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# UPPER DOLORES RIVER AND SILVER CREEK BASIN WATER QUALITY AND DISCHARGE MONITORING SUMMARY

## Rico, Colorado

## October 2002 Sampling Event

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# UPPER DOLORES RIVER AND SILVER CREEK BASIN
# WATER QUALITY AND DISCHARGE MONITORING SUMMARY
# RICO, COLORADO

## 1.0 Introduction

This report includes water quality sampling results and discharge measurement results from the Silver Creek and upper Dolores River basins near the Town of Rico, Colorado. Water Quality samples were collected October 6-9, 2002 from the St. Louis tunnel discharge, the St. Louis settling pond system discharge (002), Argentine Tailings seep, an unnamed discharge along Silver Creek, Silver Swan adit discharge, combined Rico Boy and Santa Cruz adit discharges, Santa Cruz wetlands discharge, Columbia Tailings seep, Silver Creek, and the Dolores River. This supplements data collected in July 2002 at the same sites. Water flow measurements were performed at each sampling site in conjunction with the water quality sampling. Table 1 lists the sampling station locations and site descriptions. Sampling sites in the Silver Creek basin are illustrated on Figures 1 and 2. Sampling sites in the Dolores River basins are illustrated on Figures 3 and 4. Photos 1-9 are of select sampling locations and site conditions.

**TABLE 1**
**Sampling Location Summary**

| SITE ID | SITE DESCRIPTION |
|---|---|
| SVS-8 | Silver Creek below Argentine tailings |
| SVS-12 | Argentine Tailings seep at source |
| SVS-20 | Silver Creek just above confluence with Dolores River |
| SVS-22 | Silver Creek just above the Argentine Tailings seep |
| SVS-26 | Unnamed adit downstream from the overhead tramway |
| DR-1-SW | Dolores River side channel/Columbia Tailings seep |
| DR-2-SW | Dolores River above Columbia Tailings |
| DR-4-SW | Dolores River below Silver Swan |
| DR-7-SW | Silver Swan adit |
| DR-9-SW | Rico Boy/Santa Cruz east wetland outlet |
| DR-10-SW | Rico Boy/Santa Cruz west wetland outlet |
| DR-1 | Dolores River above St. Louis settling pond system |
| DR-2 | Dolores River immediately above St. Louis settling pond system outfall |
| DR-3 | St. Louis tunnel discharge at adit |
| DR-6 | St. Louis settling pond system outfall to the Dolores River (Outfall 002) |
| DR-7 | Dolores River below St. Louis settling pond system outfall |
| DR-20 | Dolores River just west of Pond 14 |
| DR-26 | Dolores River between Columbia Tailings seep and Rico Boy/Santa Cruz wetlands |
| DR-27 | Rico Boy/Santa Cruz combined flow |

## 2.0 Methods and Procedures

### 2.1 Sampling Objectives

Data from the water samples were used to characterize the water quality of the seeps, adit drainages and receiving streams. An objective of this sampling event was to collect and analyze samples from a low-flow event.

### 2.2 Water Quality and Flow Measurement Sampling Locations

Samples were collected from the St. Louis tunnel discharge, the St. Louis settling pond system discharge, Argentine Tailings seep, Silver Swan adit discharge, combined Rico Boy and Santa Cruz adit discharges, Columbia Tailings seep, the minor discharge downstream of the overhead tramway, Silver Creek, and the Dolores River as shown in Table 1. Samples were generally collected starting with the most downstream site and progressing upstream.

The Dolores River was sampled below all adit outfalls, just downstream of the Silver Swan adit. It was also sampled between Columbia Tailings and the wetlands adjacent to the Santa Cruz/Rico Boy outlet, and above the Columbia Tailings. The river sampling, when combined with the sampling of the Silver Swan adit, the Rico Boy/Santa Cruz combined flow, the Columbia Tailings seep, and Silver Creek above the confluence, was intended to provide a basis for assessing the affect of those discharges on the water quality of the Dolores River.

The Santa Cruz wetlands west outlet (DR-10-SW), which is the discharge from the small pond receiving the combined Rico Boy/Santa Cruz flows, was sampled, as was the wetlands east outlet (DR-9-SW). DR-10-SW was sampled to be consistent with historic data, and DR-9-SW was sampled to enable comparison to the July 2002 sampling event.

The affect of the St. Louis ponds system on the Dolores River was monitored by taking four samples from the Dolores River as identified in Table 1. In addition, samples were collected from the tunnel discharge and discharge 002.

To provide a basis for assessing water quality impacts to Silver Creek, the Creek was sampled above and below the Argentine Tailings seep. Also, the Argentine Tailings seep was sampled at its source, as was the minor discharge downstream of the overhead tramway.

Flow measurements were taken at all locations where water quality samples were collected. The exceptions to this are that no flow measurements were taken in the Dolores River immediately above the St. Louis settling pond system outfall (DR-2) and along Pond 14 (DR-20). In addition, no flow measurement was taken at the west outlet of the Santa Cruz wetlands (DR-10-SW) due to considerable sheet flow as described in Section 3.2.

## 2.3 Sampling and Analysis Parameters and Methods

Water samples were analyzed for pH, temperature, conductivity, alkalinity, hardness, total dissolved solids (TDS), total suspended solids (TSS), plus the trace metals arsenic, cadmium, chromium, copper, cyanide, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc.

The following parameters/analysis were completed at the various sites:

- Arsenic – total recoverable at point sources, the Dolores River below Silver Swan, the Dolores River above the St. Louis settling pond system, and Silver Creek just above the confluence with the Dolores River
- Cadmium, Copper, Manganese, and Zinc – dissolved at all sampling stations, plus total recoverable at the St Louis tunnel, and potentially dissolved at the pond system discharge
- Chromium - Total recoverable at all sampling stations
- Iron – total recoverable at all sampling stations, and dissolved at the St Louis tunnel and pond system discharge
- Lead, Nickel, Selenium, and Silver – dissolved at all sampling stations, plus potentially dissolved at the St Louis tunnel and pond system discharge
- Cyanide –Low-Level WAD at all sampling stations
- Mercury – Total at: Argentine Seep, Santa Cruz/Rico Boy, Silver Swan, St Louis tunnel, Dolores above St Louis Ponds, Dolores below St Louis Ponds (above Silver Creek), Dolores below Silver Swan, Silver Creek above confluence, and the unnamed discharge on Silver Creek

Sampling was conducted in accordance with the sampling program used for the Rico site remediation. Lab-certified plastic bottles were used to collect sample water for hardness, TDS, and TSS analyses. Sample water for dissolved metals analysis was first collected in a clean plastic bottle, and within ten minutes, filtered through a 0.45μm filter into a sample bottle without preservative. Sample water for total recoverable metals analysis was collected without filtration in a sample bottle containing nitric acid preservative. Sample water for potentially dissolved metals analysis was collected without filtration in a sample bottle containing nitric acid preservative. Sample water for low-level mercury analysis was collected without filtration using the "clean hands/dirty hands" method (EPA Method 1631) into double wrapped, laboratory prepared glass bottles. All mercury samples were collected on the same day and shipped overnight to the laboratory. For quality control purposes, one duplicate sample and one field blank were included in addition to the 19 water quality samples submitted to the laboratory for analysis.

Field parameters were measured at the time of sample collection. Field measurement data for pH, temperature, conductivity, and alkalinity were recorded in a logbook. The pH meter was calibrated each morning using standard solutions and in accordance with manufactures instructions. Weather parameters including temperature and precipitation were recorded in the logbook. Copies of all field records are provided in Appendix A1.

All sample bottles were labeled to identify site name/number, date and time of collection, and type of analysis. In addition, sample analysis/chain of custody forms were completed and processed at the time of sample collection. Original chain of custody forms were signed, dated, and placed in the sample shipment container prior to sealing the container for shipment. Copies of all chain of custody forms are provided in Appendix A2.

## 2.4 Water Quality Analytical Procedures

All water samples were placed in a cooled container and sent to ACZ Laboratories, Inc. in Steamboat Springs, Colorado. Sample analyses were performed according to methods specified in 40 CFR, Part 136 or other methods approved by EPA. Laboratory methods and reporting limits for all parameters are presented in Table 2.

Laboratory results were supported by sufficient backup data and quality assurance results to enable reviewers to conclusively determine the quality of the data. The full analytical report package (Appendix B) includes reference to the analytical methods used, detection limits, and quality control data.

# TABLE 2
## Analytical Procedures Summary

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| Parameter | Method Detection Limit (MDL)[1] | Practical Quantitation Limit (PQL)[2] | Method | |
|---|---|---|---|---|
| **Field Parameters** | | | | |
| pH (s.u.) | --- | - - - | EPA 150.1 | |
| Temperature (°C) | --- | - - - | Standard Method 2550 | |
| Conductivity (µmhos/cm) | --- | - - - | EPA 120.1 | |
| Alkalinity (mg/L as $CaCO_3$) | 1 mg/L | 5 mg/L | EPA 310.1 | |
| **General Parameters** | | | | |
| Hardness (as $CaCO_3$) | 1 mg/L | 7 mg/L | SM 2340 B | |
| Total Dissolved Solids (as TDS) | 10 mg/L | 20 mg/L | M160.2 Gravimetric | |
| Total Suspended Solids (as TSS) | 5 mg/L | 20 mg/L | M160.2 Gravimetric | |
| **Trace Metals** | | | | |
| Arsenic CR5CO.057 | 0.5 µg/L | 3 µg/L | M200.8 ICP-MS | 190 |
| Cadmium (as Cd) | 3 µg/L | 20 µg/L | M 200.7 ICP | 1.1 |
| Chromium | 0.1 µg/L | 0.5 µg/L | M200.8 ICP-MS | 11 |
| Copper (as Cu) | 10 µg/L | 50 µg/L | M 200.7 ICP | 12 |
| Cyanide | 5 µg/L | 10 µg/L | SM4500-CN I-Colorimetric w/distillation | 5.2 |
| Iron (as Fe) | 10 µg/L | 50 µg/L | M200.7 ICP | 1000 |
| Iron II | 10 µg/L | 500 µg/L | SM3500 Fe-D | |
| Iron III | Calculation | Calculation | Calculation | |
| Lead (as Pb) | 0.2 µg/L | 1 µg/L | M200.8 ICP-MS | 3.2 |
| Manganese (as Mn) | 5 µg/L | 30 µg/L | M200.7 ICP | — |
| Mercury | 0.0002 µg/L | 0.0005 µg/L | M1631 Atomic Fluorescence | 0.012 |
| Nickel | 10 µg/L | 50 µg/L | M200.7 ICP | 160 |
| Selenium | 3 µg/L | 20 µg/L | M200.8 ICP-MS | 5 |
| Silver (as Ag) | 0.1 µg/L | 0.5 µg/L | M200.8 ICP-MS | 4.1 |
| Zinc (as Zn) | 10 µg/L | 50 µg/L | M200.7 ICP | 110 |

1 – MDL – Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations

2 – PQL – Practical Quantitation Limit, typically 5 times the MDL

## 2.5 Discharge Measurement Procedures

Discharge measurements were conducted in accordance with the measurement procedures used for the Rico site remediation as well as USGS standard discharge measurement procedures. Flows were measured by one of four methods (1) six-tenths-depth method using a Marsh-McBirney Model 2000 portable flow meter, (2) Parshall flume, (3) volumetric procedure using a 5-gallon bucket, or (4) floating stick method.

The six-tenths-depth method (for depths between 0.3 feet and 2.5 feet) was selected for the flow meter measurements. This method uses the velocity at six-tenths of the depth as the mean velocity in the vertical direction. This method is generally reliable between depths from 0.3 feet to 2.5 feet. The first step in the measurement procedure was selecting a stream section with the desired characteristics of: parallel flows, smooth streambed with minimal obstructions, a straight channel, and a flat streambed. The best possible section was selected using these criteria. On some locations rocks in the channel were moved to create a more uniform section. After selecting the stream section, a measuring tape was stretched across the stream section, perpendicular to the flow, and anchored at both ends. The width of the section was determined and divided into several (10 to 20) vertical sections. Flow measurements of velocity (by the six-tenths-depth method) and water depth were measured at each vertical section using the Marsh-McBirney flow meter and wading rod assembly. The flow meter was set to the 10 second fixed period average mode. Three velocity readings were recorded at each vertical section and an average velocity calculated. Flows were calculated for each stream section using the water depth, horizontal distance between vertical sections, and averaged velocity data. The flow meter measurements were recorded in a logbook (Appendix A1) and the discharges calculated on field data sheets (Appendix A3).

At two locations on the Dolores River (DR-1 and DR-26) a second set of flow measurement data was recorded. The second set was recorded immediately after the first set, along the exact same section line, but was performed with approximately double the number of vertical sections used in the first set. In addition, care was taken to ensure that alternating vertical sections in the second set were located at the same place as in the first set. This would enable three calculations of the River flow based on the following data sets: the first set (Set 1a); the vertical sections measured in the second set corresponding to those in the first set (Set 2a); the complete second set (Set 2b). Table 4 lists the median values of these results.

The Argentine Seep, St. Louis tunnel flow, and St. Louis Pond discharge 002 each have a Parshall flume installed. Water depth measurements were taken at the appropriate location in the flume. The flow rate was then determined from a flume rating table.

The volumetric procedure was used at the combined Rico Boy/Santa Cruz flow, and the unnamed seep downstream of the overhead tramway. Volumetric field measurements consist of leaving a 5-gallon bucket under each discharge for a known length of time and measuring the water depth in the bucket at the end of the time. The volumetric trials were averaged to determine the flow rate (in gallons per minute) at each station. The volumetric trials were recorded in a logbook.

The floating stick method was used at the Silver Swan adit, and the Santa Cruz east wetlands outfall (DR-9-SW). The floating stick method is used where flow levels are too low and the channel too flat for any of the previous methods. This method consists of finding a uniform channel section, and measuring the length, width and depth of the section. A small twig is then dropped on the water and the time required for the twig to travel the length of the section is recorded. Several trials were performed and an average velocity for the surface of the water was determined. From this average velocity and the cross-sectional area a flow rate was calculated. This method likely allows the greatest potential for error in flow estimation.

# 3.0 Results and Discussion

## 3.1 Water Quality Results and Discussion

### 3.1.1 pH

pH was measured at all sites during the July and October sampling events. The same procedures and equipment were used for both sampling events. A QA review completed after the October event identified readings that were inconsistent between the two events and, upon historical review, with past readings. Further investigation led to the conclusion that the pH meter had not been functioning properly during either sampling event. Testing performed on the unit as directed by the equipment manufacturer confirmed that the sampling probe was not working properly. Therefore all pH data has been deemed suspect and is not presented in this report.

### 3.1.2 Mercury

Ten sites, plus a blank and a duplicate, were tested for mercury. The same personnel performed the same procedures for both sampling and analysis as during the July sampling event. Initially, there were positive results at all sites for the October sampling event, including the field blank, while July test results were all "not detected." Although all test results were below the chronic in-stream standard for mercury of 0.0100 µg/l, retesting was requested of the laboratory. The highest retest reading was 0.0011 µg/l, with three samples reported as "not detected."

The field blank retest had a reading of 0.0002 µg/l, which is the MDL. From the laboratory's Quality Assurance Plan: *"Uncertainty at the Method Detection Limit (MDL) level is ±100% (or ±MDL). However, at three to five times the MDL the data is quantifiable. This level, the Practical Quantification Limit (PQL), is the lowest level that ACZ can reliably achieve within method-specified limits during routine operations. Any data reported between the MDL and PQL is flagged as an estimated value."* While the field blank result is "estimated", it is significant that it was not "not detected" in the retest and had a level comparable to other samples in the initial test. This indicates that the samples may have been contaminated at some point (potentially during analysis) and that not all readings are an accurate indication of the presence of mercury in the water. The PQL for this test is 0.0005 µg/l, indicating that five of the results are estimated values at best.

Laboratory personnel reported a problem with the clean room and potential room contamination at the time of the first analysis. The retest readings are considered suspect as well, given the inconsistency of these results with historical data for these locations, and potential room contamination reported by the laboratory.

All mercury samples were collected on October 7. The laboratory performed the first analysis on November 5 and the retest on November 21.

Retest results are presented in Tables 3, 4, and 5.

### 3.1.3 Results and Discussion

**Silver Creek Basin**. Analyses results from samples collected in the Silver Creek Basin on October 6-9, 2002, are provided in Table 3.

The leaking cofferdam in the Blaine tunnel portal was sealed on July 27, 2001. No flow was observed exiting the portal during the October field visit.

A collapsed adit discharge (SVS-26) was found on the south side of Silver Creek, approximately 0.8 miles downstream from the Blaine adit. This location is slightly downstream from where the overhead tramway cables cross the Argentine Tailings access road. This seep was found by walking downstream along Silver Creek from the Blaine Adit until this discharge was located. No other seep or discharge was found on the south side of the creek and no seep or discharge, other than the Argentine Tailings seep, was found on the north side of the creek.

**TABLE 3**
**Silver Creek Basin Analysis Results (October 6-9, 2002)**

| Parameter | Units | SVS-22<br>Silver Creek above Argentine Tailings seep | SVS-12<br>Argentine Tailings seep | SVS-8<br>Silver Creek below Argentine Tailings | SVS-26<br>Discharge Downstream of overhead tramway | SVS-20<br>Silver Creek just above Dolores River |
|---|---|---|---|---|---|---|
| | Date Sampled | 10/9/2002 | 10/9/2002 | 10/9/2002 | 10/7/2002 | 10/6/2002 |
| Time of Flow measurement | | 12:10 am | 11:05 am | 9:24 am | 9:45 am | 6:05 pm |
| Time Water Quality Sample Collected | | 9:55 am | 11:00 am | 8:55 am | 10:15 am | 5:35 pm |
| **Field Parameters** | | | | | | |
| Flow | gpm | 288 | 24 | 344 | 0.6 | 466 |
| Temperature | °C | 3.3 | 8.2 | 3.1 | 5.1 | 8.0 |
| Conductivity | µmhos/cm | 135.1 | 570 | 174.4 | 378.6 | 241.3 |
| Alkalinity | mg/L as $CaCO_3$ | 93 | 145 | 88 | 65 | 116 |
| **General Parameters** | | | | | | |
| Hardness | mg/L as $CaCO_3$ | 131 | 682 | 179 | 386 | 217 |
| Total Dissolved Solids | mg/L as TDS | 140 | 900 | 200 | 580 | 250 |
| Total Suspended Solids | mg/L as TSS | U | 16 B | U | 16 B | 6 B |

**B** – Analyte concentration detected at a value between MDL and PQL
**U** – Analyte was analyzed for but not detected at the minimum detection limit (MDL)

## TABLE 3 (cont.)
## Silver Creek Basin Analysis Results (October 6-9, 2002)

| Parameter | Units | SVS-22 Silver Creek above Argentine Tailings seep | SVS-12 Argentine Tailings seep | SVS-8 Silver Creek below Argentine Tailings | SVS-26 Discharge Downstream of overhead tramway | SVS-20 Silver Creek just above Dolores River | Eng Fresh |
|---|---|---|---|---|---|---|---|
| **Dissolved Trace Metals** | | | | | | | |
| Cadmium | µg/L as Cd | 1.2 | 0.8 | 1.2 | 11.5 | 1.5 | 1.1 |
| Copper | µg/L as Cu | U | U | U | 70 | U | 12 |
| Cyanide | mg/L as CN | U | U | U | U | U | 5.2 |
| Lead | µg/L as Pb | 1 | U | 0.5 | U | 0.3 B | 3.2 |
| Manganese | µg/L as Mn | 12 B | 5760 | 269 | 11400 | 56 | — |
| Nickel | µg/L as Ni | U | 10 B | U | 30 B | U | 160 |
| Selenium | µg/L as Se | U | U | U | U | U | 5.0 |
| Silver | µg/L as Ag | U | U | U | 0.08 B | U | 4.1 |
| Zinc | µg/L as Zn | 290 | 5070 | 490 | 8120 | 390 | 110 |
| **Total Recoverable Trace Metals** | | | | | | | |
| Arsenic | µg/L as As | na | U | na | U | U | 190 |
| Chromium | µg/L as Cr | U | U | U | U | U | 11 |
| Iron | µg/L as Fe | 80 | 4720 | 130 | 15200 | 20 B | 1000 |
| **Total** | | | | | | | |
| Mercury[1] | µg/L as Hg | na | U | na | 0.0006 | 0.0003 B | 0.012 |

**B** – Analyte concentration detected at a value between MDL and PQL
**na** – not analyzed
**U** – Analyte was analyzed for but not detected at the minimum detection limit (MDL)
[1] All Mercury samples were collected on 10/7/2002; Data is considered suspect, see Section 3.1.2

**Dolores River Basin**. Samples from the Upper Dolores River Basin were collected on October 6-8, 2002. Results from Dolores River samples are presented in Table 4 on the following page.

## TABLE 4 Upper Dolores River Analysis Results (October 6-9, 2002)

| Parameter | Units | DR-1 | DR-20 | DR-2 | DR-7 | DR-2-SW | DR-1-SW | DR-26 | DR-9-SW | DR-10-SW | DR-27 | DR-7-SW | DR-4-SW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Dolores River above St. Louis Ponds | Dolores River just west of Pond 14 | Dolores River above Outfall | Dolores River below St. Louis Ponds | Dolores River above Columbia Tailings | Dolores River side channel/ Columbia Tailings seep | Dolores River between Columbia Tailings seep and Rico Boy/Santa Cruz wetlands | Rico Boy/Santa Cruz wetland outlet | Rico Boy/Santa Cruz wetland outlet | Rico Boy/Santa Cruz combined flow | Silver Swan adit | Dolores River below Silver Swan |
| | Date Sampled | 10/8/2002 | 10/8/2002 | 10/8/2002 | 10/8/2002 | 10/6/2002 | 10/6/2002 | 10/6/2002 | 10/7/2002 | 10/6/2002 | 10/6/2002 | 10/7&8/2002 | 10/6/2002 |
| Time of Flow measurement | | 1:00 pm | na | na | 9:35 am | 10:15 am | 5:00 pm | 3:30 pm | 5:20 pm | na | 1:30 pm | 4:30 pm | 8:35 am |
| Time Water Quality Sample Collected | | 12:15 pm | 11:15 am | 10:35 am | 9:05 am | 10:40 am | 4:30 pm | 2:45 pm | 5:10 pm | 12:05 pm | 1:45 pm | 8:20 am | 8:55 am |
| **Field Parameters** | | | | | | | | | | | | | |
| Flow | gpm | 15732 A | na | na | 15071 | 15761 | 11.6 C | 13752 A | 131 | na | 13 | 20 | 15810 |
| Temperature | °C | 5.4 | 4.2 | 3.9 | 2.7 | 3.5 | 10.9 | 10.1 | 11.4 | 6.6 | 18.4 | 12.2 | 2.4 |
| Conductivity | µmhos/cm | 139.0 | 142.5 | 157.1 | 177.9 | 176.0 | 340.7 | 228.9 | 259.5 | 227.5 | 971 | 1057 | 173.8 |
| Alkalinity | mg/L as | 76 | 85 | 66 | 85 | 93 | 146 | 96 | 120 | 108 | 620 | 765 | 86 |
| **General Parameters** | | | | | | | | | | | | | |
| Hardness | Mg/L as $CaCO_3$ | 120 | 126 | 140 | 166 | 157 | 283 | 196 | 218 | 197 | 879 | 1060 | 172 |
| Total Dissolved Solids | Mg/L as TDS | 150 | 160 | 180 | 220 | 210 | 350 | 220 | 250 | 250 | 1080 | 1260 | 210 |
| Total Suspended Solids | Mg/L as TSS | U | U | U | U | U | U | U | U | U | U | 8 B | U |
| **Dissolved Trace Metals** | | | | | | | | | | | | | |
| Cadmium | µg/L as Cd | U | U | U | U | 0.2 B | 2.6 | 0.2 B | 0.2 B | U | 0.8 | 0.2 B | 0.2 B |
| Copper | µg/L as Cu | U | U | U | U | U | U | U | U | U | 10 B | U | U |
| Cyanide | Mg/L as Cn | U | U | U | U | U | U | U | U | U | U | U | U |
| Lead | µg/L as Pb | U | U | U | U | U | 0.2 B | U | 0.2 B | U | 0.1 B | 1.1 | U |
| Manganese | µg/L as Mn | 15 B | 45 | 115 | 135 | 130 | 229 | 163 | 1180 | 228 | 56 | 2640 | 143 |
| Nickel | µg/L as Ni | U | U | U | U | U | U | U | U | U | U | U | U |
| Selenium | µg/L as Se | U | U | U | U | U | U | U | U | U | U | U | U |
| Silver | µg/L as Ag | U | U | U | U | U | U | U | U | U | U | 0.19 B | U |
| Zinc | µg/L as Zn | U | U | U | U | 40 B | 850 | 60 | 30 B | 30 B | 690 | 760 | 50 |
| **Total Recoverable Trace Metals** | | | | | | | | | | | | | |
| Arsenic | µg/L as As | U | na | na | na | na | U | na | na | na | U | 6.6 | U |
| Chromium | µg/L as Cr | U | U | U | U | U | U | U | U | U | U | U | U |
| Iron | µg/L as Fe | 110 | 100 | 120 | 180 | 230 | 480 | 180 | 1120 | 150 | 80 B | 13700 | 190 |
| **Total** | | | | | | | | | | | | | |
| Mercury[1] | µg/L as Hg | 0.0009 | na | na | 0.0010 | na | na | na | na | na | U | 0.0003 B | 0.0011 |

**A** – Median value of three measurements
**B** – Analyte concentration detected at a value between MDL and PQL
**C** – Flow in side channel, not the seep
**na** – not analyzed
**U** – Analyte was analyzed for but not detected at the minimum detection limit (MDL)
[1] All Mercury samples collected on 10/7/2002; Data is considered suspect, see Section 3.1.2

**St. Louis Settling Pond System.** Sample results from the St. Louis tunnel settling pond system are presented in Table 5. Samples were collected at the St. Louis tunnel discharge at the adit (DR-3, Photo 9), and Outfall 002 (DR-6).

All tested metals, except mercury, showed a significant reduction in concentration from the tunnel to the outfall. Note that both mercury values are between the MDL and the PQL and are therefore considered estimated values. Hardness and TDS showed slight increases from the tunnel to the outfall. A similar increase in hardness and TDS occurred during the July sampling event.

**TABLE 5**
**St. Louis Tunnel Settling Pond System Analysis Results (October 6-9, 2002)**

| Parameter | Units | DR-3 Tunnel Discharge | DR-6 Outfall 002 |
|---|---|---|---|
| | Date Sampled | 10/8/2002 | 10/8/2002 |
| Time of Flow measurement | | 3:50 pm | 3:38 pm |
| Time Water Quality Sample Collected | | 3:55 pm | 3:15 pm |
| **Field Parameters** | | | |
| Flow | gpm | 462 | 68 |
| Temperature | °C | 19.7 | 11.8 |
| Conductivity | µmhos/cm | 971 | 806 |
| Alkalinity | Mg/L as $CaCO_3$ | 92 | 168 |
| **General Parameters** | | | |
| Hardness | mg/L as $CaCO_3$ | 762 | 848 |
| TDS | mg/L as TDS | 1100 | 1190 |
| TSS | mg/L as TSS | 26 | U |
| **Dissolved Trace Metals** | | | |
| Cadmium | µg/L as Cd | 13.8 | 1.7 |
| Copper | µg/L as Cu | 30 B | U |
| Cyanide | µg/L as Cn | U | U |
| Iron | µg/L as Fe | 4120 | 20 B |
| Lead | µg/L as Pb | 13.2 | U |
| Manganese | µg/L as Mn | 1830 | 296 |
| Mercury[1] | µg/L as Mg | 0.0003 B | 0.0004 B |
| Nickel | µg/L as Ni | 10 B | U |
| Selenium | µg/L as Se | U | U |
| Silver | µg/L as Ag | 0.18 B | U |
| Zinc | µg/L as Zn | 2970 | 400 |

**B** – Analyte concentration detected at a value between MDL and PQL
**U** – Analyte was analyzed for but not detected at the minimum detection limit (MDL)
[1] All Mercury samples collected on 10/7/2002; Data is considered suspect, see Section 3.1.2

## TABLE 5 (cont.)
## St. Louis Tunnel Settling Pond System Analysis Results (October 6-9, 2002)

| Parameter | Units | DR-3 Tunnel Discharge | DR-6 Outfall 002 |
|---|---|---|---|
| **Potentially Dissolved** | | | |
| Cadmium | µg/L as Cd | na | 1.8 |
| Copper | µg/L as Cu | na | U |
| Lead | µg/L as Pb | 16 | 0.8 |
| Manganese | µg/L as Mn | na | 312 |
| Nickel | µg/L as Ni | U | U |
| Selenium | µg/L as Se | U | U |
| Silver | µg/L as Ag | U | U |
| Zinc | µg/L as Zn | na | 410 |
| **Total Recoverable Trace Metals** | | | |
| Arsenic | µg/L as As | 2.1 B | U |
| Cadmium | µg/L as Cd | 14.4 | na |
| Chromium | µg/L as Cr | U | U |
| Copper | µg/L as Cu | 220 | na |
| Iron | µg/L as Fe | 12000 | 300 |
| Manganese | µg/L as Mn | 1950 | na |
| Zinc | µg/L as Zn | 3200 | na |

**B** – Analyte concentration detected at a value between MDL and PQL
**na** – not analyzed
**U** – Analyte was analyzed for but not detected at the minimum detection limit (MDL)

### 3.2 Discharge Measurement Results and Discussion

Flow measurement results from the Silver Creek Basin, the Dolores River, and the St. Louis settling pond system for all sampling during October 2002 are provided in Table 6. Flows measured during the October sampling event were generally higher than flows measured at the same sites in July 2002.

The sites are listed in order of upstream to downstream and include the measurement method used for each. In addition to Table 6, sampling site locations in the Silver Creek and Dolores River basins are illustrated on Figures 1 through 4. Appendix A3 contains the stream flow measurement forms.

DR-1-SW is in a Dolores River side channel adjacent to the Columbia Tailings. There was flow from the Dolores River entering the upstream end of the side channel, no surface discharge from the Columbia Tailings to the side channel, and surface flow out of the side channel into the Dolores River main stem. Flow was measured about midway between the upstream/inlet end of the side channel and the downstream/outlet end of the side channel. Flow entering the side channel and in the side channel was too low (Photo 6) to perform two flow measurements as was done in July 2002.

Silver Creek is running above ground from the Blaine adit to the Argentine tailings seep. The two man-made pools remain (Photo 1).

Flow was evident out of the collapsed Silver Swan adit. A lined ditch conveyed flow from the adit to a small pond on the site. While there was flow into the pond, the pond had a low water level, well below the overflow weir (Photo 9). While there was more water in the pond than in July, no surface flow exited the pond or entered the Dolores.

A new beaver dam has been constructed across the outlet channel of DR-10-SW and has formed a pool extending about 40 feet upstream (Photo 7). Water is flowing from this beaver pond to the Dolores River via the outlet channel and as broad sheet flow. Due to the relatively large volume of sheet flow no flow measurement was taken at this site. A very rough estimate is that flow out of the beaver pond is on the order of 4-5 times the flow rate of the Rico Boy/Santa Cruz combined flow. It is not known from where the additional water is coming.

At DR-9-SW the floating stick method was used to calculate a flow rate of 0.29 cfs (130 gpm). This value seemed high to both field personnel. While there is no formal basis for adjusting this number, comparison to other flows observed in the field suggest that the actual flow is in the 80-100 gpm range. Although the floating stick method is the best available for this site, it still provides only a crude estimate of the flow rate.

The recorded flow at Dolores River between Columbia Tailings seep and Rico Boy/Santa Cruz wetlands (DR-26) is noticeably lower than the other Dolores River flows. This is most likely a result of a combination of the limitations of the flow measurement method (see the discussion in the following section) and the strong diurnal variation in the flow rate of the Dolores River. Flow data from the USGS gauging station on the Dolores River below Rico is presented in Appendix A4, along with two plots of that data. The plots clearly show the diurnal

variation in the river flow rate. While the USGS gauging station is downstream of all Dolores River flow measurement sites in this investigation and thus has larger flows, it is reasonable to expect that the Dolores River in the Rico area experiences a similar diurnal affect. Flow at DR-26 was measured late in the day and therefore reflects a lower flow in the river.

**Flow Measurement Quality Control**. The accuracy of flow measurements taken in the Dolores River is thought to be affected adversely by the presence of relatively large rocks and comparatively shallow flows. Results may also have been affected by measuring on different days, and at different times of the day.

In order to perform quality control on stream flow measurements, two sites on the Dolores River were selected for additional flow measurements as described previously in Section 2.5. The results of these measurements are presented in Table 6. "Set 1a" is the first set of measurements taken, intended to represent the typical method used elsewhere on the project. "Set 2a" represents the data corresponding to the vertical sampling locations used in Set 1a, abstracted from the second set. "Set 2b" represents all data recorded from the second set, generally twice as many flow measuring locations across the stream section as in the first set. The flow rate at the downstream USGS gauging station for the same time as the flow measurements were taken is shown on each of the individual flow forms in Appendix A3. Note that the USGS gauging station is downstream of all Dolores River flow measurement sites in this investigation and thus has larger flows. Additionally, there is a noticeable diurnal variation in the flow rate in the river, which implies that the time of day of the flow measurement would affect readings.

Results from these two sites do not show a consistent disparity between the set with fewer data points and the set with more data points. There is a consistent variability of 10%-15% between computed flow rates. This is reasonable given the difficult terrain of the river bottom, and the inherent accuracy of the flow measurement method.

## TABLE 6
## Discharge Measurement Results (October 6-9, 2002)

| Site ID | Site Description | Measurement Method | Flow October |
|---|---|---|---|
| **Silver Creek Basin** | | | **(gpm)** |
| SVS-22 | Silver Creek just above the Argentine tailings seep | Flow meter | 288 |
| SVS-12 | Argentine tailings seep at source | Flume | 24 |
| SVS-8 | Silver Creek below Argentine tailings | Flow meter | 344 |
| SVS-26 | Unnamed seep downstream from the overhead tramway | Volumetric | 0.56 |
| SVS-20 | Silver Creek just above confluence with Dolores River | Flow meter | 466 |
| **Dolores River** | | | **(cfs)** except as noted |
| DR-1 (Set 1a) | Dolores River above St. Louis settling pond system | Flow meter | (A) 35.05 |
| DR-1 (Set 2a) | Dolores River above St. Louis settling pond system | Flow meter | (A) 35.04 |
| DR-1 (Set 2b) | Dolores River above St. Louis settling pond system | Flow meter | (A) 32.16 |
| DR-20 | Dolores River just west of Pond 14 | *Not Measured* | --- |
| DR-2 | Dolores River immediately above St. Louis settling pond system outfall | *Not Measured* | --- |
| DR-7 | Dolores River below St. Louis settling pond system outfall | Flow meter | 33.6 |
| DR-2-SW | Dolores River above Columbia Tailings | Flow meter | 35.1 |
| DR-1-SW | Dolores River side channel/Columbia Tailings seep | Flow meter | (B) 11.5 gpm |
| DR-26 (Set 1a) | Dolores River between Columbia Tailings seep and Rico Boy/Santa Cruz wetlands | Flow meter | (A) 26.37 |
| DR-26 (Set 2a) | Dolores River between Columbia Tailings seep and Rico Boy/Santa Cruz wetlands | Flow meter | (A) 30.64 |
| DR-26 (Set 2b) | Dolores River between Columbia Tailings seep and Rico Boy/Santa Cruz wetlands | Flow meter | (A) 30.96 |
| DR-9-SW | Rico Boy/Santa Cruz east wetlands outlet | Floating Stick | 0.29 |
| DR-10-SW | Rico Boy/Santa Cruz west wetlands outlet | *Not Measured* | --- |
| DR-27 | Rico Boy/Santa Cruz combined flow | Volumetric | 13 gpm |
| DR-7-SW | Silver Swan adit | Floating Stick | 20 gpm |
| DR-4-SW | Dolores River below Silver Swan | Flow meter | 35.2 |
| **St. Louis Settling Pond System** | | | **(gpm)** |
| DR-3 | St. Louis tunnel discharge at adit | Flume | 462 |
| DR-6 | St. Louis settling pond system outfall to the Dolores River (Outfall 002) | Flume | 68 |

**A** – three flow measurements shown for the same location, see Section 2.5 and page 14 for explanations
**B** – Flow in side channel, not the seep

## FIGURES


| | |
|---|---|
| Figure 1 | Upper Silver Creek Basin Site Location Map |
| Figure 2 | Location of SVS-8, SVS-20, and SVS-26 |
| Figure 3 | St. Louis Settling Pond System |
| Figure 4 | Dolores River Corridor – Sampling Station Location Map |

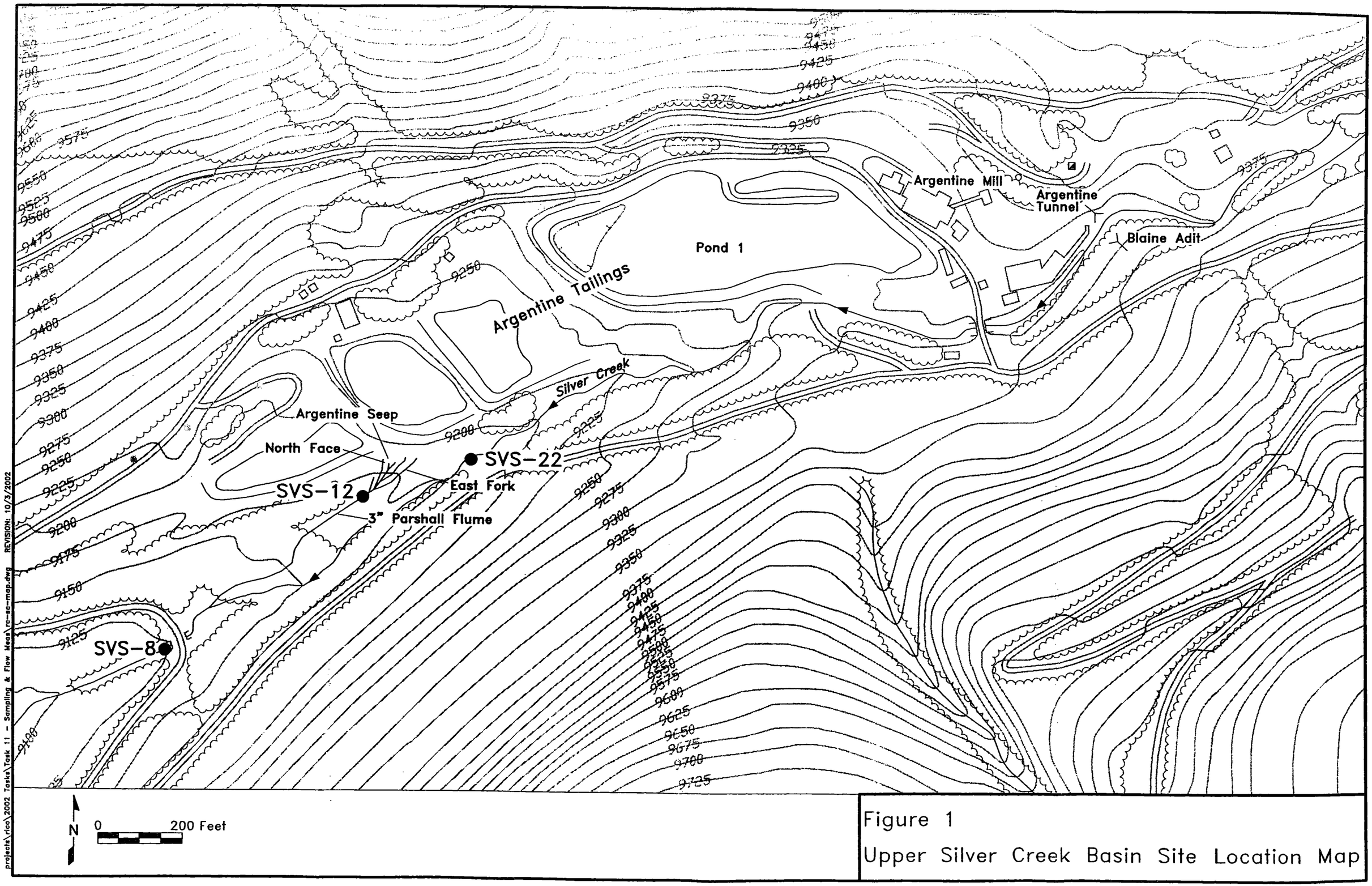



Figure 1

Upper Silver Creek Basin Site Location Map

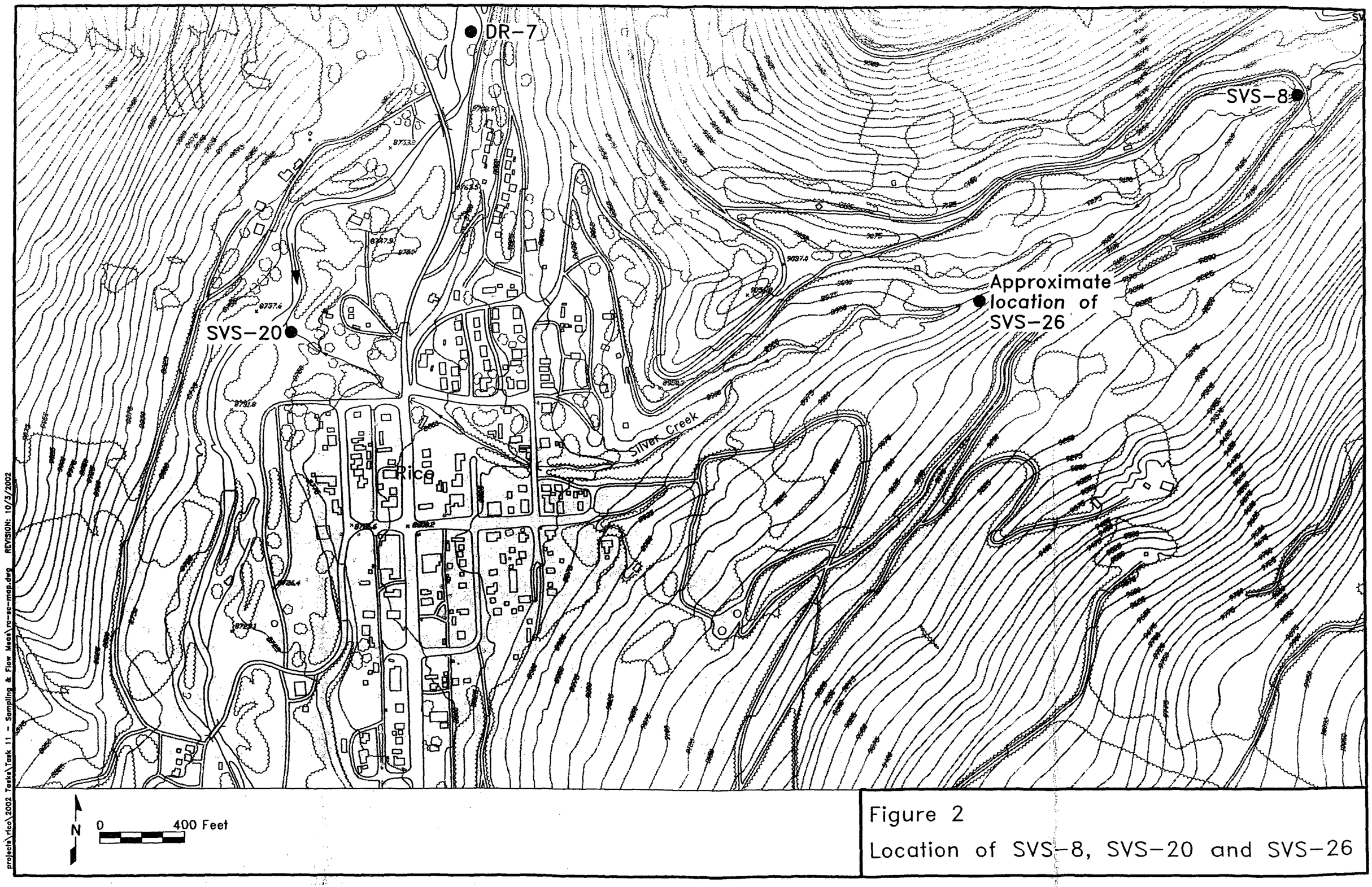
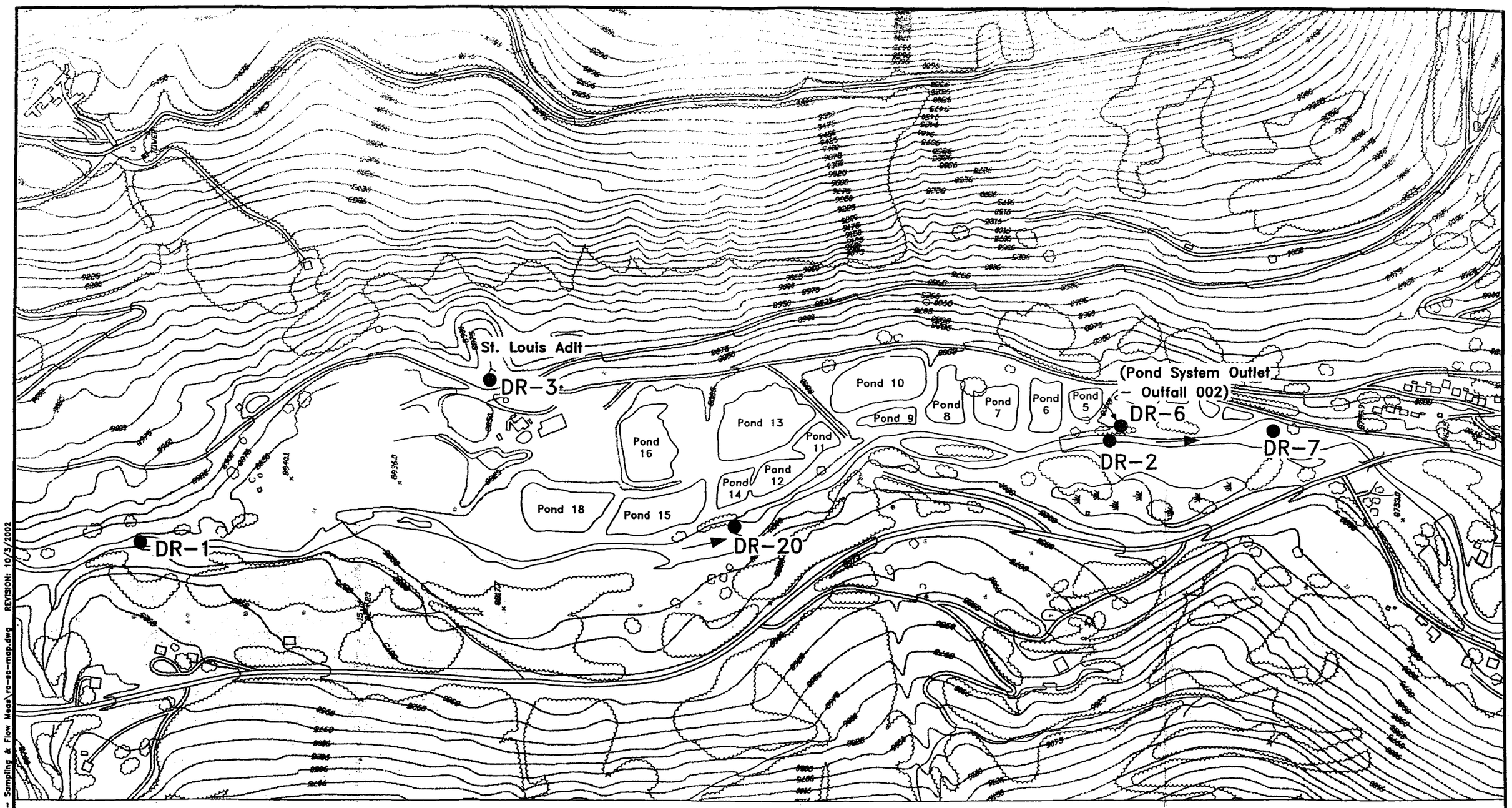



Figure 2
Location of SVS-8, SVS-20 and SVS-26




N

0 400 Feet

Figure 3
St. Louis Settling Pond System

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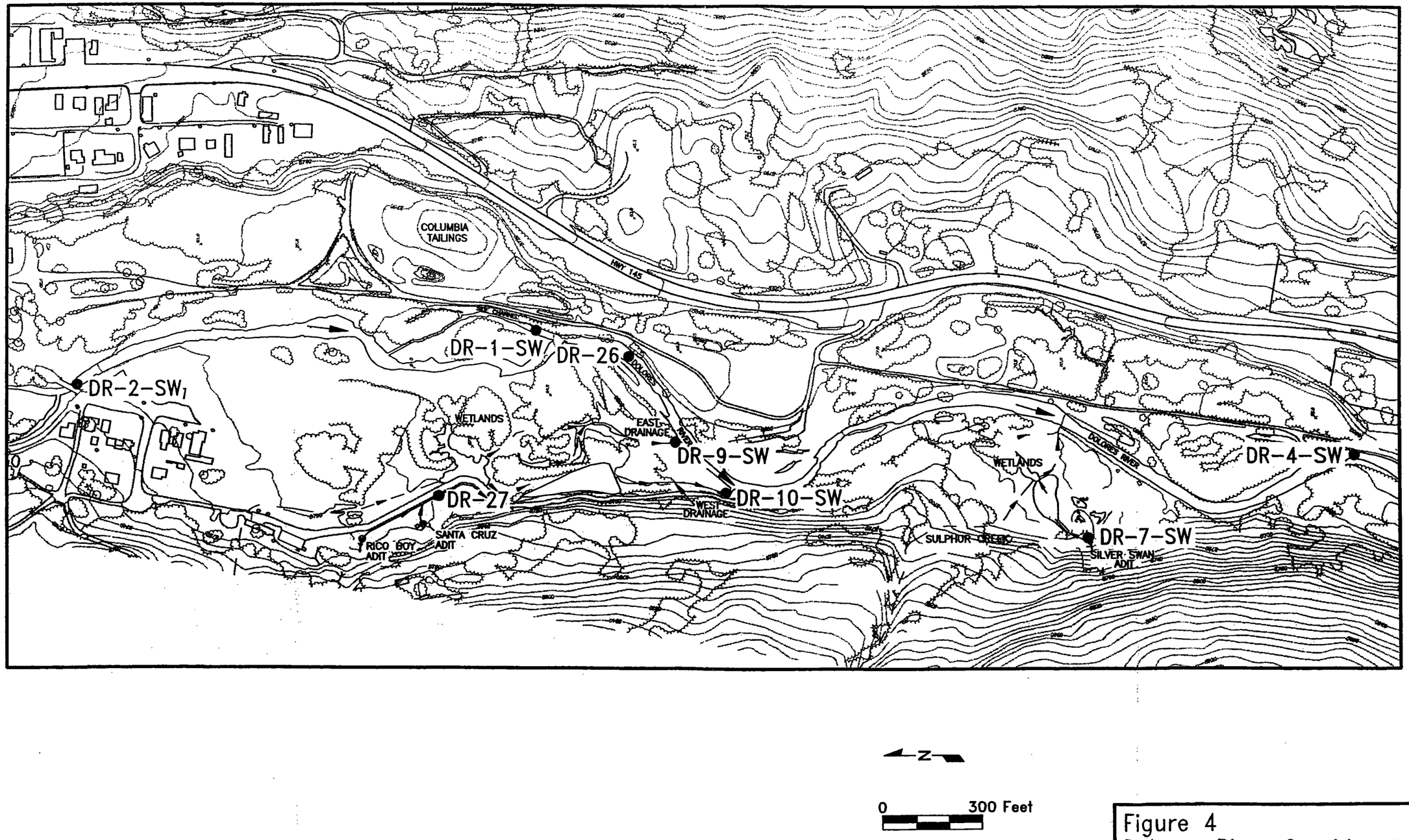


Figure 4
Dolores River Corridor
Sampling Station Location Map

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## PHOTOS

| | |
|---|---|
| Photo 1 | Silver Creek just above the Argentine tailings seep (SVS-22) looking downstream, showing the constructed pools |
| Photo 2 | Argentine tailings seep (SVS-12)-East fork of seep, looking downstream |
| Photo 3 | Unnamed adit (SVS-26) discharge to Silver Creek showing water flow measurement using funnel. Flow was measured to be 0.56 gpm |
| Photo 4 | Dolores river between Columbia tailings seep (DR-1-SW) and Rico Boy/Santa Cruz wetlands (DR-26) showing beaver dam (looking West) |
| Photo 5 | Dolores river side channel/Columbia tailing seep (DR-1-SW) showing low flow in side channel |
| Photo 6 | Dolores river side channel/Columbia tailings seep (DR-1-SW) upstream end (looking upstream) |
| Photo 7 | Beaver dam at Rico Boy/Santa Cruz west outlet (DR-10-SW) (looking upstream) |
| Photo 8 | Rico Boy/Santa Cruz west outlet (DR-10-SW) showing multi-outlet overload flow from Beaver dam pond. |
| Photo 9 | Silver Swan ponds/wetlands |

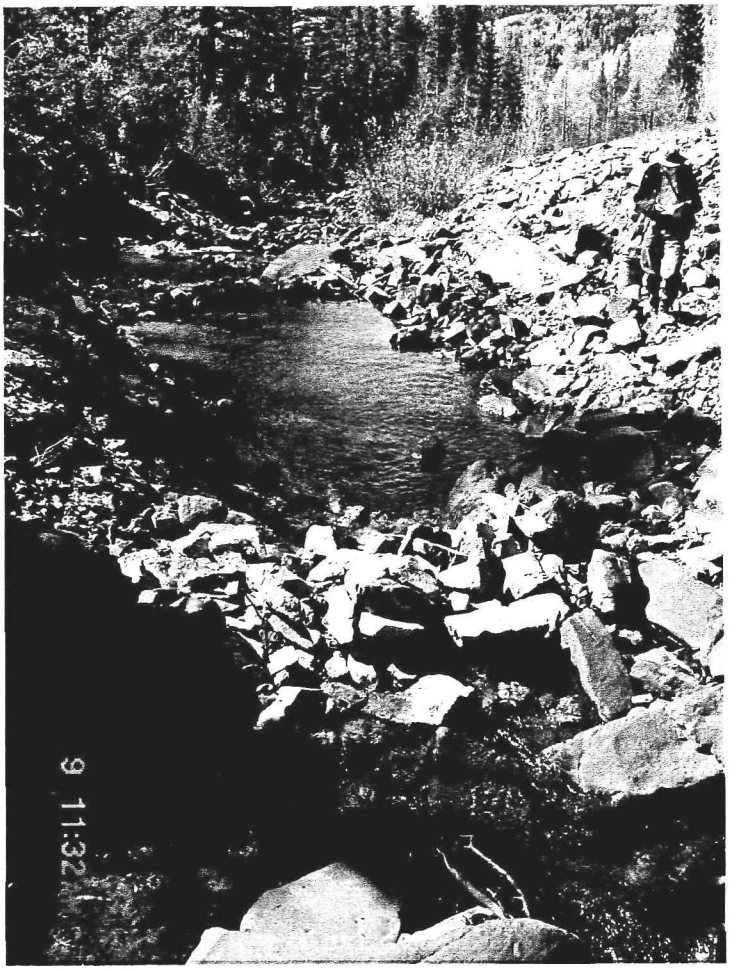



**Photo 1** Silver Creek just above the Argentine tailings seep (SVS-22) looking downstream, showing the constructed pools

**Photo 2** Argentine tailings seep (SVS-12)-East fork of seep, looking downstream

**Photo 3** Unnamed adit (SVS-26) discharge to Silver Creek showing water flow measurement using funnel. Flow was measured to be 0.56 gpm

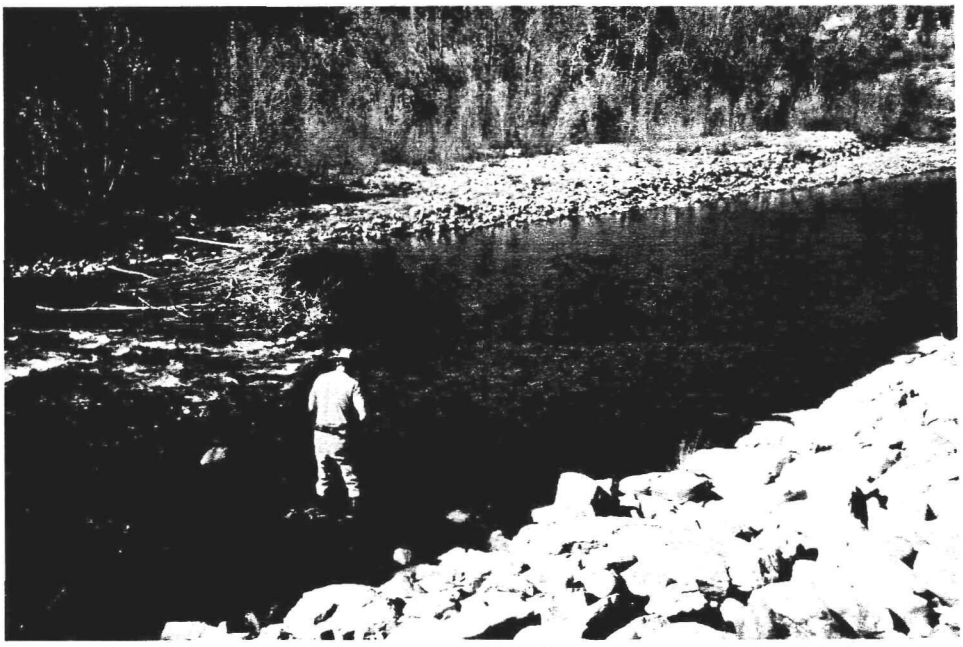


**Photo 4** Dolores river between Columbia tailings seep (DR-1-SW) and Rico Boy/Santa Cruz wetlands (DR-26) showing beaver dam (looking West)

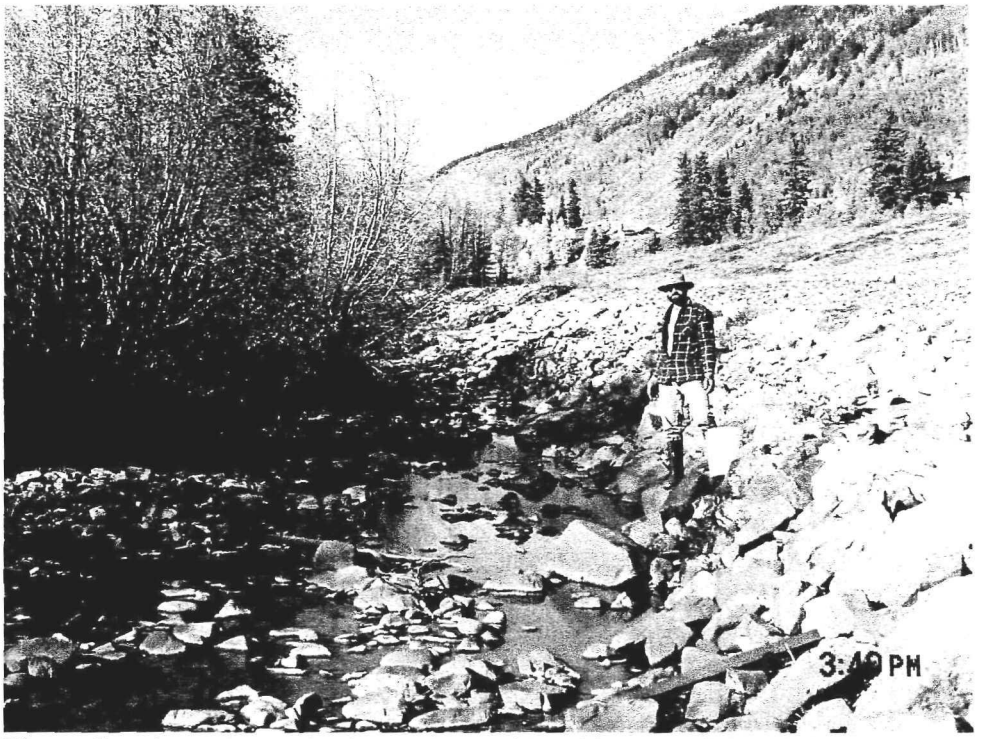



**Photo 5** Dolores river side channel/Columbia tailing seep (DR-1-SW) showing low flow in side channel

**Photo 6** Dolores river side channel/Columbia tailings seep (DR-1-SW) upstream end (looking upstream)

**Photo 7** Beaver dam at Rico Boy/Santa Cruz west outlet (DR-10-SW) (looking upstream)

**Photo 8** Rico Boy/Santa Cruz west outlet (DR-10-SW) showing multi-outlet overload flow from Beaver dam pond.

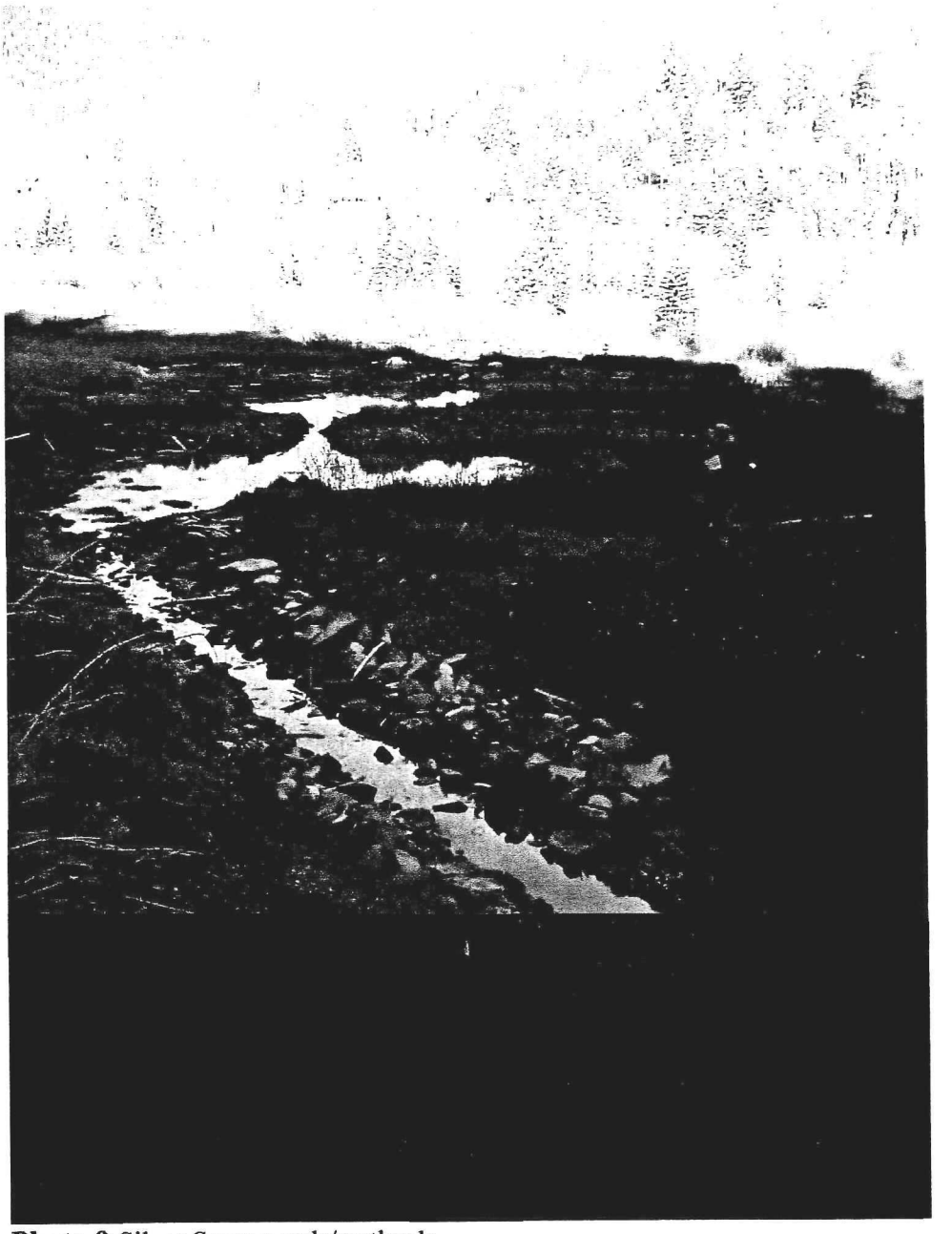


**Photo 9** Silver Swan ponds/wetlands

# APPENDIX A

## Field Records

# APPENDIX A1

## Field Notes

2007 pg 1 for Day

Arrive @ site 7:45 am

Clear, < 32°F

-4-SW Dolores River Below Silver Swan

8:35 am stream flow measurement

| Station | Depth (ft) | $V_1$ | $V_2$ | $V_3$ |
|---|---|---|---|---|
| 29.0 | 0 (edge of water) | | | |
| 34.1 | 0.28 | 0.78 | 0.76 | 0.74 |
| 37.0 | 0.38 | 0.82 | 0.79 | 0.80 |
| 39.3 | 0.66 | 0.01 | +0.05 | 0.01 |
| 40.85 | 0.98 | 1.10 | 1.12 | 1.14 |
| 43.75 | 1.24 | 1.60 | 1.42 | 1.76 |
| 45.3 | 1.37 | 1.30 | 1.32 | 1.44 |
| 47.0 | 1.00 | 2.20 | 2.27 | 1.97 |
| 48.1 | 1.43 | 1.11 | 1.61 | 1.25 |
| 50.0 | 1.60 | 1.72 | 1.28 | 0.99 |
| | | 1.59 | (0.24 @ 50.0 rejected) | |
| 51.9 | 1.40 | 1.48 | 1.62 | 1.36 |
| 53.8 | 1.32 | 1.50 | 1.48 | 1.43 |
| 55.8 | 1.20 | 1.44 | 1.45 | 1.40 |
| 57.85 | 1.10 | 1.09 | 1.13 | 1.11 |
| 58.95 | 0.69 | 0.67 | 0.62 | 0.70 |
| 60.8 | 0.62 | 0.18 | 0.17 | 0.13 |
| 62.2 | edge of water | | | |

pg 2 for Day 10/6/2003

Water Quality samples collected @ 8:55 am

White Dot Green Dot

No Dot Red Dot

pH Calibration @ 9:05 am

STD 1 10 → 10.06

STD 2 7 → 8.37 @ 1.9°C

STD 1 7 → 7.11

STD 2 10 → 9.16

Conductivity 173.8 µs 2.4°C

Specific Conductance (blanking) 314.9 µs 25°C

pH 9.74 @ 0.9°C

Alkalinity Clear 86.0

10/6/2002 pg 5 for day

DR-2-SW (cont.)

Water Quality samples collected @ 10:40 am

| | | |
|---|---|---|
| White Dot | Green Dot | Dark Blue Dot |
| No Dot | Red Dot | |

AV

Conductivity 17 $H_2O$ ~~[illegible]~~ µS 3.5°C

Specific conductance (blinking) 299.1 µS 25°C

pH 9.73 1.2°C

Alkality clear 93

DR-10-SW Rico Boy-Santa Cruz wetland outlet WEST

a beaver dam was constructed approximately 40 feet from the outlet of ~~the~~ channel into the Dolores River.

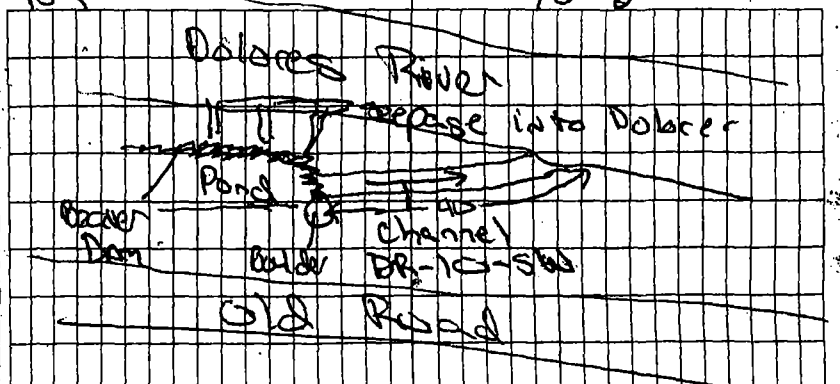
2 pictures taken of Beaver Dam

This dam is U in shape and only a small part of the discharge flows from the channel at DR-10-SW

Multi seepage occurs over the dam into the Dolores

page 6 of day

10-6-02




NOTE: DR-9-SW looks the same as in July

GENERAL OVERLAND SHEET FLOW FROM NEW BEAVER POND TO DOLORES RIVER. NO FLOW MEASUREMENT TAKEN. WATER BACKS UP ALMOST TO DAM OF SEDIMENT POND. FLOW (ALL SHEET FLOW AND DR-10-SW) IS SEVERAL TIMES RICO BOY/SANTA CRUZ COMBINED FLOW. WILD GUESS OF 10-15 gpm FLOW OUT OF BEAVER POND. MORE CONFIDENCE IN SEVERAL TIMES RB/SC FLOW, MAYBE 4-5 TIMES.

WATER QUALITY SAMPLES COLLECTED 12:05 pm

WHITE, GREEN, BLUE, RED, NO DOT

10/6/2002 pg 9 for day

no clouds!, mod wind

DR-26 warm, sunny, 55°F

stream flow measurement taken

@ 3:30 pm

| station | depth (ft) | velocity (ft/sec) $V_1$ | $V_2$ | $V_3$ |
|---|---|---|---|---|
| 5.0 | 0 | edge of water | | |
| 7.0 | 0.42 | 0.17 | 0.17 | 0.20 |
| 9.0 | 0.63 | 0.26 | 0.26 | 0.31 |
| 11.1 | 0.76 | -0.08 | -0.12 | -0.09 |
| 13.0 | 1.17 | 0.33 | 0.30 | 0.39 |
| 15.2 | 1.33 | 0.34 | 0.31 | 0.34 |
| 17.0 | 1.33 | 0.47 | 0.50 | 0.36 |
| 19.0 | 1.43 | 0.59 | 0.53 | 0.50 |
| 21.0 | 1.63 | 0.57 | 0.62 | 0.54 |
| 23.0 | 1.98 | 0.61 | 0.66 | 0.70 |
| 25.0 | 1.86 | 0.77 | 0.81 | 0.85 |
| 27.0 | 1.78 | 0.83 | 0.84 | 0.73 |
| 29.0 | 1.79 | 0.90 | 0.85 | 0.81 |
| 31.0 | 1.88 | 0.81 | 0.77 | 0.82 |
| 33.0 | 1.87 | 0.51 | 0.66 | 0.68 |
| 35.0 | 1.53 | 0.46 | 0.52 | 0.52 |
| 36.6 | 1.47 | 0.39 | 0.44 | 0.40 |
| 39.0 | 1.18 | 0.22 | 0.24 | 0.20 |
| 40.7 | 1.18 | edge of water | | |

pg 10 for day 10/6/2002

• To test streamflow measurement method we're remeasuring flow as a check

DR-26 (2nd reading) @ 3:45 pm

| station | depth (ft) | velocity (ft/sec) $V_1$ | $V_2$ | $V_3$ |
|---|---|---|---|---|
| 5.0 | 0 | edge of water | | |
| 6.0 | 0.53 | 0.18 | 0.15 | 0.17 |
| 7.0 | 0.42 | 0.32 | 0.27 | 0.30 |
| 8.0 | 0.58 | 0.24 | 0.22 | 0.27 |
| 9.0 | 0.63 | 0.32 | 0.28 | 0.39 |
| 10.0 | 0.69 | 0.37 | 0.35 | 0.30 |
| 11.1 | 0.75 | -0.09 | -0.05 | -0.09 |
| 12.0 | 0.88 | -0.05 | -0.10 | -0.10 |
| 13.0 | 1.18 | 0.32 | 0.38 | 0.36 |
| 14.0 | 1.30 | 0.35 | 0.42 | 0.48 |
| 15.2 | 1.34 | 0.40 | 0.39 | 0.43 |
| 16.25 | 1.50 | 0.39 | 0.45 | 0.46 |
| 17.0 | 1.38 | 0.59 | 0.51 | 0.45 |
| 18.2 | 1.50 | 0.64 | 0.62 | 0.63 |
| 19.0 | 1.40 | 0.65 | 0.67 | 0.62 |
| 20.0 | 1.43 | 0.53 | 0.63 | 0.61 |
| 21.0 | 1.63 | 0.71 | 0.69 | 0.69 |
| 22.0 | 1.86 | 0.78 | 0.86 | 0.67 |
| 23.0 | 1.98 | 0.71 | 0.74 | 0.78 |

CONT. →

10/6/2002 pg 13 for day

DR-1-SW flow measurement cont.

| station | depth (ft) | $V_1$ | $V_2$ | $V_3$ |
|---|---|---|---|---|
| 9.1 | 0.52 | 0.13 | 0.14 | 0.14 |
| 9.45 | 0.37 | 0.10 | 0.07 | 0.08 |
| 9.75 | 0.45 | ~~0.03~~ | ~~0.03~~ | ~~-0.03~~ |
| | | -0.02 | -0.03 | -0.02 |
| 10.1 | 0.37 | 0.10 | 0.09 | 0.13 |
| 10.5 | 0.42 | 0.04 | 0.02 | 0.01 |
| 10.8 | 0 | edge of water | | |

This stream sampling site is approximately ½ in the side channel along the Columbia Tailings. This site has extremely low flow w/ water almost stagnant and dispersed among boulders several photos taken.

The Dolores River side flow channel were we took the stream flow measurement in July does not have enough flow to measure. See photos 18 & 19.

Finish @ 5:20 for DR-1-SW

pg 14 for day 10/6/2002

SVS-20 Silver Creek just above the confluence w/ Dolores River

Water Quality sample @ 5:35 pm

White Dot Green Dot Dark Blue Dot

No Dot Red Dot

Conductivity 241.3 µS @ 8.0°C

Specific Conductance 354.1 µS @ 25°C

pH 8.88 8.4°C

Alkalinity clear 1/6

Stream Flow measurement @ 6:05 pm

velocity (ft/sec)

| station | depth (ft) | $V_1$ | $V_2$ | $V_3$ |
|---|---|---|---|---|
| 3.2 | 0 | edge of water | | |
| 3.6 | 0.25 | -0.10 | -0.14 | +0.17 |
| 4.0 | 0.25 | -0.08 | -0.04 | +0.04 |
| 4.45 | 0.38 | 0.13 | 0.17 | 0.13 |
| 4.90 | 0.33 | 0.45 | 0.46 | 0.34 |
| 5.40 | 0.46 | 0.92 | 0.91 | 0.84 |
| 5.80 | 0.48 | 1.00 | 1.07 | 0.96 |
| 6.25 | 0.70 | 1.17 | 1.12 | 1.19 |
| ~~6.80~~ 6.80 LW | 0.54 | 0.52 | 0.47 | 0.52 |

CONT. →

10/7/2002 pg 2 for day

SVS-26 (cont.)
Collected water Quality samples
Mercury @ 10:15 am
white DOT Green DOT Dark Blue DOT
No DOT Red DOT

Conductivity 378.6 µS @ 5.1 °C
Specific Condentence (blinking) 591 µS @ 25°C
pH 7.37 @ 5.0 °C
Alkaliity clear 65

NOTE: Flow is so low I took Conductivity and Specific Condenspence in the pH bottle Temperature is questable do to malifunction of reading from

DR-4-SW Dolores River Below Silver Swan

Mercury sample collected @ 11:15 am

pg 3 for day 10/7/2002

DR-7-SW Silver Swan adit
Mercury sample collected @ 11:45 am

DR-27 Rico Bog/Santa Cruz combined flow

mercury sample collected @ 12:10 pm

DR-7 Dolores River Below settling Pond System

mercury sample collected @ 12:15 pm

DR-[illegible] St. Louis settling Pond system outfall to the Dolores River (outfall 002)

Mercury sample collected @ 12:55

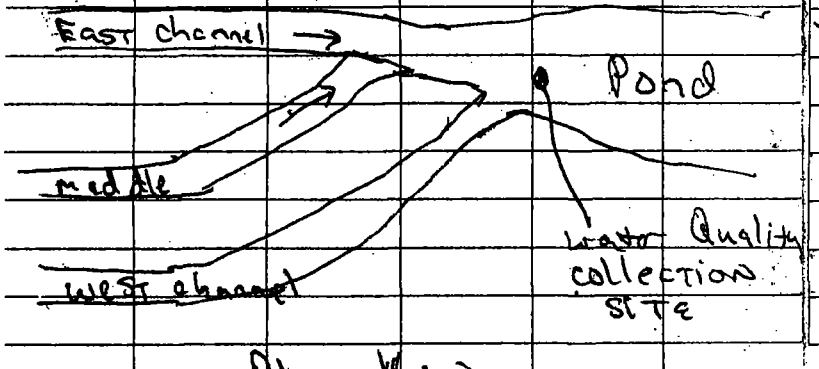
10/7/2002 pg 6 for day

@4:40 pm Morgy cleared ~~the~~ sludge from grate opened up flow. This caused sediment to rip up and and suspended fe deposits in water. We will do the water Quality at a later time

DR-9-SW Rice Bay/Santa Cruz wetland outlet

water quality samples collected @ 5:10 pm

white DOT Green DOT Dark Blue DOT
No DOT Red DOT



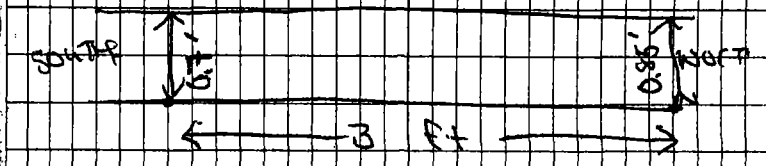

Plan View

pg 7 for day 259.5 10/7/2002

Conductivity AV ~~[illegible]~~ µS 11.4°C
Specific Conductance (blanks) 349.5 µS 25°C
pH 7.67 @ 10.8°C
alkalinity clear 120

stream flow measurement @ 5:20 pm
ANA thanks WEST channel = 15% of flow
EAST channel = 85% " "
STEVEN: EAST CHANNEL 6-10 TIMES THE FLOW OF WEST CHANNEL

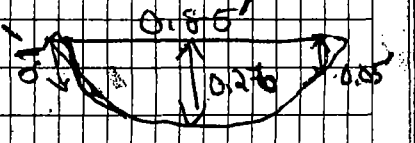
plan view of east channel




X-sec of SOUTH end

0.28 depth in center

X-sec of NORTH end




sec

1.65 sec
1.78
1.75

time it takes wood to travel 3 ft

Finish @ 6:00 pm

10/8/2002 pg 3 cont.

| DR-7 Station | depth (feet) | | velocity (ft/sec) $V_1$ | $V_2$ | $V_3$ |
|---|---|---|---|---|---|
| 8.6 | 0.25 | | edge of water | | |
| 10.4 | 0.22 | close to limit | 0.55 | 0.45 | 0.47 |
| 11.8 | 0.5 | | 1.42 | 1.48 | 1.33 |
| ~~12.4~~ 13.9 | 0.62 | | -0.12 | -0.15 | -0.13 |
| 13.15 | 0.46 | Backup | 1.33 | 1.23 | 1.30 |
| 15.5 | 0.80 | | 1.18 | 1.17 | 1.04 |
| 17.35 | 0.88 | | 0.57 | 0.54 | 0.62 |
| 18.80 | 0.98 | | 1.55 | 1.79 | 1.64 |
| 20.8 | 0.97 | | 1.89 | 1.94 | 1.92 |
| 22.8 | 0.55 | | 1.61 | 1.56 | 1.53 |
| 24.4 | 0.75 | | 1.04 | 1.03 | 1.04 |
| 26.05 | 0.80 | | 1.08 | 1.07 | 1.01 |
| 27.7 | 0.75 | | 1.02 | 1.04 | 1.00 |
| 29.3 | 0.85 | | 0.74 | 0.70 | 0.87 |
| ~~31.45~~ | ~~0.83~~ | moved | | | |
| 30.8 | 0.68 | | 1.32 | 1.32 | 1.42 |
| 32.5 | 1.10 | | 1.03 | 1.02 | 1.12 |
| 33.65 | 1.25 | | 2.37 | 2.26 | 2.24 |
| 34.80 | 1.42 | | 1.90 | 2.05 | 2.05 |
| 36.20 | 1.52 | | 1.70 | 1.69 | 1.59 |
| 37.75 | 1.45 | | 2.04 | 1.98 | 1.93 |
| 38.3 | 0.9 | | edge | | |

pg 4 for day 10/8/2002

DR-2 Dolores River ~~to~~ immediately above St. Louis settling pond OUTFALL

Water Quality Samples collected @ 10:35 am

White Dot Green Dot Dark Blue Dot
No Dot Red Dot

Conductivity 157.1 µs @ 3.9°C
Specific Conductance (blinking) AV ~~[illegible]~~ 263.3 µs @ 25°C
pH 8.21 @ 5.0°C
alkalinity clear 66

~~Meet~~ w/ Bill Duffy, Sandy ~~[illegible]~~ Robin Bullock, Chuck Stilwell

DR-20 Dolores River just west of Pond 14

Water Quality Samples collected @ 11:15 am (EAST FORK OF Dolores River around ISLAND)

White Dot Green Dot Dark Blue Dot
No Dot Red Dot

CONT. →

10/8/2002 pg 7 for day

DR-1 (CONT.) Measurement #1

| Station | depth ft | velocity ft/sec $V_1$ | $V_2$ | $V_3$ |
|---|---|---|---|---|
| 30.6 | 1.10 | 0.48 | 0.58 | 0.46 |
| 31.8 | 0.78 | edge of water | | |

Measurement #2 @ 1:15 pm

| STATION | depth (feet) | velocity (ft/sec) $V_1$ | $V_2$ | $V_3$ |
|---|---|---|---|---|
| 7.5 | 0.3 | edge of water | | |
| 8.65 | 0.65 | 0.16 | 0.21 | 0.29 |
| 9.6 ~~9.65~~ AV | 0.70 | 0.39 | 0.44 | 0.43 |
| 10.0 | 0.29 | 0.27 | 0.29 | 0.28 |
| 11.5 | 1.12 | 0.68 | 0.75 | 0.72 |
| 12.5 | 0.95 | 1.15 | 1.07 | 1.01 |
| 13.2 | 1.10 | 1.38 | 1.46 | 1.41 |
| 14.4 | 0.70 | 0.53 | 0.46 | 0.55 |
| 15.2 | 0.85 | 1.97 | 1.96 | 1.91 |
| 16.5 | 0.95 | 2.10 | 2.06 | 2.10 |
| 17.3 | 1.25 | 0.57 | 0.58 | 0.68 |
| ~~18.3~~ | ~~1.42~~ | skip | | |
| 18.5 | 1.42 | 1.54 | 1.52 | 1.40 |
| 19.5 | 1.36 | 1.06 | 1.11 | 1.14 |
| ~~20.3~~ | 1.22 | 1.15 | 1.17 | 1.14 |
| 21.1 | 1.32 | 1.56 | 1.62 | 1.48 |

~~25.1~~ CONT. →

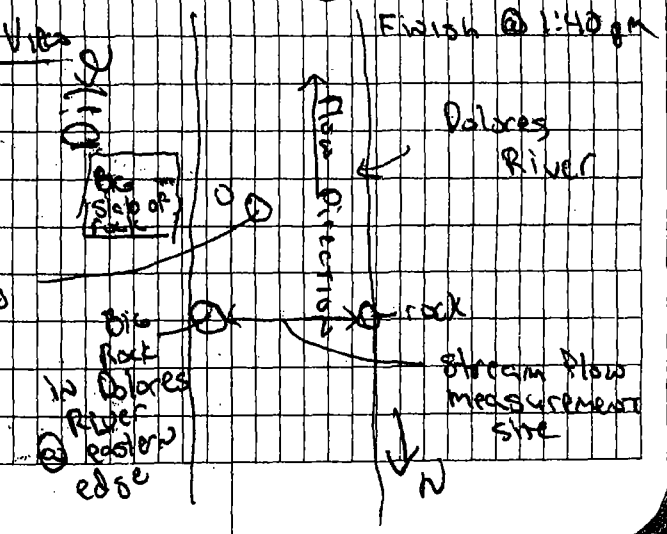
pg 8 for day 10/8/2002

DR-1 (CONT.) Measurement #2

| station | depth (feet) | velocity (ft/sec) $V_1$ | $V_2$ | $V_3$ |
|---|---|---|---|---|
| 22.1 | 0.74 | 2.04 | 1.91 | 2.00 |
| 23.1 | 0.99 | 2.19 | 2.18 | 2.39 |
| 24.3 | 1.18 | 1.28 | 1.21 | 1.23 |
| 24.7 | 1.25 | 1.91 | 1.82 | 1.91 |
| 25.5 | ~~1.05~~ AV 1.02 | 3.17 | 3.07 | 3.32 |
| 26.3 | 1.23 | 2.48 | 2.43 | 2.49 |
| 27.1 | 1.40 | 1.08 | 1.37 | 1.10 |
| 28.2 | 1.15 | 0.73 | 0.81 | 0.71 |
| 29.3 | 1.21 | 1.49 | 1.46 | 1.56 |
| 30.6 | 1.10 | 0.49 | 0.40 | 0.45 |
| 31.8 | 0.78 | edge of water | | |

Finish @ 1:40 pm

Plan View



10/8/2002 pg 11 for day

DR-3 St. Louis Tunnel adit cont.

Flume Measurement taken @ 3:50 pm
0.49 ft
@ 9" Flume

ST. LOUIS ADIT FLUME SHOWS SIGNS OF EROSION OF MATERIAL ON D/S SIDE OF FLUME. SOUTH SIDE HAS LOST MATERIAL AT TOP OF FUME FROM D/S EDGE TO U/S END OF THROAT. SOUTH SIDE AT D/S EDGE HAS LOST MATERIAL ALMOST TO BOTTOM OF FLUME. NORTH SIDE: LOST MATERIAL TO ~1' BACK FROM D/S EDGE, ALSO HAS LOST MATERIAL ALONG U/S APROACH WALL 1.4' WIDE 2.2' LONG 1.4' DEEP VOID.

5 photos of the St. Louis Adit flume w/ digital camera
3 photos w/ the 35 mm camera

Go to DR-6 and clean out OOZ outfall and Beaver Dam above flume

Done @ 5:15 pm

Pg 1 for day 10/9/2002

Steven Morgenstern
Ana Vargo

pH Calibration — @ 7:30 am
STD 1 10 → 10.08
STD 2 7 → 7.79 @ 18.7°C

SVS-8 Silver Creek below Argentine Tailings

8:45 am clear, ~~[illegible]~~ calm, 40°F

Water Quality Samples collected @ 8:55 am
White Dot Green Dot Dark Blue Dot
No Dot Red Dot

Conductivity 174.4 µS 3.1 °C
Specific Conductance (blanks) 301.4 µS 25°C
pH 8.29 2.5°C
Alkalinity — clear

10/9/2002 pg 4 for day

SVS-22 (cont.) silver ck above Argentine Tailings seep

Stream flow measurement done @ ~~10:50 am~~ 12:10 pm AV 10/9

| STATION | Depth (feet) | velocity (ft/sec) $V_1$ | $V_2$ | $V_3$ |
|---|---|---|---|---|
| 1.4 | 0 | edge of water | | |
| 2.0 | 0.4 | -0.01 | -0.03 | -0.07 |
| 2.5 | 0.51 | -0.01 | -0.03 | -0.02 |
| 3.1 | 0.72 | 0.09 | 0.10 | 0.16 |
| 3.5 | 0.89 | 0.13 | 0.17 | 0.15 |
| 4.0 | 0.93 | 0.15 | 0.10 | 0.08 |
| 4.5 | 0.94 | 0.04 | 0.11 | 0.07 |
| 5.0 | 0.98 | AV 10/9 ~~0.15~~ 0.05 | 0.05 | 0.03 |
| 5.5 | 0.92 | 0.07 | 0.09 | 0.08 |
| 6.0 | 0.93 | 0.11 | 0.20 | 0.12 |
| 6.5 | 1.00 | 0.02 | 0.08 | 0.03 |
| 7.0 | AV 10/9 ~~[illegible]~~ 1.02 | 0.06 | 0.02 | 0.05 |
| 7.45 | 1.03 | 0.12 | 0.14 | 0.14 |
| 8.0 | 0.88 | 0.02 | 0.05 | 0.02 |
| 8.5 | 0.96 | 0.0 | 0.0 | 0.01 |
| 9.0 | 0.92 | 0.15 | 0.23 | 0.16 |
| 9.5 | 1.00 | 0.30 | 0.24 | 0.21 |
| 10.0 | AV 10/9 ~~[illegible]~~ 1.02 | 0.02 | 0.04 | 0.08 |
| 10.5 | 0.87 | -0.03 | -0.04 | -0.02 |
| 10.9 | 0.86 | edge of water | | |

pg 5 for day 10/9/2002

@ 10:50 am - the batteries went dead

We took the stream flow measurement in the pool behind the lower rock dam @ 12:10 pm

SVS-12 Argentine Tailings Seep

Water Quality sample collected @ 11:00 am

White Dot Green Dot Dark Blue Dot

No Dot Red Dot

Conductivity 570 µs 8.2 °C

Specific Conductance (blinking) 828 µs 25°C

pH 7.88 @ 8.9 °C

alkalinity clear 145

Flume Measurement taken @ 11:05 am

(clean flume) 0.15' ~~0.18' (feet)~~ AV 10/9

This is a 3" Flume

Ana thinks flume capturing 95% of flow

Morgy " " " 95% flow

# APPENDIX A2

## Chain of Custody Forms

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

## CHAIN of CUSTODY

**Report to:**

Name: STEVEN MORGENSTERN
Company: SEH INC
E-mail: SMORGENSTERN@SEHINC.COM
Address: 2637 MIDPOINT DR, STE F
FC, CO 80525
Telephone: 970-484-3611

**Copy of Report to:**

Name:
Company:
E-mail:
Telephone:

**Invoice to:**

Name:
Company:
E-mail:
Address:
Telephone:

**PROJECT INFORMATION**

Quote #:
Project/PO #: RICO-ST. LOUIS PONDS
Shipping Co.:
Tracking #:
Reporting State for compliance testing:

**ANALYSES REQUESTED** *(attach list or use quote number)*

| SAMPLE IDENTIFICATION | DATE:TIME | Matrix | # of Containers | TDS, TSS, CN HARDNESS | DISSOLVED METALS | TOTAL METALS RECOVERABLE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DR-4-SW | 10-6-02 08:55 | SW | 5 | X | A | B | | | | | |
| DR-2-SW | 10-6-02 10:40 | SW | 5 | X | A | C | | | | | |
| DR-10-SW | 10-6-02 12:05 | SW | 5 | X | A | C | | | | | |
| DR-27 | 10-6-02 13:45 | SW | 5 | X | A | B | | | | | |
| DR-26 | 10-6-02 14:45 | SW | 5 | X | A | C | | | | | |
| DR-1-SW | 10-6-02 16:30 | SW | 5 | X | A | B | | | | | |
| SVS-20 | 10-6-02 17:35 | SW | 5 | X | A | B | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

**REMARKS**

WHITE & GREEN FIELD FILTERED

A = Cd, Cu, Pb, Mn, Ni, Se, Ag, Zn

B = As, Cr, Fe | C = Cr, Fe

| RELINQUISHED BY: | DATE:TIME | RECEIVED BY: | DATE:TIME |
|---|---|---|---|
| STEVEN MORGENSTERN | | | |
| | | | |
| | | | |

PAGE Of

FRMQA021.10.01.04

White - Return with sample. Yellow - Retain for your records.

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

## CHAIN of CUSTODY

**Report to:**

Name: STEVEN MORGENSTERN
Company: SEH INC
E-mail: SMORGENSTERN@SEHINC.COM
Address: 2637 MIDPOINT DR, Ste F
FC, CO 80525
Telephone: 970. 484. 3611

**Copy of Report to:**

Name:
Company:
E-mail:
Telephone:

**Invoice to:**

Name:
Company:
E-mail:
Address:
Telephone:

**PROJECT INFORMATION**

Quote #:
Project/PO #: RICO - ST LOUIS PONDS
Shipping Co.: UPS
Tracking #:
Reporting State for compliance testing:

**ANALYSES REQUESTED** *(attach list or use quote number)*

| SAMPLE IDENTIFICATION | DATE:TIME | Matrix | # of Containers | LOW LEVEL MERCURY | TDS, TSS, CN HARDNESS | DISSOLVED METALS | METALS - TOTAL RECOVERABLE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DR-4-SW | 10/7/02 11:15 am | SW | 1 | X | | | | | | | |
| DR-7-SW | 10/7/02 11:45 am | SW | 1 | X | | | | | | | |
| DR-27 | 10/7/02 12:10 pm | SW | 1 | X | | | | | | | |
| DR-7 | 10/7/02 12:45 pm | SW | 1 | X | | | | | | | |
| DR-6 | 10/7/02 12:55 pm | SW | 1 | X | | | | | | | |
| DR-3 | 10/7/02 1:10 pm | SW | 1 | X | | | | | | | |
| DR-1 | 10/7/02 1:25 pm | SW | 1 | X | | | | | | | |
| SVS-20 | 10/7/02 8:45 am | SW | 1 | X | | | | | | | |
| SVS-26 10:15 am | 10/7/02 ~~9:45 am~~ AM | SW | 6 | X | X | A | B | | | | |
| SVS-12 | 10/7/02 1:50 pm | SW | 1 | X | | | | | | | |
| DR-24 1:35 pm | 10/7/02 ~~11:30 am~~ AM | SW | 1 | X | | | | | | | |
| DR-25 | 10/7/02 11:30 am | SW | 1 | X | | | | | | | |

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

**REMARKS**

A = Cd, Cu, Pb, Mn, Ni, Se, Ag, Zn

B = As, Cr, Fe

| RELINQUISHED BY: | DATE:TIME | RECEIVED BY: | DATE:TIME |
|---|---|---|---|
| STEVEN MORGENSTERN | 10/7/02 14:20 | | |
| | | | |
| | | | |

PAGE ___ Of ___

FRMQA021.10.01.04

White - Return with sample. Yellow - Retain for your records.

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

## CHAIN of CUSTODY

**Report to:**

Name: STEVEN MORGENSTERN
Company: SEH INC
E-mail: SMORGENSTERN@SEHINC.COM
Address: 2637 MIDPOINT DR, Ste F
FC, CO 80525
Telephone: 970-484-3611

**Copy of Report to:**

Name:
Company:
E-mail:
Telephone:

**Invoice to:**

Name:
Company:
E-mail:
Address:
Telephone:

**PROJECT INFORMATION**

Quote #:
Project/PO #: RICO-ST LOUIS PONDS
Shipping Co.: UPS
Tracking #:
Reporting State for compliance testing:

**ANALYSES REQUESTED** (attach list or use quote number)

| SAMPLE IDENTIFICATION | DATE:TIME | Matrix | # of Containers | TDS, TSS, [redacted] HARDNESS | DISSOLVED METALS | METALS - TOTAL RECOVERABLE | POTENTIALLY DISSOLVED | CN- CYANIDE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DR-7-SW [redacted] | 10/8/2002 8:20AM | SW | 5 | X | A | C | | X | | | |
| DR-7 | 10/8/2002 9:05AM | SW | 5 | X | A | D | | X | | | |
| DR-2 | 10/8/2002 10:35AM | SW | 5 | X | A | D | | X | | | |
| DR-20 | 10/8/2002 11:15AM | SW | 5 | X | A | D | | X | | | |
| DR-1 | 10/8/2002 12:15AM | SW | 5 | X | A | C | | X | | | |
| DR-6 | 10/8/2002 3:15pm | SW | 6 | X | B | C | F | X | | | |
| DR-3 | 10/8/2002 3:55pm | SW | 6 | X | B | E | G | X | | | |

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

**REMARKS**

WHITE & GREEN FIELD FILTERED

A = Cd, Cu, Pb, Mn, Ni, Se, Ag, Zn
B = Cd, Cu, Pb, Mn, Ni, Se, Ag, Zn, Fe
C = As, Cr, Fe
D = Cr, Fe
E = As, Cd, Cr, Cu, Mn, Zn, Fe

Green Dot PD-Raw
F = Cd, Cu, [redacted] Mn, Ag, Zn, Pb, Ni, Se
G = Pb, Ni, Se, Ag

| RELINQUISHED BY: | DATE:TIME | RECEIVED BY: | DATE:TIME |
|---|---|---|---|
| STEVEN MORGENSTERN | 10/9/02 13:50 | | |
| | | | |
| | | | |

PAGE ___ of ___

FRMQA021.10.01.04

White - Return with sample. Yellow - Retain for your records.

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

## CHAIN of CUSTODY

**Report to:**

Name: STEVEN MORGENSTERN
Company: SEH INC
E-mail: SMORGENSTERN@SEHINC.COM
Address: 2637 MIDPOINT DR, Sye F
FC, CO, 80525
Telephone: 970-484-3611

**Copy of Report to:**

Name:
Company:
E-mail:
Telephone:

**Invoice to:**

Name:
Company:
E-mail:
Address:
Telephone:

**PROJECT INFORMATION**

Quote #:
Project/PO #: RICO-ST LOUIS PONDS
Shipping Co.: UPS
Tracking #:
Reporting State for compliance testing:

**ANALYSES REQUESTED** *(attach list or use quote number)*

| SAMPLE IDENTIFICATION | DATE:TIME | Matrix | # of Containers | TDS, TSS, CN, HARDNESS | DISSOLVED METALS | METALS - TOTAL RECOVERABLE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DR-9-SW | 10-7-02 17:10 | SW | 5 | X | A | B | | | | | |
| ~~DR-7-SW~~ | ~~[illegible]~~ | ~~SW~~ | ~~5~~ | ~~X~~ | ~~A~~ | ~~B~~ | | | | | |
| DR-24 | 10-9-02 8:45am | SW | 5 | X | A | C | | | | | |
| DR-25 | 10-9-02 11:35am | SW | 5 | X | A | C | | | | | |
| SVS-8 | 10-9-02 8:55am | SW | 5 | X | A | B | | | | | |
| SVS-22 | 10-9-02 9:55am | SW | 5 | X | A | B | | | | | |
| SVS-12 | 10-9-02 11:00am | SW | 5 | X | A | C | | | | | |
| ~~DR~~ | | | | | | | | | | | |

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

**REMARKS**

WHITE & GREEN FIELD FILTERED

A = Cd, Cu, Pb, Mn, Ni, Se, Ag, Zn

B = Cr, Fe | C = As, Cr, Fe

| RELINQUISHED BY: | DATE:TIME | RECEIVED BY: | DATE:TIME |
|---|---|---|---|
| STEVEN MORGENSTERN | 10-9-02 14:00 | | |
| | | | |
| | | | |

PAGE ___ Of ___

FRMQA021.10.01.04

White - Return with sample. Yellow - Retain for your records.

# APPENDIX A3

## Stream Flow Measurement Forms

Rico AARCOE0105.00
SVS-22 Silver Creek just above Argentine tailings seep
Flow Measurements on 10/9/2002 @ 12:10 pm
Personnel: Steven Morgenstern, Ana Vargo

| Shot Number | Distance (ft) | Distance btw shot numbers (ft) | Depth (ft) at shot number | Average depth btw two shot #s (ft) | velocity measure-ment #1 (ft/sec) | velocity measure-ment #2 (ft/sec) | velocity measure-ment #3 (ft/sec) | Average velocity of #1-3 (ft/sec) | Average Flow Velocity btw two shot #s (ft/sec) | | Segment Flow (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.4 | 0.6 | 0 | 0.2 | edge of water | | | | -0.02 | | -0.002 |
| 2 | 2 | 0.5 | 0.4 | 0.455 | -0.01 | -0.03 | -0.07 | **-0.04** | -0.03 | | -0.006 |
| 3 | 2.5 | 0.6 | 0.51 | 0.615 | -0.01 | -0.03 | -0.02 | **-0.02** | 0.05 | | 0.018 |
| 4 | 3.1 | 0.4 | 0.72 | 0.805 | 0.09 | 0.1 | 0.16 | **0.12** | 0.13 | | 0.043 |
| 5 | 3.5 | 0.5 | 0.89 | 0.91 | 0.13 | 0.17 | 0.15 | **0.15** | 0.13 | | 0.059 |
| 6 | 4 | 0.5 | 0.93 | 0.935 | 0.15 | 0.1 | 0.08 | **0.11** | 0.09 | | 0.043 |
| 7 | 4.5 | 0.5 | 0.94 | 0.96 | 0.04 | 0.11 | 0.07 | **0.07** | 0.06 | | 0.028 |
| 8 | 5 | 0.5 | 0.98 | 0.95 | 0.05 | 0.05 | 0.03 | **0.04** | 0.06 | | 0.029 |
| 9 | 5.5 | 0.5 | 0.92 | 0.925 | 0.07 | 0.09 | 0.08 | **0.08** | 0.11 | | 0.052 |
| 10 | 6 | 0.5 | 0.93 | 0.965 | 0.11 | 0.2 | 0.12 | **0.14** | 0.09 | | 0.045 |
| 11 | 6.5 | 0.5 | 1 | 1.01 | 0.02 | 0.08 | 0.03 | **0.04** | 0.04 | | 0.022 |
| 12 | 7 | 0.45 | 1.02 | 1.025 | 0.06 | 0.02 | 0.05 | **0.04** | 0.09 | | 0.041 |
| 13 | 7.45 | 0.55 | 1.03 | 0.955 | 0.12 | 0.14 | 0.14 | **0.13** | 0.08 | | 0.043 |
| 14 | 8 | 0.5 | 0.88 | 0.92 | 0.02 | 0.05 | 0.02 | **0.03** | 0.02 | | 0.008 |
| 15 | 8.5 | 0.5 | 0.96 | 0.94 | 0 | 0 | 0.01 | **0.00** | 0.09 | | 0.043 |
| 16 | 9 | 0.5 | 0.92 | 0.96 | 0.15 | 0.23 | 0.16 | **0.18** | 0.22 | | 0.103 |
| 17 | 9.5 | 0.5 | 1 | 1.01 | 0.3 | 0.24 | 0.21 | **0.25** | 0.15 | | 0.075 |
| 18 | 10 | 0.5 | 1.02 | 0.945 | 0.02 | 0.04 | 0.08 | **0.05** | 0.01 | | 0.004 |
| 19 | 10.5 | 0.4 | 0.87 | 0.86 | -0.03 | -0.04 | -0.02 | **-0.03** | -0.02 | | -0.005 |
| 20 | 10.9 | | 0.85 | 0 | edge of water | | | | | | |

Total Flow (cfs): 0.641
Total Flow (gpm): 287.7956

Rico AARCOE0105.00
SVS-12 Argentine tailings seep at source
Flow Measurements on 10/9/2002 @ 11:05 am
Personnel: Steven Morgenstern, Ana Vargo

3-inch Parshall Flume
used table

| | | |
|---|---|---|
| 0.15 ft | = | 0.0527 cfs |
| | | 23.66 gpm |

Rico AARCOE0105.00
SVS-8 Silver Creek downstream of Argentine tailings
Flow Measurements on 10/9/2001 @ 9:24 am
Personnel: Steven Morgenstern, Ana Vargo

| Shot Number | Distance (ft) | Distance btw shot numbers (ft) | Depth (ft) at shot number | Average depth btw two shot #s (ft) | velocity measure-ment #1 (ft/sec) | velocity measure-ment #2 (ft/sec) | velocity measure-ment #3 (ft/sec) | Average velocity of #1-3 (ft/sec) | Average Flow Velocity btw two shot #s (ft/sec) | | Segment Flow (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.5 | 0.75 | 0 | 0.045 | edge of water | | | | | | |
| 2 | 8.25 | 0.65 | 0.09 | 0.285 | no reading too shallow | | | | | | |
| 3 | 8.9 | 0.3 | 0.48 | 0.455 | 0.58 | 0.51 | 0.67 | **0.59** | 0.66 | | 0.089 |
| 4 | 9.2 | 0.4 | 0.43 | 0.43 | 0.72 | 0.72 | 0.73 | **0.72** | 0.76 | | 0.131 |
| 5 | 9.6 | 0.3 | 0.43 | 0.51 | 0.75 | 0.83 | 0.82 | **0.80** | 0.63 | | 0.097 |
| 6 | 9.9 | 0.4 | 0.59 | 0.645 | 0.47 | 0.44 | 0.48 | **0.46** | 0.59 | | 0.153 |
| 7 | 10.3 | 0.6 | 0.70 | 0.485 | 0.69 | 0.74 | 0.73 | **0.72** | 0.54 | | 0.157 |
| 8 | 10.9 | 0.3 | 0.27 | 0.245 | 0.36 | 0.34 | 0.37 | **0.36** | 0.25 | | 0.018 |
| 9 | 11.2 | 0.4 | 0.22 | 0.225 | 0.15 | 0.17 | 0.12 | **0.15** | 0.14 | | 0.012 |
| 10 | 11.6 | 0.4 | 0.23 | 0.265 | 0.11 | 0.15 | 0.13 | **0.13** | 0.15 | | 0.016 |
| 11 | 12.0 | 0.45 | 0.30 | 0.44 | 0.18 | 0.17 | 0.16 | **0.17** | 0.23 | | 0.045 |
| 12 | 12.45 | 0.35 | 0.58 | 0.46 | 0.30 | 0.26 | 0.30 | **0.29** | 0.24 | | 0.039 |
| 13 | 12.8 | 0.6 | 0.34 | 0.17 | 0.22 | 0.19 | 0.17 | **0.19** | 0.10 | | 0.010 |
| 14 | 13.4 | | 0 | 0 | edge of water | | | | | | |

**Total Flow (cfs): 0.767**
**Total Flow (gpm): 344.1944**

Rico AARCOE0105.00
SVS - 26 Unknown adit downstream of tramway, southside of Silver Creek
Flow Measurements on 10/07/2002 from 9:45 am
Personnel: Steven Morgenstern, Ana Vargo

| | Water depth from bottom of bucket | Volume (cubic ft) (use attached table) | Time (seconds) | Flow (cfs) | Flow (gpm) |
|---|---|---|---|---|---|
| **Test 1** | 0.41 | 0.152 | 122.35 | 0.0012 | 0.558 |
| **Test 2** | 0.4 | 0.148 | 122.97 | 0.0012 | 0.540 |
| **Test 3** | 0.58 | 0.219 | 181.47 | 0.0012 | 0.542 |
| | | | **AVG assuming 98% of flow** | **0.0012** | **0.546** |
| | | **100% of the flow assuming 98% of the flow captured** | | **0.0012** | **0.558** |

Note: Flow measurement using bucket captured 98% of the flow

Note: Used standard 5 gallon bucket (orange) and funnel

| | minutes | seconds | Decimal Minutes | seconds |
|---|---|---|---|---|
| **Test 1** | 2 | 2.35 | 2.04 | 122.35 |
| **Test 2** | 2 | 2.97 | 2.05 | 122.97 |
| **Test 3** | 3 | 1.47 | 3.02 | 181.47 |

| **Enter known data pairs:** | | |
|---|---|---|
| | height | inside diameter |
| | (ft) | (ft) |
| **Data 1** | 0 | 0.85 |
| **Data 2** | 1.18 | 0.935 |

| Query x (sta) | Result y (elev) | |
|---|---|---|
| water depth (ft) | w.s. diameter (ft) | volume (cubic ft) |
| 0 | 0.850 | 0.000 |
| 0.05 | 0.854 | 0.018 |
| 0.1 | 0.857 | 0.035 |
| 0.15 | 0.861 | 0.054 |
| 0.2 | 0.864 | 0.072 |
| 0.25 | 0.868 | 0.090 |
| 0.3 | 0.872 | 0.109 |
| 0.35 | 0.875 | 0.128 |
| 0.4 | 0.879 | 0.148 |
| 0.41 | 0.880 | 0.152 |
| 0.5 | 0.886 | 0.187 |
| 0.55 | 0.890 | 0.207 |
| 0.58 | 0.892 | 0.219 |
| 0.595 | 0.893 | 0.226 |
| 0.6 | 0.893 | 0.228 |
| 0.65 | 0.897 | 0.248 |
| 0.7 | 0.900 | 0.269 |
| 0.725 | 0.902 | 0.280 |
| 0.75 | 0.904 | 0.290 |
| 0.8 | 0.908 | 0.312 |
| 0.85 | 0.911 | 0.333 |
| 0.9 | 0.915 | 0.355 |
| 0.95 | 0.918 | 0.377 |
| 1 | 0.922 | 0.400 |
| 1.05 | 0.926 | 0.423 |

Rico AARCOE0105.00
SVS-20 Silver Creek just above confluence with Dolores River
Flow Measurements on 10/6/2002 @ 6:05 pm
Personnel: Steven Morgenstern, Ana Vargo

| Shot Number | Distance (ft) | Distance btw shot numbers (ft) | Depth (ft) at shot number | Average depth btw two shot #s (ft) | velocity measure-ment #1 (ft/sec) | velocity measure-ment #2 (ft/sec) | velocity measure-ment #3 (ft/sec) | Average velocity of #1-3 (ft/sec) | Average Flow Velocity btw two shot #s (ft/sec) | | Segment Flow (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.2 | 0.4 | 0 | 0.125 | edge of water | | | | -0.07 | | -0.003 |
| 2 | 3.6 | 0.4 | 0.25 | 0.25 | -0.10 | -0.14 | -0.17 | **-0.14** | -0.08 | | -0.008 |
| 3 | 4.0 | 0.45 | 0.25 | 0.315 | -0.08 | -0.04 | 0.04 | **-0.03** | 0.06 | | 0.008 |
| 4 | 4.45 | 0.45 | 0.38 | 0.355 | 0.13 | 0.17 | 0.13 | **0.14** | 0.28 | | 0.045 |
| 5 | 4.9 | 0.5 | 0.33 | 0.395 | 0.45 | 0.46 | 0.34 | **0.42** | 0.65 | | 0.129 |
| 6 | 5.4 | 0.4 | 0.46 | 0.47 | 0.92 | 0.91 | 0.84 | **0.89** | 0.95 | | 0.179 |
| 7 | 5.8 | 0.45 | 0.48 | 0.59 | 1.00 | 1.07 | 0.96 | **1.01** | 1.09 | | 0.288 |
| 8 | 6.25 | 0.55 | 0.70 | 0.62 | 1.17 | 1.12 | 1.19 | **1.16** | 0.83 | | 0.284 |
| 9 | 6.8 | 0.4 | 0.54 | 0.525 | 0.52 | 0.47 | 0.52 | **0.50** | 0.44 | | 0.093 |
| 10 | 7.2 | 0.4 | 0.51 | 0.47 | 0.36 | 0.38 | 0.40 | **0.38** | 0.31 | | 0.058 |
| 11 | 7.6 | 0.5 | 0.43 | 0.45 | 0.26 | 0.18 | 0.27 | **0.24** | 0.11 | | 0.026 |
| 12 | 8.1 | 0.4 | 0.47 | 0.4 | 0.02 | -0.03 | -0.02 | **-0.01** | -0.07 | | -0.011 |
| 13 | 8.5 | 0.5 | 0.33 | 0.325 | -0.12 | -0.13 | -0.13 | **-0.13** | -0.13 | | -0.021 |
| 14 | 9.0 | 0.5 | 0.32 | 0.32 | -0.15 | -0.13 | -0.12 | **-0.13** | -0.15 | | -0.023 |
| 15 | 9.5 | 0.3 | 0.32 | 0.16 | -0.17 | -0.16 | -0.15 | **-0.16** | -0.08 | | -0.004 |
| 16 | 9.8 | | 0 | 0 | edge of water | | | | | | |

**Total Flow (cfs): 1.038**
**Total Flow (gpm): 465.66**

Rico AARCOE0105.00
DR - 1 Dolores River above St. Louis settling pond system
Flow Measurements on 10/8/2002 @ 1:00 pm
Personnel: Steven Morgenstern, Ana Vargo

| Shot Number | Distance (ft) | Distance btw shot numbers (ft) | Depth (ft) at shot number | Average depth btw two shot #s (ft) | velocity measure-ment #1 (ft/sec) | velocity measure-ment #2 (ft/sec) | velocity measure-ment #3 (ft/sec) | Average velocity of #1-3 (ft/sec) | Average Flow Velocity btw two shot #s (ft/sec) | | Segment Flow (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.5 | 2 | 0.3 | 0.505 | edge of water | | | **0.00** | 0.25 | | 0.256 |
| 2 | 9.5 | 2 | 0.71 | 0.905 | 0.48 | 0.55 | 0.49 | **0.51** | 0.60 | | 1.086 |
| 3 | 11.5 | 1.7 | 1.1 | 1.1 | 0.70 | 0.67 | 0.71 | **0.69** | 1.07 | | 1.998 |
| 4 | 13.2 | 2 | 1.1 | 0.99 | 1.46 | 1.37 | 1.50 | **1.44** | 1.60 | | 3.175 |
| 5 | 15.2 | 2.1 | 0.88 | 1.06 | 1.74 | 1.82 | 1.73 | **1.76** | 1.12 | | 2.489 |
| 6 | 17.3 | 1.2 | 1.24 | 1.37 | 0.49 | 0.51 | 0.42 | **0.47** | 1.01 | | 1.660 |
| 7 | 18.5 | 2.6 | 1.5 | 1.37 | 1.54 | 1.40 | 1.70 | **1.55** | 1.62 | | 5.765 |
| 8 | 21.1 | 2 | 1.24 | 1.205 | 1.61 | 1.80 | 1.66 | **1.69** | 1.90 | | 4.571 |
| 9 | 23.1 | 1.6 | 1.17 | 1.27 | 2.16 | 2.20 | 1.95 | **2.10** | 1.93 | | 3.925 |
| 10 | 24.7 | 2.4 | 1.37 | 1.375 | 1.75 | 1.69 | 1.84 | **1.76** | 1.48 | | 4.890 |
| 11 | 27.1 | 2.2 | 1.38 | 1.29 | 1.09 | 1.23 | 1.29 | **1.20** | 1.26 | | 3.585 |
| 12 | 29.3 | 1.3 | 1.2 | 1.15 | 1.33 | 1.24 | 1.40 | **1.32** | 0.92 | | 1.368 |
| 13 | 30.6 | 1.2 | 1.1 | 0.94 | 0.48 | 0.58 | 0.46 | **0.51** | 0.25 | | 0.286 |
| 14 | 31.8 | | 0.78 | | edge of water | | | | | | |

**Total Flow (cfs): 35.05**
**Total Flow (gpm): 15,732**

Note: USGS 09165000 at Dolores River below Rico, CO
@ 1:00 PM on 7/19/02 = 39 cfs

Rico AARCOE0105.00
DR - 1 Dolores River above St. Louis settling pond system
Flow Measurements on 10/8/2002 @ 1:15 pm
Personnel: Steven Morgenstern, Ana Vargo

| Shot Number | Distance (ft) | Distance btw shot numbers (ft) | Depth (ft) at shot number | Average depth btw two shot #s (ft) | velocity measure-ment #1 (ft/sec) | velocity measure-ment #2 (ft/sec) | velocity measure-ment #3 (ft/sec) | Average velocity of #1-3 (ft/sec) | Average Flow Velocity btw two shot #s (ft/sec) | | Segment Flow (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.5 | 2.1 | 0.3 | 0.5 | edge of water | | | **0.00** | 0.21 | | 0.221 |
| 2 | 9.6 | 1.9 | 0.7 | 0.91 | 0.39 | 0.44 | 0.43 | **0.42** | 0.57 | | 0.983 |
| 3 | 11.5 | 1.7 | 1.12 | 1.11 | 0.68 | 0.75 | 0.72 | **0.72** | 1.07 | | 2.013 |
| 4 | 13.2 | 2 | 1.1 | 0.975 | 1.38 | 1.46 | 1.41 | **1.42** | 1.68 | | 3.279 |
| 5 | 15.2 | 2.1 | 0.85 | 1.05 | 1.97 | 1.96 | 1.91 | **1.95** | 1.28 | | 2.819 |
| 6 | 17.3 | 1.2 | 1.25 | 1.335 | 0.57 | 0.58 | 0.68 | **0.61** | 1.05 | | 1.679 |
| 7 | 18.5 | 2.6 | 1.42 | 1.37 | 1.54 | 1.52 | 1.4 | **1.49** | 1.52 | | 5.414 |
| 8 | 21.1 | 2 | 1.32 | 1.155 | 1.56 | 1.62 | 1.48 | **1.55** | 1.90 | | 4.397 |
| 9 | 23.1 | 1.6 | 0.99 | 1.12 | 2.19 | 2.18 | 2.39 | **2.25** | 2.07 | | 3.703 |
| 10 | 24.7 | 2.4 | 1.25 | 1.325 | 1.91 | 1.82 | 1.91 | **1.88** | 1.53 | | 4.871 |
| 11 | 27.1 | 2.2 | 1.4 | 1.305 | 1.08 | 1.37 | 1.1 | **1.18** | 1.34 | | 3.857 |
| 12 | 29.3 | 1.3 | 1.21 | 1.155 | 1.49 | 1.46 | 1.56 | **1.50** | 1.01 | | 1.514 |
| 13 | 30.6 | 1.2 | 1.1 | 0.94 | 0.49 | 0.4 | 0.65 | **0.51** | 0.26 | | 0.290 |
| 14 | 31.8 | | 0.78 | 0.39 | edge of water | | | | | | |

**Total Flow (cfs): 35.04**
**Total Flow (gpm): 15,725**

Note: USGS 09165000 at Dolores River below Rico, CO
@ 1:15 PM on 10/8/02 = 39 cfs

Rico AARCOE0105.00
DR - 1 Dolores River above St. Louis settling pond system
Flow Measurements on 10/8/2002 @ 1:15 pm
Personnel: Steven Morgenstern, Ana Vargo

| Shot Number | Distance (ft) | Distance btw shot numbers (ft) | Depth (ft) at shot number | Average depth btw two shot #s (ft) | velocity measure-ment #1 (ft/sec) | velocity measure-ment #2 (ft/sec) | velocity measure-ment #3 (ft/sec) | Average velocity of #1-3 (ft/sec) | Average Flow Velocity btw two shot #s (ft/sec) | | Segment Flow (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.5 | 1.15 | 0.3 | 0.475 | edge of water | | | **0.00** | 0.11 | | 0.060 |
| 2 | 8.65 | 0.95 | 0.65 | 0.675 | 0.16 | 0.21 | 0.29 | **0.22** | 0.32 | | 0.205 |
| 3 | 9.6 | 0.4 | 0.7 | 0.495 | 0.39 | 0.44 | 0.43 | **0.42** | 0.35 | | 0.069 |
| 4 | 10 | 1.5 | 0.29 | 0.705 | 0.27 | 0.29 | 0.28 | **0.28** | 0.50 | | 0.527 |
| 5 | 11.5 | 1 | 1.12 | 1.035 | 0.68 | 0.75 | 0.72 | **0.72** | 0.90 | | 0.928 |
| 6 | 12.5 | 0.7 | 0.95 | 1.025 | 1.15 | 1.07 | 1.01 | **1.08** | 1.25 | | 0.894 |
| 7 | 13.2 | 1.2 | 1.1 | 0.9 | 1.38 | 1.46 | 1.41 | **1.42** | 0.97 | | 1.042 |
| 8 | 14.4 | 0.8 | 0.7 | 0.775 | 0.53 | 0.46 | 0.55 | **0.51** | 1.23 | | 0.763 |
| 9 | 15.2 | 1.3 | 0.85 | 0.9 | 1.97 | 1.96 | 1.91 | **1.95** | 2.02 | | 2.360 |
| 10 | 16.5 | 0.8 | 0.95 | 1.1 | 2.1 | 2.06 | 2.10 | **2.09** | 1.35 | | 1.187 |
| 11 | 17.3 | 1.2 | 1.25 | 1.335 | 0.57 | 0.58 | 0.68 | **0.61** | 1.05 | | 1.679 |
| 12 | 18.5 | 1 | 1.42 | 1.39 | 1.54 | 1.52 | 1.4 | **1.49** | 1.30 | | 1.800 |
| 13 | 19.5 | 0.8 | 1.36 | 1.29 | 1.06 | 1.11 | 1.14 | **1.10** | 1.13 | | 1.164 |
| 14 | 20.3 | 0.8 | 1.22 | 1.27 | 1.15 | 1.17 | 1.14 | **1.15** | 1.35 | | 1.375 |
| 15 | 21.1 | 1 | 1.32 | 1.03 | 1.56 | 1.62 | 1.48 | **1.55** | 1.77 | | 1.821 |
| 16 | 22.1 | 1 | 0.74 | 0.865 | 2.04 | 1.91 | 2.00 | **1.98** | 2.12 | | 1.832 |
| 17 | 23.1 | 1.2 | 0.99 | 1.085 | 2.19 | 2.18 | 2.39 | **2.25** | 1.76 | | 2.296 |
| 18 | 24.3 | 0.4 | 1.18 | 1.215 | 1.28 | 1.31 | 1.23 | **1.27** | 1.58 | | 0.766 |
| 19 | 24.7 | 0.8 | 1.25 | 1.135 | 1.91 | 1.82 | 1.91 | **1.88** | 2.53 | | 2.300 |
| 20 | 25.5 | 0.8 | 1.02 | 1.125 | 3.17 | 3.07 | 3.32 | **3.19** | 2.83 | | 2.544 |
| 21 | 26.3 | 0.8 | 1.23 | 1.315 | 2.48 | 2.43 | 2.49 | **2.47** | 1.83 | | 1.920 |
| 22 | 27.1 | 1.1 | 1.4 | 1.275 | 1.08 | 1.37 | 1.1 | **1.18** | 0.97 | | 1.356 |
| 23 | 28.2 | 1.1 | 1.15 | 1.18 | 0.73 | 0.81 | 0.71 | **0.75** | 1.13 | | 1.462 |
| 24 | 29.3 | 1.3 | 1.21 | 1.155 | 1.49 | 1.46 | 1.56 | **1.50** | 1.01 | | 1.514 |
| 25 | 30.6 | 1.2 | 1.1 | 0.94 | 0.49 | 0.4 | 0.65 | **0.51** | 0.26 | | 0.290 |
| 26 | 31.8 | | 0.78 | 0.39 | edge of water | | | | | | |

**Total Flow (cfs): 32.16**
**Total Flow (gpm): 14,431**

Note: USGS 09165000 at Dolores River below Rico, CO
@ 1:15 PM on 10/8/02 = 39 cfs

Rico AARCOE0105.00
DR - 7 Dolores River below St. Louis Ponds Outfall
Flow Measurements on 10/8/2002 @ 9:35 am
Personnel: Steven Morgenstern, Ana Vargo

| Shot Number | Distance (ft) | Distance btw shot numbers (ft) | Depth (ft) at shot number | Average depth btw two shot #s (ft) | velocity measure-ment #1 (ft/sec) | velocity measure-ment #2 (ft/sec) | velocity measure-ment #3 (ft/sec) | Average velocity of #1-3 (ft/sec) | Average Flow Velocity btw two shot #s (ft/sec) | | Segment Flow (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.6 | 1.8 | 0.25 | 0.235 | edge of water | | | 0 | 0.25 | | 0.104 |
| 2 | 10.4 | 1.4 | 0.22 | 0.36 | 0.55 | 0.45 | 0.47 | **0.49** | 0.95 | | 0.479 |
| 3 | 11.8 | 1.35 | 0.5 | 0.48 | 1.42 | 1.48 | 1.33 | **1.41** | 1.35 | | 0.874 |
| 4 | 13.15 | 0.75 | 0.46 | 0.54 | 1.33 | 1.23 | 1.3 | **1.29** | 0.58 | | 0.234 |
| 5 | 13.9 | 1.6 | 0.62 | 0.71 | -0.12 | -0.15 | -0.13 | **-0.13** | 0.50 | | 0.566 |
| 6 | 15.5 | 1.85 | 0.8 | 0.84 | 1.18 | 1.17 | 1.04 | **1.13** | 0.85 | | 1.326 |
| 7 | 17.35 | 1.45 | 0.88 | 0.93 | 0.57 | 0.54 | 0.62 | **0.58** | 1.12 | | 1.508 |
| 8 | 18.8 | 2 | 0.98 | 0.975 | 1.55 | 1.79 | 1.64 | **1.66** | 1.79 | | 3.487 |
| 9 | 20.8 | 2 | 0.97 | 0.76 | 1.89 | 1.94 | 1.92 | **1.92** | 1.74 | | 2.647 |
| 10 | 22.8 | 1.6 | 0.55 | 0.65 | 1.61 | 1.56 | 1.53 | **1.57** | 1.30 | | 1.354 |
| 11 | 24.4 | 1.65 | 0.75 | 0.775 | 1.04 | 1.03 | 1.04 | **1.04** | 1.05 | | 1.336 |
| 12 | 26.05 | 1.65 | 0.8 | 0.775 | 1.08 | 1.07 | 1.01 | **1.05** | 1.04 | | 1.326 |
| 13 | 27.7 | 1.6 | 0.75 | 0.8 | 1.02 | 1.04 | 1 | **1.02** | 0.90 | | 1.146 |
| 14 | 29.3 | 1.5 | 0.85 | 0.765 | 0.74 | 0.7 | 0.87 | **0.77** | 1.06 | | 1.218 |
| 15 | 30.8 | 1.7 | 0.68 | 0.89 | 1.32 | 1.32 | 1.42 | **1.35** | 1.21 | | 1.823 |
| 16 | 32.5 | 1.15 | 1.1 | 1.175 | 1.03 | 1.02 | 1.12 | **1.06** | 1.67 | | 2.261 |
| 17 | 33.65 | 1.15 | 1.25 | 1.335 | 2.37 | 2.26 | 2.24 | **2.29** | 2.15 | | 3.293 |
| 18 | 34.8 | 1.4 | 1.42 | 1.47 | 1.9 | 2.05 | 2.05 | **2.00** | 1.83 | | 3.766 |
| 19 | 36.2 | 1.55 | 1.52 | 1.485 | 1.7 | 1.69 | 1.59 | **1.66** | 1.82 | | 4.193 |
| 20 | 37.75 | 0.55 | 1.45 | 1.175 | 2.04 | 1.98 | 1.93 | **1.98** | 0.99 | | 0.641 |
| 21 | 38.3 | | 0.9 | 0.45 | edge of water | | | | | | |

**Total Flow (cfs): 33.581**
**Total Flow (gpm): 15071.36**

Note: USGS 09165000 at Dolores River below Rico, CO
@ 9:30 AM on 10/08/02 = 42 cfs

Rico AARCOE0105.00
DR-2-SW Dolores River above Columbia Tailings
Flow Measurements on 10/6/2002 @ 10:15 am
Personnel: Steven Morgenstern, Ana Vargo

| Shot Number | Distance (ft) | Distance btw shot numbers (ft) | Depth (ft) at shot number | Average depth btw two shot #s (ft) | velocity measure-ment #1 (ft/sec) | velocity measure-ment #2 (ft/sec) | velocity measure-ment #3 (ft/sec) | Average velocity of #1-3 (ft/sec) | Average Flow Velocity btw two shot #s (ft/sec) | | Segment Flow (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.00 | 2.85 | 0 | 0.16 | edge of water | | | **0.00** | 0.08 | | 0.036 |
| 2 | 12.85 | 1.15 | 0.32 | 0.295 | 0.14 | 0.19 | 0.14 | **0.16** | 0.15 | | 0.050 |
| 3 | 14.00 | 1.25 | 0.27 | 0.4 | 0.16 | 0.15 | 0.11 | **0.14** | 0.26 | | 0.130 |
| 4 | 15.25 | 1.3 | 0.53 | 0.605 | 0.39 | 0.41 | 0.34 | **0.38** | 0.43 | | 0.338 |
| 5 | 16.55 | 0.85 | 0.68 | 0.665 | 0.44 | 0.46 | 0.54 | **0.48** | 0.70 | | 0.395 |
| 6 | 17.40 | 1.1 | 0.65 | 0.755 | 0.94 | 0.92 | 0.89 | **0.92** | 0.92 | | 0.765 |
| 7 | 18.50 | 1.05 | 0.86 | 0.95 | 0.95 | 0.93 | 0.9 | **0.93** | 0.89 | | 0.889 |
| 8 | 19.55 | 1.05 | 1.04 | 1.055 | 0.82 | 0.88 | 0.87 | **0.86** | 1.02 | | 1.124 |
| 9 | 20.60 | 1 | 1.07 | 1.06 | 1.18 | 1.22 | 1.12 | **1.17** | 1.39 | | 1.472 |
| 10 | 21.60 | 1.15 | 1.05 | 1.135 | 1.65 | 1.57 | 1.59 | **1.60** | 1.65 | | 2.158 |
| 11 | 22.75 | 0.75 | 1.22 | 1.255 | 1.77 | 1.68 | 1.66 | **1.70** | 1.84 | | 1.729 |
| 12 | 23.50 | 1.1 | 1.29 | 1.345 | 2.09 | 1.81 | 2.01 | **1.97** | 1.97 | | 2.917 |
| 13 | 24.60 | 0.85 | 1.40 | 1.34 | 1.97 | 1.93 | 2.02 | **1.97** | 1.63 | | 1.855 |
| 14 | 25.45 | 0.7 | 1.28 | 1.29 | 1.29 | 1.28 | 1.28 | **1.28** | 1.92 | | 1.734 |
| 15 | 26.15 | 1.3 | 1.30 | 1.485 | 2.48 | 2.55 | 2.64 | **2.56** | 1.81 | | 3.485 |
| 16 | 27.45 | 1.15 | 1.67 | 1.67 | 1.05 | 1.08 | 1.03 | **1.05** | 1.73 | | 3.313 |
| 17 | 28.60 | 1.2 | 1.67 | 1.545 | 2.34 | 2.35 | 2.5 | **2.40** | 2.51 | | 4.654 |
| 18 | 29.80 | 1.05 | 1.42 | 1.395 | 2.82 | 2.6 | 2.45 | **2.62** | 2.55 | | 3.735 |
| 19 | 30.85 | 1.25 | 1.37 | 1.315 | 2.36 | 2.5 | 2.57 | **2.48** | 2.04 | | 3.353 |
| 20 | 32.10 | 0.9 | 1.26 | 1.32 | 1.89 | 1.49 | 1.43 | **1.60** | 0.92 | | 1.091 |
| 21 | 33.00 | 1 | 1.38 | 1 | 0.04 | 0.39 | 0.27 | **0.23** | 0.03 | | 0.030 |
| 22 | 34.00 | 1 | 0.62 | 0.575 | -0.14 | -0.16 | -0.22 | **-0.17** | -0.16 | | -0.094 |
| 23 | 35.00 | 2 | 0.53 | 0.265 | -0.15 | -0.15 | -0.16 | **-0.15** | -0.08 | | -0.041 |
| 24 | 37.00 | | 0 | 0 | edge of water | | | | | | |

**Total Flow (cfs): 35.118**
**Total Flow (gpm): 15760.91**

Note: USGS 09165000 at Dolores River below Rico, CO
@ 10:15 AM on 10/06/02 = 43 cfs

Rico AARCOE0105.00
DR-1-SW Dolores River side channel/Columbia Tailings Seep
Flow Measurements on 10/6/2002 @ 5:00 pm
Personnel: Steven Morgenstern, Ana Vargo

| Shot Number | Distance (ft) | Distance btw shot numbers (ft) | Depth (ft) at shot number | Average depth btw two shot #s (ft) | velocity measure-ment #1 (ft/sec) | velocity measure-ment #2 (ft/sec) | velocity measure-ment #3 (ft/sec) | Average velocity of #1-3 (ft/sec) | Average Flow Velocity btw two shot #s (ft/sec) | | Segment Flow (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.9 | 1.1 | 0 | 0.22 | edge of water | | | **0.00** | -0.06 | | -0.015 |
| 2 | 7 | 0.25 | 0.44 | 0.435 | -0.12 | -0.12 | -0.12 | **-0.12** | -0.11 | | -0.012 |
| 3 | 7.25 | 0.25 | 0.43 | 0.42 | -0.13 | -0.13 | -0.05 | **-0.10** | -0.08 | | -0.009 |
| 4 | 7.5 | 0.25 | 0.41 | 0.42 | -0.02 | -0.08 | -0.08 | **-0.06** | -0.04 | | -0.004 |
| 5 | 7.75 | 0.15 | 0.43 | 0.425 | 0 | -0.01 | -0.02 | **-0.01** | 0.00 | | 0.000 |
| 6 | 7.9 | 0.25 | 0.42 | 0.375 | 0 | 0.01 | 0 | **0.00** | 0.00 | | 0.000 |
| 7 | 8.15 | 0.3 | 0.33 | 0.425 | 0 | 0 | 0.01 | **0.00** | 0.00 | | 0.000 |
| 8 | 8.45 | 0.3 | 0.52 | 0.48 | -0.01 | 0.01 | 0 | **0.00** | 0.05 | | 0.007 |
| 9 | 8.75 | 0.35 | 0.44 | 0.48 | 0.09 | 0.1 | 0.1 | **0.10** | 0.12 | | 0.020 |
| 10 | 9.1 | 0.35 | 0.52 | 0.445 | 0.13 | 0.14 | 0.14 | **0.14** | 0.11 | | 0.017 |
| 11 | 9.45 | 0.3 | 0.37 | 0.41 | 0.1 | 0.07 | 0.08 | **0.08** | 0.03 | | 0.004 |
| 12 | 9.75 | 0.35 | 0.45 | 0.41 | -0.02 | -0.03 | -0.02 | **-0.02** | 0.04 | | 0.006 |
| 13 | 10.1 | 0.4 | 0.37 | 0.395 | 0.1 | 0.09 | 0.13 | **0.11** | 0.07 | | 0.010 |
| 14 | 10.5 | 0.3 | 0.42 | 0.21 | 0.04 | 0.02 | 0.01 | **0.02** | 0.01 | | 0.001 |
| 15 | 10.8 | | 0 | 0 | edge of water | | | | | | |

**Total Flow (cfs): 0.026**
**Total Flow (gpm): 11.56**

Note: Channel is really shallow; therefore, the measurement will be questionable

DR - 26 Dolores River between Columbia Seep and Santa Cruz wetlands
Flow Measurements on 10/6/2002 @ 3:30 pm
Personnel: Steven Morgenstern, Ana Vargo

| Shot Number | Distance (ft) | Distance btw shot numbers (ft) | Depth (ft) at shot number | Average depth btw two shot #s (ft) | velocity measure-ment #1 (ft/sec) | velocity measure-ment #2 (ft/sec) | velocity measure-ment #3 (ft/sec) | Average velocity of #1-3 (ft/sec) | Average Flow Velocity btw two shot #s (ft/sec) | | Segment Flow (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5 | 2 | 0 | 0.21 | edge of water | | | **0.00** | 0.09 | | 0.038 |
| 2 | 7 | 2 | 0.42 | 0.525 | 0.17 | 0.17 | 0.2 | **0.18** | 0.23 | | 0.240 |
| 3 | 9 | 2.1 | 0.63 | 0.695 | 0.26 | 0.26 | 0.31 | **0.28** | 0.09 | | 0.131 |
| 4 | 11.1 | 1.9 | 0.76 | 0.965 | -0.08 | -0.12 | -0.09 | **-0.10** | 0.12 | | 0.223 |
| 5 | 13 | 2.2 | 1.17 | 1.25 | 0.33 | 0.3 | 0.39 | **0.34** | 0.34 | | 0.921 |
| 6 | 15.2 | 1.8 | 1.33 | 1.33 | 0.34 | 0.31 | 0.34 | **0.33** | 0.39 | | 0.926 |
| 7 | 17 | 2 | 1.33 | 1.38 | 0.47 | 0.5 | 0.36 | **0.44** | 0.49 | | 1.357 |
| 8 | 19 | 2 | 1.43 | 1.53 | 0.59 | 0.53 | 0.5 | **0.54** | 0.56 | | 1.709 |
| 9 | 21 | 2 | 1.63 | 1.805 | 0.57 | 0.62 | 0.54 | **0.58** | 0.62 | | 2.226 |
| 10 | 23 | 2 | 1.98 | 1.92 | 0.61 | 0.66 | 0.7 | **0.66** | 0.73 | | 2.816 |
| 11 | 25 | 2 | 1.86 | 1.82 | 0.77 | 0.81 | 0.85 | **0.81** | 0.81 | | 2.930 |
| 12 | 27 | 2 | 1.78 | 1.785 | 0.83 | 0.84 | 0.73 | **0.80** | 0.83 | | 2.951 |
| 13 | 29 | 2 | 1.79 | 1.835 | 0.9 | 0.85 | 0.81 | **0.85** | 0.83 | | 3.034 |
| 14 | 31 | 2 | 1.88 | 1.875 | 0.81 | 0.77 | 0.82 | **0.80** | 0.71 | | 2.656 |
| 15 | 33 | 2 | 1.87 | 1.7 | 0.51 | 0.66 | 0.68 | **0.62** | 0.56 | | 1.898 |
| 16 | 35 | 1.6 | 1.53 | 1.5 | 0.46 | 0.52 | 0.52 | **0.50** | 0.46 | | 1.092 |
| 17 | 36.6 | 2.4 | 1.47 | 1.325 | 0.39 | 0.44 | 0.4 | **0.41** | 0.32 | | 1.002 |
| 18 | 39 | 1.7 | 1.18 | 1.18 | 0.22 | 0.24 | 0.2 | **0.22** | 0.11 | | 0.221 |
| 19 | 40.7 | | 1.18 | 0 | edge of water | | | | | | |

**Total Flow (cfs): 26.371**
**Total Flow (gpm): 11835.21**

Note: USGS 09165000 at Dolores River below Rico, CO
@ 15:30 on 10/6/02 = 35 cfs

DR - 26 Dolores River between Columbia Seep and Santa Cruz wetlands
Flow Measurements on 10/6/2002 @ 3:45 pm
Personnel: Steven Morgenstern, Ana Vargo

| Shot Number | Distance (ft) | Distance btw shot numbers (ft) | Depth (ft) at shot number | Average depth btw two shot #s (ft) | velocity measure-ment #1 (ft/sec) | velocity measure-ment #2 (ft/sec) | velocity measure-ment #3 (ft/sec) | Average velocity of #1-3 (ft/sec) | Average Flow Velocity btw two shot #s (ft/sec) | | Segment Flow (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5 | 2 | 0 | 0.21 | edge of water | | | **0.00** | 0.15 | | 0.062 |
| 2 | 7 | 2 | 0.42 | 0.525 | 0.32 | 0.27 | 0.3 | **0.30** | 0.31 | | 0.329 |
| 3 | 9 | 2.1 | 0.63 | 0.69 | 0.32 | 0.28 | 0.39 | **0.33** | 0.13 | | 0.184 |
| 4 | 11.1 | 1.9 | 0.75 | 0.965 | -0.09 | -0.05 | -0.09 | **-0.08** | 0.14 | | 0.254 |
| 5 | 13 | 2.2 | 1.18 | 1.26 | 0.32 | 0.38 | 0.36 | **0.35** | 0.38 | | 1.053 |
| 6 | 15.2 | 1.8 | 1.34 | 1.36 | 0.4 | 0.39 | 0.43 | **0.41** | 0.46 | | 1.130 |
| 7 | 17 | 2 | 1.38 | 1.39 | 0.59 | 0.51 | 0.45 | **0.52** | 0.58 | | 1.617 |
| 8 | 19 | 2 | 1.4 | 1.515 | 0.65 | 0.67 | 0.62 | **0.65** | 0.67 | | 2.035 |
| 9 | 21 | 2 | 1.63 | 1.805 | 0.71 | 0.69 | 0.69 | **0.70** | 0.72 | | 2.599 |
| 10 | 23 | 2 | 1.98 | 1.95 | 0.71 | 0.74 | 0.78 | **0.74** | 0.87 | | 3.393 |
| 11 | 25 | 2 | 1.92 | 1.85 | 1.05 | 0.97 | 0.97 | **1.00** | 1.01 | | 3.737 |
| 12 | 27 | 2 | 1.78 | 1.785 | 0.99 | 1.04 | 1.04 | **1.02** | 0.99 | | 3.546 |
| 13 | 29 | 2 | 1.79 | 1.83 | 0.95 | 1.02 | 0.92 | **0.96** | 0.93 | | 3.386 |
| 14 | 31 | 2 | 1.87 | 1.875 | 0.86 | 0.88 | 0.92 | **0.89** | 0.73 | | 2.731 |
| 15 | 33 | 2 | 1.88 | 1.705 | 0.54 | 0.52 | 0.65 | **0.57** | 0.55 | | 1.887 |
| 16 | 35 | 1.6 | 1.53 | 1.515 | 0.55 | 0.55 | 0.51 | **0.54** | 0.54 | | 1.309 |
| 17 | 36.6 | 2.4 | 1.5 | 1.345 | 0.49 | 0.55 | 0.59 | **0.54** | 0.37 | | 1.189 |
| 18 | 39 | 1.7 | 1.19 | 1.185 | 0.18 | 0.17 | 0.23 | **0.19** | 0.10 | | 0.195 |
| 19 | 40.7 | | 1.18 | 0 | edge of water | | | | | | |

**Total Flow (cfs): 30.636**
**Total Flow (gpm): 13749.38**

Note: USGS 09165000 at Dolores River below Rico, CO
@ 15:45 on 10/6/02 = 35 cfs

DR - 26 Dolores River between Columbia Seep and Santa Cruz wetlands
Flow Measurements on 10/6/2002 @ 3:45 pm
Personnel: Steven Morgenstern, Ana Vargo

| Shot Number | Distance (ft) | Distance btw shot numbers (ft) | Depth (ft) at shot number | Average depth btw two shot #s (ft) | velocity measure-ment #1 (ft/sec) | velocity measure-ment #2 (ft/sec) | velocity measure-ment #3 (ft/sec) | Average velocity of #1-3 (ft/sec) | Average Flow Velocity btw two shot #s (ft/sec) | | Segment Flow (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5 | 1 | 0 | 0.265 | edge of water | | | **0.00** | 0.08 | | 0.022 |
| 2 | 6 | 1 | 0.53 | 0.475 | 0.18 | 0.15 | 0.17 | **0.17** | 0.23 | | 0.110 |
| 3 | 7 | 1 | 0.42 | 0.5 | 0.32 | 0.27 | 0.3 | **0.30** | 0.27 | | 0.135 |
| 4 | 8 | 1 | 0.58 | 0.605 | 0.24 | 0.22 | 0.27 | **0.24** | 0.29 | | 0.173 |
| 5 | 9 | 1 | 0.63 | 0.66 | 0.32 | 0.28 | 0.39 | **0.33** | 0.34 | | 0.221 |
| 6 | 10 | 1.1 | 0.69 | 0.72 | 0.37 | 0.35 | 0.3 | **0.34** | 0.13 | | 0.104 |
| 7 | 11.1 | 0.9 | 0.75 | 0.815 | -0.09 | -0.05 | -0.09 | **-0.08** | -0.08 | | -0.059 |
| 8 | 12 | 1 | 0.88 | 1.03 | -0.05 | -0.1 | -0.1 | **-0.08** | 0.14 | | 0.139 |
| 9 | 13 | 1 | 1.18 | 1.24 | 0.32 | 0.38 | 0.36 | **0.35** | 0.39 | | 0.477 |
| 10 | 14 | 1.2 | 1.3 | 1.32 | 0.35 | 0.42 | 0.48 | **0.42** | 0.41 | | 0.652 |
| 11 | 15.2 | 1.05 | 1.34 | 1.42 | 0.4 | 0.39 | 0.43 | **0.41** | 0.42 | | 0.626 |
| 12 | 16.25 | 0.75 | 1.5 | 1.44 | 0.39 | 0.45 | 0.46 | **0.43** | 0.48 | | 0.513 |
| 13 | 17 | 1.2 | 1.38 | 1.44 | 0.59 | 0.51 | 0.45 | **0.52** | 0.57 | | 0.991 |
| 14 | 18.2 | 0.8 | 1.5 | 1.45 | 0.64 | 0.62 | 0.63 | **0.63** | 0.64 | | 0.740 |
| 15 | 19 | 1 | 1.4 | 1.415 | 0.65 | 0.67 | 0.62 | **0.65** | 0.62 | | 0.875 |
| 16 | 20 | 1 | 1.43 | 1.53 | 0.53 | 0.63 | 0.61 | **0.59** | 0.64 | | 0.984 |
| 17 | 21 | 1 | 1.63 | 1.745 | 0.71 | 0.69 | 0.69 | **0.70** | 0.73 | | 1.280 |
| 18 | 22 | 1 | 1.86 | 1.92 | 0.78 | 0.86 | 0.67 | **0.77** | 0.76 | | 1.453 |
| 19 | 23 | 1 | 1.98 | 1.88 | 0.71 | 0.74 | 0.78 | **0.74** | 0.87 | | 1.632 |
| 20 | 24 | 1 | 1.78 | 1.85 | 0.98 | 0.99 | 1.01 | **0.99** | 1.00 | | 1.841 |
| 21 | 25 | 1 | 1.92 | 1.81 | 1.05 | 0.97 | 0.97 | **1.00** | 1.01 | | 1.822 |
| 22 | 26 | 1 | 1.7 | 1.74 | 1.09 | 0.98 | 0.98 | **1.02** | 1.02 | | 1.775 |
| 23 | 27 | 1 | 1.78 | 1.565 | 0.99 | 1.04 | 1.04 | **1.02** | 1.08 | | 1.693 |
| 24 | 28 | 1 | 1.35 | 1.57 | 1.16 | 1.15 | 1.11 | **1.14** | 1.05 | | 1.651 |
| 25 | 29 | 1.2 | 1.79 | 1.905 | 0.95 | 1.02 | 0.92 | **0.96** | 0.89 | | 2.027 |
| 26 | 30.2 | 0.8 | 2.02 | 1.945 | 0.85 | 0.74 | 0.84 | **0.81** | 0.85 | | 1.320 |
| 27 | 31 | 1 | 1.87 | 1.8 | 0.86 | 0.88 | 0.92 | **0.89** | 0.86 | | 1.545 |
| 28 | 32 | 1 | 1.73 | 1.805 | 0.82 | 0.81 | 0.86 | **0.83** | 0.70 | | 1.264 |
| 29 | 33 | 1 | 1.88 | 1.89 | 0.54 | 0.52 | 0.65 | **0.57** | 0.61 | | 1.143 |
| 30 | 34 | 1 | 1.9 | 1.715 | 0.6 | 0.66 | 0.66 | **0.64** | 0.59 | | 1.009 |
| 31 | 35 | 1 | 1.53 | 1.475 | 0.55 | 0.55 | 0.51 | **0.54** | 0.54 | | 0.789 |
| 32 | 36 | 0.6 | 1.42 | 1.46 | 0.54 | 0.5 | 0.56 | **0.53** | 0.54 | | 0.472 |
| 33 | 36.6 | 1.4 | 1.5 | 1.345 | 0.49 | 0.55 | 0.59 | **0.54** | 0.45 | | 0.847 |
| 34 | 38 | 1 | 1.19 | 1.19 | 0.41 | 0.32 | 0.34 | **0.36** | 0.28 | | 0.327 |
| 35 | 39 | 1 | 1.19 | 1.155 | 0.18 | 0.17 | 0.23 | **0.19** | 0.22 | | 0.258 |
| 36 | 40 | 0.7 | 1.12 | 1.15 | 0.26 | 0.24 | 0.26 | **0.25** | 0.13 | | 0.102 |
| 37 | 40.7 | | 1.18 | 0 | edge of water | | | | | | |

**Total Flow (cfs): 30.955**
**Total Flow (gpm): 13,893**

Note: USGS 09165000 at Dolores River below Rico, CO
@ 15:45 on 10/6/02 = 35 cfs

Rico AARCOE0105.00
DR-9-SW Rico Boy/Santa Cruz east wetland outlet
Flow Measurements on 10/07/2002 @ approximately 5:20 pm
Personnel: Steven Morgenstern, Ana Vargo

The flow is from two channels
East Channel = approximately 85% of flow
West Channel = approximately 15% of flow

NOTE: only measured approximate flow from east channel

Cross-section area calculation:

| | feet | | | | | sq ft |
|---|---|---|---|---|---|---|
| | **Width** | **Depth 1** | **Depth 2** | **Depth 3** | **Avg Depth** | **Area** |
| **upstream** | 0.85 | 0.05 | 0.26 | 0.10 | 0.14 | 0.12 |
| **downstream** | 0.70 | 0.25 | 0.28 | 0.20 | 0.24 | 0.17 |
| | | | average cross-sectional area | | | 0.14 |

distance between sections: 3 Feet

| Time Trials | | Notes |
|---|---|---|
| 1 | 1.65 sec | center of channel |
| 2 | 1.78 sec | center of channel |
| 3 | 1.75 sec | center of channel |
| | 1.73 sec | Average center of channel |

| | East Channel | **Total Flow** |
|---|---|---|
| **% of flow** | 85 | **100** |
| **cfs** | 0.25 | **0.29** |
| **gpm** | 111.70 | **131.41** |

Rico AARCOE0105.00
DR - 27 Rico Boy/Santa Cruz combined flow
Flow Measurements on 10/06/2002 at I:30pm
Personnel: Steven Morgenstern, Ana Vargo

| | Water depth from bottom of bucket | Volume (cubic ft) (use attached table) | Time (seconds) | Flow (cfs) | Flow (gpm) |
|---|---|---|---|---|---|
| **Test 1** | 0.75 | 0.406 | 15.06 | 0.026959 | 12.099 |
| **Test 2** | 0.8 | 0.436 | 15.63 | 0.027895 | 12.519 |
| **Test 3** | 0.81 | 0.441 | 15.88 | 0.027771 | 12.464 |
| | | | **AVG assuming 95% of flow** | **0.028** | **12.361** |
| | | | **100% Flow assuming 95% of flow captured** | **0.03** | **13.01** |

| **Enter known data pairs:** | | |
|---|---|---|
| | height (ft) | inside diameter (ft) |
| **Data 1** | 0 | 0.85 |
| **Data 2** | 1.18 | 0.935 |

| **Query x (sta)** | **Result y (elev)** | |
|---|---|---|
| water depth (ft) | w.s. diameter (ft) | volume (cubic ft) |
| 0 | 0.850 | 0.000 |
| 0.05 | 0.854 | 0.025 |
| 0.1 | 0.857 | 0.051 |
| 0.15 | 0.861 | 0.077 |
| 0.2 | 0.864 | 0.103 |
| 0.25 | 0.868 | 0.129 |
| 0.3 | 0.872 | 0.156 |
| 0.35 | 0.875 | 0.183 |
| 0.4 | 0.879 | 0.210 |
| 0.45 | 0.882 | 0.237 |
| 0.5 | 0.886 | 0.265 |
| 0.55 | 0.890 | 0.292 |
| 0.565 | 0.891 | 0.301 |
| 0.595 | 0.893 | 0.318 |
| 0.6 | 0.893 | 0.321 |
| 0.65 | 0.897 | 0.349 |
| 0.7 | 0.900 | 0.377 |
| 0.725 | 0.902 | 0.392 |
| 0.75 | 0.904 | 0.406 |
| 0.8 | 0.908 | 0.436 |
| 0.81 | 0.908 | 0.441 |
| 0.9 | 0.915 | 0.495 |
| 0.95 | 0.918 | 0.525 |
| 1 | 0.922 | 0.555 |
| 1.05 | 0.926 | 0.585 |

Rico AARCOE0105.00
DR-7-SW Silver Swan adit
Flow Measurements on 10/072002 @ 16:30
Personnel: Steven Morgenstern, Ana Vargo

Three cross-sections used:

| | top width (ft) | depth (ft) | area 1 (sq ft) | area 2 (sq ft) | avg area (sq ft) |
|---|---|---|---|---|---|
| Upstream | 1.4 | 0.05 | 0.035 | 0.07 | 0.053 |
| Mid | 2.4 | 0.10 | 0.12 | 0.24 | 0.180 |
| Downstream | 2.1 | 0.05 | 0.0525 | 0.105 | 0.079 |
| | | | | avg = | 0.104 |

area 1 = area assuming triangular geometry
area 2 = area assuming rectangular geometry
avg area = average of area 1 & area 2

Section length 4 ft

| Time Trials | | Notes |
|---|---|---|
| 1 | 8.66 sec | center of channel |
| 2 | 11.38 sec | center of channel |
| 3 | 8.22 sec | center of channel |
| 4 | 8.62 sec | center of channel |
| | 9.22 sec | Average time at center of channel |
| | 0.43 ft/sec | average velocity at surface |

**cfs** **0.045**
**gpm** **20.20**

Rico AARCOE0105.00
DR - 4 - SW Dolores River below Silver Swan
Flow Measurements on 10/6/2002 @ 8:35 am
Personnel: Steven Morgenstern, Ana Vargo

| Shot Number | Distance (ft) | Distance btw shot numbers (ft) | Depth (ft) at shot number | Average depth btw two shot #s (ft) | velocity measure-ment #1 (ft/sec) | velocity measure-ment #2 (ft/sec) | velocity measure-ment #3 (ft/sec) | velocity measure-ment #4 (ft/sec) | Average velocity of #1-3 (ft/sec) | Average Flow Velocity btw two shot #s (ft/sec) | | Segment Flow (cfs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 29.00 | 5.1 | 0 | 0.14 | edge of water | | | | **0.00** | 0.38 | | 0.271 |
| 2 | 34.10 | 2.9 | 0.28 | 0.33 | 0.78 | 0.76 | 0.74 | | **0.76** | 0.78 | | 0.748 |
| 3 | 37.00 | 2.3 | 0.38 | 0.52 | 0.82 | 0.79 | 0.80 | | **0.80** | 0.41 | | 0.494 |
| 4 | 39.30 | 1.55 | 0.66 | 0.82 | 0.01 | 0.05 | 0.01 | | **0.02** | 0.57 | | 0.727 |
| 5 | 40.85 | 2.9 | 0.98 | 1.11 | 1.10 | 1.12 | 1.14 | | **1.12** | 1.36 | | 4.367 |
| 6 | 43.75 | 1.55 | 1.24 | 1.305 | 1.60 | 1.42 | 1.76 | | **1.59** | 1.47 | | 2.980 |
| 7 | 45.30 | 1.7 | 1.37 | 1.185 | 1.30 | 1.32 | 1.44 | | **1.35** | 1.75 | | 3.525 |
| 8 | 47.00 | 1.1 | 1.00 | 1.215 | 2.20 | 2.27 | 1.97 | | **2.15** | 1.74 | | 2.319 |
| 9 | 48.10 | 1.9 | 1.43 | 1.515 | 1.11 | 1.61 | 1.25 | | **1.32** | 1.36 | | 3.912 |
| 10 | 50.00 | 1.9 | 1.60 | 1.5 | 1.72 | 1.28 | 0.99 | 1.59 | **1.40** | 1.44 | | 4.106 |
| 11 | 51.90 | 1.9 | 1.40 | 1.36 | 1.48 | 1.62 | 1.36 | | **1.49** | 1.48 | | 3.820 |
| 12 | 53.80 | 2 | 1.32 | 1.26 | 1.50 | 1.48 | 1.43 | | **1.47** | 1.45 | | 3.654 |
| 13 | 55.80 | 2.05 | 1.20 | 1.15 | 1.44 | 1.45 | 1.40 | | **1.43** | 1.27 | | 2.994 |
| 14 | 57.85 | 1.1 | 1.10 | 0.895 | 1.09 | 1.13 | 1.11 | | **1.11** | 0.89 | | 0.873 |
| 15 | 58.95 | 1.85 | 0.69 | 0.655 | 0.67 | 0.62 | 0.70 | | **0.66** | 0.33 | | 0.402 |
| 16 | 60.80 | 1.4 | 0.62 | 0.31 | 0.18 | 0.17 | 0.13 | | **0.16** | 0.08 | | 0.035 |
| 17 | 62.20 | | 0 | 0 | edge of water | | | | | | | |

**Total Flow (cfs): 35.228**
**Total Flow (gpm): 15810.38**

Note: USGS 09165000 at Dolores River below Rico, CO
@ 8:30am on 10/06/02 = 44 cfs

Rico AARCOE0105.00
DR - 3 St. Louis Adit at flume
Flow Measurements on 10/9/2002 @3:50 pm
Personnel: Steven Morgenstern

9-inch Parshall Flume
used table

| | | |
|---|---|---|
| 0.49' | = | 1.031 cfs |
| | | 462.6 gpm |

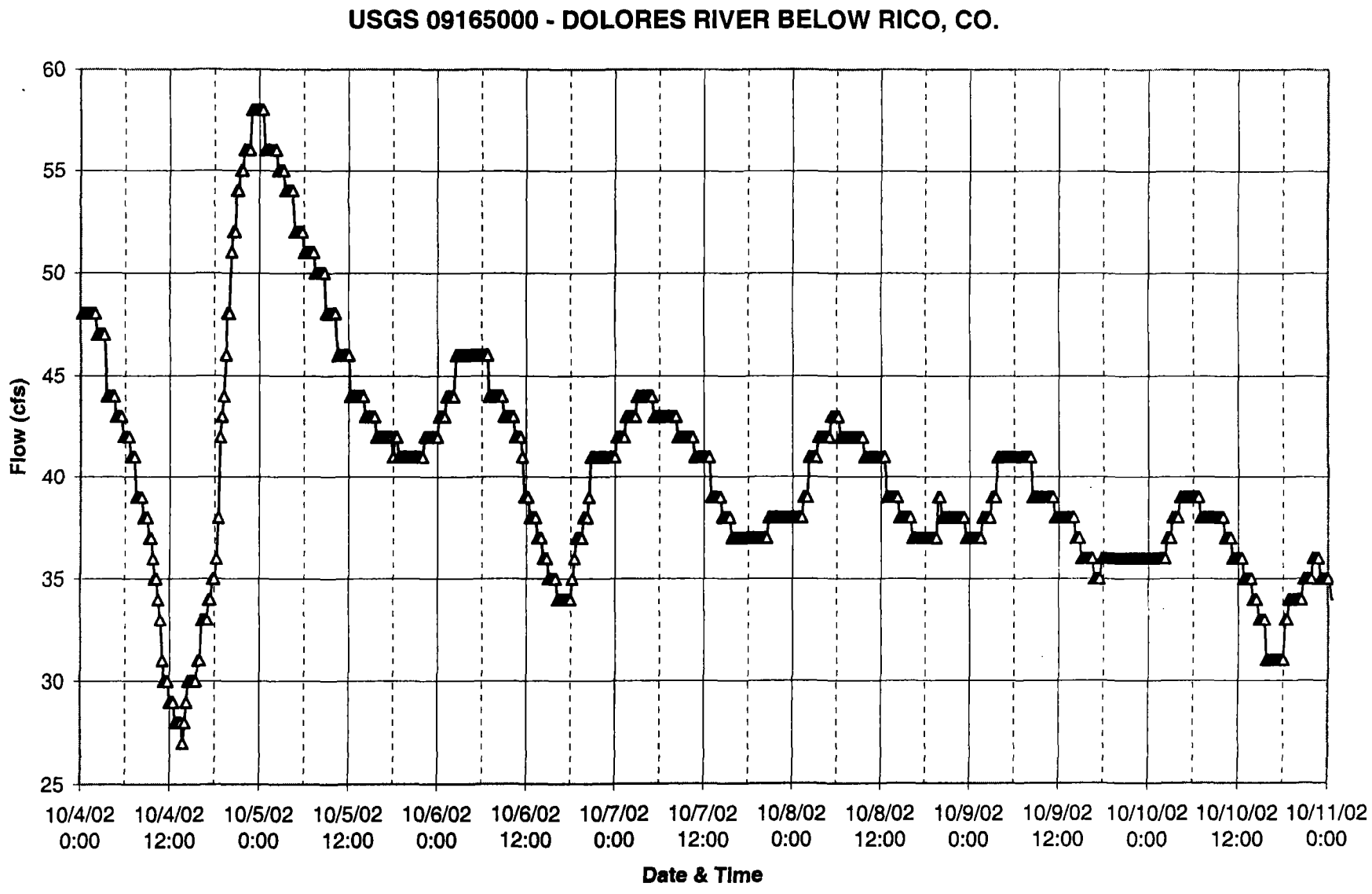
Rico AARCOE0105.00
DR - 6 Dolores River @ 002 Outfall
Flow Measurements on 10/8/2002 @ 3:38 pm
Personnel: Steven Morgenstern, Ana Vargo

9-inch Parshall Flume
used table

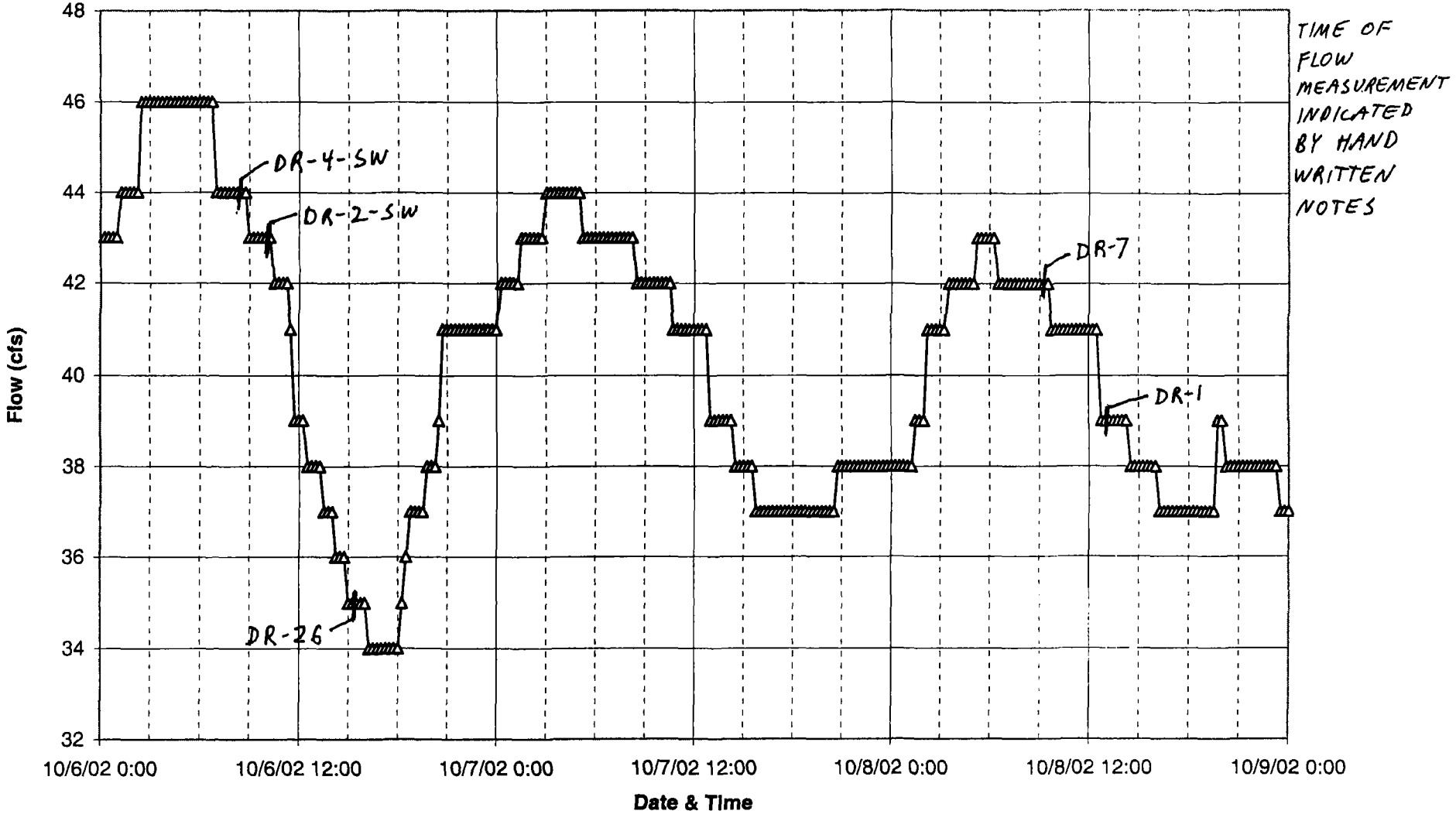
| | |
|---|---|
| 0.14 = | 0.1516 cfs |
| | 68.04 gpm |

# APPENDIX A4

**Stream Flow Data**
**USGS 09165000**
**Dolores River Below Rico, Co.**


USGS 09165000 - DOLORES RIVER BELOW RICO, CO.
Flow (cfs)
60
55
50
45
40
35
30
25
10/4/02 0:00
10/4/02 12:00
10/5/02 0:00
10/5/02 12:00
10/6/02 0:00
10/6/02 12:00
10/7/02 0:00
10/7/02 12:00
10/8/02 0:00
10/8/02 12:00
10/9/02 0:00
10/9/02 12:00
10/10/02 0:00
10/10/02 12:00
10/11/02 0:00
Date & Time

## USGS 09165000 - DOLORES RIVER BELOW RICO, CO.



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# ---------------------WARNING---------------------
# The data you have obtained from this automated
# U.S. Geological Survey database have not received
# Director's approval and as such are provisional
# and subject to revision.  The data are released
# on the condition that neither the USGS nor the
# United States Government may be held liable for
# any damages resulting from its use.
#
# Additional information can be obtained from the USGS at
#   http://waterdata.usgs.gov/co/nwis/help/?provisional
#
# retrieved: 2002-10-11 11:48:40 EDT
#
# This file consists of tab-separated columns of data
# The columns include the following fields
#
# column        column definition
# ------------  ----------------------------------------
# agency_cd     Agency collection or maintaining the site
# site_no       USGS site identification number
# datetime      date and time in ISO format (YYYY-mm-dd HH:MM:SS)
#
# The remaining fields vary for each site.  The field names
# use the following form '##_#####' where the first two numbers
# uniquely define sensor (the 'data descriptor') and  the
# used to collect the data used to collect the data
# and the 5 number sequence is the 'parameter_cd'
# that defines the type of data shown in the column.
#
#
# Data for the following stations is contained in this file
# ---------------------------------------------------------
#  USGS 09165000 DOLORES RIVER BELOW RICO, CO.
#
#
#
#
#
# List of available data for this site.  Lines preceeded by
# an asterix '*' are included in the data file.
#
#  DD parameter - Description
#  -- -----       ------------------------------------
# *02   70969   - DCP BATTERY VOLTAGE IN VOLTS
# *04   00065   - GAGE HEIGHT, FEET
# *06   00060   - DISCHARGE, CUBIC FEET PER SECOND
# *15   72117   - DATA COLLECTION PLATFORM TRANSMISSION TIME DRIFT, IN SECONDS
#
agency_cd   site_no     datetime    04_00065    06_00060    02_70969    15_72117
USGS  09165000    2002-10-04 00:15  2.30  48.0
USGS  09165000    2002-10-04 00:30  2.30  48.0
USGS  09165000    2002-10-04 00:45  2.30  48.0
USGS  09165000    2002-10-04 01:00  2.30  48.0
USGS  09165000    2002-10-04 01:15  2.30  48.0
USGS  09165000    2002-10-04 01:30  2.30  48.0
USGS  09165000    2002-10-04 01:45  2.30  48.0
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| USGS | 09165000 | 2002-10-04 03:00 | 2.29 | 47.0 | | |
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| USGS | 09165000 | 2002-10-05 04:45 | 2.33 | 52.0 | | |

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| USGS | 09165000 | 2002-10-05 10:15 | 2.30 | 48.0 | | |
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| USGS | 09165000 | 2002-10-05 10:45 | 2.29 | 46.0 | | |
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| USGS | 09165000 | 2002-10-05 11:15 | 2.29 | 46.0 | | |
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| USGS | 09165000 | 2002-10-05 13:00 | 2.28 | 44.0 | 13.2 | |
| USGS | 09165000 | 2002-10-05 13:15 | 2.28 | 44.0 | | |
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| USGS | 09165000 | 2002-10-05 13:45 | 2.28 | 44.0 | | |
| USGS | 09165000 | 2002-10-05 14:00 | 2.28 | 44.0 | | |
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| USGS | 09165000 | 2002-10-05 | 21:45 | 2.25 | 41.0 | | |
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| USGS | 09165000 | 2002-10-10 | 18:30 | 2.19 | 33.0 | | |
| USGS | 09165000 | 2002-10-10 | 18:45 | 2.20 | 34.0 | | |
| USGS | 09165000 | 2002-10-10 | 19:00 | 2.20 | 34.0 | | |

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| USGS | 09165000 | 2002-10-10 | 20:30 | 2.20 | 34.0 | | |
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# APPENDIX B

## Analytical Report Package

**ACZ Laboratories, Inc.**
*2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493*

**Analytical Report**

Steven Morgenstern
SEH
2637 Midpoint Drive Suite F
Fort Collins, CO 80525

October 31, 2002

Project: L38876

Steven Morgenstern:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 10, 2002. This project has been assigned to ACZ's project number, L38876. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 9.0. The enclosed results relate only to the samples received under L38876. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Please assess the enclosed report only in its entirety. ACZ prohibits the reproduction of this report, except in full, without the written approval of ACZ. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after November 30, 2002. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years. Please notify your Project Manager if you have other needs.

If you have any questions, please contact your Project Manager or Customer Service Representative.

Sue Barkey 31/Oct/02

Sue Barkey, Project Manager, has reviewed and accepted this report in its entirety.

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS
Sample ID: DR-7-SW

ACZ ID: ***L38876-01***
Date Sampled: *10/08/02 08:20*
Date Received: *10/10/02*
Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic, total recoverable | M200.8 ICP-MS | 0.0066 | | mg/L | 0.0005 | 0.003 | 10/23/02 8:47 | lcj |
| Cadmium, dissolved | M200.8 ICP-MS | 0.0002 | B | mg/L | 0.0001 | 0.0005 | 10/30/02 10:52 | lcj |
| Calcium, dissolved | M200.7 ICP | 338 | | mg/L | 0.2 | 1 | 10/24/02 19:17 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/23/02 15:24 | bf |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 19:17 | bf |
| Iron, total recoverable | M200.7 ICP | 13.70 | | mg/L | 0.01 | 0.05 | 10/23/02 3:27 | kdw |
| Lead, dissolved | M200.8 ICP-MS | 0.0011 | | mg/L | 0.0001 | 0.0005 | 10/30/02 10:52 | lcj |
| Magnesium, dissolved | M200.7 ICP | 52.4 | | mg/L | 0.2 | 1 | 10/24/02 19:17 | bf |
| Manganese, dissolved | M200.7 ICP | 2.640 | | mg/L | 0.005 | 0.03 | 10/24/02 19:17 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 19:17 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/25/02 15:54 | wfg |
| Silver, dissolved | M200.8 ICP-MS | 0.00019 | B | mg/L | 5E-05 | 0.0003 | 10/30/02 10:52 | lcj |
| Zinc, dissolved | M200.7 ICP | 0.76 | | mg/L | 0.01 | 0.05 | 10/24/02 19:17 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/17/02 8:11 | cdr |
| Total Recoverable Digestion | M200.2 ICP-MS | | | | | | 10/14/02 8:26 | lcj |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 11:17 | prw |
| Hardness as CaCO3 | SM2340B - Calculation | 1060 | | mg/L | 1 | 7 | 10/31/02 9:56 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 1260 | | mg/L | 10 | 20 | 10/14/02 13:37 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | 8 | B | mg/L | 5 | 20 | 10/10/02 17:20 | hap |

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS
Sample ID: DR-7

ACZ ID: ***L38876-02***
Date Sampled: *10/08/02 09:05*
Date Received: *10/10/02*
Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cadmium, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/30/02 10:57 | lcj |
| Calcium, dissolved | M200.7 ICP | 53.8 | | mg/L | 0.2 | 1 | 10/24/02 19:22 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/23/02 15:36 | bf |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 19:22 | bf |
| Iron, total recoverable | M200.7 ICP | 0.18 | | mg/L | 0.01 | 0.05 | 10/23/02 3:41 | kdw |
| Lead, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/30/02 10:57 | lcj |
| Magnesium, dissolved | M200.7 ICP | 7.6 | | mg/L | 0.2 | 1 | 10/24/02 19:22 | bf |
| Manganese, dissolved | M200.7 ICP | 0.135 | | mg/L | 0.005 | 0.03 | 10/24/02 19:22 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 19:22 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/25/02 16:00 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/30/02 10:57 | lcj |
| Zinc, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 19:22 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/17/02 8:51 | cdr |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 11:18 | prw |
| Hardness as CaCO3 | SM2340B - Calculation | 166 | | mg/L | 1 | 7 | 10/31/02 9:56 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 220 | | mg/L | 10 | 20 | 10/14/02 13:39 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 10/10/02 17:28 | hap |

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS

Sample ID: DR-2

ACZ ID: ***L38876-03***

Date Sampled: *10/08/02 10:35*

Date Received: *10/10/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cadmium, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/30/02 9:49 | lcj |
| Calcium, dissolved | M200.7 ICP | 45.6 | | mg/L | 0.2 | 1 | 10/24/02 19:27 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/23/02 15:39 | bf |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 19:27 | bf |
| Iron, total recoverable | M200.7 ICP | 0.12 | | mg/L | 0.01 | 0.05 | 10/23/02 3:45 | kdw |
| Lead, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/30/02 9:49 | lcj |
| Magnesium, dissolved | M200.7 ICP | 6.4 | | mg/L | 0.2 | 1 | 10/24/02 19:27 | bf |
| Manganese, dissolved | M200.7 ICP | 0.115 | | mg/L | 0.005 | 0.03 | 10/24/02 19:27 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 19:27 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/25/02 16:02 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/30/02 9:49 | lcj |
| Zinc, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 19:27 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/17/02 9:04 | cdr |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 12:43 | ksj |
| Hardness as CaCO3 | SM2340B - Calculation | 140 | | mg/L | 1 | 7 | 10/31/02 9:56 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 180 | | mg/L | 10 | 20 | 10/14/02 13:40 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 10/10/02 17:32 | hap |

**Note: The WAD Cyanide value is estimated due to matrix interferences.**

**ACZ Laboratories, Inc.**
*2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493*

# Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS
Sample ID: DR-20

ACZ ID: ***L38876-04***
Date Sampled: *10/08/02 11:15*
Date Received: *10/10/02*
Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cadmium, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/30/02 11:17 | lcj |
| Calcium, dissolved | M200.7 ICP | 40.4 | | mg/L | 0.2 | 1 | 10/24/02 19:31 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/23/02 15:43 | bf |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 19:31 | bf |
| Iron, total recoverable | M200.7 ICP | 0.10 | | mg/L | 0.01 | 0.05 | 10/23/02 3:58 | kdw |
| Lead, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/30/02 11:17 | lcj |
| Magnesium, dissolved | M200.7 ICP | 6.0 | | mg/L | 0.2 | 1 | 10/24/02 19:31 | bf |
| Manganese, dissolved | M200.7 ICP | 0.045 | | mg/L | 0.005 | 0.03 | 10/24/02 19:31 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 19:31 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/25/02 16:04 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/30/02 11:17 | lcj |
| Zinc, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 19:31 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/17/02 9:17 | cdr |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 12:45 | ksj |
| Hardness as CaCO3 | SM2340B - Calculation | 126 | | mg/L | 1 | 7 | 10/31/02 9:56 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 160 | | mg/L | 10 | 20 | 10/14/02 13:41 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 10/10/02 17:37 | hap |

**Note: The WAD Cyanide value is estimated due to matrix interferences.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS

Sample ID: DR-1

ACZ ID: ***L38876-05***

Date Sampled: *10/08/02 12:15*

Date Received: *10/10/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 10/23/02 8:53 | lcj |
| Cadmium, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/30/02 11:23 | lcj |
| Calcium, dissolved | M200.7 ICP | 38.5 | | mg/L | 0.2 | 1 | 10/24/02 19:46 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 16:46 | kdw |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 19:46 | bf |
| Iron, total recoverable | M200.7 ICP | 0.11 | | mg/L | 0.01 | 0.05 | 10/21/02 16:46 | kdw |
| Lead, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/30/02 11:23 | lcj |
| Magnesium, dissolved | M200.7 ICP | 5.8 | | mg/L | 0.2 | 1 | 10/24/02 19:46 | bf |
| Manganese, dissolved | M200.7 ICP | 0.015 | B | mg/L | 0.005 | 0.03 | 10/24/02 19:46 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 19:46 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/25/02 16:06 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/30/02 11:23 | lcj |
| Zinc, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 19:46 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/15/02 13:11 | cdr |
| Total Recoverable Digestion | M200.2 ICP-MS | | | | | | 10/14/02 8:39 | lcj |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 12:46 | ksj |
| Hardness as CaCO3 | SM2340B - Calculation | 120 | | mg/L | 1 | 7 | 10/31/02 9:56 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 150 | | mg/L | 10 | 20 | 10/14/02 13:43 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 10/10/02 17:41 | hap |

**Note: The WAD Cyanide value is estimated due to matrix interferences.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS

Sample ID: DR-6

ACZ ID: *L38876-06*

Date Sampled: *10/08/02 15:15*

Date Received: *10/10/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 10/23/02 8:58 | lcj |
| Cadmium, dissolved | M200.8 ICP-MS | 0.0017 | | mg/L | 0.0001 | 0.0005 | 10/30/02 11:38 | lcj |
| Cadmium, potentially dissolved | M200.8 ICP-MS | 0.0018 | | mg/L | 0.0001 | 0.0005 | 10/19/02 17:47 | lcj |
| Calcium, dissolved | M200.7 ICP | 294 | | mg/L | 0.2 | 1 | 10/24/02 20:01 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 16:50 | kdw |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 20:01 | bf |
| Copper, potentially dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 7:45 | bf |
| Iron, dissolved | M200.7 ICP | 0.02 | B | mg/L | 0.01 | 0.05 | 10/24/02 20:01 | bf |
| Iron, total recoverable | M200.7 ICP | 0.30 | | mg/L | 0.01 | 0.05 | 10/21/02 16:50 | kdw |
| Lead, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/30/02 11:38 | lcj |
| Lead, potentially dissolved | M200.8 ICP-MS | 0.0008 | | mg/L | 0.0001 | 0.0005 | 10/19/02 17:47 | lcj |
| Magnesium, dissolved | M200.7 ICP | 27.4 | | mg/L | 0.2 | 1 | 10/24/02 20:01 | bf |
| Manganese, dissolved | M200.7 ICP | 0.296 | | mg/L | 0.005 | 0.03 | 10/24/02 20:01 | bf |
| Manganese, potentially dissolved | M200.7 ICP | 0.312 | | mg/L | 0.005 | 0.03 | 10/24/02 7:45 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 20:01 | bf |
| Nickel, potentially dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 7:45 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/25/02 16:11 | wfg |
| Selenium, potentially dissolved | M200.8 ICP-MS | | U | mg/L | 0.002 | 0.008 | 10/19/02 17:47 | lcj |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/30/02 11:38 | lcj |
| Silver, potentially dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/19/02 17:47 | lcj |
| Zinc, dissolved | M200.7 ICP | 0.40 | | mg/L | 0.01 | 0.05 | 10/24/02 20:01 | bf |
| Zinc, potentially dissolved | M200.7 ICP | 0.41 | | mg/L | 0.01 | 0.05 | 10/24/02 7:45 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Acidify and filter (PD) | Potentially dissolved (CO WQCC) | | | | | | 10/15/02 11:07 | cdr |
| Acidify and filter (PD, ICP-MS) | Potentially dissolved (CO) | | | | | | 10/15/02 11:07 | cdr |
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/15/02 12:36 | cdr |
| Total Recoverable Digestion | M200.2 ICP-MS | | | | | | 10/14/02 8:52 | lcj |

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

# Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS
Sample ID: DR-6

ACZ ID: ***L38876-06***
Date Sampled: *10/08/02 15:15*
Date Received: *10/10/02*
Sample Matrix: *Surface Water*

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 12:47 | ksj |
| Hardness as CaCO3 | SM2340B - Calculation | 848 | | mg/L | 1 | 7 | 10/31/02 9:56 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 1190 | | mg/L | 10 | 20 | 10/14/02 13:44 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 10/10/02 17:45 | hap |

**Note: The WAD Cyanide value is estimated due to matrix interferences.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS

Sample ID: DR-3

ACZ ID: *L38876-07*

Date Sampled: *10/08/02 15:55*

Date Received: *10/10/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic, total recoverable | M200.8 ICP-MS | 0.0021 | B | mg/L | 0.0005 | 0.003 | 10/23/02 9:03 | lcj |
| Cadmium, dissolved | M200.8 ICP-MS | 0.0138 | | mg/L | 0.0001 | 0.0005 | 10/30/02 11:44 | lcj |
| Cadmium, total recoverable | M200.8 ICP-MS | 0.0144 | | mg/L | 0.0001 | 0.0005 | 10/23/02 9:03 | lcj |
| Calcium, dissolved | M200.7 ICP | 271 | | mg/L | 0.2 | 1 | 10/24/02 20:06 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/23/02 15:47 | bf |
| Copper, dissolved | M200.7 ICP | 0.03 | B | mg/L | 0.01 | 0.05 | 10/24/02 20:06 | bf |
| Copper, total recoverable | M200.7 ICP | 0.22 | | mg/L | 0.01 | 0.05 | 10/23/02 4:03 | kdw |
| Iron, dissolved | M200.7 ICP | 4.12 | | mg/L | 0.01 | 0.05 | 10/24/02 20:06 | bf |
| Iron, total recoverable | M200.7 ICP | 12.00 | | mg/L | 0.01 | 0.05 | 10/23/02 4:03 | kdw |
| Lead, dissolved | M200.8 ICP-MS | 0.0132 | | mg/L | 0.0001 | 0.0005 | 10/30/02 11:44 | lcj |
| Lead, potentially dissolved | M200.8 ICP-MS | 0.0160 | | mg/L | 0.0001 | 0.0005 | 10/19/02 17:53 | lcj |
| Magnesium, dissolved | M200.7 ICP | 20.5 | | mg/L | 0.2 | 1 | 10/24/02 20:06 | bf |
| Manganese, dissolved | M200.7 ICP | 1.830 | | mg/L | 0.005 | 0.03 | 10/24/02 20:06 | bf |
| Manganese, total recoverable | M200.7 ICP | 1.950 | | mg/L | 0.005 | 0.03 | 10/23/02 4:03 | kdw |
| Nickel, dissolved | M200.7 ICP | 0.01 | B | mg/L | 0.01 | 0.05 | 10/24/02 20:06 | bf |
| Nickel, potentially dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 7:55 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/25/02 16:13 | wfg |
| Selenium, potentially dissolved | M200.8 ICP-MS | | U | mg/L | 0.002 | 0.008 | 10/19/02 17:53 | lcj |
| Silver, dissolved | M200.8 ICP-MS | 0.00018 | B | mg/L | 5E-05 | 0.0003 | 10/30/02 11:44 | lcj |
| Silver, potentially dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/19/02 17:53 | lcj |
| Zinc, dissolved | M200.7 ICP | 2.97 | | mg/L | 0.01 | 0.05 | 10/24/02 20:06 | bf |
| Zinc, total recoverable | M200.7 ICP | 3.20 | | mg/L | 0.01 | 0.05 | 10/23/02 4:03 | kdw |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Acidify and filter (PD) | Potentially dissolved (CO WQCC) | | | | | | 10/15/02 11:15 | cdr |
| Acidify and filter (PD, ICP-MS) | Potentially dissolved (CO) | | | | | | 10/15/02 11:15 | cdr |
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/17/02 9:30 | cdr |
| Total Recoverable Digestion | M200.2 ICP-MS | | | | | | 10/14/02 9:05 | lcj |

**ACZ Laboratories, Inc.**
*2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493*

# Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS
Sample ID: DR-3

ACZ ID: ***L38876-07***
Date Sampled: *10/08/02 15:55*
Date Received: *10/10/02*
Sample Matrix: *Surface Water*

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 12:48 | ksj |
| Hardness as CaCO3 | SM2340B - Calculation | 762 | | mg/L | 1 | 7 | 10/31/02 9:56 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 1100 | | mg/L | 10 | 20 | 10/14/02 13:46 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | 26 | | mg/L | 5 | 20 | 10/10/02 17:49 | hap |

**Note: The WAD Cyanide value is estimated due to matrix interferences.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS

Sample ID: DR-9-SW

ACZ ID: ***L38876-08***

Date Sampled: *10/07/02 17:10*

Date Received: *10/10/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cadmium, dissolved | M200.8 ICP-MS | 0.0002 | B | mg/L | 0.0001 | 0.0005 | 10/30/02 11:49 | lcj |
| Calcium, dissolved | M200.7 ICP | 72.0 | | mg/L | 0.2 | 1 | 10/24/02 20:10 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 17:01 | kdw |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 20:10 | bf |
| Iron, total recoverable | M200.7 ICP | 1.12 | | mg/L | 0.01 | 0.05 | 10/21/02 11:55 | kdw |
| Lead, dissolved | M200.8 ICP-MS | 0.0002 | B | mg/L | 0.0001 | 0.0005 | 10/30/02 11:49 | lcj |
| Magnesium, dissolved | M200.7 ICP | 9.2 | | mg/L | 0.2 | 1 | 10/24/02 20:10 | bf |
| Manganese, dissolved | M200.7 ICP | 1.180 | | mg/L | 0.005 | 0.03 | 10/24/02 20:10 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 20:10 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/25/02 16:19 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/30/02 11:49 | lcj |
| Zinc, dissolved | M200.7 ICP | 0.03 | B | mg/L | 0.01 | 0.05 | 10/24/02 20:10 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/15/02 12:00 | cdr |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 11:19 | prw |
| Hardness as CaCO3 | SM2340B - Calculation | 218 | | mg/L | 1 | 7 | 10/31/02 0:00 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 250 | | mg/L | 10 | 20 | 10/11/02 11:58 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 10/10/02 17:53 | hap |

**Note: Sample was distilled for Total WAD Cyanide on 10/17/02, within the fourteen day holdtime.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

**Inorganic Analytical Results**

**SEH**

Project ID: RICO-ST. LOUIS PONDS
Sample ID: DR-24

ACZ ID: *L38876-09*
Date Sampled: *10/09/02 08:15*
Date Received: *10/10/02*
Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 10/23/02 9:19 | lcj |
| Cadmium, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/30/02 11:54 | lcj |
| Calcium, dissolved | M200.7 ICP | | U | mg/L | 0.2 | 1 | 10/24/02 20:15 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 17:04 | kdw |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 20:15 | bf |
| Iron, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 17:04 | kdw |
| Lead, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/30/02 11:54 | lcj |
| Magnesium, dissolved | M200.7 ICP | | U | mg/L | 0.2 | 1 | 10/24/02 20:15 | bf |
| Manganese, dissolved | M200.7 ICP | | U | mg/L | 0.005 | 0.03 | 10/24/02 20:15 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 20:15 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/25/02 16:21 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/30/02 11:54 | lcj |
| Zinc, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 20:15 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/15/02 11:24 | cdr |
| Total Recoverable Digestion | M200.2 ICP-MS | | | | | | 10/14/02 9:18 | lcj |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 12:48 | ksj |
| Hardness as CaCO3 | SM2340B - Calculation | n/a | | mg/L | 1 | 7 | 10/31/02 9:56 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | | U | mg/L | 10 | 20 | 10/15/02 14:14 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 10/10/02 17:57 | hap |

**Note: The WAD Cyanide value is estimated due to matrix interferences.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS

Sample ID: DR-25

ACZ ID: ***L38876-10***

Date Sampled: *10/09/02 11:35*

Date Received: *10/10/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic, total recoverable | M200.8 ICP-MS | 0.0008 | B | mg/L | 0.0005 | 0.003 | 10/23/02 9:25 | lcj |
| Cadmium, dissolved | M200.8 ICP-MS | 0.0007 | | mg/L | 0.0001 | 0.0005 | 10/30/02 11:59 | lcj |
| Calcium, dissolved | M200.7 ICP | 210 | | mg/L | 0.2 | 1 | 10/24/02 20:20 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 17:08 | kdw |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 20:20 | bf |
| Iron, total recoverable | M200.7 ICP | 4.62 | | mg/L | 0.01 | 0.05 | 10/21/02 12:03 | kdw |
| Lead, dissolved | M200.8 ICP-MS | 0.0001 | B | mg/L | 0.0001 | 0.0005 | 10/30/02 11:59 | lcj |
| Magnesium, dissolved | M200.7 ICP | 34.7 | | mg/L | 0.2 | 1 | 10/24/02 20:20 | bf |
| Manganese, dissolved | M200.7 ICP | 5.700 | | mg/L | 0.005 | 0.03 | 10/24/02 20:20 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 20:20 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/25/02 16:23 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/30/02 11:59 | lcj |
| Zinc, dissolved | M200.7 ICP | 4.95 | | mg/L | 0.01 | 0.05 | 10/24/02 20:20 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP-MS | | | | | | 10/14/02 9:31 | lcj |
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/15/02 10:49 | cdr |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 12:51 | ksj |
| Hardness as CaCO3 | SM2340B - Calculation | 668 | | mg/L | 1 | 7 | 10/31/02 9:56 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 890 | | mg/L | 10 | 20 | 10/15/02 14:16 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | 8 | B | mg/L | 5 | 20 | 10/10/02 18:01 | hap |

**Note: The WAD Cyanide value is estimated due to matrix interferences.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS

Sample ID: SVS-8

ACZ ID: ***L38876-11***

Date Sampled: *10/09/02 08:55*

Date Received: *10/10/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cadmium, dissolved | M200.8 ICP-MS | 0.0012 | | mg/L | 0.0001 | 0.0005 | 10/30/02 12:05 | lcj |
| Calcium, dissolved | M200.7 ICP | 60.2 | | mg/L | 0.2 | 1 | 10/24/02 20:25 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 17:11 | kdw |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 20:25 | bf |
| Iron, total recoverable | M200.7 ICP | 0.13 | | mg/L | 0.01 | 0.05 | 10/21/02 17:11 | kdw |
| Lead, dissolved | M200.8 ICP-MS | 0.0005 | | mg/L | 0.0001 | 0.0005 | 10/30/02 12:05 | lcj |
| Magnesium, dissolved | M200.7 ICP | 7.0 | | mg/L | 0.2 | 1 | 10/24/02 20:25 | bf |
| Manganese, dissolved | M200.7 ICP | 0.269 | | mg/L | 0.005 | 0.03 | 10/24/02 20:25 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 20:25 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/25/02 16:25 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/30/02 12:05 | lcj |
| Zinc, dissolved | M200.7 ICP | 0.49 | | mg/L | 0.01 | 0.05 | 10/24/02 20:25 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/15/02 10:13 | cdr |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 12:51 | ksj |
| Hardness as CaCO3 | SM2340B - Calculation | 179 | | mg/L | 1 | 7 | 10/31/02 9:56 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 200 | | mg/L | 10 | 20 | 10/15/02 14:18 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 10/10/02 18:05 | hap |

**Note: The WAD Cyanide value is estimated due to matrix interferences.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS

Sample ID: SVS-22

ACZ ID: *L38876-12*

Date Sampled: *10/09/02 09:55*

Date Received: *10/10/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cadmium, dissolved | M200.8 ICP-MS | 0.0012 | | mg/L | 0.0001 | 0.0005 | 10/30/02 12:10 | lcj |
| Calcium, dissolved | M200.7 ICP | 45.1 | | mg/L | 0.2 | 1 | 10/24/02 20:30 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 17:15 | kdw |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 20:30 | bf |
| Iron, total recoverable | M200.7 ICP | 0.08 | | mg/L | 0.01 | 0.05 | 10/21/02 17:15 | kdw |
| Lead, dissolved | M200.8 ICP-MS | 0.0010 | | mg/L | 0.0001 | 0.0005 | 10/30/02 12:10 | lcj |
| Magnesium, dissolved | M200.7 ICP | 4.4 | | mg/L | 0.2 | 1 | 10/24/02 20:30 | bf |
| Manganese, dissolved | M200.7 ICP | 0.012 | B | mg/L | 0.005 | 0.03 | 10/24/02 20:30 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 20:30 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/25/02 16:26 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/30/02 12:10 | lcj |
| Zinc, dissolved | M200.7 ICP | 0.29 | | mg/L | 0.01 | 0.05 | 10/24/02 20:30 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/15/02 9:38 | cdr |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 12:52 | ksj |
| Hardness as CaCO3 | SM2340B - Calculation | 131 | | mg/L | 1 | 7 | 10/31/02 9:56 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 140 | | mg/L | 10 | 20 | 10/15/02 14:19 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 10/15/02 13:36 | hap |

**Note: The WAD Cyanide value is estimated due to matrix interferences.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS
Sample ID: SVS-12

ACZ ID: ***L38876-13***
Date Sampled: *10/09/02 11:00*
Date Received: *10/10/02*
Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 10/23/02 9:30 | lcj |
| Cadmium, dissolved | M200.8 ICP-MS | 0.0008 | | mg/L | 0.0001 | 0.0005 | 10/30/02 11:02 | lcj |
| Calcium, dissolved | M200.7 ICP | 215 | | mg/L | 0.2 | 1 | 10/24/02 20:35 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 17:19 | kdw |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/24/02 20:35 | bf |
| Iron, total recoverable | M200.7 ICP | 4.72 | | mg/L | 0.01 | 0.05 | 10/21/02 12:14 | kdw |
| Lead, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/30/02 11:02 | lcj |
| Magnesium, dissolved | M200.7 ICP | 35.2 | | mg/L | 0.2 | 1 | 10/24/02 20:35 | bf |
| Manganese, dissolved | M200.7 ICP | 5.760 | | mg/L | 0.005 | 0.03 | 10/24/02 20:35 | bf |
| Nickel, dissolved | M200.7 ICP | 0.01 | B | mg/L | 0.01 | 0.05 | 10/24/02 20:35 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/25/02 16:28 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/30/02 11:02 | lcj |
| Zinc, dissolved | M200.7 ICP | 5.07 | | mg/L | 0.01 | 0.05 | 10/24/02 20:35 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/15/02 9:02 | cdr |
| Total Recoverable Digestion | M200.2 ICP-MS | | | | | | 10/14/02 9:45 | lcj |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 12:53 | ksj |
| Hardness as CaCO3 | SM2340B - Calculation | 682 | | mg/L | 1 | 7 | 10/31/02 9:56 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 900 | | mg/L | 10 | 20 | 10/15/02 14:58 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | 16 | B | mg/L | 5 | 20 | 10/15/02 13:40 | hap |

**Note: The WAD Cyanide value is estimated due to matrix interferences.**

**ACZ Laboratories, Inc.**
*2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493*

# Inorganic Reference

## Report Header Explanations

| | |
|---|---|
| *Batch* | A distinct set of samples analyzed at a specific time |
| *Found* | Value of the QC Type of interest |
| *Limit* | Upper limit for RPD, in %. |
| *Lower* | Lower Recovery Limit, in % (except for LCSS, mg/Kg) |
| *MDL* | Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations. |
| *PCN/SCN* | A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis |
| *PQL* | Practical Quantitation Limit, typically 5 times the MDL. |
| *QC* | True Value of the Control Sample or the amount added to the Spike |
| *Rec* | Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg) |
| *RPD* | Relative Percent Difference, calculation used for Duplicate QC Types |
| *Upper* | Upper Recovery Limit, in % (except for LCSS, mg/Kg) |
| *Sample* | Value of the Sample of interest |

## QC Sample Types

| | | | |
|---|---|---|---|
| *AS* | Analytical Spike (Post Digestion) | *LFM* | Laboratory Fortified Matrix |
| *ASD* | Analytical Spike (Post Digestion) Duplicate | *LFMD* | Laboratory Fortified Matrix Duplicate |
| *DUP* | Sample Duplicate | *LRB* | Laboratory Reagent Blank |
| *LCSS* | Laboratory Control Sample - Soil | *MS/MSD* | Matrix Spike/Matrix Spike Duplicate |
| *LCSW* | Laboratory Control Sample - Water | *PBS* | Prep Blank - Soil |
| *LFB* | Laboratory Fortified Blank | *PBW* | Prep Blank - Water |

## QC Sample Type Explanations

| | |
|---|---|
| Blanks | Verifies that there is no or minimal contamination in the prep method procedure. |
| Control Samples | Verifies the accuracy of the method, including the prep procedure. |
| Duplicates | Verifies the precision of the instrument and/or method. |
| Spikes/Fortified Matrix | Determines sample matrix interferences, if any. |

## ACZ Qualifiers (Qual)

| | |
|---|---|
| B | Analyte concentration detected at a value between MDL and PQL. |
| H | Analysis exceeded method hold time. pH is a field test with an immediate hold time. |
| R | Poor spike recovery accepted because the other spike in the set fell within the given limits. |
| T | High Relative Percent Difference (RPD) accepted because sample concentrations are less than 10x the MDL. |
| U | Analyte was analyzed for but not detected at the indicated MDL |
| V | High blank data accepted because sample concentration is 10 times higher than blank concentration |
| W | Poor recovery for Silver quality control is accepted because Silver often precipitates with Chloride. |
| X | Quality control sample is out of control. |
| Z | Poor spike recovery is accepted because sample concentration is four times greater than spike concentration. |

## Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(5) EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(6) Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995.

## Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

## Sample Receipt

SEH
RICO-ST. LOUIS PONDS

ACZ Project ID: L38876
Date Received: 10/10/02
Received By: tinaw

## Receipt Verification

| | YES | NO | NA |
|---|---|---|---|
| 1) Does this project require special handling procedures such as CLP protocol? | | | √ |
| 2) Are the custody seals on the cooler intact? | √ | | |
| 3) Are the custody seals on the sample containers intact? | | | √ |
| 4) Is there a Chain of Custody or other directive shipping papers present? | √ | | |
| 5) Is the Chain of Custody complete? | √ | | |
| 6) Is the Chain of Custody in agreement with the samples received? | | | |
| 7) Is there enough sample for all requested analyses? | √ | | |
| 8) Are all samples within holding times for requested analyses? | √ | | |
| 9) Were all sample containers received intact? | √ | | |
| 10) Are the temperature blanks present? | √ | | |
| 11) Are the trip blanks (VOA and/or Cyanide) present? | | | √ |
| 12) Are samples requiring no headspace, headspace free? | | | √ |
| 13) Do the samples that require a Foreign Soils Permit have one? | | | √ |

## Exceptions: If you answered no to any of the above questions, please describe

N/A

## Contact (For any discrepancies, the client must be contacted)

N/A

## Shipping Containers

| Cooler Id | | Temp (°C) | Rad (µR/hr) |
|---|---|---|---|
| ACZ | | 2.2 | 14 |
| AC | | 3.7 | 13 |
| | | | |
| | | | |

## Notes

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

**Sample Receipt**

**SEH**
RICO-ST. LOUIS PONDS

ACZ Project ID: L38876
Date Received: 10/10/02
Received By: tinaw

## Sample Container Preservation

| SAMPLE | CLIENT ID | R < 2 | G < 2 | Y < 2 | YG< 2 | B < 2 | BG< 2 | O < 2 | T >12 | P >12 | N/A | RAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L38876-01 | DR-7-SW | Y | Y | | | | | | | Y | | |
| L38876-02 | DR-7 | Y | Y | | | | | | | Y | | |
| L38876-03 | DR-2 | Y | Y | | | | | | | Y | | |
| L38876-04 | DR-20 | Y | Y | | | | | | | Y | | |
| L38876-05 | DR-1 | Y | Y | | | | | | | Y | | |
| L38876-06 | DR-6 | Y | Y | | | | | | | Y | | |
| L38876-07 | DR3 | Y | Y | | | | | | | Y | | |
| L38876-08 | DR-9-SW | Y | Y | | | | | | | Y | | |
| L38876-09 | DR-24 | Y | Y | | | | | | | Y | | |
| L38876-10 | DR-25 | Y | Y | | | | | | | Y | | |
| L38876-11 | SVS-8 | Y | Y | | | | | | | Y | | |
| L38876-12 | SVS-22 | Y | Y | | | | | | | Y | | |
| L38876-13 | SVS-12 | Y | Y | | | | | | | Y | | |

L38876

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

## CHAIN of CUSTODY

**Report to:**

Name: STEVEN MORGENSTERN
Company: SEH INC
E-mail: SMORGENSTERN@SEHINC.COM
Address: 2637 MIDPOINT DR, Ste F
FC, CO 80525
Telephone: 970-484-3611

**Copy of Report to:**

Name:
Company:
E-mail:
Telephone:

**Invoice to:**

Name:
Company:
E-mail:
Address:
Telephone:

**PROJECT INFORMATION**

Quote #:
Project/PO #: RICO-ST LOUIS PONDS
Shipping Co.: UPS
Tracking #:
Reporting State for compliance testing:

**ANALYSES REQUESTED** (attach list or use quote number)

| | SAMPLE IDENTIFICATION | DATE:TIME | Matrix | # of Containers | TDS, TSS, [redacted] HARDNESS | DISSOLVED METALS | METALS - TOTAL RECOVERABLE | POTENTIALLY DISSOLVED | CN CYANIDE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | DR-7-SW [redacted] | 10/8/2002 8:20 AM | SW | 5 | X | A | C | | X | | | |
| 2 | DR-7 | 10/8/2002 9:05 AM | SW | 5 | X | A | D | | X | | | |
| 3 | DR-2 | 10/8/2002 10:35 AM | SW | 5 | X | A | D | | X | | | |
| 4 | DR-20 | 10/8/2002 11:15 AM | SW | 5 | X | A | D | | X | | | |
| 5 | DR-1 | 10/8/2002 12:15 AM | SW | 5 | X | A | C | | X | | | |
| 6 | DR-6 | 10/8/2002 3:15 pm | SW | 6 | X | B | C | F | X | | | |
| 7 | DR-3 | 10/8/2002 3:55 pm | SW | 6 | X | B | E | G | X | | | |

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

**REMARKS**

WHITE & GREEN FIELD FILTERED

A = Cd, Cu, Pb, Mn, Ni, Se, Ag, Zn
B = Cd, Cu, Pb, Mn, Ni, Se, Ag, Zn, Fe
C = As, Cr, Fe
D = Cr, Fe
E = As, Cd, Cr, Cu, Mn, Zn, Fe

Green Dot PD-Raw
F = Cd, Cu, [redacted] Mn, Ag, Zn, Pb, Ni, Se
G = Pb, Ni, Se, Ag

| RELINQUISHED BY: | DATE:TIME | RECEIVED BY: | DATE:TIME |
|---|---|---|---|
| STEVEN MORGENSTERN | 10/9/02 13:50 | TMW | 10-10-02 1000 |
| | | | |
| | | | |

PAGE Of

FRMQA021.10.01.04 White - Return with sample. Yellow - Retain for your records.

L38876

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

## CHAIN of CUSTODY

**Report to:**

Name: STEVEN MORGENSTERN
Company: SEH INC
E-mail: SMORGENSTERN@SEHINC.COM
Address: 2637 MIDPOINT DR, Sye F
FC, CO, 80525
Telephone: 970-484-3611

**Copy of Report to:**

Name:
Company:
E-mail:
Telephone:

**Invoice to:**

Name:
Company:
E-mail:
Address:
Telephone:

**PROJECT INFORMATION**

Quote #:
Project/PO #: RICO-ST LOUIS PONDS
Shipping Co.: UPS
Tracking #:
Reporting State for compliance testing:

**ANALYSES REQUESTED** (attach list or use quote number)

| | SAMPLE IDENTIFICATION | DATE:TIME | Matrix | # of Containers | TDS, TSS, CN, HARDNESS | DISSOLVED METALS | METALS - TOTAL RECOVERABLE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | DR-9-SW | 10-7-02 17:10 | SW | 5 | X | A | B | | | | | |
| | ~~DR-7-SW~~ | ~~10-7-02 17:10~~ | ~~SW~~ | ~~5~~ | ~~X~~ | ~~A~~ | ~~B~~ | | | | | |
| 9 | DR-24 | 10-9-02 8:15am | SW | 5 | X | A | C | | | | | |
| 10 | DR-25 | 10-9-02 11:35am | SW | 5 | X | A | C | | | | | |
| 11 | SVS-8 | 10-9-02 8:55am | SW | 5 | X | A | B | | | | | |
| 12 | SVS-22 | 10-9-02 9:55am | SW | 5 | X | A | B | | | | | |
| 13 | SVS-12 | 10-9-02 11:00am | SW | 5 | X | A | C | | | | | |
| | ~~DR~~ | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

**REMARKS**

WHITE & GREEN FIELD FILTERED

A = Cd, Cu, Pb, Mn, Ni, Se, Ag, Zn

B = Cr, Fe | C = As, Cr, Fe

| RELINQUISHED BY: | DATE:TIME | RECEIVED BY: | DATE:TIME |
|---|---|---|---|
| STEVEN MORGENSTERN | 10-9-02 14:00 | TNW | 10-10-02 1000 |
| | | | |
| | | | |

PAGE Of

FRMQA021.10.01.04

White - Return with sample. Yellow - Retain for your records.

**ACZ Laboratories, Inc.**
*2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493*

**Analytical Report**

Steven Morgenstern
SEH
2637 Midpoint Drive Suite F
Fort Collins, CO 80525

November 01, 2002

Project: L38831

Steven Morgenstern:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 08, 2002. This project has been assigned to ACZ's project number, L38831. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 9.0. The enclosed results relate only to the samples received under L38831. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Please assess the enclosed report only in its entirety. ACZ prohibits the reproduction of this report, except in full, without the written approval of ACZ. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after December 01, 2002. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years. Please notify your Project Manager if you have other needs.

If you have any questions, please contact your Project Manager or Customer Service Representative.

Sue Barkey 01/Nov/02

Sue Barkey, Project Manager, has reviewed and accepted this report in its entirety.

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS

Sample ID: DR-4-SW

ACZ ID: ***L38831-01***

Date Sampled: *10/06/02 08:55*

Date Received: *10/08/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 10/23/02 5:22 | lcj |
| Cadmium, dissolved | M200.8 ICP-MS | 0.0002 | B | mg/L | 0.0001 | 0.0005 | 10/27/02 19:20 | lcj |
| Calcium, dissolved | M200.7 ICP | 55.9 | | mg/L | 0.2 | 1 | 10/21/02 21:16 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/19/02 0:20 | bf |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 21:16 | bf |
| Iron, total recoverable | M200.7 ICP | 0.19 | | mg/L | 0.01 | 0.05 | 10/22/02 2:33 | bf |
| Lead, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/29/02 22:49 | lcj |
| Magnesium, dissolved | M200.7 ICP | 7.9 | | mg/L | 0.2 | 1 | 10/21/02 21:16 | bf |
| Manganese, dissolved | M200.7 ICP | 0.143 | | mg/L | 0.005 | 0.03 | 10/21/02 21:16 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 21:16 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/17/02 10:41 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/31/02 20:33 | lcj |
| Zinc, dissolved | M200.7 ICP | 0.05 | | mg/L | 0.01 | 0.05 | 10/21/02 21:16 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/10/02 10:50 | cdr |
| Total Recoverable Digestion | M200.2 ICP-MS | | | | | | 10/10/02 15:47 | lcj |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 11:10 | prw |
| Hardness as CaCO3 | SM2340B - Calculation | 172 | | mg/L | 1 | 7 | 11/01/02 0:00 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 210 | | mg/L | 10 | 20 | 10/10/02 13:43 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 10/11/02 16:07 | hap |

**Note: Sample was distilled for WAD Cyanide on 10/17/02, within the fourteen day holdtime.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

**Inorganic Analytical Results**

**SEH**

Project ID: RICO-ST. LOUIS PONDS

Sample ID: DR-2-SW

ACZ ID: ***L38831-02***

Date Sampled: *10/06/02 10:40*

Date Received: *10/08/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cadmium, dissolved | M200.8 ICP-MS | 0.0002 | B | mg/L | 0.0001 | 0.0005 | 10/27/02 19:26 | lcj |
| Calcium, dissolved | M200.7 ICP | 51.2 | | mg/L | 0.2 | 1 | 10/21/02 21:20 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/19/02 0:24 | bf |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 21:20 | bf |
| Iron, total recoverable | M200.7 ICP | 0.23 | | mg/L | 0.01 | 0.05 | 10/22/02 2:38 | bf |
| Lead, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/29/02 22:55 | lcj |
| Magnesium, dissolved | M200.7 ICP | 7.1 | | mg/L | 0.2 | 1 | 10/21/02 21:20 | bf |
| Manganese, dissolved | M200.7 ICP | 0.130 | | mg/L | 0.005 | 0.03 | 10/21/02 21:20 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 21:20 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/17/02 10:47 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/31/02 20:49 | lcj |
| Zinc, dissolved | M200.7 ICP | 0.04 | B | mg/L | 0.01 | 0.05 | 10/21/02 21:20 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/10/02 11:06 | cdr |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 11:11 | prw |
| Hardness as CaCO3 | SM2340B - Calculation | 157 | | mg/L | 1 | 7 | 11/01/02 0:00 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 210 | | mg/L | 10 | 20 | 10/10/02 13:44 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 10/11/02 16:09 | hap |

**Note: Sample was distilled for WAD Cyanide on 10/17/02, within the fourteen day holdtime.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS
Sample ID: DR-10-SW

ACZ ID: *L38831-03*
Date Sampled: *10/06/02 12:05*
Date Received: *10/08/02*
Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cadmium, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/27/02 19:32 | lcj |
| Calcium, dissolved | M200.7 ICP | 64.1 | | mg/L | 0.2 | 1 | 10/21/02 21:25 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/19/02 0:29 | bf |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 21:25 | bf |
| Iron, total recoverable | M200.7 ICP | 0.15 | | mg/L | 0.01 | 0.05 | 10/22/02 2:42 | bf |
| Lead, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/29/02 23:13 | lcj |
| Magnesium, dissolved | M200.7 ICP | 9.0 | | mg/L | 0.2 | 1 | 10/21/02 21:25 | bf |
| Manganese, dissolved | M200.7 ICP | 0.228 | | mg/L | 0.005 | 0.03 | 10/21/02 21:25 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 21:25 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/17/02 10:49 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/29/02 23:13 | lcj |
| Zinc, dissolved | M200.7 ICP | 0.03 | B | mg/L | 0.01 | 0.05 | 10/21/02 21:25 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/10/02 11:21 | cdr |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 11:12 | prw |
| Hardness as CaCO3 | SM2340B - Calculation | 197 | | mg/L | 1 | 7 | 11/01/02 0:00 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 250 | | mg/L | 10 | 20 | 10/10/02 13:46 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 10/11/02 16:11 | hap |

**Note: Sample was distilled for WAD Cyanide on 10/17/02, within the fourteen day holdtime.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS

Sample ID: DR-27

ACZ ID: ***L38831-04***

Date Sampled: *10/06/02 13:45*

Date Received: *10/08/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 10/23/02 5:28 | lcj |
| Cadmium, dissolved | M200.8 ICP-MS | 0.0008 | | mg/L | 0.0001 | 0.0005 | 10/27/02 19:38 | lcj |
| Calcium, dissolved | M200.7 ICP | 286 | | mg/L | 0.2 | 1 | 10/21/02 21:29 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/19/02 0:34 | bf |
| Copper, dissolved | M200.7 ICP | 0.01 | B | mg/L | 0.01 | 0.05 | 10/21/02 21:29 | bf |
| Iron, total recoverable | M200.7 ICP | 0.08 | B | mg/L | 0.02 | 0.1 | 10/22/02 2:47 | bf |
| Lead, dissolved | M200.8 ICP-MS | 0.0001 | B | mg/L | 0.0001 | 0.0005 | 10/29/02 23:19 | lcj |
| Magnesium, dissolved | M200.7 ICP | 39.9 | | mg/L | 0.2 | 1 | 10/21/02 21:29 | bf |
| Manganese, dissolved | M200.7 ICP | 0.056 | | mg/L | 0.005 | 0.03 | 10/21/02 21:29 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 21:29 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/17/02 10:51 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/29/02 23:19 | lcj |
| Zinc, dissolved | M200.7 ICP | 0.69 | | mg/L | 0.01 | 0.05 | 10/21/02 21:29 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP-MS | | | | | | 10/10/02 16:03 | lcj |
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/10/02 11:37 | cdr |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 11:13 | prw |
| Hardness as CaCO3 | SM2340B - Calculation | 879 | | mg/L | 1 | 7 | 11/01/02 0:00 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 1080 | | mg/L | 10 | 20 | 10/10/02 13:48 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 10/11/02 16:14 | hap |

**Note: Sample was distilled for WAD Cyanide on 10/17/02, within the fourteen day holdtime.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS
Sample ID: DR-26

ACZ ID: *L38831-05*
Date Sampled: *10/06/02 14:45*
Date Received: *10/08/02*
Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cadmium, dissolved | M200.8 ICP-MS | 0.0002 | B | mg/L | 0.0001 | 0.0005 | 10/27/02 19:55 | lcj |
| Calcium, dissolved | M200.7 ICP | 64.6 | | mg/L | 0.2 | 1 | 10/21/02 21:34 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/19/02 0:38 | bf |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 21:34 | bf |
| Iron, total recoverable | M200.7 ICP | 0.18 | | mg/L | 0.01 | 0.05 | 10/22/02 2:51 | bf |
| Lead, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/29/02 23:24 | lcj |
| Magnesium, dissolved | M200.7 ICP | 8.5 | | mg/L | 0.2 | 1 | 10/21/02 21:34 | bf |
| Manganese, dissolved | M200.7 ICP | 0.163 | | mg/L | 0.005 | 0.03 | 10/21/02 21:34 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 21:34 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/17/02 10:53 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/29/02 23:24 | lcj |
| Zinc, dissolved | M200.7 ICP | 0.06 | | mg/L | 0.01 | 0.05 | 10/21/02 21:34 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/10/02 11:52 | cdr |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 11:14 | prw |
| Hardness as CaCO3 | SM2340B - Calculation | 196 | | mg/L | 1 | 7 | 11/01/02 0:00 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 220 | | mg/L | 10 | 20 | 10/10/02 13:49 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 10/11/02 16:16 | hap |

**Note: Sample was distilled for WAD Cyanide on 10/17/02, within the fourteen day holdtime.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS

Sample ID: DR-1-SW

ACZ ID: ***L38831-06***

Date Sampled: *10/06/02 16:30*

Date Received: *10/08/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 10/23/02 5:33 | lcj |
| Cadmium, dissolved | M200.8 ICP-MS | 0.0026 | | mg/L | 0.0001 | 0.0005 | 10/27/02 20:01 | lcj |
| Calcium, dissolved | M200.7 ICP | 96.1 | | mg/L | 0.2 | 1 | 10/21/02 21:38 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/19/02 0:43 | bf |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 21:38 | bf |
| Iron, total recoverable | M200.7 ICP | 0.48 | | mg/L | 0.01 | 0.05 | 10/19/02 0:43 | bf |
| Lead, dissolved | M200.8 ICP-MS | 0.0002 | B | mg/L | 0.0001 | 0.0005 | 10/29/02 23:30 | lcj |
| Magnesium, dissolved | M200.7 ICP | 10.4 | | mg/L | 0.2 | 1 | 10/21/02 21:38 | bf |
| Manganese, dissolved | M200.7 ICP | 0.229 | | mg/L | 0.005 | 0.03 | 10/21/02 21:38 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 21:38 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/17/02 10:59 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/29/02 23:30 | lcj |
| Zinc, dissolved | M200.7 ICP | 0.85 | | mg/L | 0.01 | 0.05 | 10/21/02 21:38 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP-MS | | | | | | 10/10/02 16:18 | lcj |
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/10/02 12:08 | cdr |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 11:16 | prw |
| Hardness as CaCO3 | SM2340B - Calculation | 283 | | mg/L | 1 | 7 | 11/01/02 0:00 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 350 | | mg/L | 10 | 20 | 10/10/02 13:50 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | | U | mg/L | 5 | 20 | 10/11/02 16:18 | hap |

**Note: Sample was distilled for WAD Cyanide on 10/17/02, within the fourteen day holdtime.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST. LOUIS PONDS
Sample ID: SVS-20

ACZ ID: *L38831-07*
Date Sampled: *10/06/02 17:35*
Date Received: *10/08/02*
Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 10/23/02 5:48 | lcj |
| Cadmium, dissolved | M200.8 ICP-MS | 0.0015 | | mg/L | 0.0001 | 0.0005 | 10/27/02 20:07 | lcj |
| Calcium, dissolved | M200.7 ICP | 73.2 | | mg/L | 0.2 | 1 | 10/21/02 21:42 | bf |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/19/02 1:06 | bf |
| Copper, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 21:42 | bf |
| Iron, total recoverable | M200.7 ICP | 0.02 | B | mg/L | 0.01 | 0.05 | 10/22/02 3:09 | bf |
| Lead, dissolved | M200.8 ICP-MS | 0.0003 | B | mg/L | 0.0001 | 0.0005 | 10/29/02 23:36 | lcj |
| Magnesium, dissolved | M200.7 ICP | 8.2 | | mg/L | 0.2 | 1 | 10/21/02 21:42 | bf |
| Manganese, dissolved | M200.7 ICP | 0.056 | | mg/L | 0.005 | 0.03 | 10/21/02 21:42 | bf |
| Nickel, dissolved | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/21/02 21:42 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/17/02 11:01 | wfg |
| Silver, dissolved | M200.8 ICP-MS | | U | mg/L | 5E-05 | 0.0003 | 10/29/02 23:36 | lcj |
| Zinc, dissolved | M200.7 ICP | 0.39 | | mg/L | 0.01 | 0.05 | 10/21/02 21:42 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP-MS | | | | | | 10/10/02 16:34 | lcj |
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/10/02 12:55 | cdr |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 11:17 | prw |
| Hardness as CaCO3 | SM2340B - Calculation | 217 | | mg/L | 1 | 7 | 11/01/02 0:00 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 250 | | mg/L | 10 | 20 | 10/10/02 13:52 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | 6 | B | mg/L | 5 | 20 | 10/10/02 16:59 | hap |

**Note: Sample was distilled for WAD Cyanide on 10/17/02, within the fourteen day holdtime.**

## Report Header Explanations

| | |
|---|---|
| *Batch* | A distinct set of samples analyzed at a specific time |
| *Found* | Value of the QC Type of interest |
| *Limit* | Upper limit for RPD, in %. |
| *Lower* | Lower Recovery Limit, in % (except for LCSS, mg/Kg) |
| *MDL* | Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations. |
| *PCN/SCN* | A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis |
| *PQL* | Practical Quantitation Limit, typically 5 times the MDL. |
| *QC* | True Value of the Control Sample or the amount added to the Spike |
| *Rec* | Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg) |
| *RPD* | Relative Percent Difference, calculation used for Duplicate QC Types |
| *Upper* | Upper Recovery Limit, in % (except for LCSS, mg/Kg) |
| *Sample* | Value of the Sample of interest |

## QC Sample Types

| | | | |
|---|---|---|---|
| *AS* | Analytical Spike (Post Digestion) | *LFM* | Laboratory Fortified Matrix |
| *ASD* | Analytical Spike (Post Digestion) Duplicate | *LFMD* | Laboratory Fortified Matrix Duplicate |
| *DUP* | Sample Duplicate | *LRB* | Laboratory Reagent Blank |
| *LCSS* | Laboratory Control Sample - Soil | *MS/MSD* | Matrix Spike/Matrix Spike Duplicate |
| *LCSW* | Laboratory Control Sample - Water | *PBS* | Prep Blank - Soil |
| *LFB* | Laboratory Fortified Blank | *PBW* | Prep Blank - Water |

## QC Sample Type Explanations

| | |
|---|---|
| Blanks | Verifies that there is no or minimal contamination in the prep method procedure. |
| Control Samples | Verifies the accuracy of the method, including the prep procedure. |
| Duplicates | Verifies the precision of the instrument and/or method. |
| Spikes/Fortified Matrix | Determines sample matrix interferences, if any. |

## ACZ Qualifiers (Qual)

| | |
|---|---|
| B | Analyte concentration detected at a value between MDL and PQL. |
| H | Analysis exceeded method hold time. pH is a field test with an immediate hold time. |
| R | Poor spike recovery accepted because the other spike in the set fell within the given limits. |
| T | High Relative Percent Difference (RPD) accepted because sample concentrations are less than 10x the MDL. |
| U | Analyte was analyzed for but not detected at the indicated MDL |
| V | High blank data accepted because sample concentration is 10 times higher than blank concentration |
| W | Poor recovery for Silver quality control is accepted because Silver often precipitates with Chloride. |
| X | Quality control sample is out of control. |
| Z | Poor spike recovery is accepted because sample concentration is four times greater than spike concentration. |

## Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(5) EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(6) Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995.

## Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

## Sample Receipt

SEH
RICO-ST. LOUIS PONDS

ACZ Project ID: L38831
Date Received: 10/8/02
Received By: tinaw

## Receipt Verification

| | YES | NO | NA |
|---|---|---|---|
| 1) Does this project require special handling procedures such as CLP protocol? | | | √ |
| 2) Are the custody seals on the cooler intact? | √ | | |
| 3) Are the custody seals on the sample containers intact? | | | √ |
| 4) Is there a Chain of Custody or other directive shipping papers present? | √ | | |
| 5) Is the Chain of Custody complete? | √ | | |
| 6) Is the Chain of Custody in agreement with the samples received? | √ | | |
| 7) Is there enough sample for all requested analyses? | √ | | |
| 8) Are all samples within holding times for requested analyses? | √ | | |
| 9) Were all sample containers received intact? | √ | | |
| 10) Are the temperature blanks present? | √ | | |
| 11) Are the trip blanks (VOA and/or Cyanide) present? | | | √ |
| 12) Are samples requiring no headspace, headspace free? | | | √ |
| 13) Do the samples that require a Foreign Soils Permit have one? | | | √ |

## Exceptions: If you answered no to any of the above questions, please describe

N/A

## Contact (For any discrepancies, the client must be contacted)

N/A

## Shipping Containers

| Cooler Id | | Temp (°C) | Rad (µR/hr) |
|---|---|---|---|
| ACZ | | 6.8 | 13 |
| | | | |
| | | | |
| | | | |

## Notes

# ACZ Laboratories, Inc.

*2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493*

**Sample Receipt**

SEH
RICO-ST. LOUIS PONDS

ACZ Project ID: L38831
Date Received: 10/8/02
Received By: tinaw

## Sample Container Preservation

| SAMPLE | CLIENT ID | R < 2 | G < 2 | Y < 2 | YG< 2 | B < 2 | BG< 2 | O < 2 | T >12 | P >12 | N/A | RAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L38831-01 | DR-4-SW | Y | Y | | | | | | | Y | | |
| L38831-02 | DR-2-SW | Y | Y | | | | | | | Y | | |
| L38831-03 | DR-10-SW | Y | Y | | | | | | | Y | | |
| L38831-04 | DR-27 | Y | Y | | | | | | | Y | | |
| L38831-05 | DR-26 | Y | Y | | | | | | | Y | | |
| L38831-06 | DR-1-SW | Y | Y | | | | | | | Y | | |
| L38831-07 | SVS-20 | Y | Y | | | | | | | Y | | |

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

L38831

## CHAIN of CUSTODY

**Report to:**

Name: STEVEN MORGENSTERN
Company: SEH INC
E-mail: SMORGENSTERN@SEHINC.COM
Address: 2637 MIDPOINT DR, STE F
FC, CO 80525
Telephone: 970-484-3611

**Copy of Report to:**

Name:
Company:
E-mail:
Telephone:

**Invoice to:**

Name:
Company:
E-mail:
Address:
Telephone:

**PROJECT INFORMATION**

Quote #:
Project/PO #: RICO-ST LOUIS PONDS
Shipping Co.:
Tracking #:
Reporting State for compliance testing:

**ANALYSES REQUESTED** (attach list or use quote number)

| SAMPLE IDENTIFICATION | DATE:TIME | Matrix | # of Containers | TDS, TSS, CN HARDNESS | DISSOLVED METALS | TOTAL RECOVERABLE METALS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DR-4-SW | 10-6-02 08:55 | SW | 5 | X | A | B | | | | | |
| DR-2-SW | 10-6-02 10:40 | SW | 5 | X | A | C | | | | | |
| DR-10-SW | 10-6-02 12:05 | SW | 5 | X | A | C | | | | | |
| DR-27 | 10-6-02 13:45 | SW | 5 | X | A | B | | | | | |
| DR-26 | 10-6-02 14:45 | SW | 5 | X | A | C | | | | | |
| DR-1-SW | 10-6-02 16:30 | SW | 5 | X | A | B | | | | | |
| SVS-20 | 10-6-02 17:35 | SW | 5 | X | A | B | | | | | |

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

**REMARKS**

WHITE & GREEN FIELD FILTERED
A = Cd, Cu, Pb, Mn, Ni, Se, Ag, Zn
B = As, Cr, Fe | C = Cr, Fe

| RELINQUISHED BY: | DATE:TIME | RECEIVED BY: | DATE TIME |
|---|---|---|---|
| STEVEN MORGENSTERN | | TMW | 10-8-02 1000 |
| | | | |
| | | | |

PAGE ___ Of ___

FRMQA021.10.01.04

White - Return with sample. Yellow - Retain for your records.

**ACZ Laboratories, Inc.**
*2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493*

**Analytical Report**

Steven Morgenstern
SEH
2637 Midpoint Drive Suite F
Fort Collins, CO 80525

November 08, 2002

Project: L38828

Steven Morgenstern:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 08, 2002. This project has been assigned to ACZ's project number, L38828. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 9.0. The enclosed results relate only to the samples received under L38828. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Please assess the enclosed report only in its entirety. ACZ prohibits the reproduction of this report, except in full, without the written approval of ACZ. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after December 08, 2002. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years. Please notify your Project Manager if you have other needs.

If you have any questions, please contact your Project Manager or Customer Service Representative.

Sue Barkey 08/Nov/02

Sue Barkey, Project Manager, has reviewed and accepted this report in its entirety.

**ACZ Laboratories, Inc.**
*2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493*

# Case Narrative

SEH
Project: L38828

November 08, 2002

## Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 12 surface water samples from SEH on October 8, 2002. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L38828. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

## Holding Times

All analyses were performed within EPA recommended holding times.

## Sample Analysis

These samples were analyzed for inorganic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports.

Mercury Analysis:

This report has been re-generated to include a full QC summary, which illustrates the quality of the low level mercury data. The source of the low level hits can be attributed to field activities since laboratory analyses shows no contamination originating in the laboratory. We have verified that the sample containers, reagents, and our DI Type I water source to be free of HG contamination. The levels in the samples and in the trip blank are all in the low PPT range or lower. Mercury contamination in the field can occur very easily if the clean sampling protocols are not followed exactly. Trace levels of mercury are everywhere (cotton material, paper, atmospheric, your breath if you have amalgam fillings, etc.).

The purpose of the trip blank is to demonstrate the field techniques are or are not contributing to sample contamination. We send an extra empty container for the trip blank. The sampling people are suppose to pour the water from the trip blank into the empty container. If contamination occurs at this point, it points to contamination from the field activities.

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST LOUIS PONDS

Sample ID: DR-4-SW

ACZ ID: ***L38828-01***

Date Sampled: *10/07/02 11:15*

Date Received: *10/08/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, total | M1631, Atomic Fluorescence | 0.0032 | | ug/L | 0.0002 | 0.0005 | 11/05/02 13:50 | lcj |

**ACZ Laboratories, Inc.**
*2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493*

# Inorganic Analytical Results

**SEH**

Project ID: RICO-ST LOUIS PONDS
Sample ID: DR-7-SW

ACZ ID: ***L38828-02***
Date Sampled: *10/07/02 11:45*
Date Received: *10/08/02*
Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, total | M1631, Atomic Fluorescence | 0.0004 | B | ug/L | 0.0002 | 0.0005 | 11/05/02 14:03 | lcj |

**ACZ Laboratories, Inc.**
*2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493*

# Inorganic Analytical Results

**SEH**

Project ID: RICO-ST LOUIS PONDS
Sample ID: DR-27

ACZ ID: ***L38828-03***
Date Sampled: *10/07/02 12:10*
Date Received: *10/08/02*
Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, total | M1631, Atomic Fluorescence | 0.0018 | | ug/L | 0.0002 | 0.0005 | 11/05/02 14:13 | lcj |

**ACZ Laboratories, Inc.**
*2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493*

# Inorganic Analytical Results

**SEH**

Project ID: RICO-ST LOUIS PONDS
Sample ID: DR-7

ACZ ID: ***L38828-04***
Date Sampled: *10/07/02 12:45*
Date Received: *10/08/02*
Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, total | M1631, Atomic Fluorescence | 0.0026 | | ug/L | 0.0002 | 0.0005 | 11/05/02 14:17 | lcj |

**ACZ Laboratories, Inc.**
*2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493*

# Inorganic Analytical Results

**SEH**

Project ID: RICO-ST LOUIS PONDS
Sample ID: DR-6

ACZ ID: ***L38828-05***
Date Sampled: *10/07/02 12:55*
Date Received: *10/08/02*
Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, total | M1631, Atomic Fluorescence | 0.0006 | | ug/L | 0.0002 | 0.0005 | 11/05/02 14:22 | lcj |

**ACZ Laboratories, Inc.**
*2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493*

# Inorganic Analytical Results

**SEH**

Project ID: RICO-ST LOUIS PONDS
Sample ID: DR-3

ACZ ID: ***L38828-06***
Date Sampled: *10/07/02 13:10*
Date Received: *10/08/02*
Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, total | M1631, Atomic Fluorescence | 0.0025 | | ug/L | 0.0002 | 0.0005 | 11/05/02 14:35 | lcj |

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST LOUIS PONDS

Sample ID: DR-1

ACZ ID: ***L38828-07***

Date Sampled: *10/07/02 13:25*

Date Received: *10/08/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, total | M1631, Atomic Fluorescence | 0.0024 | | ug/L | 0.0002 | 0.0005 | 11/05/02 14:40 | lcj |

**ACZ Laboratories, Inc.**
*2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493*

# Inorganic Analytical Results

**SEH**

| | | | |
|---|---|---|---|
| Project ID: | RICO-ST LOUIS PONDS | ACZ ID: | ***L38828-08*** |
| Sample ID: | SVS-20 | Date Sampled: | *10/07/02 08:45* |
| | | Date Received: | *10/08/02* |
| | | Sample Matrix: | *Surface Water* |

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, total | M1631, Atomic Fluorescence | 0.0003 | B | ug/L | 0.0002 | 0.0005 | 11/05/02 14:45 | lcj |

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST LOUIS PONDS

Sample ID: SVS-26

ACZ ID: ***L38828-09***

Date Sampled: *10/07/02 10:15*

Date Received: *10/08/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Arsenic, total recoverable | M200.8 ICP-MS | | U | mg/L | 0.0005 | 0.003 | 10/23/02 5:17 | lcj |
| Cadmium, dissolved | M200.8 ICP-MS | 0.0115 | | mg/L | 0.0001 | 0.0005 | 10/27/02 19:15 | lcj |
| Calcium, dissolved | M200.7 ICP | 120 | | mg/L | 0.2 | 1 | 10/22/02 23:03 | kdw |
| Chromium, total recoverable | M200.7 ICP | | U | mg/L | 0.01 | 0.05 | 10/18/02 23:57 | bf |
| Copper, dissolved | M200.7 ICP | 0.07 | | mg/L | 0.01 | 0.05 | 10/22/02 0:32 | bf |
| Iron, total recoverable | M200.7 ICP | 15.20 | | mg/L | 0.01 | 0.05 | 10/18/02 23:57 | bf |
| Lead, dissolved | M200.8 ICP-MS | | U | mg/L | 0.0001 | 0.0005 | 10/29/02 22:44 | lcj |
| Magnesium, dissolved | M200.7 ICP | 20.9 | | mg/L | 0.2 | 1 | 10/22/02 0:32 | bf |
| Manganese, dissolved | M200.7 ICP | 11.400 | | mg/L | 0.005 | 0.03 | 10/22/02 0:32 | bf |
| Mercury, total | M1631, Atomic Fluorescence | 0.0008 | | ug/L | 0.0002 | 0.0005 | 11/05/02 14:49 | lcj |
| Nickel, dissolved | M200.7 ICP | 0.03 | B | mg/L | 0.01 | 0.05 | 10/22/02 0:32 | bf |
| Selenium, dissolved | SM 3114 C, AA-Hydride | | U | mg/L | 0.001 | 0.005 | 10/17/02 10:39 | wfg |
| Silver, dissolved | M200.8 ICP-MS | 0.00008 | B | mg/L | 5E-05 | 0.0003 | 10/29/02 22:44 | lcj |
| Zinc, dissolved | M200.7 ICP | 8.12 | | mg/L | 0.01 | 0.05 | 10/22/02 0:32 | bf |

Metals Prep

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP | | | | | | 10/10/02 10:03 | cdr |
| Total Recoverable Digestion | M200.2 ICP-MS | | | | | | 10/10/02 15:31 | lcj |

Wet Chemistry

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Cyanide, WAD | SM4500-CN I-Colorimetric w/ distillation | | U | mg/L | 0.005 | 0.01 | 10/22/02 11:08 | prw |
| Hardness as CaCO3 | SM2340B - Calculation | 386 | | mg/L | 1 | 7 | 11/06/02 0:00 | calc |
| Residue, Filterable (TDS) @180C | M160.1 - Gravimetric | 580 | | mg/L | 10 | 20 | 10/11/02 11:44 | sjc |
| Residue, Non-Filterable (TSS) @105C | M160.2 - Gravimetric | 16 | B | mg/L | 5 | 20 | 10/10/02 16:51 | hap |

**Note: Sample was distilled for WAD Cyanide on 10/17/02, within the fourteen day holdtime.**

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST LOUIS PONDS

Sample ID: SVS-12

ACZ ID: ***L38828-10***

Date Sampled: *10/07/02 13:50*

Date Received: *10/08/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, total | M1631, Atomic Fluorescence | 0.0016 | | ug/L | 0.0002 | 0.0005 | 11/05/02 14:54 | lcj |

REPIN.01.11.00.0

**ACZ Laboratories, Inc.**
*2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493*

# Inorganic Analytical Results

**SEH**

Project ID: RICO-ST LOUIS PONDS
Sample ID: DR-24

ACZ ID: ***L38828-11***
Date Sampled: *10/07/02 13:35*
Date Received: *10/08/02*
Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, total | M1631, Atomic Fluorescence | 0.0019 | | ug/L | 0.0002 | 0.0005 | 11/05/02 14:58 | lcj |

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487(800) 334-5493

## Inorganic Analytical Results

**SEH**

Project ID: RICO-ST LOUIS PONDS

Sample ID: DR-25

ACZ ID: ***L38828-12***

Date Sampled: *10/07/02 11:30*

Date Received: *10/08/02*

Sample Matrix: *Surface Water*

Metals Analysis

| Parameter | EPA Method | Result | Qual | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|
| Mercury, total | M1631, Atomic Fluorescence | 0.0019 | | ug/L | 0.0002 | 0.0005 | 11/05/02 15:03 | lcj |

## Report Header Explanations

| | |
|---|---|
| *Batch* | A distinct set of samples analyzed at a specific time |
| *Found* | Value of the QC Type of interest |
| *Limit* | Upper limit for RPD, in %. |
| *Lower* | Lower Recovery Limit, in % (except for LCSS, mg/Kg) |
| *MDL* | Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations. |
| *PCN/SCN* | A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis |
| *PQL* | Practical Quantitation Limit, typically 5 times the MDL. |
| *QC* | True Value of the Control Sample or the amount added to the Spike |
| *Rec* | Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg) |
| *RPD* | Relative Percent Difference, calculation used for Duplicate QC Types |
| *Upper* | Upper Recovery Limit, in % (except for LCSS, mg/Kg) |
| *Sample* | Value of the Sample of interest |

## QC Sample Types

| | | | |
|---|---|---|---|
| *AS* | Analytical Spike (Post Digestion) | *LFM* | Laboratory Fortified Matrix |
| *ASD* | Analytical Spike (Post Digestion) Duplicate | *LFMD* | Laboratory Fortified Matrix Duplicate |
| *DUP* | Sample Duplicate | *LRB* | Laboratory Reagent Blank |
| *LCSS* | Laboratory Control Sample - Soil | *MS/MSD* | Matrix Spike/Matrix Spike Duplicate |
| *LCSW* | Laboratory Control Sample - Water | *PBS* | Prep Blank - Soil |
| *LFB* | Laboratory Fortified Blank | *PBW* | Prep Blank - Water |

## QC Sample Type Explanations

| | |
|---|---|
| Blanks | Verifies that there is no or minimal contamination in the prep method procedure. |
| Control Samples | Verifies the accuracy of the method, including the prep procedure. |
| Duplicates | Verifies the precision of the instrument and/or method. |
| Spikes/Fortified Matrix | Determines sample matrix interferences, if any. |

## ACZ Qualifiers (Qual)

| | |
|---|---|
| B | Analyte concentration detected at a value between MDL and PQL. |
| H | Analysis exceeded method hold time. pH is a field test with an immediate hold time. |
| R | Poor spike recovery accepted because the other spike in the set fell within the given limits. |
| T | High Relative Percent Difference (RPD) accepted because sample concentrations are less than 10x the MDL. |
| U | Analyte was analyzed for but not detected at the indicated MDL |
| V | High blank data accepted because sample concentration is 10 times higher than blank concentration |
| W | Poor recovery for Silver quality control is accepted because Silver often precipitates with Chloride. |
| X | Quality control sample is out of control. |
| Z | Poor spike recovery is accepted because sample concentration is four times greater than spike concentration. |

## Method References

(1) EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2) EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3) EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(5) EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(6) Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995.

## Comments

(1) QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2) Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3) Animal matrices for Inorganic analyses are reported on an "as received" basis.

**SEH** ACZ Project ID: ***L38828***

Project ID: RICO-ST LOUIS PONDS

**Arsenic, total recoverable** M200.8 ICP-MS

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG147412** | | | | | | | | | | | | | |
| WG147412ICS1 | ICS | 10/23/02 4:35 | MS021005-7 | .05 | | .05131 | mg/L | 102.6 | 90 | 110 | | | |
| WG147412ICB1 | ICB | 10/23/02 4:41 | | | | U | mg/L | | -0.0011 | 0.0011 | | | |
| WG147412QCS | QCS | 10/23/02 4:46 | MS021008-1 | .02 | | .01854 | mg/L | 92.7 | 90 | 110 | | | |
| WG146825LRB | LRB | 10/23/02 4:51 | | | | U | mg/L | | -0.0011 | 0.0011 | | | |
| WG146825LFB | LFB | 10/23/02 4:56 | MS021005-4 | .05 | | .04741 | mg/L | 94.8 | 85 | 115 | | | |
| L38850-03LFM | LFM | 10/23/02 5:07 | MS021005-4 | .05 | U | .05167 | mg/L | 103.3 | 70 | 130 | | | |
| L38850-03LFMD | LFMD | 10/23/02 5:12 | MS021005-4 | .05 | U | .05012 | mg/L | 100.2 | 70 | 130 | 3.05 | 20 | |
| WG147412ICS2 | ICS | 10/23/02 5:38 | MS021005-7 | .05 | | .04958 | mg/L | 99.2 | 90 | 110 | | | |
| WG147412ICB2 | ICB | 10/23/02 5:43 | | | | U | mg/L | | -0.0011 | 0.0011 | | | |
| WG147412ICS3 | ICS | 10/23/02 6:41 | MS021005-7 | .05 | | .0511 | mg/L | 102.2 | 90 | 110 | | | |
| WG147412ICB3 | ICB | 10/23/02 6:46 | | | | U | mg/L | | -0.0011 | 0.0011 | | | |
| WG147412ICS4 | ICS | 10/23/02 7:17 | MS021005-7 | .05 | | .05072 | mg/L | 101.4 | 90 | 110 | | | |
| WG147412ICB4 | ICB | 10/23/02 7:22 | | | | U | mg/L | | -0.0011 | 0.0011 | | | |

**Cadmium, dissolved** M200.8 ICP-MS

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG147682** | | | | | | | | | | | | | |
| WG147682ICS1 | ICS | 10/27/02 18:34 | MS021005-7 | .05 | | .05123 | mg/L | 102.5 | 90 | 110 | | | |
| WG147682ICB1 | ICB | 10/27/02 18:40 | | | | U | mg/L | | -0.00022 | 0.00022 | | | |
| WG147682QCS | QCS | 10/27/02 18:45 | MS021008-1 | .02 | | .01941 | mg/L | 97.1 | 90 | 110 | | | |
| WG147682LRB | LRB | 10/27/02 18:51 | | | | U | mg/L | | -0.00022 | 0.00022 | | | |
| WG147682LFB | LFB | 10/27/02 18:57 | MS021005-4 | .05 | | .04657 | mg/L | 93.1 | 85 | 115 | | | |
| WG147682ICS2 | ICS | 10/27/02 19:44 | MS021005-7 | .05 | | .05166 | mg/L | 103.3 | 90 | 110 | | | |
| WG147682ICB2 | ICB | 10/27/02 19:49 | | | | U | mg/L | | -0.00022 | 0.00022 | | | |
| L38831-07AS | AS | 10/27/02 20:13 | MS021005-4 | .05 | .0015 | .04864 | mg/L | 94.3 | 70 | 130 | | | |
| L38831-07ASD | ASD | 10/27/02 20:19 | MS021005-4 | .05 | .0015 | .04811 | mg/L | 93.2 | 70 | 130 | 1.1 | 20 | |
| WG147682ICS3 | ICS | 10/27/02 20:53 | MS021005-7 | .05 | | .05163 | mg/L | 103.3 | 90 | 110 | | | |
| WG147682ICB3 | ICB | 10/27/02 20:59 | | | | U | mg/L | | -0.00022 | 0.00022 | | | |
| WG147682ICS4 | ICS | 10/27/02 21:46 | MS021005-7 | .05 | | .05179 | mg/L | 103.6 | 90 | 110 | | | |
| WG147682ICB4 | ICB | 10/27/02 21:52 | | | | U | mg/L | | -0.00022 | 0.00022 | | | |

**Calcium, dissolved** M200.7 ICP

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG147394** | | | | | | | | | | | | | |
| WG147394ICV | ICV | 10/22/02 21:47 | II021016-1 | 102.115 | | 97.05 | mg/L | 95 | 95 | 105 | | | |
| WG147394ICB | ICB | 10/22/02 21:52 | | | | U | mg/L | | -0.2 | 0.2 | | | |
| WG147394PQV | PQV | 10/22/02 21:56 | II021001-12 | 1 | | 1.02 | mg/L | 102 | 70 | 130 | | | |
| WG147394LFB | LFB | 10/22/02 22:10 | II021022-7 | 90.02512 | | 84.68 | mg/L | 94.1 | 85 | 115 | | | |
| L38778-01AS | AS | 10/22/02 22:23 | II021022-7 | 90.02512 | 48 | 127.84 | mg/L | 88.7 | 85 | 115 | | | |
| L38778-01ASD | ASD | 10/22/02 22:27 | II021022-7 | 90.02512 | 48 | 127.89 | mg/L | 88.7 | 85 | 115 | 0.04 | 20 | |
| WG147394CCV1 | CCV | 10/22/02 22:41 | II021014-1 | 51.0575 | | 50 | mg/L | 97.9 | 90 | 110 | | | |
| WG147394CCB1 | CCB | 10/22/02 22:45 | | | | U | mg/L | | -0.2 | 0.2 | | | |
| WG147394CCV2 | CCV | 10/22/02 23:34 | II021014-1 | 51.0575 | | 49.96 | mg/L | 97.9 | 90 | 110 | | | |
| WG147394CCB2 | CCB | 10/22/02 23:39 | | | | U | mg/L | | -0.2 | 0.2 | | | |
| WG147394CCV3 | CCV | 10/23/02 0:19 | II021014-1 | 51.0575 | | 51.13 | mg/L | 100.1 | 90 | 110 | | | |
| WG147394CCB3 | CCB | 10/23/02 0:23 | | | | U | mg/L | | -0.2 | 0.2 | | | |

ACZ Laboratories, Inc.
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# Inorganic QC Summary

**SEH** ACZ Project ID: ***L38828***

Project ID: RICO-ST LOUIS PONDS

**Chromium, total recoverable** M200.7 ICP

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG147241** | | | | | | | | | | | | | |
| WG147241ICV | ICV | 10/18/02 23:06 | II021016-1 | 2 | | 1.909 | mg/L | 95.5 | 95 | 105 | | | |
| WG147241ICB | ICB | 10/18/02 23:11 | | | | U | mg/L | | -0.01 | 0.01 | | | |
| WG147241PQV | PQV | 10/18/02 23:15 | II021001-12 | .05 | | .042 | mg/L | 84 | 70 | 130 | | | |
| WG146789LRB | LRB | 10/18/02 23:29 | | | | U | mg/L | | -0.022 | 0.022 | | | |
| WG146789LFB | LFB | 10/18/02 23:34 | II021008-6 | .5 | | .46 | mg/L | 92 | 85 | 115 | | | |
| L38819-01LFM | LFM | 10/18/02 23:43 | II021008-6 | .5 | U | .447 | mg/L | 89.4 | 70 | 130 | | | |
| L38819-01LFMD | LFMD | 10/18/02 23:47 | II021008-6 | .5 | U | .431 | mg/L | 86.2 | 70 | 130 | 3.64 | 20 | |
| WG147241CCV1 | CCV | 10/19/02 0:01 | II021014-1 | 1 | | .963 | mg/L | 96.3 | 90 | 110 | | | |
| WG147241CCB1 | CCB | 10/19/02 0:06 | | | | U | mg/L | | -0.01 | 0.01 | | | |
| WG147241CCV2 | CCV | 10/19/02 0:57 | II021014-1 | 1 | | .923 | mg/L | 92.3 | 90 | 110 | | | |
| WG147241CCB2 | CCB | 10/19/02 1:02 | | | | U | mg/L | | -0.01 | 0.01 | | | |
| WG147241CCV3 | CCV | 10/19/02 1:34 | II021014-1 | 1 | | .915 | mg/L | 91.5 | 90 | 110 | | | |
| WG147241CCB3 | CCB | 10/19/02 1:39 | | | | U | mg/L | | -0.01 | 0.01 | | | |

**Copper, dissolved** M200.7 ICP

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG147244** | | | | | | | | | | | | | |
| WG147244ICV | ICV | 10/21/02 22:23 | II021016-1 | 2 | | 1.9 | mg/L | 95 | 95 | 105 | | | |
| WG147244ICB | ICB | 10/21/02 22:28 | | | | U | mg/L | | -0.01 | 0.01 | | | |
| WG147244PQV | PQV | 10/21/02 22:32 | II021001-12 | .05 | | .05 | mg/L | 100 | 70 | 130 | | | |
| WG147244LFB | LFB | 10/21/02 22:45 | II021010-2 | .5 | | .501 | mg/L | 100.2 | 85 | 115 | | | |
| WG147244CCV1 | CCV | 10/21/02 23:17 | II021014-1 | 1 | | .954 | mg/L | 95.4 | 90 | 110 | | | |
| WG147244CCB1 | CCB | 10/21/02 23:21 | | | | U | mg/L | | -0.01 | 0.01 | | | |
| L38826-01AS | AS | 10/21/02 23:57 | II021010-2 | .5 | U | .504 | mg/L | 100.8 | 85 | 115 | | | |
| L38826-01ASD | ASD | 10/22/02 0:01 | II021010-2 | .5 | U | .496 | mg/L | 99.2 | 85 | 115 | 1.6 | 20 | |
| WG147244CCV2 | CCV | 10/22/02 0:10 | II021014-1 | 1 | | .953 | mg/L | 95.3 | 90 | 110 | | | |
| WG147244CCB2 | CCB | 10/22/02 0:15 | | | | U | mg/L | | -0.01 | 0.01 | | | |
| WG147244CCV3 | CCV | 10/22/02 0:55 | II021014-1 | 1 | | .912 | mg/L | 91.2 | 90 | 110 | | | |
| WG147244CCB3 | CCB | 10/22/02 0:59 | | | | U | mg/L | | -0.01 | 0.01 | | | |

**Cyanide, WAD** SM4500-CN I-Colorimetric w/ distillation

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG147144** | | | | | | | | | | | | | |
| WG147144ICV | ICV | 10/22/02 11:05 | WI021009-2 | .3 | | .3126 | mg/L | 104.2 | 90 | 110 | | | |
| WG147144ICB | ICB | 10/22/02 11:06 | | | | U | mg/L | | -0.005 | 0.005 | | | |
| WG147144PBW | PBW | 10/22/02 11:07 | | | | U | mg/L | | -0.005 | 0.005 | | | |
| WG147144LFB | LFB | 10/22/02 11:08 | WI021010-4 | .2 | | .1914 | mg/L | 95.7 | 90 | 110 | | | |
| L38828-09DUP | DUP | 10/22/02 11:09 | | | U | U | mg/L | | | | 0 | 20 | |
| L38831-01MS | MS | 10/22/02 11:11 | WI021010-4 | .2 | U | .1988 | mg/L | 99.4 | 90 | 110 | | | |
| WG147144CCV1 | CCV | 10/22/02 11:14 | WI021003-2 | .25 | | .2631 | mg/L | 105.2 | 90 | 110 | | | |
| WG147144CCB1 | CCB | 10/22/02 11:15 | | | | U | mg/L | | -0.005 | 0.005 | | | |
| WG147144CCV2 | CCV | 10/22/02 11:22 | WI021003-2 | .25 | | .2647 | mg/L | 105.9 | 90 | 110 | | | |
| WG147144CCB2 | CCB | 10/22/02 11:22 | | | | U | mg/L | | -0.005 | 0.005 | | | |

**SEH** ACZ Project ID: ***L38828***

Project ID: RICO-ST LOUIS PONDS

**Iron, total recoverable** M200.7 ICP

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG147241** | | | | | | | | | | | | | |
| WG147241ICV | ICV | 10/18/02 23:06 | II021016-1 | 2 | | 1.931 | mg/L | 96.6 | 95 | 105 | | | |
| WG147241ICB | ICB | 10/18/02 23:11 | | | | U | mg/L | | -0.01 | 0.01 | | | |
| WG147241PQV | PQV | 10/18/02 23:15 | II021001-12 | .05 | | .04 | mg/L | 80 | 70 | 130 | | | |
| WG146789LRB | LRB | 10/18/02 23:29 | | | | .012 | mg/L | | -0.022 | 0.022 | | | |
| WG146789LFB | LFB | 10/18/02 23:34 | II021008-6 | 1 | | .945 | mg/L | 94.5 | 85 | 115 | | | |
| L38819-01LFM | LFM | 10/18/02 23:43 | II021008-6 | 1 | .1 | 1.063 | mg/L | 96.3 | 70 | 130 | | | |
| L38819-01LFMD | LFMD | 10/18/02 23:47 | II021008-6 | 1 | .1 | 1.134 | mg/L | 103.4 | 70 | 130 | 6.46 | 20 | |
| WG147241CCV1 | CCV | 10/19/02 0:01 | II021014-1 | 1 | | .971 | mg/L | 97.1 | 90 | 110 | | | |
| WG147241CCB1 | CCB | 10/19/02 0:06 | | | | U | mg/L | | -0.01 | 0.01 | | | |
| WG147241CCV2 | CCV | 10/19/02 0:57 | II021014-1 | 1 | | .946 | mg/L | 94.6 | 90 | 110 | | | |
| WG147241CCB2 | CCB | 10/19/02 1:02 | | | | U | mg/L | | -0.01 | 0.01 | | | |
| WG147241CCV3 | CCV | 10/19/02 1:34 | II021014-1 | 1 | | .952 | mg/L | 95.2 | 90 | 110 | | | |
| WG147241CCB3 | CCB | 10/19/02 1:39 | | | | U | mg/L | | -0.01 | 0.01 | | | |

**Lead, dissolved** M200.8 ICP-MS

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG147796** | | | | | | | | | | | | | |
| WG147796ICS1 | ICS | 10/29/02 21:51 | MS021029-3 | .05 | | .04958 | mg/L | 99.2 | 90 | 110 | | | |
| WG147796ICB1 | ICB | 10/29/02 21:57 | | | | U | mg/L | | -0.00022 | 0.00022 | | | |
| WG147796QCS | QCS | 10/29/02 22:03 | MS021008-1 | .02 | | .01925 | mg/L | 96.3 | 90 | 110 | | | |
| WG147796LRB | LRB | 10/29/02 22:09 | | | | U | mg/L | | -0.00022 | 0.00022 | | | |
| WG147796LFB | LFB | 10/29/02 22:15 | MS021005-4 | .05 | | .04623 | mg/L | 92.5 | 85 | 115 | | | |
| L38837-01AS | AS | 10/29/02 22:26 | MS021005-4 | .25 | U | .2195 | mg/L | 87.8 | 70 | 130 | | | |
| L38837-01ASD | ASD | 10/29/02 22:32 | MS021005-4 | .25 | U | .2187 | mg/L | 87.5 | 70 | 130 | 0.37 | 20 | |
| WG147796ICS2 | ICS | 10/29/02 23:01 | MS021029-3 | .05 | | .05004 | mg/L | 100.1 | 90 | 110 | | | |
| WG147796ICB2 | ICB | 10/29/02 23:07 | | | | U | mg/L | | -0.00022 | 0.00022 | | | |
| WG147796ICS3 | ICS | 10/30/02 0:11 | MS021029-3 | .05 | | .05041 | mg/L | 100.8 | 90 | 110 | | | |
| WG147796ICB3 | ICB | 10/30/02 0:17 | | | | U | mg/L | | -0.00022 | 0.00022 | | | |
| WG147796ICS4 | ICS | 10/30/02 1:03 | MS021029-3 | .05 | | .04894 | mg/L | 97.9 | 90 | 110 | | | |
| WG147796ICB4 | ICB | 10/30/02 1:09 | | | | U | mg/L | | -0.00022 | 0.00022 | | | |

**Magnesium, dissolved** M200.7 ICP

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG147244** | | | | | | | | | | | | | |
| WG147244ICV | ICV | 10/21/02 22:23 | II021016-1 | 101.89 | | 97.91 | mg/L | 96.1 | 95 | 105 | | | |
| WG147244ICB | ICB | 10/21/02 22:28 | | | | U | mg/L | | -0.2 | 0.2 | | | |
| WG147244PQV | PQV | 10/21/02 22:32 | II021001-12 | 1 | | .93 | mg/L | 93 | 70 | 130 | | | |
| WG147244LFB | LFB | 10/21/02 22:45 | II021010-2 | 49.98652 | | 50.21 | mg/L | 100.4 | 85 | 115 | | | |
| WG147244CCV1 | CCV | 10/21/02 23:17 | II021014-1 | 50.945 | | 49.21 | mg/L | 96.6 | 90 | 110 | | | |
| WG147244CCB1 | CCB | 10/21/02 23:21 | | | | U | mg/L | | -0.2 | 0.2 | | | |
| L38826-01AS | AS | 10/21/02 23:57 | II021010-2 | 49.98652 | 176 | 228.53 | mg/L | 105.1 | 85 | 115 | | | |
| L38826-01ASD | ASD | 10/22/02 0:01 | II021010-2 | 49.98652 | 176 | 225.99 | mg/L | 100 | 85 | 115 | 1.12 | 20 | |
| WG147244CCV2 | CCV | 10/22/02 0:10 | II021014-1 | 50.945 | | 49.55 | mg/L | 97.3 | 90 | 110 | | | |
| WG147244CCB2 | CCB | 10/22/02 0:15 | | | | U | mg/L | | -0.2 | 0.2 | | | |
| WG147244CCV3 | CCV | 10/22/02 0:55 | II021014-1 | 50.945 | | 47.39 | mg/L | 93 | 90 | 110 | | | |
| WG147244CCB3 | CCB | 10/22/02 0:59 | | | | U | mg/L | | -0.2 | 0.2 | | | |

**SEH** ACZ Project ID: ***L38828***

Project ID: RICO-ST LOUIS PONDS

**Manganese, dissolved** M200.7 ICP

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG147244** | | | | | | | | | | | | | |
| WG147244ICV | ICV | 10/21/02 22:23 | II021016-1 | 2 | | 1.9537 | mg/L | 97.7 | 95 | 105 | | | |
| WG147244ICB | ICB | 10/21/02 22:28 | | | | U | mg/L | | -0.005 | 0.005 | | | |
| WG147244PQV | PQV | 10/21/02 22:32 | II021001-12 | .025 | | .0236 | mg/L | 94.4 | 70 | 130 | | | |
| WG147244LFB | LFB | 10/21/02 22:45 | II021010-2 | .5 | | .5051 | mg/L | 101 | 85 | 115 | | | |
| WG147244CCV1 | CCV | 10/21/02 23:17 | II021014-1 | 1 | | .9856 | mg/L | 98.6 | 90 | 110 | | | |
| WG147244CCB1 | CCB | 10/21/02 23:21 | | | | U | mg/L | | -0.005 | 0.005 | | | |
| L38826-01AS | AS | 10/21/02 23:57 | II021010-2 | .5 | U | .4995 | mg/L | 99.9 | 85 | 115 | | | |
| L38826-01ASD | ASD | 10/22/02 0:01 | II021010-2 | .5 | U | .493 | mg/L | 98.6 | 85 | 115 | 1.31 | 20 | |
| WG147244CCV2 | CCV | 10/22/02 0:10 | II021014-1 | 1 | | .9839 | mg/L | 98.4 | 90 | 110 | | | |
| WG147244CCB2 | CCB | 10/22/02 0:15 | | | | U | mg/L | | -0.005 | 0.005 | | | |
| WG147244CCV3 | CCV | 10/22/02 0:55 | II021014-1 | 1 | | .9343 | mg/L | 93.4 | 90 | 110 | | | |
| WG147244CCB3 | CCB | 10/22/02 0:59 | | | | U | mg/L | | -0.005 | 0.005 | | | |

**Mercury, total** M1631, Atomic Fluorescence

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG148145** | | | | | | | | | | | | | |
| WG148145ICV | ICV | 11/05/02 13:32 | AFS021104-7 | .005 | | .00591 | ug/L | 118.2 | 77 | 123 | | | |
| WG148145ICB | ICB | 11/05/02 13:36 | | | | U | ug/L | | -0.0003 | 0.0003 | | | |
| WG148145PBW | PBW | 11/05/02 13:41 | | | | U | ug/L | | -0.0003 | 0.0003 | | | |
| WG148145LCSW | LCSW | 11/05/02 13:45 | AFS021104-7 | .005 | | .00505 | ug/L | 101 | 75 | 125 | | | |
| L38828-01MS | MS | 11/05/02 13:54 | AFS021104-4 | .002 | .0032 | .00555 | ug/L | 117.5 | 75 | 125 | | | |
| L38828-01MSD | MSD | 11/05/02 13:59 | AFS021104-4 | .002 | .0032 | .00539 | ug/L | 109.5 | 75 | 125 | 2.93 | 24 | |
| L38828-02DUP | DUP | 11/05/02 14:08 | | | .0004 | .0003 | ug/L | | | | 28.6 | 24 | T |
| WG148145CCV1 | CCV | 11/05/02 14:26 | AFS021104-7 | .005 | | .00512 | ug/L | 102.4 | 77 | 123 | | | |
| WG148145CCB1 | CCB | 11/05/02 14:31 | | | | U | ug/L | | -0.0003 | 0.0003 | | | |
| WG148145CCV2 | CCV | 11/05/02 15:21 | AFS021104-7 | .005 | | .00497 | ug/L | 99.4 | 77 | 123 | | | |
| WG148145CCB2 | CCB | 11/05/02 15:26 | | | | U | ug/L | | -0.0003 | 0.0003 | | | |
| WG148145CCV3 | CCV | 11/05/02 16:02 | AFS021104-7 | .005 | | .00517 | ug/L | 103.4 | 77 | 123 | | | |
| WG148145CCB3 | CCB | 11/05/02 16:07 | | | | U | ug/L | | -0.0003 | 0.0003 | | | |

**Nickel, dissolved** M200.7 ICP

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG147244** | | | | | | | | | | | | | |
| WG147244ICV | ICV | 10/21/02 22:23 | II021016-1 | 2 | | 1.941 | mg/L | 97.1 | 95 | 105 | | | |
| WG147244ICB | ICB | 10/21/02 22:28 | | | | U | mg/L | | -0.01 | 0.01 | | | |
| WG147244PQV | PQV | 10/21/02 22:32 | II021001-12 | .05 | | .048 | mg/L | 96 | 70 | 130 | | | |
| WG147244LFB | LFB | 10/21/02 22:45 | II021010-2 | .5 | | .497 | mg/L | 99.4 | 85 | 115 | | | |
| WG147244CCV1 | CCV | 10/21/02 23:17 | II021014-1 | 1 | | 1.002 | mg/L | 100.2 | 90 | 110 | | | |
| WG147244CCB1 | CCB | 10/21/02 23:21 | | | | U | mg/L | | -0.01 | 0.01 | | | |
| L38826-01AS | AS | 10/21/02 23:57 | II021010-2 | .5 | U | .489 | mg/L | 97.8 | 85 | 115 | | | |
| L38826-01ASD | ASD | 10/22/02 0:01 | II021010-2 | .5 | U | .479 | mg/L | 95.8 | 85 | 115 | 2.07 | 20 | |
| WG147244CCV2 | CCV | 10/22/02 0:10 | II021014-1 | 1 | | .996 | mg/L | 99.6 | 90 | 110 | | | |
| WG147244CCB2 | CCB | 10/22/02 0:15 | | | | U | mg/L | | -0.01 | 0.01 | | | |
| WG147244CCV3 | CCV | 10/22/02 0:55 | II021014-1 | 1 | | .938 | mg/L | 93.8 | 90 | 110 | | | |
| WG147244CCB3 | CCB | 10/22/02 0:59 | | | | U | mg/L | | -0.01 | 0.01 | | | |

**ACZ Laboratories, Inc.**
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

# Inorganic QC Summary

**SEH** ACZ Project ID: ***L38828***

Project ID: RICO-ST LOUIS PONDS

## Residue, Filterable (TDS) @180C — M160.1 - Gravimetric

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG146865** | | | | | | | | | | | | | |
| WG146865PBW | PBW | 10/11/02 11:30 | | | | U | mg/L | | -10 | 10 | | | |
| WG146865LCSW | LCSW | 10/11/02 11:31 | WC020927-5 | 259.67 | | 284 | mg/L | 109.4 | 80 | 120 | | | |
| L38828-09DUP | DUP | 10/11/02 11:45 | | | 580 | 588 | mg/L | | | | 1.4 | 20 | |

## Residue, Non-Filterable (TSS) @105C — M160.2 - Gravimetric

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG146835** | | | | | | | | | | | | | |
| WG146835PBW | PBW | 10/10/02 16:35 | | | | U | mg/L | | -10 | 10 | | | |
| WG146835LCSW | LCSW | 10/10/02 16:39 | WC021010-1 | 148.72 | | 140 | mg/L | 94.1 | 80 | 120 | | | |
| L38876-01DUP | DUP | 10/10/02 17:24 | | | 8 | 8 | mg/L | | | | 0 | 20 | |

## Selenium, dissolved — SM 3114 C, AA-Hydride

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG147089** | | | | | | | | | | | | | |
| WG147089ICV | ICV | 10/17/02 10:24 | II021012-1 | .02 | | .0219 | mg/L | 109.5 | 90 | 110 | | | |
| WG147089ICB | ICB | 10/17/02 10:26 | | | | U | mg/L | | -0.0022 | 0.0022 | | | |
| WG147089LRB | LRB | 10/17/02 10:28 | | | | U | mg/L | | -0.0022 | 0.0022 | | | |
| WG147089LFB | LFB | 10/17/02 10:30 | II021012-4 | .01666667 | | .0171 | mg/L | 102.6 | 85 | 115 | | | |
| WG147089CCV1 | CCV | 10/17/02 10:43 | II021012-2 | .025 | | .0252 | mg/L | 100.8 | 90 | 110 | | | |
| WG147089CCB1 | CCB | 10/17/02 10:45 | | | | U | mg/L | | -0.0022 | 0.0022 | | | |
| L38831-05LFM | LFM | 10/17/02 10:55 | II021012-4 | .01666667 | U | .0175 | mg/L | 105 | 85 | 115 | | | |
| L38831-05LFMD | LFMD | 10/17/02 10:57 | II021012-4 | .01666667 | U | .0175 | mg/L | 105 | 85 | 115 | 0 | 20 | |
| WG147089CCV2 | CCV | 10/17/02 11:02 | II021012-2 | .025 | | .0251 | mg/L | 100.4 | 90 | 110 | | | |
| WG147089CCB2 | CCB | 10/17/02 11:04 | | | | U | mg/L | | -0.0022 | 0.0022 | | | |
| WG147089CCV3 | CCV | 10/17/02 11:21 | II021012-2 | .025 | | .0245 | mg/L | 98 | 90 | 110 | | | |
| WG147089CCB3 | CCB | 10/17/02 11:23 | | | | U | mg/L | | -0.0022 | 0.0022 | | | |
| WG147089CCV4 | CCV | 10/17/02 11:29 | II021012-2 | .025 | | .025 | mg/L | 100 | 90 | 110 | | | |
| WG147089CCB4 | CCB | 10/17/02 11:31 | | | | U | mg/L | | -0.0022 | 0.0022 | | | |

## Silver, dissolved — M200.8 ICP-MS

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG147796** | | | | | | | | | | | | | |
| WG147796ICS1 | ICS | 10/29/02 21:51 | MS021029-3 | .025 | | .02508 | mg/L | 100.3 | 90 | 110 | | | |
| WG147796ICB1 | ICB | 10/29/02 21:57 | | | | U | mg/L | | -0.00011 | 0.00011 | | | |
| WG147796QCS | QCS | 10/29/02 22:03 | MS021008-1 | .02 | | .01909 | mg/L | 95.5 | 90 | 110 | | | |
| WG147796LRB | LRB | 10/29/02 22:09 | | | | U | mg/L | | -0.00011 | 0.00011 | | | |
| WG147796LFB | LFB | 10/29/02 22:15 | MS021005-4 | .0125 | | .0114 | mg/L | 91.2 | 85 | 115 | | | |
| L38837-01AS | AS | 10/29/02 22:26 | MS021005-4 | .0625 | U | .04772 | mg/L | 76.4 | 70 | 130 | | | |
| L38837-01ASD | ASD | 10/29/02 22:32 | MS021005-4 | .0625 | U | .04821 | mg/L | 77.1 | 70 | 130 | 1.02 | 20 | |
| WG147796ICS2 | ICS | 10/29/02 23:01 | MS021029-3 | .025 | | .02557 | mg/L | 102.3 | 90 | 110 | | | |
| WG147796ICB2 | ICB | 10/29/02 23:07 | | | | U | mg/L | | -0.00011 | 0.00011 | | | |
| WG147796ICS3 | ICS | 10/30/02 0:11 | MS021029-3 | .025 | | .02527 | mg/L | 101.1 | 90 | 110 | | | |
| WG147796ICB3 | ICB | 10/30/02 0:17 | | | | .00009 | mg/L | | -0.00011 | 0.00011 | | | |

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

## Inorganic QC Summary

**SEH** ACZ Project ID: ***L38828***

Project ID: RICO-ST LOUIS PONDS

**Zinc, dissolved** M200.7 ICP

| ACZ ID | Type | Analyzed | PCN/SCN | QC | Sample | Found | Units | Rec | Lower | Upper | RPD | Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WG147244** | | | | | | | | | | | | | |
| WG147244ICV | ICV | 10/21/02 22:23 | II021016-1 | 2 | | 1.939 | mg/L | 97 | 95 | 105 | | | |
| WG147244ICB | ICB | 10/21/02 22:28 | | | | U | mg/L | | -0.01 | 0.01 | | | |
| WG147244PQV | PQV | 10/21/02 22:32 | II021001-12 | .05 | | .05 | mg/L | 100 | 70 | 130 | | | |
| WG147244LFB | LFB | 10/21/02 22:45 | II021010-2 | .5 | | .505 | mg/L | 101 | 85 | 115 | | | |
| WG147244CCV1 | CCV | 10/21/02 23:17 | II021014-1 | 1 | | .981 | mg/L | 98.1 | 90 | 110 | | | |
| WG147244CCB1 | CCB | 10/21/02 23:21 | | | | U | mg/L | | -0.01 | 0.01 | | | |
| L38826-01AS | AS | 10/21/02 23:57 | II021010-2 | .5 | U | .5 | mg/L | 100 | 85 | 115 | | | |
| L38826-01ASD | ASD | 10/22/02 0:01 | II021010-2 | .5 | U | .501 | mg/L | 100.2 | 85 | 115 | 0.2 | 20 | |
| WG147244CCV2 | CCV | 10/22/02 0:10 | II021014-1 | 1 | | .978 | mg/L | 97.8 | 90 | 110 | | | |
| WG147244CCB2 | CCB | 10/22/02 0:15 | | | | U | mg/L | | -0.01 | 0.01 | | | |
| WG147244CCV3 | CCV | 10/22/02 0:55 | II021014-1 | 1 | | .925 | mg/L | 92.5 | 90 | 110 | | | |
| WG147244CCB3 | CCB | 10/22/02 0:59 | | | | U | mg/L | | -0.01 | 0.01 | | | |

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

## Sample Receipt

SEH
RICO-ST LOUIS PONDS

ACZ Project ID: L38828
Date Received: 10/8/02
Received By: tonya

## Receipt Verification

| | YES | NO | NA |
|---|---|---|---|
| 1) Does this project require special handling procedures such as CLP protocol? | | | √ |
| 2) Are the custody seals on the cooler intact? | | | √ |
| 3) Are the custody seals on the sample containers intact? | | | √ |
| 4) Is there a Chain of Custody or other directive shipping papers present? | √ | | |
| 5) Is the Chain of Custody complete? | √ | | |
| 6) Is the Chain of Custody in agreement with the samples received? | √ | | |
| 7) Is there enough sample for all requested analyses? | √ | | |
| 8) Are all samples within holding times for requested analyses? | √ | | |
| 9) Were all sample containers received intact? | √ | | |
| 10) Are the temperature blanks present? | √ | | |
| 11) Are the trip blanks (VOA and/or Cyanide) present? | | √ | |
| 12) Are samples requiring no headspace, headspace free? | | | √ |
| 13) Do the samples that require a Foreign Soils Permit have one? | | | √ |

## Exceptions: If you answered no to any of the above questions, please describe

N/A

## Contact (For any discrepancies, the client must be contacted)

N/A

## Shipping Containers

| Cooler Id | | Temp (°C) | Rad (µR/hr) |
|---|---|---|---|
| ACZ | | 5.7 | 13 |
| | | | |
| | | | |
| | | | |

## Notes

ADDED 1mL NAOH TO PURPLE SAMPLE - pH = 11.

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

## Sample Receipt

**SEH**
RICO-ST LOUIS PONDS

ACZ Project ID: L38828
Date Received: 10/8/02
Received By: tonya

### Sample Container Preservation

| SAMPLE | CLIENT ID | R < 2 | G < 2 | Y < 2 | YG< 2 | B < 2 | BG< 2 | O < 2 | T >12 | P >12 | N/A | RAD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L38828-01 | DR-4-SW | | | | | | | | | | O | |
| L38828-02 | DR-7-SW | | | | | | | | | | O | |
| L38828-03 | DR-27 | | | | | | | | | | O | |
| L38828-04 | DR-7 | | | | | | | | | | O | |
| L38828-05 | DR-6 | | | | | | | | | | O | |
| L38828-06 | DR-3 | | | | | | | | | | O | |
| L38828-07 | DR-1 | | | | | | | | | | O | |
| L38828-08 | SVS-20 | | | | | | | | | | O | |
| L38828-09 | SVS-26 | Y | Y | | | | | | | Y | | |
| L38828-10 | SVS-12 | | | | | | | | | | O | |
| L38828-11 | DR-24 | | | | | | | | | | O | |
| L38828-12 | DR-25 | | | | | | | | | | O | |

# ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

L38828

## CHAIN of CUSTODY

**Report to:**

Name: STEVEN MORGENSTERN
Company: SEH INC
E-mail: SMORGENSTERN@SEHINC.COM
Address: 2637 MIDPOINT DR, Ste F
FC, CO 80525
Telephone: 970.484.3611

**Copy of Report to:**

Name:
Company:
E-mail:
Telephone:

**Invoice to:**

Name:
Company:
E-mail:
Address:
Telephone:

**PROJECT INFORMATION**

Quote #:
Project/PO #: RICO - ST LOUIS PONDS
Shipping Co.: UPS
Tracking #:
Reporting State for compliance testing:

ANALYSES REQUESTED (attach list or use quote number)

| | SAMPLE IDENTIFICATION | DATE:TIME | Matrix | # of Containers | LOW LEVEL MERCURY | TDS, TSS, CN HARDNESS | DISSOLVED METALS | METALS - TOTAL RECOVERABLE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | DR-4-SW | 10/7/02 11:15 am | SW | 1 | X | | | | | | | |
| 2. | DR-7-SW | 10/7/02 11:45 am | SW | 1 | X | | | | | | | |
| 3. | DR-27 | 10/7/02 12:10 pm | SW | 1 | X | | | | | | | |
| 4. | DR-7 | 10/7/02 12:45 pm | SW | 1 | X | | | | | | | |
| 5. | DR-6 | 10/7/02 12:55 pm | SW | 1 | X | | | | | | | |
| 6. | DR-3 | 10/7/02 1:10 pm | SW | 1 | X | | | | | | | |
| 7. | DR-1 | 10/7/02 1:25 pm | SW | 1 | X | | | | | | | |
| 8. | SVS-20 | 10/7/02 8:45 am | SW | 1 | X | | | | | | | |
| 9. | SVS-26 10:15am | 10/7/02 ~~9:45am~~ AV | SW | 6 | X | X | A | B | | | | |
| 10. | SVS-12 | 10/7/02 1:50 pm | SW | 1 | X | | | | | | | |
| 11. | DR-24 1:35pm | 10/7/02 ~~11:30am~~ AV | SW | 1 | X | | | | | | | |
| 12. | DR-25 | 10/7/02 11:30 am | SW | 1 | X | | | | | | | |

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

**REMARKS**

A = Cd, Cu, Pb, Mn, Ni, Se, Ag, Zn

B = As, Cr, Fe

| RELINQUISHED BY: | DATE:TIME | RECEIVED BY: | DATE:TIME | PAGE |
|---|---|---|---|---|
| STEVEN MORGENSTERN | 10/7/02 14:20 | | 10/08/02 1015 | |
| | | | | Of |
| | | | | |

FRMQA021.10.01.04

White - Return with sample. Yellow - Retain for your records.