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# REPORT OF SAMPLING ACTIVITIES

# AND ANALYTICAL RESULTS

# RICHARDSON FLAT TAILINGS

# SUMMIT COUNTY, UTAH

TDD F08-8903-06 - PAN FUT0039HDA

EPA ID UTD980952840

SITE ASSESSMENT

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DATE SUBMITTED: OCTOBER 13, 1989

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transferred into Supplemental Site Inspection Report submitted 12/20/89.

S. Kennedy 12/20/89


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# ~~SAMPLING ACTIVITIES AND ANALYTICAL RESULTS~~ REPORT

RICHARDSON FLAT TAILINGS

SUMMIT COUNTY, UTAH

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## 1.0 INTRODUCTION

This report was prepared to satisfy the requirements of Technical Directive Document (TDD) F08-8903-06, issued to Ecology and Environment, Inc.'s Field Investigation Team (FIT) by the Region VIII office of the U.S. Environmental Protection Agency (EPA). This report details sampling activities and provides a discussion of analytical results for samples collected during this ~~follow-up~~ supp site in~~vestigation~~ (SI) at Richardson Flat Tailings in Summit County, Utah. The follow-up work was designed to support EPA efforts to respond to comments on the nomination of the site to the National Priorities List under the current Hazard Ranking System. insp

The FIT performed the field work from July 18 through July 20, 1989. FIT members conducting this investigation included Kevin Mackey, project officer; Steve Yarbrough, site safety officer and Dan Kenney, sampler. Site access was coordinated by Tom Burns of EPA and Regional ~~Council.~~ Counsel Sampling procedures used during this investigation conform to requirements established in the Region VIII Standard Operating Procedures for Field Operations at Hazardous Waste Sites (SOP III-2 E & E 1989). The sampling effort was conducted under the approved Sampling Plan (TDD F08-8903-06). ?

## 2.0 OBJECTIVES

The major objectives of the follow-up ~~field~~ ? activities at Richardson Flat Tailings were to:

Pull together all responses to comments

- o Define the surface water drainage patterns throughout the site area;

- o Verify a release of inorganic contaminants into Silver Creek;

- o Identify source material contributing to metals contamination in Silver Creek.

Dist to GW Pace?

All of the aforementioned objectives were addressed during the July 18 through July 20, 1989 sampling effort. ~~However, the exact source of metals contamination has not been verified.~~

## 3.0 BACKGROUND

### 3.1 LOCATION AND SITE DESCRIPTION

Richardson Flat Tailings lies within the northwest quarter of Section 1 and the northeast quarter of Section 2, Township 2 South, Range 4 East, Salt Lake Meridian, in Summit County, Utah. The tailings cover an area of approximately 160 acres on a topographic depression located one and one-half miles northeast of the town of Park City (Figure 1).

The mill tailings at Richardson Flat came from the Keetley Ontario Mine and other metal mining operations currently owned by United Park City Mines (UPCM). The most recent use of the area for tailings disposal was from 1975 to 1981. During that time UPCM had all its mining properties leased to either Park City Ventures or Noranda Mining, Inc. who constructed and operated milling facilities on UPCM properties. In May of 1974, the Utah Division of Health - Water Pollution Committee approved plans by Park City Ventures to construct an embankment, dikes and a diversion ditch to contain mill tailings deposited on Richardson Flat.

## 3.2 PREVIOUS WORK

SI?

~~RS~~ insp

The original FIT site investigation at Richardson Flat Tailings was conducted during the summer of 1985. One background monitoring well was installed by the FIT as part of the investigation. The background well and two existing UPCM wells located at the base of the dam were sampled. In addition, six surface water samples, one surface soil sample, two subsurface soil samples, four surface tailings samples and four subsurface tailings samples were collected during the 1985 sampling effort. Findings of the original ~~field investigation~~ site insp are discussed in the Report of Sampling Activities (TDD R8-8505-27) and the Analytical Results Report (TDD R8-8508-07).

In July, 1986 the FIT conducted high-volume air sampling at the site. A report of air sampling activities (TDD R8-8605-12) and an analytical results report for air sampling (TDD R8-8608-05) provide details of field work and data results.

The FIT submitted a Hazard Ranking System (HRS) package for Richardson Flat Tailings on September 3, 1987. Based on documented observed releases of inorganic contaminants to surface water and air, the site received an overall migration score exceeding the 28.5 threshold value required for nomination to the National Priorities List (NPL). ~~Proposal of~~ Richardson Flat Tailings to the NPL ~~appeared in the Federal Register~~ on June 14, 1988, EPA proposed

## 3.3 ~~4.0~~ SITE GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

### 3.3.1 ~~4.1~~ GEOLOGY

Richardson Flat Tailings lies within a broad, gently rolling flat north of Park City, identified as Parleys Park. Over half of the total area (approximately 35 square miles) of Parleys Park is underlain by unconsolidated deposits of a poorly sorted mixture of clay to cobble size material. The unconsolidated deposits, which are saturated to within a few feet of the ground surface, occur primarily along Silver

and East Canyon Creeks and in the flats northwest of Quarry Mountain. The rest of the park is underlain by consolidated rocks including volcanics of Tertiary origin and Knight Conglomerate (Baker 1970).

## 3.3.2 ~~4.2~~ HYDROGEOLOGY

The water sources for wells in the Heber-Kamas-Park City area are primarily consolidated rocks in the mountains and unconsolidated alluvial fill in the valleys. Few wells exist within Parleys Park, so the unconfined aquifer characteristics in the area are not well understood. There appears to be no well-defined beds of material of very high or very low permeability, and no indications of the existence of artesian conditions. The average saturated thickness of the unconfined aquifer is broadly estimated to be about 40 feet.

The general ground water flow direction corresponds with the regional surface water flow directions. Recharge to ground water in the unconsolidated deposits in Parleys Park comes from direct infiltration of precipitation, runoff from the mountains and secondarily from subsurface inflow through consolidated rocks (Baker 1970).

add Map #1 "Parley Park" show Weber & Park City direction of flow

## 3.3.2 ~~4.3~~ HYDROLOGY

Parleys Park is drained by East Canyon Creek and Silver Creek, both tributaries to the Weber River. Silver Creek flows west of and near the northern extension of Richardson Flat Tailings, ~~which~~ and has been channelized for irrigation purposes both upstream of and downstream ~~of~~ from the tailings. The nearest diversion from Silver Creek downstream of the tailings is the G.M. Pace ditch used for flood irrigation of alfalfa fields and pasture. location?

A diversion ditch within the tailings ~~has been~~ was constructed in 1977? as part of the effort by Park City Ventures to contain tailings material deposited on Richardson Flat. Construction of the diversion ditch has altered the drainage pattern as depicted on the 1955 USGS topographic map (Figure 1). The diversion ditch originates east of the tailings and

part of approved plan?

terminates near the embankment at the northwest portion of the tailings. Figure 2 depicts the course of the diversion ditch as viewed on an oblique aerial photograph provided by EPA Environmental Monitoring Systems Laboratory (EMSL), dated June 1984.

Normal annual total precipitation for Richardson Flat is reported between 16 and 20 inches (Baker 1970).

## ~~5.0~~ 4.0 SAMPLING ACTIVITIES

### ~~5~~4.1 SAMPLE COLLECTION

FIT sampling activities at the Richardson Flat Tailings began on Tuesday, July 18, 1989 and continued through July 20, 1989. The sampling team consisted of Kevin Mackey, project officer, Steve Yarbrough, site safety officer and Dan Kenney, sampler.

Samples collected during this effort were shipped on July 20, 1989 to the following Contract Laboratory Program (CLP) laboratories for analysis: Samples of tailings and surface water were shipped as low hazard environmental samples to Keystone Environmental Resources in Houston, Texas for total metals analysis under Regular Analytical Services case number 12334. However, due to contractual difficulties Keystone Environmental performed only mercury analysis on these samples. Under the direction of the Sample Management Office (SMO) these samples were shipped by Keystone Environmental to Silver Valley Laboratory in Kellogg, Idaho for the remainder of the analyses. Sediment samples were shipped to Silver Valley Laboratory in Kellog, Idaho under Special Analytical Service case number 4725H. These samples were sieved in an 80 mesh sieve in order to remove large gravel and organic matter prior to analysis for total metals.

4.5

Initially, the FIT proposed screening sediment samples using FASP XRF analysis for metal contaminant detection. However, during the sampling period the FIT XRF experienced operating problems and was not available to perform the analysis. The FIT opted to send a single

sediment sample from each sample location to the CLP laboratory for sieving and analysis.

### 4/5.1.1 Tailings Samples

The FIT collected a total of five tailings samples from various locations throughout the tailings impoundment, Figure 2. These samples included:

| | |
|---|---|
| RFT-TA-1 | Eastern end of tailings between access road and diversion ditch. |
| RFT-TA-2 | Southern end of tailings pile between Union Pacific Railroad and diversion ditch. |
| RFT-TA-3 | Southwestern edge of tailings between Union Pacific Railroad and diversion ditch. |
| RFT-TA-4 | Flood plain tailings located ~~next to~~ on west side of Silver Creek on the western edge of Union Pacific Railroad bed. |
| RFT-TA-5 | Downgradient-most sample along the flood plain tailings near Silver Creek. |

All tailings samples were collected using a plastic scoop or a decontaminated stainless steel spoon. The FIT composited samples on a plastic sheet prior to placing them in the appropriate sample containers.

### 4/5.1.2 Surface Water Samples

The FIT collected 12 surface water samples during the course of this investigation. Two sample aliquots were collected at each station. One sample (designated by the station location number followed by an "A" designator) was filtered with a 0.45 micron filter and a barrel filter prior to preservation with nitric acid to a pH <2. The second aliquot

(designated by location number followed by a "B" qualifier) was preserved in the same manner without filtering. These samples were collected from Silver Creek located west of the tailings pond, and from a diversion ditch which conveys runoff around the tailings impoundment and from a marshy area located downgradient of the diversion ditch at the base of the tailings dam. The FIT collected one additional sample from the Pace Homer irrigation ditch which discharges into Silver Creek upgradient of the tailings impoundment. Sample locations are shown in Figure 2. Specifically, the samples included:

| | |
|---|---|
| RFT-SW-1 | Background sample collected from the Pace Homer Ditch. |
| RFT-SW-2 | Sample collected from Silver Creek near the floodplain tailings. |
| RFT-SW-3 | Additional sample collected from Silver Creek near floodplain tailings. |
| RFT-SW-4 | Upgradient sample in runoff diversion ditch. |
| RFT-SW-5 | Samples collected from the diversion ditch at possible point of tailings entry. |
| RFT-SW-6 | Sample collected from point of diversion ditch discharge into marshy area. |
| RFT-SW-7 | Sample collected from a marshy area upgradient of the confluence with Silver Creek. |
| RFT-SW-8 | Sample collected from the point where Silver Creek enters marshy area. |
| RFT-SW-9 | Sample collected at culvert area where Silver Creek and marshy area drain under U.S. Route 40. |

RFT-SW-10 Downgradient sample collected 800 feet upstream of the G.M. Pace irrigation diversion point.

from Silver Cr.

RFT-SW-16 Surface water sample collected downstream of the confluence of Pace Homer Ditch and Silver Creek.

RFT-SW-17 Background surface water sample collected from Silver Creek approximately 20 feet upstream of the confluence of the Pace Homer ditch and Silver Creek.

Heavy construction activity upgradient of surface water sample locations RFT-SW-2 and RFT-SW-3 resulted in highly turbid water at the time of sampling. The turbidity in the surface water was caused by heavy machinery moving through Silver Creek and disturbing streambed material. The additional suspended sediment could result in elevated metals concentrations in the unfiltered aliquots of samples collected from these locations.

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### 4/5.1.3 Sediment Sample Collection

The FIT collected sediment samples in conjunction with each surface water sample. Each sediment sample was collected immediately following surface water sample collection. Each sample was collected using a plastic scoop or a decontaminated stainless steel spoon. The FIT composited each sediment sample on a plastic sheet prior to placing the sample in the appropriate sample container.

### 4/5.1.4 Opportunity Samples

After performing a site reconnaissance the FIT selected two locations for opportunity sample collection. Additional surface water samples (RFT-OPW-1A and RFT-OPW-1B) and a sediment sample (RFT-OSE-1) were collected from a ponded seep area at the base of the tailings dam. A second opportunity sediment sample (RFT-OSE-2) was collected from a small seep area located approximately 50 feet northeast of the ponded seep area, along the face of the tailings dam (Figure 2). Flow in this

seep area was insufficient for surface water sample collection. Surface water sample RFT-OPW-1A was filtered prior to preservation with nitric acid to a pH <2.

## 5.0 QUALITY CONTROL

The FIT closely adhered to quality control procedures during the sampling activity as described in the Sampling Plan and in SOP III-2, Chapter 6.

### 5.1 ~~5.2.1~~ Instrument Calibration

Instruments utilized on this SI were calibrated by FIT members in the field. An Orion pH meter and a specific conductivity meter were calibrated daily and used at each surface water sample collection point. In addition, pH paper was used to determine tailings and sediment pH at each sample location. All pH, temperature and specific conductance data can be seen in Tables 2 and 3 of this report. Daily instrument calibrations can be found in the Richardson Flat logbook (TDD F08-8903-06).

### 5.2 ~~5.2.2~~ Sample Containers

All sample containers were obtained though the Sample Management Office (SMO) Bottle Repository. A rinsate blank was collected for each day of sampling and submitted to the Contract Laboratory Program (CLP) laboratory to assess quality control (quality assurance on equipment decontamination and field handling).

### 5.3 ~~5.2.3~~ Background Samples

The FIT collected background samples for both the Silver Creek and diversion ditch drainage. Upgradient surface water and sediment samples RFT-SW-1A, RFT-SW-1B and RFT-SE-1 were collected from the Pace Homer Ditch (an irrigation ditch which discharges into Silver Creek upgradient of the floodplain tailings area). Additional surface water and sediment

samples RFT-SW/SE-16 and RFT-SW/SE-17 were collected on Silver Creek upgradient of the floodplain tailings. Samples RFT-SW/SE-16 and RFT-SW/SE-17 were collected downgradient and upgradient of the confluence of the irrigation ditch with Silver Creek, respectively.

An upgradient surface water and sediment sample (RFT-SW/SE-4) was collected from the eastern end of the runoff diversion ditch which conveys runoff from the surrounding hills near the tailings pond (Figure 2).

### 5.4 ~~5.2.4~~ Blank Samples

The FIT prepared a total of three blanks for this sampling effort. RFT-SW-12A, RFT-SW-12B, RFT-SW-15A, RFT-SW-15B, RFT-SW-18A and RFT-SW-18B were field rinsate blanks (prepared to check decontamination of sampling equipment).

### 5.5 ~~5.2.5~~ Duplicate Samples

Samples RFT-SW-11A and RFT-SW-11B were collected as a duplicate of RFT-SW-2A and RFT-SW-2B. These samples provide verification of laboratory accuracy.

### 5.6 ~~5.2.6~~ Decontamination Procedures

The FIT followed decontamination procedures as set forth in SOP III-2, Chapter 11 Equipment Decontamination Procedures. This procedure involved the following steps: a tap water wash, soapy water wash, triple deionized water rinse and air drying.

## 5.7 ~~5.3~~ DOCUMENTATION

Following sample collection, all samples were handled in strict accordance with chain of custody protocol prescribed by the NEIC Procedures Manual for the Evidence Audit of Enforcement Investigation by Contractor Evidence Audit Teams, April 1984 (EPA-330/9-81-003R). Table

1 of this report includes the sample identification numbers, sample tag numbers, traffic report numbers and chain of custody number. Copies of traffic reports, chain of custody records and pertinent airbills are available in TDD file F08-8903-06. The Richardson Flat logbook has a complete record of all documentation information (TDD F08-8903-06).

## 6.0 ~~FIELD OBSERVATIONS~~ RESULTS / FINDINGS

The FIT spent three days collecting samples from the tailings and runoff features at the Richardson Flat Tailings facility. Weather conditions were favorable with no appreciable precipitation occurring during the sampling effort. 4.?

Start w/

Surface water samples RFT-SW-2 and RFT-SW-3 collected from Silver Creek were highly turbid due to heavy construction occurring approximately 200 feet upstream of the sample locations. All field observations for this sampling effort are recorded in the Richardson Flat logbook (TDD F08-8903-06). 4.?

FIT sampling activities were observed by UPCM personnel Kerry Gee and Ed Osika and consultant Bill Bullock of MSE (an environmental consulting firm from Butte, Montana). The FIT provided split samples to UPCM personnel for each sample FIT collected. Each split was treated in an identical manner to those samples FIT submitted for CLP analysis. 4.?

Samples were collected in a manner which took into account drainage patterns throughout the Richardson Flat area. The FIT collected samples in order to assess possible migration of contaminants offsite into Silver Creek and determine the presence of contaminants in these drainage areas. Additional samples were taken from two possible seep locations at the base of the tailings dam in order to assess the likelihood of contaminant migration via seeps and springs from the tailings pond area. 4.?

Two additional tailings samples were collected from the "flood plain tailings" located along Silver Creek adjacent to the Richardson 4.?

finding

Flat site. There is no containment feature associated with these areas and the tailings material could easily be washed into Silver Creek during storm events. According to plat maps obtained from the Summit County Assessor's office, these floodplain tailings are on land which is currently owned by the U.S. Department of Transportation. 4.9

The FIT collected samples from the diversion ditch around the tailings pile. These samples were taken in such a manner as to determine availability of contaminated material for transport offsite via the diversion ditch structure. In addition, these samples will help the FIT assess the integrity of runoff control structures onsite. 4.7

## 7.0 QUALITY ASSURANCE REVIEW

move to 5.8

The inorganic data packages were examined thoroughly by FIT chemists for compliance using EPA Functional Guidelines for Reviewing Inorganic Data and the approved Region VIII FIT CLP Quality Assurance Standard Operating Procedures (SOP). The quality assurance reports and data sheets are attached as Appendix C. The data packages were judged acceptable overall, with qualifications as follows.

### 7.1 SEDIMENT SAMPLES

Spike recoveries were low for antimony and thallium indicating positive results for these elements are biased low and are flagged "j", estimated. Selenium recoveries were unacceptably low and positive values are flagged "j" and undetected values are rejected, "r". Thallium and selenium data were also flagged "j" for below criteria correlation in method of standard additions. Cadmium data were flagged "j", estimated, due to percent difference in serial dilution results.

### 7.2 WATER AND TAILINGS SAMPLES

Samples were transferred from one CLP laboratory to another by the Sample Management Office. Mercury results are flagged "j" estimated because of missed holding times. Recoveries for thallium and selenium

were low and were flagged as described above. Lead results were flagged "j" due to duplicate results. Arsenic data were flagged "j", estimated data, due to poor correlation coefficients for MHP 517, MHP 518 and MHP 504. Arsenic and zinc solid sample results were flagged "j" due to high serial dilution results. Field duplicates showed good relative agreement. Field blanks were free of contamination above contract detection limits except that arsenic in RFT-SW-12B was detected at 12 µg/l.

## 8.0 ANALYTICAL RESULTS

Incorporate in Chap 6.

The results of the inorganic analysis are shown in Tables 3,4 and 5. The sampling locations and the concentrations of arsenic and lead at each sample location are depicted in Figures 3 through 5. Each figure gives relative concentrations of contaminants for each medium sampled (i.e. Figure 3 contains lead and arsenic concentrations for tailings samples. Figure 4 contains lead and arsenic concentrations for surface water samples. Figure 5 contains lead and arsenic concentrations for sediment samples).

The following is a discussion of analytical results for each medium sampled.

### 8.1 TAILINGS SAMPLES

Samples collected from the Richardson Flat tailings pond showed fairly constant concentrations of lead and arsenic. In particular, arsenic concentrations in tailings samples were relatively constant at approximately 200 mg/kg while lead concentrations were slightly more variable (ranging from 2580 mg/kg to 4520 mg/kg). These samples were collected from an area immediately south of the tailings pond diversion ditch. There was no effective barrier to erosional transport of this material into the diversion ditch. Contaminants detected in this material could potentially be transported via the diversion ditch into the Silver Creek drainage.

Samples collected from the floodplain tailings (RFT-TA-4 and RFT-TA-5) exhibited a higher degree of variability. Arsenic concentrations in sample RFT-TA-4 were 859 mg/kg while sample RFT-TA-5 had an arsenic concentration of 175 mg/kg. Lead concentrations were also highly variable with sample RFT-TA-5 having a lead concentration of 31,600 mg/kg while RFT-TA-4 had a concentration of 9300 mg/kg. These tailings were also susceptible to erosional transport into Silver Creek with no visible containment structure present.

## 8.2 SURFACE WATER SAMPLES

Analysis of surface water samples collected from Silver Creek showed significant levels of lead, arsenic and mercury. Specifically, these contaminants were detected at largest concentration in samples collected near the floodplain tailings area (RFT-SW-2B, RFT-SW-3B) and in samples collected from the upper reaches of the Richardson Flat diversion ditch (RFT-SW-4B). Elevated arsenic and lead levels in samples RFT-SW-2B and RFT-SW-3B may be due to turbidity generated by heavy construction activities upsream on Silver Creek. In all cases, the unfiltered surface water samples showed much higher concentrations of arsenic, lead and mercury than the filtered samples (samples with an "A" designation).

Arsenic, lead and zinc levels were also higher in opportunity sample RFT-OPW-1B. The FIT collected this sample from a seep area at the base of the tailings pond. Arsenic concentrations in RFT-OPW-1B were 33.1 µg/l while lead and zinc concentrations were 68.2 µg/l and 759 µg/l, respectively. Mercury was not detected in significant quantities in this seep sample.

Contaminant concentrations in opportunity sample RFT-OPW-1B suggest a slight contribution to surface water contamination from the Richardson Flat Tailings area. However, a higher level of contamination was detected in Silver Creek samples (RFT-SW-2B and RFT-SW-3B). Surface water sample RFT-SW-2B had arsenic concentrations of 619 µg/l, lead 20,000 µg/l, mercury 11.50 µg/l and zinc 19,300 µg/l significantly

elevated above concentrations in background samples RFT-SW-1A and B, RFT-SW-16A and B and RFT-SW-17A and B. Sample RFT-SW-3B had elevated concentrations of arsenic 41.9 µg/l, lead 1100 µg/l and zinc 3790 µg/l, while mercury was not detected. Based on these concentrations the floodplain tailings and additional upgradient sources appear to be contributing arsenic, lead, mercury and zinc to the Silver Creek drainage.

At each sample location, the unfiltered surface water samples showed higher levels of contamination indicating that a majority of the contaminants were suspended in solution. The filtered and the unfiltered surface water samples exhibit a similar trend in relative contaminant magnitudes and in the contaminants detected. Downgradient concentrations of lead, arsenic and mercury are elevated above those detected in background samples for the filtered samples.

## 8.3 SEDIMENT SAMPLES

Analysis of sediment samples collected from Silver Creek, the marshy area and the storm runoff diversion ditch around the tailings pond indicated significant levels of arsenic, cadmium, lead, mercury and zinc contamination in the area. The discussion focuses on arsenic since the other contaminants correlate with arsenic.

The background sediment sample collected from Silver Creek above the Pace Homer ditch confluence (RFT-SE-17) had a concentration of 555 mg/kg of arsenic. However, immediately downstream of the confluence, sample RFT-SE-16 had a lower arsenic concentrations 211 mg/kg. Meanwhile sample RFT-SE-1 collected from the Pace Homer ditch above the confluence of Silver Creek showed an 83.2 mg/kg concentration of arsenic. These concentrations indicate an additional source of contamination upstream of the Richardson Flat tailings dam and the floodplain tailings.

Samples RFT-SE-2 and RFT-SE-3 were collected from Silver Creek near the floodplain tailings and upstream of the convergence with the marsh

area at the base of the tailings pond. These samples exhibited arsenic concentrations of 570 mg/kg and 427 mg/kg, respectively. However, these relatively large concentrations are not three times the levels detected in background samples RFT-SE-16 and RFT-SE-17. These sediments contained arsenic and lead at concentrations greater than the floodplain tailings.

Samples collected from the marsh area also showed significant concentrations of arsenic. Those sediment samples collected from the marsh area confluence with Silver Creek (RFT-SE-8 and RFT-SE-9) exhibited higher arsenic concentrations than those samples collected from the area where the diversion ditch discharges into the marsh (RFT-SE-6 and RFT-SE-7 in Figure 2). Again, arsenic values were not three times greater than those detected in the background samples.

Arsenic concentrations in the diversion ditch samples (RFT-SE-4, RFT-SE-5 and RFT-SE-6) actually decreased in a downgradient manner across the tailings pile. The highest concentration of arsenic in the diversion ditch was detected in upgradient sample RFT-SE-4, 776 mg/kg and consistently decreased in the more downgradient samples (RFT-SE-5 at 320 mg/kg and RFT-SE-6 at 261 mg/kg). These samples were collected from areas with little hydraulic gradient, low flow and without a well-defined channel. Heavy marsh vegetation was present. Samples RFT-SE-5 and RFT-SE-6 contained a large amount of decaying organic matter which may have decreased arsenic concentration.

Downgradient sediment sample RFT-SE-10 was collected 800 feet upgradient of an irrigation diversion structure on Silver Creek. This sample exhibited a low arsenic concentration, 5.4 mg/kg, suggesting a significant decrease in arsenic levels within 600 feet of RFT-SE-9, collected from the marsh, which showed much higher contamination.

The result of these analyses indicate that a majority of the elevated arsenic concentrations may be the result of contribution from additional tailings located upgradient along Silver Creek. This

occurrence indicates additional sources other than the tailings stored in the Richardson Flat tailings pond.

## 8.4 OPPORTUNITY SAMPLES

After careful reconnaissance of the tailings dam and the surrounding area the FIT discovered two locations which warranted additional sampling.

Samples RFT-OPW/OSE-1 and RFT-OSE-2 were collected from seep areas at the base of the tailings dam. Opportunity sediment sample RFT-OSE-1 was collected from a ponded area at the base of the tailings dam and showed elevated lead (12,500 mg/kg) and arsenic (751 mg/kg). Sediment sample RFT-OSE-2 was collected from a seep area located approximately 50 feet north of the pond area where opportunity sample RFT-OSE-1 was collected. Flow from this seep was minimal and the FIT was not able to collect a water sample. Sediment sample, RFT-OSE-2 contained the highest overall arsenic concentrations, 839 mg/kg. However, lead concentrations in RFT-OSE-2 were roughly half of those detected in RFT-OSE-1 (6900 mg/kg). These arsenic and lead concentrations exceed those found in the surface tailings samples from the Richardson Flat.

These concentrations indicate a possible loss of integrity in the tailings dam control structure. The presence of these contaminants in seep samples may indicate a contribution of contamination to Silver Creek from the tailings pond area.

## 9.0 SUMMARY AND CONCLUSIONS

Results ? → Chap 6

After a systematic sampling effort, the FIT detected a number of inorganic contaminants present in tailings, surface water and sediment samples collected from the Silver Creek and Richardson Flat tailings area. The surface water results are more subject to transitory changes due to turbidity than are the sediment results, although they show the same trends.

RESULTS

Arsenic, lead and mercury were detected in most of the samples. The highest concentrations of lead and arsenic were detected in upgradient samples RFT-SE-17 (555 mg/kg arsenic and 12,200 mg/kg lead) and RFT-SE-4 (776 mg/kg arsenic and 13,600 mg/kg lead). Sediment concentrations of arsenic and lead are fairly constant from upgradient sample RFT-SE-17 downstream along Silver Creek to downgradient sample RFT-SE-10. Arsenic levels range from 211 mg/kg in sample RFT-SE-16 to 590 mg/kg in sample RFT-SE-2.

Arsenic and lead concentrations may actually be fairly constant throughout the Silver Creek drainage studied in this investigation with variations in sample results possibly due to non-homogenous depositional variations in contaminated sediment material. Contribution of contaminants by the floodplain tailings that were sampled is not well understood.

Samples collected from the Richardson Flat run-off diversion ditch also showed elevated lead and arsenic contamination. However, concentrations of both compounds decrease consistently in downgradient samples. Sample RFT-SE-4, collected from the eastern upgradient end of the diversion ditch, has roughly twice the arsenic concentrations as those detected in downgradient diversion ditch samples. This may be due to the large amount of decaying organic matter present in the downgradient samples.

Samples collected from sediment in Silver Creek indicate additional sources of contamination upstream of the Richardson Flat tailings dam. However, seep and sediment samples collected from the face of the tailings dam and sediment samples collected from the diversion ditch indicate some contribution from the tailings area.

In general, the weight of the evidence indicates a substantial contaminant contribution to Silver Creek by sources upgradient of the Richardson Flat tailings area. Additional contamination is migrating from the Richardson Flat tailings area and could also be affecting water quality in the Silver Creek drainage.

## 10.0 REFERENCES


Baker, C. H., Jr., 1970, Water Resources of the Heber-Kamas-Park City Area North Central Utah, Utah Dept. of Nat. Res. Tech. Publ. No. 27.

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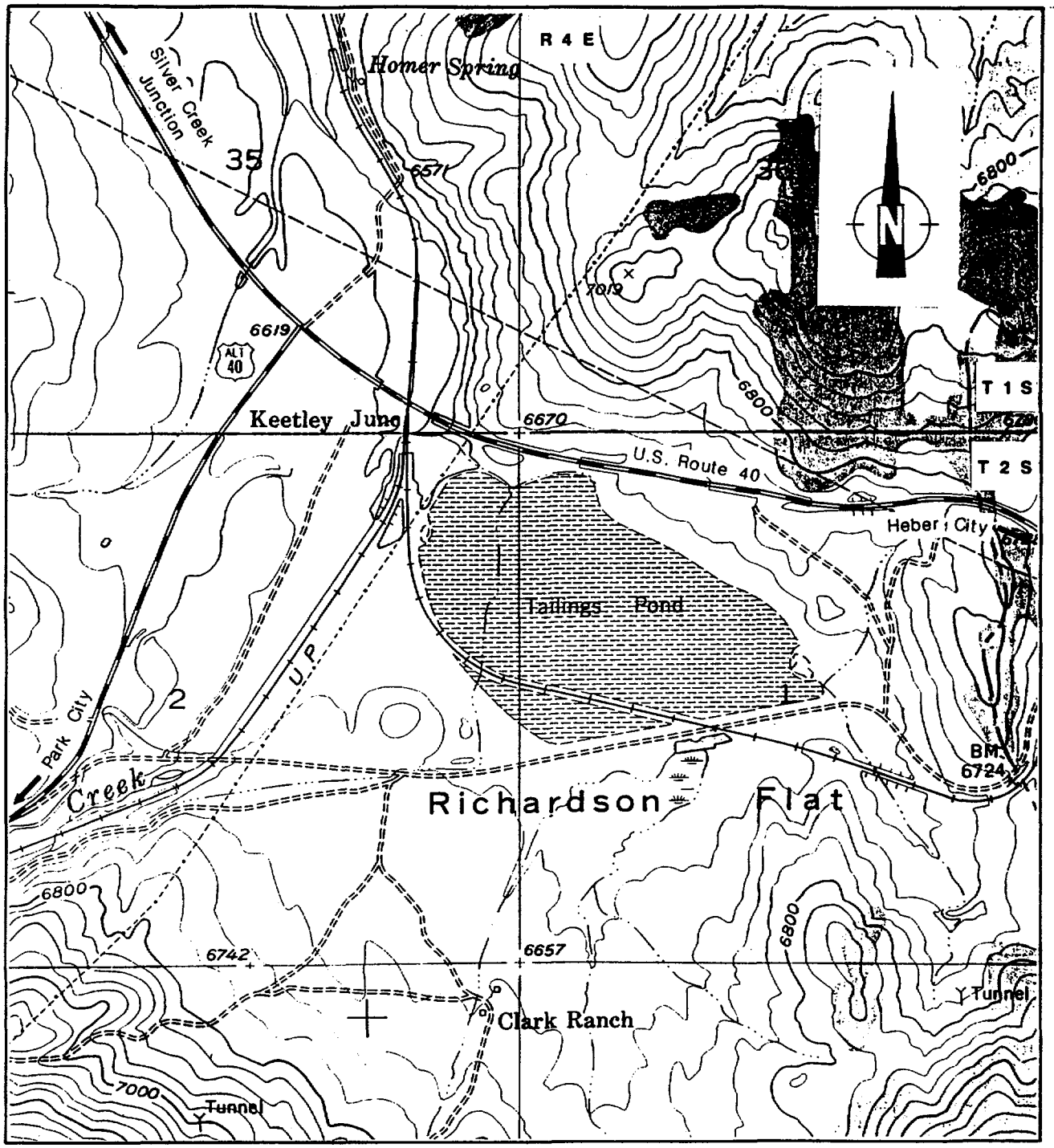
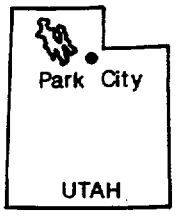



Source: Park City Quadrangle, Utah. USGS, 1955

0 1/2 1 Mile

LOCATION MAP




FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

TITLE:

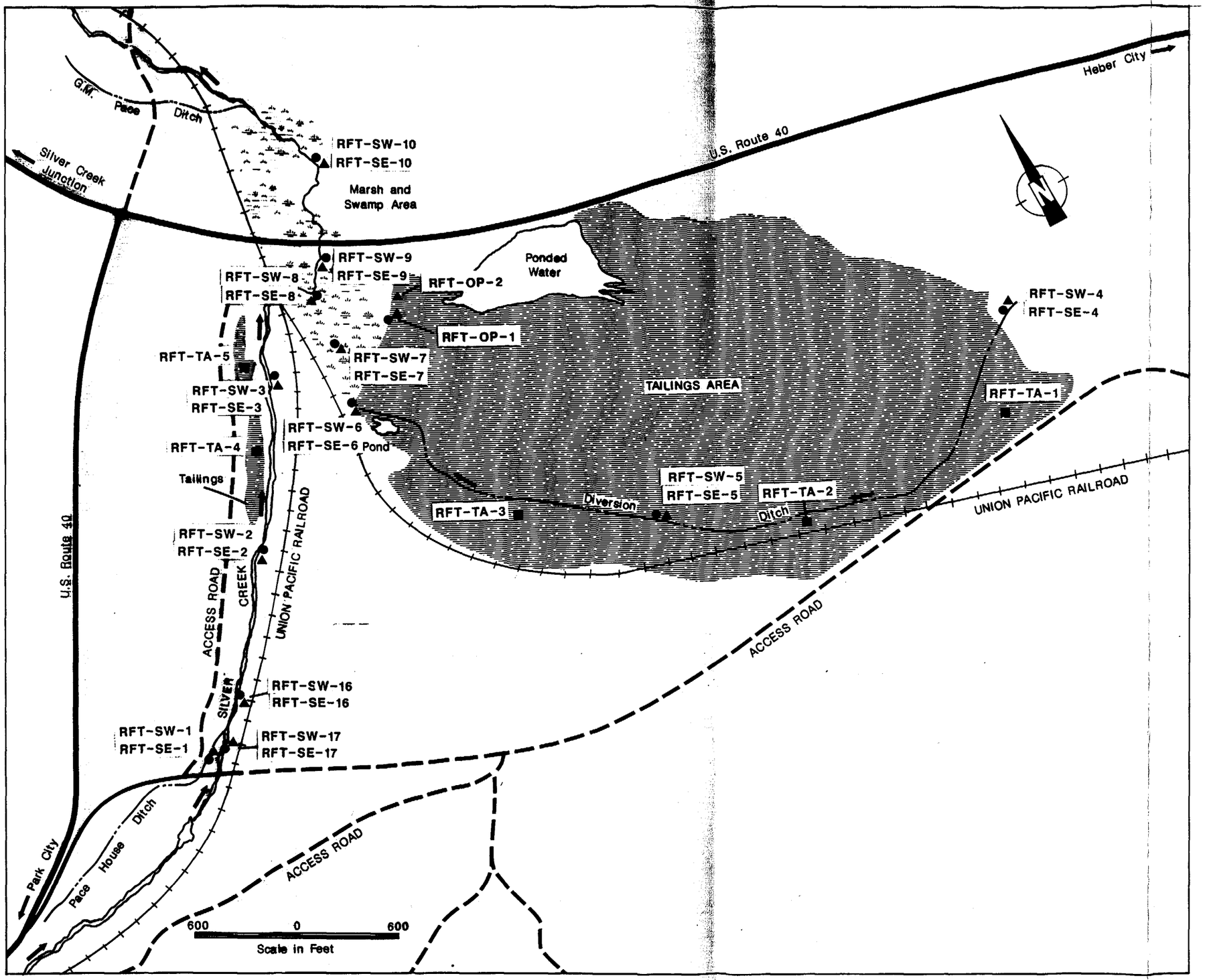
RICHARDSON FLAT TAILINGS
Park City, Utah
SITE LOCATION MAP

T.D.D. F08-8903-06

ecology & environment, inc.
DENVER, COLORADO

FIG. 1

Date: 06/89 Drawn by: RSM Scale: _____




LEGEND

- ■ Tailings sample
- ● Surface water sample
- ▲ Sediment sample

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

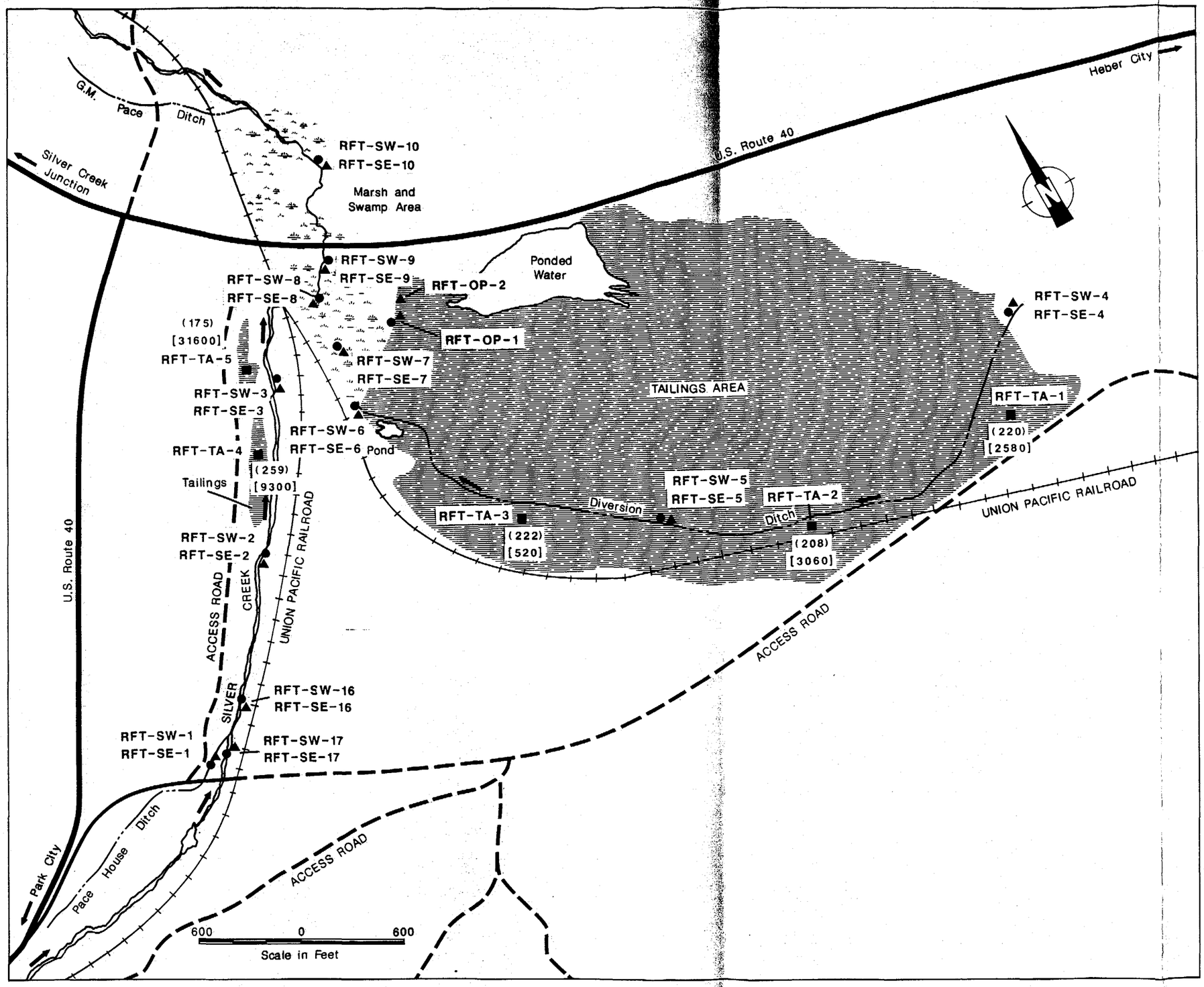
TITLE:
RICHARDSON FLAT TAILINGS
Park City, Utah
SAMPLE LOCATION MAP

T.D.D. F08-8903-06

ecology & environment, inc.
DENVER, COLORADO

FIG. 2

Date: 08/89 Drawn by: RSM Scale: _____




LEGEND

- ■ Tailings sample
- ● Surface water sample
- ▲ Sediment sample

**(259)** Arsenic concentration (mg/kg)

**[31600]** Lead concetration (mg/kg)

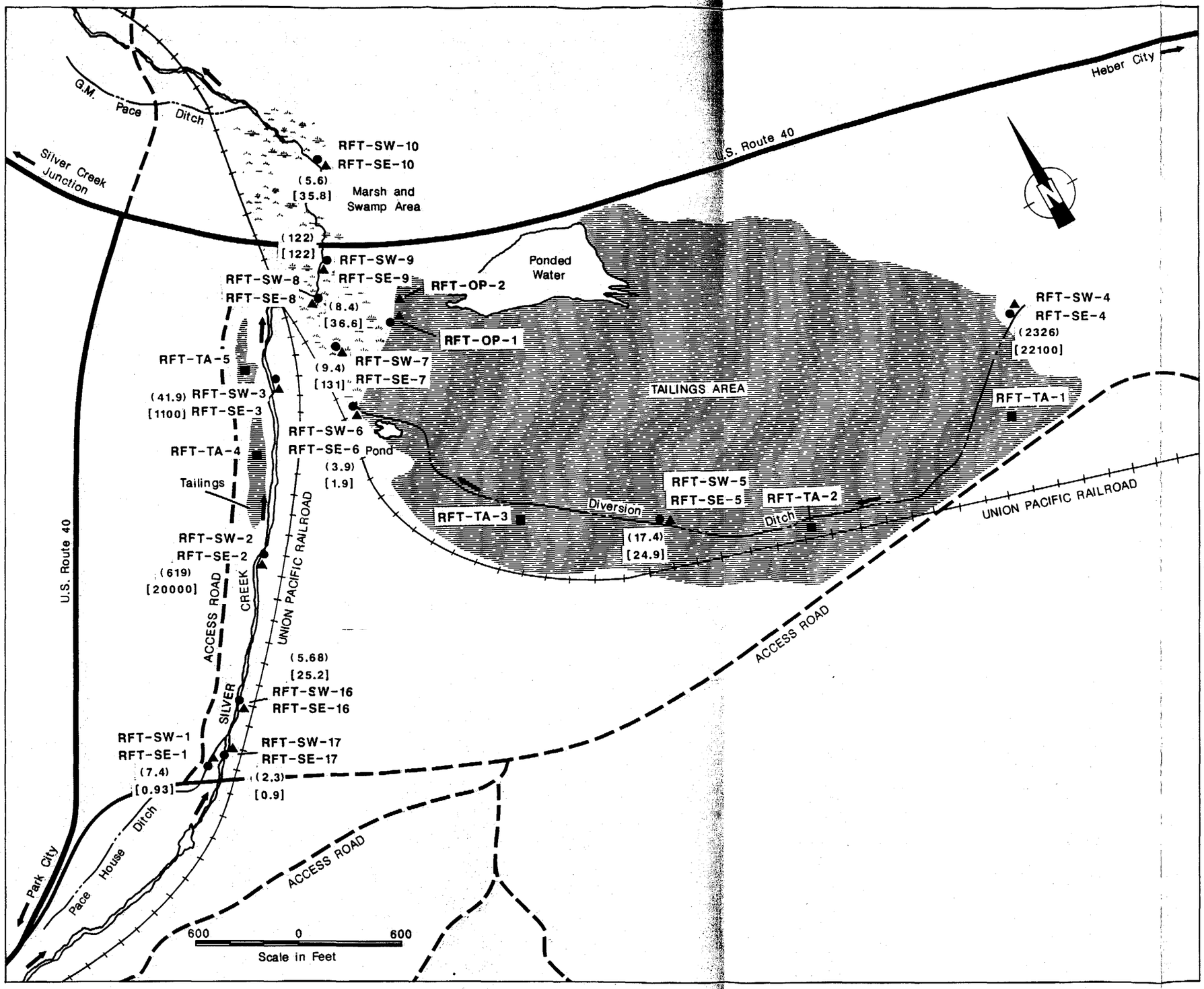
FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

TITLE:
RICHARDSON FLAT TAILINGS
Park City, Utah
CONCENTRATION OF LEAD AND ARSENIC IN TAILINGS SAMPLES
T.D.D. F08-8903-06

ecology & environment, inc.
DENVER, COLORADO

FIG. 3

Date: 08/89 Drawn by: RSM Scale:




LEGEND

- ■ Tailings sample
- ● Surface water sample
- ▲ Sediment sample

[20000] Lead concentration (ug/l)

(619) Arsenic concentraton (ug/l)

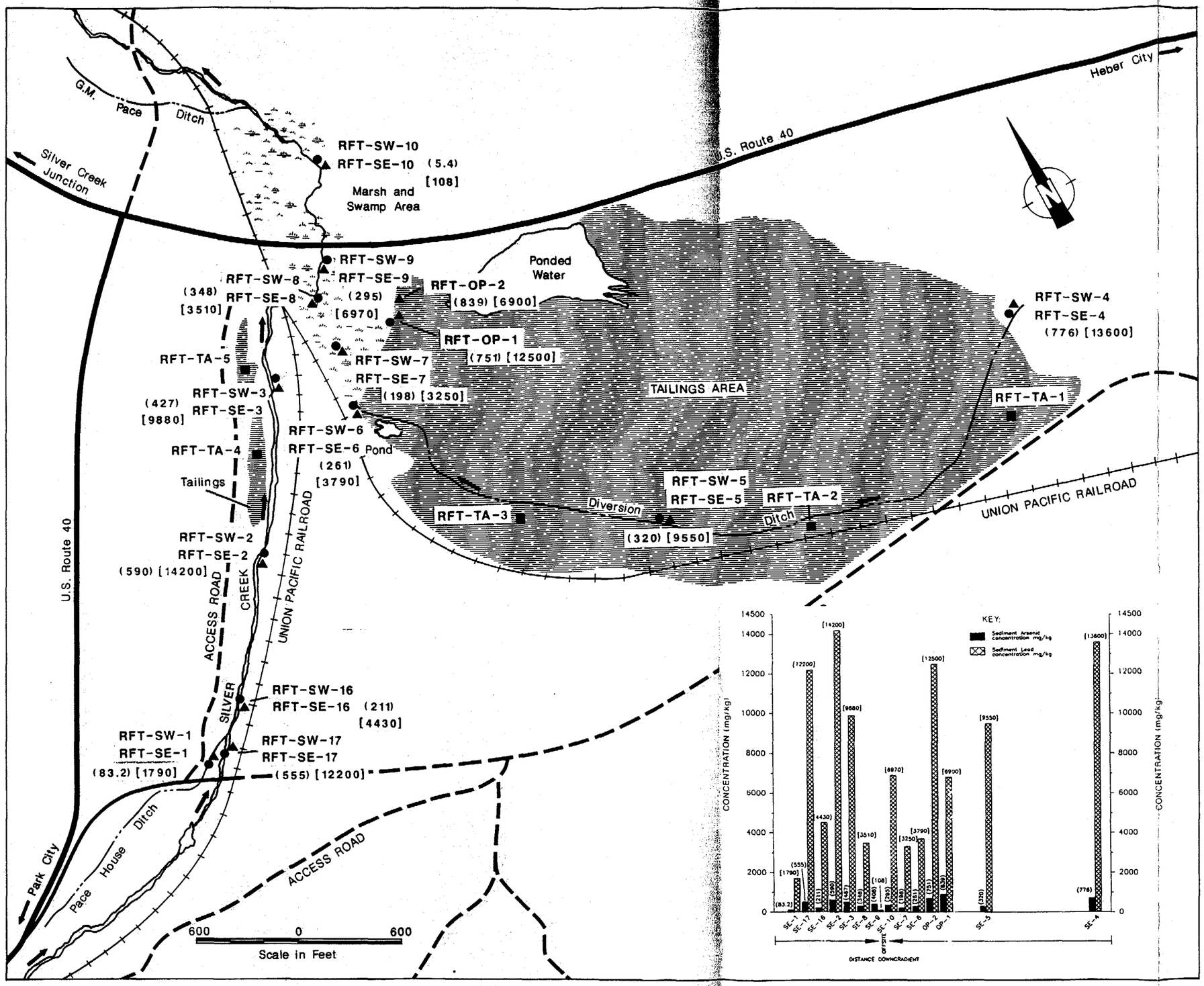
FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

TITLE:
RICHARDSON FLAT TAILINGS
Park City, Utah
CONCENTRATIONS OF LEAD AND ARSENIC IN UNFILTERED WATER SAMPLES (ug/l)
T.D.D. F08-8903-06

ecology & environment, inc.
DENVER, COLORADO

FIG. 4

Date: 08/89 Drawn by: RSM Scale:




LEGEND

- ■ Tailings sample
- ● Surface water sample
- ▲ Sediment sample
- (839) Sediment Arsenic concentrations mg/kg
- [14200] Sediment Lead concentrations mg/kg

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

TITLE:
RICHARDSON FLAT TAILINGS
Park City, Utah
SEDIMENT ARSENIC AND LEAD CONCENTRATION MAP

T.D.D. F08-8903-06

ecology & environment, inc.
DENVER, COLORADO

FIG. 5

Date: 08/89 Drawn by: RSM Scale:

TABLE 1 SURFACE WATER FIELD DATA SITE: Richardson Flat Tailings

| SAMPLE ID. | SAMPLING | | SHIPPING DATE | FIELD DATA | | | COMMENTS |
|---|---|---|---|---|---|---|---|
| | DATE | TIME | | pH | COND. umho | TEMP. C | |
| RFT-SW-1A & B | 07/19/89 | 1107 | 07/20/89 | 7.5 | 620 | 20 | |
| RFT-SW-2A & B | 07/19/89 | 1040 | 07/20/89 | 7.3 | 1300 | 19 | These samples were collected in Silver Creek downstream of construction activities. These activities resulted in highly turbid water which, in turn, may increase metals concentrations in unfiltered surface water samples RFT-SW-2B and RFT-SW-3B. |
| RFT-SW-3A & B | 07/19/89 | 1016 | 07/20/89 | 7.5 | 1350 | 18 | |
| RFT-SW-4A & B | 07/19/89 | 0911 | 07/20/89 | 7.05 | 1000 | 14 | |
| RFT-SW-5A & B | 07/19/89 | 0854 | 07/20/89 | 7.09 | 1300 | 14 | |
| RFT-SW-6A & B | 07/19/89 | 0824 | 07/20/89 | 6.8 | 1600 | 17 | |
| RFT-SW-7A & B | 07/18/89 | 1648 | 07/20/89 | 6.01 | 1500 | 20 | |
| RFT-SW-8A & B | 07/18/89 | 1633 | 07/20/89 | 6.61 | 1500 | 19 | |
| RFT-SW-9A & B | 07/18/89 | 1345 | 07/20/89 | 7.74 | 1200 | 24 | |
| RFT-SW-10A & B | 07/18/89 | 1511 | 07/20/89 | 8.08 | 1200 | 22 | |
| RFT-OPW-1A & B | 07/19/89 | 1345 | 07/20/89 | 7.51 | 1200 | 17 | |

TABLE 1 (Cont) SURFACE WATER FIELD DATA SITE: Richardson Flat Tailings

| SAMPLE ID. | SAMPLING | | SHIPPING DATE | FIELD DATA | | | COMMENTS |
|---|---|---|---|---|---|---|---|
| | DATE | TIME | | pH | COND. umho | TEMP. C | |
| RFT-SW-11A & B | 07/19/89 | 1040 | 07/20/89 | 7.3 | 1300 | 19 | Duplicate of RFT-SW-2A & B |
| RFT-SW-15A & B | 07/19/89 | 1437 | 07/20/89 | -- | -- | -- | Blank |
| RFT-SW-16A & B | 07/20/89 | 1025 | 07/20/89 | 7.15 | 1000 | 16 | |
| RFT-SW-17A & B | 07/20/89 | 1040 | 07/20/89 | 7.0 | 1000 | 16 | |
| RFT-SW-18A & B | 07/20/89 | 1100 | 07/20/89 | -- | -- | -- | Blank |
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TABLE 2 SOIL AND SEDIMENT FIELD DATA SITE Richardson Flat Tailings

| SAMPLE ID | SAMPLING | | SHIPPING DATE | COMMENTS |
|---|---|---|---|---|
| | DATE | TIME | | |
| RFT-SE-1 | 07/19/89 | 1107 | 07/20/89 | Dark brown material, some organic matter present |
| RFT-SE-2 | 07/19/89 | 1040 | 07/20/89 | Light gray medium to fine grained sediment |
| RFT-SE-3 | 07/19/89 | 1016 | 07/20/89 | Light gray medium to fine grained sediment |
| RFT-SE-4 | 07/19/89 | 0925 | 07/20/89 | Dark brown to medium gray, fine grained sediment |
| RFT-SE-5 | 07/19/89 | 0900 | 07/20/89 | Gray with rust color |
| RFT-SE-6 | 07/19/89 | 0835 | 07/20/89 | Light gray, medium to coarse grained sediment |
| RFT-SE-7 | 07/18/89 | 1700 | 07/20/89 | Dark brown sediment high in organic matter |
| RFT-SE-8 | 07/18/89 | 1640 | 07/20/89 | Dark brown sediment high in organic matter |
| RFT-SE-9 | 07/18/89 | 1351 | 07/20/89 | Medium gray fine grained sediment, some organic matter present |
| RFT-SE-10 | 07/18/89 | 1524 | 07/20/89 | Dark brown silty clay (fine grained) |
| RFT-SE-16 | 07/20/89 | 1025 | 07/20/89 | Medium gray, fine to coarse grained sediment |
| RFT-SE-17 | 07/20/89 | 1040 | 07/20/89 | Medium gray, fine to coarse grained sediments |
| RFT-TA-1 | 07/18/89 | 1115 | 07/20/89 | Tan or rust colored, fine sand or tailings |
| RFT-TA-2 | 07/18/89 | 1125 | 07/20/89 | Tan colored, fine sand or tailings |

TABLE 2 SOIL AND SEDIMENT FIELD DATA SITE Richardson Flat Tailings

| SAMPLE ID | SAMPLING | | SHIPPING DATE | COMMENTS |
|---|---|---|---|---|
| | DATE | TIME | | |
| RFT-TA-3 | 07/18/89 | 1138 | 07/20/89 | Light tan to gray material, fine texture |
| RFT-TA-4 | 07/18/89 | 1205 | 07/20/89 | Soil pH measurements showed a pH of 2 for these tailings |
| RFT-TA-5 | 07/18/89 | 1217 | 07/20/89 | Soil pH measurements showed a pH of 2 |
| | | | | |
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TABLE 3
INORGANIC ANALYTICAL RESULTS FOR
TAILINGS SAMPLES (mg/kg)
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD F08-8903-06 - PAN FUT0039HDA

| SAMPLE # | RFT-TA-1 | RFT-TA-2 | RFT-TA-3 | RFT-TA-4 | RFT-TA-5 |
|---|---|---|---|---|---|
| TRAFFIC RPT # | MHL-955 | MHL-956 | MHP-500 | MHP-501 | MHP-502 |
| SAMPLE LOCATION | EAST OF TAILINGS POND | MIDDLE OF TAILINGS POND | WEST OF TAILINGS POND | FLOOD PLAIN TAILINGS | FLOOD PLAIN TAILINGS |
| Aluminum | 691 | 1040 | 1530 | 1030 | 240 |
| Antimony | 63.1 | 84.4 | 87.0 | 120 | 144 |
| Arsenic | 220j | 208j | 222j | 259j | 175j |
| Barium | 153 | 86.9 | [32.8] | 117 | [39.5] |
| Beryllium | 0.22u | 0.22u | 0.22u | 0.27u | 0.23u |
| Cadmium | 21.1 | 41.2 | 95.9 | 117 | 250 |
| Calcium | 37000 | 54500 | 68200 | 5400 | 32800 |
| Chromium | [2.0] | 6.0 | 8.8 | 0.69u | 0.59u |
| Cobalt | [5.5] | [2.6] | [7.4] | [3.9] | [3.2] |
| Copper | 149 | 205 | 336 | 281 | 265 |
| Iron | 44700 | 36500 | 53400 | 97400 | 87000 |
| Lead | 2580 | 3060 | 4520 | 9300 | 31600 |
| Magnesium | 11200 | 18500 | 23000 | [1140] | [142] |
| Manganese | 1440 | 1740 | 2320 | 212 | 252 |
| Mercury * | 0.99 | 1.3 | .88 | 8.20 | 7.60 |
| Nickel | 8.2 | 9.4 | [7.1] | [5.1] | [6.2] |
| Potassium | [255] | [496] | [827] | [1140] | [680] |
| Selenium | 23.6 | 12.7 | 19.2 | 45.7 | 38.4 |
| Silver | 12.6 | 18.5 | 22.1 | 62.8 | 115 |
| Sodium | [22.4] | [34.8] | [42.6] | [603] | [117] |
| Thallium | 6.6j | 3.0j | [4.2]j | [9.7]j | [6.8]j |
| Vanadium | [1.3] | [3.8] | [3.7] | [2.6] | 0.57u |
| Zinc | 3220 | 5710 | 14100 | 16200 | 33800 |

* - Results have been provided by Keystone Laboratory of Houston, Texas. The remaining results are from analyses conducted by Silver Valley Laboratories of Kellog, Idaho.

j - The associated numerical value is an estimated quantity because the amount detected is below the contract required detection limit (CRDL) or because minor quality control criteria were not met. Presence of the material is reliable.

u - The material was analyzed for, but was not detected. The associated numerical value is the estimated sample quantitation limit or CRDL.

[] - The associated numerical value is an estimated quantity because the amount detected is below the contract required detection limit (CRDL). Presence of the material is reliable. (Inorganic data only).

TABLE 4
INORGANIC ANALYTICAL RESULTS FOR
SEDIMENT SAMPLES
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD F08-8903-06 - PAN FUT0039HDA

| SAMPLE # | RFT-SE-1 | RFT-SE-2 | RFT-SE-3 | RFT-SE-4 | RFT-SE-5 |
|---|---|---|---|---|---|
| PACKING LIST # | 4725H-01 | 4725H-02 | 4725H-03 | 4725H-04 | 4725H-05 |
| SAMPLE LOCATION | BCKGRND IRRIG DITCH | SILVER CRK NEXT TO FLOOD PLAIN | SILVER CRK DNGRDNT FLOOD PLAIN | UPGRDNT DIVERSION DITCH | DIVERSION DITCH |
| Aluminum | 18400 | 8620 | 7650 | 25100 | 2810 |
| Antimony | 19.8j | 201j | 114j | 200j | 178j |
| Arsenic | 83.2 | 590 | 427 | 776 | 320 |
| Barium | 270 | 147 | 130 | 1220 | 134 |
| Beryllium | 1.7 | [.86] | [.81] | [1.9] | [.47] |
| Cadmium | 14.6j | 91.4j | 82.0j | 100j | 149j |
| Calcium | 15000 | 25600 | 2610 | 82100 | 89700 |
| Chromium | 21.9 | .77u | [1.0] | 33.2 | 10.9 |
| Cobalt | [11.4] | 43.5 | 38.5 | [10.1] | [5.3] |
| Copper | 239 | 753 | 459 | 840 | 613 |
| Iron | 30800 | 181000 | 148000 | 58600 | 44800 |
| Lead | 1790 | 14200 | 9880 | 13600 | 9550 |
| Magnesium | 6130 | 9430 | 8480 | 33800 | 19700 |
| Manganese | 1260 | 1730 | 1630 | 2770 | 3090 |
| Mercury | 1.0 | 4.9 | 6.0 | 5.5 | 1.5 |
| Nickel | 23.5 | 21.5 | 28.8 | 27.0 | [2.9] |
| Potassium | 3160 | [1160] | [1150] | 6270 | [794] |
| Selenium | 3.1j | 46.2j | 42.7j | 15.4j | 16.1jr |
| Silver | 9.7 | 47.5 | 30.3 | 86.0 | 60.9 |
| Sodium | [239] | [181] | [173] | [447] | [84.6] |
| Thallium | [.81]j | [3.6]j | 4.1j | 23.2j | 12.7j |
| Vanadium | 48.7 | 19.0 | 21.2 | 46.5 | [8.6] |
| Zinc | 2770 | 15500 | 15100 | 15700 | 26400 |

j - The associated numerical value is an estimated quantity because the amount detected is below the contract required detection limit (CRDL) or because minor quality control criteria were not met. Presence of the material is reliable.

r - Quality control indicates that data is not usable (material may or may not be present). **DO NOT USE THIS DATA!.**

u - The material was analyzed for, but was not detected. The associated numerical value is the estimated sample quantitation limit or CRDL.

[] - The associated numerical value is an estimated quantity because the amount detected is below the contract required detection limit (CRDL). Presence of the material is reliable. (Inorganic data only).

TABLE 4 CONT.
INORGANIC ANALYTICAL RESULTS FOR
SEDIMENT SAMPLES (mg/kg)
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD F08-8903-06 - PAN FUT0039HDA

| SAMPLE # | RFT-SE-6 | RFT-SE-7 | RFT-SE-8 | RFT-SE-9 | RFT-SE-10 |
|---|---|---|---|---|---|
| PACKING LIST # | 4725H-06 | 4725H-07 | 4725H-08 | 4725H-09 | 4725H-10 |
| SAMPLE LOCATION | OUT FLOW POINT FOR DIVERSION DITCH | MARSH | SILVER CRK DRAINAGE IN MARSH AREA | CULVERT DRAINAGE MARSH AREA | DNGRDNT 800' UPSTRM OF IRRIG DITCH |
| Aluminum | 11100 | 9710 | 14000 | 10900 | 20200 |
| Antimony | 40.8 | 37.6j | 80.5j | 107j | 10.1uj |
| Arsenic | 261j | 198 | 348 | 295 | 5.4 |
| Barium | 944 | 384 | 286 | 229 | 408 |
| Beryllium | [.85] | [1.1] | [1.5] | [1.4] | 1.6 |
| Cadmium | 62.3j | 102j | 82.3j | 90.2j | 2.2j |
| Calcium | 46900 | 90700 | 85800 | 38700 | 9640 |
| Chromium | .71u | 9.9 | 16.5 | 16.3 | 18.5 |
| Cobalt | 64.4 | 20.4 | 33.3 | 20.1 | [10.9] |
| Copper | 256 | 264 | 567 | 498 | 40.7 |
| Iron | 41400 | 64900 | 49200 | 68700 | 25500 |
| Lead | 3790 | 3250 | 3510 | 6970 | 108 |
| Magnesium | 13300 | 20700 | 18400 | 11100 | 6360 |
| Manganese | 207000 | 19100 | 14300 | 3070 | 303 |
| Mercury | 0.24 | 0.82 | 1.1 | 5.0 | [.10] |
| Nickel | 69.7 | 14.0 | 25.8 | 16.3 | 17.0 |
| Potassium | 1870 | 1880 | 2400 | 1590 | 6050 |
| Selenium | 5.6j | 9.2j | 13.2j | 21.9j | 5.6ur |
| Silver | 13.7 | 23.9 | 36.9 | 36.2 | .41u |
| Sodium | [344] | [254] | [276] | [220] | [389] |
| Thallium | 8.5j | 10.1j | 14.2j | 4.1j | .23uj |
| Vanadium | 34.8 | 20.5 | 26.9 | 31.2 | 37.7 |
| Zinc | 18800 | 17600 | 18300 | 15900 | 302 |

j - The associated numerical value is an estimated quantity because the amount detected is below the contract required detection limit (CRDL) or because minor quality control criteria were not met. Presence of the material is reliable.

r - Quality control indicates that data is not usable (material may or may not be present). **DO NOT USE THIS DATA!.**

u - The material was analyzed for, but was not detected. The associated numerical value is the estimated sample quantitation limit or CRDL.

[] - The associated numerical value is an estimated quantity because the amount detected is below the contract required detection limit (CRDL). Presence of the material is reliable. (Inorganic data only).

TABLE 4 CONT.
ANALYTICAL RESULTS FOR
INORGANIC SEDIMENT SAMPLES
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD F08-8903-06 - PAN FUT0039HDA

| SAMPLE # | RFT-OSE-1 | RFT-OSE-2 | RFT-SE-16 | RFT-SE-17 |
|---|---|---|---|---|
| PACKING LIST # | 4725H-11 | 4725H-12 | 4725H-13 | 4725H-14 |
| SAMPLE LOCATION | OPPORTUNITY POND SEDIMENT SAMPLE | OPPORTUNITY SEEP SEDIMENT SAMPLE | BCKGRND SEDIMENT ON SILVER CREEK | BCKGRND BETWEEN IRRIG DITCH & ROAD ON SILVER |
| Aluminum | 19500 | 6880 | 15200 | 4440 |
| Antimony | 142j | 49.3j | 53.9j | 183j |
| Arsenic | 751 | 839 | 211 | 555 |
| Barium | 668 | 557 | 209 | 66.0 |
| Beryllium | [2.3] | [1.6] | [1.4] | [.63] |
| Cadmium | 185j | 131j | 43.9j | 113j |
| Calcium | 249000 | 167000 | 14500 | 18900 |
| Chromium | 18.2 | 1.0u | 11.8 | .72u |
| Cobalt | [5.9] | 53.3 | 24.6 | 76.8 |
| Copper | 870 | 456 | 231 | 496 |
| Iron | 156000 | 132000 | 86100 | 263000 |
| Lead | 12500 | 6900 | 4430 | 12200 |
| Magnesium | 29700 | 23400 | 6340 | 5880 |
| Manganese | 19600 | 23700 | 1560 | 1370 |
| Mercury | 1.9 | .73 | 3.3 | .81 |
| Nickel | 32.1 | 26.3 | 22.4 | 31.4 |
| Potassium | 4790 | 1690 | 2490 | [657] |
| Selenium | 19.9j | 2.5j | 25.1j | 84.0j |
| Silver | 60.6 | 22.5 | 15.5 | 39.8 |
| Sodium | [764] | [206] | [215] | [105] |
| Thallium | 24.1j | 21.0j | 1.2bj | 6.0j |
| Vanadium | 38.0 | [18.6] | 40.5 | [10.4] |
| Zinc | 24000 | 20000 | 8580 | 17500 |

j - The associated numerical value is an estimated quantity because the amount detected is below the contract required detection limit (CRDL) or because minor quality control criteria were not met. Presence of the material is reliable.

u - The material was analyzed for, but was not detected. The associated numerical value is the estimated sample quantitation limit or CRDL.

[] - The associated numerical value is an estimated quantity because the amount detected is below the contract required detection limit (CRDL). Presence of the material is reliable. (Inorganic data only).

TABLE 5
ANALYTICAL RESULTS FOR
INORGANIC SURFACE WATER SAMPLES (µg/l)
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD F08-8903-06 - PAN FUT0039HDA

| SAMPLE # | RFT-SW-1A | RFT-SW-1B | RFT-SW-2A | RFT-SW-2B | RFT-SW-3A |
|---|---|---|---|---|---|
| TRAFFIC RPT # | MHP-525 | MHP-526 | MHP-523 | MHP-524 | MHP-521 |
| SAMPLE LOCATION | BCKGRND PACE HOMER DITCH | BCKGRND PACE HOMER DITCH | SILVER CRK NEAR FLOOD PLAIN TLGS | SILVER CRK NEAR FLOOD PLAIN TLGS | SILVER CRK NEAR FLOOD PLAIN TLGS |
| Aluminum | [27.9]ub | [26.3]ub | [18.2]ub | 44500b | [16.5]ub |
| Antimony | 19.9u | 19.9u | [25.7]ub | 210b | 19.9u |
| Arsenic | [7.2] | [7.7] | [6.6] | 619 | [3.8] |
| Barium | [61.9]ub | [61.9]ub | [61.5]ub | 881b | [52.9]ub |
| Beryllium | 1.1u | 1.1u | 1.1u | [2.4] | 1.1u |
| Cadmium | 1.8u | 1.8u | [5.0]ub | 137b | 9.2b |
| Calcium | 132000b | 131000b | 211000b | 248000b | 199000b |
| Chromium | 2.8u | 2.8u | 2.8u | 72.2 | 2.8u |
| Cobalt | [3.1]ub | 2.6u | [3.5]ub | [27.0]ub | [2.6]ub |
| Copper | 1.1u | [2.4]ub | [1.2]ub | 1390b | [1.5]ub |
| Iron | [56.4]ub | [84.7]ub | [63.2]ub | 98500b | [39.9]ub |
| Lead | 9.2bj | [0.93]ub | 48.3bj | 20000bj | 38.2bj |
| Magnesium | 34700b | 34400b | 41400b | 68400b | 39600b |
| Manganese | 20.3b | 19.1b | 1170b | 3080b | 1080b |
| Mercury | 0.20u | 0.20u | 0.20u | 11.50 | 0.20u |
| Nickel | 9.7u | 9.7u | [13.9] | 67.3 | 9.7u |
| Potassium | [1820]ub | [2110]ub | [3180] | 8980b | [3470]ub |
| Selenium | [15.4]ub | [15.2]ub | [2.6]ub | [34.2]ub | [14.7]ub |
| Silver | 1.6u | 1.6u | 1.6u | 131b | 1.6u |
| Sodium | 19700 | 19700 | 42300b | 42900b | 41000b |
| Thallium | 0.90u | 0.90u | 0.90u | [4.7] | 0.90u |
| Vanadium | 2.7u | 2.7u | 2.7u | 129 | 2.7u |
| Zinc | 64.1b | 52.7b | 1730b | 19300b | 2360b |

b - Material was detected in the laboratory blanks. Quantity reported is >5X the amount found in the blank (>10X for methylene chloride, acetone, toluene, and phthalates). A false positive result may exist.

u - The material was analyzed for, but was not detected. The associated numerical value is the estimated sample quantitation limit or CRDL.

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TABLE 5 CONT.
INORGANIC ANALYTICAL RESULTS FOR
SURFACE WATER SAMPLES
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD F08-8903-06 - PAN FUT0039HDA

| SAMPLE # | RFT-SW-3B | RFT-SW-4A | RFT-SW-4B | RFT-SW-5A | RFT-SW-5B |
|---|---|---|---|---|---|
| TRAFFIC RPT # | MHP-522 | MHP-515 | MHP-516 | MHP-517 | MHP-518 |
| SAMPLE LOCATION | SILVER CRK NEAR FLOOD PLAIN TLGS | UPGRDNT DIVERSION DITCH | UPGRDNT DIVERSION DITCH | DIVERSION DITCH | DIVERSION DITCH |
| Aluminum | 1740b | [32.8] | 30900 | [32.6] | [33.7] |
| Antimony | [53.8]ub | [39.3] | 937 | 19.9u | 19.9u |
| Arsenic | 41.9 | 68.6 | 2326 | 10.7j | 17.4j |
| Barium | [82.2]ub | [102] | 2330 | [37.0] | [35.9] |
| Beryllium | 1.1u | 1.1u | [1.7] | 1.1u | 1.1u |
| Cadmium | [16.0] | [4.6] | 289 | [3.3] | 6.2 |
| Calcium | 206000b | 180000 | 446000 | 308000 | 314000 |
| Chromium | 2.8u | 2.8u | 50.2 | 2.8u | 2.8u |
| Cobalt | [5.7] | [8.8] | [48.7] | 2.6u | 2.6u |
| Copper | 71.4b | [13.6] | 1540 | [12.4] | [5.6] |
| Iron | 5320b | 267 | 107000 | 416 | 696 |
| Lead | 1100bj | 41.8 | 22100j | 12.9 | 24.9 |
| Magnesium | 42000b | 38000 | 104000 | 61600 | 62700 |
| Manganese | 1220b | 2780 | 21100 | 1310 | 1340 |
| Mercury | 0.2u | 0.2u | 8.0 | 0.2u | 0.2u |
| Nickel | 9.7u | 9.7u | 65.5 | [25.8] | 9.7u |
| Potassium | [3160]ub | 5580 | 15600 | 273u | 273u |
| Selenium | [28.5]ub | 14.0ur | 1.2ur | 14.0ur | 14.0ur |
| Silver | [6.3]ub | 1.6u | 201 | 1.6u | 1.6u |
| Sodium | 42000b | 54600 | 58500 | 28800 | 29300 |
| Thallium | 0.90u | 14.1 | 83.4j | 1.0u | 1.0u |
| Vanadium | [5.5] | 2.7u | 58.7 | 2.7u | 2.7u |
| Zinc | 3790b | 2650 | 49100 | 2990 | 3060 |

b - Material was detected in the laboratory blanks. Quantity reported is >5X the amount found in the blank (>10X for methylene chloride, acetone, toluene, and phthalates). A false positive result may exist.

j - The associated numerical value is an estimated quantity because the amount detected is below the contract required detection limit (CRDL) or because minor quality control criteria were not met. Presence of the material is reliable.

r - Quality control indicates that data is <u>not</u> usable (material may or may not be present). **<u>DO NOT USE THIS DATA!.</u>**

u - The material was analyzed for, but was not detected. The associated numerical value is the estimated sample quantitation limit or CRDL.
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TABLE 5 CONT.
INORGANIC ANALYTICAL RESULTS FOR
SURFACE WATER SAMPLES
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD F08-8903-06 - PAN FUT0039HDA

| SAMPLE # | RFT-SW-6A | RFT-SW-6B | RFT-SW-7A | RFT-SW-7B | RFT-SW-8A |
|---|---|---|---|---|---|
| TRAFFIC RPT # | MHP-519 | MHP-520 | MHP-509 | MHP-510 | MHP-511 |
| SAMPLE LOCATION | DIVERSION DITCH OUTFALL | DIVERSION DITCH OUTFALL | MARSHY AREA | MARSHY AREA | SILVER CRK IN MARSHY AREA |
| Aluminum | [17.6] | [34.7]ub | 11.5u | 368 | [16.8] |
| Antimony | 19.9u | 19.9u | 19.9u | 19.9u | 19.9u |
| Arsenic | 2.3u | [3.9] | 2.3u | [9.4] | [5.3] |
| Barium | [14.9] | [14.9]ub | [14.9]ub | [37.0] | [32.1] |
| Beryllium | 1.1u | 1.1u | 1.1u | 1.1u | 1.1u |
| Cadmium | 1.8u | 1.8u | 1.8u | [2.6] | 1.8u |
| Calcium | 316000 | 330000b | 322000 | 333000 | 320000 |
| Chromium | 2.8u | 2.8u | 2.8u | 2.8u | 2.8u |
| Cobalt | 2.6u | [3.8]ub | 2.6u | [3.8] | 2.6u |
| Copper | [10.4] | [1.2]ub | [1.9] | [12.9] | 1.1u |
| Iron | 426 | 123 | 270 | 1070 | 224 |
| Lead | 1.8u | [1.9]ubj | 0.90u | 131 | 0.90u |
| Magnesium | 68200 | 71200b | 68700 | 70500 | 68600 |
| Manganese | 3180 | 3170b | 94.8 | 2110 | 960 |
| Mercury | 0.2u | 0.2u | 0.2u | 0.2u | 0.2u |
| Nickel | [13.2] | 9.7u | 9.7u | 9.7u | 9.7u |
| Potassium | [2010] | [2230] | [1480] | [1710] | [1330] |
| Selenium | 14.0ur | 12.0u | 14.0ur | 1.4ur | 14.0ur |
| Sodium | 45000 | 49600b | 47500 | 48400 | 46700 |
| Silver | 1.6u | 1.6u | 1.6u | [2.4] | 1.6u |
| Thallium | 1.0u | 0.9u | 1.0u | 1.0u | 1.0u |
| Vanadium | 2.7u | 2.7u | 2.7u | 2.7u | 2.7u |
| Zinc | 219 | 198b | 190 | 656 | 295 |

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TABLE 5 CONT.
INORGANIC ANALYTICAL RESULTS FOR
SURFACE WATER SAMPLES
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD F08-8903-06 - PAN FUT0039HDA

| SAMPLE # | RFT-SW-8B | RFT-SW-9A | RFT-SW-9B | RFT-SW-10A | RFT-SW-10B |
|---|---|---|---|---|---|
| TRAFFIC RPT # | MHP-512 | MHP-506 | MHP-507 | MHP-503 | MHP-504 |
| SAMPLE LOCATION | SILVER CRK IN MARSHY AREA | CULVERT NEAR ROUTE 40 | CULVERT NEAR ROUTE 40 | DNGRDNT SAMPLE | DNGRDNT SAMPLE |
| Aluminum | [106] | [24.6] | 370 | [26.6] | [75.8] |
| Antimony | 19.9u | 19.9u | 19.9u | 19.9u | 19.9u |
| Arsenic | [8.4] | [6.8] | 12.2 | [3.3] | [5.6]r |
| Barium | [33.5] | [54.6] | [59.1] | [51.5] | [52.5] |
| Beryllium | 1.1u | 1.1u | 1.1u | 1.1u | 1.1u |
| Cadmium | 1.8u | 1.8u | 1.8u | [2.0] | [2.2] |
| Calcium | 303000 | 139000 | 144000 | 147000 | 147000 |
| Chromium | 2.8u | 2.8u | [2.8] | 2.8u | 2.8u |
| Cobalt | 2.6u | [2.6] | 2.6u | 2.6u | [4.0] |
| Copper | [4.9] | [2.9] | [11.7] | [6.3] | [5.6] |
| Iron | 1090 | 338 | 1200 | 195 | 481 |
| Lead | 36.6 | 6.2 | 122 | [5.9] | 35.8 |
| Magnesium | 64900 | 34600 | 35600 | 36400 | 36200 |
| Manganese | 950 | 274 | 335 | 223 | 240 |
| Mercury | 0.2u | 0.2u | 0.2u | 0.2u | 0.2u |
| Nickel | 9.7u | 9.7u | 9.7u | 9.7u | 9.7u |
| Potassium | [986] | [1790] | [1980] | 2090 | [1920] |
| Selenium | 14.0ur | 14.0ur | 1.4ur | 1.4ur | 14.0ur |
| Silver | 1.6u | 1.6u | 1.6u | 1.6u | 1.6u |
| Sodium | 44300 | 22900 | 23400 | 25200 | 24100 |
| Thallium | 1.0u | 1.0u | 1.0u | 1.0u | 1.0u |
| Vanadium | 2.7u | 2.7u | 2.7u | 2.7u | 2.7u |
| Zinc | 332 | 429 | 726 | 419 | 519 |

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TABLE 5 CONT.
INORGANIC ANALYTICAL RESULTS FOR
SURFACE WATER SAMPLES
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD F08-8903-06 - PAN FUT0039HDA

| SAMPLE # | RFT-SW-11A | RFT-SW-11B | RFT-SW-12A | RFT-SW-12B | RFT-SW-15A | RFT-SW-15B | RFT-SW-16A |
|---|---|---|---|---|---|---|---|
| TRAFFICE RPT # | MHP-528 | MHP-527 | MHP-513 | MHP-514 | MHP-529 | MHP-530 | MHP-534 |
| SAMPLE LOCATION | DUPLICATE OF 2A | DUPLICATE OF 2B | FILTERED BLANK | UNFILTERED BLANK | FILTERED BLANK | UNFILTERED BLANK | DNSTRM OF PACE HOMER DITCH CONFLUENCE W/SILVER CK |
| Aluminum | [28.0]ub | 43400b | [23.3] | [16.6] | [24.9]ub | [32.1]ub | [44.6]ub |
| Antimony | [26.9]ub | 199b | 19.9u | 19.9u | 19.9u | 19.9u | [20.1]ub |
| Arsenic | [5.6] | 540 | 2.3u | 12.0 | 2.3u | 2.3u | 2.3u |
| Barium | [60.8] | 788b | 1.3u | 1.3u | 1.3u | 1.3u | [56.7]ub |
| Beryllium | 1.1u | [2.1] | 1.1u | 1.1u | 1.1u | 1.1u | 1.1u |
| Cadmium | 6.0b | 127b | 1.8u | 1.8u | 1.8u | 1.8u | 10.3b |
| Calcium | 211000b | 246000b | [154] | [56.3] | [214]ub | [136]ub | 205000b |
| Chromium | 2.8u | 68.5 | [3.5] | 2.8u | 2.8u | 2.8u | 2.8u |
| Cobalt | [5.3] | [28.4]ub | 2.6u | 2.6u | 2.6u | 2.6u | [3.1]ub |
| Copper | [1.2] | 1260b | 1.1u | [4.4] | 1.1u | 1.1u | [2.7]ub |
| Iron | [55.1] | 89300b | 277 | 219 | [64.2]ub | [41.5]ub | [31.5]ub |
| Lead | 34.6bj | 17900bj | 0.90u | 0.90u | [1.8]ubj | [1.6]ubj | [1.4]ubj |
| Magnesium | 41400b | 67100b | [42.5] | 20.9u | [43.7]ub | [29.0]ub | 40400b |
| Manganese | 1180b | 2950b | [2.3] | [2.0] | [1.4]ub | [2.5]ub | 1070b |
| Mercury | 0.20u | 8.50 | 0.2u | 0.2u | .20u | .20u | .20u |
| Nickel | 9.7u | 57.3 | 9.7u | 9.7u | 9.7u | 9.7u | 9.7u |
| Potassium | [3060]ub | 8770b | 273u | 273u | 273u | 273u | [3180]ub |
| Selenium | [15.1]ub | [43.9]ub | 1.4ur | 1.4ur | 1.2u | 1.2u | [2.7]ub |
| Silver | 1.6u | 117 | 1.6u | 1.6u | 1.6u | 23.8b | 1.6u |
| Sodium | 41200 | 42700 | [68.9] | [76.0] | [47.5]ub | 13.2u | 41900b |
| Thallium | 0.90u | [4.2] | 1.0u | 1.0u | .90u | .90u | .90u |
| Vanadium | [3.8] | 121 | 2.7u | 2.7u | 2.7u | 2.7u | 2.7u |
| Zinc | 1730b | 17700b | [4.5] | 1.3u | [12.6]ub | [6.5]ub | 2970b |

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TABLE 5 CONT.
INORGANIC ANALYTICAL RESULTS FOR
SURFACE WATER SAMPLES
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD F08-8903-06 - PAN FUT0039HDA

| SAMPLE # | RFT-SW-16B | RFT-SW-17A | RFT-SW-17B | RFT-SW-18A | RFT-SW-18B |
|---|---|---|---|---|---|
| TRAFFIC RPT # | MHP-535 | MHP-537 | MHP-538 | MHP-539 | MHP-540 |
| SAMPLE LOCATION | DNSTRM OF PACE HOMER DITCH CONFLUENCE W/SILVER CRK | UPGRDNT CONFLUENCE SILVER CRK PACE HOMER DITCH | UPGRDNT CONFLUENCE SILVER CRK PACE HOMER DITCH | BLANK | BLANK |
| Aluminum | [61.1]ub | [49.5]ub | [29.6]ub | [29.0]ub | [27.0]ub |
| Antimony | 19.9u | 19.9u | [20.1]ub | 19.9u | 19.9u |
| Arsenic | [5.6] | 2.3u | 2.3u | 2.3u | 2.3u |
| Barium | [56.0]ub | [54.3]ub | [51.1]ub | [1.7]ub | 1.3u |
| Beryllium | 1.1u | 1.1u | 1.1u | 1.1u | 1.1u |
| Cadmium | 10.3b | 13.3b | 13.5b | 1.8u | 1.8u |
| Calcium | 205000b | 228000b | 218000b | [109]ub | [90.8]ub |
| Chromium | 2.8u | 2.8u | 2.8u | 2.8u | 2.8u |
| Cobalt | [3.5]ub | [6.6]ub | [5.3]ub | 2.6u | [2.7]ub |
| Copper | [4.9]ub | [3.9]ub | [1.5]ub | 1.1u | 1.1u |
| Iron | 496b | 346bj | [43.7]ub | [33.4]ub | [32.2]ub |
| Lead | 25.2bj | 8.8b | 0.90uj | [1.3]ub | 0.90uj |
| Magnesium | 40300b | 41800b | 39900b | [38.6]ub | [27.8]ub |
| Manganese | 1080b | 1380b | 1330b | [2.0]ub | [1.4]ub |
| Mercury | 0.20u | 0.20u | 0.20u | 0.20u | 0.20u |
| Nickel | [10.6] | 9.7u | 9.7u | 9.7u | 9.7u |
| Potassium | [3380]ub | [3630]ub | [3570]ub | 273u | [437]ub |
| Selenium | 1.2u | [20.0]ub | [18.0]ub | 1.2u | 1.2u |
| Silver | 1.6u | 1.6u | 1.6u | 1.6u | 1.6u |
| Sodium | 41900 | 48000b | 46400b | [41.8]ub | [13.3]ub |
| Thallium | 0.90u | 0.90u | 0.90u | 0.90u | 0.90u |
| Vanadium | 2.7u | 2.7u | 2.7u | 2.7u | 2.7u |
| Zinc | 3130b | 3880b | 3720b | [2.9]ub | 1.3u |

b - Material was detected in the laboratory blanks. Quantity reported is >5X the amount found in the blank (>10X for methylene chloride, acetone, toluene, and phthalates). A false positive result may exist.

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TABLE 5 CONT.
INORGANIC ANALYTICAL RESULTS FOR
SURFACE WATER SAMPLES
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD F08-8903-06 - PAN FUT0039HDA

| SAMPLE # | RFT-OPW-1A | RFT-OPW-1B |
|---|---|---|
| TRAFFIC RPT # | MHP-532 | MHP-533 |
| SAMPLE LOCATION | PONDED AREA AT BASE OF TLGS DAM | PONDED AREA AT BASE OF TLGS DAM |
| Aluminum | [23.0]ub | 317b |
| Antimony | 19.9u | 19.9u |
| Arsenic | [2.9] | 33.1 |
| Barium | [37.3]ub | [82.2]ub |
| Beryllium | 1.1u | 1.1u |
| Cadmium | 1.8u | [3.6]ub |
| Calcium | 312000 | 369000b |
| Chromium | 2.8u | 2.8u |
| Cobalt | [6.3]ub | [5.6]ub |
| Copper | [1.2]ub | [6.6]ub |
| Iron | 503b | 10200b |
| Lead | 0.90u | 68.2bj |
| Magnesium | 56100b | 58800b |
| Manganese | 12900b | 21400b |
| Mercury | 0.20u | 0.20u |
| Nickel | 9.7u | 9.7u |
| Potassium | 5380 | 9960 |
| Selenium | 12.0u | [18.5]ub |
| Silver | 1.6u | 1.6u |
| Sodium | 60000b | 63400b |
| Thallium | 0.90u | 0.90u |
| Vanadium | 2.7u | 2.7u |
| Zinc | [19.8]ub | 759b |

b - Material was detected in the laboratory blanks. Quantity reported is >5X the amount found in the blank (>10X for methylene chloride, acetone, toluene, and phthalates). A false positive result may exist.

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# APPENDIX A

## SAMPLE COLLECTION AND SHIPMENT INFORMATION

APPENDIX A
SAMPLE COLLECTION AND SHIPMENT INFORMATION
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD F08-8903-06 - PAN FUT0039HDA

| SAMPLE ID | PARAMETERS | TRAFFIC RPT # | SAMPLE TAG # | CHAIN OF CUSTODY |
|---|---|---|---|---|
| RFT-SW-1A | METALS | MHP-525 | 8-94551 | 8-11438 |
| RFT-SW-1B | METALS | MHP-526 | 8-94552 | 8-11438 |
| RFT-SW-2A | METALS | MHP-523 | 8-94553 | 8-11438 |
| RFT-SW-2B | METALS | MHP-524 | 8-94556 | 8-11438 |
| RFT-SW-3A | METALS | MHP-521 | 8-94554 | 8-11438 |
| RFT-SW-3B | METALS | MHP-522 | 8-94555 | 8-11438 |
| RFT-SW-4A | METALS | MHP-515 | 8-94557 | 8-11438 |
| RFT-SW-4B | METALS | MHP-516 | 8-94558 | 8-11438 |
| RFT-SW-5A | METALS | MHP-517 | 8-94559 | 8-11438 |
| RFT-SW-5B | METALS | MHP-518 | 8-94560 | 8-11438 |
| RFT-SW-6A | METALS | MHP-519 | 8-94561 | 8-11438 |
| RFT-SW-6B | METALS | MHP-520 | 8-94562 | 8-11438 |
| RFT-SW-7A | METALS | MHP-509 | 8-94563 | 8-11446 |
| RFT-SW-7B | METALS | MHP-510 | 8-94564 | 8-11446 |
| RFT-SW-8A | METALS | MHP-511 | 8-94565 | 8-11446 |
| RFT-SW-8B | METALS | MHP-512 | 8-94566 | 8-11446 |
| RFT-SW-9A | METALS | MHP-506 | 8-94567 | 8-11446 |
| RFT-SW-9B | METALS | MHP-507 | 8-94587 | 8-11446 |
| RFT-SW-10A | METALS | MHP-503 | 8-94568 | 8-11446 |
| RFT-SW-10B | METALS | MHP-504 | 8-94569 | 8-11446 |
| RFT-SW-11A | METALS | MHP-528 | 8-94591 | 8-10998 |
| RFT-SW-11B | METALS | MHP-527 | 8-94590 | 8-10998 |
| RFT-SW-12A | METALS | MHP-513 | 8-94588 | 8-10998 |
| RFT-SW-12B | METALS | MHP-514 | 8-94589 | 8-10998 |
| RFT-SW-15A | METALS | MHP-529 | 8-94593 | 8-10998 |
| RFT-SW-15B | METALS | MHP-530 | 8-94593 | 8-10998 |
| RFT-SW-16A | METALS | MHP-534 | 8-94599 | 8-10997 |
| RFT-SW-16B | METALS | MHP-535 | 8-94600 | 8-10997 |
| RFT-SW-17A | METALS | MHP-537 | 8-94527 | 8-10997 |
| RFT-SW-17B | METALS | MHP-538 | 8-94527 | 8-10997 |
| RFT-SW-18A | METALS | MHP-539 | 8-94529 | 8-10997 |
| RFT-SW-18B | METALS | MHP-540 | 8-94530 | 8-10997 |
| RFT-TA-1 | METALS | MHL-955 | 8-94580 | 8-11446 |
| RFT-TA-2 | METALS | MHL-956 | 8-94581 | 8-11446 |
| RFT-TA-3 | METALS | MHP-500 | 8-94582 | 8-11446 |
| RFT-TA-4 | METALS | MHP-501 | 8-94583 | 8-11446 |
| RFT-TA-5 | METALS | MHP-502 | 8-94584 | 8-11446 |

APPENDIX A CONT.
SAMPLE COLLECTION AND SHIPMENT INFORMATION
RICHARDSON FLAT TAILINGS
SUMMIT COUNTY, UTAH
TDD F08-8903-06 - PAN FUT0039HDA

| SAMPLE ID | PARAMETERS | SAS # | SAMPLE TAG # | CHAIN OF CUSTODY |
|---|---|---|---|---|
| RFT-SE-1 | METALS | 4725H-01 | 8-94570 | 8-11437 |
| RFT-SE-2 | METALS | 4725H-02 | 8-94571 | 8-11437 |
| RFT-SE-3 | METALS | 4725H-03 | 8-94572 | 8-11437 |
| RFT-SE-4 | METALS | 4725H-04 | 8-94573 | 8-11437 |
| RFT-SE-5 | METALS | 4725H-05 | 8-94574 | 8-11437 |
| RFT-SE-6 | METALS | 4725H-06 | 8-94575 | 8-11437 |
| RFT-SE-7 | METALS | 4725H-07 | 8-94576 | 8-11437 |
| RFT-SE-8 | METALS | 4725H-08 | 8-94577 | 8-11437 |
| RFT-SE-9 | METALS | 4725H-09 | 8-94578 | 8-11437 |
| RFT-SE-10 | METALS | 4725H-10 | 8-94579 | 8-11437 |
| RFT-SE-16 | METALS | 4725H-13 | 8-94525 | 8-11440 |
| RFT-SE-17 | METALS | 4725H-1 | 8-94528 | 8-11440 |

# APPENDIX B

# SAMPLING PHOTO LOG

PHOTO 1: WEST FACING PHOTO OF SAMPLE LOCATION RFT-SW/SE-4.

PHOTO 2: WEST FACING PHOTO OF FIT MEMBER COLLECTING TAILINGS SAMPLE RFT-TA-1.

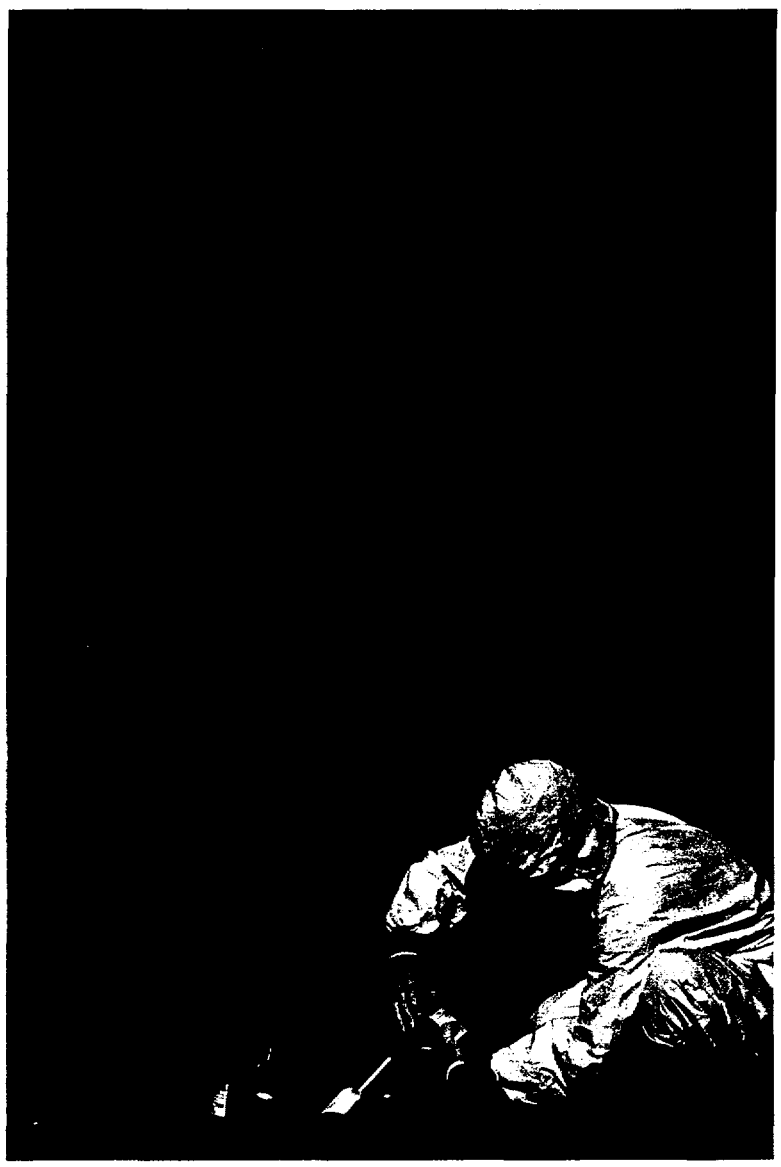


PHOTO 3 (LEFT): NORTHWEST FACING PHOTO OF FIT MEMBER COLLECTING TAILINGS SAMPLE RFT-TA-2.

PHOTO 4 (BELOW): SOUTH FACING PHOTO OF FIT MEMBER COLLECTING TAILINGS SAMPLE RFT-TA-3.

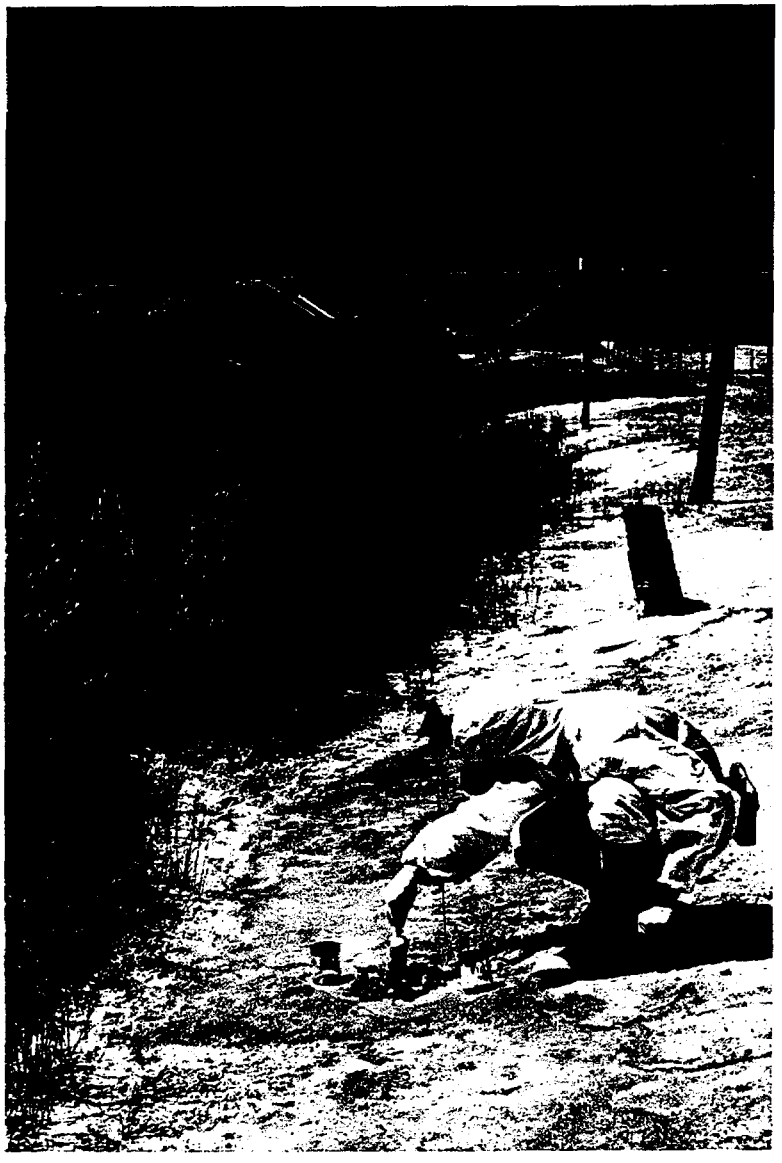


PHOTO 5: SOUTHWEST VIEW OF SAMPLE LOCATION RFT-TA-4.

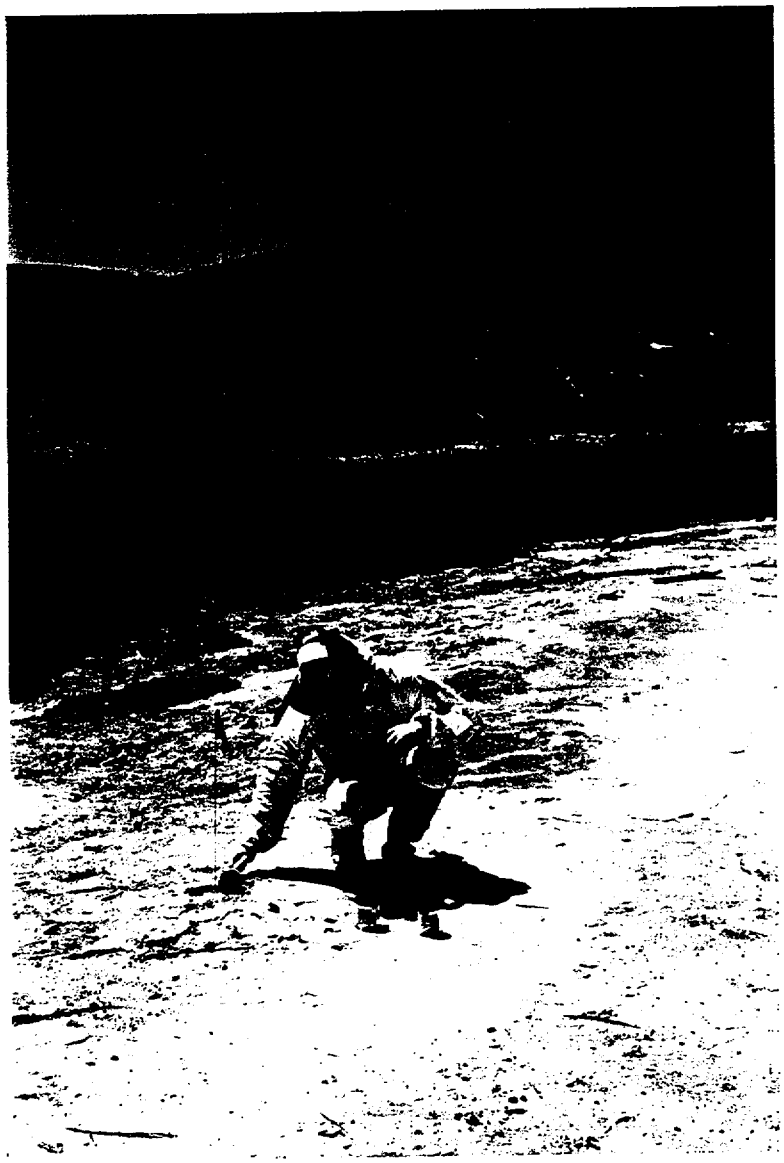


PHOTO 6: SOUTH VIEW OF SAMPLE LOCATION RFT-TA-5.

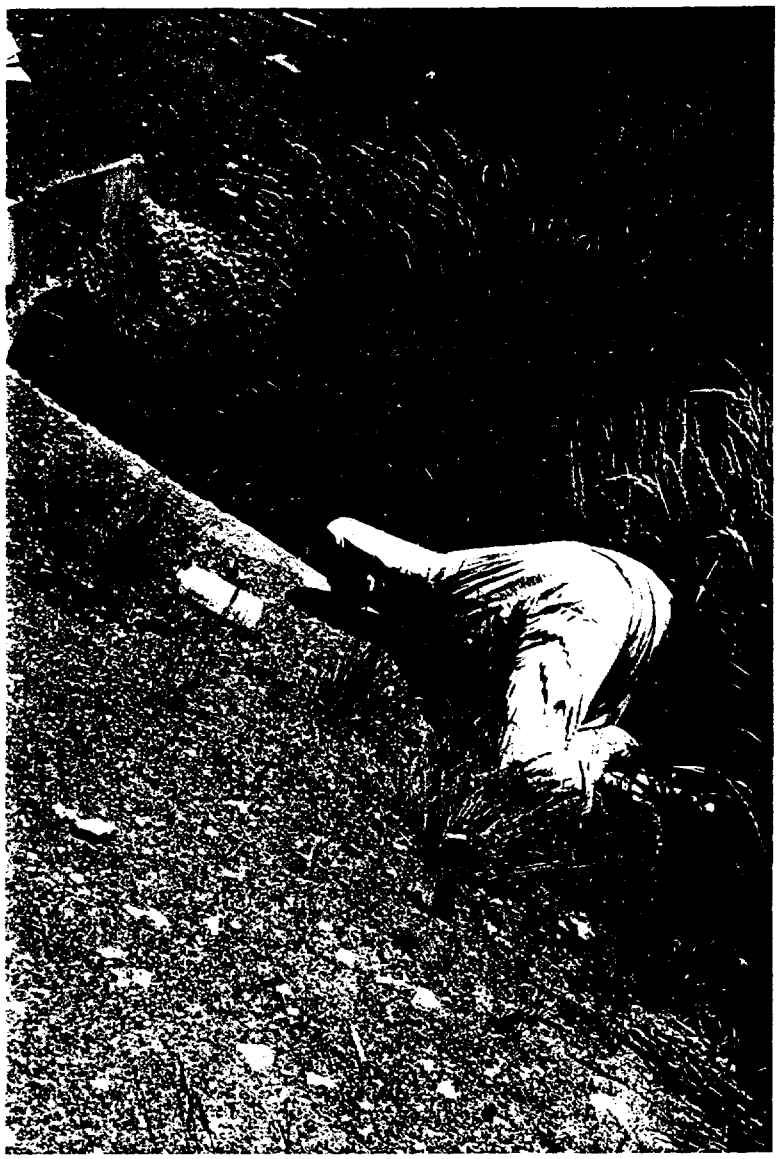


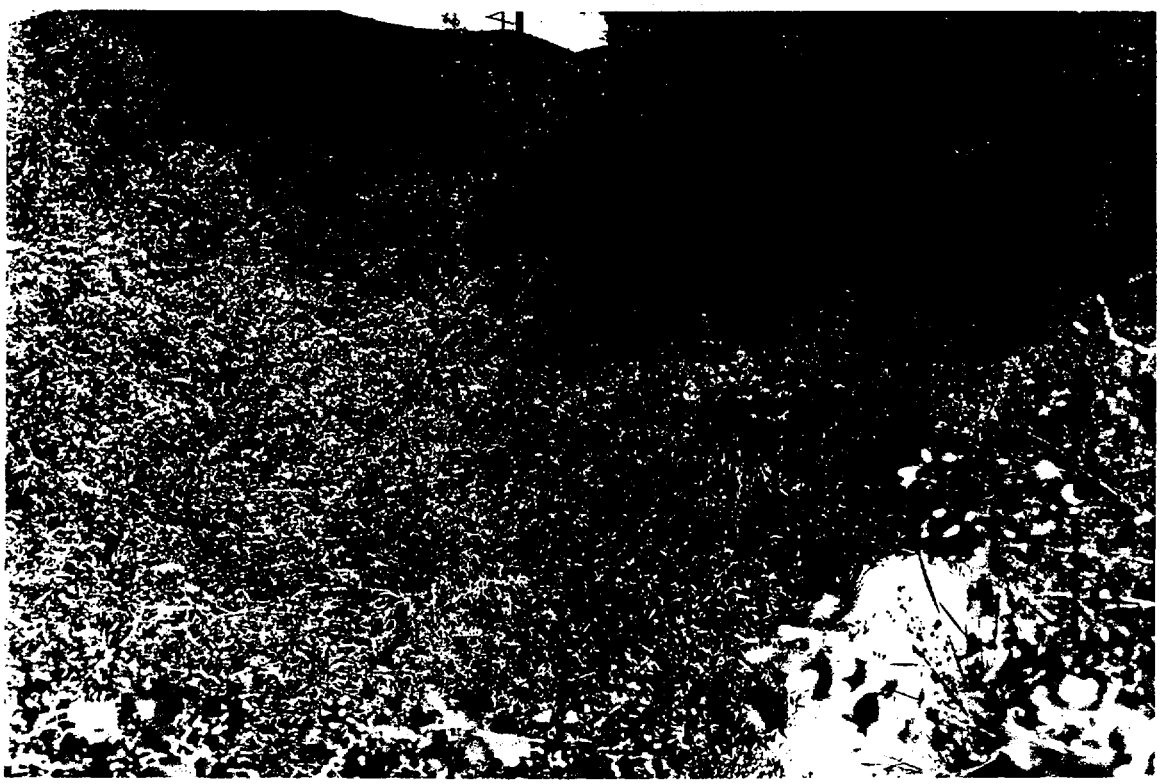
PHOTO 7: FIT MEMBER COLLECTING SAMPLE RFT-SW-9.

PHOTO 8: NORTHEAST FACING PHOTO OF FIT MEMBER COLLECTING SURFACE WATER SAMPLE RFT-SW/SE-7.

PHOTO 9: SOUTHEAST FACING PHOTO OF FIT MEMBER COLLECTING SAMPLE RFT-SW/SE-8.

PHOTO 10: NORTH FACING PHOTO OF SAMPLE LOCATION RFT-SW/SE-6.

PHOTO 11: WEST FACING PHOTO OF SAMPLE LOCATION RFT-SW/SE-5.



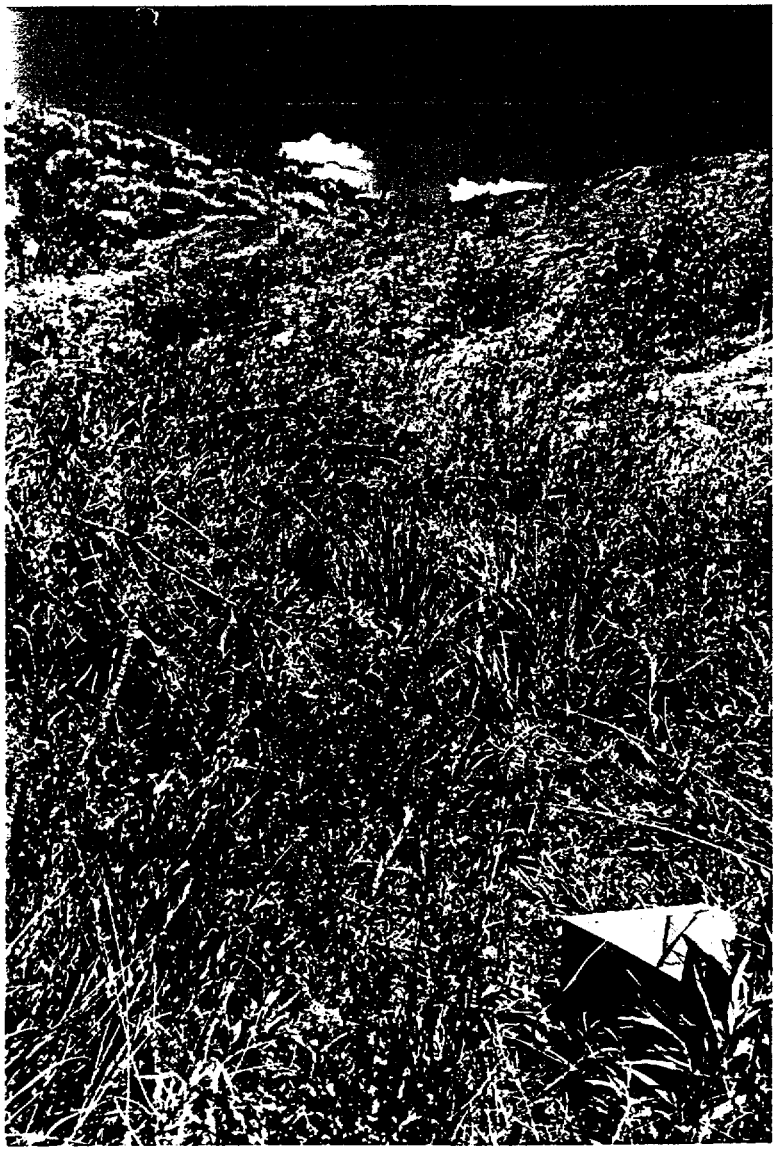


PHOTO 12 (ABOVE): SOUTH FACING PHOTO OF SURFACE WATER SAMPLE LOCATION RFT-OPW-1 AND RFT-OSE-1 AT BASE OF TAILINGS DAM.

PHOTO 13 (LIFT): NORTHEAST FACING PHOTO OF OPPORTUNITY SEDIMENT SAMPLE LOCATION RFT-OSE-2.

# APPENDIX C

# QUALITY ASSURANCE REVIEW

REGION VIII SUMMARY OF DATA QUALITY ASSURANCE REVIEW

***guideline references are from Contract #787***

Case No.: 12334 TDD No.: FO-8909-08

Site: Richardson Flats

Contractor Laboratory: Silver Valley Labs, Inc.; Kellogg, ID

Data Reviewer : Lynn Fischer Date of Review: Oct. 11, 1989

Sample Matrix: 19 low waters

Analysis: Metals and Mercury.

Sample Nos.: MHP520, MHP521, MHP522, MHP523, MHP524, MHP525, MHP526, MHP527, MHP528, MHP529, MHP530, MHP532, MHP533, MHP534, MHP535, MHP537, MHP538, MHP539, and MHP540.

( ) Data are acceptable for use.

(X) Data are acceptable for use with qualifications noted.

( ) Data are preliminary - pending verification.

( ) Data are unacceptable.

Action required by DPO?

No X Yes ___ The following items require action:

All Mercury data is unusable because of missed holding times. Mercury analysis however was performed by Keystone, TX prior to samples being shipped on to Silver Valley for analysis, this data is being used. SMO, or whomever decided to forward the samples should always consider holding time requirements when making these decisions.

Action required by project officer?

No X Yes ___

**The following are our findings:**

**Data are acceptable for use, with the exception of the mercury analysis, with the following qualifications.**

Holding time criteria were met for all analysis with the exception of the mercury cold vapor analysis; all the mercury results are flagged "a", unusable.

All calibration frequencies and requirements were met.

Quite a few contaminants were detected in analysis of the initial, continuing, and laboratory preparation blanks they are: aluminum, antimony, barium, calcium, cadmium, cobalt, copper, iron, magnesium, manganese, potassium, selenium, silver, sodium, zinc, and lead. All samples with positive results for these analytes were flagged "ub", "uj", or "b". "UB" was used to flag those results detected below the contract required detection limit (CRDL), "uj" was used to flag those results greater than the CRDL but less than five times the greatest amount detected in any blank, and "b" was used to flag all other positive results.

Brackets are applied to all results greater than the instrument detection limit (IDL) but less than the CRDL.

Duplicate results for the following analytes were outside limits (+/- 20%), however none were flagged because all were associated with either results below the CRDL, contaminants detected in the blanks, or one of the values was undetected: aluminum, copper, iron, potassium, arsenic, and selenium.

Analysis of the spiked sample had two outliers, lead (16.7%) and selenium (-134.3%), limits are (75-125%). All lead results were flagged "j", results may be biased low. No flags were added to selenium results since both the sample and spiked sample results were less than the CRDL.

All other quality control (QC) criteria were met.

## Inorganic Data Completeness Checklist

Inorganic analysis data (Form I)

Initial calibration and continuing calibration verification (Form IIA)

CRDL standard for AA and ICP (Form IIB)

Blanks (Form III)

ICP interference Check sample (Form IV)

Spike sample recovery (Form VA)

Post digestion spike sample recovery (Form VB)

Duplicates (Form VI)

Laboratory control sample (Form VII)

Standard addition results (Form VIII)

ICP serial dilutions (Form IX)

Holding times (Form X)

Instrument detection limits-quarterly (Form XI)

ICP interelement correction factors-quarterly (Form II)

ICP linear ranges-quarterly (Form XIII)

Raw data for interference checks

Raw data for calibration standards

Raw data for blanks

Raw data for CRI and/or CRA

Raw data for samples

Raw data for duplicates

Raw data for spikes

Traffic reports

## Contract Compliance

I. **Initial and Continuing Calibration Verification (ICV and CCV)** (guidelines pg. E-4, Form IIA)

1. Was instrument calibrated daily and each time it was set up?
   yes X no ___

2. Were instruments calibrated using 1 blank and several standards?
   yes X no ___

3. Were calibration verifications within 90-110%?
   yes X no ___

4. Were continuing calibrations run at 10% frequency?
   yes X no ___

5. Were the raw data correctly transcribed onto Form IIA?
   yes X no___

II. **CRDL Standards for ICP (CRI) and/or AA (CRA)** (guidelines pg. E-6, Form IIB)

1. For ICP analysis, were standards (CRI) @ 2x the CRDL or the IDL (whichever was greater) analyzed at the beginning and the end of each sample run, or at a minimum of twice/8 hour shift, whichever was more frequent?
   yes X no ___

2. For furnace AA analysis, were standards (CRA) analyzed at the beginning and the end of each sample run, or at a minimum of twice/8 hour shift, whichever was more frequent?
   yes X no ___

3. Were the CRI and/or CRA standards analyzed after the ICV?
   yes X no ___

4. Were these data reported on Form IIB?
   yes X no ___

5. Were the raw data correctly transcribed onto Form IIB?
   yes X no ___

III. **Blanks** (guidelines pg. E-6, Form III)

1. Was the initial calibration blank (ICB) analyzed immediately after the initial calibration verification (ICV)?
   yes X no ___

2. Was a continuing calibration blank (CCB) analyzed immediately after each continuing calibration verification (CCV)?
   yes X no ___

3. Was a preparation blank (PB) analyzed at a frequency of at least 1 in 20 samples?
   yes X no ___ NA

4. How many elements were detected above the CRDLs? o (if 0, go to question 5)

4a. How many elements were detected in the blanks at greater than one-half the amount detected in any sample?

5. Were raw data correctly transcribed onto Form III?
yes X no ___

Comments: See narrative for elements detected in blanks.

IV. ICP Interference Checks (ICS) (guidelines pg. E-7, Form IV)

1. Was the ICS analyzed twice per 8 hour shift?
yes X no ___

2. Were the ICSs analyzed before and after samples?
yes X no ___

3. Was any massive interference detected?
yes ___ no X

4. Were the ICSs within ±20% mean value?
yes X no ___

5. Were raw data correctly transcribed onto Form IV?

V. Spike Sample Analysis (S) (guideline pg. E-8, Form V)

1. Were spikes analyzed at a frequency of 1 in 20 samples?
yes X no ___

2. Were spike recoveries correctly calculated?
yes X no ___

$$\% \text{ recovery} = \frac{(SSR - SR)}{SA} \times 100$$

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added

3. Were spike recoveries within the range of 75-125%?
yes ___ no X

3a. For recoveries outside this range, were associated data flagged "N" by the laboratory on Forms I and V?
yes X no ___ NA ___

(an exception if granted where the sample concentration is >4X the spike concentration)

4. Were raw data correctly transcribed onto Form V?

yes X no ___

* Refer to page E-9 (SOW 787) for information regarding the amount of spike to be added for each analyte and for other information about the Spike Sample Analysis.

VI. Duplicates (D) (guidelines pg. E-11, Form VI)

1. Were duplicates analyzed at a frequency of 1 in 20 samples?
   yes X no ___

2. Were RPDs correctly calculated?
   yes X no ___

$$RPD = \frac{S - D}{(S + D)/2} \times 100$$

S = Sample
D = Duplicate

3a. For sample concentrations >5x the CRDL, were RPDs ±20%? (limits of ±35% apply for soil/sediment/tailings samples)
yes X no ___ NA ___

3b. For sample concentrations >5x the CRDL, did duplicate analysis results fall outside the control window of ± the CRDL?
yes ___ no X NA ___

3c. Where the RPDs exceeded the control limits, were the data flagged '*' on Forms I and VI by the laboratory?
yes X no ___ NA ___

4. Were raw data correctly transcribed onto Form VI?
yes X no ___

* Other Considerations:
- Field blanks cannot be used for duplicate analyses
- Duplicates must be analyzed for each analytical method

VII. **Laboratory Control Sample (LCS) Analysis** (guideline pg. E-12, Form VII)

1. Was an LCS analyzed for every sample delivery group or batch of samples, whichever was more frequent?
yes X no ___

2. Were recoveries within the 80-120% limit?
yes X no ___

-if the recoveries were outside this range the analysis must be terminated, the problem corrected and the previous samples associated with that LCS redigested and reanalyzed.

3. Were the raw data correctly transcribed onto Form VII?
yes X no ___

VIII. **Furnace Atomic Absorption (AA) QC Analysis** (guidelines pg. E-14, Form VIII)

1. Does the raw data package contain absorbance values for two injections per sample, the average values and the relative standard deviation (RSD)?
yes X no ___

2. For analyte concentrations > the CRDL, did the RSD for the duplicate injections agree within 20%? (if yes, go to question 3)
yes X no ___

$$RSD = \frac{SD}{M} \times 100$$

SD = Standard Deviation of Duplicate Injections
M = Mean of Duplicate Injections

2a. Were samples that exceeded the 20% criteria reanalyzed?
yes ___ no ___

2b. Did any reanalyzed samples exceed the 20% criteria?
yes ___ no ___

2c. If yes, did the laboratory flag the data of Form I with an 'M'?
yes no

3. Was the recovery of the spike > 40%? (if yes, go to question 4).
yes X no ___

If no, was the sample diluted and rerun with another spike?
yes no

4. Was sample absorbance >50% of spike absorbance?* (if yes, go to question 5).
yes ___ no X

* Spike absorbance = absorbance of spiked sample - absorbance of sample.

4a. For spike recoveries between 85 and 115%, were results reported to the IDL?
yes X no ___

$$RPD = \frac{(SSR - SR)}{SA} \times 100$$

SSR = Spike Sample Recovery
SR = Sample Result
SA = Spike Added

4b. For spike recoveries outside the 85 and 115% range, were results reported to the IDL and flagged with 'W'?
yes X no ___

5. Was spike recovery between 85 and 115%? (if no, go to question 6)

5a. Were results quantified from calibration curve and reported to IDL?
yes ___ no ___

6. Was an MSA at 50, 100 and 150% of the sample absorbance analyzed?
yes no

6a. Was each MSA analysis identified in the raw data along with the slope, intercept and correlation coefficient?
yes no

6b. Were these data correctly transcribed onto Form VIII?

yes no

6c. Were correlation coefficients(r) > 0.995?
yes no

6d. If no, were MSAs run once more?
yes no

- If the correlation coefficients were still > 0.995, data on Form I must be from the run with the best 'r' and the data on Forms I and VII must be flagged with a '+'.

Were these criteria met?
yes no

6e. Were all MSA obtained data marked with an 'S' or an S+ on form I?
yes no

IX. ICP Serial Dilution (L) Analysis (guidelines pg. E-12, Form IX)

1. Was an ICP serial dilution performed on each group of samples of a similar matrix (i.e., soil, water) and concentration (i.e., low, high) or for each sample delivery group, whichever was more frequent?
yes X no ___

2. For elements with concentrations >10X the CRDL, did any exceed the serial dilution results by more than 10%? (if no, skip questions 3 and 4)
yes X no ___

$$\% \text{ difference} = \frac{I - S}{I} \times 100$$

I = Initial Sample Result
S = Serial Dilution Result (instrument reading X5)

3. Which elements had concentrations that exceeded the 10% criteria? only those associated with undetected values or blank contaminanats.

4. Did the laboratory flag these data with an 'E' on Form IX?
yes no

5. Were the raw data correctly transcribed onto Form IX?
yes X no ___

X. Instrument Detection Limits (IDL) (guidelines pg. E-13, Form XI)

1. Were IDLs reported for each analyzed element?
yes X no ___

2. Were IDLs reported for each instrument used?
yes X no ___

3. Did the IDLs meet the contract requirements? (refer to pg. E-13, SOW 787)
yes X no

**XI. Interelement Corrections for ICP (guidelines pg. E-13, Form XII)**

1. Were correction factors reported on Form XII?
   yes X no ___

**XII. Linear Range Analysis (LRA) (guidelines pg. E-14, Form XII)**

1. Was a linear range verification standard analyzed?
   yes X no ___

2. Was the results within ±5% of the true value?
   yes X no ___

**Holding Times**

Limits: Metals - 6 months; Hg - 30 days; Cn - 28 days.

1. Verified date of sample receipt by laboratory 8-16-89
2. Date of preparation/analyses ICP - 8-24-89
   AS - 8-31-89
   SE - 8-31-89
   PB - 8-29-89
   TL - 8-24-89
3. Were holding times met? yes X, for all but HG

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP520

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-D8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: _____ SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: _____

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | [34.7] | B | UB | P | LAF |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | ~~40.0~~ [3.9] | B | | E | MAB 10/10/89 |
| 7440-39-3 | Barium | [14.9] | B | UB | P | LAF |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 1.8 | U | | P | |
| 7440-70-2 | Calcium | 830000. | | B | P | LAF |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | [3.8] | B | UB | P | LAF |
| 7440-50-8 | Copper | [1.2] | B | UB | P | LAF |
| 7439-89-6 | Iron | 123. | | | P | |
| 7439-92-1 | Lead | [1.6] | B | N UB | E | LAF |
| 7439-95-4 | Magnesium | 71200. | | B | P | LAF |
| 7439-96-5 | Manganese | 3170. | | B | P | LAF |
| 7439-97-6 | Mercury | 0.2 | U | R | E | LAF |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | [2230.] | B | UB | P | LAF |
| 7782-49-2 | Selenium | 12.0 | U | N* | E | LAF |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 49600. | | B | P | LAF |
| 7440-28-0 | Thallium | 0.9 | U | | E | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 198. | | B | P | LAF |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture: _____

Color After: COLORLESS Clarity After: CLEAR Artifacts: _____

Comments:

16

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP521

Lab Name: SILVER VALLEY LABS, INC. Contract: 68-W80074 ~~68-D9-0071~~ MAB 10/02/89

Lab Code: SILVER Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | [16.5] | B | WB | P | LAF |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | [3.8] | B | N | F | MAB 09/08/89 |
| 7440-39-3 | Barium | [52.9] | B | WB | P | LAF |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 9.2 | | B | P | LAF |
| 7440-70-2 | Calcium | 199000 | | B | P | LAF |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | [2.6] | B | WB | P | LAF |
| 7440-50-8 | Copper | [1.5] | B | WB | P | LAF |
| 7439-89-6 | Iron | [39.9] | B | WB | P | LAF |
| 7439-92-1 | Lead | 38.2 | | N~~S~~ (B) | F | MAB 09/08/89 |
| 7439-95-4 | Magnesium | 39600 | | B | P | LAF |
| 7439-96-5 | Manganese | 1080 | | B | P | LAF |
| 7439-97-6 | Mercury | 0.20 | U | N R | CV | MAB 09/08/89 LAF |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | [3470] | B | WB | P | LAF |
| 7782-49-2 | Selenium | 14.7 | B | N* WB | F | LAF |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 41000 | | B | P | LAF |
| 7440-28-0 | Thallium | 0.90 | U | N | F | LAF |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 2360 | | B | P | LAF |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP522

Lab Name: SILVER VALLEY LABS, INC. Contract: ~~68-D3-0071~~ 68-W8-0014 MAB 10/04/89

Lab Code: SILVER Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 1740 | | B | P | LAF |
| 7440-36-0 | Antimony | 53.8 | B | WB | P | LAF |
| 7440-38-2 | Arsenic | 41.9 | | N | F | MAB 09/08/89 |
| 7440-39-3 | Barium | 82.2 | B | WB | P | LAF |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 16.0 | | B | P | LAF |
| 7440-70-2 | Calcium | 206000 | | B | P | LAF |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 5.7 | B | | P | LAF |
| 7440-50-8 | Copper | 71.4 | | B | P | LAF |
| 7439-89-6 | Iron | 5320 | | B | P | LAF |
| 7439-92-1 | Lead | 1100 | | B | P | LAF |
| 7439-95-4 | Magnesium | 42000 | | B | P | LAF |
| 7439-96-5 | Manganese | 1220 | | B | P | LAF |
| 7439-97-6 | Mercury | 2.2 | | N R | CV | MAB 09/08/89 LAF |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 3160 | B | B | P | LAF |
| 7782-49-2 | Selenium | 28.5 | B | NW* | F | LAF |
| 7440-22-4 | Silver | 6.3 | B | B | P | LAF |
| 7440-23-5 | Sodium | 42000 | | B | P | LAF |
| 7440-28-0 | Thallium | 0.90 | U | | F | |
| 7440-62-2 | Vanadium | 5.5 | B | | P | LAF |
| 7440-66-6 | Zinc | 3790 | | B | P | LAF |
| | Cyanide | | | | NR | |

Color Before: BROWN Clarity Before: CLEAR Texture:

Color After: BROWN Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP523

Lab Name: SILVER VALLEY LABS, INC. Contract: ~~68-D9-0071~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: mab 10/02/89 SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | [18.2] | B | uB | P | LAF |
| 7440-36-0 | Antimony | [25.7] | B | uB | P | LAF |
| 7440-38-2 | Arsenic | [6.6] | B | ~~N~~W | F | mab 09/08/89 |
| 7440-39-3 | Barium | [61.5] | B | uB | P | LAF |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | [5.0] | B | uB | P | LAF |
| 7440-70-2 | Calcium | 211000 | | B | P | LAF |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | [3.5] | B | uB | P | LAF |
| 7440-50-8 | Copper | [1.2] | B | uB | P | LAF |
| 7439-89-6 | Iron | [63.2] | B | uB | P | LAF |
| 7439-92-1 | Lead | 48.3 | | ~~N8*~~ R | F | mab 10/02/89 LAF |
| 7439-95-4 | Magnesium | 41400 | | B | P | LAF |
| 7439-96-5 | Manganese | 1170 | | B | P | LAF |
| 7439-97-6 | Mercury | 0.20 | U | ~~N~~ R | CV | mab 09/08/89 LAF |
| 7440-02-0 | Nickel | [13.9] | B | | P | LAF |
| 7440-09-7 | Potassium | [3180] | B | uB | P | LAF |
| 7782-49-2 | Selenium | [2.6] | B | N* uB | F | LAF |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 42300 | | B | P | LAF |
| 7440-28-0 | Thallium | 0.90 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 1730 | | B | P | LAF |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP524

Lab Name: SILVER VALLEY LABS, INC. Contract: 68-W8-0074 ~~68-D9-0071~~ mab/10/2/89

Lab Code: SILVER Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 44500 | | B | P | LAF |
| 7440-36-0 | Antimony | 210 | | B | P | LAF |
| 7440-38-2 | Arsenic | 619 | | | P | |
| 7440-39-3 | Barium | 881 | | B | P | LAF |
| 7440-41-7 | Beryllium | [2.4] | B | | P | |
| 7440-43-9 | Cadmium | 137 | | B | P | LAF |
| 7440-70-2 | Calcium | 248000 | | B | P | LAF |
| 7440-47-3 | Chromium | 72.2 | | | P | |
| 7440-48-4 | Cobalt | [27.0] | B | LAB | P | LAF |
| 7440-50-8 | Copper | 1390 | | B | P | LAF |
| 7439-89-6 | Iron | 98500 | | B | P | LAF |
| 7439-92-1 | Lead | 20000 | | [illegible] | P | LAF |
| 7439-95-4 | Magnesium | 68400 | | B | P | LAF |
| 7439-96-5 | Manganese | 3080 | | B | P | LAF |
| 7439-97-6 | Mercury | 39.2 | | N R | CV | MAB LAF 09/08/89 |
| 7440-02-0 | Nickel | 67.3 | | | P | |
| 7440-09-7 | Potassium | 8980 | | B | P | LAF |
| 7782-49-2 | Selenium | [34.2] | B | N* LAB | F | LAF |
| 7440-22-4 | Silver | 131 | | B | P | LAF |
| 7440-23-5 | Sodium | 42900 | | B | P | LAF |
| 7440-28-0 | Thallium | [4.7] | B | W | F | LAF |
| 7440-62-2 | Vanadium | 129 | | | P | |
| 7440-66-6 | Zinc | 19300 | | B | P | LAF |
| | Cyanide | | | | NR | |

Color Before: BROWN Clarity Before: OPAQUE Texture:

Color After: BROWN Clarity After: OPAQUE Artifacts:

Comments:

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U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP525

Lab Name: SILVER VALLEY LABS, INC. Contract: 68-W8-0074 ~~68-D9-0071~~ MAB 10/04/89

Lab Code: SILVER Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | [27.9] | B | uB | P | LAF |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | [7.2] | B | ~~N~~W | F | MAB 10/04/89 |
| 7440-39-3 | Barium | [61.9] | B | uB | P | LAF |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 1.8 | U | | P | |
| 7440-70-2 | Calcium | 132000 | | B | P | LAF |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | [3.1] | B | uB | P | LAF |
| 7440-50-8 | Copper | 1.1 | U | | P | |
| 7439-89-6 | Iron | [56.4] | B | uB | P | LAF |
| 7439-92-1 | Lead | 9.2 | | ~~NS*~~ BJ | F | MAB 10/02/89 |
| 7439-95-4 | Magnesium | 34700 | | B | P | LAF |
| 7439-96-5 | Manganese | 20.3 | | B | P | LAF |
| 7439-97-6 | Mercury | 0.20 | U | ~~N~~ R | CV | MAB 10/05/89 LAF |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | [1820] | B | uB | P | LAF |
| 7782-49-2 | Selenium | [15.4] | B | N* uB | F | LAF |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 19700 | | | P | |
| 7440-28-0 | Thallium | 0.90 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 64.1 | | B | P | LAF |
| | Cyanide | | | | NR | |
| | | | | | | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

recycled paper
recycled paper
recycled paper



ecology and environment
ecology and environment
ecology and environment

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U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP526

Lab Name: SILVER VALLEY LABS, INC. Contract: ~~68-D9-0071~~ 68-C08-0074 MAB 10/02/89

Lab Code: SILVER Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 26.3 | B | UB | P | LAF |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 7.7 | B | ~~NW~~ | F | MAB 09/08/89 |
| 7440-39-3 | Barium | 61.9 | B | UB | P | LAF |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 1.8 | U | | P | |
| 7440-70-2 | Calcium | 131000 | | B | P | LAF |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 2.6 | U | | P | |
| 7440-50-8 | Copper | 2.4 | B | UB | P | LAF |
| 7439-89-6 | Iron | 84.7 | B | UB | P | LAF |
| 7439-92-1 | Lead | 0.93 | B | ~~NW*~~ UB | F | MAB 10/02/89 LAF |
| 7439-95-4 | Magnesium | 34400 | | B | P | LAF |
| 7439-96-5 | Manganese | 19.1 | | B | P | LAF |
| 7439-97-6 | Mercury | 0.20 | U | ~~N~~ R | CV | MAB LAF 09/08/89 |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 2110 | B | UB | P | LAF |
| 7782-49-2 | Selenium | 15.2 | B | N* UB | F | LAF |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 19700 | | | P | |
| 7440-28-0 | Thallium | 0.90 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 52.7 | | B | P | LAF |
| | Cyanide | | | | NR | |
| | | | | | | |

olor Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

omments:

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP527

Lab Name: SILVER VALLEY LABS, INC. Contract: ~~68-D9-0071~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: MRB 10/02/89 SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 43400 | | B | P | LAF |
| 7440-36-0 | Antimony | 199 | | B | P | LAF |
| 7440-38-2 | Arsenic | 540 | | | P | |
| 7440-39-3 | Barium | 788 | | B | P | LAF |
| 7440-41-7 | Beryllium | [2.1] | B | | P | LAF |
| 7440-43-9 | Cadmium | 127 | | B | P | LAF |
| 7440-70-2 | Calcium | 246000 | | B | P | LAF |
| 7440-47-3 | Chromium | 68.5 | | | P | |
| 7440-48-4 | Cobalt | [28.4] | B | UB | P | LAF |
| 7440-50-8 | Copper | 1260 | | B | P | LAF |
| 7439-89-6 | Iron | 89300 | | B | P | LAF |
| 7439-92-1 | Lead | 17900 | | B J | P | LAF |
| 7439-95-4 | Magnesium | 67100 | | B | P | LAF |
| 7439-96-5 | Manganese | 2950 | | B | P | LAF |
| 7439-97-6 | Mercury | 36.0 | | N R | CV | MRB LAF 09/08/89 |
| 7440-02-0 | Nickel | 57.3 | | | P | |
| 7440-09-7 | Potassium | 8770 | | B | P | LAF |
| 7782-49-2 | Selenium | [43.9] | B | N* UB | F | LAF |
| 7440-22-4 | Silver | 117 | | B | P | LAF |
| 7440-23-5 | Sodium | 42700 | | | P | |
| 7440-28-0 | Thallium | [4.2] | B | W | F | LAF |
| 7440-62-2 | Vanadium | 121 | | | P | |
| 7440-66-6 | Zinc | 17700 | | B | P | LAF |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

recycled paper



ecology and environment

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U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP528

Lab Name: SILVER VALLEY LABS, INC. Contract: ~~68-D9-0071~~ 68-W8-0074 MAB 9/02/89

Lab Code: SILVER Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | [28.0] | B | WB | P | WAF |
| 7440-36-0 | Antimony | [26.9] | B | WB | P | WAF |
| 7440-38-2 | Arsenic | [5.6] | B | NW | F | MAB 09/08/89 WAF |
| 7440-39-3 | Barium | [60.8] | B | WB | P | WAF |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 6.0 | | B | P | WAF |
| 7440-70-2 | Calcium | 211000 | | B | P | WAF |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | [5.3] | B | WB | P | WAF |
| 7440-50-8 | Copper | [1.2] | B | WB | P | WAF |
| 7439-89-6 | Iron | [55.1] | B | WB | P | WAF |
| 7439-92-1 | Lead | 34.6 | | ~~N~~ R | F | MAB 9/02/89 WAF |
| 7439-95-4 | Magnesium | 41400 | | B | P | WAF |
| 7439-96-5 | Manganese | 1180 | | B | P | WAF |
| 7439-97-6 | Mercury | 0.20 | U | ~~N~~ R | CV | MAB WAF 09/08/89 |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 3060 | B | WB | P | WAF |
| 7782-49-2 | Selenium | 15.1 | B | NW* WB | F | WAF |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 41200 | | | P | |
| 7440-28-0 | Thallium | 0.90 | U | | F | |
| 7440-62-2 | Vanadium | [3.8] | B | | P | WAF |
| 7440-66-6 | Zinc | 1730 | | B | P | WAF |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP529

Lab Name: SILVER VALLEY LABS, INC. Contract: ~~68-D9-0074~~ 68-W8-0074 MAB 10/02/89

Lab Code: SILVER Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | [24.9] | B | WB | P | LAF |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 2.3 | U | N | F | MAB 09/08/89 |
| 7440-39-3 | Barium | 1.3 | U | | P | |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 1.8 | U | | P | |
| 7440-70-2 | Calcium | [214] | B | WB | P | LAF |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 2.6 | U | | P | |
| 7440-50-8 | Copper | 1.1 | U | | P | |
| 7439-89-6 | Iron | [64.2] | B | WB | P | LAF |
| 7439-92-1 | Lead | [1.8] | B | ~~N~~ WB | F | MAB 09/08/89 LAF |
| 7439-95-4 | Magnesium | [43.7] | B | WB | P | LAF |
| 7439-96-5 | Manganese | [1.4] | B | WB | P | LAF |
| 7439-97-6 | Mercury | 0.20 | U | N R | CV | MAB 09/08/89 LAF |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 273 | U | | P | |
| 7782-49-2 | Selenium | 1.2 | U | NW* | F | LAF |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | [47.5] | B | WB | P | LAF |
| 7440-28-0 | Thallium | 0.90 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | [12.6] | B | WB | P | LAF |
| | Cyanide | | | | NR | |
| | | | | | | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

025

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP530

Lab Name: SILVER VALLEY LABS, INC. Contract: ~~68-D9-0071~~ 68-W8-0074 MAB 09/08/89

Lab Code: SILVER Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | [32.1] | B | LAB | P | LAF |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 2.3 | U | N | F | MAB 09/08/89 |
| 7440-39-3 | Barium | 1.3 | U | | P | |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 1.8 | U | | P | |
| 7440-70-2 | Calcium | [136] | B | LAB | P | LAF |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 2.6 | U | | P | |
| 7440-50-8 | Copper | 1.1 | U | | P | |
| 7439-89-6 | Iron | [41.5] | B | | P | LAF |
| 7439-92-1 | Lead | [1.6] | B | NW* LAB | F | MAB 10/04/89 LAF |
| 7439-95-4 | Magnesium | [29.0] | B | LAB | P | LAF |
| 7439-96-5 | Manganese | [2.5] | B | LAB | P | LAF |
| 7439-97-6 | Mercury | 0.20 | U | N R | CV | MAB LAF 09/08/89 |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 273 | U | | P | |
| 7782-49-2 | Selenium | 1.2 | U | N* | F | |
| 7440-22-4 | Silver | 23.8 | | B | P | LAF |
| 7440-23-5 | Sodium | 13.2 | U | | P | |
| 7440-28-0 | Thallium | 0.90 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | [6.5] | B | LAB | P | LAF |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP532

Lab Name: SILVER VALLEY LABS, INC. Contract: 68-W8-0074 ~~68-B9-0074~~ MAB 10/04/89

Lab Code: SILVER Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | [23.0] | B | WB | P | LAF |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | [2.9] | B | NW | F | LAF MAB 09/08/89 |
| 7440-39-3 | Barium | [37.3] | B | WB | P | LAF |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 1.8 | U | | P | |
| 7440-70-2 | Calcium | 321000 | | | P | |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | [6.3] | B | WB | P | LAF |
| 7440-50-8 | Copper | [1.2] | B | WB | P | LAF |
| 7439-89-6 | Iron | 503 | | B | P | LAF |
| 7439-92-1 | Lead | 0.90 | U | NW* | F | MAB 09/08/89 |
| 7439-95-4 | Magnesium | 56100 | | B | P | LAF |
| 7439-96-5 | Manganese | 12900 | | B | P | LAF |
| 7439-97-6 | Mercury | 0.20 | U | N ℓ | CV | LAF MAB 09/08/89 |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 5380 | | | P | |
| 7782-49-2 | Selenium | 12.0 | U | NW* | F | LAF |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 60000 | | B | P | LAF |
| 7440-28-0 | Thallium | 0.90 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | [19.8] | B | WB | P | LAF |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP533

Lab Name: SILVER VALLEY LABS, INC. Contract: ~~68-D9-0071~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: MRB 10/02/89 SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 317 | | B | P | LAF |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 33.1 | | NS | F | MRB 09/02/89 |
| 7440-39-3 | Barium | [82.2] | ~~B~~ | UB | P | LAF |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | [3.6] | ~~B~~ | UB | P | LAF |
| 7440-70-2 | Calcium | 369000 | | B | P | LAF |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | [5.6] | ~~B~~ | UB | P | LAF |
| 7440-50-8 | Copper | [6.6] | ~~B~~ | UB | P | LAF |
| 7439-89-6 | Iron | 10200 | | B | P | LAF |
| 7439-92-1 | Lead | 68.2 | | ~~NS~~ B | F | MRB 10/02/89 LAF |
| 7439-95-4 | Magnesium | 58800 | | B | P | LAF |
| 7439-96-5 | Manganese | 21400 | | B | P | LAF |
| 7439-97-6 | Mercury | 0.20 | U | R | CV | LAF |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 9960 | | | P | |
| 7782-49-2 | Selenium | [18.5] | ~~B~~ | NW* UB | F | LAF |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 63400 | | B | P | LAF |
| 7440-28-0 | Thallium | 0.90 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 759 | | B | P | LAF |
| | Cyanide | | | | NR | |

Color Before: YELLOW Clarity Before: CLOUDY Texture:

Color After: YELLOW Clarity After: CLOUDY Artifacts:

Comments:

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U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP534

Lab Name: SILVER VALLEY LABS, INC. Contract: 68-W8-0074 ~~68-D9-0071~~

Lab Code: SILVER Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | [44.6] | B | WB | P | LAF |
| 7440-36-0 | Antimony | [20.1] | B | WB | P | LAF |
| 7440-38-2 | Arsenic | 2.3 | U | NW | F | MAB 09/08/89 |
| 7440-39-3 | Barium | [56.7] | B | WB | P | LAF |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 10.3 | | B | P | LAF |
| 7440-70-2 | Calcium | 205000 | | B | P | LAF |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | [3.1] | B | WB | P | LAF |
| 7440-50-8 | Copper | [2.7] | B | WB | P | LAF |
| 7439-89-6 | Iron | [31.5] | B | WB | P | LAF |
| 7439-92-1 | Lead | [1.4] | B | N~~X~~ WB J | F | MAB 09/08/89 LAF |
| 7439-95-4 | Magnesium | 40400 | | B | P | LAF |
| 7439-96-5 | Manganese | 1070 | | B | P | LAF |
| 7439-97-6 | Mercury | 0.20 | U | N R | CV | MAB 09/08/89 LAF |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | [3180] | B | WB | P | LAF |
| 7782-49-2 | Selenium | [2.7] | B | N* WB | F | LAF |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 41900 | | B | P | LAF |
| 7440-28-0 | Thallium | 0.90 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 2970 | | B | P | LAF |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP535

Lab Name: SILVER VALLEY LABS, INC. Contract: ~~68-D9-0071~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: MAB 10/02/89 SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | [61.1] | ~~B~~ | UB | P | LAF |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | [5.6] | ~~B~~ | ~~NW~~ | F | MAB LAF 09/08/89 |
| 7440-39-3 | Barium | [56.0] | ~~B~~ | UB | P | LAF |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 10.3 | | B | P | LAF |
| 7440-70-2 | Calcium | 205000 | | B | P | LAF |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | [3.5] | ~~B~~ | UB | P | LAF |
| 7440-50-8 | Copper | [4.9] | ~~B~~ | UB | P | LAF |
| 7439-89-6 | Iron | 496 | | B | P | LAF |
| 7439-92-1 | Lead | 25.2 | | ~~NS*~~ B | F | MAB 09/08/89 LAF |
| 7439-95-4 | Magnesium | 40300 | | B | P | LAF |
| 7439-96-5 | Manganese | 1080 | | B | P | LAF |
| 7439-97-6 | Mercury | 0.20 | U | ~~N~~ R | CV | MAB LAF 09/08/89 |
| 7440-02-0 | Nickel | [10.6] | ~~B~~ | | P | LAF |
| 7440-09-7 | Potassium | [3380] | ~~B~~ | UB | P | LAF |
| 7782-49-2 | Selenium | 1.2 | U | NW* | F | |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 41900 | | | P | |
| 7440-28-0 | Thallium | 0.90 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 3130 | | B | P | LAF |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP537

Lab Name: SILVER VALLEY LABS, INC. Contract: ~~68-D9-0071~~ 68-L08-0074

Lab Code: SILVER Case No.: 12334 SAS No.: MAB 10/02/89 SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | [49.5] | ~~B~~ | UB | P | LAF |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 2.3 | U | NW | F | MAB 09/07/89 |
| 7440-39-3 | Barium | [54.3] | ~~B~~ | UB | P | LAF |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 13.3 | | B | P | LAF |
| 7440-70-2 | Calcium | 228000 | | B | P | LAF |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | [6.6] | ~~B~~ | UB | P | LAF |
| 7440-50-8 | Copper | [3.9] | ~~B~~ | UB | P | LAF |
| 7439-89-6 | Iron | 346 | | B | P | LAF |
| 7439-92-1 | Lead | 8.8 | | ~~NW~~ B | F | MAB 09/07/89 |
| 7439-95-4 | Magnesium | 41800 | | B | P | LAF |
| 7439-96-5 | Manganese | 1380 | | B | P | LAF |
| 7439-97-6 | Mercury | 0.20 | U | ~~N~~ R | CV | MAB 09/07/89 LAF |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | [3630] | ~~B~~ | UB | P | LAF |
| 7782-49-2 | Selenium | [20.0] | ~~B~~ | NW* UB | F | LAF |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 48000 | | B | P | LAF |
| 7440-28-0 | Thallium | 0.90 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 3880 | | B | P | LAF |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP539

Lab Name: SILVER VALLEY LABS, INC. Contract: ~~68-D9-0071~~ 68-W8-0074 MAB 10/2/89

Lab Code: SILVER Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | [29.0] | B | WB | P | LAF |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 2.3 | U | N | F | MAB 09/08/89 |
| 7440-39-3 | Barium | [1.7] | B | WB | P | LAF |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 1.8 | U | | P | |
| 7440-70-2 | Calcium | [109] | B | WB | P | LAF |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 2.6 | U | | P | |
| 7440-50-8 | Copper | 1.1 | U | | P | |
| 7439-89-6 | Iron | [33.4] | B | WB | P | LAF |
| 7439-92-1 | Lead | [1.3] | B | NW WB | F | MAB 10/2/89 LAF |
| 7439-95-4 | Magnesium | [38.6] | B | WB | P | LAF |
| 7439-96-5 | Manganese | [2.0] | B | WB | P | LAF |
| 7439-97-6 | Mercury | 0.20 | U | N R | CV | MAB LAF 09/08/89 |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 273 | U | | P | |
| 7782-49-2 | Selenium | 1.2 | U | N* | F | |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | [41.8] | B | WB | P | LAF |
| 7440-28-0 | Thallium | 0.90 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | [2.9] | B | WB | P | LAF |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP538

Lab Name: SILVER VALLEY LABS, INC. Contract: 68-W8-0074 ~~68-D9-0071~~

Lab Code: SILVER Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 29.6 | B | | P | |
| 7440-36-0 | Antimony | 20.1 | B | | P | |
| 7440-38-2 | Arsenic | 2.3 | U | NW | F | |
| 7440-39-3 | Barium | 51.1 | B | | P | |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 13.5 | | | P | |
| 7440-70-2 | Calcium | 218000 | | | P | |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 5.3 | B | | P | |
| 7440-50-8 | Copper | 1.5 | B | | P | |
| 7439-89-6 | Iron | 43.7 | B | | P | |
| 7439-92-1 | Lead | 0.90 | U | NW* | F | |
| 7439-95-4 | Magnesium | 39900 | | | P | |
| 7439-96-5 | Manganese | 1330 | | | P | |
| 7439-97-6 | Mercury | 0.20 | U | NR | CV | |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 3570 | B | | P | |
| 7782-49-2 | Selenium | 18.0 | B | NW* | F | |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 46400 | | | P | |
| 7440-28-0 | Thallium | 0.90 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 3720 | | | P | |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP540

Lab Name: SILVER VALLEY LABS, INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | [27.0] | B | WB | P | LAF |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 2.3 | U | NW | F | |
| 7440-39-3 | Barium | 1.3 | U | | P | |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 1.8 | U | | P | |
| 7440-70-2 | Calcium | [90.8] | B | WB | P | LAF |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | [2.7] | B | WB | P | LAF |
| 7440-50-8 | Copper | 1.1 | U | | P | |
| 7439-89-6 | Iron | [32.2] | B | WB | P | LAF |
| 7439-92-1 | Lead | 0.90 | U | NW | F | |
| 7439-95-4 | Magnesium | [27.8] | B | WB | P | LAF |
| 7439-96-5 | Manganese | [1.4] | B | WB | P | LAF |
| 7439-97-6 | Mercury | 0.20 | U | R | CV | LAF |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | [437] | B | WB | P | LAF |
| 7782-49-2 | Selenium | 1.2 | U | NW* | F | LAF |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | [13.3] | B | WB | P | LAF |
| 7440-28-0 | Thallium | 0.90 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 1.3 | U | | P | |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

recycled paper
recycled paper
recycled paper

ecology and environment
ecology and environment
ecology and environment

**REGION VIII SUMMARY OF DATA QUALITY ASSURANCE REVIEW**

*****guideline references are from Contract #787*****

Case No.: 12334 TDD No.: F08-8909-08

Site: Richardson Flats

Contractor Laboratory: Keystone-Houston

Data Reviewer : Annette Sackman Date of Review: 10-3-89

Sample Matrix: 19 Low Waters

Analysis: Mercury

Sample Nos.: MHP520, MHP521, MHP522, MHP523, MHP524, MHP525, MHP526, MHP527, MHP528, MHP529, MHP530, MHP532, MHP533, MHP534, MHP535, MHP537, MHP538, MHP539, MHP540

(X) Data are acceptable for use.

( ) Data are acceptable for use with qualifications noted.

( ) Data are preliminary - pending verification.

( ) Data are unacceptable.

Action required by DPO?

No X Yes The following items require action:

Action required by project officer?

No X Yes

The following are our findings:

All requirements were met for the mercury analysis except Form VII - Laboratory Control Sample was not included. Since the LCS was analyzed and reported in the raw data and met all other requirements, no action is taken.

## Inorganic Data Completeness Checklist

X Inorganic analysis data (Form I)

X Initial calibration and continuing calibration verification (Form IIA)

CRDL standard for AA and ICP (Form IIB)

X Blanks (Form III)

ICP interference Check sample (Form IV)

X Spike sample recovery (Form VA)

Post digestion spike sample recovery (Form VB)

X Duplicates (Form VI)

X Laboratory control sample (Form VII)

Standard addition results (Form VIII)

ICP serial dilutions (Form IX)

X Holding times (Form X)

X Instrument detection limits-quarterly (Form XI)

X ICP interelement correction factors-quarterly (Form II)

X ICP linear ranges-quarterly (Form XIII)

Raw data for interference checks

X Raw data for calibration standards

X Raw data for blanks

Raw data for CRI and/or CRA

X Raw data for samples

X Raw data for duplicates

X Raw data for spikes

X Traffic reports

## Contract Compliance

**I. Initial and Continuing Calibration Verification (ICV and CCV) (guidelines pg. E-4, Form IIA)**

1. Was instrument calibrated daily and each time it was set up?
   yes X no

2. Were instruments calibrated using 1 blank and several standards?
   yes X no

3. Were calibration verifications within 90-110%?
   yes X no

4. Were continuing calibrations run at 10% frequency?
   yes X no

5. Were the raw data correctly transcribed onto Form IIA?
   yes X no

Comments: All requirements met.

**II. CRDL Standards for ICP (CRI) and/or AA (CRA) (guidelines pg. E-6, Form IIB)**

1. For ICP analysis, were standards (CRI) @ 2x the CRDL or the IDL (whichever was greater) analyzed at the beginning and the end of each sample run, or at a minimum of twice/8 hour shift, whichever was more frequent?
   yes no

2. For furnace AA analysis, were standards (CRA) analyzed at the beginning and the end of each sample run, or at a minimum of twice/8 hour shift, whichever was more frequent?
   yes no

3. Were the CRI and/or CRA standards analyzed <u>after</u> the ICV?
   yes no

4. Were these data reported on Form IIB?
   yes no

5. Were the raw data correctly transcribed onto Form IIB?
   yes no

Comments: Not required.

## III. Blanks (guidelines pg. E-6, Form III)

1. Was the initial calibration blank (ICB) analyzed immediately after the initial calibration verification (ICV)?
   yes X no

2. Was a continuing calibration blank (CCB) analyzed immediately after each continuing calibration verification (CCV)?
   yes X no

3. Was a preparation blank (PB) analyzed at a frequency of at least 1 in 20 samples?
   yes X no NA

4. How many elements were detected above the CRDLs? 0 (if 0, go to question 5)

   4a. How many elements were detected in the blanks at greater than one-half the amount detected in any sample?

5. Were raw data correctly transcribed onto Form III?
   yes X no

Comments: All requirements met.

## IV. ICP Interference Checks (ICS) (guidelines pg. E-7, Form IV)

1. Was the ICS analyzed twice per 8 hour shift?
   yes no

2. Were the ICSs analyzed before and after samples?
   yes no

3. Was any massive interference detected?
   yes no

4. Were the ICSs within ±20% mean value?
   yes no

5. Were raw data correctly transcribed onto Form IV?

Comments: Not required.

## V. Spike Sample Analysis (S) (guideline pg. E-8, Form V)

1. Were spikes analyzed at a frequency of 1 in 20 samples?
   yes X no

2. Were spike recoveries correctly calculated?
   yes X no

$$\% \text{ recovery} = \frac{(SSR - SR)}{SA} \times 100$$

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added

3. Were spike recoveries within the range of 75-125%?
   yes X no

   3a. For recoveries outside this range, were associated data flagged "N" by the laboratory on Forms I and V?
   yes no NA X

   (an exception if granted where the sample concentration is >4X the spike concentration)

4. Were raw data correctly transcribed onto Form V?
   yes X no

* Refer to page E-9 (SOW 787) for information regarding the amount of spike to be added for each analyte and for other information about the Spike Sample Analysis.

Comments: All requirements met.

## VI. Duplicates (D) (guidelines pg. E-11, Form VI)

1. Were duplicates analyzed at a frequency of 1 in 20 samples?
   yes X no

2. Were RPDs correctly calculated?
   yes X no

$$RPD = \frac{S - D}{(S + D)/2} \times 100$$

S = Sample
D = Duplicate

3a. For sample concentrations >5x the CRDL, were RPDs ±20%? (limits of ±35% apply for soil/sediment/tailings samples)

yes X no NA

3b. For sample concentrations >5x the CRDL, did duplicate analysis results fall outside the control window of ± the CRDL?

yes no X NA

3c. Where the RPDs exceeded the control limits, were the data flagged '*' on Forms I and VI by the laboratory?

yes no NA

4. Were raw data correctly transcribed onto Form VI?

yes X no

* Other Considerations:
- Field blanks cannot be used for duplicate analyses
- Duplicates must be analyzed for each analytical method

Comments: All requirements met.

VII. Laboratory Control Sample (LCS) Analysis (guideline pg. E-12, Form VII)

1. Was an LCS analyzed for every sample delivery group or batch of samples, whichever was more frequent?

yes X no

2. Were recoveries within the 80-120% limit?

yes X no

-if the recoveries were outside this range the analysis must be terminated, the problem corrected and the previous samples associated with that LCS redigested and reanalyzed.

3. Were the raw data correctly transcribed onto Form VII?

yes no X

Comments: Form VII was not included in the data package, however, the LCS was analyzed and met contract requirements, therefore, no action is taken.

**VIII. Furnace Atomic Absorption (AA) QC Analysis (guidelines pg. E-14, Form VIII)**

1. **Does the raw data package contain absorbance values for two injections per sample, the average values and the relative standard deviation (RSD)?**

   **yes no**

2. **For analyte concentrations > the CRDL, did the RSD for the duplicate injections agree within 20%? (if yes, go to question 3)**

   **yes no**

   $$RSD = \frac{SD}{M} \times 100$$

   SD = Standard Deviation of Duplicate Injections
   M = Mean of Duplicate Injections

   2a. Were samples that exceeded the 20% criteria reanalyzed?

   yes no

   2b. Did any reanalyzed samples exceed the 20% criteria?

   yes no

   2c. If yes, did the laboratory flag the data of Form I with an 'M'?

   yes no

3. Was the recovery of the spike > 40%? (if yes, go to question 4).

   yes no

   If no, was the sample diluted and rerun with another spike?

   yes no

4. Was sample absorbance 50% of spike absorbance?* (if yes, go to question 5).

   yes no

* Spike absorbance = absorbance of spiked sample - absorbance of sample.

4a. For spike recoveries between 85 and 115%, were results reported to the IDL?

yes no

$$RPD = \frac{(SSR - SR)}{SA} \times 100$$

SSR = Spike Sample Recovery
SR = Sample Result
SA = Spike Added

4b. For spike recoveries outside the 85 and 115% range, were results reported to the IDL and flagged with 'W'?

yes no

5. Was spike recovery between 85 and 115%? (if no, go to question 6)

5a. Were results quantified from calibration curve and reported to IDL?

yes no

6. Was an MSA at 50, 100 and 150% of the sample absorbance analyzed?

yes no

6a. Was each MSA analysis identified in the raw data along with the slope, intercept and correlation coefficient?

yes no

6b. Were these data correctly transcribed onto Form VIII?

yes no

6c. Were correlation coefficients(r) > 0.995?

yes no

6d. If no, were MSAs run once more?

yes no

- If the correlation coefficients were still > 0.995, data on Form I must be from the run with the best 'r' and the data on Forms I and VII must be flagged with a '+'.

Were these criteria met?

yes no

6e. Were all MSA obtained data marked with an 'S' or an S+ on form I?

yes no

Comments: Not required.

## IX. ICP Serial Dilution (L) Analysis (guidelines pg. E-12, Form IX)

1. Was an ICP serial dilution performed on each group of samples of a similar matrix (i.e., soil, water) and concentration (i.e., low, high) or for each sample delivery group, whichever was more frequent?

   yes no

2. For elements with concentrations >10X the CRDL, did any exceed the serial dilution results by more than 10%? (if no, skip questions 3 and 4)

   yes no

$$\% \text{ difference} = \frac{I - S}{I} \times 100$$

I = Initial Sample Result
S = Serial Dilution Result (instrument reading X5)

3. Which elements had concentrations that exceeded the 10% criteria?

4. Did the laboratory flag these data with an 'E' on Form IX?

   yes no

5. Were the raw data correctly transcribed onto Form IX?

   yes no

Comments: Not required.

**X. Instrument Detection Limits (IDL) (guidelines pg. E-13, Form XI)**

1. Were IDLs reported for each analyzed element?
   yes X no

2. Were IDLs reported for each instrument used?
   yes X no

3. Did the IDLs meet the contract requirements? (refer to pg. E-13, SOW 787)
   yes X no

Comments: All requirements met.

**XI. Interelement Corrections for ICP (guidelines pg. E-13, Form XII)**

1. Were correction factors reported on Form XII?
   yes X no

Comments: All requirements met.

**XII. Linear Range Analysis (LRA) (guidelines pg. E-14, Form XII)**

1. Was a linear range verification standard analyzed?
   yes X no

2. Was the results within ±5% of the true value?
   yes no

## Holding Times

Limits: Metals - 6 months; Hg - 30 days; Cn - 28 days.

1. Verified date of sample receipt by laboratory 7-21-89
2. Date of preparation/analyses 8-3-89
3. Were holding times met? yes X no

| Analyte | Matrix | Date Sampled | Prep Date | Holding Time | Holding Time Limit | Met |
|---|---|---|---|---|---|---|
| Mercury | Low Water | 7-18-89 | 8-3-89 | 16 days | 30 days | yes |

Keystone 12334-8-5

U.S. EPA - CLP

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP520

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774002

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP521

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774005

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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Keystone 12334-8-5

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP522

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774006

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP523

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774007

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP524

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774008

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 11.50 | | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

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Color After: Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP525

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774009

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

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Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP526

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774010

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

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Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP527

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774011

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 8.50 | | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

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Color After: Clarity After: Artifacts:

Comments:



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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP528

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774012

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP529

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774013

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:



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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP530

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774014

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

Keystone DC# 12334-8-5

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP532

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774015

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:



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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP533

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774016

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP534

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774017

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:



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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP535

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774018

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP537

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774019

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
MHP538

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774020

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP539

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774021

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:



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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP540

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHP520

Matrix (soil/water): WATER Lab Sample ID: 890774022

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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# REGION VIII SUMMARY OF DATA QUALITY ASSURANCE REVIEW

***guideline references are from Contract #787***

Case No.: SAS 4725H TDD No.: F08-8909-08

Site: Richardson Flats

Contractor Laboratory: Silver Valley Labs

Data Reviewer : Annette Sackman Date of Review: 9-15-89

Sample Matrix: 14 Low Soils

Analysis: Metals plus Mercury

Sample Nos.: 4725H01, 4725H02, 4725H03, 4725H04, 4725H05, 4725H06, 4725H07, 4725H08, 4725H09, 4725H10, 4725H11, 4725H12, 4725H13, 4725H14

( ) Data are acceptable for use.

(X) Data are acceptable for use with qualifications noted.

( ) Data are preliminary - pending verification.

( ) Data are unacceptable.

Action required by DPO?

No X Yes The following items require action:

Action required by project officer?

No X Yes

The following are our findings:

All calibration and blank contract compliances were met except that for the last half of the thallium analysis the ICV, ICB, CCV and CCB was not recorded on forms IIA and III.

The CRDL standards were run only at the beginning of the furnace AA analysis and not at the end. No qualifications have been prescribed for this discrepancy so no flags are assigned.

Spike recoveries were low for antimony (52.9%) and thallium (48.7%) and indicate positive values for these elements are biased low and flagged "J", estimated. Undetected values indicate antimony and thallium may or may not be present due to elevated detection limits; therefore, these values are flagged "UJ", estimated. Selenium spike recoveries were very low (-33.1%) and indicate these values are severely biased low. Positive values confirm the presence of the element but are flagged "J" and estimated low. Undetected values do not indicate the nonexistence of the element and are unusable and flagged "R", rejected.

For the MSA analysis for thallium, no raw data was presented for duplicate injections. One of the correlation coefficients was below 0.995 for samples 4725H02, 4725H06, 4725H09 and 4725H11; therefore, thallium values for these samples are flagged "J", estimated. For sample 4725H03, both correlation coefficients were below 0.995; therefore, the thallium value for this sample is unusable and flagged "R", rejected.

For the MSA analysis for selenium, both correlation coefficients were below 0.995 for samples 4725H01, 4725H04, 4725H05 and 4725H08; therefore, values for these samples are unusable and flagged "R", rejected.

The percent difference was high for the serial dilution for cadmium (14.5%); therefore these values are flagged "J", estimated.

Lead was analyzed by ICAP due to high sample concentrations, therefore the CRDL of 5µg/l was not met but is waived under these unusual conditions.


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## Inorganic Data Completeness Checklist

X Inorganic analysis data (Form I)

X Initial calibration and continuing calibration verification (Form IIA)

X CRDL standard for AA and ICP (Form IIB)

X Blanks (Form III)

X ICP interference Check sample (Form IV)

X Spike sample recovery (Form VA)

X Post digestion spike sample recovery (Form VB)

X Duplicates (Form VI)

X Laboratory control sample (Form VII)

X Standard addition results (Form VIII)

X ICP serial dilutions (Form IX)

X Holding times (Form X)

X Instrument detection limits-quarterly (Form XI)

X ICP interelement correction factors-quarterly (Form II)

X ICP linear ranges-quarterly (Form XIII)

X Raw data for interference checks

X Raw data for calibration standards

X Raw data for blanks

X Raw data for CRI and/or CRA

X Raw data for samples

X Raw data for duplicates

X Raw data for spikes

X Traffic reports

## Contract Compliance

**I. Initial and Continuing Calibration Verification (ICV and CCV)** (guidelines pg. E-4, Form IIA)

1. Was instrument calibrated daily and each time it was set up?
   yes X no

2. Were instruments calibrated using 1 blank and several standards?
   yes X no

3. Were calibration verifications within 90-110%?
   yes X no

4. Were continuing calibrations run at 10% frequency?
   yes X no

5. Were the raw data correctly transcribed onto Form IIA?
   yes no X

Comments: For thallium, one-half of the CCV's were not recorded on Forms IIA. All other requirements were met.

**II. CRDL Standards for ICP (CRI) and/or AA (CRA)** (guidelines pg. E-6, Form IIB)

1. For ICP analysis, were standards (CRI) @ 2x the CRDL or the IDL (whichever was greater) analyzed at the beginning and the end of each sample run, or at a minimum of twice/8 hour shift, whichever was more frequent?
   yes X no

2. For furnace AA analysis, were standards (CRA) analyzed at the beginning and the end of each sample run, or at a minimum of twice/8 hour shift, whichever was more frequent?
   yes no X

3. Were the CRI and/or CRA standards analyzed <u>after</u> the ICV?
   yes X no

4. Were these data reported on Form IIB?
   yes X no

5. Were the raw data correctly transcribed onto Form IIB?
   yes X no

Comments: No CRA was run at the end of the furnace AA analyses.


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## III. Blanks (guidelines pg. E-6, Form III)

1. Was the initial calibration blank (ICB) analyzed immediately after the initial calibration verification (ICV)?
   yes X no

2. Was a continuing calibration blank (CCB) analyzed immediately after each continuing calibration verification (CCV)?
   yes X no

3. Was a preparation blank (PB) analyzed at a frequency of at least 1 in 20 samples?
   yes X no NA

4. How many elements were detected above the CRDLs? 0 (if 0, go to question 5)

   4a. How many elements were detected in the blanks at greater than one-half the amount detected in any sample?

5. Were raw data correctly transcribed onto Form III?
   yes no X

Comments: Only one-half of the blanks for thallium were recorded on Form III. All other requirements were met.

## IV. ICP Interference Checks (ICS) (guidelines pg. E-7, Form IV)

1. Was the ICS analyzed twice per 8 hour shift?
   yes X no

2. Were the ICSs analyzed before and after samples?
   yes X no

3. Was any massive interference detected?
   yes no X

4. Were the ICSs within ±20% mean value?
   yes X no

5. Were raw data correctly transcribed onto Form IV?
   yes X no

Comments: All requirements met.

## V. Spike Sample Analysis (S) (guideline pg. E-8, Form V)

1. Were spikes analyzed at a frequency of 1 in 20 samples?
   yes X no

2. Were spike recoveries correctly calculated?
   yes X no

$$\% \text{ recovery} = \frac{(SSR - SR)}{SA} \times 100$$

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added

3. Were spike recoveries within the range of 75-125%?
   yes no X

   3a. For recoveries outside this range, were associated data flagged "N" by the laboratory on Forms I and V?
   yes X no NA

   (an exception if granted where the sample concentration is >4X the spike concentration)

   4. Were raw data correctly transcribed onto Form V?
   yes X no

* Refer to page E-9 (SOW 787) for information regarding the amount of spike to be added for each analyte and for other information about the Spike Sample Analysis.

Comments: For antimony and thallium, recoveries were 52.9% and 48.7%, respectively; therefore, positive values are flagged "J", estimated and undetected values are flagged "UJ". For selenium, recoveries were -33.1%, therefore, positive values are flagged "J", estimated and confirm the presence of selenium in the sample and undetected values are unusable and flagged "R", rejected.

## VI. Duplicates (D) (guidelines pg. E-11, Form VI)

1. Were duplicates analyzed at a frequency of 1 in 20 samples?
   yes X no

2. Were RPDs correctly calculated?
   yes X no

$$RPD = \frac{S - D}{(S + D)/2} \times 100$$

S = Sample
D = Duplicate


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3a. For sample concentrations >5x the CRDL, were RPDs ±20%? (limits of ±35% apply for soil/sediment/tailings samples)

yes X no NA

3b. For sample concentrations >5x the CRDL, did duplicate analysis results fall outside the control window of ± the CRDL?

yes no X NA

3c. Where the RPDs exceeded the control limits, were the data flagged '*' on Forms I and VI by the laboratory?

yes no NA X

4. Were raw data correctly transcribed onto Form VI?

yes X no

* Other Considerations:
- Field blanks cannot be used for duplicate analyses
- Duplicates must be analyzed for each analytical method

Comments: All requirements met.

VII. **Laboratory Control Sample (LCS) Analysis** (guideline pg. E-12, Form VII)

1. Was an LCS analyzed for every sample delivery group or batch of samples, whichever was more frequent?

yes X no

2. Were recoveries within the 80-120% limit?

yes X no

-if the recoveries were outside this range the analysis must be terminated, the problem corrected and the previous samples associated with that LCS redigested and reanalyzed.

3. Were the raw data correctly transcribed onto Form VII?

yes X no

Comments: All requirements met.

**VIII. Furnace Atomic Absorption (AA) QC Analysis (guidelines pg. E-14, Form VIII)**

1. Does the raw data package contain absorbance values for two injections per sample, the average values and the relative standard deviation (RSD)?

   yes no X

2. For analyte concentrations > the CRDL, did the RSD for the duplicate injections agree within 20%? (if yes, go to question 3)

   yes no X

   $$RSD = \frac{SD}{M} \times 100$$

   SD = Standard Deviation of Duplicate Injections
   M = Mean of Duplicate Injections

   2a. Were samples that exceeded the 20% criteria reanalyzed?

   yes X no

   2b. Did any reanalyzed samples exceed the 20% criteria?

   yes X no

   2c. If yes, did the laboratory flag the data of Form I with an 'M'?

   yes X no

3. Was the recovery of the spike > 40%? (if yes, go to question 4).

   yes no X

   If no, was the sample diluted and rerun with another spike?

   yes X no

4. Was sample absorbance >50% of spike absorbance?* (if yes, go to question 5).

   yes no X

* Spike absorbance = absorbance of spiked sample - absorbance of sample.


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4a. For spike recoveries between 85 and 115%, were results reported to the IDL?

yes X no

$$RPD = \frac{(SSR - SR)}{SA} \times 100$$

SSR = Spike Sample Recovery
SR = Sample Result
SA = Spike Added

4b. For spike recoveries outside the 85 and 115% range, were results reported to the IDL and flagged with 'W'?

yes X no

5. Was spike recovery between 85 and 115%? (if no, go to question 6)

5a. Were results quantified from calibration curve and reported to IDL?

yes no X

6. Was an MSA at 50, 100 and 150% of the sample absorbance analyzed?

yes X no

6a. Was each MSA analysis identified in the raw data along with the slope, intercept and correlation coefficient?

yes X no

6b. Were these data correctly transcribed onto Form VIII?

yes X no

6c. Were correlation coefficients(r) > 0.995?

yes no X

6d. If no, were MSAs run once more?

yes X no

- If the correlation coefficients were still > 0.995, data on Form I must be from the run with the best 'r' and the data on Forms I and VII must be flagged with a '+'.

Were these criteria met?

yes X no

6e. Were all MSA obtained data marked with an 'S' or an S+ on form I?

yes X no

Comments: There was no raw data for duplicate injections for the thallium analysis. For the duplicate sample in the selenium analysis, the duplicate injections and the third injection was greater than 20%D. No flag was assigned since this was a QA sample. The thallium values for the following samples had on correlation coefficient <0.995 and are flagged "J", estimated: 4725H02, 4725H06, 4725H09 and 4725H11. The thallium and selenium values for the following samples had both correlation coefficients <0.995 and are flagged "R", rejected: thallium - 4725H03, selenium - 4725H01, 4725H04, 4725H05 and 4725H08.

IX. ICP Serial Dilution (L) Analysis (guidelines pg. E-12, Form IX)

1. Was an ICP serial dilution performed on each group of samples of a similar matrix (i.e., soil, water) and concentration (i.e., low, high) or for each sample delivery group, whichever was more frequent?

   yes X no

2. For elements with concentrations >10X the CRDL, did any exceed the serial dilution results by more than 10%? (if no, skip questions 3 and 4)

   yes X no

$$\% \text{ difference} = \frac{I - S}{I} \times 100$$

I = Initial Sample Result
S = Serial Dilution Result (instrument reading X5)

3. Which elements had concentrations that exceeded the 10% criteria? Cadmium

4. Did the laboratory flag these data with an 'E' on Form IX?

   yes X no

5. Were the raw data correctly transcribed onto Form IX?

   yes X no

Comments: Cadmium values are flagged "J", estimated due to high %D (14.5%).


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**X. Instrument Detection Limits (IDL)** (guidelines pg. E-13, Form XI)

1. Were IDLs reported for each analyzed element?
   yes X no

2. Were IDLs reported for each instrument used?
   yes X no

3. Did the IDLs meet the contract requirements? (refer to pg. E-13, SOW 787)
   yes no X

Comments: Lead was analyzed by ICAP due to high sample concentration. No action is taken due to these conditions.

**XI. Interelement Corrections for ICP** (guidelines pg. E-13, Form XII)

1. Were correction factors reported on Form XII?
   yes X no

Comments: All requirements met.

**XII. Linear Range Analysis (LRA)** (guidelines pg. E-14, Form XII)

1. Was a linear range verification standard analyzed?
   yes X no

2. Was the results within ±5% of the true value?
   yes no

## Holding Times

Limits: Metals - 6 months; Hg - 30 days; Cn - 28 days.

1. Verified date of sample receipt by laboratory 7-24-89
2. Date of preparation/analyses 8-10-89
3. Were holding times met? yes X no

| Analyte | Matrix | Date Sampled | Prep Date | Holding Time | Holding Time Limit | Met |
|---|---|---|---|---|---|---|
| Mercury | Low soil | 7-18-89 | 8-10-89 | 23 days | 30 days | Yes |
| Metals | Low soil | 7-18-89 | 8-10-89 | 23 days | 6 months | Yes |


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1.
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.: 4725H01

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: ____ SAS No.: 4725H SDG No.: 4725HC

Matrix (soil/water): SOIL Lab Sample ID: ____

Level (low/med): LOW Date Received: 07/24/89

% Solids: 69.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 18400. | | | P | |
| 7440-36-0 | Antimony | 19.8 | | N | P | J AB |
| 7440-38-2 | Arsenic | 83.2 | | | P | |
| 7440-39-3 | Barium | 270. | | E | P | |
| 7440-41-7 | Beryllium | 1.7 | | | P | |
| 7440-43-9 | Cadmium | 14.6 | | | P | J AB |
| 7440-70-2 | Calcium | 15000. | | | P | |
| 7440-47-3 | Chromium | 21.9 | | | P | |
| 7440-48-4 | Cobalt | 11.4 | B | | P | |
| 7440-50-8 | Copper | 239. | | | P | |
| 7439-89-6 | Iron | 30800. | | | P | |
| 7439-92-1 | Lead | 1790. | | | P | |
| 7439-95-4 | Magnesium | 6130. | | | P | |
| 7439-96-5 | Manganese | 1260. | | | P | |
| 7439-97-6 | Mercury | 1.0 | | | CV | |
| 7440-02-0 | Nickel | 23.5 | | | P | |
| 7440-09-7 | Potassium | 3160. | | | P | |
| 7782-49-2 | Selenium | 3.1 | | +N | E | J AB R AB |
| 7440-22-4 | Silver | 9.7 | | | P | |
| 7440-23-5 | Sodium | 239. | B | | P | |
| 7440-28-0 | Thallium | .81 | B | N | E | J AB |
| 7440-62-2 | Vanadium | 48.7 | | | P | |
| 7440-66-6 | Zinc | 2770 | | | P | |
| | Cyanide | | | | NR | |
| | | | | | | |

Color Before: BROWN Clarity Before: ____ Texture: MEDIUM

Color After: YELLOW Clarity After: ____ Artifacts: ____

Comments:

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1.

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.: 4725H02

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: _____ SAS No.: 4725H SDG No.: 4725H

Matrix (soil/water): SOIL Lab Sample ID: _____

Level (low/med): LOW Date Received: 07/24/89

% Solids: 73.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 8620. | | | P | |
| 7440-36-0 | Antimony | 201. | | N | P | J AB |
| 7440-38-2 | Arsenic | 590. | | | P | |
| 7440-39-3 | Barium | 147 | | E | P | |
| 7440-41-7 | Beryllium | .86 | B | | P | |
| 7440-43-9 | Cadmium | 91.4 | | | P | J AB |
| 7440-70-2 | Calcium | 25600 | | | P | |
| 7440-47-3 | Chromium | .77 | U | | P | |
| 7440-48-4 | Cobalt | 43.5 | | | P | |
| 7440-50-8 | Copper | 753 | | | P | |
| 7439-89-6 | Iron | 181000 | | | P | |
| 7439-92-1 | Lead | 14200 | | | P | |
| 7439-95-4 | Magnesium | 9430 | | | P | |
| 7439-96-5 | Manganese | 1730 | | | P | |
| 7439-97-6 | Mercury | 4.9 | | | CV | |
| 7440-02-0 | Nickel | 21.5 | | | P | |
| 7440-09-7 | Potassium | 1160. | B | | P | |
| 7782-49-2 | Selenium | 46.2 | | ~~*~~ N | E | mgB 08/22/89 J AB |
| 7440-22-4 | Silver | 47.5 | | | P | |
| 7440-23-5 | Sodium | 181 | B | | P | |
| 7440-28-0 | Thallium | 3.6 | B | SN | E | J AB |
| 7440-62-2 | Vanadium | 19.0 | | | P | |
| 7440-66-6 | Zinc | 15500. | | | P | |
| | Cyanide | | | | NR | |
| | | | | | | |

Color Before: BROWN Clarity Before: _____ Texture: MEDIUM

Color After: YELLOW Clarity After: _____ Artifacts: _____

Comments:



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1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
4725H03

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: _____ SAS No.: 4725H SDG No.: 4725

Matrix (soil/water): SOIL Lab Sample ID: _____

Level (low/med): LOW Date Received: 07/24/89

% Solids: 77.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 7650 | | | P | |
| 7440-36-0 | Antimony | 114. | | N | P | JAB |
| 7440-38-2 | Arsenic | 427 | | | P | |
| 7440-39-3 | Barium | 130. | | E | P | |
| 7440-41-7 | Beryllium | .81 | B | | P | |
| 7440-43-9 | Cadmium | 82.0 | | | P | JAB |
| 7440-70-2 | Calcium | 2610 | | | P | |
| 7440-47-3 | Chromium | 1.0 | B | | P | |
| 7440-48-4 | Cobalt | 38.5 | | | P | |
| 7440-50-8 | Copper | 459 | | | P | |
| 7439-89-6 | Iron | 148000 | | | P | |
| 7439-92-1 | Lead | 9880 | | | P | |
| 7439-95-4 | Magnesium | 8480 | | | P | |
| 7439-96-5 | Manganese | 1630. | | | P | |
| 7439-97-6 | Mercury | 6.0 | | | CV | |
| 7440-02-0 | Nickel | 28.8 | | | P | |
| 7440-09-7 | Potassium | 1150 | B | | P | |
| 7782-49-2 | Selenium | 42.7 | | ~~*~~ N | E | MAB JAB 08/22/89 |
| 7440-22-4 | Silver | 30.3 | | | P | |
| 7440-23-5 | Sodium | 173 | B | | P | |
| 7440-28-0 | Thallium | 4.1 | | +N | E | JAB RAB |
| 7440-62-2 | Vanadium | 21.2 | | | P | |
| 7440-66-6 | Zinc | 15100 | | | P | |
| | Cyanide | | | | NR | |

Color Before: BROWN Clarity Before: _____ Texture: MEDIU

Color After: YELLOW Clarity After: _____ Artifacts: _____

Comments:

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1.
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
4725H04

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: _____ SAS No.: 4725H SDG No.: 4725H

Matrix (soil/water): SOIL Lab Sample ID: _____

Level (low/med): LOW Date Received: 07/24/89

% Solids: 52.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 25100. | | | P | |
| 7440-36-0 | Antimony | 200. | | N | P | JAS |
| 7440-38-2 | Arsenic | 776. | | | P | |
| 7440-39-3 | Barium | 1220 | | E | P | |
| 7440-41-7 | Beryllium | 1.9 | B | | P | |
| 7440-43-9 | Cadmium | 100. | | | P | JAS |
| 7440-70-2 | Calcium | 82100 | | | P | |
| 7440-47-3 | Chromium | 33.2 | | | P | |
| 7440-48-4 | Cobalt | 10.1 | B | | P | |
| 7440-50-8 | Copper | 840. | | | P | |
| 7439-89-6 | Iron | 58600. | | | P | |
| 7439-92-1 | Lead | 13600 | | | P | |
| 7439-95-4 | Magnesium | 33800 | | | P | |
| 7439-96-5 | Manganese | 2770. | | | P | |
| 7439-97-6 | Mercury | 5.5 | | | CV | |
| 7440-02-0 | Nickel | 27.0 | | | P | |
| 7440-09-7 | Potassium | 6270 | | | P | |
| 7782-49-2 | Selenium | 15.4 | | +N | F | JAS RAS |
| 7440-22-4 | Silver | 86.0 | | | P | |
| 7440-23-5 | Sodium | 447 | B | | P | |
| 7440-28-0 | Thallium | 23.2 | | N | F | JAS |
| 7440-62-2 | Vanadium | 46.5 | | | P | |
| 7440-66-6 | Zinc | 15700. | | | P | |
| | Cyanide | | | | NR | |
| | | | | | | |

Color Before: BROWN Clarity Before: _____ Texture: MEDIUM

Color After: YELLOW Clarity After: _____ Artifacts: _____

Comments:

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1.
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

4725H05

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: _____ SAS No.: 4725H SDG No.: 4725H

Matrix (soil/water): SOIL Lab Sample ID: _____

Level (low/med): LOW Date Received: 07/24/89

% Solids: 78.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 2810 | | | P | |
| 7440-36-0 | Antimony | 178. | | N | P | J AS |
| 7440-38-2 | Arsenic | 320 | | | P | |
| 7440-39-3 | Barium | 134 | | E | P | |
| 7440-41-7 | Beryllium | .47 | B | | P | |
| 7440-43-9 | Cadmium | 149 | | | P | J AS |
| 7440-70-2 | Calcium | 89700 | | | P | |
| 7440-47-3 | Chromium | 10.9 | | | P | |
| 7440-48-4 | Cobalt | 5.3 | B | | P | |
| 7440-50-8 | Copper | 61.3 | | | P | |
| 7439-89-6 | Iron | 44800. | | | P | |
| 7439-92-1 | Lead | 9550 | | | P | |
| 7439-95-4 | Magnesium | 19700. | | | P | |
| 7439-96-5 | Manganese | 3090 | | | P | |
| 7439-97-6 | Mercury | 1.5 | | | CV | |
| 7440-02-0 | Nickel | 2.9 | B | | P | |
| 7440-09-7 | Potassium | 794 | B | | P | |
| 7782-49-2 | Selenium | 16.1 | | +N | F | J AS R AS |
| 7440-22-4 | Silver | 60.9 | | | P | |
| 7440-23-5 | Sodium | 84.6 | B | | P | |
| 7440-28-0 | Thallium | 12.7 | | SN | F | J AS |
| 7440-62-2 | Vanadium | 8.6 | B | | P | |
| 7440-66-6 | Zinc | 26400. | | | P | |
| | Cyanide | | | | NR | |

Color Before: BROWN Clarity Before: _____ Texture: MEDIUM

Color After: YELLOW Clarity After: _____ Artifacts: _____

Comments:

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1.

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.: 4725H06

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: _____ SAS No.: 4725H SDG No.: 4725HC

Matrix (soil/water): SOIL Lab Sample ID: _____

Level (low/med): LOW Date Received: 07/24/89

% Solids: 78.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 11100. | | | P | |
| 7440-36-0 | Antimony | 40.8 | | N | P | |
| 7440-38-2 | Arsenic | 261 | | | P | J AS |
| 7440-39-3 | Barium | 944 | | E | P | |
| 7440-41-7 | Beryllium | .85 | B | | P | |
| 7440-43-9 | Cadmium | 62.3 | | | P | J AS |
| 7440-70-2 | Calcium | 46900. | | | P | |
| 7440-47-3 | Chromium | .71 | U | | P | |
| 7440-48-4 | Cobalt | 64.4 | | | P | |
| 7440-50-8 | Copper | 256 | | | P | |
| 7439-89-6 | Iron | 4400. | | | P | |
| 7439-92-1 | Lead | 3790 | | | P | |
| 7439-95-4 | Magnesium | 13300. | | | P | |
| 7439-96-5 | Manganese | 207000 | | | P | |
| 7439-97-6 | Mercury | 0.24 | | | CV | |
| 7440-02-0 | Nickel | 69.7 | | | P | |
| 7440-09-7 | Potassium | 1870 | | | P | |
| 7782-49-2 | Selenium | 5.6 | | N | F | J AS |
| 7440-22-4 | Silver | 13.7 | | | P | |
| 7440-23-5 | Sodium | 344. | B | | P | |
| 7440-28-0 | Thallium | 8.5 | | SN | F | J AS |
| 7440-62-2 | Vanadium | 34.8 | | | P | |
| 7440-66-6 | Zinc | 18800. | | | P | |
| | Cyanide | | | | NR | |
| | | | | | | |

Color Before: BROWN Clarity Before: _____ Texture: MEDIUM

Color After: YELLOW Clarity After: _____ Artifacts: _____

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

4725H07

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: ____ SAS No.: 4725H SDG No.: 4725H

Matrix (soil/water): SOIL Lab Sample ID: ____

Level (low/med): LOW Date Received: 07/24/89

% Solids: 66.8

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 9710 | | | P | |
| 7440-36-0 | Antimony | 37.6 | | N | P | JAB |
| 7440-38-2 | Arsenic | 198 | | | P | |
| 7440-39-3 | Barium | 384 | | E | P | |
| 7440-41-7 | Beryllium | 1.1 | B | | P | |
| 7440-43-9 | Cadmium | 102. | | | P | JAB |
| 7440-70-2 | Calcium | 90700 | | | P | |
| 7440-47-3 | Chromium | 9.9 | | | P | |
| 7440-48-4 | Cobalt | 20.4 | | | P | |
| 7440-50-8 | Copper | 264. | | | P | |
| 7439-89-6 | Iron | 64900. | | | P | |
| 7439-92-1 | Lead | 3250 | | | P | |
| 7439-95-4 | Magnesium | 20700 | | | P | |
| 7439-96-5 | Manganese | 19100. | | | P | |
| 7439-97-6 | Mercury | .82 | | | CV | |
| 7440-02-0 | Nickel | 14.0 | | | P | |
| 7440-09-7 | Potassium | 1880 | | | P | |
| 7782-49-2 | Selenium | 9.2 | | N | E | JAB |
| 7440-22-4 | Silver | 23.9 | | | P | |
| 7440-23-5 | Sodium | 254 | B | | P | |
| 7440-28-0 | Thallium | 10.1 | | SN | E | JAB |
| 7440-62-2 | Vanadium | 20.5 | | | P | |
| 7440-66-6 | Zinc | 17600. | | | P | |
| | Cyanide | | | | NR | |

Color Before: BROWN Clarity Before: ____ Texture: MEDIUM

Color After: YELLOW Clarity After: ____ Artifacts: ____

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

4725H08

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: _____ SAS No.: 4725H SDG No.: 4725HC

Matrix (soil/water): SOIL Lab Sample ID: _____

Level (low/med): LOW Date Received: 07/24/89

% Solids: 64.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 14000 | | | P | |
| 7440-36-0 | Antimony | 80.5 | | N | P | JAS |
| 7440-38-2 | Arsenic | 348. | | | P | |
| 7440-39-3 | Barium | 286 | | E | P | |
| 7440-41-7 | Beryllium | 1.5 | B | | P | |
| 7440-43-9 | Cadmium | 82.3 | | | P | JAS |
| 7440-70-2 | Calcium | 85800 | | | P | |
| 7440-47-3 | Chromium | 16.5 | | | P | |
| 7440-48-4 | Cobalt | 33.3 | | | P | |
| 7440-50-8 | Copper | 567 | | | P | |
| 7439-89-6 | Iron | 49200 | | | P | |
| 7439-92-1 | Lead | 3510 | | | P | |
| 7439-95-4 | Magnesium | 18400 | | | P | |
| 7439-96-5 | Manganese | 14300 | | | P | |
| 7439-97-6 | Mercury | 1.1 | | | CV | |
| 7440-02-0 | Nickel | 25.8 | | | P | |
| 7440-09-7 | Potassium | 2400 | | | P | |
| 7782-49-2 | Selenium | 13.2 | | +N | F | JAS RAS |
| 7440-22-4 | Silver | 36.9 | | | P | |
| 7440-23-5 | Sodium | 276 | B | | P | |
| 7440-28-0 | Thallium | 14.2 | | SN | F | JAS AC 8-23-89 |
| 7440-62-2 | Vanadium | 26.9 | B | | P | |
| 7440-66-6 | Zinc | 18300 | | | P | |
| | Cyanide | | | | NR | |

Color Before: BROWN Clarity Before: _____ Texture: MEDIU

Color After: YELLOW Clarity After: _____ Artifacts: _____

Comments:



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1.
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

4725H09

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: ____ SAS No.: 4725H SDG No.: 4725H

Matrix (soil/water): SOIL Lab Sample ID: ____

Level (low/med): LOW Date Received: 07/24/89

% Solids: 72.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 10900 | | | P | |
| 7440-36-0 | Antimony | 107 | | N | P | J A8 |
| 7440-38-2 | Arsenic | 295 | | | P | |
| 7440-39-3 | Barium | 229 | | E | P | |
| 7440-41-7 | Beryllium | 1.4 | B | | P | |
| 7440-43-9 | Cadmium | 90.2 | | | P | J A8 |
| 7440-70-2 | Calcium | 38700 | | | P | |
| 7440-47-3 | Chromium | 16.3 | | | P | |
| 7440-48-4 | Cobalt | 20.1 | | | P | |
| 7440-50-8 | Copper | 498 | | | P | |
| 7439-89-6 | Iron | 68700 | | | P | |
| 7439-92-1 | Lead | 6970 | | | P | |
| 7439-95-4 | Magnesium | 11100. | | | P | |
| 7439-96-5 | Manganese | 3070 | | | P | |
| 7439-97-6 | Mercury | 5.0 | | | CV | |
| 7440-02-0 | Nickel | 16.3 | | | P | |
| 7440-09-7 | Potassium | 1590 | | | P | |
| 7782-49-2 | Selenium | 21.9 | | SN | F | J A8 |
| 7440-22-4 | Silver | 36.2 | | | P | |
| 7440-23-5 | Sodium | 220 | B | | P | |
| 7440-28-0 | Thallium | 4.1 | | SN | F | J A8 |
| 7440-62-2 | Vanadium | 31.2 | | | P | |
| 7440-66-6 | Zinc | 15900. | | | P | |
| | Cyanide | | | | NR | |

Color Before: BROWN Clarity Before: ____ Texture: MEDIUM

Color After: YELLOW Clarity After: ____ Artifacts: ____

Comments:

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1.

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.: 4725H10

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: ____ SAS No.: 4725H SDG No.: 4725H

Matrix (soil/water): SOIL Lab Sample ID: ____

Level (low/med): LOW Date Received: 07/24/89

% Solids: 79.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 20200. | | | P | |
| 7440-36-0 | Antimony | 10.1 | U | N | P | UJ AB BC 8-23-89 |
| 7440-38-2 | Arsenic | 5.4 ~~10.1~~ | U | S | F | |
| 7440-39-3 | Barium | 408 | | E | P | |
| 7440-41-7 | Beryllium | 1.6 | | | P | |
| 7440-43-9 | Cadmium | 2.2 | | | P | J AB |
| 7440-70-2 | Calcium | 9640 | | | P | |
| 7440-47-3 | Chromium | 18.5 | | | P | |
| 7440-48-4 | Cobalt | 10.9 | B | | P | |
| 7440-50-8 | Copper | 40.7 | | | P | |
| 7439-89-6 | Iron | 25500. | | | P | |
| 7439-92-1 | Lead | 108 | | | P | |
| 7439-95-4 | Magnesium | 6360 | | | P | |
| 7439-96-5 | Manganese | 303 | | | P | |
| 7439-97-6 | Mercury | .10 | B | | CV | |
| 7440-02-0 | Nickel | 17.0 | | | P | |
| 7440-09-7 | Potassium | 6050 | | | P | |
| 7782-49-2 | Selenium | 5.6 | U | N | F | R AB |
| 7440-22-4 | Silver | .41 | U | | P | |
| 7440-23-5 | Sodium | 389 | B | | P | |
| 7440-28-0 | Thallium | .23 | U | N | F | UJ AB |
| 7440-62-2 | Vanadium | 37.7 | | | P | |
| 7440-66-6 | Zinc | 302. | | | P | |
| | Cyanide | | | | NR | |
| | | | | | | |

Color Before: BROWN Clarity Before: ____ Texture: MEDIUM

Color After: YELLOW Clarity After: ____ Artifacts: ____

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

4725H11

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: _____ SAS No.: 4725H SDG No.: 4725H0

Matrix (soil/water): SOIL Lab Sample ID: _____

Level (low/med): LOW Date Received: 07/24/89

% Solids: 37.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 19500. | | | P | |
| 7440-36-0 | Antimony | 142. | | N | P | J AS |
| 7440-38-2 | Arsenic | 251. | | | P | |
| 7440-39-3 | Barium | 668 | | E | P | |
| 7440-41-7 | Beryllium | 2.3 | B | | P | |
| 7440-43-9 | Cadmium | 185 | | | P | J AS |
| 7440-70-2 | Calcium | 249000 | | | P | |
| 7440-47-3 | Chromium | 18.2 | | | P | |
| 7440-48-4 | Cobalt | 5.9 | B | | P | |
| 7440-50-8 | Copper | 270 | | | P | |
| 7439-89-6 | Iron | 156000 | | | P | |
| 7439-92-1 | Lead | 12500 | | | P | |
| 7439-95-4 | Magnesium | 29700 | | | P | |
| 7439-96-5 | Manganese | 19600 | | | P | |
| 7439-97-6 | Mercury | 1.9 | | | CV | |
| 7440-02-0 | Nickel | 32.1 | | | P | |
| 7440-09-7 | Potassium | 4790 | | | P | |
| 7782-49-2 | Selenium | 19.9 | | N | F | J AS |
| 7440-22-4 | Silver | 60.6 | | | P | |
| 7440-23-5 | Sodium | 764 | B | | P | |
| 7440-28-0 | Thallium | 24.1 | | S N | F | J AS |
| 7440-62-2 | Vanadium | 38.0 | | | P | |
| 7440-66-6 | Zinc | 24000 | | | P | |
| | Cyanide | | | | NR | |
| | | | | | | |

Color Before: BROWN Clarity Before: _____ Texture: MEDIUM

Color After: YELLOW Clarity After: _____ Artifacts: _____

Comments:

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1.

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

4725H12

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: _____ SAS No.: 4725H SDG No.: 4725H0

Matrix (soil/water): SOIL Lab Sample ID: _____

Level (low/med): LOW Date Received: 07/24/89

% Solids: 53.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 6880 | | | P | |
| 7440-36-0 | Antimony | 49.3 | | N | P | JAS |
| 7440-38-2 | Arsenic | 839 | | | P | |
| 7440-39-3 | Barium | 557 | | E | P | |
| 7440-41-7 | Beryllium | 1.6 | B | | P | |
| 7440-43-9 | Cadmium | 131 | | | P | JAS |
| 7440-70-2 | Calcium | 167000 | | | P | |
| 7440-47-3 | Chromium | 1.0 | U | | P | |
| 7440-48-4 | Cobalt | 53.3 | | | P | |
| 7440-50-8 | Copper | 856 | | | P | |
| 7439-89-6 | Iron | 132000 | | | P | |
| 7439-92-1 | Lead | 6900 | | | P | |
| 7439-95-4 | Magnesium | 23400 | | | P | |
| 7439-96-5 | Manganese | 23700 | | | P | |
| 7439-97-6 | Mercury | .73 | | | CV | |
| 7440-02-0 | Nickel | 26.3 | | | P | |
| 7440-09-7 | Potassium | 1690. | | | P | |
| 7782-49-2 | Selenium | 2.5 | | SN | F | JAS |
| 7440-22-4 | Silver | 22.5 | | | P | |
| 7440-23-5 | Sodium | 206 | B | | P | |
| 7440-28-0 | Thallium | 21.0 | | SN | F | JAS |
| 7440-62-2 | Vanadium | 18.6 | B | | P | |
| 7440-66-6 | Zinc | 20000. | | | P | |
| | Cyanide | | | | NR | |
| | | | | | | |

Color Before: BROWN Clarity Before: _____ Texture: MEDIUM

Color After: YELLOW Clarity After: _____ Artifacts: _____

Comments:

U.S. EPA - CLP

1.
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.: 4725H13

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: _____ SAS No.: 4725H SDG No.: 4725HC

Matrix (soil/water): SOIL Lab Sample ID: _____

Level (low/med): LOW Date Received: 07/24/89

% Solids: 73.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 15200. | | | P | |
| 7440-36-0 | Antimony | 53.9 | | N | P | J AS |
| 7440-38-2 | Arsenic | 211 | | | P | |
| 7440-39-3 | Barium | 209 | | E | P | |
| 7440-41-7 | Beryllium | 1.4 | B | | P | |
| 7440-43-9 | Cadmium | 43.9 | | | P | J AS |
| 7440-70-2 | Calcium | 14500 | | | P | |
| 7440-47-3 | Chromium | 11.8 | | | P | |
| 7440-48-4 | Cobalt | 24.6 | | | P | |
| 7440-50-8 | Copper | 231 | | | P | |
| 7439-89-6 | Iron | 86100 | | | P | |
| 7439-92-1 | Lead | 4430 | | | P | |
| 7439-95-4 | Magnesium | 6340 | | | P | |
| 7439-96-5 | Manganese | 1560 | | | P | |
| 7439-97-6 | Mercury | 3.3 | | | CV | |
| 7440-02-0 | Nickel | 22.4 | | | P | |
| 7440-09-7 | Potassium | 2490 | | | P | |
| 7782-49-2 | Selenium | 25.1 | | N | F | J AS |
| 7440-22-4 | Silver | 15.5 | | | P | |
| 7440-23-5 | Sodium | 215 | B | | P | |
| 7440-28-0 | Thallium | 1.2 | B | N | F | J AS |
| 7440-62-2 | Vanadium | 40.5 | | | P | |
| 7440-66-6 | Zinc | 3580 | | | P | |
| | Cyanide | | | | NR | |
| | | | | | | |

Color Before: BROWN Clarity Before: _____ Texture: MEDIUM

Color After: YELLOW Clarity After: _____ Artifacts: _____

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

4725H14

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: ~~4725I~~ SAS No.: 4725H SDG No.: 4725H

Matrix (soil/water): SOIL Lab Sample ID:

Level (low/med): LOW Date Received: 07/24/89

% Solids: ~~77.9~~ 77.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 4440 | | | P | |
| 7440-36-0 | Antimony | 183 | | N | P | J AS |
| 7440-38-2 | Arsenic | 555 | | | P | |
| 7440-39-3 | Barium | 66.0 | | E | P | |
| 7440-41-7 | Beryllium | .63 | B | | P | |
| 7440-43-9 | Cadmium | 113 | | | P | J AS |
| 7440-70-2 | Calcium | 18900 | | | P | |
| 7440-47-3 | Chromium | .72 | U | | P | |
| 7440-48-4 | Cobalt | 76.8 | | | P | |
| 7440-50-8 | Copper | 496. | | | P | |
| 7439-89-6 | Iron | 263000 | | | P | |
| 7439-92-1 | Lead | 12200. | | | P | |
| 7439-95-4 | Magnesium | 5880. | | | P | |
| 7439-96-5 | Manganese | 1370 | | | P | |
| 7439-97-6 | Mercury | .81 | | | CV | |
| 7440-02-0 | Nickel | 31.4 | | | P | |
| 7440-09-7 | Potassium | 657 | B | | P | |
| 7782-49-2 | Selenium | 84.0 | | N | F | J AS |
| 7440-22-4 | Silver | 39.8 | | | P | |
| 7440-23-5 | Sodium | 105 | B | | P | |
| 7440-28-0 | Thallium | 6.0 | | SN | F | J AS |
| 7440-62-2 | Vanadium | 10.4 | B | | P | |
| 7440-66-6 | Zinc | 17500 | | | P | |
| | Cyanide | | | | NR | |

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

FORM I - IN 7/87

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# REGION VIII SUMMARY OF DATA QUALITY ASSURANCE REVIEW

***guideline references are from Contract #787***

Case No.: 12334 TDD No.: F08-8909-08

Site: Richardson Flats

Contractor Laboratory: Keystone-Houston

Data Reviewer : Annette Sackman Date of Review: 10-3-89

Sample Matrix: 5 Low Soils, 15 Low Waters

Analysis: Mercury

Sample Nos.: MHL955, MHL956, MHP500, MHP501, MHP502, MHP503, MHP504, MHP506, MHP507, MHP509, MHP510, MHP511, MHP512, MHP513, MHP514, MHP515, MHP516, MHP517, MHP518, MHP519

(X) Data are acceptable for use.

( ) Data are acceptable for use with qualifications noted.

( ) Data are preliminary - pending verification.

( ) Data are unacceptable.

Action required by DPO?

No X Yes The following items require action:

Action required by project officer?

No X Yes

The following are our findings:

All requirements were met for the mercury analysis. No flags were assigned.


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## Inorganic Data Completeness Checklist

X Inorganic analysis data (Form I)

X Initial calibration and continuing calibration verification (Form IIA)

CRDL standard for AA and ICP (Form IIB)

X Blanks (Form III)

ICP interference Check sample (Form IV)

X Spike sample recovery (Form VA)

Post digestion spike sample recovery (Form VB)

X Duplicates (Form VI)

X Laboratory control sample (Form VII)

Standard addition results (Form VIII)

ICP serial dilutions (Form IX)

X Holding times (Form X)

X Instrument detection limits-quarterly (Form XI)

X ICP interelement correction factors-quarterly (Form II)

X ICP linear ranges-quarterly (Form XIII)

Raw data for interference checks

X Raw data for calibration standards

X Raw data for blanks

Raw data for CRI and/or CRA

X Raw data for samples

X Raw data for duplicates

X Raw data for spikes

X Traffic reports

## Contract Compliance

**I. Initial and Continuing Calibration Verification (ICV and CCV) (guidelines pg. E-4, Form IIA)**

1. Was instrument calibrated daily and each time it was set up?
   yes X no

2. Were instruments calibrated using 1 blank and several standards?
   yes X no

3. Were calibration verifications within 90-110%?
   yes X no

4. Were continuing calibrations run at 10% frequency?
   yes X no

5. Were the raw data correctly transcribed onto Form IIA?
   yes X no

Comments: All requirements met.

**II. CRDL Standards for ICP (CRI) and/or AA (CRA) (guidelines pg. E-6, Form IIB)**

1. For ICP analysis, were standards (CRI) @ 2x the CRDL or the IDL (whichever was greater) analyzed at the beginning and the end of each sample run, or at a minimum of twice/8 hour shift, whichever was more frequent?
   yes no

2. For furnace AA analysis, were standards (CRA) analyzed at the beginning and the end of each sample run, or at a minimum of twice/8 hour shift, whichever was more frequent?
   yes no

3. Were the CRI and/or CRA standards analyzed <u>after</u> the ICV?
   yes no

4. Were these data reported on Form IIB?
   yes no

5. Were the raw data correctly transcribed onto Form IIB?
   yes no

Comments: Not required.


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## III. Blanks (guidelines pg. E-6, Form III)

1. Was the initial calibration blank (ICB) analyzed immediately after the initial calibration verification (ICV)?
   yes X no

2. Was a continuing calibration blank (CCB) analyzed immediately after each continuing calibration verification (CCV)?
   yes X no

3. Was a preparation blank (PB) analyzed at a frequency of at least 1 in 20 samples?
   yes X no NA

4. How many elements were detected above the CRDLs? 0 (if 0, go to question 5)

   4a. How many elements were detected in the blanks at greater than one-half the amount detected in any sample?

5. Were raw data correctly transcribed onto Form III?
   yes X no

Comments: All requirements met.

## IV. ICP Interference Checks (ICS) (guidelines pg. E-7, Form IV)

1. Was the ICS analyzed twice per 8 hour shift?
   yes no

2. Were the ICSs analyzed before and after samples?
   yes no

3. Was any massive interference detected?
   yes no

4. Were the ICSs within ±20% mean value?
   yes no

5. Were raw data correctly transcribed onto Form IV?

Comments: Not required.

## V. Spike Sample Analysis (S) (guideline pg. E-8, Form V)

1. Were spikes analyzed at a frequency of 1 in 20 samples?
   yes X no

2. Were spike recoveries correctly calculated?
   yes X no

$$\% \text{ recovery} = \frac{(SSR - SR)}{SA} \times 100$$

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added

3. Were spike recoveries within the range of 75-125%?
   yes X no

   3a. For recoveries outside this range, were associated data flagged "N" by the laboratory on Forms I and V?
   yes no NA X

   (an exception if granted where the sample concentration is >4X the spike concentration)

   4. Were raw data correctly transcribed onto Form V?
   yes X no

* Refer to page E-9 (SOW 787) for information regarding the amount of spike to be added for each analyte and for other information about the Spike Sample Analysis.

Comments: All requirements met.

## VI. Duplicates (D) (guidelines pg. E-11, Form VI)

1. Were duplicates analyzed at a frequency of 1 in 20 samples?
   yes X no

2. Were RPDs correctly calculated?
   yes X no

$$RPD = \frac{S - D}{(S + D)/2} \times 100$$

S = Sample
D = Duplicate


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3a. For sample concentrations >5x the CRDL, were RPDs ±20%? (limits of ±35% apply for soil/sediment/tailings samples)

yes X no NA

3b. For sample concentrations >5x the CRDL, did duplicate analysis results fall outside the control window of ± the CRDL?

yes no X NA

3c. Where the RPDs exceeded the control limits, were the data flagged '*' on Forms I and VI by the laboratory?

yes no NA

4. Were raw data correctly transcribed onto Form VI?

yes X no

* Other Considerations:
- Field blanks cannot be used for duplicate analyses
- Duplicates must be analyzed for each analytical method

Comments: All requirements met.

VII. Laboratory Control Sample (LCS) Analysis (guideline pg. E-12, Form VII)

1. Was an LCS analyzed for every sample delivery group or batch of samples, whichever was more frequent?

yes X no

2. Were recoveries within the 80-120% limit?

yes X no

-if the recoveries were outside this range the analysis must be terminated, the problem corrected and the previous samples associated with that LCS redigested and reanalyzed.

3. Were the raw data correctly transcribed onto Form VII?

yes X no

Comments: All requirements met.

**VIII. Furnace Atomic Absorption (AA) QC Analysis (guidelines pg. E-14, Form VIII)**

1. Does the raw data package contain absorbance values for two injections per sample, the average values and the relative standard deviation (RSD)?

   yes no

2. For analyte concentrations > the CRDL, did the RSD for the duplicate injections agree within 20%? (if yes, go to question 3)

   yes no

   $$RSD = \frac{SD}{M} \times 100$$

   SD = Standard Deviation of Duplicate Injections
   M = Mean of Duplicate Injections

   2a. Were samples that exceeded the 20% criteria reanalyzed?

   yes no

   2b. Did any reanalyzed samples exceed the 20% criteria?

   yes no

   2c. If yes, did the laboratory flag the data of Form I with an 'M'?

   yes no

3. Was the recovery of the spike > 40%? (if yes, go to question 4).

   yes no

   If no, was the sample diluted and rerun with another spike?

   yes no

4. Was sample absorbance 50% of spike absorbance?* (if yes, go to question 5).

   yes no

* Spike absorbance = absorbance of spiked sample - absorbance of sample.


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4a. For spike recoveries between 85 and 115%, were results reported to the IDL?

yes no

$$RPD = \frac{(SSR - SR)}{SA} \times 100$$

SSR = Spike Sample Recovery
SR = Sample Result
SA = Spike Added

4b. For spike recoveries outside the 85 and 115% range, were results reported to the IDL and flagged with 'W'?

yes no

5. Was spike recovery between 85 and 115%? (if no, go to question 6)

5a. Were results quantified from calibration curve and reported to IDL?

yes no

6. Was an MSA at 50, 100 and 150% of the sample absorbance analyzed?

yes no

6a. Was each MSA analysis identified in the raw data along with the slope, intercept and correlation coefficient?

yes no

6b. Were these data correctly transcribed onto Form VIII?

yes no

6c. Were correlation coefficients(r) > 0.995?

yes no

6d. If no, were MSAs run once more?

yes no

- If the correlation coefficients were still > 0.995, data on Form I must be from the run with the best 'r' and the data on Forms I and VII must be flagged with a '+'.

Were these criteria met?

yes no

6e. Were all MSA obtained data marked with an 'S' or an S+ on form I?

yes no

Comments: Not required.

IX. ICP Serial Dilution (L) Analysis (guidelines pg. E-12, Form IX)

1. Was an ICP serial dilution performed on each group of samples of a similar matrix (i.e., soil, water) and concentration (i.e., low, high) or for each sample delivery group, whichever was more frequent?

yes no

2. For elements with concentrations >10X the CRDL, did any exceed the serial dilution results by more than 10%? (if no, skip questions 3 and 4)

yes no

$$\% \text{ difference} = \frac{I - S}{I} \times 100$$

I = Initial Sample Result
S = Serial Dilution Result (instrument reading X5)

3. Which elements had concentrations that exceeded the 10% criteria?

4. Did the laboratory flag these data with an 'E' on Form IX?

yes no

5. Were the raw data correctly transcribed onto Form IX?

yes no

Comments: Not required.


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**X. Instrument Detection Limits (IDL) (guidelines pg. E-13, Form XI)**

1. Were IDLs reported for each analyzed element?
   yes X no

2. Were IDLs reported for each instrument used?
   yes X no

3. Did the IDLs meet the contract requirements? (refer to pg. E-13, SOW 787)
   yes X no

Comments: All requirements met.

**XI. Interelement Corrections for ICP (guidelines pg. E-13, Form XII)**

1. Were correction factors reported on Form XII?
   yes X no

Comments: All requirements met.

**XII. Linear Range Analysis (LRA) (guidelines pg. E-14, Form XII)**

1. Was a linear range verification standard analyzed?
   yes X no

2. Was the results within ±5% of the true value?
   yes no

## Holding Times

Limits: Metals - 6 months; Hg - 30 days; Cn - 28 days.

1. Verified date of sample receipt by laboratory 7-21-89
2. Date of preparation/analyses 8-3-89
3. Were holding times met? yes X no

| Analyte | Matrix | Date Sampled | Prep Date | Holding Time | Holding Time Limit/Met | |
|---|---|---|---|---|---|---|
| Mercury | Low soil | 7-18-89 | 8-3-89 | 13 days | 30 days | yes |
| Mercury | Low Water | 7-18-89 | 8-3-89 | 13 days | 30 days | yes |


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Keystone DC# 12334-8-5

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHL955

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): SOIL Lab Sample ID: 890773003

Level (low/med): LOW Date Received: 07/21/89

% Solids: 98.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.99 | | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

000007

Keystone DC# 12334-8-5

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHL956

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): SOIL Lab Sample ID: 890773006

Level (low/med): LOW Date Received: 07/21/89

% Solids: 97.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 1.30 | | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:



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FORM I - IN

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Keystone DC# 12334-8-5

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP500

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): SOIL Lab Sample ID: 890773007

Level (low/med): LOW Date Received: 07/21/89

% Solids: 98.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.88 | | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

Keystone DC# 12334-8-5

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP501

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): SOIL Lab Sample ID: 890773008

Level (low/med): LOW Date Received: 07/21/89

% Solids: 82.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 8.20 | | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

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Comments:



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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP502

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): SOIL Lab Sample ID: 890773009

Level (low/med): LOW Date Received: 07/21/89

% Solids: 92.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 7.60 | | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP503

Lab-Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID: 890773010

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

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Comments:



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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP504

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID: 890773011

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

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Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP506

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID: 890773012

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP507

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID: 890773013

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP509

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID: 890773014

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

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Comments:



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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP510

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID: 890773015

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

Keystone DC# 12334-8-5

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP511

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID: 890773016

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

Keystone DC# 12334-8-5

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP512

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID: 890773017

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

Keystone DC# 12334-8-5

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP513

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID: 890773020

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

Keystone DC# 12334-8-5

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP514

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID: 890773021

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

Keystone DC# 12334-8-5

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP515

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID: 890773022

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

Keystone DC# 12334-8-5

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP516

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID: 890773023

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 8.00 | | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

Keystone DC# 12334-8-5

U.S. EPA - CLP

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP517

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID: 890773024

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

Keystone DC# 12334-8-5

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP518

Lab-Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID: 890773025

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

Keystone DC# 12334-8-5

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP519

Lab Name: KEYSTONE ENVIRONMENTAL Contract: 68-W8-0005

Lab Code: KEYTX Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID: 890773026

Level (low/med): LOW Date Received: 07/21/89

% Solids: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | | | | NR |
| 7440-36-0 | Antimony | | | | NR |
| 7440-38-2 | Arsenic | | | | NR |
| 7440-39-3 | Barium | | | | NR |
| 7440-41-7 | Beryllium | | | | NR |
| 7440-43-9 | Cadmium | | | | NR |
| 7440-70-2 | Calcium | | | | NR |
| 7440-47-3 | Chromium | | | | NR |
| 7440-48-4 | Cobalt | | | | NR |
| 7440-50-8 | Copper | | | | NR |
| 7439-89-6 | Iron | | | | NR |
| 7439-92-1 | Lead | | | | NR |
| 7439-95-4 | Magnesium | | | | NR |
| 7439-96-5 | Manganese | | | | NR |
| 7439-97-6 | Mercury | 0.20 | U | | CV |
| 7439-02-0 | Nickel | | | | NR |
| 7440-09-7 | Potassium | | | | NR |
| 7782-49-2 | Selenium | | | | NR |
| 7440-22-4 | Silver | | | | NR |
| 7440-23-5 | Sodium | | | | NR |
| 7440-28-0 | Thallium | | | | NR |
| 7440-62-2 | Vanadium | | | | NR |
| 7440-66-6 | Zinc | | | | NR |
| | Cyanide | | | | NR |

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:



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FORM I - IN

ecology and environment

7/87

# REGION VIII SUMMARY OF DATA QUALITY ASSURANCE REVIEW

***guideline references are from Contract #787***

Case No.: 12334 TDD No.: F08-8909-08

Site: Richardson Flats

Contractor Laboratory: Silver Valley Labs

Data Reviewer : Annette Sackman Date of Review: 10-3-89

Sample Matrix: 5 Low Soils, 15 Low Waters

Analysis: Metals plus Mercury

Sample Nos.: MHL955, MHL956, MHP500, MHP501, MHP502, MHP503, MHP504, MHP506, MHP507, MHP509, MHP510, MHP511, MHP512, MHP513, MHP514, MHP515, MHP516, MHP517, MHP518, MHP519

( ) Data are acceptable for use.

(X) Data are acceptable for use with qualifications noted.

( ) Data are preliminary - pending verification.

( ) Data are unacceptable.

Action required by DPO?

No X Yes The following items require action:

Action required by project officer?

No X Yes

The following are our findings:

These samples were originally sent to Keystone-Houston Labs for metal analysis; however, due to contractual problems, Keystone Houston only analyzed for mercury and then sent the samples to Silver Valley Labs for complete metal analysis. This package is the results for the analysis performed by Silver Valley Labs and includes metals plus mercury analysis. Since the samples were first sent to Keystone-Houston Labs, the holding times for the mercury analysis performed by Sliver Valley Labs was missed by seven days. Therefore, all mercury values in this package are flagged "J" and considered estimate.

The remaining data is acceptable for use with the following qualifications:

No final CRDL standard was run for the furnace AA analysis. The CRDL value for selenium was transposed on Form IIB and the correct %D is 78.6%; however, no qualifications are required for these discrepancies.

The spike recovery was below 40% for selenium values for water matrix (22.8%); therefore, all associated selenium values are unusable and rejected "R". The thallium spike recovery for soil matrix was low (54.3%); therefore all thallium soil values are flagged "J" and considered biased low.

Duplicate results for lead water values obtained by ICAP were high (37.0%RPD). Since sample MHP516 was the only water sample in which lead was analyzed by ICAP, this lead value is considered estimated and flagged "J".

All MSA criteria were followed except for the following: MSA was required for arsenic for sample MHP517 and thallium for sample MHP516; therefore these values are estimated and flagged "J". One correlation coefficient was <0.995 for the arsenic analysis for sample MHP518; therefore, this value is flagged "J", estimated. Both correlation coefficients were <0.995 for the arsenic analysis for sample MHP504; therefore this value is unusable and flagged "R", rejected.

Serial dilution results for arsenic and zinc soil values were slightly high, 12.1% and 13.3 %, respectively. These soil values are therefore flagged "J", estimated.

The arsenic value for sample MHP516 was analyzed by furnace AA and reported as 46.5 µg/l; however, this number was not multiplied by the dilution factor of 50. The correct arsenic value is actually 2326 µg/l for this sample.

## Inorganic Data Completeness Checklist

X Inorganic analysis data (Form I)

X Initial calibration and continuing calibration verification (Form IIA)

X CRDL standard for AA and ICP (Form IIB)

X Blanks (Form III)

X ICP interference Check sample (Form IV)

X Spike sample recovery (Form VA)

X Post digestion spike sample recovery (Form VB)

X Duplicates (Form VI)

X Laboratory control sample (Form VII)

X Standard addition results (Form VIII)

X ICP serial dilutions (Form IX)

X Holding times (Form X)

X Instrument detection limits-quarterly (Form XI)

X ICP interelement correction factors-quarterly (Form II)

X ICP linear ranges-quarterly (Form XIII)

X Raw data for interference checks

X Raw data for calibration standards

X Raw data for blanks

X Raw data for CRI and/or CRA

X Raw data for samples

X Raw data for duplicates

X Raw data for spikes

X Traffic reports

## Contract Compliance

**I. Initial and Continuing Calibration Verification (ICV and CCV) (guidelines pg. E-4, Form IIA)**

1. Was instrument calibrated daily and each time it was set up?
   yes X no

2. Were instruments calibrated using 1 blank and several standards?
   yes X no

3. Were calibration verifications within 90-110%?
   yes X no

4. Were continuing calibrations run at 10% frequency?
   yes X no

5. Were the raw data correctly transcribed onto Form IIA?
   yes X no

Comments: All requirements met.

**II. CRDL Standards for ICP (CRI) and/or AA (CRA) (guidelines pg. E-6, Form IIB)**

1. For ICP analysis, were standards (CRI) @ 2x the CRDL or the IDL (whichever was greater) analyzed at the beginning and the end of each sample run, or at a minimum of twice/8 hour shift, whichever was more frequent?
   yes X no

2. For furnace AA analysis, were standards (CRA) analyzed at the beginning and the end of each sample run, or at a minimum of twice/8 hour shift, whichever was more frequent?
   yes no X

3. Were the CRI and/or CRA standards analyzed <u>after</u> the ICV?
   yes X no

4. Were these data reported on Form IIB?
   yes X no

5. Were the raw data correctly transcribed onto Form IIB?
   yes no X

Comments: The CRA was run only at the beginning of the sample runs and not at the end. The selenium CRDL value was transposed on Form IIB and the correct %D is 78.6%. No flags are required for these discrepancies.

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## III. Blanks (guidelines pg. E-6, Form III)

1. Was the initial calibration blank (ICB) analyzed immediately after the initial calibration verification (ICV)?
   yes X no

2. Was a continuing calibration blank (CCB) analyzed immediately after each continuing calibration verification (CCV)?
   yes X no

3. Was a preparation blank (PB) analyzed at a frequency of at least 1 in 20 samples?
   yes X no NA

4. How many elements were detected above the CRDLs? 0 (if 0, go to question 5)

   4a. How many elements were detected in the blanks at greater than one-half the amount detected in any sample?

5. Were raw data correctly transcribed onto Form III?
   yes X no

Comments: All requirements met.

## IV. ICP Interference Checks (ICS) (guidelines pg. E-7, Form IV)

1. Was the ICS analyzed twice per 8 hour shift?
   yes X no

2. Were the ICSs analyzed before and after samples?
   yes X no

3. Was any massive interference detected?
   yes no X

4. Were the ICSs within ±20% mean value?
   yes X no

5. Were raw data correctly transcribed onto Form IV?

Comments: All requirements met.

## V. Spike Sample Analysis (S) (guideline pg. E-8, Form V)

1. Were spikes analyzed at a frequency of 1 in 20 samples?
   yes X  no

2. Were spike recoveries correctly calculated?
   yes X  no

$$\% \text{ recovery} = \frac{(SSR - SR)}{SA} \times 100$$

SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added

3. Were spike recoveries within the range of 75-125%?
   yes  no X

   3a. For recoveries outside this range, were associated data flagged "N" by the laboratory on Forms I and V?
   yes X  no  NA

   (an exception if granted where the sample concentration is >4X the spike concentration)

   4. Were raw data correctly transcribed onto Form V?
   yes X  no

* Refer to page E-9 (SOW 787) for information regarding the amount of spike to be added for each analyte and for other information about the Spike Sample Analysis.

Comments: Selenium water values are unusable and flagged "R" due to spike recoveries below 40% (22.8%). Thallium soil values are estimated and flagged "J" due to low spike recoveries (54.3%).

## VI. Duplicates (D) (guidelines pg. E-11, Form VI)

1. Were duplicates analyzed at a frequency of 1 in 20 samples?
   yes X  no

2. Were RPDs correctly calculated?
   yes X  no

$$RPD = \frac{S - D}{(S + D)/2} \times 100$$

S = Sample
D = Duplicate

3a. For sample concentrations >5x the CRDL, were RPDs ±20%? (limits of ±35% apply for soil/sediment/tailings samples)

yes no X NA

3b. For sample concentrations >5x the CRDL, did duplicate analysis results fall outside the control window of ± the CRDL?

yes no X NA

3c. Where the RPDs exceeded the control limits, were the data flagged '*' on Forms I and VI by the laboratory?

yes X no NA

4. Were raw data correctly transcribed onto Form VI?

yes no X

* Other Considerations:
- Field blanks cannot be used for duplicate analyses
- Duplicates must be analyzed for each analytical method

Comments: The selenium values for water sample MHP503D was done on ICAP and was compared to the furnace AA value for MHP503 which gave an RPD of 200%. The ICAP value for MHP503 of 28.02 µg/l, which should have been used for comparison, gives a new RPD of 27.8%. Since no water samples were analyzed by ICAP no flags are assigned to selenium values. Duplicate results for arsenic and lead water samples were high when analyzed by ICAP (200% and 37.0%, respectively). No arsenic values were acquired by ICAP analysis but the lead value for sample MHP516 was analyzed by ICAP and is therefore estimated and flagged "J".

## VII. Laboratory Control Sample (LCS) Analysis (guideline pg. E-12, Form VII)

1. Was an LCS analyzed for every sample delivery group or batch of samples, whichever was more frequent?

yes X no

2. Were recoveries within the 80-120% limit?

yes X no

-if the recoveries were outside this range the analysis must be terminated, the problem corrected and the previous samples associated with that LCS redigested and reanalyzed.

3. Were the raw data correctly transcribed onto Form VII?

yes X no

Comments: All requirements met.

**VIII. Furnace Atomic Absorption (AA) QC Analysis (guidelines pg. E-14, Form VIII)**

1. Does the raw data package contain absorbance values for two injections per sample, the average values and the relative standard deviation (RSD)?

   yes X  no

2. For analyte concentrations > the CRDL, did the RSD for the duplicate injections agree within 20%? (if yes, go to question 3)

   yes X  no

   $$RSD = \frac{SD}{M} \times 100$$

   SD = Standard Deviation of Duplicate Injections
   M = Mean of Duplicate Injections

   2a. Were samples that exceeded the 20% criteria reanalyzed?

   yes  no

   2b. Did any reanalyzed samples exceed the 20% criteria?

   yes  no

   2c. If yes, did the laboratory flag the data of Form I with an 'M'?

   yes  no

3. Was the recovery of the spike > 40%? (if yes, go to question 4).

   yes  no X

   If no, was the sample diluted and rerun with another spike?

   yes X  no

4. Was sample absorbance >50% of spike absorbance?* (if yes, go to question 5).

   yes  no X

* Spike absorbance = absorbance of spiked sample - absorbance of sample.

4a. For spike recoveries between 85 and 115%, were results reported to the IDL?

yes X no

$$RPD = \frac{(SSR - SR)}{SA} \times 100$$

SSR = Spike Sample Recovery
SR = Sample Result
SA = Spike Added

4b. For spike recoveries outside the 85 and 115% range, were results reported to the IDL and flagged with 'W'?

yes X no

5. Was spike recovery between 85 and 115%? (if no, go to question 6)

5a. Were results quantified from calibration curve and reported to IDL?

yes X no

6. Was an MSA at 50, 100 and 150% of the sample absorbance analyzed?

yes no X

6a. Was each MSA analysis identified in the raw data along with the slope, intercept and correlation coefficient?

yes X no

6b. Were these data correctly transcribed onto Form VIII?

yes no

6c. Were correlation coefficients(r) > 0.995?

yes no X

6d. If no, were MSAs run once more?

yes X no

- If the correlation coefficients were still > 0.995, data on Form I must be from the run with the best 'r' and the data on Forms I and VII must be flagged with a '+'.

Were these criteria met?

yes X no

6e. Were all MSA obtained data marked with an 'S' or an S+ on form I?

yes X no

Comments: MSA was required but not performed for sample MHP516's thallium value or for sample MHP517's arsenic value. These values are estimated and flagged "J". One correlation coefficient was <0.995 for sample MHP518's arsenic value and is flagged "J", estimated. Both correlation coefficients were <0.995 for sample MHP504's arsenic value and is considered unusable and flagged "R", rejected.

## IX. ICP Serial Dilution (L) Analysis (guidelines pg. E-12, Form IX)

1. Was an ICP serial dilution performed on each group of samples of a similar matrix (i.e., soil, water) and concentration (i.e., low, high) or for each sample delivery group, whichever was more frequent?

   yes X no

2. For elements with concentrations >10X the CRDL, did any exceed the serial dilution results by more than 10%? (if no, skip questions 3 and 4)

   yes X no

$$\% \text{ difference} = \frac{I - S}{I} \times 100$$

I = Initial Sample Result
S = Serial Dilution Result (instrument reading X5)

3. Which elements had concentrations that exceeded the 10% criteria? For soils, arsenic and zinc.

4. Did the laboratory flag these data with an 'E' on Form IX?

   yes X no

5. Were the raw data correctly transcribed onto Form IX?

   yes X no

Comments: For the soil samples, the arsenic and zinc values are flagged "J", estimated due to slightly high %D's of 12.1 and 13.3%, respectively.

**X. Instrument Detection Limits (IDL)** (guidelines pg. E-13, Form XI)

1. Were IDLs reported for each analyzed element?
   yes X no

2. Were IDLs reported for each instrument used?
   yes X no

3. Did the IDLs meet the contract requirements? (refer to pg. E-13, SOW 787)
   yes X no

Comments: All requirements met.

**XI. Interelement Corrections for ICP** (guidelines pg. E-13, Form XII)

1. Were correction factors reported on Form XII?
   yes X no

Comments: All requirements met.

**XII. Linear Range Analysis (LRA)** (guidelines pg. E-14, Form XII)

1. Was a linear range verification standard analyzed?
   yes X no

2. Was the results within ±5% of the true value?
   yes no

## Holding Times

Limits: Metals - 6 months; Hg - 30 days; Cn - 28 days.

1. Verified date of sample receipt by laboratory 8-16-89
2. Date of preparation/analyses 8-25-89
3. Were holding times met? yes no X

Mercury holding times were not met; therefore, all mercury values are estimated low and flagged "J".

| Analyte | Matrix | Date Sampled | Prep Date | Holding Time | Holding Time Limit | Met |
|---|---|---|---|---|---|---|
| Mercury | Low soil | 7-18-89 | 8-25-89 | 37 days | 30 days | no |
| Mercury | Low water | 7-18-89 | 8-25-89 | 37 days | 30 days | no |
| Metals | Low soil | 7-18-89 | 8-25-89 | 37 days | 6 months | yes |
| Metals | Low water | 7-18-89 | 8-25-89 | 37 days | 6 months | yes |

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U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHL955

Lab Name: SILVER VALLEY LABS., INC. Contract: ~~68-09-0071~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: AC 9-13-89 SDG No.: MHL955

Matrix (soil/water): SOIL Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 98.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 691 | | * | P | |
| 7440-36-0 | Antimony | 63.1 | | | P | |
| 7440-38-2 | Arsenic | 220 | | | P | JAS |
| 7440-39-3 | Barium | 153 | | * | P | |
| 7440-41-7 | Beryllium | 0.22 | U | | P | |
| 7440-43-9 | Cadmium | 21.1 | | | P | |
| 7440-70-2 | Calcium | 37000 | | | P | |
| 7440-47-3 | Chromium | 2.0 | B | | P | |
| 7440-48-4 | Cobalt | 5.5 | B | | P | |
| 7440-50-8 | Copper | 149 | | | P | |
| 7439-89-6 | Iron | 44700 | | | P | |
| 7439-92-1 | Lead | 2580 | | | P | |
| 7439-95-4 | Magnesium | 11200 | | | P | |
| 7439-96-5 | Manganese | 1440 | | | P | |
| 7439-97-6 | Mercury | 0.9 ~~1.0~~ | ~~U~~ | ~~N~~ JAS | CV | AC 9-12-89 |
| 7440-02-0 | Nickel | 8.2 | | | P | |
| 7440-09-7 | Potassium | 255 | B | | P | |
| 7782-49-2 | Selenium | 23.6 | | | F | |
| 7440-22-4 | Silver | 12.6 | | * | P | |
| 7440-23-5 | Sodium | 22.4 | B | | P | |
| 7440-28-0 | Thallium | 6.6 | | NS | F | JAS |
| 7440-62-2 | Vanadium | 1.3 | B | | P | |
| 7440-66-6 | Zinc | 3220 | | E | P | |
| | Cyanide | | | | NR | |

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHL956

Lab Name: SILVER VALLEY LABS.,INC. Contract: ~~68-D9-0071~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: DC 9-12-89 SDG No.: MHL955

Matrix (soil/water): SOIL Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 98.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 1040 | | * | P | |
| 7440-36-0 | Antimony | 84.4 | | | P | |
| 7440-38-2 | Arsenic | 208 | | | P | J AS |
| 7440-39-3 | Barium | 86.9 | | * | P | |
| 7440-41-7 | Beryllium | 0.22 | U | | P | |
| 7440-43-9 | Cadmium | 41.2 | | | P | |
| 7440-70-2 | Calcium | 54500 | | | P | |
| 7440-47-3 | Chromium | 6.0 | | | P | |
| 7440-48-4 | Cobalt | 2.6 | B | | P | |
| 7440-50-8 | Copper | 205 | | | P | |
| 7439-89-6 | Iron | 36500 | | | P | |
| 7439-92-1 | Lead | 3060 | | | P | |
| 7439-95-4 | Magnesium | 18500 | | | P | |
| 7439-96-5 | Manganese | 1740 | | | P | |
| 7439-97-6 | Mercury | 1.4 ~~1.0~~ | | N J AS | CV | DC 9-12-89 |
| 7440-02-0 | Nickel | 9.4 | | | P | |
| 7440-09-7 | Potassium | 496 | B | | P | |
| 7782-49-2 | Selenium | 12.7 | | | F | |
| 7440-22-4 | Silver | 18.5 | | * | P | |
| 7440-23-5 | Sodium | 34.8 | B | | P | |
| 7440-28-0 | Thallium | 3.0 | | NS | F | J AS |
| 7440-62-2 | Vanadium | 3.8 | B | | P | |
| 7440-66-6 | Zinc | 5710 | | E | P | |
| | Cyanide | | | | NR | |

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

33

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP500

Lab Name: SILVER VALLEY LABS.,INC. Contract: ~~68-09-0071~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: AC 9/12/89 SDG No.: MHL955

Matrix (soil/water): SOIL Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 99.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 1530 | | * | P | |
| 7440-36-0 | Antimony | 87.0 | | | P | |
| 7440-38-2 | Arsenic | 222 | | | P | J AB |
| 7440-39-3 | Barium | 32.8 | B | * | P | |
| 7440-41-7 | Beryllium | 0.22 | U | | P | |
| 7440-43-9 | Cadmium | 95.9 | | | P | |
| 7440-70-2 | Calcium | 68200 | | | P | |
| 7440-47-3 | Chromium | 8.8 | | | P | |
| 7440-48-4 | Cobalt | 7.4 | B | | P | |
| 7440-50-8 | Copper | 336 | | | P | |
| 7439-89-6 | Iron | 53400 | | | P | |
| 7439-92-1 | Lead | 4520 | | | P | |
| 7439-95-4 | Magnesium | 23000 | | | P | |
| 7439-96-5 | Manganese | 2320 | | | P | |
| 7439-97-6 | Mercury | 1.1 | | ~~N~~ J~~S~~ | CV | AC 9/12/89 |
| 7440-02-0 | Nickel | 7.1 | B | | P | |
| 7440-09-7 | Potassium | 827 | B | | P | |
| 7782-49-2 | Selenium | 19.2 | | | F | |
| 7440-22-4 | Silver | 22.1 | | * | P | |
| 7440-23-5 | Sodium | 42.6 | B | | P | |
| 7440-28-0 | Thallium | 4.2 | B | N | F | J AB |
| 7440-62-2 | Vanadium | 3.7 | B | | P | |
| 7440-66-6 | Zinc | 14100 | | E | P | |
| | Cyanide | | | | NR | |

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

34

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP501

Lab Name: SILVER VALLEY LABS.,INC. Contract: ~~68-D3-0071~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: DC 6/13/89 SDG No.: MHL955

Matrix (soil/water): SOIL Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 81.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 1030 | | * | P | |
| 7440-36-0 | Antimony | 120 | | | P | |
| 7440-38-2 | Arsenic | 259 | | | P | J AB |
| 7440-39-3 | Barium | 117 | | * | P | |
| 7440-41-7 | Beryllium | 0.27 | U | | P | |
| 7440-43-9 | Cadmium | 117 | | | P | |
| 7440-70-2 | Calcium | 5400 | | | P | |
| 7440-47-3 | Chromium | 0.69 | U | | P | |
| 7440-48-4 | Cobalt | 3.9 | B | | P | |
| 7440-50-8 | Copper | 281 | | | P | |
| 7439-89-6 | Iron | 97400 | | | P | |
| 7439-92-1 | Lead | 9300 | | | P | |
| 7439-95-4 | Magnesium | 1140 | B | | P | |
| 7439-96-5 | Manganese | 212 | | | P | |
| 7439-97-6 | Mercury | 4.3 ~~1.7~~ | | N J AB | CV | DC 9/12/89 |
| 7440-02-0 | Nickel | 5.1 | B | | P | |
| 7440-09-7 | Potassium | 1140 | B | | P | |
| 7782-49-2 | Selenium | 45.7 | | | F | |
| 7440-22-4 | Silver | 62.8 | | * | P | |
| 7440-23-5 | Sodium | 603 | B | | P | |
| 7440-28-0 | Thallium | 9.7 | B | N | F | J AB |
| 7440-62-2 | Vanadium | 2.6 | B | | P | |
| 7440-66-6 | Zinc | 16200 | | E | P | |
| | Cyanide | | | | NR | |

Color Before: BROWN Clarity Before: Texture: FINE

Color After: YELLOW Clarity After: Artifacts:

Comments:

35

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP502

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0094 ~~68-D9-0071~~

Lab Code: SILVER Case No.: 12334 SAS No.: DC 9/13/89 SDG No.: MHL955

Matrix (soil/water): SOIL Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 95.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 240 | | * | P | |
| 7440-36-0 | Antimony | 144 | | | P | |
| 7440-38-2 | Arsenic | 175 | | | P | J AB |
| 7440-39-3 | Barium | 39.5 | B | * | P | |
| 7440-41-7 | Beryllium | 0.23 | U | | P | |
| 7440-43-9 | Cadmium | 250 | | | P | |
| 7440-70-2 | Calcium | 32800 | | | P | |
| 7440-47-3 | Chromium | 0.59 | U | | P | |
| 7440-48-4 | Cobalt | 3.2 | B | | P | |
| 7440-50-8 | Copper | 265 | | | P | |
| 7439-89-6 | Iron | 87000 | | | P | |
| 7439-92-1 | Lead | 31600 | | | P | |
| 7439-95-4 | Magnesium | 142 | B | | P | |
| 7439-96-5 | Manganese | 252 | | | P | |
| 7439-97-6 | Mercury | ~~42~~ 0 | | N JAS | CV | DC 9/13/89 |
| 7440-02-0 | Nickel | 6.2 | B | | P | |
| 7440-09-7 | Potassium | 680 | B | | P | |
| 7782-49-2 | Selenium | 38.4 | | | F | |
| 7440-22-4 | Silver | 115 | | * | P | |
| 7440-23-5 | Sodium | 117 | B | | P | |
| 7440-28-0 | Thallium | 6.8 | B | N | F | J AB |
| 7440-62-2 | Vanadium | 0.57 | U | | P | |
| 7440-66-6 | Zinc | 33800 | | E | P | |
| | Cyanide | | | | NR | |

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: YELLOW Clarity After: Artifacts:

Comments:

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U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP503

Lab Name: SILVER VALLEY LABS.,INC. Contract: ~~68-D9-0071~~ 68-W8-0094

Lab Code: SILVER Case No.: 12334 SAS No.: DC 9-13-89 SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 26.6 | B | | P | |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 3.3 | B | NW | F | |
| 7440-39-3 | Barium | 51.5 | B | | P | |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 2.0 | B | | P | |
| 7440-70-2 | Calcium | 147000 | | | P | |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 2.6 | U | | P | |
| 7440-50-8 | Copper | 6.3 | B | | P | |
| 7439-89-6 | Iron | 195 | | | P | |
| 7439-92-1 | Lead | 5.9 | B | N* | F | |
| 7439-95-4 | Magnesium | 36400 | | | P | |
| 7439-96-5 | Manganese | 223 | | | P | |
| 7439-97-6 | Mercury | 0.2 ~~2.0~~ | U | ~~N~~ JRS | CV | DC 9-11-89 |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 2090 | B | | P | |
| 7782-49-2 | Selenium | 1.4 | U | N* | F | R AS |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 25200 | | | P | |
| 7440-28-0 | Thallium | 1.0 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 419 | | | P | |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP504

Lab Name: SILVER VALLEY LABS., INC. Contract: ~~68-D9-0074~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: DC 9-1-89 SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 75.8 | B | | P | |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 5.6 | B | N+ | F | R AB |
| 7440-39-3 | Barium | 52.5 | B | | P | |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 2.2 | B | | P | |
| 7440-70-2 | Calcium | 147000 | | | P | |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 4.0 | B | | P | |
| 7440-50-8 | Copper | 5.6 | B | | P | |
| 7439-89-6 | Iron | 481 | | | P | |
| 7439-92-1 | Lead | 35.8 | | NS* | F | |
| 7439-95-4 | Magnesium | 36200 | | | P | |
| 7439-96-5 | Manganese | 240 | | | P | |
| 7439-97-6 | Mercury | 0.2 ~~0~~ | U | ~~N~~ J AB | CV | DC 9-11-89 |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 1920 | B | | P | |
| 7782-49-2 | Selenium | 14.0 | U | N* | F | R AB |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 24100 | | | P | |
| 7440-28-0 | Thallium | 1.0 | U | W | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 519 | | | P | |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP506

Lab Name: SILVER VALLEY LABS., INC. Contract: ~~68-D9-0071~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: DC 9-13-89 SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 24.6 | B | | P |
| 7440-36-0 | Antimony | 19.9 | U | | P |
| 7440-38-2 | Arsenic | 6.8 | B | NW | F |
| 7440-39-3 | Barium | 54.6 | B | | P |
| 7440-41-7 | Beryllium | 1.1 | U | | P |
| 7440-43-9 | Cadmium | 1.8 | U | | P |
| 7440-70-2 | Calcium | 139000 | | | P |
| 7440-47-3 | Chromium | 2.8 | U | | P |
| 7440-48-4 | Cobalt | 2.6 | B | | P |
| 7440-50-8 | Copper | 2.9 | B | | P |
| 7439-89-6 | Iron | 338 | | | P |
| 7439-92-1 | Lead | 6.2 | | N* | F |
| 7439-95-4 | Magnesium | 34600 | | | P |
| 7439-96-5 | Manganese | 274 | | | P |
| 7439-97-6 | Mercury | 0.2 ~~2.9~~ | U | ~~N~~ J ~~AB~~ | CV |
| 7440-02-0 | Nickel | 9.7 | U | | P |
| 7440-09-7 | Potassium | 1790 | B | | P |
| 7782-49-2 | Selenium | 14.0 | U | N* | F |
| 7440-22-4 | Silver | 1.6 | U | | P |
| 7440-23-5 | Sodium | 22900 | | | P |
| 7440-28-0 | Thallium | 1.0 | U | W | F |
| 7440-62-2 | Vanadium | 2.7 | U | | P |
| 7440-66-6 | Zinc | 429 | | | P |
| | Cyanide | | | | NR |

DC 9-11-89

R AB

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP507

Lab Name: SILVER VALLEY LABS.,INC. Contract: ~~68-D9-0071~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: DC 9-13-89 SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 370 | | | P | |
| 7440-36-0 | Antimony | 19.3 | U | | P | |
| 7440-38-2 | Arsenic | 12.2 | | NS | F | |
| 7440-39-3 | Barium | 59.1 | B | | P | |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 1.8 | U | | P | |
| 7440-70-2 | Calcium | 144000 | | | P | |
| 7440-47-3 | Chromium | 2.8 | B | | P | |
| 7440-48-4 | Cobalt | 2.6 | U | | P | |
| 7440-50-8 | Copper | 11.7 | B | | P | |
| 7439-89-6 | Iron | 1200 | | | P | |
| 7439-92-1 | Lead | 122 | | N* | F | |
| 7439-95-4 | Magnesium | 35600 | | | P | |
| 7439-96-5 | Manganese | 335 | | | P | |
| 7439-97-6 | Mercury | 0.2 ~~2.0~~ | ~~UN~~ | JB | CV | DC 9-11-89 |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 1980 | B | | P | |
| 7782-49-2 | Selenium | 1.4 | U | N* | F | RAB |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 23400 | | | P | |
| 7440-28-0 | Thallium | 1.0 | U | W | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 726 | | | P | |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

40

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP509

Lab Name: SILVER VALLEY LABS.,INC. Contract: ~~68-D9-0074~~ 68-W8-0094

Lab Code: SILVER Case No.: 12334 SAS No.: DC 9-13-89 SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 11.5 | U | | P | |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 2.3 | U | NW | F | |
| 7440-39-3 | Barium | 14.9 | B | | P | |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 1.8 | U | | P | |
| 7440-70-2 | Calcium | 322000 | | | P | |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 2.6 | U | | P | |
| 7440-50-8 | Copper | 1.9 | B | | P | |
| 7439-89-6 | Iron | 270 | | | P | |
| 7439-92-1 | Lead | 0.90 | U | NW* | F | |
| 7439-95-4 | Magnesium | 68700 | | | P | |
| 7439-96-5 | Manganese | 94.8 | | | P | |
| 7439-97-6 | Mercury | 0.2 ~~2.0~~ | U | N J ~~B~~ | CV | DC 9-11-89 |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 1480 | B | | P | |
| 7782-49-2 | Selenium | 14.0 | U | N* | F | R ~~B~~ |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 47500 | | | P | |
| 7440-28-0 | Thallium | 1.0 | U | W | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 190 | | | P | |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

41

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP510

Lab Name: SILVER VALLEY LABS.,INC. Contract: ~~68-89-0071~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: QC 4/13/89 SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 368 | | | P | |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 9.4 | B | NW | F | |
| 7440-39-3 | Barium | 37.0 | B | | P | |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 2.6 | B | | P | |
| 7440-70-2 | Calcium | 333000 | | | P | |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 3.8 | B | | P | |
| 7440-50-8 | Copper | 12.9 | B | | P | |
| 7439-89-6 | Iron | 1070 | | | P | |
| 7439-92-1 | Lead | 131 | | N* | F | |
| 7439-95-4 | Magnesium | 70500 | | | P | |
| 7439-96-5 | Manganese | 2110 | | | P | |
| 7439-97-6 | Mercury | 0.2 ~~2.9~~ | U | ~~N J~~ | CV | QC 9-11-89 |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 1710 | B | | P | |
| 7782-49-2 | Selenium | 1.4 | U | N* | F | RAS |
| 7440-22-4 | Silver | 2.4 | B | | P | |
| 7440-23-5 | Sodium | 48400 | | | P | |
| 7440-28-0 | Thallium | 1.0 | U | W | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 656 | | | P | |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP511

Lab Name: SILVER VALLEY LABS.,INC. Contract: ~~68-D9-0071~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: DC 9-7-89 SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 16.8 | B | | P | |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 5.3 | B | NW | F | |
| 7440-39-3 | Barium | 32.1 | B | | P | |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 1.8 | U | | P | |
| 7440-70-2 | Calcium | 320000 | | | P | |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 2.6 | U | | P | |
| 7440-50-8 | Copper | 1.1 | U | | P | |
| 7439-89-6 | Iron | 224 | | | P | |
| 7439-92-1 | Lead | 0.90 | U | N* | F | |
| 7439-95-4 | Magnesium | 68600 | | | P | |
| 7439-96-5 | Manganese | 960 | | | P | |
| 7439-97-6 | Mercury | 0.2 ~~2.0~~ | U | N J ~~AS~~ | CV | DC 9-11-89 |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 1330 | B | | P | |
| 7782-49-2 | Selenium | 14.0 | U | N* | F | RAS |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 46700 | | | P | |
| 7440-28-0 | Thallium | 1.0 | U | W | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 295 | | | P | |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP512

Lab Name: SILVER VALLEY LABS., INC. Contract: ~~68-D9-0071~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: DC 9/13/89 SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 106 | B | | P | |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 8.4 | B | N | F | |
| 7440-39-3 | Barium | 33.5 | B | | P | |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 1.8 | U | | P | |
| 7440-70-2 | Calcium | 303000 | | | P | |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 2.6 | U | | P | |
| 7440-50-8 | Copper | 4.9 | B | | P | |
| 7439-89-6 | Iron | 1090 | | | P | |
| 7439-92-1 | Lead | 36.6 | | NS* | F | |
| 7439-95-4 | Magnesium | 64900 | | | P | |
| 7439-96-5 | Manganese | 950 | | | P | |
| 7439-97-6 | Mercury | ~~2.0~~ 0.2 | U | ~~NJ~~ | CV | DC 9-11-89 |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 986 | B | | P | |
| 7782-49-2 | Selenium | 14.0 | U | N* | F | RAB |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 44300 | | | P | |
| 7440-28-0 | Thallium | 1.0 | U | W | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 332 | | | P | |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP513

Lab Name: SILVER VALLEY LABS.,INC. Contract: 68W8-0074 ~~68-B9-0071~~

Lab Code: SILVER Case No.: 12334 SAS No.: DC 9-13-89 SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 23.3 | B | | P |
| 7440-36-0 | Antimony | 19.9 | U | | P |
| 7440-38-2 | Arsenic | 2.3 | U | N | F |
| 7440-39-3 | Barium | 1.3 | U | | P |
| 7440-41-7 | Beryllium | 1.1 | U | | P |
| 7440-43-9 | Cadmium | 1.8 | U | | P |
| 7440-70-2 | Calcium | 154 | B | | P |
| 7440-47-3 | Chromium | 3.5 | B | | P |
| 7440-48-4 | Cobalt | 2.6 | U | | P |
| 7440-50-8 | Copper | 1.1 | U | | P |
| 7439-89-6 | Iron | 277 | | | P |
| 7439-92-1 | Lead | 0.90 | U | N* | F |
| 7439-95-4 | Magnesium | 42.5 | B | | P |
| 7439-96-5 | Manganese | 2.3 | B | | P |
| 7439-97-6 | Mercury | 0.2 ~~2.9~~ | U | ~~N J~~ | CV |
| 7440-02-0 | Nickel | 9.7 | U | | P |
| 7440-09-7 | Potassium | 273 | U | | P |
| 7782-49-2 | Selenium | 1.4 | U | N* | F |
| 7440-22-4 | Silver | 1.6 | U | | P |
| 7440-23-5 | Sodium | 68.9 | B | | P |
| 7440-28-0 | Thallium | 1.0 | U | W | F |
| 7440-62-2 | Vanadium | 2.7 | U | | P |
| 7440-66-6 | Zinc | 4.5 | B | | P |
| | Cyanide | | | | NR |

DC 9-11-89

RDB

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

45

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP514

Lab Name: SILVER VALLEY LABS.,INC. Contract: 68-W8-0094 ~~68-D9-0071~~

Lab Code: SILVER Case No.: 12334 SAS No.: DC 9-13-89 SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 16.6 | B | | P | |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 12.0 | | NS | F | |
| 7440-39-3 | Barium | 1.3 | U | | P | |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 1.8 | U | | P | |
| 7440-70-2 | Calcium | 56.3 | B | | P | |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 2.6 | U | | P | |
| 7440-50-8 | Copper | 4.4 | B | | P | |
| 7439-89-6 | Iron | 219 | | | P | |
| 7439-92-1 | Lead | 0.90 | U | NW* | F | |
| 7439-95-4 | Magnesium | 20.9 | U | | P | |
| 7439-96-5 | Manganese | 2.0 | B | | P | |
| 7439-97-6 | Mercury | 0.2 ~~2.0~~ | U | ~~NJ~~ AB | CV | DC 9-11-89 |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 273 | U | | P | |
| 7782-49-2 | Selenium | 1.4 | U | N* | F | R AB |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 76.0 | B | | P | |
| 7440-28-0 | Thallium | 1.0 | U | W | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 1.3 | U | | P | |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MHP515

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074 ~~68-D9-0071~~

Lab Code: SILVER Case No.: 12334 SAS No.: DC 9-13-89 SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 32.8 | B | | P | |
| 7440-36-0 | Antimony | 39.3 | B | | P | |
| 7440-38-2 | Arsenic | 68.6 | | N | F | |
| 7440-39-3 | Barium | 102 | B | | P | |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 4.6 | B | | P | |
| 7440-70-2 | Calcium | 180000 | | | P | |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 8.8 | B | | P | |
| 7440-50-8 | Copper | 13.6 | B | | P | |
| 7439-89-6 | Iron | 267 | | | P | |
| 7439-92-1 | Lead | 41.8 | | N* | F | |
| 7439-95-4 | Magnesium | 38000 | | | P | |
| 7439-96-5 | Manganese | 2780 | | | P | |
| 7439-97-6 | Mercury | 0.2 ~~2.9~~ | U | ~~N J *B~~ | CV | DC 9-11-89 |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 5580 | | | P | |
| 7782-49-2 | Selenium | 14.0 | U | N* | F | R *B |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 54600 | | | P | |
| 7440-28-0 | Thallium | 14.1 | | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 2650 | | | P | |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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U.S. EPA - CLP

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MHP516

Lab Name: SILVER VALLEY LABS., INC. Contract: 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 30900 | | | P | |
| 7440-36-0 | Antimony | 937 | | | P | |
| 7440-38-2 | Arsenic | 2340 | | | NF | |
| 7440-39-3 | Barium | 2330 | | | P | |
| 7440-41-7 | Beryllium | 1.7 | B | | P | |
| 7440-43-9 | Cadmium | 289 | | | P | |
| 7440-70-2 | Calcium | 446000 | | | P | |
| 7440-47-3 | Chromium | 50.2 | | | P | |
| 7440-48-4 | Cobalt | 48.7 | B | | P | |
| 7440-50-8 | Copper | 1540 | | | P | |
| 7439-89-6 | Iron | 107000 | | | P | |
| 7439-92-1 | Lead | 22100 | | | P | J |
| 7439-95-4 | Magnesium | 104000 | | | P | |
| 7439-96-5 | Manganese | 21100 | | | P | |
| 7439-97-6 | Mercury | 16.0 | | J | CV | |
| 7440-02-0 | Nickel | 65.5 | | | P | |
| 7440-09-7 | Potassium | 15600 | | | P | |
| 7782-49-2 | Selenium | 1.2 | U | W | NF | R |
| 7440-22-4 | Silver | 201 | | | P | |
| 7440-23-5 | Sodium | 58500 | | | P | |
| 7440-28-0 | Thallium | 83.4 | | | F | J |
| 7440-62-2 | Vanadium | 58.7 | | | P | |
| 7440-66-6 | Zinc | 49100 | | | P | |
| | Cyanide | | | | NR | |

lab didn't multiply by dilution for SOX

Color Before: BROWN Clarity Before: CLOUDY Texture:

Color After: BROWN Clarity After: CLOUDY Artifacts:

Comments:

48

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP517

Lab Name: SILVER VALLEY LABS.,INC. Contract: ~~68-D9-0071~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: DC 9-11-89 SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 32.6 | B | | P | |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 10.7 | | N | F | J AB |
| 7440-39-3 | Barium | 37.0 | B | | P | |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 3.3 | B | | P | |
| 7440-70-2 | Calcium | 308000 | | | P | |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 2.6 | U | | P | |
| 7440-50-8 | Copper | 12.4 | B | | P | |
| 7439-89-6 | Iron | 416 | | | P | |
| 7439-92-1 | Lead | 12.9 | | N* | F | |
| 7439-95-4 | Magnesium | 61600 | | | P | |
| 7439-96-5 | Manganese | 1310 | | | P | |
| 7439-97-6 | Mercury | 0.2 ~~2.9~~ | U | ~~N~~ J AB | CV | DC 9-11-89 |
| 7440-02-0 | Nickel | 25.8 | B | | P | |
| 7440-09-7 | Potassium | 273 | U | | P | |
| 7782-49-2 | Selenium | 14.0 | U | N* | F | R AB |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 28800 | | | P | |
| 7440-28-0 | Thallium | 1.0 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 2990 | | | P | |
| | Cyanide | | | | NR | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

49

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHP518

Lab Name: SILVER VALLEY LABS., INC. Contract: ~~68-D9-0071~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: DC 4-17-86 SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 33.7 | B | | P | |
| 7440-36-0 | Antimony | 19.9 | U | | P | |
| 7440-38-2 | Arsenic | 17.4 | | NS | F | J AB |
| 7440-39-3 | Barium | 95.9 | B | | P | |
| 7440-41-7 | Beryllium | 1.1 | U | | P | |
| 7440-43-9 | Cadmium | 6.2 | | | P | |
| 7440-70-2 | Calcium | 314000 | | | P | |
| 7440-47-3 | Chromium | 2.8 | U | | P | |
| 7440-48-4 | Cobalt | 2.6 | U | | P | |
| 7440-50-8 | Copper | 5.6 | B | | P | |
| 7439-89-6 | Iron | 696 | | | P | |
| 7439-92-1 | Lead | 24.9 | | N* | F | |
| 7439-95-4 | Magnesium | 62700 | | | P | |
| 7439-96-5 | Manganese | 1340 | | | P | |
| 7439-97-6 | Mercury | ~~0.2~~ 0 | U | ~~N J~~ AB | CV | DC 9-11-89 |
| 7440-02-0 | Nickel | 9.7 | U | | P | |
| 7440-09-7 | Potassium | 273 | U | | P | |
| 7782-49-2 | Selenium | 14.0 | U | N* | F | R AB |
| 7440-22-4 | Silver | 1.6 | U | | P | |
| 7440-23-5 | Sodium | 29300 | | | P | |
| 7440-28-0 | Thallium | 1.0 | U | | F | |
| 7440-62-2 | Vanadium | 2.7 | U | | P | |
| 7440-66-6 | Zinc | 3060 | | | P | |
| | Cyanide | | | | NR | |
| | | | | | | |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

MHPS19

Lab Name: SILVER VALLEY LABS., INC. Contract: ~~68-D9-0074~~ 68-W8-0074

Lab Code: SILVER Case No.: 12334 SAS No.: SDG No.: MHL955

Matrix (soil/water): WATER Lab Sample ID:

Level (low/med): LOW Date Received: 08/16/89

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

| CAS No. | Analyte | Concentration | C | Q | M |
|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 17.6 | B | | P |
| 7440-36-0 | Antimony | 19.9 | U | | P |
| 7440-38-2 | Arsenic | 2.3 | U | NW | F |
| 7440-39-3 | Barium | 14.9 | B | | P |
| 7440-41-7 | Beryllium | 1.1 | U | | P |
| 7440-43-9 | Cadmium | 1.8 | U | | P |
| 7440-70-2 | Calcium | 316000 | | | P |
| 7440-47-3 | Chromium | 2.8 | U | | P |
| 7440-48-4 | Cobalt | 2.6 | U | | P |
| 7440-50-8 | Copper | 10.4 | B | | P |
| 7439-89-6 | Iron | 426 | | | P |
| 7439-92-1 | Lead | 1.8 | U | N* | F |
| 7439-95-4 | Magnesium | 68200 | | | P |
| 7439-96-5 | Manganese | 3180 | | | P |
| 7439-97-6 | Mercury | ~~2.0~~ 0.2 | U | ~~N~~ J | CV |
| 7440-02-0 | Nickel | 13.2 | B | | P |
| 7440-09-7 | Potassium | 2010 | B | | P |
| 7782-49-2 | Selenium | 14.0 | U | N* | F |
| 7440-22-4 | Silver | 1.6 | U | | P |
| 7440-23-5 | Sodium | 45000 | | | P |
| 7440-28-0 | Thallium | 1.0 | U | | F |
| 7440-62-2 | Vanadium | 2.7 | U | | P |
| 7440-66-6 | Zinc | 219 | | | P |
| | Cyanide | | | | NR |

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments: