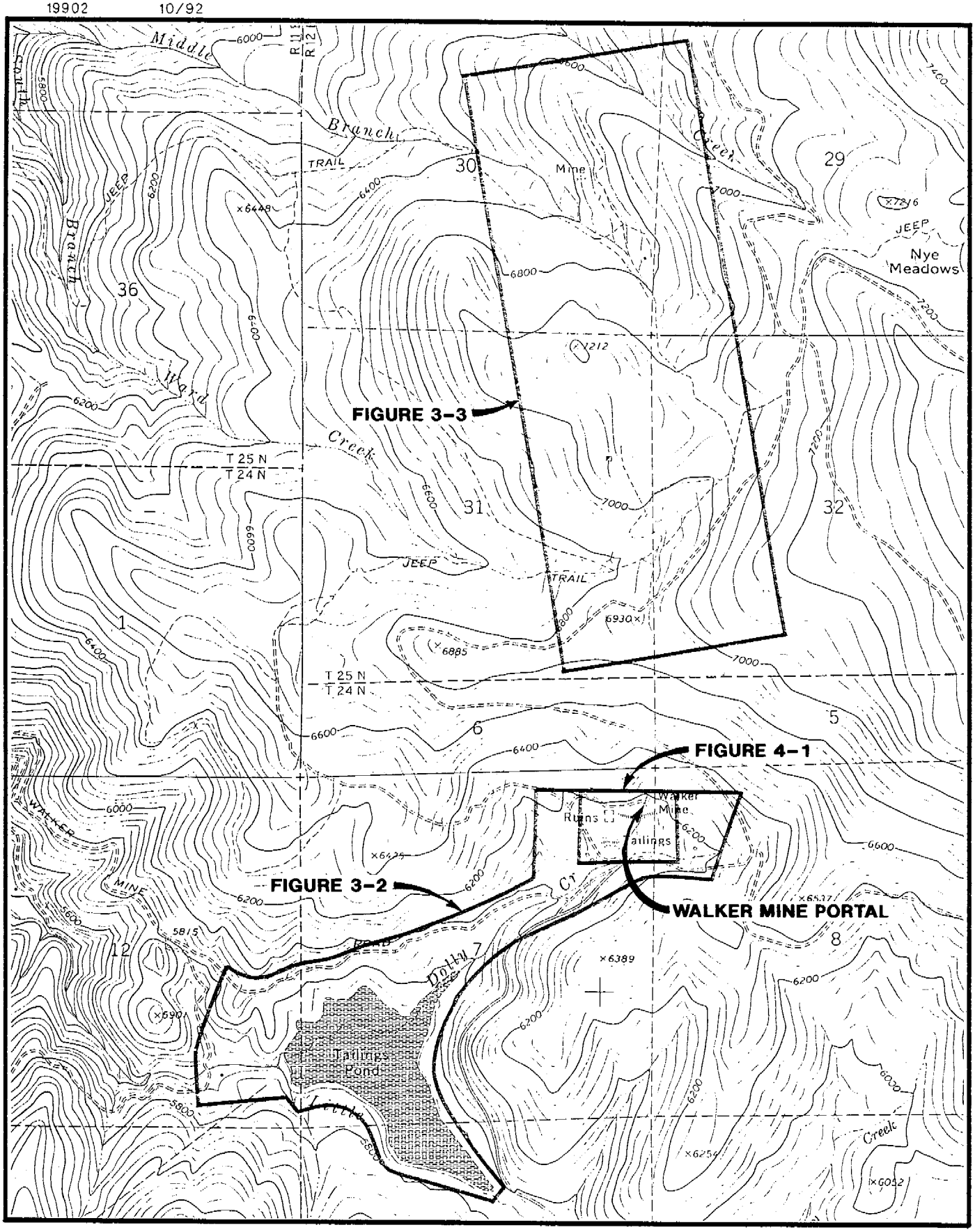

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FIGURE 3-1

WALKER MINE AREA

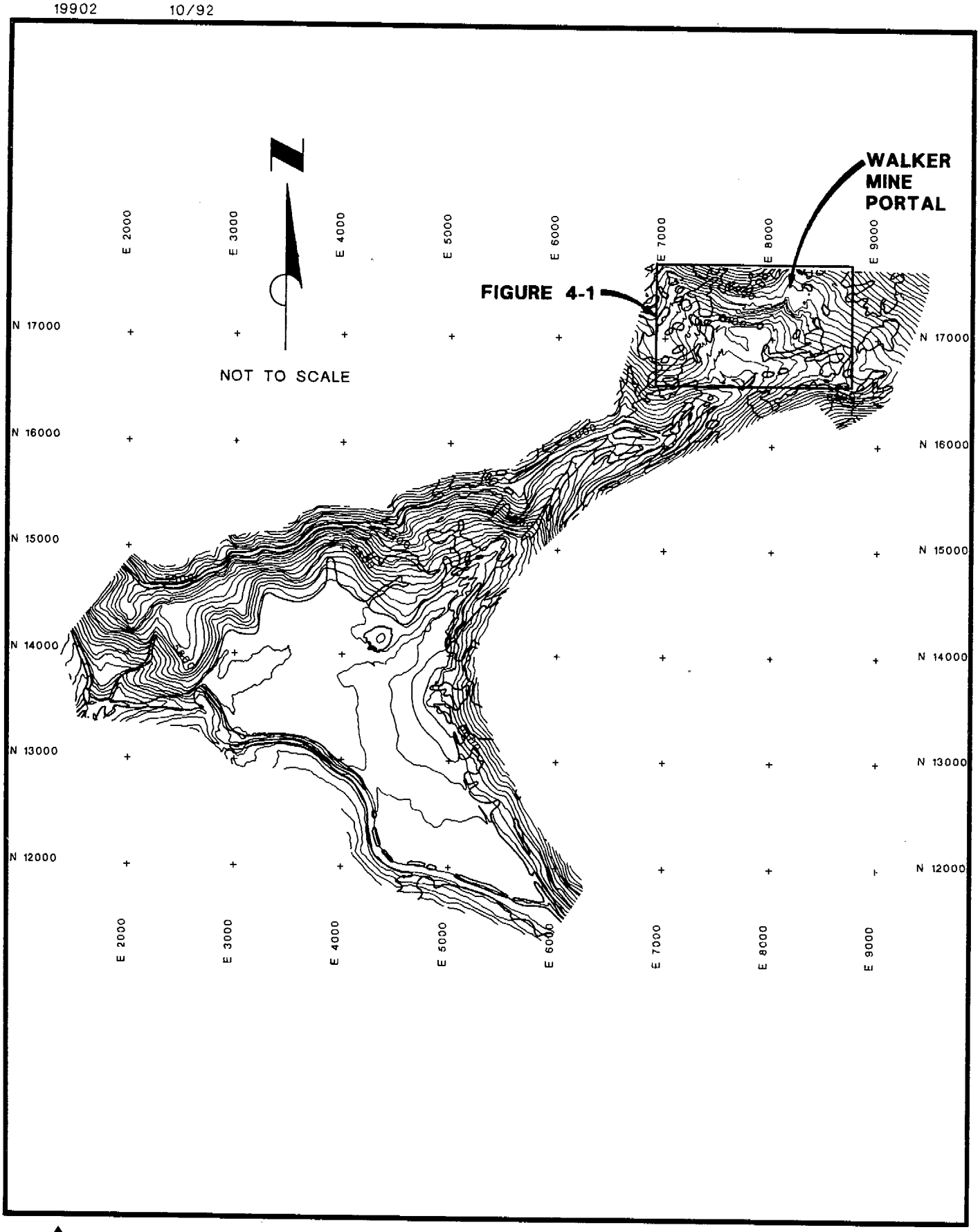

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FIGURE 3-2

TOPOGRAPHIC MAP OF
WALKER MINE PORTAL &
TAILINGS POND AREA

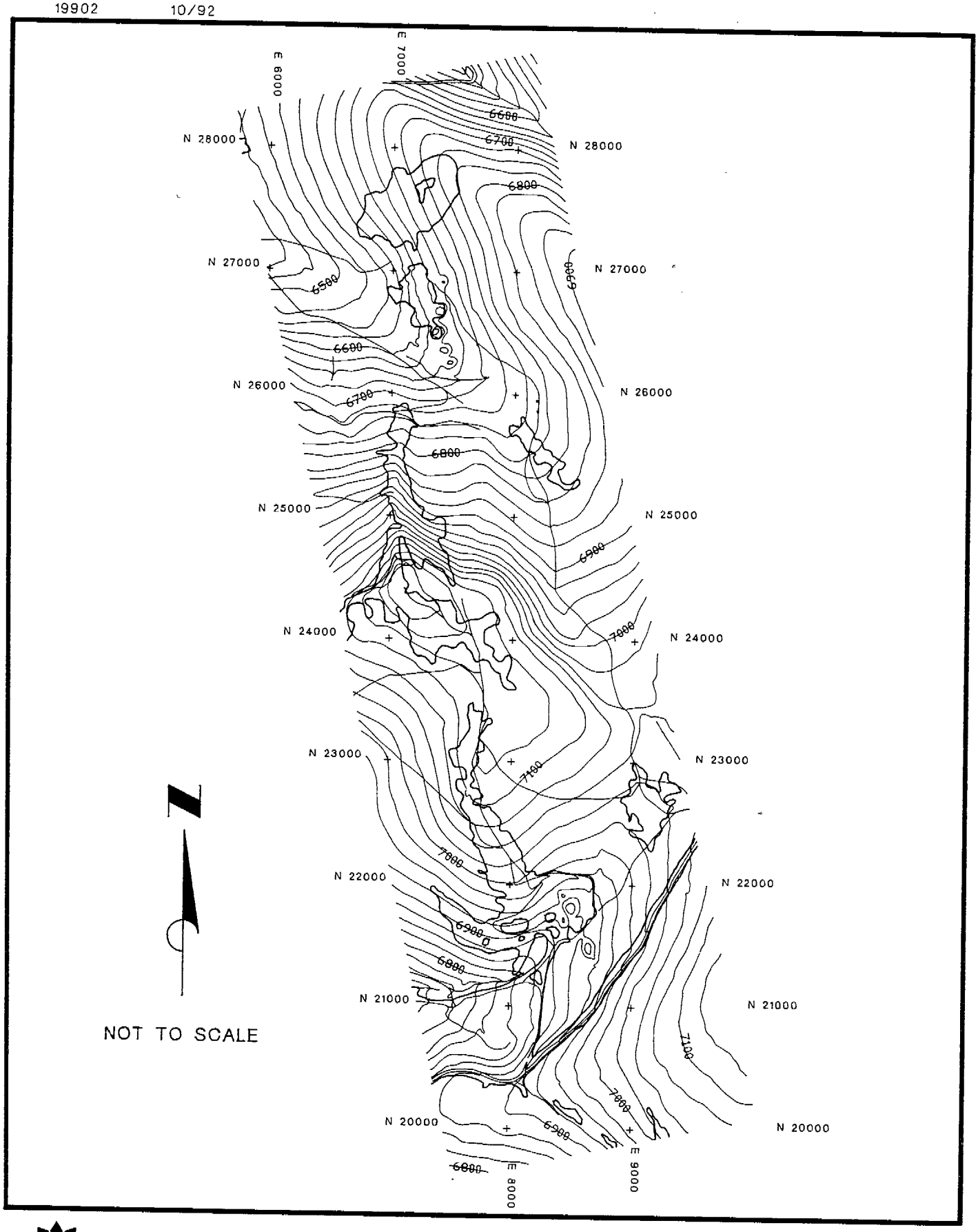

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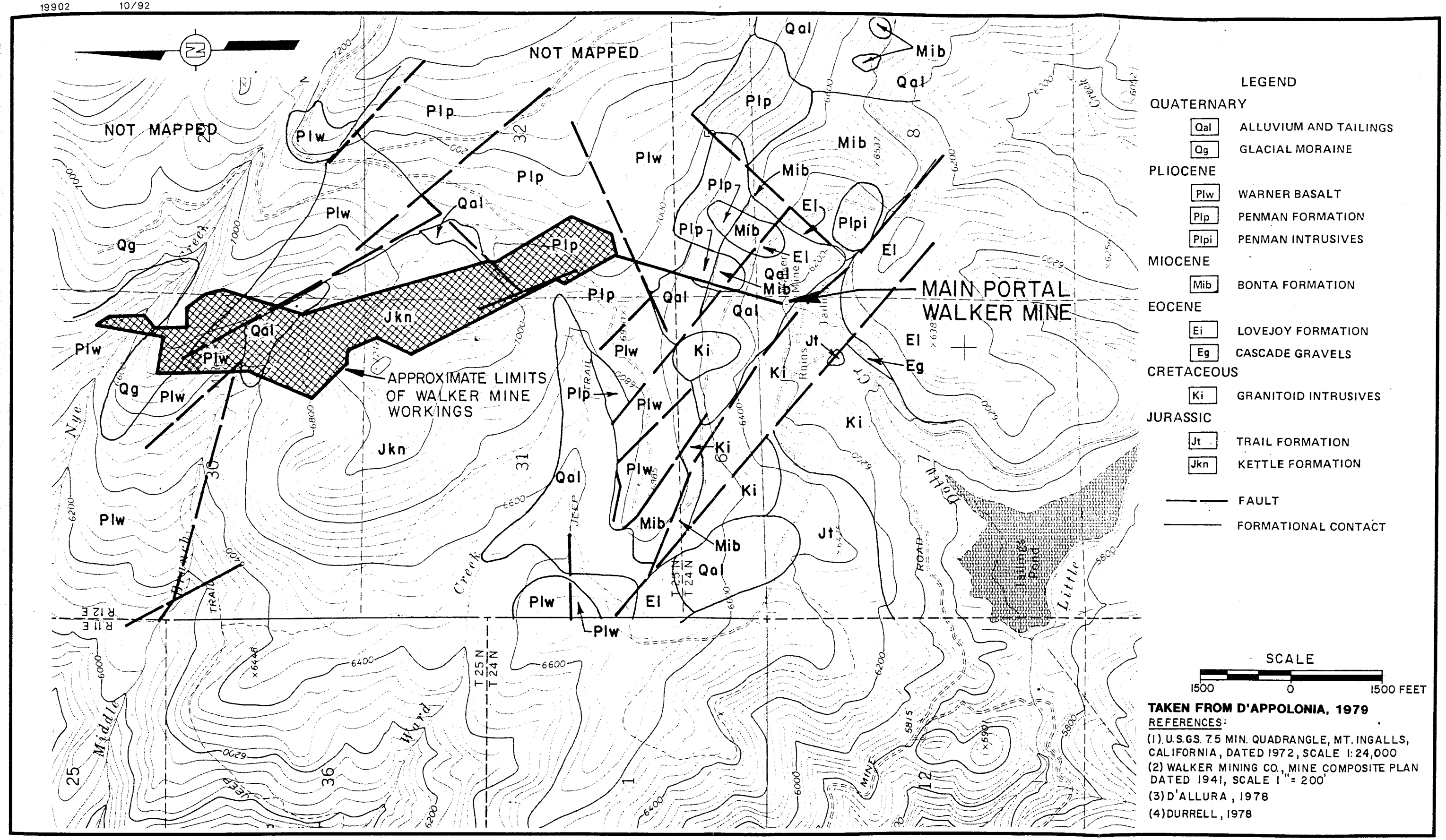
FIGURE 3-3

TOPOGRAPHIC MAP OF SINKHOLES AREA



TAKEN FROM D'APPOLONIA, 1979

REFERENCES:

(1) U.S.G.S. 7.5 MIN. QUADRANGLE, MT. INGALLS, CALIFORNIA, DATED 1972, SCALE 1:24,000

(2) WALKER MINING CO., MINE COMPOSITE PLAN DATED 1941, SCALE 1" = 200'

(3) D'ALLURA, 1978

(4) DURRELL, 1978

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FIGURE 3-4

STRUCTURAL GEOLOGY MAP

19902 10/92

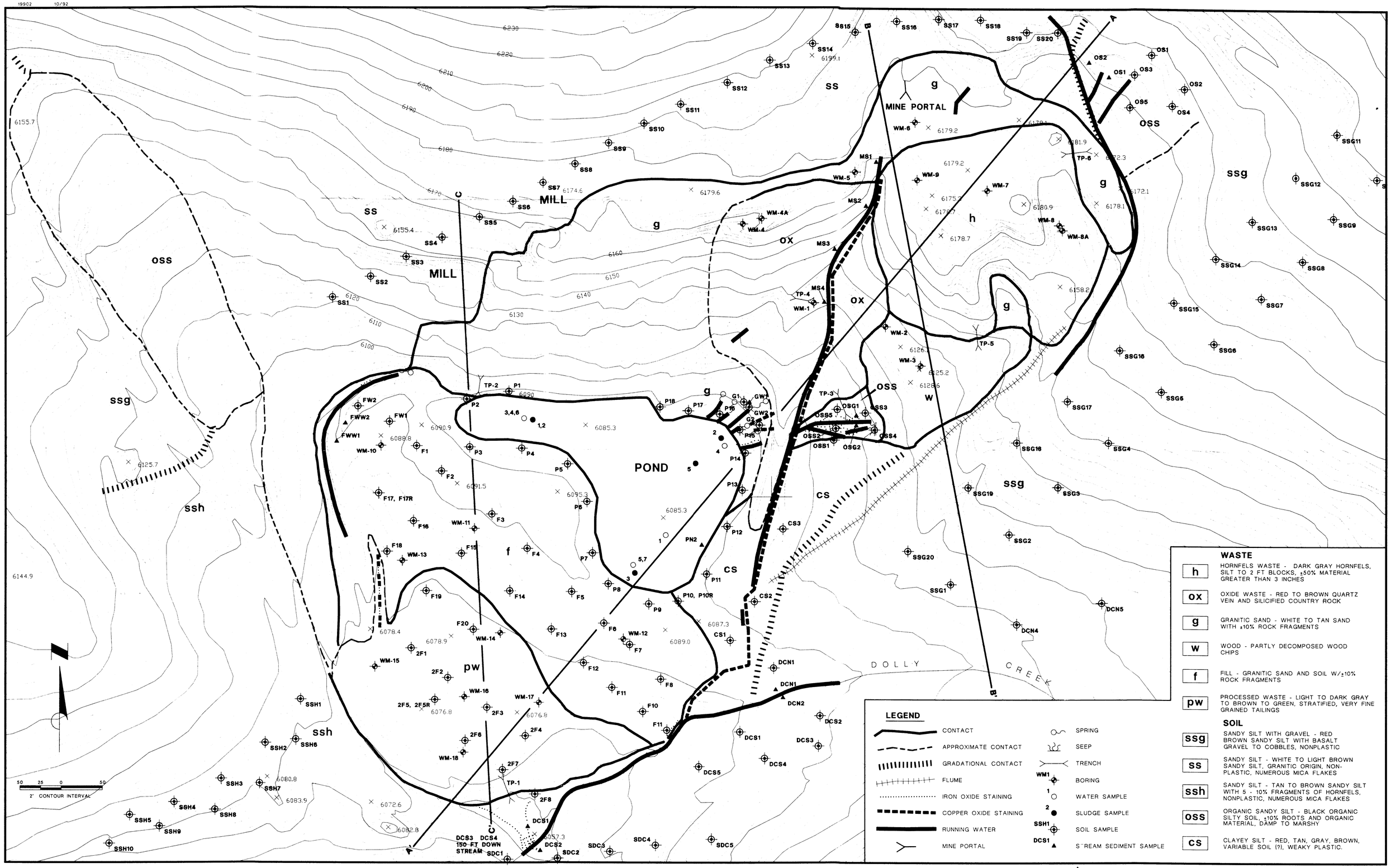

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FIGURE 4-1

SOILS, WASTE AND SAMPLE LOCATIONS

19902 10/92

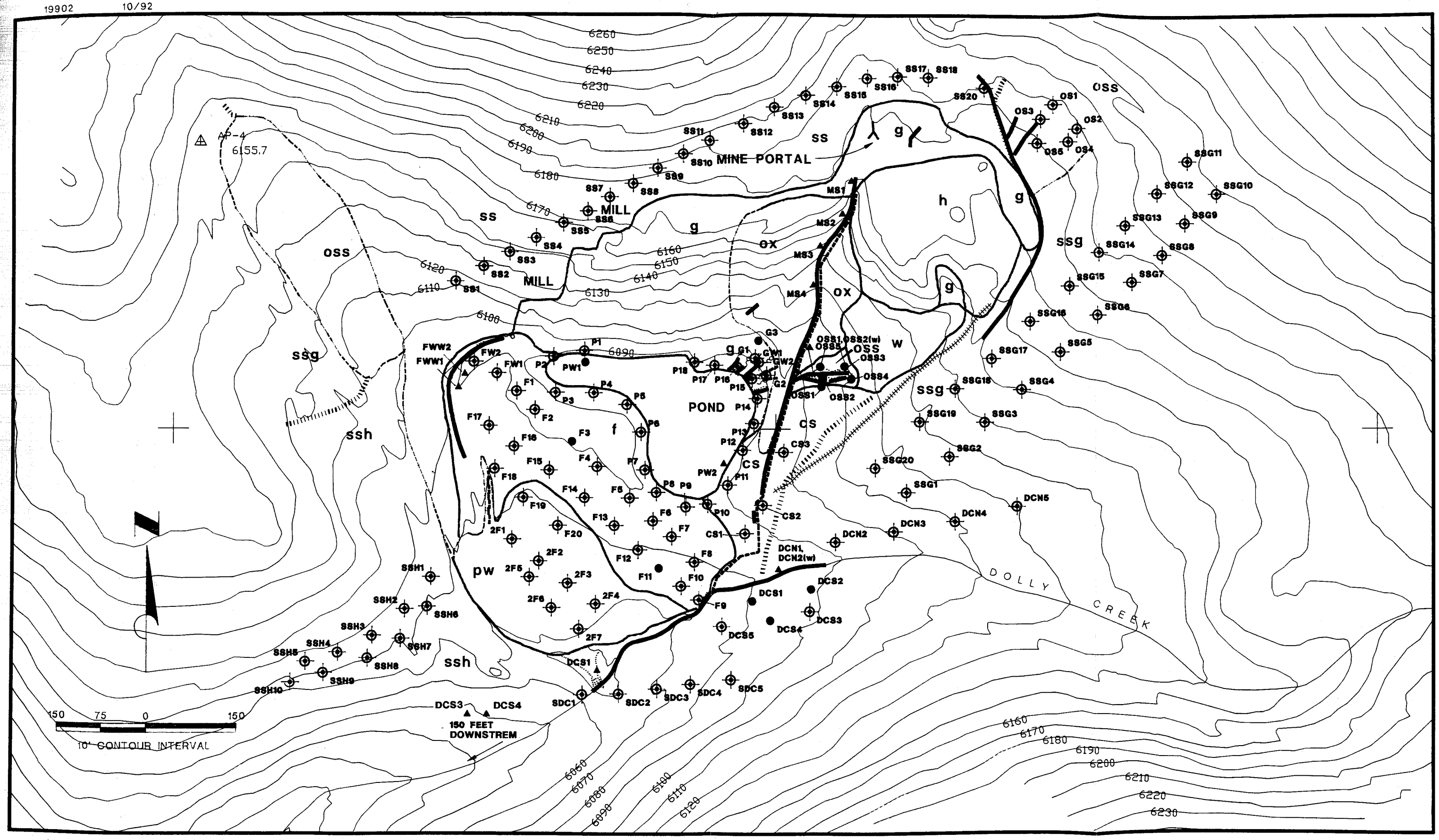

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FIGURE 4-2

BACTERIA SAMPLE LOCATIONS

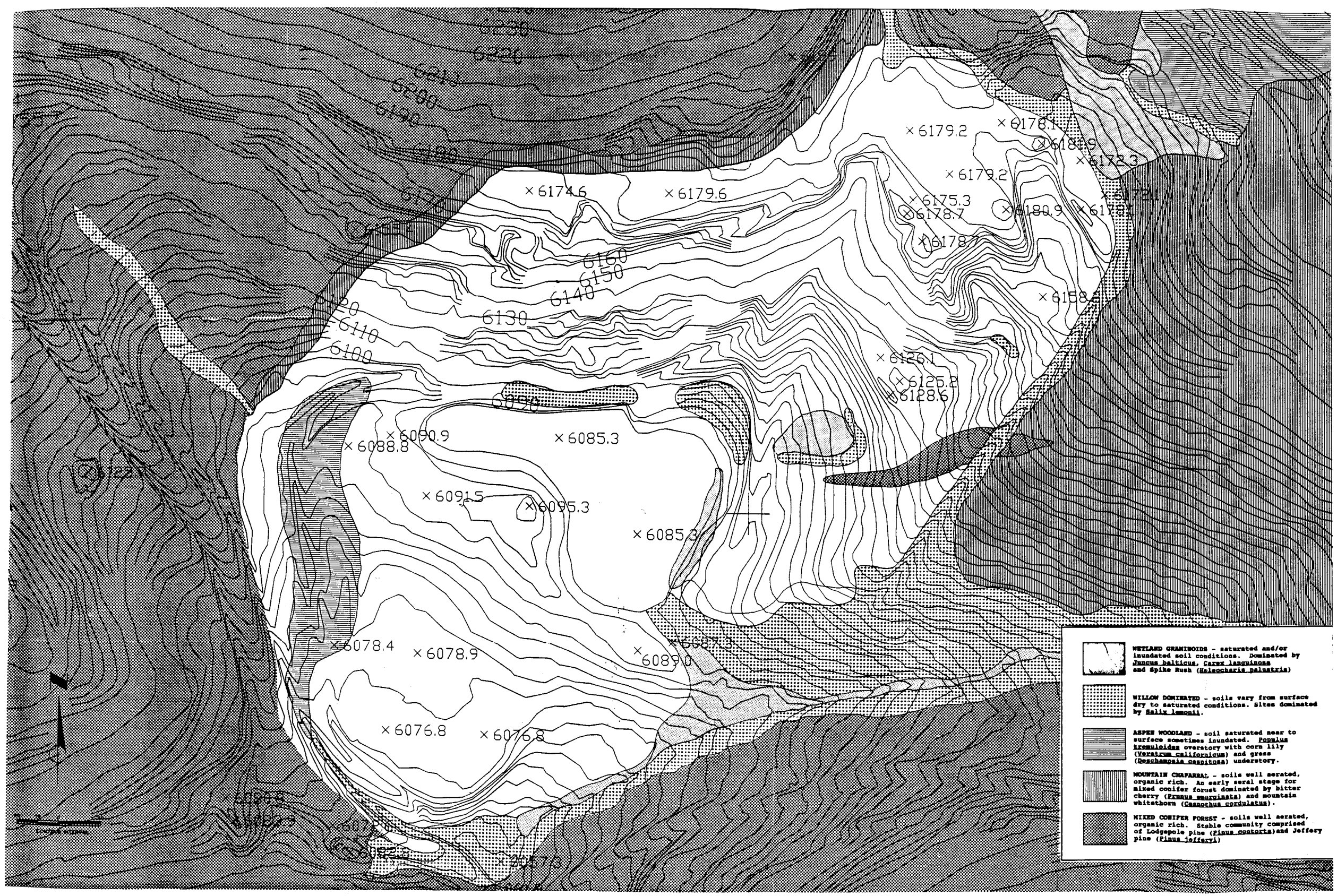

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FIGURE 4-3

DISTRIBUTION OF PLANT SPECIES

19902 10/92

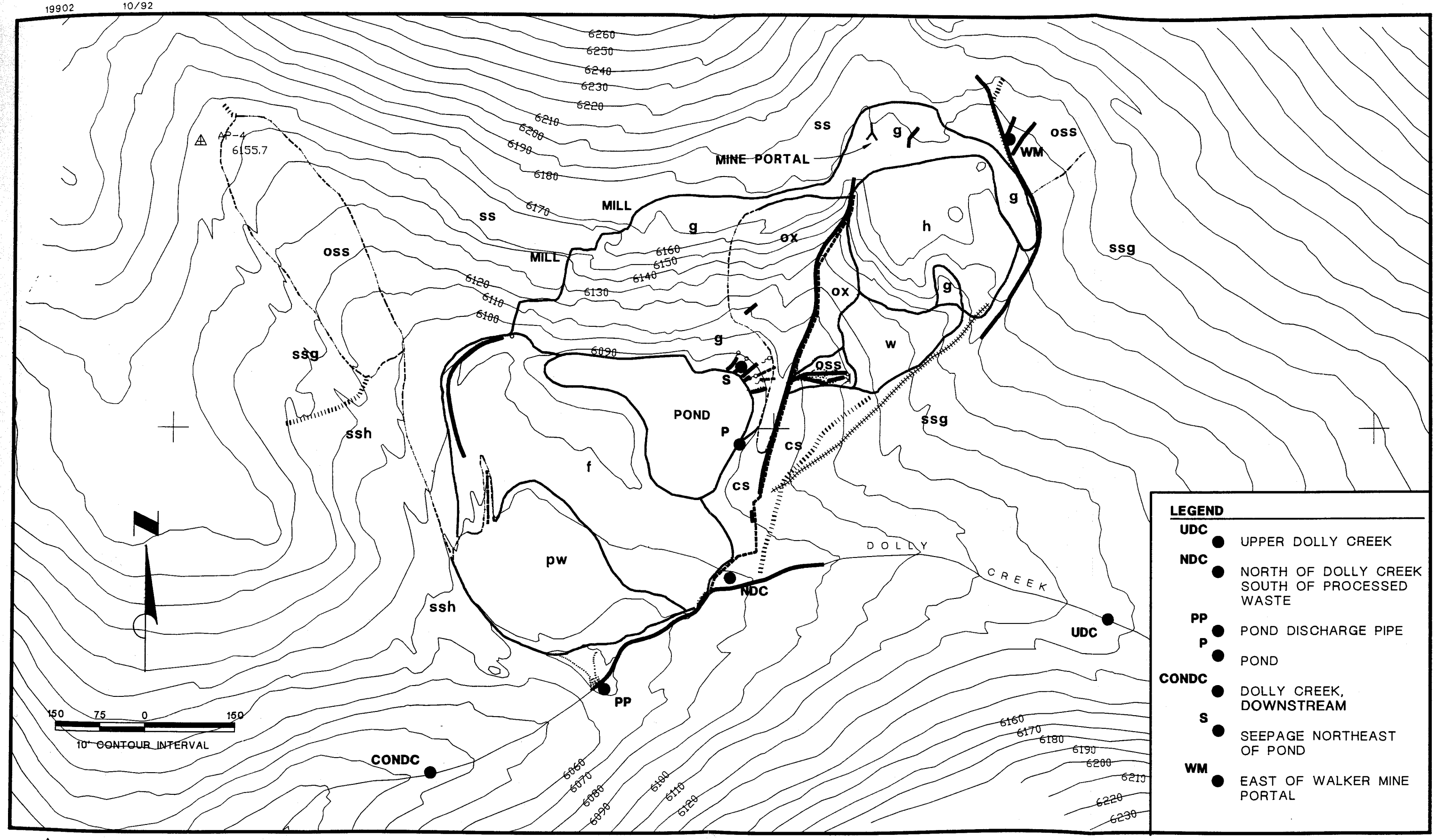

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FIGURE 4-4

PLANT SAMPLE LOCATIONS

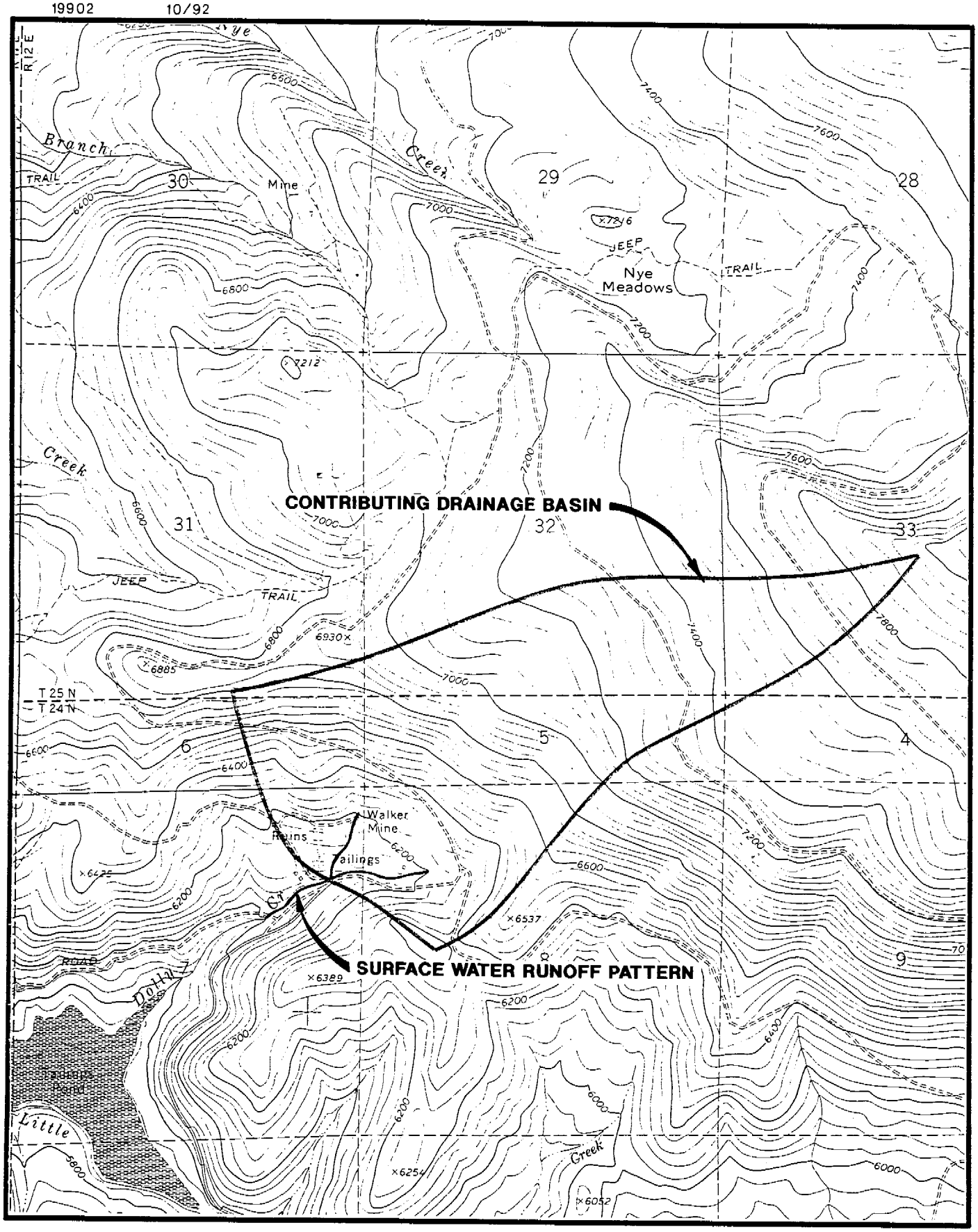

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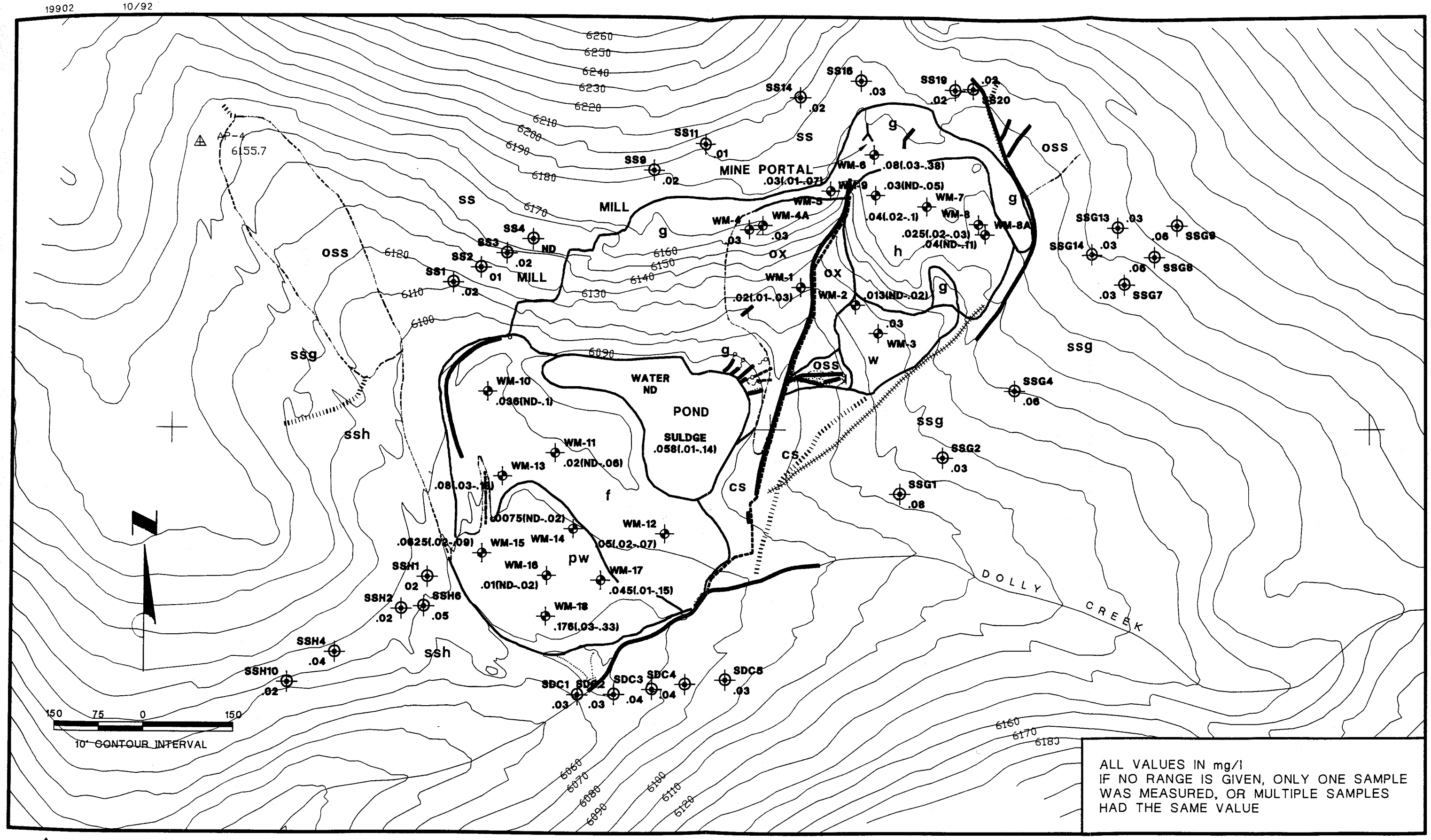
FIGURE 4-5

SURFACE WATER RUN-ON
AND RUNOFF PATTERNS



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WATER QUALITY CONTROL BOARD

FIGURE 5-1

PLAN VIEW OF KEY METALS: CADMIUM
CADMIUM WET EXTRACTION VALUES, AVE (RANGE)

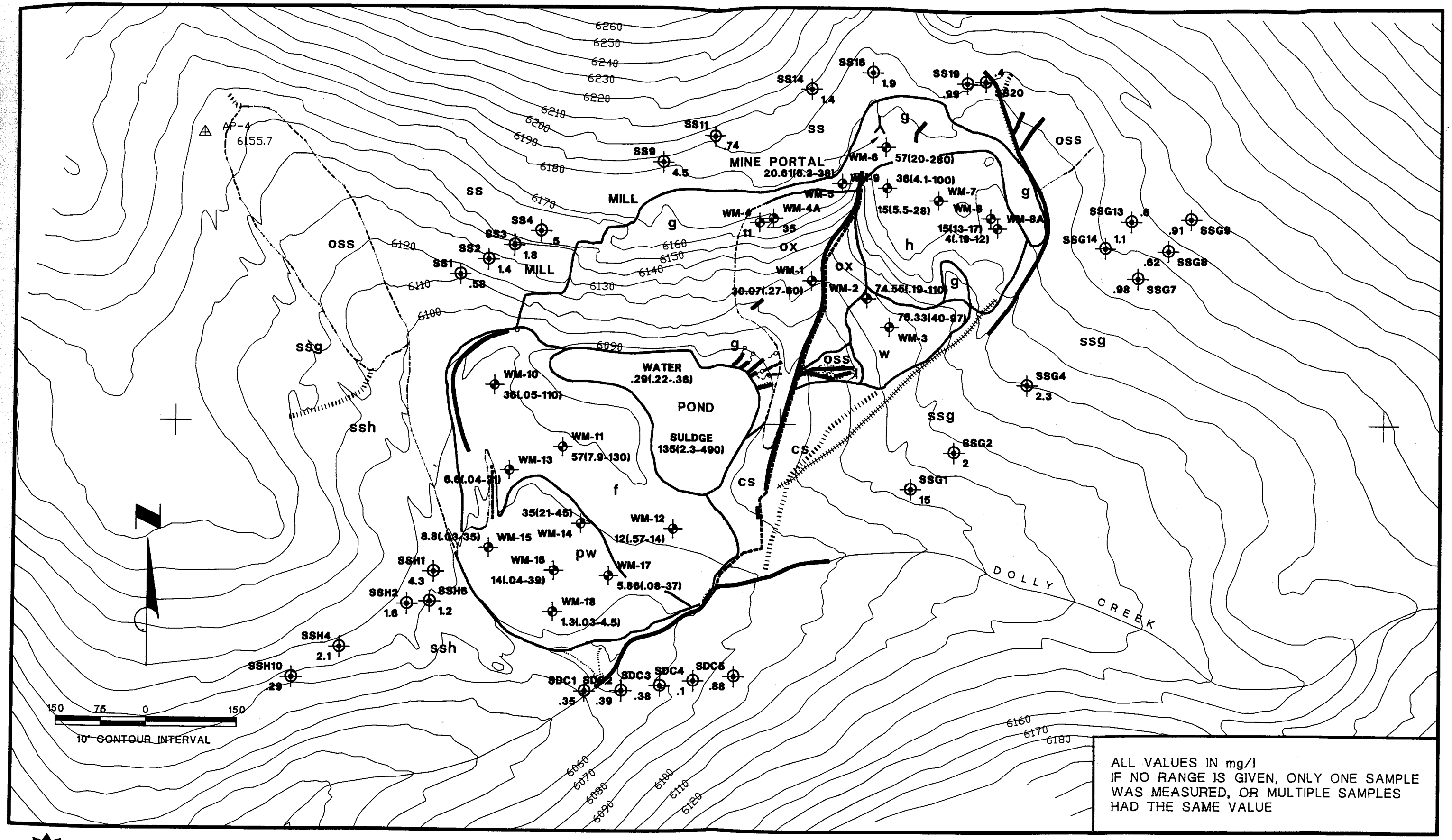

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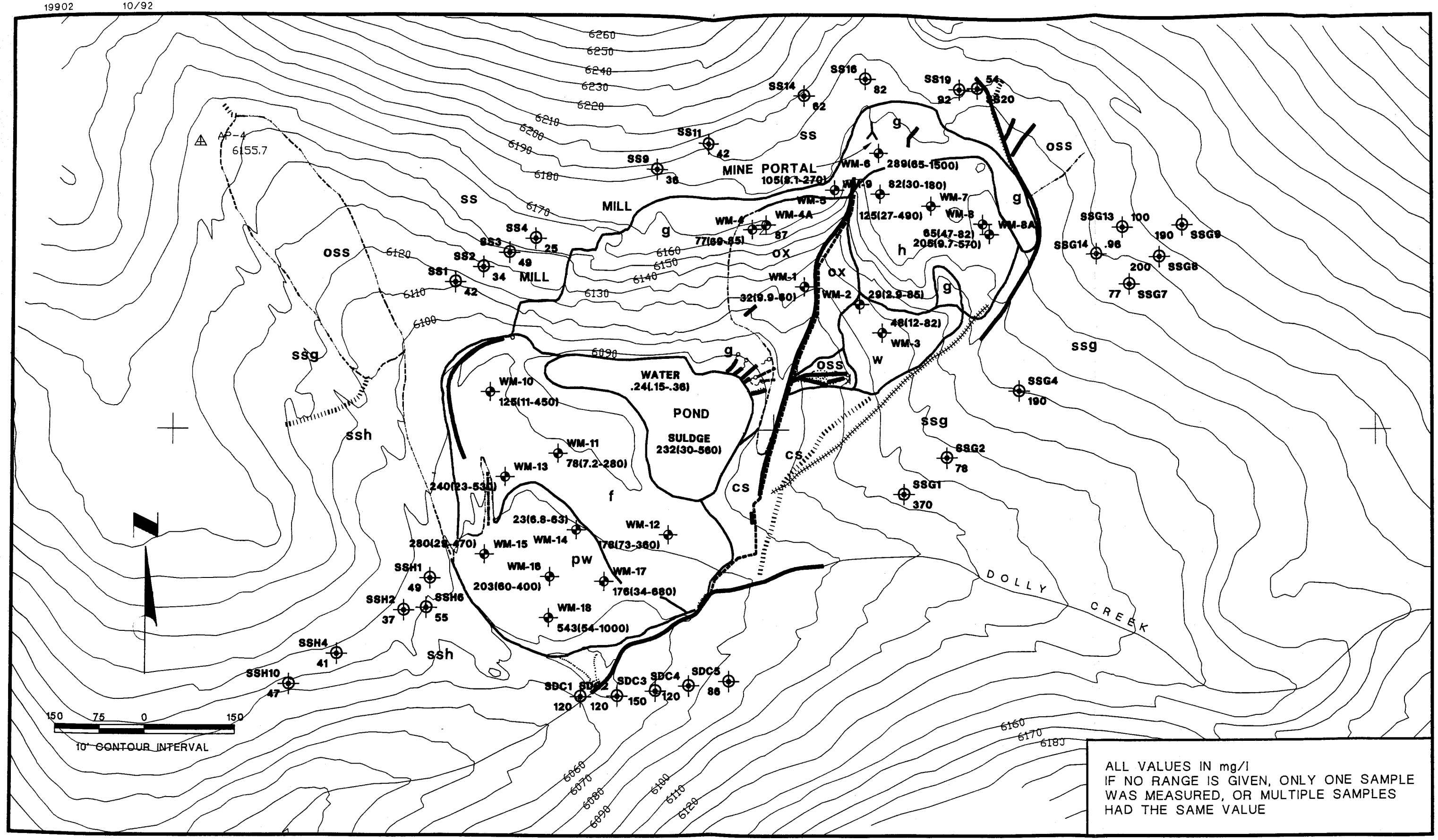
FIGURE 5-2

PLAN VIEW OF KEY METALS: COPPER
COPPER WET EXTRACTION VALUES, AVE (RANGE)



ALL VALUES IN mg/l
IF NO RANGE IS GIVEN, ONLY ONE SAMPLE WAS MEASURED, OR MULTIPLE SAMPLES HAD THE SAME VALUE

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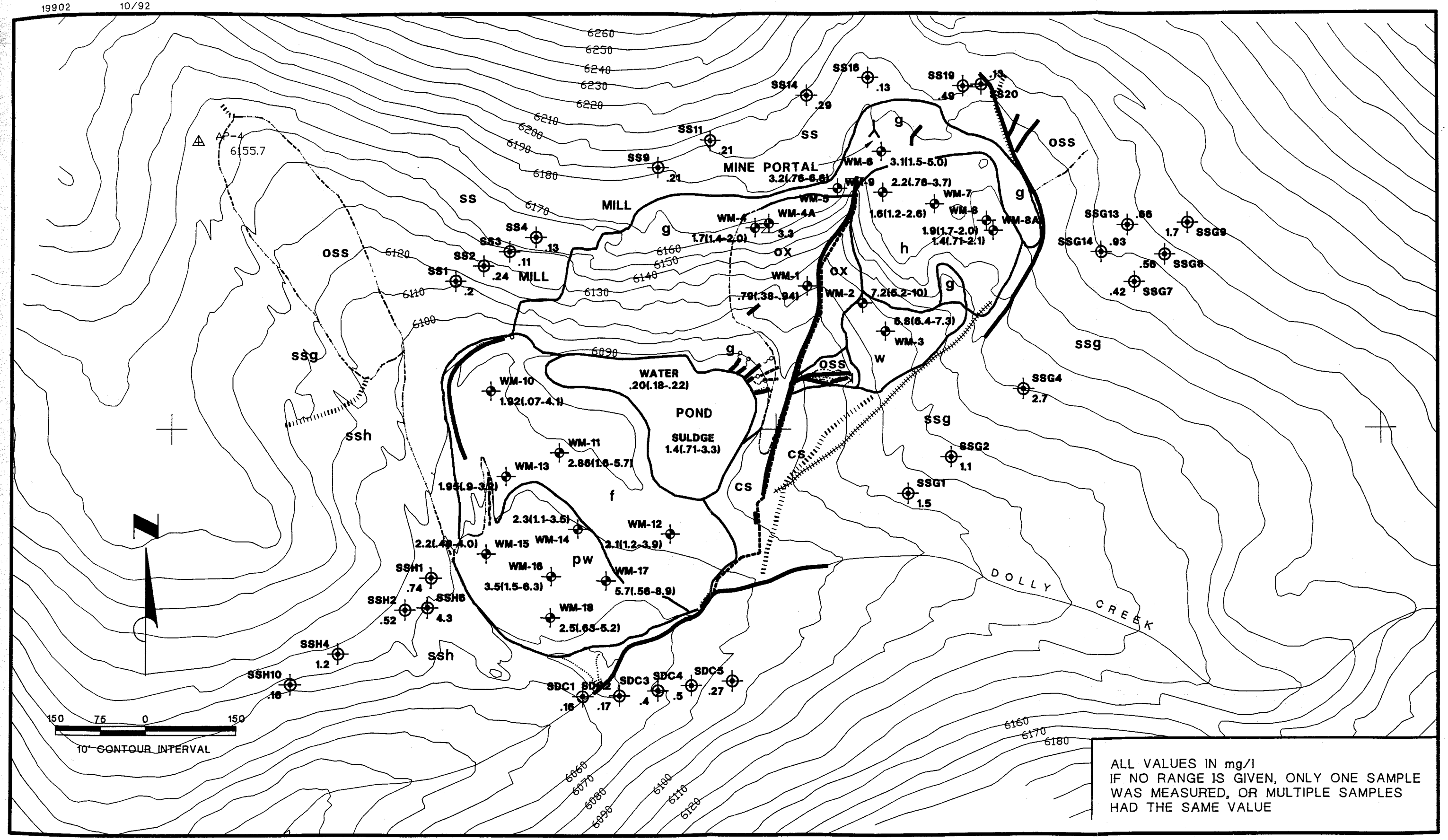
FIGURE 5-3

PLAN VIEW OF KEY METALS: IRON
IRON WET EXTRACTION VALUES, AVE (RANGE)



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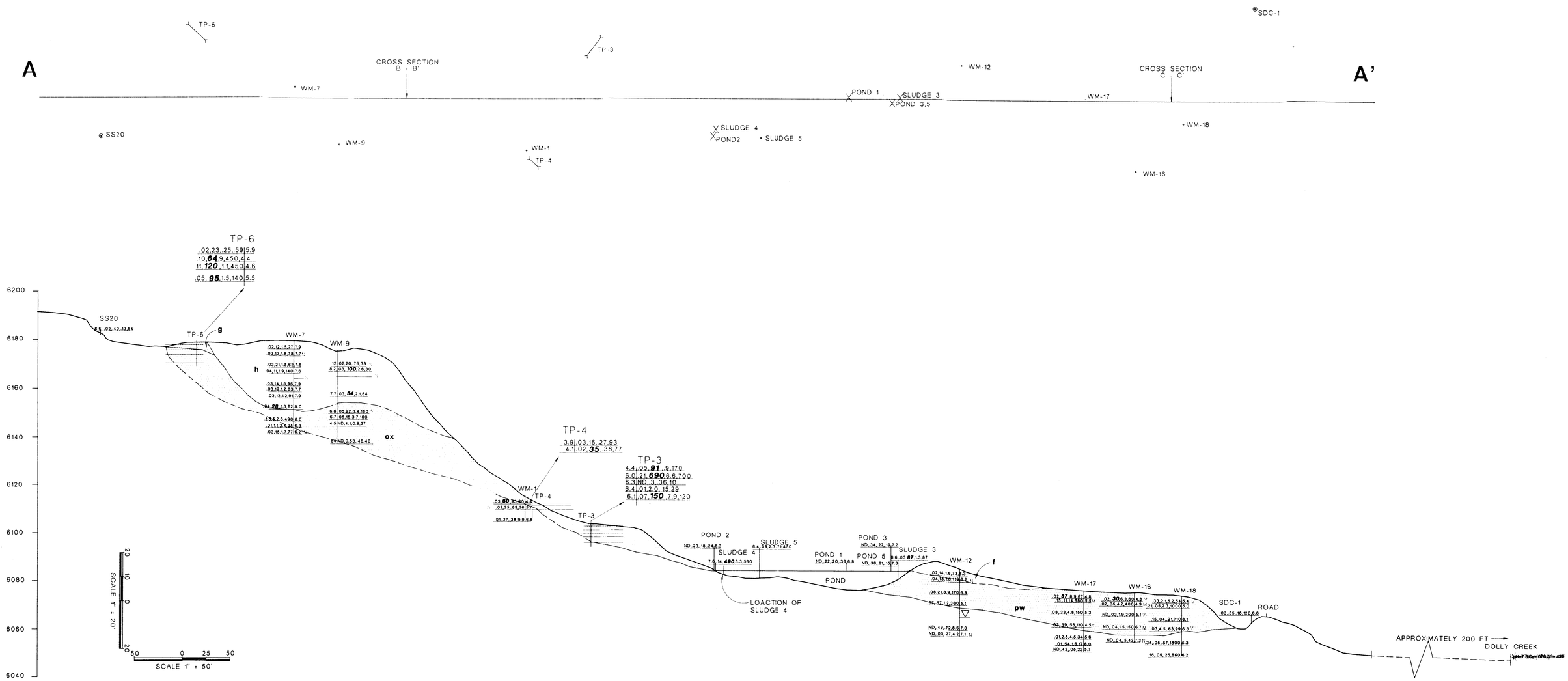
WATER QUALITY CONTROL BOARD

FIGURE 5-4

PLAN VIEW OF KEY METALS: ZINC
ZINC WET EXTRACTION VALUES, AVE (RANGE)



LEGEND

WM-1

pH,Cd,Cu,Zn,Fe

Cd,Cu,Zn,Fe,pH

TRACE METAL CONCENTRATIONS IN MG/L AND pH VALUES AT DEPTH INDICATED IN DRILL HOLE WM-1

54 :CONCENTRATION ABOVE THE SOLUBLE THRESHOLD LIMIT CONCENTRATION (STLC)
ND: CONCENTRATION BELOW DETECTION LIMIT

STATIC TEST RESULTS: ACID GENERATION
Y = YES
M = MAYBE
N = NO

WASTE

- **h** HORNFELS WASTE - DARK GRAY HORNFELS, SILT TO 2 FT BLOCKS, +/- 50% MATERIAL GREATER THAN 3 INCHES
- **ox** OXIDE WASTE - RED TO BROWN QUARTZ VEIN AND SILICIFIED COUNTRY ROCK
- **f** FILL - GRANITIC SAND AND SOIL WITH +/- 10% ROCK FRAGMENTS
- **pw** PROCESSED WASTE - LIGHT TO DARK GRAY TO BROWN TO GREEN, STRATIFIED, VERY FINE GRAINED TAILINGS
- **g** GRANITIC SAND - WHITE TO TAN SAND WITH +/- 10% ROCK FRAGMENTS

TEST PIT LOCATION

WM-1 ° BOREHOLE LOCATION

SOIL SAMPLE LOCATION

POND AND POND SLUDGE SAMPLE LOCATION

CONTACT

APPROXIMATE CONTACT

ACID GENERATING

SATURATED SOILS

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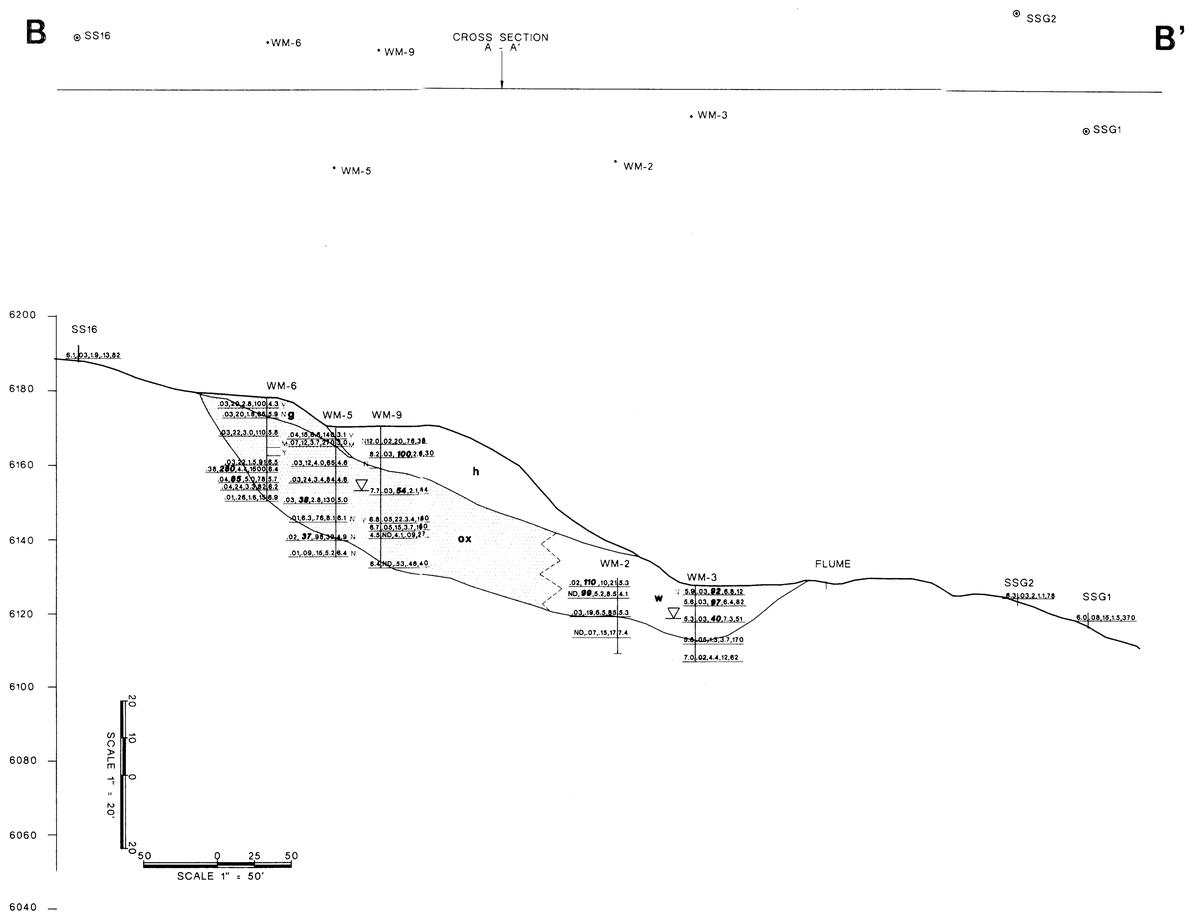
REGIONAL WATER
QUALITY CONTROL BOARD

FIGURE 5-5

CROSS SECTION A-A' LOOKING SOUTHEAST THROUGH MINE WASTES SHOWING SOLUBLE TRACE METAL CONCENTRATIONS



LEGEND

WM-1

Y pH Cd,Cu,Zn,Fe
Cd,Cu,Zn,Fe pH N

TRACE METAL CONCENTRATIONS IN MG/L AND pH VALUES AT DEPTH INDICATED IN DRILL HOLE WM-1

54 :CONCENTRATION ABOVE THE SOLUBLE THRESHOLD LIMIT CONCENTRATION (STLC)
ND: CONCENTRATION BELOW DETECTION LIMIT

STATIC TEST RESULTS: ACID GENERATION
Y = YES
M = MAYBE
N = NO

WASTE

- **h** HORNFELS WASTE - DARK GRAY HORNFELS, SILT TO 2 FT BLOCKS, +/- 50% MATERIAL GREATER THAN 3 INCHES
- **ox** OXIDE WASTE - RED TO BROWN QUARTZ VEIN AND SILICIFIED COUNTRY ROCK
- **f** FILL - GRANITIC SAND AND SOIL WITH +/- 10% ROCK FRAGMENTS
- **pw** PROCESSED WASTE - LIGHT TO DARK GRAY TO BROWN TO GREEN, STRATIFIED, VERY FINE GRAINED TAILINGS
- **g** GRANITIC SAND - WHITE TO TAN SAND WITH +/- 10% ROCK FRAGMENTS
- **w** WOOD - PARTLY DECOMPOSED WOOD CHIPS

TEST PIT LOCATION

WM-1 • BOREHOLE LOCATION

SOIL SAMPLE LOCATION

X PCND AND POND SLUDGE SAMPLE LOCATION

CONTACT

APPROXIMATE CONTACT

ACID GENERATING

SATURATED SOILS

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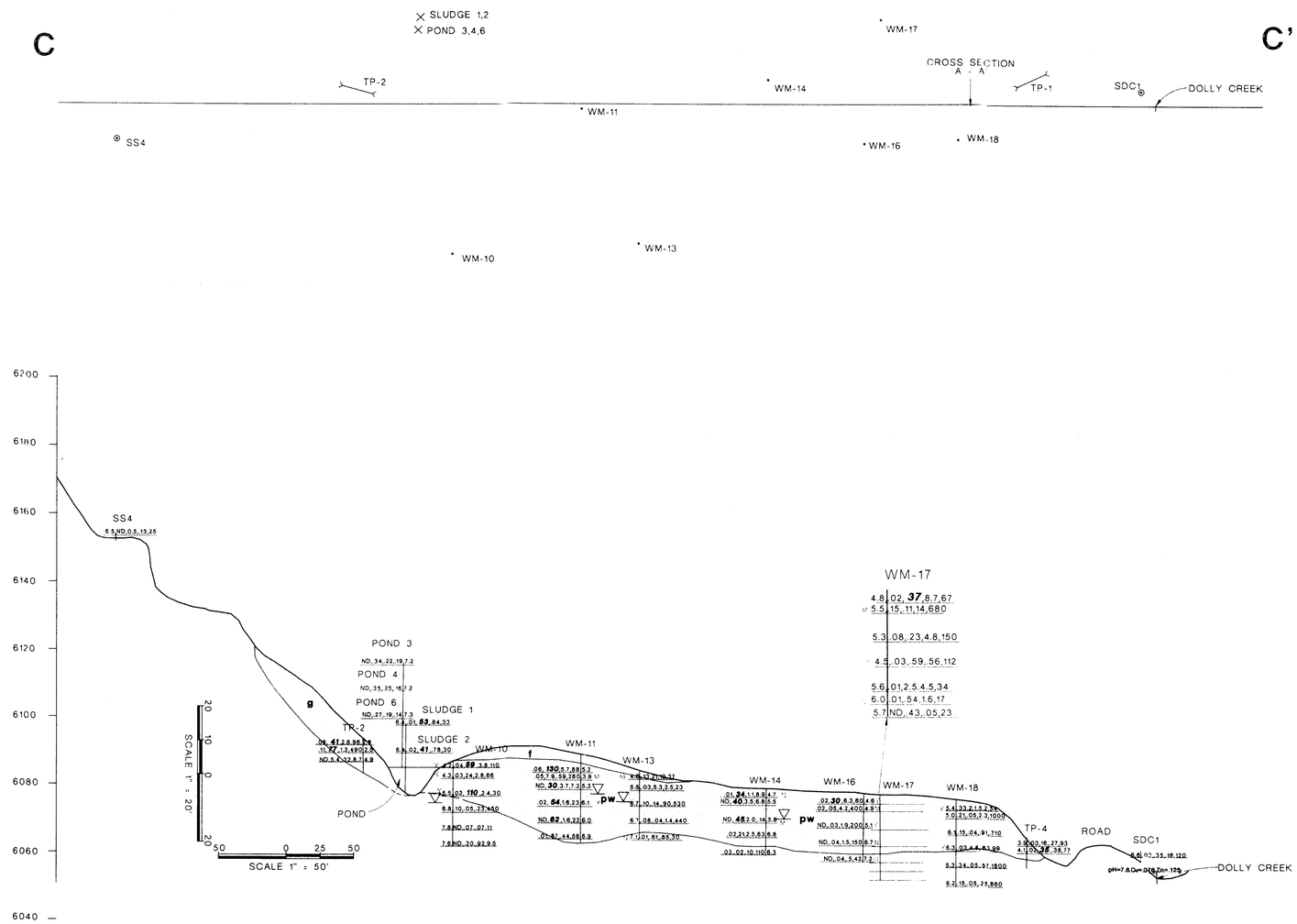
QUALITY CONTROL BOARD

FIGURE 5-6

CROSS SECTION B-B' LOOKING EAST THROUGH MINE WASTES SHOWING SOLUBLE TRACE METAL CONCENTRATIONS



LEGEND

WM-1

pH,Cd,Cu,Zn,Fe
Cd,Cu,Zn,Fe,pH N

TRACE METAL CONCENTRATIONS IN MG/L AND pH VALUES AT DEPTH INDICATED IN DRILL HOLE WM-1

54 :CONCENTRATION ABOVE THE SOLUBLE THRESHOLD LIMIT CONCENTRATION (STLC)
ND: CONCENTRATION BELOW DETECTION LIMIT

STATIC TEST RESULTS: ACID GENERATION
Y = YES
M = MAYBE
N = NO

WASTE

- **h** HORNFELS WASTE - DARK GRAY HORNFELS, SILT TO 2 FT BLOCKS, +/- 50% MATERIAL GREATER THAN 3 INCHES
- **ox** OXIDE WASTE - RED TO BROWN QUARTZ VEIN AND SILICIFIED COUNTRY ROCK
- **f** FILL - GRANITIC SAND AND SOIL WITH +/- 10% ROCK FRAGMENTS
- **pw** PROCESSED WASTE - LIGHT TO DARK GRAY TO BROWN TO GREEN, STRATIFIED, VERY FINE GRAINED TAILINGS
- **g** GRANITIC SAND - WHITE TO TAN SAND WITH +/- 10% ROCK FRAGMENTS

TEST PIT LOCATION

WM-1 ° BOREHOLE LOCATION

SOIL SAMPLE LOCATION

× POND AND POND SLUDGE SAMPLE LOCATION

CONTACT

APPROXIMATE CONTACT

ACID GENERATING

SATURATED SOILS

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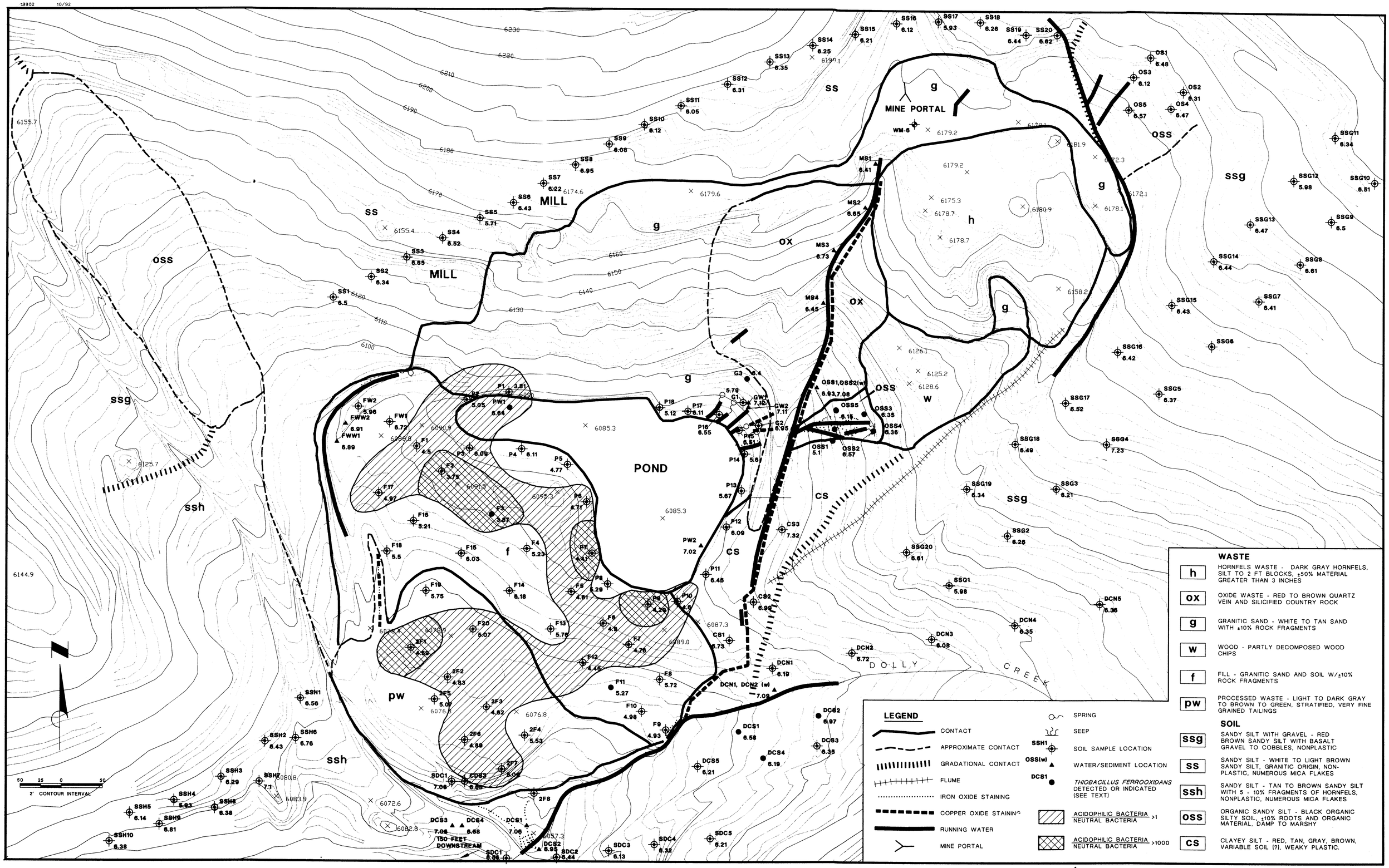
FIGURE 5-7

CROSS SECTION C-C' LOOKING EAST THROUGH MINE WASTES SHOWING SOLUBLE TRACE METAL CONCENTRATIONS

19902 10/92



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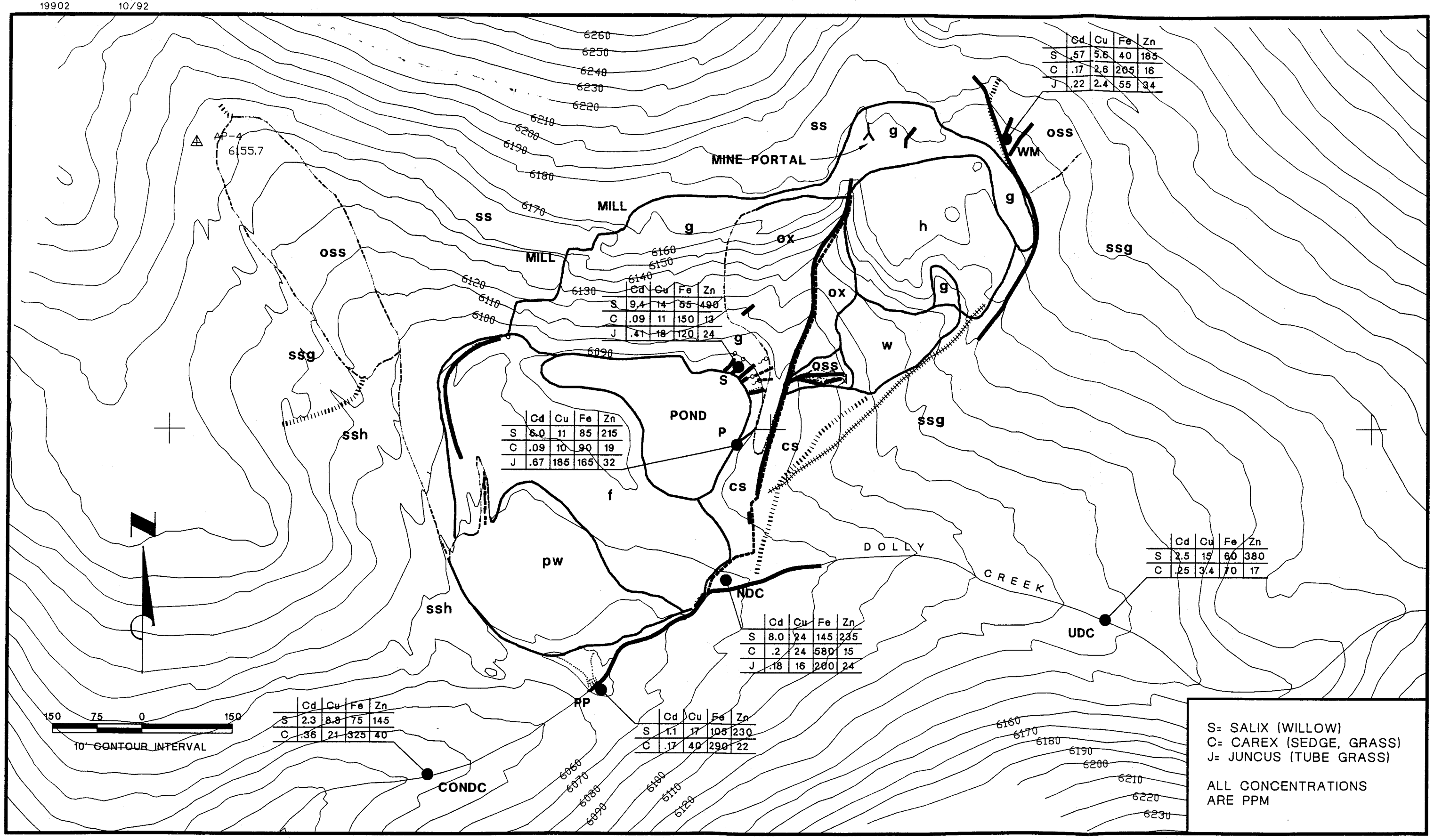
CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

FIGURE 5-8

BACTERIAL DISTRIBUTION AND pH IN MINE WASTE ROCK AND BACKGROUND SOIL



	Cd	Cu	Fe	Zn
S	.57	5.6	40	185
C	.17	2.6	205	16
J	.22	2.4	55	34

	Cd	Cu	Fe	Zn
S	9.4	14	55	490
C	.09	11	150	13
J	.41	18	120	24

	Cd	Cu	Fe	Zn
S	6.0	11	85	215
C	.09	10	90	19
J	.67	185	165	32

	Cd	Cu	Fe	Zn
S	2.5	15	60	380
C	.25	3.4	70	17

	Cd	Cu	Fe	Zn
S	8.0	24	145	235
C	.2	24	580	15
J	.18	16	200	24

	Cd	Cu	Fe	Zn
S	2.3	8.8	75	145
C	.36	21	325	40

	Cd	Cu	Fe	Zn
S	1.1	17	105	230
C	.17	40	290	22

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FIGURE 5-9

PLANT METALS DISTRIBUTION

19902 10/92 MM

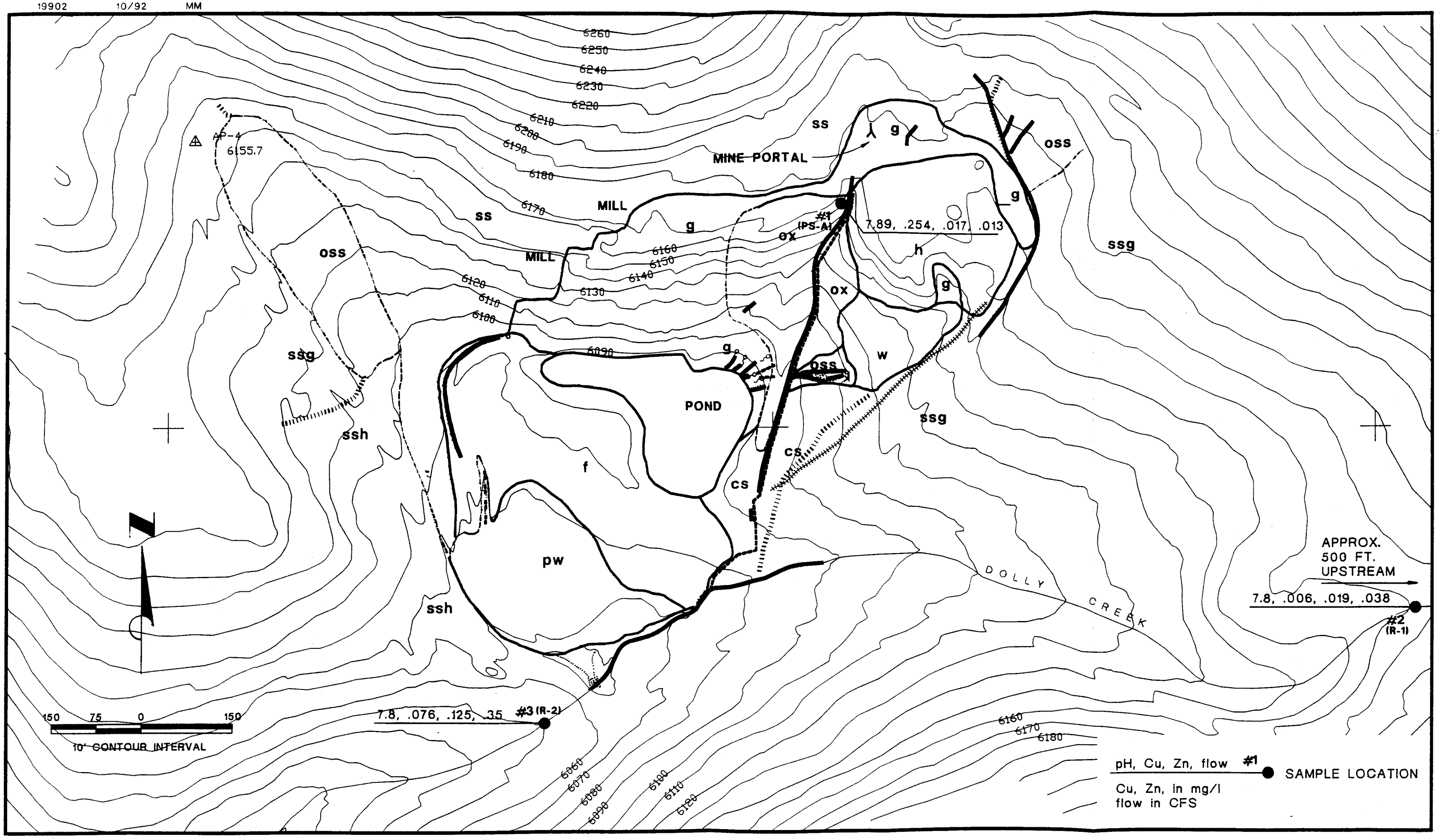

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FIGURE 6-1

WATER QUALITY DATA AVERAGE VALUES AFTER MINE PORTAL SEAL

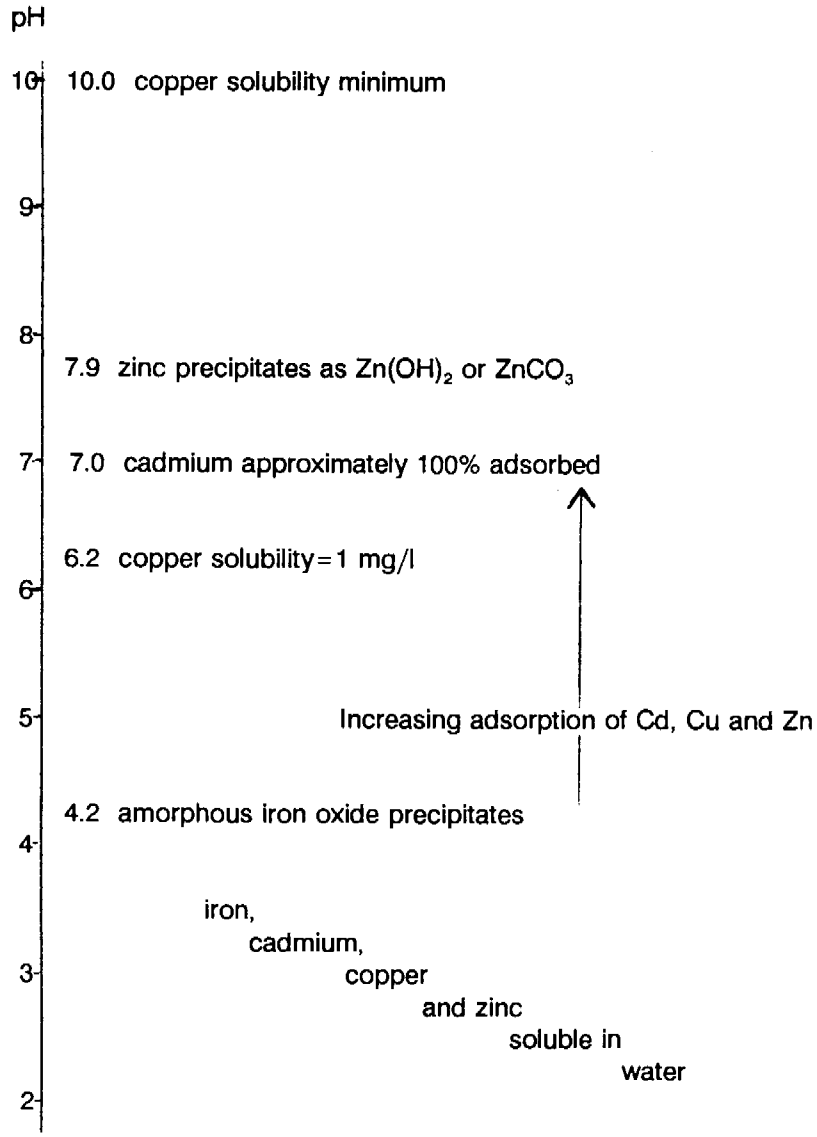

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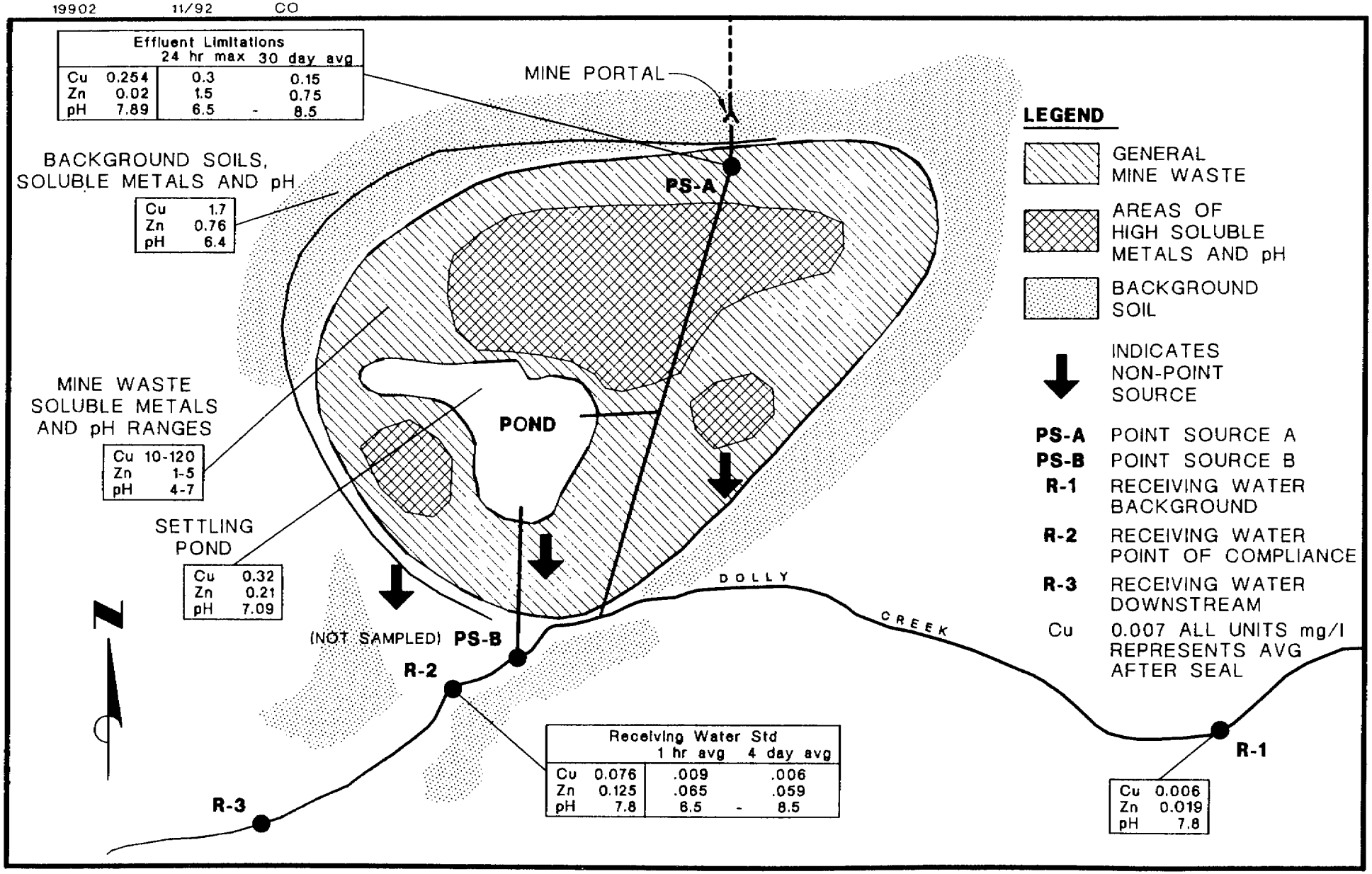
FIGURE 6-2

SUMMARY OF CHEMICAL CHARACTERISTICS OF KEY METALS

19902 11/92 CO



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CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

FIGURE 7-1

CONCEPTUAL SITE MODEL OF COPPER AND ZINC MOBILITY

APPENDIX A

3942 Valley Ave. Suite F
Pleasanton, Calif. 94566

WESTEC
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

J. Heggeness
WESTEC
5250 Neil Road Suite 300
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: C.V. Regional Board Phone Number: 916-361-7722
Client Address: 3443 Routier Rd. Suite A P.O. Number:
City, State, Zip: Sacramento Calif. 95827-3098
Project Name: Walker Mine Project Number: 19702-2
Sampled By: John Heggeness Signature: John O. Heggeness

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers	EPA Method 3050	Antimony, Arsenic	Barium, Beryllium	Pb, Hg, Ni, Nickel	Selenium, Silver	Total Cr, Cobalt	Cu, Zn, Thallium	Vanadium, Zinc	Remarks/ Preservative
W M-13-20	6/12	11:00	Soil	1	✓	✓	✓	✓	✓	✓	✓	✓	
W M-14-20	↓	13:15	↓	↓	✓	✓	✓	✓	✓	✓	✓	✓	
W M-15-17.5	↓	14:05	↓	↓	✓	✓	✓	✓	✓	✓	✓	✓	
W M-16-20	↓	14:40	↓	↓	✓	✓	✓	✓	✓	✓	✓	✓	
W M-17-10	↓	16:15	↓	↓	✓	✓	✓	✓	✓	✓	✓	✓	
W M-18-5	↓	17:35	↓	↓	✓	✓	✓	✓	✓	✓	✓	✓	
Blank 4	6/8/92	18:20	Blank		↓	↓	↓	↓	↓	↓	↓	↓	
Pond 2	6/9/92	18:00	H_2O		↓	↓	↓	↓	↓	↓	↓	↓	Filtered/Nitric

	Signature	Company	Date	Time
Relinquished by:	John O. Heggeness	WESTEC	6/14/92	15:41
Received by:	[illegible]	CAL	6/14	15:41
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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April 15, 1992

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Pleasanton Calif
94566

WESTEC
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

J. Heggeness
WESTEC
5250 Neil Rd. Suite 300
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board Phone Number: 916-361-5722
Client Address: 3443 Routier Rd P.O. Number:
City, State, Zip: Sacramento Calif 95827-3098
Project Name: Walker Mine Project Number: 17902-2
Sampled By: John Heggeness Signature: John O. Heggeness

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers	EPA Method 3050	Antimony, Arsenic	Barium, Beryllium	Pb, Hg, Mo, Ni	Selenium, Cadmium	Total Cr, Cobalt	Cu, Ag, Thallium	Vanadium, ZnPb	Remarks/ Preservative
WM-1-5	6/9/92	9:00	Soil	1	✓	✓	✓	✓	✓	✓	✓	✓	None
WM-2-5	↓	11:10		↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
WM-3-10	↓	14:30											
WM-4-5	6/10/92	8:30											
WM-5-10	↓	11:45											
W M-6-5	↓	14:40											
W M-7-5	↓	18:15											
W M-8-5	6/11/92	10:55											
W M-9-5	↓	13:40											
W M-10-5	↓	17:15											
W M-11-5	↓	18:35											
W M-12-5	6/12/92	9:10	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓

	Signature	Company	Date	Time
Relinquished by:	John O. Heggeness	WESTEC	6/14/92	15:41
Received by:	[illegible]	[illegible]	6/14	15:41
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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WESTEC
5250 Neil Road Suite
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board Phone Number: 916-361-5722
Client Address: 3442 Routier Rd. P.O. Number:
City, State, Zip: Sacramento Calif.
Project Name: Walker Mine Project Number: 19902-2
Sampled By: J. Hegganess Signature: John O. Hegganess

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers			WET Extraction						Remarks/ Preservative
Pond #1	6/9/92	17:30	H_2O Nitric + Hexed	1									After Extraction
Pond #3	6/13/92	14:00	Nitric	1									Hold For
Pond #4	6/13/92	14:10	Nitric	1									Further Instructions
Pond #5		14:25	Nitric	1									
Pond #6		14:05	"	1									
Pond #7		14:30	"	1									
3-Wyac	6/9/92	16:00	H_2O Nitric with Hexed	1									
5-Wyac	6/10/92	13:00		1									
17-Wyac	6/12/92	1800		1									

	Signature	Company	Date	Time
Relinquished by:	John O. Hegganess	WESTEC	6/14	15:42
Received by:	[illegible]	CKY	6/14	15:42
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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J. Heggeness
WESTEC
5250 Neil Rd
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board Phone Number: 916-361-5722
Client Address: 3442 Routier Rd P.O. Number:
City, State, Zip: Sacramento Calif.
Project Name: Walker Mine Project Number: 19902-2
Sampled By: J. Heggeness Signature: John U. Heggeness

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers	WET Extract	Remarks/ Preservative
TP-4-1	6/13	11:00	Soil	1	✓	After Extraction Hold For Further Instructions
TP-4-2	↓	11:00		1	↓	
TP-6-1	↓	12:00		1	↓	
TP-6-2	↓	12:00		1	↓	
TP-6-3	↓	12:00		1	↓	
TP-6-4	↓	12:20		1	↓	
Sludge 1	6/8/92	18:10	Sludge		↓	
Sludge 2	↓	18:00	↓		↓	
Sludge 3	↓	18:15	↓		↓	
Sludge 5	↓	18:30	↓		↓	

	Signature	Company	Date	Time
Relinquished by:	John U. Heggeness	WESTEC	6/14/92	15:40
Received by:	[illegible]	CITY	6/14/92	15:40
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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94566

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WESTEC
5250 Neil Rd. suite 300
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board Phone Number: 916-361-5722
Client Address: 3442 Routier Rd. P.O. Number:
City, State, Zip: Sacramento Calif. 95827-3098
Project Name: Walker Mine Project Number: 17902-2
Sampled By: J. Heggeness Signature: [signature]

Analyses Required: WET Extraction

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers	Remarks/ Preservative
16-205	6/12/92	14:40	Soil	1	After Extraction
16-5		14:45		2	Hold For
16-10		14:50		1	Further
16-15		15:00		2	Instructions
16-20		15:10		3	
17-205		16:00		3	
17-5		16:10		2	
17-10		16:15		2	
17-15		16:30		2	
17-20		16:40		1	
17-225		16:50		2	
17-25		16:55		1	

	Signature	Company	Date	Time
Relinquished by:	[signature]	WESTEC	6/14	15:35
Received by:	[signature]	CRY	6/14	15:35
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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Ship to: Curtis
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Pleasanton Calif.
94566

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Issu
J. Heggeness
WESTEC
5250 Neil Rd. Suite 300
Reno, Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board — Phone Number: 916-361-5722
Client Address: 3442 - Routier Rd - P.O. Number:
City, State, Zip: Sacramento Calif. 95827-3018
Project Name: Walker Mine — Project Number: 19902
Sampled By: J. Heggeness — Signature: Halm C. Heggeness

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers			WET Extraction						Remarks/ Preservative
UM- 18-25	6/12/92	17:30	Soil	2									After Extraction Hold For Further Instructions
18-5		17:35		2									
18-10		17.40		3									
18-15		17:50		1									
18-20		18-00		2									
18-25		18:10		3									

	Signature	Company	Date	Time
Relinquished by:	Halm C. Heggeness	WESTEC	6/14	15:55
Received by:	[illegible]	[illegible]	6/14	15:55
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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5250 Neil Road
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board Phone Number: 916-361-5722
Client Address: 3442 Routier Rd. P.O. Number:
City, State, Zip: Sacramento Calif. 95827-3098
Project Name: Walker Mine Project Number: 19902
Sampled By: J. Heggeness Signature: John O. Heggeness

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers		WET Extract.							Remarks/ Preservative
TP-1-1	6/13	8:35	Soil										After Extraction Hold
TP-2-1		9:15											For Further
TP-2-2		9:15											Instructions
TP-2-3		9:15											
TP-3-1		9:50											
TP-3-2		9:50											
TP-3-3		9:50											
TP-3-4		9:50											
TP-3-5		9:50											
TP-3-6		10:10											

	Signature	Company	Date	Time
Relinquished by:	John O. Heggeness	WESTEC	6/14/92	15:34
Received by:	Elizabeth Chan	CRL	6/16	15:39
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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J. Heyneness
5250 Neil Road Suite 300
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board
Phone Number: 916-361-5722
Client Address: 3442 Routier Road
P.O. Number:
City, State, Zip: Sacramento Calif. 95827-3098
Project Name: Walker Mine
Project Number: 14902-2
Sampled By: J. Heyneness
Signature: John H. Heyneness

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers	WET Extraction	Remarks/ Preservative
PM - 6-205	4/10	14:30	Soil	1		After Extraction Hold for Further Instructions
6-10		14:50		1		
6-17.5		15:20		1		
6-20		15:25		2		
6-27.5		15:45		2		
6-25		15:55		2		
6-27.5		16:10		2		
7-205		17:20		1		
7-5		17:30		1		
7-10		17:40		1		
7-17.5		17:45		1		
7-17.5		18:00		1		

	Signature	Company	Date	Time
Relinquished by:				
Received by:	[illegible]			
Relinquished by:		CHJ	6/14	15:25
Received by:				
Relinquished by:				
Received by:				

112.FRM
April 15, 1992

Ship to - CPT Inc
3942 Valley Ave Suite F
Pleasanton Calif.
94566

WESTEC
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

Results to
J. Heggeness
5250 Neil Rd. Suite 300
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board Phone Number: 916-361-5722
Client Address: 3443 - Routier Rd P.O. Number:
City, State, Zip: Sacramento Calif. 95827-3098
Project Name: Walker Mine Project Number: 19902-2
Sampled By: J. Heggeness Signature: John O. Heggeness

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers	WET Extraction							Remarks/ Preservative
7-22.5	6/11/92	8:00	Soil	1								After Extraction
7-27.5		8:25		1								Hold For
32.5		9:00		1								Further
35		9:15		2								Instructions.
37.5		9:30		1								
8-7.5		11:05		1								
8A-10'		11:55		1								
8A-12.5		12:05		2								
8A-15		12:15		1								

	Signature	Company	Date	Time
Relinquished by:	John O. Heggeness	WESTEC	6/14/92	15:30
Received by:	[illegible]	CPT	6/14	15:35
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

112.FRM
April 15, 1992

3492 Valley Ave Suite
Pleasanton Calif
94566

WESTEC
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

J. Heggeness
5250 Neil Rd Suite 300
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board Phone Number: 916-361-5722
Client Address: 3442 - Routier Rd P.O. Number:
City, State, Zip: Sacramento Calif. 95827-3098
Project Name: Walker Mine Project Number: 19902-2
Sampled By: J. Heggeness Signature: John O. Heggeness

Analyses Required: WET Extraction

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers	WET Extraction	Remarks/ Preservative
9 - 7.5	6/11/92	13:30	Soil	1		After Extraction
9 - 17.5		14:20		1		Hold For
9 - 25		14:50		1		Further Instructions
9-27.5		15:00		1		
9 - 30		15:15		1		
9 - 37.5		15:55		2		
10 - 2.5		17:15		1		
10 - 5		17:25		2		
10 - 10		17:30		2		
10 - 15		17:40		3		
10 - 20		17:45		3		
10 - 25		18:00		1		

	Signature	Company	Date	Time
Relinquished by:	John O. Heggeness	WESTEC	6/14/92	15:33
Received by:	[illegible]	CKY	6/14	15:33
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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April 15, 1992

Ship To: [redacted] 3492 Valley Ave. Suite [redacted]
Pleasanton Calif.
94566

WESTEC
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

Ship To: [redacted] 5250 Neil Rd - Suite 300
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board — Phone Number: 916-361-5722
Client Address: 3442 Routier Rd. — P.O. Number:
City, State, Zip: Sacramento Calif 95827-3078
Project Name: Walker Mine — Project Number: 19902-2
Sampled By: J. Hoyeness — Signature: John O. Hoyeness

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers	WET Extraction	Remarks/ Preservative
10m- 11-5	6/11/92	18:25	Soil	1		After Extraction
11-to5		18:30		1		hold For
-10		18:40		3		Further
15		18:50		2		Instructions
20		19:00		2		
25		19:10		2		

	Signature	Company	Date	Time
Relinquished by:	John O. Hoyeness	WESTEC	6/14/92	15:33
Received by:	[illegible]	CRL	6/14	15:33
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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April 15, 1992

Ship to: C[illegible] I[illegible]
3492 Valley Ave Suite [illegible]
Pleasanton, Calif.
94566

WESTEC
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

Return to: J. Heggeness
WESTEC
5250 Neil Rd Suite 300
Reno, Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board Phone Number: 916-361-5722
Client Address: 3442 Routier Rd P.O. Number:
City, State, Zip: Sacramento Calif. 95827-3096
Project Name: Walker Mine Project Number: 17902-2
Sampled By: J. Heggeness Signature: [signature]

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers	WET Extraction							Remarks/ Preservative
12-205	6/12/92	9:00		2	✓							After Extraction
12-10	↓	9:25		3	↓							hold For
12-15	↓	9:35		3	↓							Further
12-25	↓	10:10		1	↓							Instructions
17-2705	↓	10:30		1	↓							
13-205	↓	11:00		1	↓							
13-5	↓	11:15		2	↓							
13-10	↓	11:25		2	↓							
13-15	↓	11:35		2	↓							
13-20	↓	11:45		2	↓							
14-205	↓	12:50		1	↓							
14-5	↓	12:55		2	↓							

	Signature	Company	Date	Time
Relinquished by:	[signature]	WESTEC	6/14	15:33
Received by:	[signature]	CKJ	6/14	15:33
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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April 15, 1992

Samples to: Suite F
3492 Valley Ave
Pleasanton Calif.
94566

WESTEC
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

Results to: J. Heggeness
WESTEC
5250 Neil Rd Suite 300
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board
Phone Number: 916-361-5722
Client Address: 3442 - Routier Rd
P.O. Number:
City, State, Zip: Sacramento Calif. 95827-3018
Project Name: Walker Mine
Project Number: 19902-2
Sampled By: J. Heggeness
Signature: John C. Heggeness

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers	Analyses Required: WET Extractic	Remarks/ Preservative
14-10	6/12/92	1300		2		After Extraction
14-15		13:10		2		hold For
14-20		13:15		1		Further
15-205		13:35		1		Instructions
15-5		13:40		3		
15-10		13:50		1		
15-20		14:10		2		

	Signature	Company	Date	Time
Relinquished by:	John C. Heggeness	WESTEC	6/14	15:33
Received by:	[illegible]	CEY	6/14	15:33
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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April 15, 1992

3972 Valley Ave. Suite E
Pleasanton Calif.
94566

WESTEC
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

J. Heggeness
WESTEC
5250 Neil Rd. Suite 300
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board Phone Number: 916-361-5722
Client Address: 3443 Routier Rd P.O. Number:
City, State, Zip: Sacramento Calif. 95827-3098
Project Name: Walker Mine Project Number: 19902-2
Sampled By: John Heggeness Signature: John O. Heggeness

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers	Analyses Required: SEE Extract							Remarks/ Preservative
WM-1-205	6/9/92	9:00	Soil	1	✓							After Extraction
WM-1-5		9:15		2	✓							Hold For
WM-1-10		9:45		1	✓							Further
2-205		10:50		1	✓							Instructions
2-5		11:10		1	✓							
2-10		11:30		2	✓							
2-15		11:45		1	✓							
3-2.5		14:10		1	✓							
3-5		14:20		1	✓							
3-15		14:45		2	✓							
3-20		15:30		2	✓							
~~3-25~~					✓							

	Signature	Company	Date	Time
Relinquished by:	John O. Heggeness	WESTEC	6/14/92	15:33
Received by:	[illegible]	CPI	6/14/92	15:38
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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April 15, 1992

Ship To: [illegible] Suite [illegible]
39 H2 Valley Ave
Pleasanton Cal. F.
94566

WESTEC
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

Results To: J. H eggeness
WESTEC
5250 Neil Road Suite 300
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board Phone Number: 916-361-5722

Client Address: 3442-Routier Rd. P.O. Number:

City, State, Zip: Sacramento Cal. F. 95827-3048

Project Name: Walker Mine Project Number: 19902-2

Sampled By: J.O. Heggeness Signature: John O. Heggeness

Analyses Required: Wet Extraction

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers	Remarks/ Preservative
4-205	6/10/92	8:20	Soil		After Extraction Hold For Further Instructions
4A-15		10:10			
5-205		11:20			
5-5		11:30			
5-15		11:55			
5-20		12:05			
5-25		12:25			
5-30		12:40			
5-35		13:00			

	Signature	Company	Date	Time
Relinquished by:	John O. Heggeness	WESTEC	6/14/92	15:35
Received by:	[illegible]	CMI	6/14/92	15:35
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

112.FRM
April 15, 1992

Ship To: [illegible] 11801 E 33rd Ave Suite C
Aurora CO- 80010.

WESTEC
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

Results To - J. Heggeness
WESTEC
5250 Neil Rd. Suite 300
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board — Phone Number: 916-361-[illegible]
Client Address: 3442 Routier Rd — P.O. Number:
City, State, Zip: Sacramento Calif 95827-3098
Project Name: Walker Mine — Project Number: 19902-2
Sampled By: J. Heggeness — Signature: John O. Heggeness

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers	Static Test PSI Method 5010	Remarks/ Preservative
10M- 13-20S	6/12	11:00	Soil	1	✓	
13-20	6/12	11:45		1	✓	
14-20S	✓	12:30		1	✓	
14-10	✓	13:00		1	✓	
15-20S	✓	13:35		1	✓	
15-10	✓	13:50		1	✓	
16-5	✓	14:45		1	✓	
16-10	✓	14:50		1	✓	
17-5	✓	16:10		1	✓	
17-15	✓	16:30		1	✓	
17-22S	✓	16:50		1	✓	
					✓	

	Signature	Company	Date	Time
Relinquished by:	John O. Heggeness	WESTEC	6/15/92	12:00
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

112.FRM
April 15, 1992

11801 E 33rd
Aurora CO.
80010

WESTEC
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

J. Heggeness
WESTEC
5250 Neil Rd Suite 300
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board Phone Number: 916-361-5722
Client Address: 3442 Routier Rd P.O. Number:
City, State, Zip: Sacramento Calif 95827-3098
Project Name: Walker Mine Project Number: 19902-2
Sampled By: J. Heggeness Signature: John O. Heggeness

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers			Static Test PSI Method 5010						Remarks/ Preservative
18-205	6/12/92	17:30	Soil	1			✓						
18-15		17:50		1			✓						

	Signature	Company	Date	Time
Relinquished by:	John O. Heggeness	WESTEC	6/15/92	12:00
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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April 15, 1992

11801 E 33rd Ave. Suite C
Aurora Colorado 80010

WESTEC
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

J. Hessenness
WESTEC
5250 Neil Rd. Suite 300
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board Phone Number: 916-361-5722
Client Address: 3443 Routier Rd. P.O. Number:
City, State, Zip: Sacramento Calif. 95827-3098
Project Name: Walker Mine Project Number: 19902-2
Sampled By: J. Hessenness Signature: John O. Hessenness

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers	Analyses Required: Static Test PSI Method 1010	Remarks/ Preservative
5-30	6/10/92	12:40	Soil	2		
5-35	6/10/92	13:00		1		
6-205		14:30		1		
6-5		14:40		1		
6-12.5		15:00		1		
6-15		15:10		1		
7-5		17:30		1		
7-15		17:55		1		
7-32.5	6/11/92	9:00		1		
7-37.5		9:30		1		
8-205		10:45		1		
8A-10		11:55		1		

	Signature	Company	Date	Time
Relinquished by:	John O. Hessenness	WESTEC	6/15/92	12:00
Received by:		Shipped Fed. Express		
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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April 15, 1992

Ship To: [illegible] Systems
11801 E. 33rd Ave, Suite C
Aurora Colorado, 80010

WESTEC
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

Result To:
J. Heggeness
WESTEC
5250 Neil Road, Suite 300
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: C.V. Regional Board Phone Number: 916-341-5722
Client Address: 3443 Routier Rd. Suite A P.O. Number:
City, State, Zip: Sacramento, Calif. 95827-3018
Project Name: Walker Mine Project Number: 19902-2
Sampled By: John Heggeness Signature: John O. Heggeness

	Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers			Static test PSI Method 5010						Remarks/ Preservative
WM	-1-205	6/9/92	9:00	soil	1			↓						
WM-	1-5'	6/9/92	9:15		1									
	2-205	6/9/92	10:50		1									
	2-5'	6/9/92	11:10		1									
	2-15		11:45		1									
	3-205		14:10		1									
	3-10	↓	14:30		1									
	4-205	6/10/92	8:20		1									
	4A-205		9:40		1									
	5-205		11:20		1									
	5-5		11:30		1									
	5-25		12:25	↓	1			↓						

	Signature	Company	Date	Time
Relinquished by:	John O. Heggeness	WESTEC	6/15/92	12:00
Received by:		Shipped Fed. Express		
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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April 15, 1992

11801 E 33rd Ave Suite C
Aurora CO.
80010

WESTEC
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

WESTEC
5250 Neil Rd Suite 300
Reno Nevada 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board Phone Number: 916-361-5722
Client Address: 3442 Routier Rd. P.O. Number:
City, State, Zip: Sacramento Calif 95827-3098
Project Name: Walker Mine Project Number: 19902
Sampled By: J. Heggeness Signature: John O. Heggeness

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers			Analyses Required: Standard Tests PST Method 5010	Humidity Cell PST Method 502					Remarks/ Preservative
Sludge 1	6/13/92	14:40	Sludge	1 bottle									
Sludge 2	6/13/92	14:45											
Sludge 3	6/13/92	14:50											
Sludge 4	6/13/92	14:55											
Sludge 5	6/13/92	15:00											
WM-1-Comp	6/9/92	10:00	Composite	1 ½ box									
WM-2-Comp	6/9/92	11:50											
WM-3-Comp	6/9/92	15:45											
WM-4-Comp	6/10/92	12:20											
WM-5-Comp	6/10/92	13:10											
WM-6-Comp	6/10/92	15:20											
WM-7-Comp	6/11/92	9:35											

	Signature	Company	Date	Time
Relinquished by:	John O. Heggeness	WESTEC	6/15/92	12:00
Received by:	Shipper	Fedex Express		
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

112.FRM
April 15, 1992

11801 E 33rd Ave Suite C
Aurora CO. 80010

WESTEC
WELSH ENGINEERING SCIENCE & TECHNOLOGY, INC.

To:
J. Heggeness
WESTEC
5250 Neil Rd, Suite 300
Reno Nev. 89502

CHAIN OF CUSTODY RECORD

Client Name: Regional Board — Phone Number: 916-361-5722
Client Address: 3442 Routier Rd — P.O. Number:
City, State, Zip: Sacramento, Calif. 95827-3098
Project Name: Walker Mine — Project Number: 19102-2
Sampled By: J. Heggeness — Signature: John O. Heggeness

Sample Number	Date Sampled	Time Sampled	Sample Description	Number Of Containers			Analyses Required: Humidity Cell PSI Method 502						Remarks/ Preservative
10M-DA-COMP	6/11/92	12:20	Composite	1 bag									
9-COMP	6/11/92	16:00											
10-COMP		18:10											
11-COMP		19:20											
12-COMP	6/12/92	10:40											
13-COMP		11:50											
14-COMP		13:20											
15-COMP		14:25											
16-COMP		15:20											
17-COMP		17:05											
18-COMP		18:00											
19-COMP		19:30											

	Signature	Company	Date	Time
Relinquished by:	John O. Heggeness	WESTEC	6/15/92	12:00
Received by:	Shipped	Fed Express		
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

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April 15, 1992

WELSH ENGINEERING

PROJECT NAME Walker Mine NO. WM-1

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES	DRILLER Cortney —	DATE STARTED / DATE FINISHED 6/8	
DRILLING EQUIPMENT Access II		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollow Stem Auger	DRILL BIT 6"	NO. OF SAMPLES / DIST.	UNDIST. 3
SIZE AND TYPE OF CASING —		WATER ELEV. / FIRST 9	COMPL. — / 24 HRS
TYPE OF PERFORATION —	FROM TO FT.	LOGGED BY JOH	CHECKED BY:
SIZE AND TYPE OF PACK —	FROM TO FT.		
TYPE OF SEAL —	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No.	SAMPLES: Recovery ft	SAMPLES: Penetr. Resist. (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
									Tubes
	Soil extract diatomed brown sandy silt, & light brown ~~sand~~ silty sand - non plastic						-	15/12/16	1, 1, 1/3
5	→ H. Brown silty sand - aromitic soil non plastic, 60% sand 40% silt.				5		-	22/6c/94	1, 1, 1
10	aromitic sand -			▽	10		-	100 For 4"	3/4
15	T.D. 10 Ft								
20									
25									
30									

FIELD LOG OF BORING NO. WM-1 SHEET 1 of 1

WM - 2

WELSH ENGINEERING

PROJECT NAME Walker Mine 2 NO. 1902-2

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Drilling	DRILLER Hartney	DATE STARTED / DATE FINISHED 5/9 –	
DRILLING EQUIPMENT Access II		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollow Stem Auger	DRILL BIT 6" 3 1/4 id	NO. OF SAMPLES DIST.	UNDIST. 4
SIZE AND TYPE OF CASING –		WATER ELEV. FIRST 9 –	COMPL. – 24 HRS.
TYPE OF PERFORATION –	FROM TO FT.	LOGGED BY JOH	CHECKED BY:
SIZE AND TYPE OF PACK –	FROM TO FT.		
TYPE OF SEAL –	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No.	SAMPLES: Density (t)	SAMPLES: Penetra Resist (Blows/6 in)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
	2½ – wood chips (brown) up to 0.5cm							3/3/4	1, 3/4
5	wood Chips				5			4/5/17	2 1/4
10	wood			▼	10			2/5/10	~~1/4~~ 1, 1/4
	sedimentary sandy clay 10% sand F to m 90% silt & clay – ~~#~~ mod plastic								
15					15			63/77/–	1, 1, –
20	gray (med. mm) clayey sand 70% sand 30% Fines F.P. weakly Plastic				20			100 for 2"	No Samp

Notes:
Could the sandy clay at 15 ft have been the process waste seen IN Trench 3?

FIELD LOG OF BORING NO. WM - 2 SHEET 1 of 1

MW-3

WELSH ENGINEERING

PROJECT NAME Walker Mine NO. 19402-2

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES ~~Empire~~ Drilling	DRILLER Cortney	DATE STARTED / DATE FINISHED 6/9	
DRILLING EQUIPMENT Access II		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollow stem Auger	DRILL BIT 6"	NO. OF SAMPLES / DIST.	UNDIST. 5
SIZE AND TYPE OF CASING –		WATER ELEV. / FIRST –	COMPL. – / 24 HRS –
TYPE OF PERFORATION –	FROM TO FT.	LOGGED BY Jolt	CHECKED BY:
SIZE AND TYPE OF PACK –	FROM TO FT.		
TYPE OF SEAL –	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No.	SAMPLES: Interval ft	SAMPLES: Penetra. Resist. (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
									Tubes
	wood chips dk brown up to .5 cm					–		4/5/5	– 1, 3/4
5	" "					–		3/4/4	– 1, 1
10	Blackwet wood chips				▽	–		1/2/2	– 1, 1
15	dk gry silt - w/ 20% wood chips 60% grey silt - very wet slurry 20% sand F to C.					–		21/42/43	– 1, 1
20	~~wet~~ weakly to mod wx granodiorite with relict phenos of ~~[illegible]~~ Feldspar, biotite, muscovite & Qtz. weakly altered/wx to clay.	–	–			–		34/100-4"	→ 1, 1/4

T.D. 20 ft

Again could the 15' Interval be the Process Waste seen in Trench 3

FIELD LOG OF BORING NO. WM-3 SHEET 1 of 1

WM - 4

WELSH ENGINEERING

PROJECT NAME Walker Mine NO. 19902-2

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Drilling	DRILLER Dean Sampson	DATE STARTED / DATE FINISHED 6/10/92	
DRILLING EQUIPMENT CME 55 w. Torque		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollow stem	DRILL BIT 6"	NO. OF SAMPLES / DIST.	UNDIST. 12
SIZE AND TYPE OF CASING —		WATER ELEV. / FIRST —	COMPL. / 24 HRS
TYPE OF PERFORATION —	FROM TO FT.	LOGGED BY JOH	CHECKED BY:
SIZE AND TYPE OF PACK —	FROM TO FT.		
TYPE OF SEAL —	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No.	SAMPLES: Elevation	SAMPLES: Penetrat. Resist. (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
									Tubes
	oxide waste 50% silt + sand 50% gravel up to 3 cm. FeOx stained tailings + silica field tailings + "Veins" material							6/6/7	1, 3/4, -
5	HA.							7/9/8	1, -, -
10	hole starting to cave around auger. 5 FT Diameter hole around auger							21/34/24	No sample -, -, -
	No sample							9/31/10	No Sample
15	- No sample							50/37/50 for 4"	
	End Hole TD - 15'								
20	Move 10' East +								
	Drill WM-4A-								
25									
30									
	No composite sample								

FIELD LOG OF BORING NO. WM-4 SHEET 1 of 1

WM-4A

WELSH ENGINEERING

PROJECT NAME ~~[illegible]~~ Walker Mine NO. 19902

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Drilling	DRILLER Dean	DATE STARTED / DATE FINISHED 6/10	
DRILLING EQUIPMENT CME 55		COMPLETION DEPTH	SAMPLER 3" I.D.
DRILLING METHOD Hollow Stem Auger	DRILL BIT 6"	NO. OF SAMPLES / DIST.	UNDIST. 2
SIZE AND TYPE OF CASING –		WATER ELEV. / FIRST –	COMPL. / 24 HRS
TYPE OF PERFORATION –	FROM TO FT.	LOGGED BY AOH	CHECKED BY:
SIZE AND TYPE OF PACK –	FROM TO FT.		
TYPE OF SEAL –	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No.	SAMPLES: Recov. ft	SAMPLES: Penetra Resist (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
5	No Sample								
	.3/4 tube gravel Oxide waste .5 cm to 5 cm.							6/9/10	No Sample
10	No sample							9/9/31	3/4, –, –
								35/40/20	No Sample
15	Sand to gravel 6 cm (1/2 tube) Oxide waste & Oxidized granodiorite & Silicified "Vein"							8/13	18 – 1/2, –, –
	Auger Refusal T.D. 18'								
20	Lost 10' of Auger & bit in Hole – bolt came out, last auger that came out was cracked where bolt was.								
25									
30									
	No Composite Sample								

FIELD LOG OF BORING NO. 4A SHEET 1 of 1

WM-5

WELSH ENGINEERING

PROJECT NAME Walker Mine NO. 19902-2

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Drilling	DRILLER Dean Simpson	DATE STARTED / DATE FINISHED 6/10	
DRILLING EQUIPMENT CME 55		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollow stem auger	DRILL BIT	NO. OF SAMPLES / DIST.	UNDIST. 8
SIZE AND TYPE OF CASING —		WATER ELEV. / FIRST —	COMPL. 24 HRS
TYPE OF PERFORATION —	FROM TO FT.	LOGGED BY Jo H	CHECKED BY:
SIZE AND TYPE OF PACK —	FROM TO FT.		
TYPE OF SEAL —	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Permeameter Data	SAMPLES: Type No.	SAMPLES: Interval ft	SAMPLES: Penetr. Resist. (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
	granitic waste							10/7/7	3/4 & 1/4
5	sandy gravel oxide(?) - 50% sand F to C, 50% gravel up to 3cm, granitic fragments							9/12/11	- 2 tubes
10	granitic sand, gravel granitic waste 20%, 60% S F to C, 30% gravel							4/9/8	- 1 tube
15	granitic sandy gravel — Horn Fels cobble							11/8/7	- 1 tube
20	~~sandy~~ gravelly sand — its Above							11/13/11	- 1 tube
								27/28/26	- No sample
25	granite waste? wx granite pieces up to 6cm.							8/10/11	1 tube
30	- soil contact - - - - - sandy, granitic soil							5/8/10	2 1/2
35	- wx granite - - - - TD. - - - - - Dg					35		13/33/50 for 5"	2 1/2

FIELD LOG OF BORING NO. WM-5 SHEET 1 of 1

WM-6

WELSH ENGINEERING

PROJECT NAME Walker Mine NO. 19902

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Drilling	DRILLER Dean Sampson	DATE STARTED / DATE FINISHED 6/10	
DRILLING EQUIPMENT CME55		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollow Stem	DRILL BIT 6"	NO. OF SAMPLES / DIST.	UNDIST.
SIZE AND TYPE OF CASING		WATER ELEV. / FIRST	COMPL. / 24 HRS
TYPE OF PERFORATION	FROM TO FT.	LOGGED BY JOH	CHECKED BY:
SIZE AND TYPE OF PACK	FROM TO FT.		
TYPE OF SEAL	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No.	SAMPLES: Recovery	SAMPLES: Penetr. Resist. (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
	oxide waste FeOx stained sandy gravel 50% sand F-C - 50% gravel up to 2 5cm							10/11/12	3 tubes 1 3/4
5	AA							7/14/10	2 tubes 1,1
10	AA							6/10/7	- 1/2 tube
	Oxide waste AA - ox Jarosite w/ opv/py							8/8/7	- 1/2 tube
	w/ silicic rock vein								
15	AA							5/5/5	- 3/4 tube
	AA							8/14/24	- 3/4
20	wood and wood chips - hit beam w/ sampler I 6" thick.							23/50 for 3"	- 1 1/2 tubes
	wood & soil mixed brown clayey organic silt.							4/4/9	- 2 tubes
25	AA 10% wood							9/13/13	- for 2 tubes
	weathered granite							12/50 for 6"	
30	TD. 27.5 ft								

FIELD LOG OF BORING NO. WM-6 SHEET 1 of 1

WM-7

WELSH ENGINEERING

PROJECT NAME Walker Mine NO. 19902

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Drilling	DRILLER (Not) Sampled	DATE STARTED / DATE FINISHED 6/10 –	
DRILLING EQUIPMENT CME 55		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollow Stem Auger	DRILL BIT 6"	NO. OF SAMPLES / DIST.	UNDIST. 12
SIZE AND TYPE OF CASING –		WATER ELEV. / FIRST 3205 ?	COMPL. / 24 HRS
TYPE OF PERFORATION –	FROM TO FT.	LOGGED BY JOH	CHECKED BY:
SIZE AND TYPE OF PACK –	FROM TO FT.		
TYPE OF SEAL –	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Contents	Piezometer Data	SAMPLES: Type No.	SAMPLES: Recovery %	SAMPLES: Penetr. Resist. (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
	Hornfels waste Sand 50% S to F, gravel 0% up to 2.5cm							10/14/11	½ tube
5	Oxide waste weak! From stamp in Fines & white silicified hornfels 20% F, 40% S, 40% gravel → F to C							9/6/7	~~1~~ 1¾ tubes
10								10/5/8	– 1 tube
	Hornfels waste 20% F 40% Sand F to C, 40% gravels up to 3cm ~~[illegible]~~ gravel is dark grey Tan, F2lb ~~[illegible]~~ 10% white silicified hornfels.							6/6/5	1 tube
15								5/6/6 –	1 tube
								6/8/9	– 1 tube
20	1-H							9/10/11 –	1 tube
	Hornfels waste 20% F, 50% S-F to C, 30% gravel to 4cm No F to C, No silicified Hornfels.							9/14/12 –	1 tube
25								11/14/10 –	No sample
	Hornfels waste 25% F 55% S F to C. 20% gravel to 6cm Hornfels dk grey ±1% py.							5/6/17 –	½ tube
30	No sample lost portion of Bit in Hole –							9/20/13 –	No sample
	Woodchips & soil		70					20/6/5 –	2 tubes
35	Granitic soil – see Lump. Book							8/11/22 –	2 tubes
	Mix of granitic soil and decomposed granite							6/10/17 –	2 tubes
	T.D. 37.5								

FIELD LOG OF BORING NO. WM-7 SHEET 1 of 1

WM-8

WELSH ENGINEERING

PROJECT NAME Walker Mine NO.

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Drilling	DRILLER Dean Sampson	DATE STARTED / DATE FINISHED 6/11	
DRILLING EQUIPMENT CME 55		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollow Stem Auger	DRILL BIT 6"	NO. OF SAMPLES / DIST.	UNDIST. 3
SIZE AND TYPE OF CASING –		WATER ELEV. / FIRST	COMPL. / 24 HRS
TYPE OF PERFORATION –	FROM TO FT.	LOGGED BY JOH	CHECKED BY: –
SIZE AND TYPE OF PACK –	FROM TO FT.		
TYPE OF SEAL –	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No	SAMPLES: Recovery ft	SAMPLES: Penetra Resist (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
	Hornfels waste 30% F 50% S, F+C 20% gravel								
5	Hornfels waste 10% F 50% S, F+C 40% gravel up to 5cm							7/8/14	1/2 tube
								8/8/8	1 tube
	Hornfels waste 20% F 50% S, F+C, 30% gravel up to 2.5cm							5/7/7	1 tube
10	wood → No sample – wood in shoe							50 for 2"	No sample
	Auger Refusal at 11 ft.								
	Move 10' & Redrill to 10' before								
15	sampling –								
20									
25									
30									

FIELD LOG OF BORING NO. WM-8 SHEET 1 of 1

WM-8A

WELSH ENGINEERING

PROJECT NAME ~~WM-8A~~ Walker Mine NO. 4702-2

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Exploration	DRILLER Dean Sampson	DATE STARTED / DATE FINISHED 6/11	
DRILLING EQUIPMENT CME-55		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollow Stem Auger	DRILL BIT 10"	NO. OF SAMPLES / DIST.	UNDIST. 3
SIZE AND TYPE OF CASING –		WATER ELEV. / FIRST	COMPL. / 24 HRS
TYPE OF PERFORATION –	FROM TO FT.	LOGGED BY JOH	CHECKED BY:
SIZE AND TYPE OF PACK –	FROM TO FT.		
TYPE OF SEAL –	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No	SAMPLES: Recovery ft	SAMPLES: Penetra Resist (Blows/6 in)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
5	Not sampling Repeat of WM-8								
10	soil							8/37	For 6" – 2 tube
	12.5 Clayey/Soil variable red/orange/brown, weak plastic, trace 30% sand, trace 30% gravel							9/13	– 2 tubes
15	– w/o Hem. basalt, brick, dg.							52/51	For 4"
	T.D = 15'								

FIELD LOG OF BORING NO. WM-8A SHEET 1 of 1

WM-9

WELSH ENGINEERING

PROJECT NAME Walker Mine NO. 19902-2

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Drilling	DRILLER Dean Sampson	DATE STARTED / DATE FINISHED 6/11	
DRILLING EQUIPMENT CME 55		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollowstem Auger	DRILL BIT 6"	NO. OF SAMPLES: DIST. –	UNDIST. 8
SIZE AND TYPE OF CASING –		WATER ELEV. / FIRST	COMPL. / 24 HRS
TYPE OF PERFORATION –	FROM TO FT.	LOGGED BY JOH	CHECKED BY:
SIZE AND TYPE OF PACK –	FROM TO FT.		
TYPE OF SEAL –	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No	SAMPLES: Interv. ft	SAMPLES: Penetra. Resist (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
5	white silty sand, 40%, F, 60% sand F to c gravel coarse.							1/3/5	1½
	OWFF sandy silt 60% F, 30% sand F to C, 10% gravel Hematite?							5/8/12	1 tube
10	AA-							4/8/2	1 tube
	No sample							16/12/12	No sample
15	No sample							1/10/10	No Sample
	oxide waste	FeOx sand Hem Fe s, w/ st. s.i.c. Jinx 20% sand F to c, 80% gravel up to						5/6/6	1 tube
20	No samp	Gem. Damp?						7/10/10	No samp
	No sample							7/15/14	No Sample
25	Oxide waste - See sample Boo-							11/21/12	2 tubes
	Oxide Waste 10% F, 30% S, F to c, 60% gravel gravel: silicified RK/Vein? Py + cpy - st. FeOx							7/8/5	1 tube
30								10/25/20	1½ tube
	No sample							50 for 5"	No sample
35	No sample							50 for 6"	No Sample
	small decomposed granite silt. brown 70% F, 30% sand.							12/37/30 for 3"	
	T.D.								
40									

FIELD LOG OF BORING NO. WM-9 SHEET 1 of 1

WM-10

WELSH ENGINEERING

PROJECT NAME Walker Mine NO.

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Drilling	DRILLER Jason Gramoson	DATE STARTED / DATE FINISHED 6/11	
DRILLING EQUIPMENT CME 75		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollow Stem	DRILL BIT	NO. OF SAMPLES / DIST.	UNDIST. 6
SIZE AND TYPE OF CASING		WATER ELEV. / FIRST 1105	COMPL. / 24 HRS
TYPE OF PERFORATION	FROM TO FT.	LOGGED BY Jolt	CHECKED BY:
SIZE AND TYPE OF PACK	FROM TO FT.		
TYPE OF SEAL	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Condition	Piezometer Data	SAMPLES: Type No	SAMPLES: Recov. ft	SAMPLES: Penetra Resist (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
	Little Fork Hillwood P.W. gravelly sandy silt 30% silt 70% sand brown to grey-brown							11/20/21	3 tubes
5	AA							6/6/8	3 Tubes
10	- medium brown sand 50% F - [illegible] 5 ft thick No odor no Fork,			▽				4/4/5	- 2½ tubes
15	AA. micaceous,							2/2/4	- 3 tubes
20	Same but color changes to tan Numerous Roots (?) in soil.							2/3/4	- 3 tubes.
25	- - TD. 25 PG - - -							55 for 4"	

FIELD LOG OF BORING NO. WM-10 SHEET 1 of 1

WM-11

WELSH ENGINEERING

PROJECT NAME Walker Mine NO. 17902-2

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Drilling	DRILLER Dean, Compson	DATE STARTED / DATE FINISHED 6/1	
DRILLING EQUIPMENT CME 55		COMPLETION DEPTH	SAMPLER 3" SD
DRILLING METHOD Hollow Stem Auger	DRILL BIT 6"	NO. OF SAMPLES / DIST. —	UNDIST. 6
SIZE AND TYPE OF CASING —		WATER ELEV. / FIRST 16	COMPL. / 24 HRS
TYPE OF PERFORATION —	FROM TO FT.	LOGGED BY JOH	CHECKED BY:
SIZE AND TYPE OF PACK —	FROM TO FT.		
TYPE OF SEAL —	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No	SAMPLES: Recov ft	SAMPLES: Penetr Resist (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
5	- 50% wood & 50% ~~silt~~ sandy, silt.							8/16/16	1 tube
								10/14/12	- 2 2/3 tubes
7.5	PW vfg - salty sand ~~FROTONGE~~ to gray 100% fg sandy to silt micaceous, w/ Fe							1/3/4	
10	dk gy, process waste 100% F to F sand			▽				1/3/4	- 3
15	100% silt F to F m/c sand dk gy process waste							5/7/8	2 2/3
20	very liquid dk gy process waste Not heaving.							7/8/18	2
25	process waste AA + ~~dk~~ gray at 26' TD. 25							37/29/	- 2 tubes

FIELD LOG OF BORING NO. WM-11 SHEET 1 of 1

WELSH ENGINEERING

PROJECT NAME Walker Mine NO. 19902

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Drilling	DRILLER Dean Sampson	DATE STARTED / DATE FINISHED 6-12-92	
DRILLING EQUIPMENT CME 55		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollow Stem Auger	DRILL BIT 8"	NO. OF SAMPLES / DIST.	UNDIST. 6
SIZE AND TYPE OF CASING —		WATER ELEV. / FIRST	COMPL. / 24 HRS
TYPE OF PERFORATION —	FROM TO FT.	LOGGED BY JOH	CHECKED BY:
SIZE AND TYPE OF PACK —	FROM TO FT.		
TYPE OF SEAL —	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No.	SAMPLES: Recov. ft	SAMPLES: Penetr. Resist. (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
	50% pw - 50% Granite Fill							5/6/5	- 2 tubes
5	Granite Fill/pw - dk Gray, 50% silt + 30% Sand 20% gravel upto 1" diam. - micaceous few roots							2/3/3	- 2 tubes
10	AA - w/ wood chips - 5'							1/3/5	- 2 1/2 tubes
15	AA Gravel [illegible] shoe							3/5/10	- 2 1/2
20	No Sample Few clayey ls chips			▽				9/11/15	- No sample
	No Sample							15/18/18	- No sample
25	Granitic Sand - 100% Sand F+C.							19/39/44	1 tube
	Eg. - TD. 72.5							7/20/29	- 2 tubes
30									

FIELD LOG OF BORING NO. WM-12 SHEET 1

WM-13-

WELSH ENGINEERING

PROJECT NAME Walker Mine NO. 14902-2

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Drilling	DRILLER Dean Sampson	DATE STARTED / DATE FINISHED ?/1/2	
DRILLING EQUIPMENT CME 75		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollow Stem Auger	DRILL BIT	NO. OF SAMPLES - DIST.	UNDIST. 5
SIZE AND TYPE OF CASING -		WATER ELEV. - FIRST 8	COMPL. - 24 HRS
TYPE OF PERFORATION -	FROM TO FT.	LOGGED BY JOH	CHECKED BY: -
SIZE AND TYPE OF PACK -	FROM TO FT.		
TYPE OF SEAL -	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG Lithology	GRAPHIC LOG Piezometer Installation	Water Content	Piezometer Data	SAMPLES Type No.	SAMPLES Recov. ft	SAMPLES Penetra Resist (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
	PW - dk gry 50% silt - 50% sand F. micaceous non plastic							3/5/6	Tubes - 2½
5	100% silt no plastic dk gry							1/2/1	- 2
				▽					
10	AA Roots in shoe							2/2/2	- 2
15	Roots in sample AA - change to lt grn in bottom of sample							3/3/5	2
20	FeOx stained Dg TD - 20'							10/20/10	- 2½

FIELD LOG OF BORING NO. WM-13 SHEET 1 of 1

WM-14

WELSH ENGINEERING

PROJECT NAME Walker Mine NO. 14402-2

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Drilling	DRILLER Dean Sampson	DATE STARTED / DATE FINISHED 1/12	
DRILLING EQUIPMENT CME 55		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollow Stem	DRILL BIT 6"	NO. OF SAMPLES / DIST.	UNDIST. 5
SIZE AND TYPE OF CASING —		WATER ELEV. / FIRST 9'	COMPL. — / 24 HRS
TYPE OF PERFORATION —	FROM TO FT.	LOGGED BY JOH	CHECKED BY:
SIZE AND TYPE OF PACK —	FROM TO FT.		
TYPE OF SEAL —	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No.	SAMPLES: Heavy ft	SAMPLES: Penetra Resist (Blows/6 in)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
	PW - 100% f - tan/brown - dkgry tailing [illegible]							11/3/34	- 2 tubes
5	PW [illegible] / tailing							1/3/2	2 tubes
10	[illegible]			I				3/3/2	- 2½
15	AA - dkgry Process Waste 100% Fine to Fine Sand [illegible]							3/4/8	- 2
20	Dd - T.D. = 20'							6/18/37	- 2
25									

FIELD LOG OF BORING NO. WM - 14 SHEET 1 of 1

wm-15

WELSH ENGINEERING

PROJECT NAME Walker Mine NO. 14902

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY GES Drilling	DRILLER	DATE STARTED / DATE FINISHED	
DRILLING EQUIPMENT CME 55		COMPLETION DEPTH	SAMPLER 3 ID
DRILLING METHOD Hollow Stem	DRILL BIT	NO. OF SAMPLES: DIST.	UNDIST. 5
SIZE AND TYPE OF CASING		WATER ELEV.: FIRST ±5	COMPL. 24 HRS.
TYPE OF PERFORATION	FROM TO FT.	LOGGED BY JOH	CHECKED BY:
SIZE AND TYPE OF PACK	FROM TO FT.		
TYPE OF SEAL	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No.	SAMPLES: Depth ft	SAMPLES: Penetra. Resist (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
	Clayey								
	PW - Tan/brown/red, 100% F to F Gravel, No plastic - Colors intermixed							7/5/3	2
5	All dk gray wet/ Fluid				▽			1/2/2	2 1/2
10	AH							3/3/4	2
15	No sample							10/16/19	No sample
	wood & AH - large wood piece pierced shoe							9/12/16	1
20	Dd							11/23/16	3

FIELD LOG OF BORING NO. wm-15 SHEET 1 of 1

WM-16

WELSH ENGINEERING

PROJECT NAME Walker Mine NO. 19902-2

BORING LOCATION Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Drilling	DRILLER Clem, Sampson	DATE STARTED / DATE FINISHED 6/12/9-	
DRILLING EQUIPMENT CME-55		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollow Stem	DRILL BIT 6"	NO. OF SAMPLES / DIST.	UNDIST: 5
SIZE AND TYPE OF CASING		WATER ELEV. / FIRST ± 8'	COMPL. / 24 HRS
TYPE OF PERFORATION	FROM TO FT.	LOGGED BY JOH	CHECKED BY:
SIZE AND TYPE OF PACK	FROM TO FT.		
TYPE OF SEAL	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No.	SAMPLES: Interval	SAMPLES: Penetra. Resist. (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
	Light grey to orange brown 50% F - 50% F. sand, Stiff, Fine [illegible]							1/1/4/4	- 2
5	Till a [illegible] grey/							1/1/1	- 2 2/3
					I V				
10	AA - very Fluid							1/3/3	- 2
15	AA - not Fluid wood / Roots							2/2/6	- 2
20	Contrast w/ Soil green - ic soil lt. grey, Roots [illegible], 50% Silt 50% Sand Fine [illegible]							7/4/4	- 3
	dg.								
25	T.D. = 20'								

FIELD LOG OF BORING NO. WM-16 SHEET 1 of 1

WM-17

WELSH ENGINEERING

PROJECT NAME Walker Mine NO. 9902

BORING LOCATION Walker Mine		ELEVATION AND DATUM ~~[illegible]~~	
DRILLING AGENCY SES Drilling	DRILLER Pierson Sampson	DATE STARTED / DATE FINISHED 6/12	
DRILLING EQUIPMENT CME 55		COMPLETION DEPTH	SAMPLER 2" SD
DRILLING METHOD Hollow stem	DRILL BIT	NO. OF SAMPLES / DIST.	UNDIST. 7
SIZE AND TYPE OF CASING —		WATER ELEV. / FIRST	COMPL. / 24 HRS
TYPE OF PERFORATION —	FROM TO FT.	LOGGED BY JOH	CHECKED BY:
SIZE AND TYPE OF PACK —	FROM TO FT.		
TYPE OF SEAL —	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No.	SAMPLES: Recov. ft	SAMPLES: Penetra Resist (Blows/6 in)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
	TD Gravel, VFg [illegible] Strong Fizz								
5	dk gry PW - vFg 100% silt/sand [illegible]							1/6/5	2 1/2
								1/1/1	2 1/2
10	AA							2/3/3	2
15	AA							4/5/8	2 1/2
	Black, soil in shoe								
20	Clayey soil (?) - w/ pl. cubes (Mucronite) Fresh ?? tan/brown 50% F - 50% silt [illegible] wk plastic Fe Ox stained clay.							3/5/5	1/2
								3/3/8	3
25	Dg - wk Fe Ox							10/13/12	1
	TD. 25								

FIELD LOG OF BORING NO. WM-17 SHEET 1 of 1

WELSH ENGINEERING

PROJECT NAME Walker Mine NO. 19902-2

WM-18

BORING LOCATION: Walker Mine		ELEVATION AND DATUM	
DRILLING AGENCY SES Drilling	DRILLER Dean Sampson	DATE STARTED / DATE FINISHED 4/12	
DRILLING EQUIPMENT CME55		COMPLETION DEPTH	SAMPLER 3" ID
DRILLING METHOD Hollow stem	DRILL BIT 6"	NO. OF SAMPLES DIST. 2	UNDIST. 6
SIZE AND TYPE OF CASING –		WATER ELEV. FIRST	COMPL. 24 HRS
TYPE OF PERFORATION –	FROM TO FT.	LOGGED BY JOH	CHECKED BY:
SIZE AND TYPE OF PACK –	FROM TO FT.		
TYPE OF SEAL –	FROM TO FT.		

DEPTH (FEET)	DESCRIPTION	GRAPHIC LOG: Lithology	GRAPHIC LOG: Piezometer Installation	Water Content	Piezometer Data	SAMPLES: Type No.	SAMPLES: Elevation	SAMPLES: Penetration Resist. (Blows/6 in.)	REMARKS (Drill Rate, Fluid loss, Odor, etc.)
	orange & brown pw - uFs - strat. f. 'd appear to be clay & grav. tie beds.							2/2/2	2½
5	pw - uFs 100% f - mod plastic							1/1/1	2½
10	AA - nonplastic low - plastic							2/1/1	3½
15	[illegible] black silty pw? w/ [illegible] to dem. 15% [illegible] gravel f to c							4/50 for 5"	2
20	gravelly, coll[illegible] 40% f [illegible] grav. tie beds grn.							7/12/34	2
25	very st. mix granite mostly [illegible] st. relict structure							3/2/4	3'
	T.D. 25								

FIELD LOG OF BORING NO. WM-18 SHEET 1 of 1

LOG OF TEST PIT NO. Trench. TP-1

LOCATION Walker mine

SURFACE CONDITIONS PW - edge of PW near Dolly Creek ELEVATION: _____

DEPTH IN FEET	SAMPLE	MOISTURE CONTENT-%	LITHOLOGY	DESCRIPTION	SYMBOL	REMARKS
1				stratified FeOx [illegible] silty sand bedding stain to 1 ft. dk gray to orange brown - yellow variable color Red/orange, Brown, silty sand [illegible] of ft, [illegible]% sand f-c, [illegible]% silt [illegible]		TP-1-1
2						
3						
4				orange gravelly sand. well bedded in part, buried 80% dk gray clay?, gravel and boulders to 1 ft.		
5						strong stuffing of sides.
6						
7				thin bedded clay? beds .2 cm to 1cm dk gray clay. Few stringers of ~~so~~ FeOx stained sandy soil - saturated,		
8						
9						
10						
11				TD. 11.5'		

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Job No. 1990

Engr. JOK

Date 6/13/92

FIGURE

LOG OF TEST PIT NO. TP-2

LOCATION Walker mine

SURFACE CONDITIONS Edge of Pond to gravel waste pile ELEVATION: -

DEPTH IN FEET	SAMPLE	MOISTURE CONTENT-%	LITHOLOGY	DESCRIPTION	SYMBOL	REMARKS
1				granitic waste 100% sand F to C Tan		TP-2-1
2				wood st. FeOx - Iron waste coated/stick,		
3				FeOx stained granitic soil/waste 100% sand F to C		TP-2-2
4				~~w~~ granite - minimous.		
5				granite ~~as~~ RK/WX hard & soft w/gravel granitic w/phenocrys of Qtz, Feldspar		
6				muscovite, biotite. FeOx (strong) along some		
7				Fractures, (Natural or leachate?). looks natural because confined to		TP-2-3
8				Qtz lenses/veins		
9						
				T.D. 9.5		

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Job No. 19902-2

Engr. JOH

Date 6/13/92

FIGURE

LOG OF TEST PIT NO. TP-3

LOCATION Walker Mine

SURFACE CONDITIONS spring - wood - Oxide Covered Rk ELEVATION: -

DEPTH IN FEET	SAMPLE	MOISTURE CONTENT-%	LITHOLOGY	DESCRIPTION	SYMBOL	REMARKS
1				gravelly Sand 20% F, 50% S F+C, 30% gravel to 1 ft. st. Feox st. brown/orange Roots. gravel is subrounded to subangular		TP-3-1
2				wood [illegible]		TP-3-2
3				dk gray to [illegible] [illegible] % F w/ [illegible] wood [illegible]. H2O running across top.		
4				may be P.O		TP3-3 & 4
5						
6						
7				gravelly Sand don't see Roots		TP-3-5
8						
9				gravel		
10				T.D. TP-3-6		
11				#4 was of extension of trench towards Marshy area black organic soil? Roots, Sandy silt.		40% Sand F+C.
12				40% silt, 10% [illegible] gravels, up to 1 ft.		

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Job No. 199027 2

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Date 6/13/92

FIGURE

LOG OF TEST PIT NO. TP-4

LOCATION Walker Mine

SURFACE CONDITIONS ~~B.~~ oxide Waste Pile Near hole WM-1

ELEVATION: _____

DEPTH IN FEET	SAMPLE	MOISTURE CONTENT-%	LITHOLOGY	DESCRIPTION	SYMBOL	REMARKS
1				oxide waste 20% Gr - 30% Sand F to C, 30% gravel 20% boulder oxide color Hard Fels Silic Fossil Rx, vein ? Pebbles		
2						TP-4-1
3						
4				wood beam. sandy soil gravelly soil, 60% Sand F to C 40% F		
5				brown to reddish brown. Few Roots. Non plastic - light brown.		TP-4-2
6						
7						
8				granite variable contact		
9						
10						
11						

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Job No. 14902-2

Engr. JOH

Date 6/13

FIGURE

LOG OF TEST PIT NO. TP-5

LOCATION Walker Mine

SURFACE CONDITIONS Rocky soil Waste ELEVATION: -

DEPTH IN FEET	SAMPLE	MOISTURE CONTENT-%	LITHOLOGY	DESCRIPTION	SYMBOL	REMARKS
1				Dtgry homFcls waste gravel to Bouldersized pieces, - silts on top of wood (silt over wood)		
2				wood Chips -		No samples
3						
4						
5						
6						
7				wood Chips		
8						
9						
10						
11						
12						
13						
14				Gravelly soil ltgry 10% F, 50% S F to C. 40% gravel to 1 F#. Nonplastic wet. TD.		

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Date 6/13/92

FIGURE

LOG OF TEST PIT NO. TP-6

LOCATION Walker Mine

SURFACE CONDITIONS Waste Pile

ELEVATION: _____

DEPTH IN FEET	SAMPLE	MOISTURE CONTENT-%	LITHOLOGY	DESCRIPTION	SYMBOL	REMARKS
				granitic soil		
1				VFs soil, ~~tan~~ F to orange to yellow as lenses, Few as small lenses, 100% F,		TP-6-1
2						
3				Orange to brown to Red soil (?) angular frags up to 1 Ft., 10% F, 50% S F to C, 40% gravel & boulders		TP-6-2&3
4				St. FeOx locally, Mod to St. MnOx locally		
5						Roots to 5'
6				dk gray a brown boldery soil. 30% F, 40% S F to C 30% gravel & boulders up to 1 Ft. wk plastic. Micaceous.		
7						
8				Red/brown clayey soil (?) 50% F 30% S F to C 20% gravel & boulders. wk plastic orange yellow, Red, DwFF ~~[illegible]~~		TP-6-4
9						
10				TD - 10 Ft		

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Job No. 19902

Engr. JOH

Date 6/13/92

FIGURE

102

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DAILY FIELD REPORT

FOR

Monday 6 / 8 / 92
DAY OF WEEK MONTH DATE YEAR

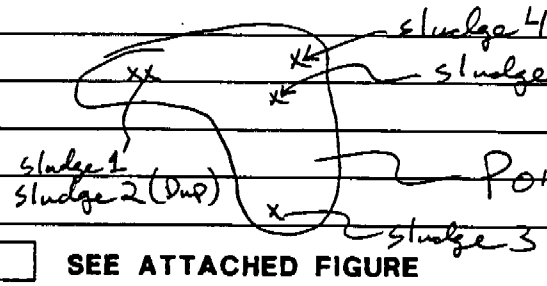
REPORT NO. _____ PAGE 1 OF _____

PROJECT NAME: Walker Mine	PROJECT NO.: 19902-2
LOCATION: Walker Mine	CLIENT: C.V. Regional Board
CONTRACTOR: SES Drilling	CLIENT CONTACT: Bill Croyle
TECHNICIAN:	ENGINEER: J. Heggeness
HOURS: 1:30 - 6:30	TESTS: / RETESTS:
WEATHER: 80° Clear	TEMPERATURE:

THE FOLLOWING WAS NOTED:

Met Drillers at Davis Lake. Drove to Mine site. Walk site with Drillers to see where Drills can get to. SES Drilling brought 2 drills a Access II (4WD Bollon Tire) and a CME 55) ~~[illegible]~~ we decided to do the Access II on the side of the Dumps first and then use the CME 55 on the top of the Dump and the lower area (South of the Pond).
The Access II had a little trouble getting up to the drill site but ~~[illegible]~~ did get it. Drilled 4' befor Auger refusal. moved 10 ft away and drilled 3 ft befor Auger refusal. In Both holes could see large rocks and often pieces of old drill steel and metal pieces. Quit for the day @ 6:30 Return to Portola. Collected 4 sludge & 1 QA/QC sludge Samples from Pond

P.S. Drill can only get a little way down old road down through Dump in Front of Mill Foundations.



☐ SEE ATTACHED FIGURE

RECEIVED AND ACKNOWLEDGED BY: _____

REPRESENTING: _____

SIGNED: John O. Heggeness

DATE: 6/8/92

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DAILY FIELD REPORT

FOR

Tue — DAY OF WEEK
6 / 9 / 92 — MONTH DATE YEAR

REPORT NO. _____ PAGE 1 OF _____

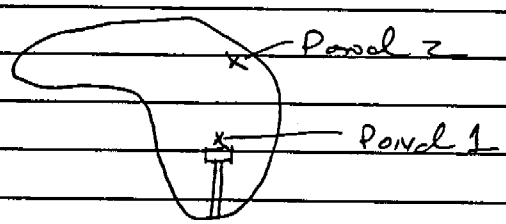
PROJECT NAME: Walker Mine	PROJECT NO.: 19902-2
LOCATION: Walker Mine	CLIENT: C.V. Regional Board
CONTRACTOR: SES Drilling	CLIENT CONTACT: Bill Croyle
TECHNICIAN:	ENGINEER: J. Heggeness
HOURS: 8:00 - 6:30	TESTS / RETESTS
WEATHER:	TEMPERATURE:

THE FOLLOWING WAS NOTED:

Move Access II to next site after 2 holes w/ refusal at 4 & 3 Ft. Took Sample at 2.5 Ft on New hole and had just entered soil (granitic) went to 15' on Hole WM-1 Moved to Hole 2 & Drilled to 20 Ft through wood chips into granitic soil. Moved to 3rd hole WM-3 Drilled through Wood chips into competant granodiorite (weakly weathered).

Moved off Waste piles w/ Access II & Steam clean Augers and set up CME 55 on WM-4

Collected 2 preserved Pond liquid Filtered Samples From Pond (Pond 1 & Pond 2)



☐ SEE ATTACHED FIGURE

RECEIVED AND ACKNOWLEDGED BY:

REPRESENTING:

SIGNED: John R. Heggeness

DATE: 6/9/92

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DAILY FIELD REPORT

FOR

Wed. 6 / 10 / 92
DAY OF WEEK MONTH DATE YEAR

REPORT NO. PAGE 1 OF

PROJECT NAME: Walker Mine	PROJECT NO.: 19902-2
LOCATION: Walker Mine	CLIENT: C.V. Regional Board
CONTRACTOR: SES. Drilling	CLIENT CONTACT: Bill Croyle
TECHNICIAN:	ENGINEER: J. Heggeness
HOURS: 7:30 → 18:00	TESTS: / RETESTS:
WEATHER:	TEMPERATURE:

THE FOLLOWING WAS NOTED:

Started drilling on road that cuts down the waste piles in front of the Mill. Drilled holes 4 to ~~20 Ft~~ ~~at hard refusal~~ 15 Ft had no sample since 5 Ft. ~~Ft~~ collected 2 and 3/4 tubes ~~at~~ on hole. Moved 15 Ft up road & Drilled hole 4A to 20 Ft had refusal. Collected 3/4 & 1/2 Tubes over 20 Ft. both holes had problems caving around the hole collar. Hole 4A had a 6 Ft diameter by 3 Ft hole around the collar. Driller lost 10 Ft of Auger & bit in hole while pulling out.
Moved up ~~Road~~ to where the road reaches the top of the Dump. Drilled to 35 Ft. in granitic waste. Soil at 30 Ft. collected 10 Full tubes 1 tube 3/4 Full, ~~and~~ 2 tubes 1/2 Full and 1 tube 1/4 Full. Steam cleaned. Moved to MW-6 in front of Portal drilled to 27.5 Ft Oxide waste and wood near the contact with the soil.
Steam Cleaned
Drilled ~~Ft~~ WM-7 to 20 Ft. quit for the Day

☐ SEE ATTACHED FIGURE

RECEIVED AND ACKNOWLEDGED BY:

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DATE:

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DAILY FIELD REPORT
FOR

Thur. 6 / 11 / 92
DAY OF WEEK MONTH DATE YEAR

REPORT NO. _____ PAGE 1 OF ____

PROJECT NAME: Walker Mine	PROJECT NO.: 14902-2
LOCATION: Walker Mine	CLIENT:
CONTRACTOR: SES Drilling	CLIENT CONTACT: Regional Board
TECHNICIAN:	ENGINEER: J. Heggeness
HOURS: 7:00 to 8:30	TESTS / RETESTS
WEATHER:	TEMPERATURE:

THE FOLLOWING WAS NOTED:

Finish ~~at~~ WM-7 to 37.5 Ft Move to ~~WM-~~ WM-8 after steam cleaning. Drill to 11 Ft befar Auger Refusal. Move 10' East Drill 8A to 10 Ft befar sampling Drill to 15 Ft. Steam Clean Drill WM-9 to 37.5. Steam clean Drill WM-10 & 11 to 25 Ft each.

talk to Rick Joy (Joy Engineering) set up trackhoe for Saturday.

☐ SEE ATTACHED FIGURE

RECEIVED AND ACKNOWLEDGED BY:

REPRESENTING:

SIGNED: John Heggeness

DATE: 6/11/92

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DAILY FIELD REPORT

FOR

Fri — DAY OF WEEK
6 / 12 / 92 — MONTH / DATE / YEAR

REPORT NO. _____ PAGE 1 OF _____

PROJECT NAME: Walker Mine	PROJECT NO.: 14902-2
LOCATION: Walker Mine	CLIENT: Regional Board
CONTRACTOR: SES Drilling	CLIENT CONTACT: Bill Croyle
TECHNICIAN:	ENGINEER: J. Heggeness
HOURS: 7:00 - 8:00	TESTS / RETESTS
WEATHER:	TEMPERATURE:

THE FOLLOWING WAS NOTED:

steam Clean Drill Hole 12 & 13 to 27.5 and 20'. Steam clean Drill 14 to 20' ~~and~~ 15 to 22.5 Ft and 16 to 20 Ft. Steam Clean. Drill 17 to 25 Ft and 18 to 25 Ft.

Quit For Day

Drive to Reno - Drop of Coolers at my house push tank out of truck.

☐ SEE ATTACHED FIGURE

RECEIVED AND ACKNOWLEDGED BY: _____

REPRESENTING: _____

SIGNED: John O. Heggeness

DATE: 6/12/92

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DAILY FIELD REPORT

FOR

Sat. 6 / 13 / 92
DAY OF WEEK MONTH DATE YEAR

REPORT NO. _____ PAGE 1 OF _____

PROJECT NAME: Walker Mine	PROJECT NO.: 14902-2
LOCATION: Walker Mine	CLIENT: Regional Board
CONTRACTOR: Joy Engineering	CLIENT CONTACT: Bill Crayle
TECHNICIAN:	ENGINEER: J Heggeness
HOURS: 6:00 - 5:00	TESTS / RETESTS
WEATHER:	TEMPERATURE:

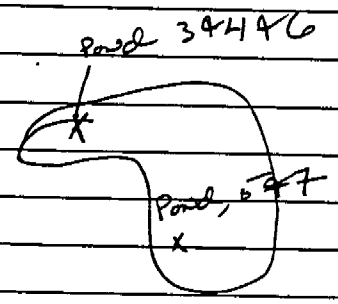
THE FOLLOWING WAS NOTED:

Drive Reno → Mine Pick up Dean Sampson (Driller SES) on way. Trench TP-1, in PW TP-2 in granitic waste near pond TP-3 - in spring, TP 4 in oxide waste, TP5 - in wood chips & hornfels, TP 6 in Hornfels & granitic waste.

collect H_2O Samples 3-7
" Sludge " 1-5 (For Pintail)

Mark Holes Pick up Coolers / trash.

Mine → Reno



☐ SEE ATTACHED FIGURE

RECEIVED AND ACKNOWLEDGED BY:

REPRESENTING:

SIGNED: John P. Heggeness

DATE: 6/13/92

APPENDIX B

APPENDIX B

C K Y incorporated
Analytical Laboratories

RECEIVED
AUG 17 1992
WESTEC™

Date: 08/13/92
920692

Welsh Engineering Science & Technology Inc.
5250 Neil Road, Suite 300
Reno, Nevada 89502

Attn: Mr. John Heggeness

Subject: Laboratory Report
Project: Walker Mine

Enclosed is the partial laboratory report for samples received on 06/14/92. The samples were received in coolers with ice and intact; the chain-of-custody forms were properly filled out. The data reported includes:

Method	No. of Analysis
EPA 3050/6010/7000 (TTLC CAM Metals)	19 Soils/1 Water
EPA 9045 (pH)	139 Soils/1 Water
Wet Method/STLC Metals	120 Soils

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely,

Wasfi Attala, Ph.D.
Laboratory Director

630 Maple Ave., Torrance, Calif. 90503 • Telephone 310-618-8889 • Fax: 310-618-0818

EPA 3050/6010/7000
TTLC CAM METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/14/92
PROJECT:	Walker Mine	**DATE EXTRACTED:**	06/23/92
CONTROL NO:	920692	**DATE ANALYZED:**	06/24/92
MATRIX:	Soil		

SAMPLE ID:	Blank	WM-1-2.5	WM-2-5	
CONTROL NO.:		-115	-116	
PARAMETERS				**DETECTION LIMIT (mg/kg)**
Antimony	ND	8.2	ND	5.0
Arsenic	ND	34	11	5.0
Barium	ND	210	5.2	0.50
Beryllium	ND	ND	ND	0.50
Cadmium	0.54	6.2	0.78	0.50
Chromium - Total	ND	16	1.6	0.50
Cobalt	ND	10	1.8	0.50
Copper	0.79	650	1500	0.50
Iron	ND	21000	410	2.5
Lead	ND	ND	ND	1.0
Mercury	ND	ND	0.07	0.05
Molybdenum	0.60	ND	0.90	0.50
Nickel	ND	7.2	ND	1.0
Selenium	ND	ND	ND	5.0
Silver	ND	ND	ND	0.50
Thallium	ND	24	ND	10
Vanadium	ND	35	3.1	0.50
Zinc	1.7	78	16	0.50

EPA 3050/6010/7000
TTLC CAM METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/14/92
PROJECT:	Walker Mine	**DATE EXTRACTED:**	06/23/92
CONTROL NO:	920692	**DATE ANALYZED:**	06/24/92
MATRIX:	Soil		

SAMPLE ID:	WM-3-10	WM-4-5	WM-5-10	WM-6-5	
CONTROL NO.:	-117	-118	-119	-120	
PARAMETERS		**RESULTS (mg/kg)**	**RESULTS (mg/kg)**		**DETECTION LIMIT (mg/kg)**
Antimony	ND	15	9.8	6.7	5.0
Arsenic	11	29	45	31	5.0
Barium	3.7	2400	1300	1100	0.50
Beryllium	ND	0.50	ND	ND	0.50
Cadmium	1.4	16	15	13	0.50
Chromium - Total	ND	8.5	6.0	21	0.50
Cobalt	3.0	12	15	18	0.50
Copper	1700	2300	2300	3900	0.50
Iron	2400	58000	58000	47000	2.5
Lead	ND	36	8.0	14	1.0
Mercury	ND	0.97	0.72	0.59	0.05
Molybdenum	0.60	2.1	1.6	0.80	0.50
Nickel	ND	3.8	3.2	7.5	1.0
Selenium	ND	15	15	19	5.0
Silver	8.3	8.9	1.0	8.9	0.50
Thallium	ND	ND	ND	14	10
Vanadium	1.1	50	42	40	0.50
Zinc	13	100	130	150	0.50

EPA 3050/6010/7000
TTLC CAM METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/14/92
PROJECT:	Walker Mine	**DATE EXTRACTED:**	06/23/92
CONTROL NO:	920692	**DATE ANALYZED:**	06/24/92
MATRIX:	Soil		

SAMPLE ID:	WM-7-20	WM-8-5	WM-9-5	WM-10-2.5	
CONTROL NO.:	-121	-122	-123	-124	
PARAMETERS	**RESULTS (mg/kg)**				**DETECTION LIMIT (mg/kg)**
Antimony	12	6.2	150	6.1	5.0
Arsenic	44	30	47	32	5.0
Barium	610	880	1100	700	0.50
Beryllium	0.54	0.85	ND	0.72	0.50
Cadmium	13	12	12	7.3	0.50
Chromium - Total	7.8	7.3	4.9	19	0.50
Cobalt	14	13	8.3	10	0.50
Copper	1700	1300	1900	2100	0.50
Iron	48000	48000	51000	32000	2.5
Lead	14	21	430	24	1.0
Mercury	1.2	0.85	1.7	0.31	0.05
Molybdenum	0.80	2.4	1.5	2.3	0.50
Nickel	6.6	2.9	2.1	6.4	1.0
Selenium	14	7.9	18	9.1	5.0
Silver	ND	3.2	31	0.58	0.50
Thallium	10	ND	ND	20	10
Vanadium	47	47	22	40	0.50
Zinc	98	110	110	160	0.50

EPA 3050/6010/7000
TTLC CAM METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/14/92
PROJECT:	Walker Mine	**DATE EXTRACTED:**	06/23/92
CONTROL NO:	920692	**DATE ANALYZED:**	06/25/92
MATRIX:	Soil		

SAMPLE ID:	WM-11-7.5	WM-12-5	WM-13-2.5	WM-14-20	
CONTROL NO.:	-125	-126	-127	-128	
PARAMETERS	**RESULTS (mg/kg)**				**DETECTION LIMIT (mg/kg)**
Antimony	7.8	5.4	ND	6.4	5.0
Arsenic	18	33	20	31	5.0
Barium	1900	210	110	260	0.50
Beryllium	0.59	0.66	ND	0.85	0.50
Cadmium	11	4.3	2.9	8.3	0.50
Chromium - Total	4.4	37	9.8	39	0.50
Cobalt	6.2	8.1	56	18	0.50
Copper	390	590	220	5.6	0.50
Iron	48000	17000	8600	33000	2.5
Lead	11	18	ND	ND	1.0
Mercury	0.31	0.09	0.05	ND	0.05
Molybdenum	8.8	0.80	0.90	ND	0.50
Nickel	ND	7.0	3.9	12	1.0
Selenium	13	ND	ND	ND	5.0
Silver	11	ND	ND	ND	0.50
Thallium	ND	25	16	72	10
Vanadium	32	35	16	47	0.50
Zinc	23	56	41	49	0.50

EPA 3050/6010/7000
TTLC CAM METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/14/92
PROJECT:	Walker Mine	**DATE EXTRACTED:**	06/23/92
CONTROL NO:	920692	**DATE ANALYZED:**	06/24/92
MATRIX:	Soil		

SAMPLE ID:	WM-15-17.5	WM-16-2.5	WM-17-10	WM-18-5	Sludge 4	
CONTROL NO.:	-129	-130	-131	-132	-133	
PARAMETERS	**RESULTS (mg/kg)**					**DETECTION LIMIT (mg/kg)**
Antimony	6.6	7.5	12	11	7.5	5.0
Arsenic	39	19	32	46	13	5.0
Barium	150	2900	1600	1200	90	0.50
Beryllium	0.94	0.83	0.96	ND	ND	0.50
Cadmium	4.8	14	17	11	5.9	0.50
Chromium - Total	27	3.2	3.0	3.4	2.4	0.50
Cobalt	7.6	17	38	53	1.5	0.50
Copper	26	2500	4800	5500	5600	0.50
Iron	22000	62000	71000	48000	27000	2.5
Lead	1.6	11	25	29	70	1.0
Mercury	0.06	0.54	0.46	1.4	0.28	0.05
Molybdenum	ND	4.6	16	3.8	1.1	0.50
Nickel	12	ND	1.7	1.6	ND	1.0
Selenium	ND	11	13	9.0	ND	5.0
Silver	ND	2.3	10	12	1.2	0.50
Thallium	16	ND	ND	ND	ND	10
Vanadium	56	55	63	22	3.3	0.50
Zinc	24	54	180	150	48	0.50

EPA 3005/6010/7000
TTLC CAM METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**DATE EXTRACTED:**	06/23/92
SAMPLE ID:	Pond 2	**DATE ANALYZED:**	06/25/92
CONTROL NO:	920692-134	**MATRIX TYPE:**	Water

PARAMETERS	RESULTS (mg/L)	DETECTION LIMIT (mg/L)
Antimony	ND	0.10
Arsenic	ND	0.20
Barium	0.06	0.05
Beryllium	ND	0.01
Cadmium	ND	0.01
Chromium - Total	ND	0.01
Cobalt	0.02	0.02
Copper	0.16	0.01
Iron	ND	0.05
Lead	ND	0.10
Mercury	ND	0.0002
Molybdenum	ND	0.01
Nickel	ND	0.05
Selenium	ND	0.20
Silver	ND	0.01
Thallium	ND	0.20
Vanadium	ND	0.02
Zinc	0.22	0.01

EPA 3005/6010/7000
TTLC CAM METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**DATE EXTRACTED:**	06/23/92
SAMPLE ID:	Method Blank	**DATE ANALYZED:**	06/25/92
CONTROL NO:	920692	**MATRIX TYPE:**	Water

PARAMETERS	**RESULTS (mg/L)**	**DETECTION LIMIT (mg/L)**
Antimony	ND	0.10
Arsenic	ND	0.20
Barium	ND	0.05
Beryllium	ND	0.01
Cadmium	ND	0.01
Chromium - Total	ND	0.01
Cobalt	0.03	0.02
Copper	0.01	0.01
Lead	ND	0.10
Mercury	ND	0.0002
Molybdenum	ND	0.01
Nickel	ND	0.05
Selenium	ND	0.20
Silver	ND	0.01
Thallium	ND	0.20
Vanadium	ND	0.02
Zinc	0.07	0.01

EPA 9045
pH

CLIENT:	WESTEC	DATE REC'D:	06/18/92
PROJECT:	Walker Mine	DATE EXTRACTED:	06/23/92
CONTROL NO:	920692	DATE ANALYZED:	06/26/92
MATRIX:	Soil		

SAMPLE ID:	CONTROL NO:	RESULTS (pH Units)	DETECTION LIMIT (pH Units)
WM-1-2.5	920692-1	4.4	0.1
WM-1-5	920692-2	5.7	0.1
WM-1-10	920692-3	6.8	0.1
WM-2-2.5	920692-4	5.3	0.1
WM-2-5	920692-5	5.5	0.1
WM-2-10	920692-6	5.3	0.1
WM-2-15	920692-7	7.4	0.1
WM-3-2.5	920692-8	5.9	0.1
WM-3-5	920692-9	5.6	0.1
WM-3-15	920692-10	5.8	0.1
WM-3-20	920692-11	7.0	0.1
WM-4-2.5	920692-12	4.3	0.1
WM-4A-15	920692-13	4.9	0.1
WM-5-2.5	920692-14	3.1	0.1
WM-5-5	920692-15	3.0	0.1
WM-5-15	920692-16	4.6	0.1
WM-5-20	920692-17	5.0	0.1
WM-5-25	920692-18	6.1	0.1
WM-5-30	920692-19	4.9	0.1
WM-5-35	920692-20	6.4	0.1
WM-6-2.5	920692-21	4.3	0.1
WM-6-10	920692-22	5.8	0.1
WM-6-17.5	920692-23	6.5	0.1
WM-6-20	920692-24	6.4	0.1
WM-6-22.5	920692-25	5.7	0.1
WM-6-25	920692-26	6.2	0.1
WM-6-27.5	920692-27	6.9	0.1
WM-7-2.5	920692-28	7.9	0.1
WM-7-5	920692-29	7.7	0.1
WM-7-10	920692-30	7.8	0.1
WM-7-12.5	920692-31	7.6	0.1
WM-7-17.5	920692-32	7.9	0.1
WM-7-22.5	920692-33	7.9	0.1
WM-7-27.5	920692-34	8.0	0.1
WM-7-32.5	920692-35	8.0	0.1
WM-7-35	920692-36	6.3	0.1

EPA 9045
pH

CLIENT:	WESTEC	DATE REC'D:	06/18/92
PROJECT:	Walker Mine	DATE EXTRACTED:	06/23/92
CONTROL NO:	920692	DATE ANALYZED:	06/26/92
MATRIX:	Soil		

SAMPLE ID:	CONTROL NO:	RESULTS (pH Units)	DETECTION LIMIT (pH Units)
WM-7.5	920692-37	6.2	0.1
WM-8-7.5	920692-38	5.4	0.1
WM-8A-10	920692-39	6.0	0.1
WM-8A-12.5	920692-40	6.9	0.1
WM-8A-15	920692-41	7.2	0.1
WM-9-7.5	920692-42	8.2	0.1
WM-9-17.5	920692-43	7.7	0.1
WM-9-25	920692-44	6.8	0.1
WM-9-27.5	920692-45	6.7	0.1
WM-9-30	920692-46	4.5	0.1
WM-9-37.5	920692-47	6.4	0.1
WM-10-2.5	920692-48	4.2	0.1
WM-10-5	920692-49	4.3	0.1
WM-10-10	920692-50	5.5	0.1
WM-10-15	920692-51	6.8	0.1
WM-10-20	920692-52	7.8	0.1
WM-10-25	920692-53	7.6	0.1
WM-11-5	920692-54	5.2	0.1
WM-11-7.5	920692-55	4.3	0.1
WM-11-10	920692-56	5.3	0.1
WM-11-15	920692-57	6.1	0.1
WM-11-20	920692-58	6.0	0.1
WM-12-2.5	920692-59	6.3	0.1
WM-12-10	920692-60	6.9	0.1
WM-12-15	920692-61	5.1	0.1
WM-12-25	920692-62	7.0	0.1
WM-12-27.5	920692-63	7.1	0.1
WM-13-2.5	920692-64	4.6	0.1
WM-13-5	920692-65	5.5	0.1
WM-13-10	920692-66	6.7	0.1
WM-13-15	920692-67	6.7	0.1
WM-13-20	920692-68	7.1	0.1
WM-14-2.5	920692-69	4.7	0.1
WM-14-5	920692-70	5.5	0.1
WM-14-10	920692-71	5.8	0.1

EPA 9045
pH

CLIENT:	WESTEC	DATE REC'D:	06/18/92
PROJECT:	Walker Mine	DATE EXTRACTED:	06/23/92
CONTROL NO:	920692	DATE ANALYZED:	06/26/92
MATRIX:	Soil		

SAMPLE ID:	CONTROL NO:	RESULTS (pH Units)	DETECTION LIMIT (pH Units)
WM-14-15	920692-72	6.8	0.1
WM-14-20	920692-73	6.1	0.1
WM-15-2.5	920692-74	6.3	0.1
WM15-5	920692-75	5.8	0.1
WM-15-10	920692-76	6.8	0.1
WM-15-20	920692-77	7.1	0.1
WM-17-2.5	920692-83	4.8	0.1
WM-17-5	920692-84	5.5	0.1
WM-17-10	920692-85	5.7	0.1
WM-17-15	920692-86	4.5	0.1
WM-17-20	920692-87	5.6	0.1
WM-17-22.5	920692-88	6.0	0.1
WM-17-25	920692-89	5.7	0.1
WM-18-2.5	920692-90	5.4	0.1
WM-18-5	920692-91	5.4	0.1
WM-18-10	920692-92	6.1	0.1
WM-18-15	920692-93	6.3	0.1
WM-18-20	920692-94	5.3	0.1
WM-18-25	920692-95	6.2	0.1
Pond #1	920692-96	6.8	0.1
Pond # 3	920692-97	7.2	0.1
Pond #4	920692-98	7.2	0.1
Pond #5	920692-99	7.3	0.1
Pond #6	920692-100	7.3	0.1
Pond #7	920692-101	7.5	0.1
WM-3-QA/QC	920692-102	7.2	0.1
WM-5-QA/QC	920692-103	7.7	0.1
WM-17-QA/QC	920692-104	7.6	0.1
TP-1-1	920692-105	4.2	0.1
TP-2-1	920692-106	2.8	0.1
TP-2-2	920692-107	2.5	0.1
TP-2-3	920692-108	4.9	0.1
TP-3-1	920692-109	4.4	0.1
TP-3-2	920692-110	6.0	0.1
TP-3-3	920692-111	6.3	0.1
TP-3-4	920692-112	6.1	0.1

EPA 9045
pH

CLIENT:	WESTEC	DATE REC'D:	06/18/92
PROJECT:	Walker Mine	DATE EXTRACTED:	06/23/92
CONTROL NO:	920692	DATE ANALYZED:	06/26/92
MATRIX:	Soil		

SAMPLE ID:	CONTROL NO:	RESULTS (pH Units)	DETECTION LIMIT (pH Units)
TP-3-5	920692-113	6.4	0.1
TP-3-6	920692-114	6.1	0.1
WM-1-2.5	920692-115	4.1	0.1
WM-2-5	920692-116	4.1	0.1
WM-3-10	920692-117	5.3	0.1
WM-4-5	920692-118	4.1	0.1
WM-5-10	920692-119	4.6	0.1
WM-6-5	920692-120	5.9	0.1
WM-7-20	920692-121	7.7	0.1
WM-8-5	920692-122	5.9	0.1
WM-9-5	920692-123	12	0.1
WM-10-2.5	920692-124	4.0	0.1
WM-11-7.5	920692-125	3.9	0.1
WM-12-5	920692-126	6.2	0.1
WM-13-2.5	920692-127	3.5	0.1
WM-14-20	920692-128	6.3	0.1
WM-15-17.5	920692-129	6.3	0.1
WM-16-2.5	920692-130	5.5	0.1
WM-17-10	920692-131	5.3	0.1
WM-18-5	920692-132	5.0	0.1
Sludge 4	920692-133	7.0	0.1
Pond 2	920692-134*	6.3	0.1
TP-4-1	920692-135	3.9	0.1
TP-4-2	920692-136	4.1	0.1
TP-6-1	920692-137	5.9	0.1
TP-6-2	920692-138	4.4	0.1
TP-6-3	920692-139	4.6	0.1
TP-6-4	920692-140	5.5	0.1
WM-11-25	920692-141	6.9	0.1
Sludge 1	920692-142	6.4	0.1
Sludge 2	920692-143	6.4	0.1
Sludge 3	920692-144	6.6	0.1
Sludge 5	920692-145	6.4	0.1

* Water sample

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	07/31/92

SAMPLE ID:	Blank	WM-1-2.5	WM-1-5	WM-1-10	
CONTROL NO:		-1	-2	-3	
PARAMETERS		RESULTS (mg/L)			DETECTION LIMIT (mg/L)
Cadmium	ND	0.03	0.02	0.01	0.01
Copper	0.03	60	25	0.27	0.01
Iron	0.17	60	26	9.9	0.05
Zinc	0.06	0.93	0.89	0.38	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	07/31/92

SAMPLE ID:	WM-2-2.5	WM-2-5	WM-2-10	WM-2-15	
CONTROL NO:	-4	-5	-6	-7	
PARAMETERS	RESULTS (mg/L)				DETECTION LIMIT (mg/L)
Cadmium	0.02	0.02	0.03	ND	0.01
Copper	110	89	0.19	0.07	0.01
Iron	21	2.9	85	17	0.05
Zinc	10	5.5	6.5	0.15	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	07/31/92

SAMPLE ID:	WM-3-2.5	WM-3-5	WM-3-15	WM-3-20	
CONTROL NO:	-8	-9	-10	-11	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	0.03	0.03	0.05	0.02	0.01
Copper	92	97	1.3	4.4	0.01
Iron	12	82	170	62	0.05
Zinc	6.8	6.4	3.7	12	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	07/31/92

SAMPLE ID:	WM-4-2.5	WM-4A-15	WM-5-2.5	WM-5-5	
CONTROL NO:	-12	-13	-14	-15	
PARAMETERS	RESULTS (mg/L)				DETECTION LIMIT (mg/L)
Cadmium	0.03	0.03	0.04	0.07	0.01
Copper	11	35	15	12	0.01
Iron	69	87	140	270	0.05
Zinc	2.0	3.3	6.6	3.7	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	07/31/92

SAMPLE ID:	WM-5-15	WM-5-20	WM-5-25	WM-5-30	
CONTROL NO:	-16	-17	-18	-19	
PARAMETERS	RESULTS (mg/L)				DETECTION LIMIT (mg/L)
Cadmium	0.03	0.03	0.01	0.02	0.01
Copper	24	38	6.3	37	0.01
Iron	84	130	8.1	39	0.05
Zinc	3.4	2.8	0.76	0.98	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	07/31/92

SAMPLE ID:	WM-5-35	WM-6-2.5	WM-6-10	WM-6-17.5	
CONTROL NO:	-20	-21	-22	-23	
PARAMETERS	RESULTS (mg/L)				DETECTION LIMIT (mg/L)
Cadmium	0.01	0.03	0.03	0.03	0.01
Copper	0.09	20	22	22	0.01
Iron	5.2	100	110	91	0.05
Zinc	0.15	2.8	3.0	1.5	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	07/31/92

SAMPLE ID:	WM-6-20	WM-6-22.5	WM-6-25	WM-6-27.5	
CONTROL NO:	-24	-25	-26	-27	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	0.38	0.04	0.04	0.01	0.01
Copper	280	65	24	0.26	0.01
Iron	1500	78	82	15	0.05
Zinc	4.4	5.0	3.3	1.6	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	07/31/92

SAMPLE ID:	WM-7-2.5	WM-7-5	WM-7-10	WM-7-12.5	
CONTROL NO:	-28	-29	-30	-31	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	0.02	0.03	0.03	0.04	0.01
Copper	12	13	21	11	0.01
Iron	27	78	62	140	0.05
Zinc	1.5	1.8	1.5	1.9	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	07/31/92

SAMPLE ID:	WM7-17.5	WM7-22.5	WM7-27.5	WM7-32.5	
CONTROL NO:	-32	-33	-34	-35	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	0.03	0.03	0.04	0.10	0.01
Copper	14	12	28	5.5	0.01
Iron	96	91	62	490	0.05
Zinc	1.5	1.2	1.3	2.6	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/03/92

SAMPLE ID:	WM-7-35	WM-7-37.5	WM-8-7.5	WM-8A-10	
CONTROL NO:	-36	-37	-38	-39	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	0.01	0.03	0.03	0.11	0.01
Copper	1.1	15	17	12	0.01
Iron	25	77	82	570	0.05
Zinc	3.4	1.7	2.0	2.1	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/03/92

SAMPLE ID:	WM-8A-12.5	WM-8A-15	WM-9-7.5	WM-19-17.5	
CONTROL NO:	-40	-41	-42	-43	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	0.02	ND	0.03	0.03	0.01
Copper	0.38	0.19	100	54	0.01
Iron	36	9.7	30	54	0.05
Zinc	1.3	0.71	2.6	2.1	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/03/92

SAMPLE ID:	WM9-25	WM9-27.5	WM9-30	WM9-37.5	
CONTROL NO:	-44	-45	-46	-47	
PARAMETERS	RESULTS (mg/L)				DETECTION LIMIT (mg/L)
Cadmium	0.05	0.05	ND	ND	0.01
Copper	22	15	4.1	0.53	0.01
Iron	180	160	27	40	0.05
Zinc	3.4	3.7	0.90	0.46	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/03/92

SAMPLE ID:	WM10-2.5	WM10-5	WM10-10	WM10-15	
CONTROL NO:	-48	-49	-50	-51	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	0.04	0.03	0.02	0.10	0.01
Copper	59	24	110	0.05	0.01
Iron	110	66	30	450	0.05
Zinc	3.8	2.8	2.4	0.23	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/03/92

SAMPLE ID:	WM10-20	WM10-25	WM-11-5	WM-11-7.5	
CONTROL NO:	-52	-53	-54	-55	
PARAMETERS	RESULTS (mg/L)				DETECTION LIMIT (mg/L)
Cadmium	ND	ND	0.06	0.01	0.01
Copper	0.07	0.30	130	12	0.01
Iron	11	9.5	88	47	0.05
Zinc	0.07	0.92	5.7	2.3	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/03/92

SAMPLE ID:	WM-11-10	WM-11-15	WM-11-20	WM-12-2.5	
CONTROL NO:	-56	-57	-58	-59	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	ND	0.02	ND	0.02	0.01
Copper	30	54	62	14	0.01
Iron	7.2	23	22	73	0.05
Zinc	3.7	1.6	1.6	1.6	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/03/92

SAMPLE ID:	WM-12-10	WM-12-15	WM-12-25	WM-12-27.5	
CONTROL NO:	-60	-61	-62	- 63	
PARAMETERS	RESULTS (mg/L)				DETECTION LIMIT (mg/L)
Cadmium	0.06	0.07	ND	ND	0.01
Copper	21	0.57	0.49	0.05	0.01
Iron	170	360	8.6	4.2	0.05
Zinc	3.9	1.2	0.72	0.27	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/03/92

SAMPLE ID:	WM-13-2.5	WM-13-5	WM-13-10	WM-13-15	
CONTROL NO:	-64	-65	-66	-67	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	0.13	0.03	0.1	0.08	0.01
Copper	21	5.3	0.14	0.04	0.01
Iron	37	23	530	440	0.05
Zinc	12	2.5	0.90	1.4	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	08/05/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/16/92

SAMPLE ID:	WM-13-20	WM-14-2.5	WM-14-5	WM-14-10	
CONTROL NO:	-68	-69	-70	-71	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	0.01	0.01	ND	ND	0.01
Copper	0.61	34	40	45	0.01
Iron	30	8.9	6.8	14	0.05
Zinc	0.85	1.1	3.5	2.0	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	08/05/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/16/92

SAMPLE ID:	Blank	WM-14-15	
CONTROL NO:		-72	

PARAMETERS	**RESULTS (mg/L)**		**DETECTION LIMIT (mg/L)**
Cadmium	ND	0.02	0.01
Copper	0.02	21	0.01
Iron	0.12	63	0.05
Zinc	0.03	2.5	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/04/92

SAMPLE ID:	Blank	WM-14-20	WM-15-2.5	WM-15-5	
CONTROL NO:		-73	-74	-75	
PARAMETERS		**RESULTS (mg/L)**			**DETECTION LIMIT (mg/L)**
Cadmium	ND	0.03	0.02	0.09	0.01
Copper	0.05	0.08	35	0.04	0.01
Iron	0.15	92	29	420	0.05
Zinc	0.05	0.07	4.0	2.9	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/04/92

SAMPLE ID:	WM-15-10	WM-15-20	
CONTROL NO:	-76	-77	
PARAMETERS		**RESULTS (mg/L)**	**DETECTION LIMIT (mg/L)**
Cadmium	0.09	0.04	0.01
Copper	0.03	0.37	0.01
Iron	470	150	0.05
Zinc	1.3	0.20	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/04/92

SAMPLE ID:	WM-17-2.5	WM-17-5	WM-17-10	WM-17-15	
CONTROL NO:	-83	-84	-85	-86	
PARAMETERS	RESULTS (mg/L)				DETECTION LIMIT (mg/L)
Cadmium	0.02	0.15	0.05	0.03	0.01
Copper	37	0.11	0.08	0.59	0.01
Iron	67	680	150	110	0.05
Zinc	8.9	14	4.5	0.56	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/04/92

SAMPLE ID:	WM-17-20	WM-17-22.5	WM-17-25	WM-18-2.5	
CONTROL NO:	-87	-88	-89	-90	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	0.01	0.01	ND	0.33	0.01
Copper	2.5	0.54	0.43	2.1	0.01
Iron	34	17	23	54	0.05
Zinc	4.5	1.6	0.05	5.2	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/04/92

SAMPLE ID:	WM-18-5	WM-18-10	WM-18-15	WM-18-20	
CONTROL NO:	-91	-92	-93	-94	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	0.16	0.15	0.03	0.34	0.01
Copper	0.03	0.04	4.5	0.05	0.01
Iron	850	710	99	1800	0.05
Zinc	3.1	0.91	0.63	0.57	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/04/92

SAMPLE ID:	WM-18-25	Pond #1	Pond #3	Pond #4	
CONTROL NO:	-95	-96	-97	-98	
PARAMETERS		**RESULTS (mg/L)**			**DETECTION LIMIT (mg/L)**
Cadmium	0.15	ND	ND	ND	0.01
Copper	0.05	0.22	0.34	0.35	0.01
Iron	860	0.36	0.19	0.16	0.05
Zinc	0.25	0.20	0.22	0.25	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/04/92

SAMPLE ID:	Pond #5	Pond #6	Pond #7	WM-3-QA/QC	
CONTROL NO:	-99	-100	-101	-102	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	ND	ND	ND	ND	0.01
Copper	0.36	0.27	0.30	0.06	0.01
Iron	0.15	0.14	0.11	0.80	0.05
Zinc	0.21	0.19	0.21	0.14	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	07/29/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/04/92

SAMPLE ID:	WM-5-QA/QC	WM-17-QA/QC	TP-1-1	TP-2-1	
CONTROL NO:	-103	-104	-105	-106	
PARAMETERS	RESULTS (mg/L)				DETECTION LIMIT (mg/L)
Cadmium	ND	ND	0.05	0.03	0.01
Copper	0.06	0.11	16	41	0.01
Iron	0.28	0.64	200	96	0.05
Zinc	0.13	0.18	0.21	2.8	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	08/03/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/05/92

SAMPLE ID:	Blank	TP-2-2	TP-2-3	TP-3-1	
CONTROL NO:		-107	-108	-109	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	ND	0.11	ND	0.05	0.01
Copper	0.02	77	5.4	91	0.01
Iron	0.12	490	8.7	170	0.05
Zinc	0.02	1.3	0.32	0.90	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	08/03/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/05/92

SAMPLE ID:	TP-3-2	TP-3-3	TP-3-4	TP-3-5	TP-3-6	
CONTROL NO:	-110	-111	-112	-113	-114	
PARAMETERS	**RESULTS (mg/L)**					**DETECTION LIMIT (mg/L)**
Cadmium	0.21	ND	0.01	0.01	0.07	0.01
Copper	690	0.30	1.0	2.0	150	0.01
Iron	700	10	31	29	120	0.05
Zinc	6.6	0.36	0.06	0.15	7.9	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	08/03/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/05/92

SAMPLE ID:	TP-4-1	TP-4-2	TP-6-1	TP-6-2	
CONTROL NO:	-135	-136	-137	-138	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	0.03	0.02	0.02	0.10	0.01
Copper	16	35	23	64	0.01
Iron	93	77	59	450	0.05
Zinc	0.27	0.38	0.25	0.90	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	08/03/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/05/92

SAMPLE ID:	TP-6-3	TP-6-4	WM-11-25	Sludge 1	
CONTROL NO:	-139	-140	-141	-142	
PARAMETERS	**RESULTS (mg/L)**				**DETECTION LIMIT (mg/L)**
Cadmium	0.11	0.05	0.01	0.01	0.01
Copper	130	95	0.87	53	0.01
Iron	450	140	56	33	0.05
Zinc	1.1	1.5	0.44	0.84	0.01

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	08/03/92
MATRIX TYPE:	Extract	**DATE ANALYZED:**	08/05/92

SAMPLE ID:	Sludge 2	Sludge 3	Sludge 5
CONTROL NO:	-143	-144	-145

PARAMETERS	RESULTS (mg/L)			DETECTION LIMIT (mg/L)
Cadmium	0.02	0.03	0.09	0.01
Copper	41	87	2.3	0.01
Iron	30	87	450	0.05
Zinc	0.78	1.3	0.71	0.01

QUALITY CONTROL DATA

CLIENT: WESTEC
PROJECT: Walker Mine
CONTROL NO: 920692

METHOD EPA 3050/6010
MATRIX: Soil

SAMPLE ID: 920692-120

COMPOUND	SAMPLE RESULT (mg/kg)	DUP. SAMPLE RESULT (mg/kg)	RPD %
Iron	47000	46000	2

METHOD EPA 3050/6010
MATRIX: Soil

SAMPLE ID: 920692-125

COMPOUND	SAMPLE RESULT (mg/kg)	DUP. SAMPLE RESULT (mg/kg)	RPD %
Iron	48000	57000	17

METHOD EPA 3050/6010
MATRIX: Soil

SAMPLE ID: 920692-133

COMPOUND	SAMPLE RESULT (mg/kg)	DUP. SAMPLE RESULT (mg/kg)	RPD %
Iron	27000	26000	4

QUALITY CONTROL DATA

CLIENT: WESTEC
PROJECT: Walker Mine
CONTROL NO: 920692

METHOD EPA 9045
MATRIX: Soil

SAMPLE ID: 920692-10

COMPOUND	SAMPLE RESULT (pH units)	DUP. SAMPLE RESULT (pH units)	RPD %
pH	5.8	5.9	2

METHOD EPA 9045
MATRIX: Soil

SAMPLE ID: 920692-20

COMPOUND	SAMPLE RESULT (pH units)	DUP. SAMPLE RESULT (pH units)	RPD %
pH	6.4	6.8	6

QUALITY CONTROL DATA

CLIENT: WESTEC
PROJECT: Walker Mine
CONTROL NO: 920692

METHOD EPA 9045
MATRIX: Soil

SAMPLE ID: 920692-30

COMPOUND	SAMPLE RESULT (pH units)	DUP. SAMPLE RESULT (pH units)	RPD %
pH	7.8	7.8	0

METHOD EPA 9045
MATRIX: Soil

SAMPLE ID: 920692-40

COMPOUND	SAMPLE RESULT (pH units)	DUP. SAMPLE RESULT (pH units)	RPD %
pH	6.9	6.9	0

QUALITY CONTROL DATA

CLIENT: WESTEC
PROJECT: Walker Mine
CONTROL NO: 920692

METHOD EPA 9045
MATRIX: Soil

SAMPLE ID: 920692-50

COMPOUND	SAMPLE RESULT (pH units)	DUP. SAMPLE RESULT (pH units)	RPD %
pH	5.5	5.5	0

METHOD EPA 9045
MATRIX: Soil

SAMPLE ID: 920692-60

COMPOUND	SAMPLE RESULT (pH units)	DUP. SAMPLE RESULT (pH units)	RPD %
pH	6.9	6.8	1

QUALITY CONTROL DATA

CLIENT: WESTEC
PROJECT: Walker Mine
CONTROL NO: 920692

METHOD EPA 9045
MATRIX: Soil

SAMPLE ID: 920692-70

COMPOUND	SAMPLE RESULT (pH units)	DUP. SAMPLE RESULT (pH units)	RPD %
pH	5.5	5.7	4

METHOD EPA 9045
MATRIX: Soil

SAMPLE ID: 920692-90

COMPOUND	SAMPLE RESULT (pH units)	DUP. SAMPLE RESULT (pH units)	RPD %
pH	5.4	5.2	4

QUALITY CONTROL DATA

CLIENT: WESTEC
PROJECT: Walker Mine
CONTROL NO: 920692

METHOD EPA 9045
MATRIX: Soil

SAMPLE ID: 920692-100

COMPOUND	SAMPLE RESULT (pH units)	DUP. SAMPLE RESULT (pH units)	RPD %
pH	7.3	7.3	0

METHOD EPA 9045
MATRIX: Soil

SAMPLE ID: 920692-110

COMPOUND	SAMPLE RESULT (pH units)	DUP. SAMPLE RESULT (pH units)	RPD %
pH	6.0	6.4	6

QUALITY CONTROL DATA

CLIENT: WESTEC
PROJECT: Walker Mine
CONTROL NO: 920692

METHOD EPA 9045
MATRIX: Soil

SAMPLE ID: 920692-120

COMPOUND	SAMPLE RESULT (pH units)	DUP. SAMPLE RESULT (pH units)	RPD %
pH	5.9	6.6	11

METHOD EPA 9045
MATRIX: Soil

SAMPLE ID: 920692-130

COMPOUND	SAMPLE RESULT (pH units)	DUP. SAMPLE RESULT (pH units)	RPD %
pH	5.5	5.4	2

QUALITY CONTROL DATA

CLIENT: WESTEC
PROJECT: Walker Mine
CONTROL NO: 920692

METHOD EPA WET 3010/6010/7000
MATRIX: Extract

SAMPLE ID: 920692-3

COMPOUND	SAMPLE RESULTS (mg/L)	AMOUNT SPIKED (mg/L)	% REC.	DUP. % REC.	RPD
Cadmium	0.01	1	N.A.	70	N.A.
Zinc	0.38	1	82	82	0

METHOD EPA WET 3010/6010
MATRIX: Water

SAMPLE ID: 920692-7

COMPOUND	SAMPLE RESULTS (mg/L)	AMOUNT SPIKED (mg/L)	% REC.	DUP. % REC.	RPD
Cadmium	0.01	1	72	N.A.	N.A.
Zinc	1.6	1	100	80	8

QUALITY CONTROL DATA

CLIENT: WESTEC
PROJECT: Walker Mine
CONTROL NO: 920692

METHOD EPA WET 3010/6010
MATRIX: Water

SAMPLE ID: 920692-91

COMPOUND	SAMPLE RESULTS (mg/L)	AMOUNT SPIKED (mg/L)	% REC.	DUP. % REC.	RPD
Cadmium	ND	1	74	N.A.	N.A.
Copper	0.19	1	76	76	0

METHOD EPA WET 3010/6010
MATRIX: Water

SAMPLE ID: 920692-53

COMPOUND	SAMPLE RESULTS (mg/L)	AMOUNT SPIKED (mg/L)	% REC.	DUP. % REC.	RPD
Zinc	0.92	1	78	N.A.	N.A.
Cadmium	ND	1	73	73	0
Iron	9.5	1	100	N.A.	N.A.
Copper	0.30	1	100	83	18

QUALITY CONTROL DATA

CLIENT: WESTEC
PROJECT: Walker Mine
CONTROL NO: 920692

METHOD EPA 3010/6010
MATRIX: Water

SAMPLE ID: 920692-100

COMPOUND	SAMPLE RESULTS (mg/L)	AMOUNT SPIKED (mg/L)	% REC.	DUP. % REC.	RPD
Cadmium	ND	1	87	87	0
Copper	0.27	1	93	93	0
Iron	0.14	1	86	80	6
Zinc	0.19	1	91	81	10

METHOD EPA 3010/6010
MATRIX: Water

SAMPLE ID: 920692-104

COMPOUND	SAMPLE RESULTS (mg/L)	AMOUNT SPIKED (mg/L)	% REC.	DUP. % REC.	RPD
Cadmium	ND	1	81	N.A.	N.A.
Copper	0.11	1	85	77	9
Zinc	0.18	1	82	N.A.	N.A.

QUALITY CONTROL DATA

CLIENT: WESTEC
PROJECT: Walker Mine
CONTROL NO: 920692

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METHOD EPA 3010/6010
MATRIX: Extract

SAMPLE ID: 920692-63

COMPOUND	SAMPLE RESULTS (mg/L)	AMOUNT SPIKED (mg/L)	% REC.	DUP. % REC.	RPD
Zinc	0.28	1	72	72	0
Cadmium	0.01	1	70	N.A.	N.A.
Copper	0.06	1	85	85	0

C K Y incorporated
Analytical Laboratories

Date: 08/25/92
920692

Welsh Engineering Science & Technology Inc.
5250 Neil Road, Suite 300
Reno, Nevada 89502

RECEIVED
AUG 31 1992
WESTEC

Attn: Mr. John Heggeness

Subject: Laboratory Report
Project: Walker Mine

Enclosed is the supplementary laboratory report for samples received on 06/14/92. The samples were received in coolers with ice and intact; the chain-of-custody forms were properly filled out. The data reported includes:

Method	No. of Analysis
EPA 300 (Sulfate)	139 Soils/1 Water
EPA WET 3010/6010	19 Soils/1 Water

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely,

Wasfi Attala, Ph.D.
Laboratory Director

630 Maple Ave., Torrance, Calif. 90503 • Telephone 310-618-8889 • Fax: 310-618-0818

EPA 300
SULFATE

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**DATE EXTRACTED:**	06/27/92 - 07/01/92
CONTROL NO:	920692	**DATE ANALYZED:**	08/07/92 - 08/14/92
MATRIX:	Extract		

SAMPLE ID:	CONTROL NO:	RESULTS (mg/kg)	DETECTION LIMIT (mg/kg)
WM-1-2.5	920692-1	63	10
WM-1-5	920692-2	11	10
WM-1-10	920692-3	ND	10
WM-2-2.5	920692-4	13	10
WM-2-5	920692-5	14	10
WM-2-10	920692-6	16	10
WM-2-15	920692-7	11	10
WM-3-2.5	920692-8	10	10
WM-3-5	920692-9	33	10
WM-3-15	920692-10	ND	10
WM-3-20	920692-11	17	10
WM-4-2.5	920692-12	73	10
WM-4A-15	920692-13	35	10
WM-5-2.5	920692-14	370	10
WM-5-5	920692-15	230	10
WM-5-15	920692-16	60	10
WM-5-20	920692-17	65	10
WM-5-25	920692-18	13	10
WM-5-30	920692-19	41	10
WM-5-35	920692-20	37	10
WM-6-2.5	920692-21	170	10
WM-6-10	920692-22	190	10
WM-6-17.5	920692-23	160	10
WM-6-20	920692-24	460	10
WM-6-22.5	920692-25	43	10
WM-6-25	920692-26	15	10
WM-6-27.5	920692-27	ND	10
WM-7-2.5	920692-28	11	10
WM-7-5	920692-29	22	10
WM-7-10	920692-30	19	10
WM-7-12.5	920692-31	46	10
WM-7-17.5	920692-32	39	10
WM-7-22.5	920692-33	50	10
WM-7-27.5	920692-34	18	10
WM-7-32.5	920692-35	32	10
WM-7-35	920692-36	22	10

EPA 300
SULFATE

CLIENT:	WESTEC	DATE REC'D:	06/18/92
PROJECT:	Walker Mine	DATE EXTRACTED:	06/27/92 - 07/01/92
CONTROL NO:	920692	DATE ANALYZED:	08/07/92 - 08/14/92
MATRIX:	Extract		

SAMPLE ID:	CONTROL NO:	RESULTS (mg/L)	DETECTION LIMIT (mg/L)
WM-7-37.5	920692-37	21	10
WM-8-7.5	920692-38	32	10
WM-8A-10	920692-39	33	10
WM-8A-12.5	920692-40	10	10
WM-8A-15	920692-41	ND	10
WM-9-7.5	920692-42	37	10
WM-9-17.5	920692-43	32	10
WM-9-25	920692-44	160	10
WM-9-27.5	920692-45	160	10
WM-9-30	920692-46	38	10
WM-9-37.5	920692-47	15	10
WM-10-2.5	920692-48	22	10
WM-10-5	920692-49	83	10
WM-10-10	920692-50	150	10
WM-10-15	920692-51	130	10
WM-10-20	920692-52	ND	10
WM-10-25	920692-53	ND	10
WM-11-5	920692-54	88	10
WM-11-7.5	920692-55	140	10
WM-11-10	920692-56	55	10
WM-11-15	920692-57	25	10
WM-11-20	920692-58	38	10
WM-12-2.5	920692-59	14	10
WM-12-10	920692-60	14	10
WM-12-15	920692-61	19	10
WM-12-25	920692-62	13	10
WM-12-27.5	920692-63	18	10
WM-13-2.5	920692-64	110	10
WM-13-5	920692-65	41	10
WM-13-10	920692-66	18	10
WM-13-15	920692-67	19	10
WM-13-20	920692-68	10	10
WM-14-2.5	920692-69	88	10
WM-14-5	920692-70	87	10
WM-14-10	920692-71	54	10

EPA 300
SULFATES

CLIENT:	WESTEC	DATE REC'D:	06/18/92
PROJECT:	Walker Mine	DATE EXTRACTED:	06/27/92 - 07/01/92
CONTROL NO:	920692	DATE ANALYZED:	08/07/92 - 08/14/92
MATRIX:	Extract		

SAMPLE ID:	CONTROL NO:	RESULTS (mg/L)	DETECTION LIMIT (mg/L)
WM-14-15	920692-72	49	10
WM-14-20	920692-73	ND	10
WM-15-2.5	920692-74	34	10
WM15-5	920692-75	45	10
WM-15-10	920692-76	31	10
WM-15-20	920692-77	ND	10
WM-17-2.5	920692-83	200	10
WM-17-5	920692-84	37	10
WM-17-10	920692-85	34	10
WM-17-15	920692-86	53	10
WM-17-20	920692-87	42	10
WM-17-22.5	920692-88	150	10
WM-17-25	920692-89	ND	10
WM-18-2.5	920692-90	55	10
WM-18-5	920692-91	62	10
WM-18-10	920692-92	42	10
WM-18-15	920692-93	29	10
WM-18-20	920692-94	24	10
WM-18-25	920692-95	14	10
Pond #1	920692-96	120	10
Pond # 3	920692-97	120	10
Pond #4	920692-98	110	10
Pond #5	920692-99	110	10
Pond #6	920692-100	94	10
Pond #7	920692-101	110	10
WM-3-QA/QC	920692-102	ND	10
WM-5-QA/QC	920692-103	ND	10
WM-17-QA/QC	920692-104	ND	10
TP-1-1	920692-105	140	10
TP-2-1	920692-106	250	10
TP-2-2	920692-107	850	10
TP-2-3	920692-108	14	10
TP-3-1	920692-109	150	10
TP-3-2	920692-110	22	10
TP-3-3	920692-111	29	10
TP-3-4	920692-112	ND	10

EPA 300
SULFATES

CLIENT:	WESTEC	DATE REC'D:	06/18/92
PROJECT:	Walker Mine	DATE EXTRACTED:	06/27/92 - 07/01/92
CONTROL NO:	920692	DATE ANALYZED:	08/07/92 - 08/14/92
MATRIX:	Extract		

SAMPLE ID:	CONTROL NO:	RESULTS (mg/L)	DETECTION LIMIT (mg/L)
TP-3-5	920692-113	14	10
TP-3-6	920692-114	46	10
WM-1-2.5	920692-115	53	10
WM-2-5	920692-116	12	10
WM-3-10	920692-117	60	10
WM-4-5	920692-118	91	10
WM-5-10	920692-119	96	10
WM-6-5	920692-120	97	10
WM-7-20	920692-121	17	10
WM-8-5	920692-122	43	10
WM-9-5	920692-123	360	10
WM-10-2.5	920692-124	220	10
WM-11-7.5	920692-125	130	10
WM-12-5	920692-126	16	10
WM-13-2.5	920692-127	480	10
WM-14-20	920692-128	ND	10
WM-15-17.5	920692-129	12	10
WM-16-2.5	920692-130	44	10
WM-17-10	920692-131	32	10
WM-18-5	920692-132	58	10
Sludge 4	920692-133	430	10
Pond 2	920692-134*	97	10
TP-4-1	920692-135	140	10
TP-4-2	920692-136	89	10
TP-6-1	920692-137	35	10
TP-6-2	920692-138	130	10
TP-6-3	920692-139	170	10
TP-6-4	920692-140	14	10
WM-11-25	920692-141	ND	10
Sludge 1	920692-142	19	10
Sludge 2	920692-143	21	10
Sludge 3	920692-144	22	10
Sludge 5	920692-145	31	10

* Water sample

WET/EPA 3010/6010
STLC METALS BY ICP

CLIENT:	WESTEC	DATE REC'D:	06/18/92
PROJECT:	Walker Mine	DATE EXTRACTED:	08/21/92
CONTROL NO:	920692	DATE ANALYZED:	08/24/92
MATRIX:	Extract		

SAMPLE ID:	CONTROL NO:	RESULTS (mg/L) Cd	Cu	Fe	Zn
WM-1-2.5	920692-115	0.02	35	34	0.94
WM-2-5	920692-116	ND	99	8.5	5.2
WM-3-10	920692-117	0.03	40	51	7.3
WM-4-5	920692-118	0.03	11	85	1.4
WM-5-10	920692-119	0.03	12	65	4.0
WM-6-5	920692-120	0.03	20	65	1.8
WM-7-20	920692-121	0.03	19	83	1.2
WM-8-5	920692-122	0.02	13	47	1.7
WM-9-5	920692-123	0.02	20	38	0.76
WM-10-2.5	920692-124	0.03	48	85	4.1
WM-11-7.5	920692-125	0.05	7.9	280	0.59
WM-12-5	920692-126	0.04	13	110	1.5
WM-13-2.5	920692-127	0.05	6.6	170	3.2
WM-14-20	920692-128	0.03	0.02	110	0.10
WM-15-17.5	920692-129	0.05	0.03	200	0.49
WM-16-2.5	920692-130	0.01	39	6.1	0.74
WM-17-10	920692-131	0.08	0.23	150	4.8
WM-18-5	920692-132	0.21	0.05	1000	2.3
Sludge 4	920692-133	0.14	490	560	3.3
Pond 2	920692-134*	ND	0.23	0.24	0.18
Method Blank	920692	ND	0.02	0.13	0.02
DETECTION LIMIT		0.01	0.01	0.05	0.01

* Water Sample

QUALITY CONTROL DATA

CLIENT: WESTEC
PROJECT: Walker Mine
CONTROL NO: 920692

METHOD EPA WET 3010/6010
MATRIX: Extract
SAMPLE ID: Method Blank
DATE ANALYZED 08/24/92

COMPOUND	SAMPLE RESULTS (mg/L)	AMOUNT SPIKED (mg/L)	% REC.	DUP. % REC.	RPD
Cadmium	ND	2	70	70	0
Copper	0.02	2	84	89	6
Iron	0.13	2	78	74	5
Zinc	0.02	2	74	74	0

METHOD EPA WET EPA 3010/6010
MATRIX: Extract
SAMPLE ID: 920692-130
DATE ANALYZED 08/24/92

COMPOUND	SAMPLE RESULTS (mg/L)	AMOUNT SPIKED (mg/L)	% REC.	DUP. % REC.	RPD
Cadmium	0.01	5	74	74	0
Iron	6.1	5	78	78	0
Zinc	0.74	5	77	77	0

QUALITY CONTROL DATA

CLIENT: WESTEC
PROJECT: Walker Mine
CONTROL NO: 920692

METHOD EPA WET 300
MATRIX: Extract
DATE ANALYZED 08/07/92

COMPOUND	SAMPLE RESULTS (mg/L)	AMOUNT SPIKED (mg/L)	% REC.
SAMPLE ID:	920692-12		
Sol. Sulfate	73	100	115
SAMPLE ID:	920692-23		
Sol. Sulfate	160	180	94
SAMPLE ID:	920692-36		
Sol. Sulfate	22	100	93
SAMPLE ID:	920692-46		
Sol. Sulfate	38	100	96
SAMPLE ID:	920692-55		
Sol. Sulfate	140	100	98
SAMPLE ID:	920692-1		
Sol.Sulfate	63	100	98
SAMPLE ID:	920692-60		
Sol. Sulfate	14	100	122
SAMPLE ID:	920692-70		
Sol. Sulfate	87	100	111
SAMPLE ID:	920692-76		
Sol. Sulfate	31	100	115

QUALITY CONTROL DATA

CLIENT: WESTEC
PROJECT: Walker Mine
CONTROL NO: 920692

METHOD EPA WET 300
MATRIX: Extract
DATE ANALYZED 08/13/92

COMPOUND	SAMPLE RESULTS (mg/L)	AMOUNT SPIKED (mg/L)	% REC.
SAMPLE ID:	920692-86		
Sol. Sulfate	53	100	109
SAMPLE ID:	920692-96		
Sol. Sulfate	120	100	104
SAMPLE ID:	920692-106		
Sol. Sulfate	250	100	90
SAMPLE ID:	920692-114		
Sol. Sulfate	46	100	116

QUALITY CONTROL DATA

CLIENT: WESTEC
PROJECT: Walker Mine
CONTROL NO: 920692

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METHOD EPA WET 300
MATRIX: Extract
DATE ANALYZED 08/14/92

COMPOUND	SAMPLE RESULTS (mg/L)	AMOUNT SPIKED (mg/L)	% REC.
SAMPLE ID:	920692-124		
Sol. Sulfate	220	100	81
SAMPLE ID:	920692-134		
Sol. Sulfate	97	100	86
SAMPLE ID:	920692-144		
Sol. Sulfate	22	100	104

C K Y incorporated
Environmental Services

RECEIVED
SEP 21 1992
WESTEC™

Date: 09/7/92
920692

Welsh Engineering Science & Technology, Inc.
5250 Neil Road, Suite 300
Reno, Nevada 89502

Attn: Mr. John Heggeness

Subject: Laboratory Report
Project: Walker Mine

Enclosed is the supplementary laboratory report for samples received on 06/14/92. The samples were received in coolers with ice and intact; the chain-of-custody forms were properly filled out. The data reported includes:

Method	No. of Analysis
EPA 300 (Sulfate)	5 Soil
EPA 8020	5 Soil
EPA 9045 (pH)	5 Soil

The results are summarized on the following pages.

Please feel free to call if you have any questions concerning these results.

Sincerely,

Danny Hoang
Laboratory Director

3942 Valley Avenue, Suite F, Pleasanton, CA 94566 • Telephone 510-846-3188 • Fax: 510-846-1236

EPA 9045
pH

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walter Mine	**DATE EXTRACTED:**	06/25/92
CONTROL NO:	920692	**DATE ANALYZED:**	09/01/92
MATRIX:	Soil		

SAMPLE ID:	CONTROL NO:	RESULTS (pH Units)	DET.LIMIT (pH Units)
WM-16-2.5	920692-78	4.6	0.1
WM-16-5	920692-79	4.9	0.1
WM-16-10	920692-80	5.1	0.1
WM-16-15	920692-81	6.7	0.1
WM-16-20	920692-82	7.2	0.2

EPA 300
SULFATE

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**DATE EXTRACTED:**	07/01/92
CONTROL NO:	920692	**DATE ANALYZED:**	09/03/92
MATRIX:	Extract		

SAMPLE ID:	CONTROL NO:	RESULTS (mg/L)	DETECTION LIMIT (mg/L)
WM-16-2.5	920692-78	95	10
WM-16-5	920692-79	50	10
WM-16-10	920692-80	45	10
WM-16-15	920692-81	30	10
WM-17-20	920692-82	16	10

WET METHOD/EPA 6010/7000
STLC METALS BY ICP/AAS

CLIENT:	WESTEC	**DATE REC'D:**	06/18/92
PROJECT:	Walker Mine	**STLC EXTRACT:**	06/27/92
CONTROL NO:	920692	**DATE EXTRACTED:**	08/29/92
MATRIX:	Extract	**DATE ANALYZED:**	08/31/92

SAMPLE ID:	WM-16-2.5	WM-16-5	WM-16-10	WM-16-15	WM-16-20	
CONTROL NO:	-78	-79	-80	-81	-82	
PARAMETERS	**RESULTS (mg/L)**					**DET LMT (mg/L)**
Cadmium	.02	.02	ND	ND	ND	0.01
Copper	30	.05	.03	.04	.04	0.01
Iron	60	400	200	150	42	0.05
Zinc	6.3	4.2	1.9	1.5	0.5	0.01

PINTAIL SYSTEMS, INC.
11801 E. 33RD AVE, SUITE C
AURORA, COLORADO 80010

REPORT OF ANALYSIS

PO NUMBER WM-092

Submitted by: J.O. Haggeness
Project name: Walker Mine Evaluation
Sample type: rock

Date shipped: 06/12/92
Date completed: 09/09/92
Sample total: 53

ITEM	ID	FOOTAGE	S %	AGP lbs/T	NP lbs/T	NP:AP ratio	ACID FORMATION
1	WM-1	catchment pond sediment	0.00	0.0	40	>3	NO
2	WM-1	surface	0.02	1.2	45	36.0	NO
3	WM-1	5.0	0.02	1.2	40	32.0	NO
4	WM-2	15.0	0.00	0.0	45	>3	NO
5	WM-3	2.5	0.04	2.5	-7	-3.0	NO
6	WM-4	2.5	1.26	78.7	40	0.5	YES
7	WM-4a	7.5	0.14	8.7	55	6.3	NO
8	WM-5	2.5	4.48	279.7	13	0.0	YES
9	WM-5	5.0	0.47	29.3	40	1.4	MAYBE
10	WM-5	25.0	0.01	0.6	43	68.1	NO
11	WM-5	30.0	0.02	1.2	47	38.0	NO
12	WM-5	35.0	0.01	0.6	38	60.1	NO
13	WM-6	2.5	0.94	58.7	47	0.8	YES
14	WM-6	5.0	0.55	34.3	120	3.5	NO
15	WM-6	12.5	0.61	38.1	47	1.2	MAYBE
16	WM-6	15.0	1.10	68.7	43	0.6	YES
17	WM-7	5.0	0.21	13.1	78	5.9	NO
18	WM-7	15.0	0.17	10.6	70	6.6	NO
19	WM-7	37.5	0.01	0.6	32	52.0	NO
20	WM-8	2.5	0.12	7.5	70	9.3	NO
21	WM-8a	10.0	0.10	6.2	55	8.8	NO
22	WM-8a	15.0	0.00	0.0	45	>3	NO
23	WM-9a	surface seep NE pond	0.05	3.1	40	12.8	NO
24	WM-9	5.0	0.20	12.5	1150	92.1	NO
25	WM-9	10.0	0.07	4.4	55	12.6	NO
26	WM-9	25.0	1.20	74.9	43	0.6	YES
27	WM-10	2.5	1.81	113.0	40	0.4	YES
28	WM-10	5.0	0.14	8.7	43	4.9	NO
29	WM-10	10.0	1.17	73.1	50	0.7	YES
30	WM-11a	Walker tailings, reveg area	0.01	0.6	43	68.1	NO

Approved H.C. Thompson

PINTAIL SYSTEMS, INC.
11801 E. 33RD AVE. SUITE C
AURORA, COLORADO 80010

REPORT OF ANALYSIS

PO NUMBER WM-f92

Submitted by: J.O. Heggeness
Project name: Walker Mine Evaluation
Sample type: rock

Date shipped: 06/12/92
Date completed: 09/09/92
Sample total: 53

ITEM	ID	FOOTAGE	S %	AGP lbs/T	NP lbs/T	NP:AP ratio	ACID FORMATION
31	WM-11	7.5	0.20	12.5	32	2.6	MAYBE
32	WM-11	15.0	0.88	54.9	45	0.8	YES
33	WM-12	5.0	0.09	5.6	47	8.5	NO
34	WM-12	27.5	0.01	0.6	38	60.1	NO
35	WM-13	2.5	0.41	25.6	30	1.2	MAYBE
36	WM-13	20.0	0.00	0.0	43	>3	NO
37	WM-14	2.5	0.17	10.6	53	4.9	NO
38	WM-14	10.0	0.66	41.2	50	1.2	MAYBE
39	WM-15	2.5	0.27	16.9	43	2.5	MAYBE
40	WM-15	10.0	0.68	42.5	57	1.4	MAYBE
41	WM-16	road N of Mine portal	0.01	0.6	1233	1973.9	NO
42	WM-16	2.5	1.71	106.8	50	0.5	YES
43	WM-16	5.0	0.43	26.8	65	2.4	MAYBE
44	WM-16	10.0	0.93	58.1	45	0.8	YES
45	WM-16	15.0	0.05	3.1	30	9.6	NO
46	WM-16	20.0	0.04	2.5	53	21.0	NO
47	WM-17	road N of Mine portal	0.02	1.2	28	22.0	NO
48	WM-17	5.0	0.50	31.2	47	1.5	MAYBE
49	WM-17	15.0	0.94	58.7	47	0.8	YES
49	WM-17	22.5	0.02	1.2	32	26.0	NO
50	WM-18	tailings west of pond	0.01	0.6	50	80.1	NO
51	WM-18	2.5	1.47	91.8	25	0.3	YES
52	WM-18	15.0	1.00	62.4	50	0.8	YES

Approved

APPENDIX C

DATA FOR SOIL SAMPLES

ROW ID	pH	% MOIST	(x10³) HET	(x10³) HETAC	HAC/HET
1 F1	4.5000	6.2015	.6372	6.3721	10.0000
2 F2	3.7500	10.9849	.0011	23.3068	21000.0000
3 F3	3.8700	10.5263	.0011	44.2105	40000.0000
4 F4	5.2300	10.2996	143.3895	75.0038	.5231
5 F4R	5.5600	8.9695	697.4045	84.9962	.1219
6 F5	4.6100	10.4651	.3866	33.1395	85.7143
7 F6	4.9000	10.6090	11.0609	136.0491	12.3000
8 F7	4.7600	10.2467	22.0493	62.8406	2.8500
9 F8	5.7200	12.6894	112.6894	38.3144	.3400
10 F9	4.9300	11.9093	106.3138	38.0492	.3579
11 F10	4.9800	11.0280	152.1084	71.0579	.4672
12 F11	5.2700	10.3314	242.7291	84.9552	.3500
13 F12	4.4500	8.6716	32.6015	44.5554	1.3667
14 F13	5.7600	11.2167	529.3917	25.5798	.0483
15 F14	6.1800	9.8485	362.5000	35.1515	.0970
16 F15	6.0300	10.4869	364.6067	71.8165	.1970
17 F16	5.2100	12.1673	97.5856	48.2319	.4943
18 F17	4.9700	10.0189	11.0019	40.7070	3.7000
19 F17R	6.1400	12.3261	325.7455	69.6422	.2138
20 F18	5.5000	8.7452	163.1179	30.4487	.1867
21 F19	5.7500	9.4050	262.5720	76.5835	.2917
22 F20	5.0700	6.5217	22.3696	74.5652	3.3333
23 2F1	4.5900	6.8182	.1068	239.2727	2240.0000
24 2F2	4.8300	8.0769	.8646	55.1192	63.7500
25 2F3	4.6200	8.6207	1.0862	21.7241	20.0000
26 2F4	5.5300	14.1243	117.5480	43.3672	.3689
27 2F5	5.0700	9.5238	43.8095	20.8095	.4750
28 2F5R	5.2000	7.6336	21.5267	10.7634	.5000
29 2F6	4.8900	7.3724	1.0737	79.4556	74.0000
30 2F7	5.0900	11.9772	.1120	23.5152	210.0000
31 P1	3.8100	19.6000	.2392	39.4680	165.0000
32 P2	5.0500	14.2000	.1142	1.1420	10.0000
33 P3	6.0900	10.2767	22.0553	33.0830	1.5000
34 P4	6.1100	11.9231	35.8154	13.4308	.3750
35 P5	4.7700	12.5737	97.9391	34.8978	.3563
36 P6	4.7100	12.7660	.1128	1.1277	10.0000
37 P7	4.4100	11.7761	.0011	1.1178	1000.0000
38 P8	5.2900	7.9523	38.8628	26.9881	.6944
39 P9	4.2900	8.5657	.0011	18.4562	17000.0000
40 P10	5.1800	10.2161	148.7917	98.0923	.6593
41 P10R	4.6000	12.4752	22.4951	110.2257	4.9000
42 P11	6.4600	25.5361	145.6218	1.2554	.0086
43 P12	6.0900	6.8898	1389.5670	95.1319	.0685
44 P13	5.6700	13.2411	421.2569	33.9723	.0806
45 P14	5.6000	19.5446	155.4080	3.5863	.0231
46 P15	6.5100	22.2656	171.1719	.0012	.0000
47 P16	6.5500	20.8748	84.6123	2.4175	.0286
48 P17	6.1100	15.3082	968.5885	9.2247	.0095
49 P18	5.1200	11.9608	57.1000	14.5549	.2549
50 OSS1	5.1000	21.3333	592.1067	12.9827	.0219

HET = Neutral heterotrophic counts
HETAC= Acidophilic heterotrophic counts
HAC/HET= Ratio of acidophilic and neutral counts

DATA FOR SOIL SAMPLES

ROW	ID	pH	% MOIST	(x10³) HET	(x10³) HETAC	HAC/HET
51	OSS2	6.5700	35.1923	162.2308	6.4892	.0400
52	OSS3	6.3500	34.1699	2280.8880	11.9411	.0052
53	OSS4	6.3600	32.4952	755.2224	15.5019	.0205
54	OSS5	6.1500	33.7232	2500.6240	3.4768	.0014
55	OS1	6.4800	16.9847	10177.6700	39.7748	.0039
56	OS2	6.3100	19.5489	11357.1400	98.0301	.0086
57	OS3	6.1200	12.3506	4494.0240	17.6390	.0039
58	OS4	6.4700	13.3595	9522.2010	13.8299	.0015
59	OS5	6.5700	12.7863	2142.9390	7.5567	.0035
60	CS1	6.7300	18.9923	2022.8680	98.7636	.0488
61	CS2	6.9900	16.5385	1281.9230	5.3608	.0042
62	CS3	7.3200	18.8976	1664.5670	12.0087	.0072
63	G1	5.7900	12.1212	1233.3330	35.8788	.0291
64	G2	6.9500	26.0952	290.0190	.0013	.0000
65	G3	6.4000	23.3010	3082.5240	3.0825	.0010
66	FW1	6.7200	16.6340	4082.1920	215.7730	.0529
67	FW2	5.9600	9.8266	342.6590	14.2775	.0417
68	DCN1	6.1900	10.1365	3083.8210	13.9873	.0045
69	DCN2	6.7200	27.1654	71212.6000	123.3504	.0017
70	DCN3	6.0800	19.4059	4656.8320	75.2257	.0162
71	DCN4	6.3500	15.8203	3127.1480	91.4980	.0293
72	DCN5	6.3600	14.1199	1825.9190	180.3095	.0987
73	DCN5R	6.1200	13.5755	2157.9350	96.5392	.0447
74	DCS1	6.5800	26.8924	2791.6330	73.5976	.0264
75	DCS1R	6.4400	20.6897	3620.6900	270.3448	.0747
76	DCS2	6.9700	24.6154	87230.7700	51.0923	.0006
77	DCS3	6.3500	19.6532	9691.9070	17.9480	.0019
78	DCS4	6.1900	17.5803	8936.1060	38.8015	.0043
79	DCS5	6.2100	17.9537	3774.5170	74.3108	.0197
80	SDC1	6.5600	18.3267	863.7849	8.8745	.0103
81	SDC2	6.4400	18.8350	2139.0290	9.5068	.0044
82	SDC2R	6.5200	16.6337	2449.3070	6.6481	.0027
83	SDC3	6.1300	16.5714	3963.4280	55.9543	.0141
84	SDC4	6.3200	16.8605	6193.6040	15.7762	.0025
85	SDC5	6.2100	17.6015	4116.0540	11.0545	.0027
86	SS1	6.5000	9.1418	1527.9850	66.5765	.0436
87	SS2	6.3400	9.9437	5277.2980	113.2420	.0215
88	SS3	6.6500	12.2605	1796.1680	180.7395	.1006
89	SS4	6.5200	6.2500	1806.2500	263.5000	.1459
90	SS5	5.7100	7.3218	2468.4010	455.0443	.1843
91	SS5R	6.3500	6.8965	1710.3450	375.2069	.2194
92	SS6	6.4300	9.4412	2626.5900	595.3603	.2267
93	SS7	6.2200	4.7348	1885.2270	444.0758	.2356
94	SS8	6.9500	4.5113	4493.9850	140.0451	.0312
95	SS9	6.0800	4.1276	1353.6580	269.6904	.1992
96	SS10	6.1200	9.3511	1968.3210	126.8473	.0644
97	SS11	6.0500	11.0266	2553.6120	246.4791	.0965
98	SS12	6.3100	9.7847	1010.0200	283.2446	.2804
99	SS13	6.3500	15.5769	3120.5770	409.1423	.1311
100	SS14	6.2500	10.5578	3427.2910	254.2829	.0742

HET = Neutral heterotrophic counts
HETAC= Acidophilic heterotrophic counts
HAC/HET= Ratio of acidophilic and neutral counts

DATA FOR SOIL SAMPLES

ROW	ID	pH	% MOIST	(x10³) HET	(x10³) HETAC	HAC/HET
101	SS15	6.2100	8.9463	1198.4100	59.9205	.0500
102	SS16	6.1200	7.5614	2151.2290	392.5992	.1825
103	SS17	5.9300	7.9612	1403.4950	164.1010	.1169
104	SS18	6.2600	22.4652	1836.9780	409.0338	.2227
105	SS19	6.4400	18.5039	3199.6060	253.5984	.0793
106	SS20	6.6200	18.7146	6054.4420	125.8374	.0208
107	SSG1	5.9800	19.2607	5724.5130	73.9416	.0129
108	SSG2	6.2600	15.3409	4498.2950	29.9886	.0067
109	SSG3	6.2100	18.9923	5711.6280	16.6589	.0029
110	SSG4	7.2300	22.9755	3935.2170	7.3785	.0019
111	SSG5	6.3700	19.9226	4796.9050	16.6692	.0035
112	SSG7	6.4100	17.4905	1997.3380	15.2738	.0076
113	SSG8	6.6100	12.3288	3145.2060	93.2329	.0296
114	SSG9	6.5000	13.3462	3627.0790	102.0116	.0281
115	SSG10	6.5100	12.3529	2584.1180	161.7882	.0626
116	SSG11	6.3400	20.1149	3723.5630	219.8103	.0590
117	SSG12	5.9800	9.4778	2408.5110	170.7853	.0709
118	SSG13	6.4700	19.7674	17725.5800	104.1977	.0059
119	SSG14	6.4400	16.9625	3274.9510	38.5976	.0118
120	SSG15	6.4300	18.4971	2014.4510	77.0231	.0382
121	SSG16	6.4200	17.4419	3640.6980	13.8581	.0038
122	SSG17	6.5200	18.4211	1894.7370	5.9211	.0031
123	SSG18	6.4900	20.7364	3984.3020	76.0639	.0191
124	SSG19	6.3400	17.2549	3165.8820	78.5608	.0248
125	SSG20	6.6100	18.1641	82714.8400	153.6133	.0019
126	SSH1	6.5600	12.5490	78784.3100	200.3372	.0025
127	SSH2	6.4300	15.5206	2310.4130	68.1572	.0295
128	SSH3	6.2900	12.4756	5286.3550	112.4756	.0213
129	SSH4	5.9300	17.7515	2001.7750	120.1065	.0600
130	SSH5	6.1400	17.8846	82519.2300	75.4462	.0009
131	SSH6	6.7600	18.0769	11689.6200	53.1346	.0045
132	SSH7	7.1000	15.8203	2779.6880	521.1914	.1875
133	SSH8	6.3800	19.3424	3341.5860	358.0271	.1071
134	SSH9	6.8100	13.4875	2269.7500	203.1426	.0895
135	SSH10	6.3800	14.1199	5135.3960	285.2998	.0556

HET = Neutral heterotrophic counts
HETAC= Acidophilic heterotrophic counts
HAC/HET= Ratio of acidophilic and neutral counts

DATA FOR WATERS AND WATER SEDIMENTS

ROW ID	pH *	(x10³) HET **	(x10³) HETAC **	HAC/HET
1 OSS1	6.9300	17.7000	.4000	.0226
2 OSS2	7.0800	129.0000	.0010	.0000
3 DCN1	7.0900	250.0000	1.5000	.0060
4 DCS1	7.0600	65.0000	3.7000	.0569
5 DCS2	6.9500	26.0000	.8000	.0308
6 DCS3	7.0600	86.0000	1.3000	.0151
7 DCS4	6.6800	43.0000	.5000	.0116
8 FWW1	6.8900	560.0000	2.5000	.0045
9 FWW2	6.9100	588.0000	3.2000	.0054
10 GW1	7.1200	16.0000	.7000	.0437
11 GW2	7.1100	25.0000	2.6000	.1040
12 PW1	6.6400	.5000	4.9000	9.8000
13 PW2	7.0200	36.0000	1.5000	.0417
14 MS1	6.4100	304.0000	1.8000	.0059
15 MS2	6.6500	15.0000	.1000	.0067
16 MS3	6.7300	105.0000	.5000	.0048
17 MS4	6.4500	520.0000	.3000	.0006

* pH of water
** Colony counts from water sediments

HET = Neutral heterotrophic counts
HETAC= Acidophilic heterotrophic counts
HAC/HET= Ratio of acidophilic and neutral counts

TABLE 1
T. ferrooxidan colony counts (CFU's/gram)*

SAMPLE	*T. ferroxidan* colonies ($X10^2$)**
F3	460
F11	20
PW1+	70
OSS1	5Z++
OSS2	2Z
OSS3	3Z
OSS4	4Z
OSS5	1Z
DCS1	6Z
DCS2	1Z
DCS4	1Z
G3	3Z

* Calculated on a wet weight basis
** For soils except where indicated
\+ Water sediment sample
++ Z referes to zones of ferric iron deposition within the agar.

SAMPLE CODES (see Figure 1): F, fill material adjacent to pond; PW, pond water sediments; OSS, marshy area at foot of rock tailings near seepage area; DCS, south of Dolly Creek; G, seepage area at foot of tailings.

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

RECEIVED
SEP 25 1992
WESTEC

JOB NO. WKB 001
September 23, 1992
SHIPMENT NO.: 1
REF. JOB NO.: G792001V
V21030889 TO R-CONDC

WESTEC
Attn: Ms. Nancy L. Parduhn-Jackson
36 Glen Carran Circle
Sparks, NV 89431

Analysis of 22 Plant Samples

ITEM	SAMPLE NUMBER	Cu (ppm)	Zn (ppm)	Fe (ppm)	Cd (ppb)
1	V21030889	7.7	11.	195.	225.
2	J-P	185.0	32.	165.	670.
3	S-P	11.0	215.	85.	6000.
4	C-P	10.0	19.	90.	90.
5	R-P	4.0	46.	205.	185.
6	S-WM	5.6	185.	40.	570.
7	J-WM	2.4	34.	55.	220.
8	C-WM	2.6	16.	205.	170.
9	S-PP	17.0	230.	105.	1100.
10	C-PP	40.0	22.	290.	170.
11	S-UDC	15.0	380.	60.	2500.
12	C-UDC	3.4	17.	70.	250.
13	R-UDC	10.0	200.	85.	3200.
14	S-S	14.0	490.	55.	9400.
15	J-S	18.0	24.	120.	410.
16	C-S	11.0	13.	150.	90.
17	S-NDC	24.0	235.	145.	8000.
18	J-NDC	16.0	24.	200.	180.
19	C-NDC	24.0	15.	580.	200.
20	S-CONDC	8.8	145.	75.	2300.

SKYLINE LABS, INC.
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JOB NO. WKB 001
September 23, 1992

ITEM	SAMPLE NUMBER	Cu (ppm)	Zn (ppm)	Fe (ppm)	Cd (ppb)
21	C-CONDC	21.0	40.	325.	360.
22	R-CONDC	29.0	17.	240.	200.

NOTE: Values in original plant material.

cc: Westec
Attn.: Ms. Nancy L. Parduhn-Jackson
5250 Neil Road #300
Reno, NV 89502

REGISTERED ASSAYER
CERTIFICATE NO.
9425
WILLIAM L. LEHMBECK
ARIZONA

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

APPENDIX D

WALKER MINE
PROGRAM NO. 85-053

SITE LOCATION	SITE NO.	DATE OF SAMPLES	NAME OF SAMPLER	pH (pH units)	Al (mg/l)	Cu (mg/l)	Fe (mg/l)	Zn (mg/l)	FLOW (cfs)	HARDNESS (mg/l)	COMMENTS
Various Sampling Locations Not Usually Sampled											
Below Piute Slopes at road crossing and pond	0	7/27/87		0.00		0.0800		0.0420	N.S.	0.0	
WM-2, Nye Creek #9	0	7/27/87		0.00		0.0100		0.0130	N.S.	0.0	
LGC/Halfway between Brown's and Dolly Creek	0	8/4/88		0.00		0.0700		<0.05	N.S.	0.0	
LGC, 100 yards above Spanish Creek	0	8/4/88		0.00		0.0160		<0.005	N.S.	0.0	
Nearby House	0	11/3/88		0.00		0.0040		0.2100	N.S.	0.0	QA/QC Data; Ca=38, Mg=7, Na=9, Flouride=0.6
Nearby House	0	11/3/88	WAC	0.00		0.0054	0.053	0.2110	N.S.	0.0	Ca=34.1, Mg=5.5
Pipe discharge from pond	0	6/20/89	WAC	0.00		0.5600		0.2000	0.002	0.0	
LGC / 112 @ mile 21.5	0	7/31/91	WAC	9.20		<0.003		<0.01	4.0		EC=165
LGC / 112 @ mile 21.5	0	11/11/91	WAC			0.0160	<0.05	<0.01			
LGC, Mile 21.5	0	6/11/92	WAC			<0.03	0.040	<0.03			
Beaver Pond in DC	0	4/22/92	WAC	8.80		0.0024		<0.001			EC= 79, Flow= 0
BC, 100 ft. d/s LGC	0	6/11/92	WAC			0.0400	0.320	<0.03			
Mine discharge adjacent to pond		5/23/91	WAC		0.230	2.8000	0.040	0.1300	0.025		Flow=11 GPM
Old Settling Pond		5/23/91	WAC		0.480	2.4000	0.590	0.3400			
Mine Discharge (PS-A)	1	6/25/57	LET	4.60		12.0000		3.2000	0.10	0.0	Al=0.94 ppm
	1	5/27/58	LET	4.30		21.0000		2.1000	N.S.	0.0	
	1	7/11/58		4.80		12.0000		1.6000	N.S.	0.0	
	1	9/13/58	Fish and Game	6.60		2.5000		0.2900	0.05	0.0	
	1	10/18/58	DWR/LET	6.30		0.7600		0.1400	0.02	0.0	
	1	4/27/60	DWR/LET	6.40		0.5300		0.1700	N.S.	0.0	
	1	4/28/60		6.40		0.5300		0.1700	N.S.	0.0	
	1	4/28/60		0.00		0.4700		0.1100	N.S.	0.0	
	1	5/5/60	USGS/Stone	6.40		0.5200			0.00	0.0	
	1	5/19/60		0.00		0.3100		N.S.	N.S.	0.0	

WALKER MINE
PROGRAM NO. 85-053

SITE LOCATION	SITE NO.	DATE OF SAMPLES	NAME OF SAMPLER	pH (pH units)	Al (mg/l)	Cu (mg/l)	Fe (mg/l)	Zn (mg/l)	FLOW (cfs)	HARDNESS (mg/l)	COMMENTS
	1	6/4/60		5.20		9.7000		1.3000	N.S.	0.0	
	1	6/10/60	DWR/LET	4.60		19.0000		2.2000	0.156	0.0	
	1	6/14/60		4.30		38.0000		2.2000	N.S.	0.0	
	1	7/4/60	DWR/LET	5.20		9.7000	0.130	1.3000	0.50	0.0	Mn=1.9
	1	5/29/62	DWR/LET	3.70		54.0000		3.4000	0.20	0.0	
	1	6/14/62		4.30		38.0000		2.2000	N.S.	0.0	
	1	7/18/62	DWR/LET	4.60		0.9700		0.2000	0.011	0.0	
	1	8/20/70		0.00		14.0000		N.S.	0.10	0.0	
	1	9/15/70	DWR/LET	4.30		14.0000		0.6000	0.333	0.0	
	1	11/16/70		5.47		10.0000		N.S.	N.S.	0.0	
	1	9/27/71		5.27		0.2350		0.0250	N.S.	0.0	
	1	6/29/72	WHC	0.00		16.0000		0.6000	0.067	0.0	
	1	7/24/74	Fish and Game	4.80		15.0000		1.7000	1.0	0.0	
	1	10/15/74	Fish and Game	4.60		17.0000		0.7200	N.S.	0.0	
	1	5/30/75	Fish and Game	0.00		69.0000		0.9300	N.S.	0.0	
	1	7/15/75	Fish and Game	0.00		27.0000		1.2000	N.S.	0.0	
	1	9/15/75	Fish and Game	0.00		9.1000		0.8000	N.S.	0.0	
	1	10/17/75	Crawford	5.51	3.180	14.0000	0.720	0.7200	N.S.	0.0	pH<5.5
	1	10/20/75		0.00		2.6000		0.2200	0.40	0.0	
	1	12/3/75	Fish and Game	0.00		2.4000		0.1800	N.S.	0.0	
	1	1/8/76	Fish and Game	0.00		7.6000		0.4000	N.S.	0.0	
	1	2/4/76	Fish and Game	0.00		10.0000		0.5400	N.S.	0.0	
	1	5/26/76	RJM	< 5.5		6.8000	0.200	0.5100	0.70	0.0	Sulfate Not Sampled
	1	5/23/77	RJM	0.00		7.2000		0.8000	N.S.	0.0	
	1	11/10/77	RJM	6.40		3.5000		0.5400	N.S.	0.0	
	1	4/20/78		0.00		12.4000		1.3000	N.S.	0.0	
	1	5/10/78		0.00		16.2000		0.9500	N.S.	0.0	
	1	6/21/78	RJM	0.00		2.6000		0.0900	1.75	0.0	
	1	10/17/78	LFN	4.00		11.0000		1.7000	N.S.	0.0	Cd=0.03
	1	6/19/79		0.00		24.3000		1.0200	N.S.	0.0	
	1	8/20/79		0.00		20.1000		0.8200	N.S.	0.0	
	1	6/1/80		0.00		13.6000		N.S.	N.S.	0.0	
	1	6/12/80	Conoco	0.00		20.7000		0.6400	0.97	0.0	
	1	7/11/80	Conoco	0.00		9.3000		0.6200	0.65	0.0	
	1	8/8/80	Conoco	0.00		14.7000		0.6000	0.45	0.0	
	1	9/4/80	Conoco	0.00		15.5000		0.5800	0.25	0.0	
	1	10/3/80	Conoco	0.00		13.6000		0.6400	N.S.	0.0	
	1	11/7/80	Conoco	0.00		13.4000		N.S.	N.S.	0.0	
	1	3/5/81	LFN	4.40		10.5000		0.5700	0.25	0.0	TDS=228
	1	5/11/81	Conoco	4.20		19.4000		0.8300	N.S.	0.0	
	1	6/5/81	Conoco	4.30		22.1000		0.8700	N.S.	0.0	

WALKER MINE
PROGRAM NO. 85-053

SITE LOCATION	SITE NO.	DATE OF SAMPLES	NAME OF SAMPLER	pH (pH units)	Al (mg/l)	Cu (mg/l)	Fe (mg/l)	Zn (mg/l)	FLOW (cfs)	HARDNESS (mg/l)	COMMENTS
	1	7/10/81	Conoco	4.60		17.4000		0.7900	0.20	0.0	
	1	8/7/81	Conoco	4.80		15.2000		0.7900	0.07	0.0	
	1	9/3/81	Conoco	4.90		13.5000		0.7000	0.089	0.0	
	1	10/1/81	Conoco	4.90		12.2000		0.7000	N.S.	0.0	
	1	9/20/82	Pearson	5.00		16.7000		0.6800	0.245	0.0	Mn=2.55
	1	10/10/82	Pearson	5.10		15.3000		0.6800	0.156	0.0	Mn=2.62
	1	10/17/82	Pearson	4.80		14.5000		0.6500	0.178	0.0	Mn=2.56
	1	10/24/82	Pearson	5.00		14.0000		0.6500	0.145	0.0	Mn=2.59
	1	11/6/82	Pearson	4.80		14.8000		0.6700	0.167	0.0	Mn=2.76
	1	9/27/83	WUM	7.00		13.3000		0.6600	0.03	0.0	
	1	8/8/84	Crawford	4.00		16.0000		0.7200	0.18	0.0	
	1	3/18/85		5.20		1.5000		0.5300	0.18	0.0	
	1	5/14/85	WAC	0.00		17.3000		0.7600	2.30	0.0	
	1	6/13/85	WAC and Fong	5.00		19.0000		N.S.	0.55	0.0	Flow Estimated
	1	6/25/85		4.40		19.0000		N.S.	0.10	0.0	Flow Estimated
	1	7/2/85	WAC	0.00	3.600	17.2000		0.7400	0.19	0.0	As<0.004
	1	7/15/85	WAC and Fong	0.00		16.1000		N.S.	0.26	0.0	
	1	8/26/85	WAC	4.20		13.3000		N.S.	0.09	0.0	Flow Estimated
	1	9/17/85	WAC and Fong	5.40		12.0000		0.6200	0.20	0.0	
	1	12/7/85	WAC	0.00		8.9500		N.S.	1.04	0.0	
	1	1/11/86	WAC	4.40		9.0000		0.5700	0.18	0.0	
	1	4/7/86	WAC	3.70	5.200	26.0000	0.350	0.9000	1.48	0.0	
	1	4/23/86	WAC	3.80		28.0000		0.9500	2.443	0.0	
	1	6/11/86	WAC	5.10		23.0000		0.8900	1.39	0.0	Metal Scan Done
	1	6/23/86	WAC	4.70		20.0000	0.080	0.8600	1.40	0.0	
	1	7/2/86	WAC	0.00		23.7000		0.8100	N.S.	0.0	
	1	8/1/86	WAC	0.00		10.4000		0.5000	0.07	0.0	
	1	9/18/86	WAC	0.00		5.9300		0.4100	0.04	0.0	
	1	10/8/86	WAC	0.00		6.4600		0.3800	N.S.	0.0	
	1	11/25/86	WAC	0.00		4.9600		0.3800	0.01	0.0	
	1	3/29/87	WAC	0.00		8.0000		0.0400	0.13	0.0	Flow Estimated
	1	5/15/87	WAC	0.00		22.6000		0.9300	0.38	0.0	
	1	6/24/87	WAC	0.00		12.0000		0.5400	N.S.	0.0	
	1	7/22/87	WUM	6.10		10.2000		0.4600	N.S.	0.0	
	1	9/26/87	WAC	0.00		3.2000		0.2200	0.25	0.0	
	1	10/7/87	WAC	0.00		4.9000		0.3300	0.47	0.0	
	1	10/13/87	WUM	0.00		1.5000		N.S.	N.S.	0.0	
	1	11/7/87	WAC	0.00		5.7000		0.3100	0.04	0.0	
	1	11/14/87	WAC	0.00		0.3900		0.0100	0.02	0.0	
	1	12/7/87	WAC	0.00					0.02	0.0	
	1	3/26/88	WAC	0.00		0.2900		0.0100	0.02	0.0	

WALKER MINE
PROGRAM NO. 85-053

SITE LOCATION	SITE NO.	DATE OF SAMPLES	NAME OF SAMPLER	pH (pH units)	Al (mg/l)	Cu (mg/l)	Fe (mg/l)	Zn (mg/l)	FLOW (cfs)	HARDNESS (mg/l)	COMMENTS
	1	6/2/88	WAC	0.00		0.2480		0.0054	0.013	52.0	
	1	7/16/88	JKT	0.00		0.2400		< 0.01	N.S.	0.0	
	1	8/3/88	WAC	2.00		0.2200		<0.05	0.01	0.0	
	1	11/3/88	WAC	0.00		0.2290		0.0070	0.01	0.0	
	1	11/3/88	WAC	0.00		0.2290		0.0065	0.01	40.0	
	1	11/3/88	WAC	0.00		0.2400		0.0400	N.S.	50.0	QA/QC Data
	1	1/29/89	WAC	0.00		0.2500		0.0140	0.041	0.0	
	1	3/29/89	WAC	0.00		0.4500		< 0.005	0.033	0.0	Flow 10 to 15 GPM
	1	6/20/89	WAC	0.00		0.3100		0.0200	N.S.	0.0	
	1	6/20/89	WAC	0.00		0.2600		0.0200	N.S.	0.0	QA/QC #2
	1	6/20/89	WAC	0.00		0.2800		0.0100	0.01 0.0096	52.0	TDS=88, Metal Scan Done, Flow=4.3 GPM
	1	8/17/89	WAC	7.30		0.2800		< 0.05	0.01	52.0	Na=4.65, K=0.46, Mn=2.3, Ca=12, TDS=105
	1	11/14/89	WAC	6.90		0.2300		< 0.001	0.01	40.0	
	1	11/14/89	WAC	0.00		0.2800		0.0100		0.0	
	1	5/10/90	WAC	7.20		0.2300		< 0.03	0.01	54.0	
	1	7/17/90	JKT			0.2550		0.0050			qa/qc Cu .255, Zn .0065
	1	5/8/91	WAC		ND	0.3200	ND	ND			
	1	5/23/91	WAC	8.60	ND	0.3600	ND	ND	0.008		EC=104, Flow= 3.7 GPM
	1	7/31/91	WAC	9.10	<0.05	0.2100	<0.03	0.0460	0.008		EC = 94, Flow= 3.76 GPM
	1	11/11/91	WAC			0.2200	<0.05	<0.01			
	1	11/12/91	WAC								Cd< 0.0010, Cr< 0.0010
	1	12/2/91	WAC	8.70		0.2000	0.039	<0.03	0.006		EC=110, Flow= 2.5 GPM
	1	1/8/92	WAC								Cu=0.174, Fe=0.077, Zn< 0.03 Dissoved Metals
	1	3/3/92	WAC	8.20		0.1740		0.0360	0.011		EC= 110, Flow= 4.8 GPM
	1	4/22/92	WAC	8.10		0.2480		<0.03	0.009		EC= 115, Flow= 3.9 GPM
	1										
	1	6/11/92	WAC			0.2000	0.030	<0.03			
	1	7/30/92	SER	8.02		0.1400			<0.015		EC= 100, Flow= 3 GPM
	1	10/5/92	WAC	6.76	<0.4	0.1980	0.045	<0.03	0.0042	61.0	EC=107, QA/QC data avail.
	1	12/1/92	DID			0.1800	<0.10	<0.02	0.0040		Dis. Cu=0.15, QA/QC data avail.
Dolly Creek, upstream of mine (R-1)	2	10/5/57		7.60		N.S.		N.S.	N.S.	0.0	Cu and Zn below detection limits
	2	5/27/58		6.40		N.S.		N.S.	N.S.	0.0	Cu and Zn below detection limits
	2	6/5/58		0.00		N.S.		N.S.	N.S.	0.0	Cu and Zn below detection limits
	2	9/13/58	Fish and Game	7.50		0.1600		N.S.	0.30	0.0	
	2	10/18/58	DWR/LET	7.60		N.S.		N.S.	0.25	0.0	

WALKER MINE
PROGRAM NO. 85-053

SITE LOCATION	SITE NO.	DATE OF SAMPLES	NAME OF SAMPLER	pH (pH units)	Al (mg/l)	Cu (mg/l)	Fe (mg/l)	Zn (mg/l)	FLOW (cfs)	HARDNESS (mg/l)	COMMENTS
	2	10/29/59	DWR/LET	7.80		0.0100		N.S.	0.223	0.0	
	2	4/28/60	DWR/LET	7.60		0.0100		0.0200	0.40	0.0	
	2	5/10/60	USGS/Stone	7.60		0.0100		N.S.	N.S.	0.0	Zn not sampled.
	2	6/14/60	DWR/LET	7.70		0.0100		0.0100	0.75	0.0	
	2	7/4/60	DWR/LET	7.70		0.0300	0.130	N.S.	2.0	0.0	
	2	8/18/60		0.00		0.0100		N.S.	N.S.	0.0	
	2	8/31/60	DWR/LET	7.50		0.0100		0.0100	0.25	0.0	
	2	6/29/72		0.00		N.S.		N.S.	N.S.	0.0	
	2	7/18/62		0.00		0.0500		N.S.	N.S.	0.0	
	2	5/30/75		0.00		0.0100		0.0100	N.S.	0.0	
	2	7/14/75		0.00		< 0.01		< 0.01	N.S.	0.0	
	2	8/27/75		0.00		< 0.01		< 0.01	N.S.	0.0	
	2	9/17/75		0.00		< 0.01		< 0.01	N.S.	0.0	
	2	10/17/75		0.00		N.S.		N.S.	N.S.	0.0	
	2	10/20/75		0.00		< 0.01		< 0.01	N.S.	0.0	
	2	10/20/75	Fish and Game	0.00		< 0.01		< 0.01	0.00	0.0	
	2	12/3/75		0.00		< 0.01		< 0.01	N.S.	0.0	
	2	12/3/75	Fish and Game	0.00		< 0.01		< 0.01	0.00	0.0	
	2	1/8/76	Fish and Game	0.00		< 0.01		< 0.01	N.S.	0.0	
	2	2/4/76	Fish and Game	0.00		< 0.01		< 0.01	N.S.	0.0	
	2	5/23/77		0.00		0.0100		N.S.	N.S.	0.0	
	2	11/10/77		0.00		0.0200		N.S.	N.S.	0.0	
	2	6/21/78		0.00		N.S.		N.S.	N.S.	0.0	
	2	5/23/79		0.00		< 0.005		2.5000	N.S.	0.0	
	2	6/19/79		0.00		< 0.005		< 0.002	N.S.	0.0	
	2	8/20/79		0.00		0.0040		0.0040	N.S.	0.0	
	2	6/18/80		0.00		0.0300		N.S.	N.S.	0.0	
	2	7/15/80		0.00		0.0050		N.S.	N.S.	0.0	
	2	8/13/80		0.00		0.0100		N.S.	N.S.	0.0	
	2	9/12/80		0.00		0.0120		N.S.	N.S.	0.0	
	2	10/7/80		0.00		0.0100		N.S.	N.S.	0.0	
	2	11/3/80		0.00		0.0040		N.S.	N.S.	0.0	
	2	5/31/81		0.00		0.0030		N.S.	N.S.	0.0	
	2	6/15/81		0.00		0.0060		N.S.	N.S.	0.0	
	2	7/16/81		0.00		0.0040		N.S.	N.S.	0.0	
	2	8/17/81		0.00		0.0090		N.S.	N.S.	0.0	
	2	9/27/83		7.40		< 0.02		< 0.01	N.S.	0.0	
	2	8/8/84		7.00		< 0.20		< 0.01	1.89	0.0	
	2	3/18/85	WAC	7.30		< 0.02		< 0.01	1.022	0.0	
	2	6/13/85		7.00		0.0200		N.S.	0.011	0.0	
	2	6/25/85		6.40		< 0.02		< 0.02	N.S.	0.0	

WALKER MINE
PROGRAM NO. 85-053

SITE LOCATION	SITE NO.	DATE OF SAMPLES	NAME OF SAMPLER	pH (pH units)	Al (mg/l)	Cu (mg/l)	Fe (mg/l)	Zn (mg/l)	FLOW (cfs)	HARDNESS (mg/l)	COMMENTS
	2	4/7/86		0.00	<0.02	< 0.025	<0.01	0.0250	N.S.	0.0	
	2	6/11/86		0.00		< 0.025		< 0.02	N.S.	0.0	Metal Scan Done
	2	8/1/86		0.00		< 0.10		< 0.10	N.S.	0.0	
	2	3/29/87		0.00		0.0010		0.0030	N.S.	0.0	
	2	8/4/88		0.00		0.0080		0.0230	N.S.	0.0	
	2	11/3/88	WAC	0.00		0.0062		0.0028	0.001	70.0	
	2	11/3/88	WAC	0.00		0.0070		0.0450	N.S.	80.0	QA/QC Data
	2	1/29/89	WAC	0.00		< 0.002		< 0.005	0.003	0.0	
	2	6/20/89	WAC	0.00		< 0.001		< 0.01	0.044	0.0	
	2	8/17/89	WAC	0.00		< 0.005	0.050	< 0.05	0.10	0.0	
	2	11/14/89	WAC	6.90		< 0.03		< 0.001		60.0	
	2	11/14/89	WAC	0.00		< 0.001		0.0030		0.0	
	2	5/10/90	WAC	7.70		< 0.03		< 0.03	0.004	52.0	
	2	5/10/90	WAC	0.00		< 0.01		0.0300		37.4	
	2	7/17/90	JKT	0.00		<.001		<.001	0.067		
	2	5/23/91	WAC	6.50	0.050	ND	0.060	ND	0.067		EC= 69, Flow= 30 GPM
	2	7/31/91	WAC	9.50	<0.05	<0.008	0.210	<0.01	0.003	87.0	EC = 91, Flow= 1.3 GPM
	2	4/22/92	WAC	8.60		<0.001		0.0100	0.0026		EC=80, Flow= 1.2 GPM, Cu< 0.001, Zn= 0.010 Dissolved
	2	6/11/92	WAC			0.0086	0.040	<0.001			Cu<0.0010, Zn= 0.010 Dissolved
	2	10/5/92	WAC	7.58		<0.001	0.110	<0.02	0.095		EC=159
Spring adjacent mine portal (New R-1)	2a	8/4/88	WAC			0.0100		0.0070	1.01		
	2a	4/22/92	WAC	7.50		<0.001		<0.001	0.780		EC= 68, Flow= 350 GPM
	2a	12/1/92	DID			<0.001	<0.1	<0.02			
Dolly Creek below mine access road (R-2)	3	10/5/57		7.60		0.0900		0.0100	0.00	0.0	Double Check Data, Not Sure If This Is Correct
	3	5/27/58		5.50		8.2000		0.4800	N.S.	0.0	
	3	10/30/59	DWR/LET	7.80		0.1000		N.S.	0.446	0.0	
	3	5/19/60	DWR/LET	7.80		0.1500		< 0.05	1.0	0.0	
	3	6/10/60	DWR/LET	7.30		0.6800		0.0300	2.0	0.0	Blue-Green Bottom
	3	7/4/60	DWR/LET	8.00		0.3700	0.480	0.0500	5.0	0.0	Mn=0.11
	3	10/1/60	DWR/LET	7.90		0.1200		0.0200	0.40	0.0	
	3	6/23/61	DWR/LET	8.20		0.0400		N.S.	N.S.	0.0	
	3	7/18/62	DWR/LET	7.70		0.2100		0.0400	1.50	0.0	
	3	6/29/72	WHC	0.00		6.0000		0.2300	N.S.	0.0	
	3	7/24/74	Crooks	7.60		3.7000		0.0900	0.00	0.0	
	3	8/2/74		7.60		5.0000		0.1400	N.S.	0.0	

WALKER MINE
PROGRAM NO. 85-053

SITE LOCATION	SITE NO.	DATE OF SAMPLES	NAME OF SAMPLER	pH (pH units)	Al (mg/l)	Cu (mg/l)	Fe (mg/l)	Zn (mg/l)	FLOW (cfs)	HARDNESS (mg/l)	COMMENTS
	3	5/23/79		0.00		14.2000		7.6000	N.S.	0.0	
	3	6/19/79		0.00		7.5000		0.4350	N.S.	0.0	
	3	8/20/79		0.00		6.2900		0.3020	N.S.	0.0	
	3	9/27/83		6.00		0.8500		0.1300	0.00	0.0	
	3	6/13/85		6.00		7.6500		N.S.	0.50	0.0	
	3	6/25/85		5.80		7.6500		N.S.	0.50	0.0	
	3	9/17/85		7.70		1.8900		0.1350	0.69	0.0	
	3	4/8/86		0.00	15.000	9.7000	18.000	0.4480	N.S.	0.0	
	3	6/11/86		0.00		5.8000		0.2500	N.S.	0.0	Metal Scan Done
	3	7/2/86		0.00		0.3900	0.430	0.0100	N.S.	0.0	
	3	8/1/86		0.00		3.4000		0.1000	N.S.	0.0	
	3	5/15/87		0.00		12.7000		0.4800	N.S.	0.0	
	3	9/26/87		0.00		1.1000		N.S.	N.S.	0.0	
	3	10/13/87		0.00		0.8900		N.S.	N.S.	0.0	
	3	10/13/87		0.00		0.8900			N.S.	0.0	
	3	7/16/88		0.00		0.1100		< 0.01	N.S.	0.0	
	3	8/3/88		0.00		0.0450		0.0050	N.S.	0.0	
	3	11/3/88	WAC	0.00		0.0230		0.0050	0.223	70.0	
	3	11/3/88	WAC	0.00		0.0180		0.0440	N.S.	70.0	QA/QC Data
	3	1/29/89	WAC	0.00		0.1700		0.6400	0.167	0.0	
	3	6/20/89	WAC	0.00		0.0700		0.3000	0.446	0.0	Flow 200 +/- 10 GPM
	3	6/20/89	WAC	0.00		0.0700		0.3000	0.445	0.0	Flow 200 +/- 10 GPM; Duplicate QA/QC
	3	8/17/89	WAC	8.10	0.060	0.0120	0.410	< 0.05	0.001	68.0	
	3	11/14/89	WAC	7.30		0.1200		< 0.001	0.18	60.0	
	3	11/14/89	WAC	0.00		0.1500		0.0090		0.0	
	3	5/10/90	WAC	7.60		< 0.03		< 0.03	0.67	61.0	
	3	5/10/90	WAC	0.00		0.0100		0.0100		54.8	
	3	7/17/90	JKT			0.0295		0.0175			
	3	5/8/91	WAC		0.320	0.1000	0.380	(ND)			Cu=0.06,Zn=0.01 Dissolved
	3	5/23/91	WAC	7.50	0.160	0.1300	0.300	0.0100	1.0		EC=91, Flow= 450 GPM
	3	7/31/91	WAC	9.50	<0.05	0.0240	0.500	<0.01	0.167		EC = 125, Flow est. at 75 GPM
	3	11/11/91	WAC			<0.010	0.440	<0.01			
	3	11/12/91	WAC								Cd < 0.0010, Cr= 0.0015
	3	3/3/92	WAC	7.40		0.3210		0.0300	0.223		EC=220, Flow est. at 100 GPM
	3	6/11/92	WAC			<0.03	0.620	<0.03			
	3	6/11/92	WAC	7.10		<0.03	0.510	<0.03		59.0	EC= 142, Cd< 0.0005; Full water analysis available
	3	7/30/92	SER	8.10		0.0110		<0.015			EC= 144
	3	10/5/92	WAC	7.70		0.0130	0.550	<0.02	0.280		EC=156, QA/QC Available
	3	12/1/92	DID			0.0120	0.410	<0.02			Dis. Cu=0.0072, Fe=0.25

WALKER MINE
PROGRAM NO. 85-053

SITE LOCATION	SITE NO.	DATE OF SAMPLES	NAME OF SAMPLER	pH (pH units)	Al (mg/l)	Cu (mg/l)	Fe (mg/l)	Zn (mg/l)	FLOW (cfs)	HARDNESS (mg/l)	COMMENTS
Dolly Creek, 100 ft. above 36" culvert (R-3)	4	5/30/75	Fish and Game	0.00		4.4000		0.1900	N.S.	0.0	
	4	7/14/75	Fish and Game	0.00		12.0000		0.2800	N.S.	0.0	
	4	8/27/75	Fish and Game	0.00		3.2000		0.1700	N.S.	0.0	
	4	9/17/75	Fish and Game	0.00		1.5000		0.0800	N.S.	0.0	
	4	10/20/75	Fish and Game	0.00		1.8000		0.1500	N.S.	0.0	
	4	12/3/75	Fish and Game	0.00		2.0000		0.1600	N.S.	0.0	
	4	1/8/76	Fish and Game	0.00		1.9000		0.1200	N.S.	0.0	
	4	2/4/76	Fish and Game	0.00		1.7000		0.1400	N.S.	0.0	
	4	8/8/84		7.00		1.8000		0.1800	0.91	0.0	
	4	3/18/85		7.50		0.9300		0.0700	2.0	0.0	Flow Estimated
	4	6/13/85		0.00		7.0000		N.S.	0.53	0.0	
	4	7/15/85		0.00		5.7000		N.S.	0.60	0.0	
	4	9/17/85		7.80		1.8200		0.1200	0.62	0.0	
	4	12/7/85		0.00		1.0900		N.S.	N.S.	0.0	
	4	1/11/86		0.00		1.0000		0.1400	N.S.	0.0	
	4	4/23/86		0.00		7.9000		0.3100	N.S.	0.0	
	4	6/11/86		0.00		5.5000		0.2500	N.S.	0.0	Metal Scan Done
	4	7/2/86		0.00		0.7000	0.480	0.0200	N.S.	0.0	
	4	8/1/86		0.00		3.2000		0.1000	N.S.	0.0	
	4	9/18/86		0.00		1.4800		0.0920	N.S.	0.0	
	4	3/29/87		0.00		2.0000		0.0900	N.S.	0.0	
	4	5/15/87		0.00		12.4000		0.4300	N.S.	0.0	
	4	8/4/88		0.00		0.0690		0.0070	N.S.	0.0	
	4	11/3/88	WAC	0.00		0.0380		0.0030	0.278	68.0	
	4	6/20/89	WAC	0.00		0.0900		0.0100	0.535	0.0	Flow 210 to 240 GPM
	4	11/14/89	WAC	7.30		0.1500		0.0060	0.36	64.0	
	4	11/14/89	WAC	0.00		0.1700		0.0260		0.0	
	4	7/17/90	JKT			0.0630		<0.001			
	4	7/31/91	WAC	8.80	<0.05	0.0330	0.400	0.1500	0.223		EC = 123, Flow= 100 GPM
	4	11/11/91	WAC			0.0150	0.310	<0.01			
	4	6/11/92	WAC			0.0400	0.390	<0.03			
	4	10/5/92	WAC	7.9		0.047	0.35	<0.02	0.09		EC=150
	4	12/1/92	DID			0.0230	0.410	<0.02			Dis. Cu=0.020, Fe=0.30
Little Grizzly Creek, upstream from tailing at 24N60	5	10/5/57		0.00		N.S.		N.S.	N.S.	0.0	
	5	6/5/58		0.00		N.S.		N.S.	N.S.	0.0	
	5	4/20/60		0.00		0.2000		N.S.	N.S.	0.0	
	5	5/5/60	USGS/Stone	7.60		0.0200		N.S.	N.S.	0.0	
	5	5/19/60		0.00		0.0100		N.S.	N.S.	0.0	
	5	6/10/60	DWR/LET	7.50		0.0200		< 0.005	5.0	0.0	

WALKER MINE
PROGRAM NO. 85-053

SITE LOCATION	SITE NO.	DATE OF SAMPLES	NAME OF SAMPLER	pH (pH units)	Al (mg/l)	Cu (mg/l)	Fe (mg/l)	Zn (mg/l)	FLOW (cfs)	HARDNESS (mg/l)	COMMENTS
	5	6/14/60		0.00		0.0200		N.S.	N.S.	0.0	
	5	7/4/60		0.00		0.0100		N.S.	N.S.	0.0	
	5	8/31/60		0.00		0.0100		N.S.	N.S.	0.0	
	5	5/4/62		0.00		0.0400		N.S.	N.S.	0.0	
	5	5/29/62		0.00		0.0500		N.S.	N.S.	0.0	
	5	9/22/71		0.00		0.0010		N.S.	N.S.	0.0	
	5	6/20/72		0.00		N.S.		N.S.	N.S.	0.0	
	5	7/24/74		0.00		0.0100		N.S.	N.S.	0.0	
	5	10/15/74		0.00		N.S.		N.S.	N.S.	0.0	
	5	5/30/75		0.00		N.S.		0.0100	N.S.	0.0	
	5	6/30/75		0.00		N.S.		N.S.	N.S.	0.0	
	5	7/15/75		0.00		< 0.01		< 0.01	N.S.	0.0	
	5	8/27/75		0.00		< 0.01		< 0.01	N.S.	0.0	
	5	9/15/75		0.00		< 0.01		< 0.01	N.S.	0.0	
	5	10/20/75		0.00		< 0.01		< 0.01	N.S.	0.0	
	5	12/3/75		0.00		< 0.01		< 0.01	N.S.	0.0	
	5	1/8/76		0.00		< 0.01		< 0.01	N.S.	0.0	
	5	2/4/76		0.00		< 0.01		< 0.01	N.S.	0.0	
	5	5/23/77		0.00		N.S.		0.0200	N.S.	0.0	
	5	11/10/77		6.40		0.0100		0.0200	N.S.	0.0	
	5	5/13/80		0.00		0.0600		N.S.	N.S.	0.0	
	5	6/15/80		0.00		0.0030		N.S.	N.S.	0.0	
	5	6/18/80		0.00		< 0.001		N.S.	N.S.	0.0	
	5	7/15/80		0.00		0.0010		N.S.	N.S.	0.0	
	5	7/16/80		0.00		0.0060		N.S.	N.S.	0.0	
	5	8/8/80		0.00		0.0200		N.S.	N.S.	0.0	
	5	8/13/80		0.00		0.0100		N.S.	N.S.	0.0	
	5	8/17/80		0.00		0.0010		N.S.	N.S.	0.0	
	5	9/12/80		0.00		0.0030		N.S.	N.S.	0.0	
	5	10/7/80		0.00		0.0020		N.S.	N.S.	0.0	
	5	11/3/80		0.00		0.1500		N.S.	N.S.	0.0	
	5	5/13/81		0.00		0.0060			0.00	0.0	
	5	6/15/81		0.00		0.0030		N.S.	N.S.	0.0	
	5	7/16/81		0.00		0.0060			0.00	0.0	
	5	8/17/81		0.00		0.0060			0.00	0.0	
	5	9/27/83		5.50		< 0.002		< 0.01	N.S.	0.0	
	5	8/8/84		0.00		< 0.02		N.S.	N.S.	0.0	
	5	3/18/85		7.40		< 0.02		< 0.01	2.0	0.0	Flow Estimated
	5	6/13/85		7.20		0.0200		N.S.	1.90	0.0	
	5	6/25/85		7.20		0.0200		N.S.	1.90	0.0	
	5	9/17/85		7.50		0.0090		0.0010	0.13	0.0	

WALKER MINE
PROGRAM NO. 85-053

SITE LOCATION	SITE NO.	DATE OF SAMPLES	NAME OF SAMPLER	pH (pH units)	Al (mg/l)	Cu (mg/l)	Fe (mg/l)	Zn (mg/l)	FLOW (cfs)	HARDNESS (mg/l)	COMMENTS
	5	4/7/86		0.00		< 0.025		0.0210	N.S.	0.0	
	5	4/28/86		0.00		< 0.025		0.0240	N.S.	0.0	
	5	6/11/86		0.00		< 0.025		0.0250	N.S.	0.0	Metal Scan Done
	5	8/1/86		0.00		< 0.1		< 0.1	N.S.	0.0	
	5	3/29/87		0.00		<0.001		< 0.001	N.S.	0.0	
	5	5/15/87		0.00		< 0.01		< 0.01	N.S.	0.0	
	5	7/27/87		7.15		0.0100		0.0030	N.S.	0.0	
	5	8/4/88		0.00		0.0020		0.0300	N.S.	0.0	
	5	11/3/88	WAC	0.00		0.0030		0.0020	0.056	60.0	
	5	11/3/88	WAC	0.00		0.0030		0.0400	N.S.	50.0	QA/QC Data
	5	1/29/89	WAC	0.00		< 0.001		< 0.002	N.S.	0.0	
	5	6/20/89	WAC	0.00		< 0.01	0.300	< 0.01	0.669	0.0	Flow 200 to 300 GPM
	5	11/14/89	WAC	7.30		< 0.03		0.0120	0.36	42.0	
	5	5/10/90	WAC	0.00		< 0.01		0.0200			
	5	7/17/90	JKT			< 0.001		< 0.001			
	5	10/5/92	WAC	7.40	0.100	0.0016	0.420	<0.02	0.040		EC=129
Dolly Creek, beginning of Tailings	60	8/4/88	WAC			0.1300		0.0700	N.S.	0.0	
	60	7/17/90	JKT			0.0850		0.0010			
	60	10/5/92	WAC	8.00	<0.10	0.0560	0.850	0.0200	0.15		EC=148
USFS Dam on Dolly Creek	6	10/30/59	DWR/LET	7.80		0.4000		0.0500	0.446	0.0	
	6	4/28/60	DWR/LET	7.60		0.4800		0.1000	1.0	0.0	
	6	5/5/60	USGS/Stone	7.60		0.4700		N.S.	N.S.	0.0	
	6	6/10/60	DWR/LET	7.60		0.5300		0.0700	2.0	0.0	Some Silt Moving In Water
	6	7/4/60	DWR/LET	7.90		0.8200	0.900	0.1100	5.0	0.0	Mn=0.20
	6	10/1/60	DWR/LET	8.10		0.3200		0.0600	0.40	0.0	
	6	6/23/61	DWR/LET	8.10		0.4000		0.0400	2.0	0.0	
	6	5/4/62	DWR/LET & EEC	7.40		0.6200		0.1200	3.0	0.0	
	6	6/14/62	DWR/Kretsin	6.50		1.7000		0.7500	0.00	0.0	It Was Raining When Sample Was Taken.
	6	6/29/72	WHC	0.00		5.1000		0.2300	N.S.	0.0	
	6	7/24/74	Crooks	7.80		3.7000		0.0900	N.S.	0.0	
	6	8/2/74		7.80		3.7000		0.0900	N.S.	0.0	
	6	8/8/84		7.60		1.7200		0.1100	0.68	0.0	
	6	3/18/85		7.60		0.8100		0.0560	4.0	0.0	Flow Estimated
	6	6/13/85		7.30		6.8200		N.S.	1.0	0.0	
	6	6/13/85		0.00		6.8200		N.S.	N.S.	0.0	