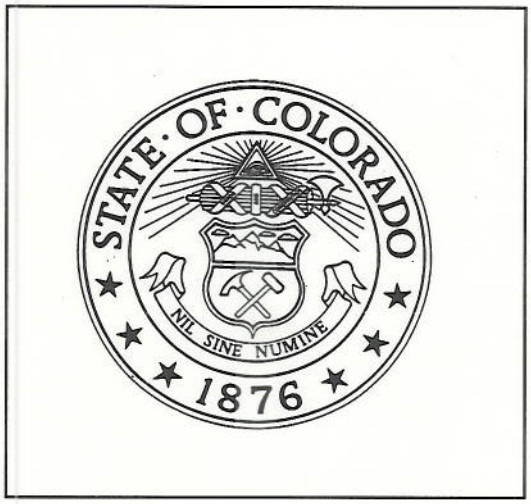
COLORADO DEPARTMENT OF PUBLIC HEALTH

AND ENVIRONMENT

HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION



COMBINED ASSESSMENT
ANALYTICAL RESULTS REPORT
CANYON CREEK WATERSHED
OURAY COUNTY, COLORADO

OCTOBER 26, 2000

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OURAY COUNTY, COLORADO

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ANALYTICAL RESULTS REPORT
Canyon Creek Watershed,
Ouray County Colorado

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

1.0 INTRODUCTION

This Analytical Results Report (ARR) of the Canyon Creek Watershed (CCW) site (CERCLIS ID #CO0008969994) located in Ouray County, Colorado, has been prepared under a cooperative agreement by the Colorado Department of Public Health and Environment (CDPHE) for the U.S. Environmental Protection Agency (EPA). Field activities conducted at the CCW site during September 20-22, 1999, followed the standard Site Inspection (SI) format and were conducted in accordance with EPA=s Guidance for Performing Site Inspections under CERCLA, Interim Final (1992) and the Region VIII Supplement to the Site Inspection Guidance (U.S. Environmental Protection Agency (EPA) 1992; EPA 1993).

Field work at the CCW site included sampling and non-sampling data collection. All field work followed the applicable State of Colorado Standard Operating Procedures (CDPHE 1988). The actual sampling activities at the Canyon Creek site included the collection of samples from 64 separate locations, including two QA/QC, samples from within the Canyon Creek watershed. Specifically, CDPHE collected the following:18 waste source samples consisting of 18 total metal and 11 cyanide aliquots; 22 surface water samples (inclusive of aqueous adit samples) consisting of 22 total, 22 dissolved, and 11 cyanide aliquots; and 20 sediment samples consisting of 20 total metal and 11 cyanide aliquots. The aforementioned samples include two rinsate and two duplicate Quality Assurance/Quality Control (QA/QC) samples as well as field samples collected from the Canyon Creek, Sneffels Creek, Imogene Creek, Governor Creek and the Uncompahgre River drainages. Project personnel also submitted three sediment samples for organic analyses inclusive of Volatile Organic Analysis (VOA), semi-volatile organics Base Neutral Acid extractables (BNA), and Pesticide/PCB analysis. Waste source samples consisted of medium to coarse-grained, tailings materials collected from the onsite tailings piles located at the Atlas, Camp Bird and Upper Camp Bird mines as well as waste rock materials collected from numerous waste rock piles situated along the banks of creeks and streams within the Canyon Creek watershed (Table 1).

Non-sampling activities included the collection of surface water flow data needed to calculate the metals loading to nearby surface water bodies and perform mass balance analysis along the drainage. In addition, CDPHE personnel also collected field measurements of the dimensions of piles and waste rock dumps to assist in the estimation of waste volumes.

All samples were analyzed through the EPA Contract Laboratories Program (CLP), Routine Analytical Services (RAS) for the Target Analyte List (TAL) total metals and dissolved metals. CDPHE also collected 10 percent of all sediment samples for full suite TCL Organic Analysis. Unique Laboratory Services Analyses (ULSA) included surface water samples submitted for Lab Group B and C analytes. Lab Group B analytes

consist of: fluoride; chloride; sulfate; and alkalinity. Lab Group C parameters include: ammonia; nitrate and nitrite; phosphates; and total organic carbon.

Samples scheduled for inorganic analysis were shipped via Federal Express on September 24, 1999, to American Analytical and Technical Services, Inc. in Broken Arrow, Oklahoma. On September 24, 1999 CDPHE shipped the organic samples collected during the investigation to American Technical and Analytical Services in Maryland Heights, Missouri and hand delivered those samples scheduled for Lab Group B and C analyses to Acculabs Inc., located in Golden Colorado.

2.0 OBJECTIVES

The Canyon Creek watershed is characterized by numerous mine waste sources that are uncontained with respect to the surface water, ground water and air migration pathways. The Sample and Analysis Plan (SAP) called for the collection of samples and non-sampling data to characterize and test whether impacts have occurred to human health or the environment and to screen for effects to human health and the environment within the watershed using EPA's Hazard Ranking System (HRS) criteria (Office of the Federal Register 1990). CDPHE collected source, surface water, and sediment samples. The SAP was intended to fulfill the following objectives:

- ∃ Characterize mine sources associated with the Canyon Creek watershed through the collection and analysis of waste rock, tailings and adit discharge samples; and

- ∃ Evaluate the impact to surface water targets through the collection and analysis of aqueous surface water and collocated sediment samples.

3.0 BACKGROUND INFORMATION

3.1 SITE LOCATION AND DESCRIPTION

The Canyon Creek watershed lies within the Ouray mining district on the northern edge of the San Juan volcanic region in southwestern Colorado. The Ouray mining district covers an area of approximately 250 square miles that is bounded by Ouray on the north, Silverton to the south, Hinsdale-San Juan county line on the east and Ophir on the west (King et. al., 1950). Land ownership in the area is mixed between Federal (USDA Forest Service) and private interests.

Topography in the study area is extremely rugged and ranges in altitude from 8,000 to 14,000 feet above mean sea level (amsl). The landforms consist of jagged, high mountain peaks dissected by steep walled canyons, talus slopes, and shear rock faces. Periods of glaciation have formed many high mountain cirques and have resulted in the deposition of morainal deposits in the low lying canyons (King et. al., 1950).

Timberline in the area varies from between 11,000 to 11,500 feet amsl with the slopes below timberline vegetated by fir, spruce, and, on the south facing slopes, aspen stands. The portions of the watershed above timber line are vegetated with grasses and low shrubs associated with alpine tundra.

Mines in the area are, with a few exceptions, inactive and can be accessed by a series of rough, four-wheel drive trails. Access to the mine sites occupying the upper portions of the watershed is limited to two to three months out of the year, and the ability to access some of the workings early in the summer is largely dependent both on the amount of precipitation received in the winter months and the rate of snowmelt.

The Canyon Creek watershed drains a total of 28.5 square miles and contains numerous mine workings. These workings date from 1874 when the main rush to the area was brought on by the negotiation of a treaty with nearby Indian tribes.

Mine and milling facilities as encountered in the order of ascension up the Canyon Creek drainage are as follows (Figure 1):

X Mineral Farm Mine
X Camp Bird Mine
X Highland Chief Mine
X Hawkeye Mine
X Bimetallist Mine
X Torpedo Eclipse Mill
X Torpedo Eclipse Mine
X Revenue Mine
X Atlas Mine
X Dread Not and Genessee Claims
X Yankee Boy Mine
X Ruby Trust Mine
X Mountain Top Mine

X Virginius Mine; and

X Humbolt Mine

Mines in the Canyon Creek watershed are accessed by traveling from Ouray to the Southwest up the Camp Bird Road (named after the Camp Bird Mine and Mill situated at the confluence of Sneffels and Imogene Creeks).

Mineral Farm Mine

Located near the confluence of Canyon Creek and the Uncompahgre River, the Mineral Farm Mine is one of the earliest gold mines in the Ouray area. The Mineral Farm Mine was discovered in October of 1875 and consisted largely of placer claims. Immediately after discovery miners built several log cabins and spent the winter working the area and establishing several more placer claims (Gregory et. al., 1992). There were no milling activities occurring on site since miners collected ore and shipped it to either the Shenandoah-Dives mill in Silverton or the Banner-American Zinc mill in Ouray (Fischer et. al., 1958). The legal description of the mine is the SE of the SW of Section 6, Township 43 North, Range 7 West (USGS 1955).

There are two small waste rock dumps present on this site. These dumps contain an estimated 25 cubic yards of highly oxidized rock materials. Runoff from the dumps appears to be channeled to Canyon Creek via an intermittent gulch. In addition to the waste rock dumps, there is a mine adit with bright orange staining present on the channel bottom (pH of 6.4 and specific conductance of 500 microsiemans/centimeter (μS/cm)). Chemical analysis of the adit discharge by Colorado Geological Survey (CGS) personnel indicated that concentrations of iron, cadmium, and lead exceed state water quality standards for the Canyon Creek drainage (CGS 1997).

Camp Bird Mine

The Camp Bird Mine and Mill (CBMM) site is located in the Imogene basin at the headwaters of Canyon Creek southwest of Ouray on the northern border of the San Juan Mountains. The CBMM site is located approximately six miles southwest of Ouray, in Ouray County, Colorado. The CBMM site comprises 129 patented mining claims and occupies approximately 1,000 acres. The CBMM produced gold and silver during its early operational period and later, toward the end of site operations, produced lead and zinc. The CBMM site occupies two separate areas comprised of the

Camp Bird Portal (1400 level adit) and mill site and the Upper Camp Bird Mine workings (300 Level). The Camp Bird 1400 level portal served as the main entrance to the mine area and is located at the terminus of county road 361. The mill-site and portal entrance is located in the NW of the SE of Section 22, Township 43 North, Range 8 West (USGS 1955).

The Upper Camp Bird is located in the SE/4 of the SE/4 of Section 27, Township 43 North, Range 8 West at an elevation of approximately 11,200 feet amsl. The Upper Camp Bird Mine is situated approximately two miles south of the Camp Bird Mill-site and includes openings to the number 200 and number 300 level adits (USGS 1955).

A large tailings pond and associated mill buildings are present below the 1400 Level portal. The tailings piles include the inactive tailings facility (265,360 cubic yards), the active tailings facility (60,935 cubic yards), and the historic tailings (146,225 cubic yards) (CDPHE 1998). The aforementioned volume estimates are based on measurements taken from a scaled schematic provided to CDPHE, and a conservative tailings depth estimate of 20 feet. Utilizing these assumptions, the combined volume of tailings materials present in all on-site piles is estimated at approximately 472,520 cubic yards (Federal Resources 1998, CDPHE 1998).

Highland Chief Mine

Immediately above the Camp Bird Mine along the Sneffels Creek drainage is the Highland Chief Mine. The Highland Chief Mine is visible from the Camp Bird Road across Sneffels Creek. The mine produced silver and lead ore during its operational period but now consists of rotting timbers and small quantities of waste rock materials. There is little information available on the operational history of this mine and the lack of significant infrastructure indicates that the mine was probably not a large producer. Available information states that the Highland Chief exported a majority of its ore to the Shenandoah-Dives Mill at Silverton or to the Banner-American Zinc Mill at Ouray (Fischer 1968). Field observations did not indicate the presence of flowing adits or large quantities of waste rock or tailings materials; however, there is an adit associated with the mine on the south side of the Imogene basin Road. The adit was not flowing during the CDPHE site visit but may flow during the spring and early summer months (CDPHE 1998).

Hawkeye Mine

The Hawkeye Mine is an abandoned lead, zinc and silver mine situated in the southwest 1/4 of the southwest 1/4 of Township 43 North, Range 8, West, New Mexico Principal Meridian. The mine is located to the northwest of the Camp Bird road and consists of an adit, a waste rock dump and several piles of rusted metal debris (possibly discarded ore cart track). At the time of the CDPHE site visit the adit was not flowing but previous reports by the Colorado Geological Survey indicate that the adit was flowing at a rate of approximately 1 gallon per minute (gpm) (CGS 1997). In addition, runoff from the waste rock dump is able to directly enter a perennial stream that flows into Sneffels Creek (CDPHE 1998). During the September 1998 CDPHE site visit, the toe of the waste rock dump was visibly eroding into the perennial stream.

Bimetallist Mine

The Bimetallist Mine is a lead, zinc, silver mine located approximately 500 feet to the northeast of the Hawkeye Mine at an elevation of 11,440 feet amsl. The site is situated on a south facing slope and is accessed by a pack trail. The main features of this mine include several mine adits and waste rock dumps. The waste rock dumps are located well above any significant drainages and the adits were not flowing at the time of the CDPHE site visit (CDPHE 1998). Due to the steepness of the terrain, the waste rock volumes were difficult to estimate.

Torpedo Eclipse Mine and Mill

Located immediately across the road from the intersection of the Camp Bird Road and the Imogene Pass Road, the Torpedo Eclipse Mill consists of ore processing machinery situated inside several old buildings. The Torpedo Eclipse Mill is actually an old commissary that was converted to a mill in the 1950's to process ore from the Torpedo-Eclipse and the Ruby Trust mines (Gregory et.al., 1992). There are no large waste rock dumps at this site but there is a closed adit that appears to be drained by two separate aluminum pipes. These pipes have been riddled with bullet holes and are now leaking; however, the leakage does not appear to be generating any precipitate or discoloration indicative of acidic conditions and is well removed from any perennial drainage.

Revenue Mine

Located approximately 2 mile upstream of the Camp Bird Mine is the Revenue mine and mill site. At one time Federal Resources owned both the Camp Bird and the Revenue Mine and Mill sites. The Revenue Mine is currently owned by Sunshine Mining Company and is no longer owned by Federal Resources Group Inc. The mine is an inactive gold and silver producer that is scheduled to begin operation again (DMG Permit # M-80-068); however, the exact date of proposed activation is unknown. Site observations are limited because the area is posted and fenced. There does not appear to be any discharge from the mine portal. There is an extensive waste rock pile which runs for approximately 100 yards along the banks of Sneffels Creek in the area. The waste rock pile shows little sign of oxidation (some slightly visible in isolated pockets throughout the dump). There are several buildings visible on the surface of the mine area but no visible tailings impoundment.

The mine portal associated with the Revenue bisects the workings of the Virginius Mine located above the Revenue at an elevation of 12,200 feet amsl. Ore concentrates from the mine/mill were hauled to Ouray via mule train in 1890.

Atlas Mine and Mill

Approximately 0.25 mile west of the Revenue Mine are the remnants of the Atlas Mine and Mill site. The Atlas Mine and Mill site is an abandoned gold and silver mine. The mine workings are located on the southern wall of the valley at an elevation of approximately 11,280 feet amsl approximately 150 feet above the mill structure on the canyon wall. There is significant discharge flowing from the mine opening that runs over the waste rock material into an un-named drainage the flows into Sneffels Creek immediately above the Revenue Mine. There is a dilapidated aerial tram leading from the mine opening to the Atlas Mill located approximately 1,000 feet to the northwest. At the Atlas Mill there are remnants of the original mill structure, a waste rock dump, and two large deposits of tailings (lower pile and upper pile) adjacent to Sneffels Creek. These tailings show visible signs of oxidation as well as erosion and are situated immediately adjacent to Sneffels Creek. There are signs of stressed vegetation and some evaporative metal salts on the surface of the upper pile materials.

Measurements of the piles made by pacing indicate the following dimensions for the piles (CDPHE 1998): The Lower pile is approximately 520 feet long by 160 feet wide with an estimated average depth of approx. 5 feet. Assuming a roughly rectangular shape, the estimated volume for the pile is 15,400 cubic yards; The upper pile shows more visible indications of oxidation and measures roughly

570 feet long, by 130 feet wide with an average depth of 3 feet, yielding an estimated total volume of 8,230 cubic yards.

Immediately to the southeast of the mill is a waste rock pile of undetermined volume that shows visible signs of oxidation. The mill building is disintegrating and there are pieces of debris lying around the site. There are no signs stating that the area is posted and the materials from both tailings piles are readily available for migration into Sneffels Creek. These piles show visible evidence of fluvial erosion and are uncontained with respect to any of the major migration pathways. Rocks lining the bank of Sneffels Creek had significant staining (rust/oxidation-type) adjacent to and downstream of the mill and tailings area.

Genessee and Dread Not Claims

This group of adits and waste rock dumps were inventoried previously by CGS personnel. This site is situated along the north side of Forest Service Road #853.1B, approximately 2 mile east of the trail head for the Blue Lakes Trail. All of the mine claims (former copper, silver, lead and zinc claims) and associated infrastructure are situated on patented land and consist of the following features: there are three adits that were flowing during the initial CGS Abandoned Mine Land (AML) survey; however, during the September 30, 1998 site visit the adits were not flowing. There are two waste rock dump features associated with this area. These waste rock dumps show visible evidence of oxidation. Pacing measurements taken to approximate volumes yielded estimated waste rock volumes for the upper and lower piles of 2,309 cubic yards and 3,000 cubic yards, respectively.

During the CGS AML survey field personnel collected a single sample from a point onsite where a perennial stream emerged from the base of the waste rock dump. Analysis of this sample indicated that the emerging water was below state standards for all analytes except zinc. The discharge zinc concentration 31 micrograms/liter (µg/l) was slightly elevated above Table Value Standards (28 µg/l) when adjusted for hardness. CGS did not submit any adit samples for analysis; however, pH measurements yielded values ranging from 5.0 to 6.9.

Walker Ruby Mine

The Walker Ruby mine (also known as the Ruby Trust mine) is a permitted mine (Permit # M-79-181) that is located at the confluence of the Governor Basin Drainage and Sneffels Creek. The Walker Ruby mine is a producer of gold, silver and lead that is currently listed as inactive. The presence of

earth moving equipment suggests that the site has not been inactive for long. The site is posted and has a large waste rock pile that is skirted by Sneffels Creek (to the west-southwest). There is no evidence of oxidation visible on the waste rock pile materials and there does not appear to be any discharge coming from the portal (the portal is boarded up and the plywood does not look excessively weathered). Near the portal there appears to be some oxidation on the hillslope and there is discharge coming from above the portal area. This discharge does not appear to originate from the portal but may issue from another adit or spring above the portal.

Mountain Top Mine

The Mountain Top Mine is located in the upper reaches of Governor Basin; however, there are numerous waste rock deposits lower down in the watershed where the Governor Basin jeep road descends into the bottom of the drainage and turns back to the east prior to proceeding up the basin to the Virginius and Humbolt Mines. The waste rock deposits are on patented lands and the area is closed behind a locking gate. Access into the site on foot is unrestricted; however, the area is posted Aprivate property≅.

The mine portal is located at an elevation of 12,000 feet amsl and was a major producer of silver and lead. Evidently, the main operation of the mine closed in 1929 but was reopened several times. The mine operation was subject to snowslide hazards and, as a result, miners constructed a 60 ton/day mill 900 feet underground in the mine workings. This mill never functioned properly and was abandoned. There is an abandoned aerial tramway that was used to transport ore from the upper workings to the base area.

The most recent effort to open the mine resulted in the construction of a two-story storage building onsite; however, the structure was erected in the middle of an avalanche chute and was destroyed by a slide in 1998 (CDMG 1999). Additional efforts to reactivate the mine have failed and the mining permit has since been revoked by DMG.

The Virginius and Humbolt Mines

The Virginius and Humbolt Mines are abandoned gold and silver mines located at the top of Governor Basin up an extremely narrow and precipitous wagon road. According to the CGS, both the Virginius and Humbolt Mine adits contribute substantial volumes of water to Governor Creek. At the Humbolt Mine, water runs over the waste rock dump. Bright orange and red-brown precipitates coat the rocks

along the drainage extending below the dump. Previous water quality parameters collected from the adit discharge indicates substantial degradation from the initial surface expression (discharge 15 gpm, pH of 5.8 and conductivity of 100 ΦS/cm) of the discharge after it infiltrates and issues from the waste rock dump (discharge 5 gpm, pH of 3.6 and conductivity of 500 ΦS/cm).

Samples of water collected from below the waste rock dump indicate the potential for severe degradation of surface water quality in Governor Creek. Specifically, concentrations of the following analytes exceeded the numeric standards for the Canyon Creek Drainage; aluminum, cadmium, copper, iron, lead, manganese, and zinc (all exceeding standards by an order of magnitude) (CGS 1997).

The volume of material present within the Virginius waste rock dump is estimated at approximately 38,000 cubic yards of materials. Effluent from the mine infiltrates the waste rock dump and issues from the base in several locations (CGS 1997).

3.2 SITE HISTORY AND PREVIOUS WORK

In 1874 prospectors began operations in the high mountains near Engineer Mountain. Mining activities accelerated in the area in 1875 with the influx of miners moving into the region down the Uncompahgre River and Bear Creek drainages to the Ouray area. That year, discoveries were made in what is presently called ABox Canyon≅. These discoveries included the Fisherman and Trout lodes and the Mineral Farm Mine located near the confluence of Canyon Creek and Uncompahgre River. Additional discoveries of 1875 included finds in both Imogene and Yankee Boy basins near the top of the Canyon Creek watershed (Gregory et. al. 1992). By 1881 the Virginius Mine at the top of the Canyon Creek watershed had two shafts advanced into the host rock with mining activities occurring on three levels (King et.al.,1950).

A gold rush to the Ouray area ensued the following spring and facilitated the surveying and incorporation of the town of Ouray on September 2, 1876. Since there was no rail service to the area, ore was transported by mule train to Silverton for processing. This limitation made it impractical to transport anything but the highest grade ores. Initially, the richest discoveries were made in the Sneffels District, located immediately southwest of the Camp Bird mine (Gregory et. al. 1992). The Sneffels District included the mines situated in the Imogene, Governor, and Yankee Boy Basins inclusive of all mining activities in and around the town of Sneffels. The principal ore bearing deposits were discovered in the Sneffels District between 1875 and 1881 (Gregory et. al. 1992).

The Camp Bird mine was one of the largest producers and was discovered in 1877. The prospectors, though aware of a certain concentration of gold in the ore, were discouraged by the high cost of transporting the ore to Silverton by mule and did not develop the mine. In 1896 Thomas Walsh, while passing through the area examined some of the quartz materials in the mine dump. After assaying the ore, Walsh discreetly began to acquire title to all claims in the area by direct purchase or by the purchase of tax title. Mr. Walsh went on to develop the property into a large, highly profitable, mining operation. In 1898 buildings were erected at the No. 2 adit level and a 20 stamp mill was erected on the Camp Bird mill-site. In 1899 a surface plant consisting of a compressor-house, electrical station, aerial tram and large boarding house were erected at the No. 3 adit level (Purington et.al. 1902). By 1913, an English Corporation called the Camp Bird limited purchased all of the property. Camp Bird Ltd. extracted a majority of the high-grade ore by 1916 with the inflow of the water making further ore extraction uneconomical. A subsidiary company called Camp Bird Tunnel was then incorporated to drive the level 14 adit to intercept the main ore vein approximately 450 feet below the deepest workings. This effort did not result in the extraction of appreciable quantities of gold ore and large scale operations were discontinued (King et. al., 1950).

The mine has been developed by three cross cuts at successively lower levels (King et. al., 1950). The fourteenth level is the lowest tunnel at an altitude of 9,822 feet and is located approximately 2,000 feet below the outcrop of the vein. The fourteenth level served as the major haul-way through which miners transported all ore materials from the mine to the mill area located near the fourteenth level portal.

Ore at the Camp Bird Mine was derived from the vein occupying a fault fissure that crosses the Red Mountain, Sneffels, Telluride area on an east-west course. The most extensive mining operations have occurred in the Imogene basin and the vein is called the Camp Bird vein in this area. To the east of the Imogene Basin the vein reportedly splits into several diffuse components and gradually disappears. The vein consists largely of massive quartz of variable width (usually five to ten feet wide). In the vicinity of the Camp Bird Mine the vein branches into three main shoots. These shoots include the hematite shoot to the east, the Big Discovery to the west and the Camp Bird in the vicinity of the level 14 cross-cut (King et. al., 1950).

During the period from 1896 to 1916 the Camp Bird mine and mill-site processed a total of 820,730 tons of ore for a total gross value of $27,269,768. In 1925 Charles Bell Sr. obtained a lease from the Camp Bird Limited, and operated the mill-site as a partnership under the name of Camp Bird leasing

Co. until 1928. In 1928 the partnership dissolved and the King Lease was formed. The King Lease operated the mill-site continuously until 1956 when the operation reverted to Camp Bird Ltd. Camp Bird Ltd. expected increased ore production from newly developed veins and subsequently demolished the stamp mill and constructed a 500-ton-per-day mill which was completed in 1960. In 1962 the company acquired the Revenue-Virginius Corporation which held adjacent formerly producing mines including the Revenue, Cumberland, Wheel of Fortune, and Terrible (Fischer 1968).

In 1963, Federal Resources Corporation acquired the Camp Bird mine and mill-site including300mining claims and the 500 ton per day flotation mill. Federal Resources corporation sought to mine adjacent leased claims, particularly the Virginius vein through the Revenue tunnel workings associated with past excavation activities previously developed in the Camp Bird tunnel.

During a November 12, 1976 Bureau of Mines inspection of the facility, the mine was in operation and was mining a portion of the Telluride Conglomerate which is rich in lead and zinc. The mining operations were following a mineralized fault zone that was 25 feet wide and between 40 and 70 feet high. At the time of the inspection, the mine was producing approximately 400 tons of ore per day. The ore consisted of a pyrite-rich marmatite that carried lead and zinc along with a small quantity of chalcopyrite (US Bureau of Mines 1976). Mining and milling operations continued until 1981 when Federal Resources Inc., shut down operations.

In 1986 Royal Gold Inc., a subsidiary of Royal Resources Corp., along with Chipeta Mining Corp., and Ouray Ventures Inc., entered into an agreement with Camp Bird Colorado, a subsidiary of Federal Resources Corp., to lease the mine and mill (US Bureau of Mines 1986). In 1987 Royal Gold announced that it had acquired a 19% lease option interest in the Camp Bird joint venture and together with partners had until December 1988 to exercise the option and purchase the mine for approximately $2.4 million. During the option period, the partnership completed a major exploration and development program reportedly estimated to cost approximately $8 million.

Evidently, the purchase option was never exercised. In 1990 the lease was terminated and the mine became inactive. In 1995 a Canadian firm dismantled the flotation mill and shipped it overseas for reconstruction at another mine (Rosemeyer 1998). At present, the site is still jointly owned by Camp Bird Inc. and Federal Resources Corporation both of Salt Lake City (Ouray County Assessors Office 1998).

3.2.1 Ore-processing History

There were five mills that operated in the Canyon Creek watershed. These mills included the Camp Bird Mine and Mill, the Torpedo Eclipse Mill, the Revenue Mill, the Atlas Mill, and the Mountain Top Mine and Mill. Ore-processing techniques employed at the mill sites varied but a summary of the processes employed at the Camp Bird mill may give insight into ore processing activities utilized at other mills in the Canyon Creek watershed.

Ore processing at the Camp Bird, Revenue, Atlas, Mountain Top, and Torpedo Eclipse mills involved the implementation of several treatment methods. These methods included mercury amalgamation, vanner concentration, and cyanide treatment. A narrative of the processes utilized at the Camp Bird Mill is provided to illustrate some of the possible processes employed at the various mills. While this accounting of the Camp Bird methodology may not apply to all of the mills, certain aspects of the following processes were most likely utilized in mill sites throughout the Canyon Creek watershed.

Ore-processing at the Camp Bird mine and mill site was initiated with the transport of materials from the underground workings via both an aerial tram and through the main haulway associated with the No. 14 level adit.
In 1897 a 10 stamp mill was erected a mile down the canyon from the initial mine workings. In 1898, after successive improvements, several buildings and 20-stamp mill were erected at the No. 2 level which later was expanded to a 60-stamp mill. Additional improvements occurred in 1899 with the construction of a surface plant, consisting of a compressor house, electrical station, aerial tram, and large boarding house at the No. 3 level where a cross cut tunnel was driven 2,200 feet to intercept the vein 800 feet below the surface.

Specific ore processing activities at the Camp Bird mill involved ore treatment through the following steps. These steps included; crushing the ore with Blake crushers, pulverizing with stamps, copper plate amalgamation, vanner-concentration and the direct treatment of tailings with cyanide.

After off loading from the tram-buckets the ore was crushed within the Blake crushers yielding a mixture of fine and coarse grained rock. The resulting mixture of rock was then further crushed on stamp presses with individual stamps weighing approximately 850 pounds each and dropping at a rate of 100 times/minute. Water was fed to the stamp press at a rate of approximately 20 gallons per minute through a 1.5-inch pipe insuring a thorough mixture with the ore.

Amalgamation of the ore materials was achieved through the use of 16 foot long by 53 inch wide annealed copper plates. The plates were prepared by scouring the surface by rubbing with tailings or fragments of brick to remove all traces of oxide and expose the surface of the metal. The plate was then fastened to the amalgamating table with brass screws and washed with a lye solution. Mercury was applied in small aliquots and rubbed onto the plate with a brush.

The amalgamation plates were cleaned daily and the plates were routinely washed. The amalgam at the edge of each plate was softened by sprinkling with a small quantity of mercury and scrubbing with brushes. Miners then removed the amalgam by scraping with rubber scrapers and working from the bottom edge upward. After the amalgam was removed, the plates were again treated with mercury. Workers spread the mercury and thoroughly worked the material into the copper. The dressing often required utilizing a weak solution of cyanide and lye and potassium, with an occasional addition of lime to the process to neutralize the acidity of the feed water and ore. This method resulted in an average extraction efficiency of 75 percent and a loss of 0.142 to 0.166 oz. of mercury per ton of ore treated.

The recovered amalgam was then transferred to the amalgam room where it was cleaned and retorted. The impurities present in the amalgam were removed by grinding the crude amalgam in mortars for the purpose of mechanically separating the sulphurets and sand. The amalgam was first treated by the addition of mercury and softening by grinding in hot water. This process facilitated the separation of the impurities by encouraging the clean amalgam to sink to the bottom while the impurities floated on the top and were subsequently skimmed off. The remaining amalgam was then squeezed through canvas bags and removed of excess mercury. This amalgam was then subjected to a second round of grinding and skimming so that a majority of the impurities were removed. After an additional round of squeezing, the amalgam was then retorted. This process resulted in a yield of approximately 40% and purity of removed gold of approximately 0.740.

Excess mercury present in the pulp from the stamp presses was contained in traps and recovered on a weekly basis. The remaining pulp, after traveling through the traps, was delivered to the concentrators. The concentrators consisted of 30 six-foot Frue vanners, and six wifely tables. The first row of vanners were fitted with copper plates designed to capture any remaining amalgam materials. The sulphurets accumulated in the concentrators were then trammed directly to the dryer-building. The dryers consisted of iron bins heated by coils of pipe warmed by the exhaust steam of the mill-engine.

The vanner tailings were then subject to further treatment utilizing a cyanide-works process. The tailings were pumped into leaching vats where the slimes separated and were stored for treatment during the summer months. During treatment the tailings materials underwent either a single or double treatment process. In both cases the materials were treated with a potassium cyanide solution to leach any remaining gold from the matrix.

The Camp Bird stamp mill was demolished in 1960 and replaced with a 600 ton per day flotation mill. This mill operated periodically until 1990 when mining activities ceased at the facility. In 1995 a Canadian firm dismantled the flotation mill for reconstruction at an overseas operation.

The amount of information available on operational histories of each mine is variable, with the major producers such as the Camp Bird Mine and Mill, the Revenue, the Virginius and Humbolt Mines having extensive histories on site operations while the less productive mines have little historical information readily available. For those operations that have extensive information, CDPHE has provided a summary of operational methods and history. Additional information on the operational history ,when available, has been included for each mine/mill site and is included in Section 3.1 Location and Site Description.

3.2.2 Previous Investigations

Investigations at the Canyon Creek watershed mine and mill sites is limited largely to a Colorado Geological Survey (CGS) inventory of the abandoned mine sites within the basin (CGS 1997) and NPDES compliance monitoring at the Camp Bird Mine and Mill. The CGS investigation provided an inventory of mine and mill sites as well as an assessment of general water quality parameters associated with selected adit discharges at each mine/millsite.

In 1975 the US Bureau of Mines Conducted a visit at the Camp Bird mine largely to gain an understanding of ore bodies and mining practices. Information gathered did not detail tailings/material handling procedures employed at the mine but instead covered mining and milling procedures utilized at the site. There is no known existing analytical data that characterizes the nature of site wastes or documents the offsite migration of site related contaminants.

During a September 11, 1996 inspection of the Camp Bird Mine by Colorado Water Quality Control Division personnel, inspectors indicated that tailings materials were slumping into Canyon Creek and the water contained within the on-site settling pond was an Aunnatural green color≅ (CWQCD 1996).

Inquiries into the nature and characteristics of the tailings materials indicates that there is no data readily available that characterizes the nature of site wastes.

Analysis of both influent (originating from the Camp Bird Level 14 portal) and effluent samples from the settling pond indicated that the pond effluent was, at times, higher in total zinc values than was the influent (CWQCD 1997). Zinc concentrations in pond influent samples averaged 0.21 milligrams/liter (mg/l) for a period from August 1996 to April 1997. Total zinc values for pond effluent samples averaged 0.24 mg/l for the same period.

Additional analysis of the portal effluent utilizing Whole Effluent Toxicity (WET) indicated that there was no significant reduction in survival or reproduction of either WET indicator species (*Cerodaphnia dubia* (water flea) and *Pimphales promelas* (Fathead minnow)) at the In stream Waste Concentration of 64% (ENSR 1997).

On October 29, 1997, CDPHE CWQCD issued a letter to Camp Bird Colorado, Inc. notifying Camp Bird Inc. that sampling efforts conducted in May and June of 1997, indicated an exceedance of permit limitations (CWQCD Permit # CO 0026981) for 30-day average dissolved zinc concentrations in mine effluent. The May and June 30-day average values for zinc were 0.615 mg/l and 0.539 mg/l, respectively. Both of these values exceeded the calculated stream standards of 0.36 mg/l (May) and 0.53 mg/l (June).

Additional investigations at the Camp Bird Mine and Mill site include efforts by the U.S. EPA National Pollution Discharge Elimination System (NPDES) inspectors to characterize water discharges from the Number 14 level portal, and at the settling pond outfall. EPA-NPDES personnel performed this sampling effort during the summer of 1998 in response to a Federal Resources request to discontinue its discharge permit for the facility.

3.3 SITE CHARACTERISTICS

3.3.1 Physical Geography

The Canyon Creek watershed encompasses a drainage area of approximately 28.5 square miles. The elevation of the various mines and mill sites varies from a low of approximately 8,600 feet amsl at the Mineral Farm mine near Ouray to a high of 12,600 feet amsl at the Humbolt mine in Governor Basin (USGS 1955).

Topography in the area is extremely rugged and is characterized by high mountains dissected with steep- walled valleys and sharp ridge lines. Valleys in the area exhibit evidence of past glacial activity. The area surrounding the upper reaches of the watershed is characterized by large rugged topography with sparsely vegetated boulder fields typical of an alpine environment.

3.3.2 Geology

Major rock types encountered within the San Juan Mountain region include metamorphic, sedimentary, and igneous rocks ranging in age from Precambrian to Recent. Precambrian exposures are limited in the area with the exception of the Needle mountains located to the south of the Ouray district and are confined to a few isolated masses encompassing a few square miles each (Burbank et. al. 1968). Metasedimentary, metavolcanic and igneous rocks present within the Precambrian group suggest a variety of environmental conditions and allow for the division of the Precambrian group into two age categories. The oldest and most widespread group is the metamorphosed and deformed mica schist, horneblende schist, amphibolite, gneiss and quartzite. This group is exposed in the Needles Mountains and is also highly intruded in this area by igneous plutons with a predominant siliceous composition.

The younger group consists of less metamorphosed and deformed conglomerate, quartzite, argillite, and slate and is exposed in both the Needle Mountains and the canyon areas south of Ouray. In the vicinity of Ouray, there are alternating layers of quartzite and slate that total over 8,000 feet in thickness. This group was also intruded by igneous plutons varying in size from small to large that were comprised of largely siliceous materials. The Precambrian surface was eroded in the area to a gently rolling surface before submergence by the sea in late Cambrian time (Burbank 1958).

During late Cambrian time Paleozoic and Mesozoic sedimentary strata was deposited with a pronounced angular unconformity to the beveled Precambrian rocks. Burbank et. al., divided the Paleozoic strata into two general sequences. The older sequence is composed of thin widespread quartzites, dolomites, and limestones of Cambrian (Ignacio Quartzite) through Mississippian ages (Leadville Limestone) that were deposited under shallow marine conditions (Burbank 1958). The upper sequence includes several thousand feet of conglomerates, sandstones, siltstones, limestones, salt, and gypsum ranging from Pennsylvanian (Molas, Hermosa and Rico Formations) to Permian (Cutler Formation) ages that were deposited on the outer margins of an ancient land mass in the San Juan region (Burbank 1958).

The ancient land mass consists of the Uncompahgre-San Luis Highland that extended from west-central Colorado in a southerly direction through the San Juan region into north-central New Mexico. This highland area served as source of sediments during the late Paleozoic and Part of the Mesozoic time. The Pennsylvanian aged Molas Formation accumulated on the surface of the weathered Mississippian materials prior to the advancement of the sea. The Molas formation forms the basal unit and is characterized by the sequence of thick Ared beds≅. As the highland area was continuously uplifted, the deposition in the area changed from a marine environment to continental deposition. This change is evidenced by the successive occurrence of sedimentary rocks of the Pennsylvanian aged Hermosa and Rico Formations as well as by the Permian aged Cutler formation (Burbank 1958).

Terrestrial deposition continued through the Triassic and Jurassic. Within the vicinity of Ouray there is an unconformity separating the Cutler and older units of the Dolores Formation of Late Triassic age. In the Ouray area there is evidence of erosion, monoclinal folding and faulting indicating local deformation at the end of the Paleozoic. Jurassic and Triassic rocks are approximately 1,500 feet thick and include beds of sandstone, siltstone, shale, mudstone, limestone and gypsum associated with the Dolores, Entrada sandstone, Wanakah, Junction Creek Sandstone and Morrison Formations. These rocks represent deposition in terrestrial, lagoonal, and/or near-shore environments (Burbank 1958).

The Cretaceous aged rocks show evidence of marine, near-shore, and coastal swamp deposition and constitute a sequence of sandstone, shale and shaley limestone nearly 9,000 feet thick. Cretaceous units include the Dakota Sandstone, Mancos Shale, Mesaverde Group and Intrusive rocks. Late Cretaceous and early Tertiary rocks show evidence of additional uplift (Laramide orogeny) and erosion, monoclinal folding, and faulting; however, this period was also accompanied by extensive igneous activity. Stream erosion reduced the western San Juan region to one of fairly low relief with scattered residual hills .

The materials derived from the early Tertiary erosion accumulated on the low lying surface to form the Telluride conglomerate of possible Oligocene age. A wide volcanic plateau of eruptive materials related to volcano tectonic subsidence structures was then formed on top of the Telluride, where present, or on top of the pre-tertiary rocks where the Telluride is absent.

The overlying volcanic layer has an aggregate thickness exceeding 1.5 miles and consists of numerous rock and depositional types. The oldest sequence of volcanics comprises the Lake Fork Formation and the San Juan Formation. These sequences were erupted from a cluster of central vent volcanoes

extending from near the current site of Lake City southwestward toward Silverton. The debris from these eruptions was deposited mainly as mud flows and laval flows over hundreds of square miles reaching a thickness of up to 3,000 feet near Ouray. Toward the end of the volcanic eruption a large oval shaped depression formed, possibly through engulfment of the volcanic vents.

The second, or middle, stratigraphic sequence is confined to the San Juan depression where continued eruptions resulted in the deposition of the Silverton Volcanic Group. The San Juan depression measures roughly 15 miles wide by 30 miles long and is divisible into four principal units: The Picayune; Eureka Tuff; Burns Formation; and, the Henson Formation.

The Picayune Formation is comprised of mafic lava flows, tuffs, and breccias extruded from central-vent volcanoes. The Eureka Tuff consists of thick welded ash flows tuffs. The Burns Formation occurs primarily as domes and volcanic piles along the rims of the depression and as domes and thick flows on the basin floor. Limestones and shales were deposited concurrently as ashy and pumiceous freshwater limestones and shales on the basin floor. The more mafic lava and ash derived from continuing eruptions eventually formed the Henson Formation, the youngest of the middle sequence.

The youngest of the volcanic sequence is the Potosi Volcanic Group which consists almost entirely of siliceous welded ash-flow tuffs. Eruption of these tuffs resulted in the formation and subsidence of the younger Silverton and Lake City cauldrons (Burbank 1958). These cauldrons have a diameter of roughly 10 miles and are located within the San Juan volcanic depression (Burbank 1958).

Post volcanic faulting fissuring and igneous intrusion altered the rock and was one of the reasons for the formation of the late Tertiary ore deposits. The late Tertiary erosion occurred along with the basaltic and rhyolitic eruptions of the Hinsdale Formation northeast, east and southeast of Lake City. The current, uneven mountainous topography is attributable to Pleistocene glaciation and fluvial and colluvial mass wasting (Burbank 1958).

Quaternary deposits consist of unconsolidated glacial debris, land-slide materials talus and related debris on slopes and alluvium along present day stream valleys. Quaternary deposits include isolated pockets of manganese-rich travertine precipitated from the hot springs at Ouray and some iron rich material sometimes called bog iron ore, deposited by springs in the vicinity of Red Mountain and Uncompahgre Peak (Fisher).

Ore deposits in the Ouray area are of late Cretaceous or early Tertiary age and occur as veins running along east-trending fractures. These deposits may also form some tabular or irregularly shaped ore bodies.

3.3.3 Hydrogeology

There are two aquifers in the region, water occurs in both the fractured bedrock and the Quaternary alluvium. The Quaternary alluvium is confined to the stream valley bottoms and the potentiometric surface encountered in these deposits most likely conforms to the surrounding ground surface. The alluvial deposits in the area are thin and discontinuous. In the vicinity of the Camp Bird Mine, alluvium overlies tertiary volcanic and sedimentary rocks inclusive of the lava flows, flow breccias, explosive ejecta as well as sedimentary and welded ash flows representing the Potosi, Silverton volcanic groups, the San Juan formation and the Telluride conglomerate (Fischer 1968). Water contained in the Quaternary deposits can also be a means of transmitting stream water to bedrock.

Historical reports indicate that the quantity of water encountered in mine workings is proportional to the depth of the working (Purington 1902). Based on observations at the Camp Bird Mine, Purington postulates that the amount of water encountered in the mine excavation is directly proportional to the depth the workings penetrate toward the valley bottoms (Purington 1902).

The nearest wells consist of five geothermal wells located in the town of Ouray (population 644). Four of these wells are situated approximately six miles northeast of the Camp Bird Mine and mill site. These wells are situated on the southern portion of Ouray near the confluence of Canyon Creek and the Uncompahgre River. The fifth well is located on the northern edge of the Town of Ouray along the Uncompahgre River. These wells are utilized to supply water to the hot springs pools in Ouray (Wurst 1998). Completion detail provided in the data base states that the four southern wells range in depth from 300 to 345 below ground surface (bgs). The depth and completion details of the northern-most well is not listed within the Colorado Division of Water Resources well permit data base (Colorado Division of Water Resources 1998). The stated depth of these wells and the available literature summarizing the geology of the area suggests that the Ouray municipal wells are drawing water that issues from planar fractures within the underlying bedrock materials. Depending on depth of the screened interval, the wells may be drawing from fractures within either the Paleozoic sedimentary rocks or the Precambrian aged rocks.

3.3.4 Hydrology

The Canyon Creek watershed is comprised of the Richmond, Imogene, Pierson, Silver, Sidney, Governor, and Yankee Boy basins. Flow data on Canyon Creek is limited with a duration of record encompassing a time period from 1911 to 1915. Canyon Creek, as measured from the USGS gauging station 09145500 formerly located near Ouray, Colorado drains an area of 25.8 square miles and has a maximum annual peak discharge value of 680 cubic feet per second (cfs), recorded on October 10, 1911. This event appears to be anomalous since a majority of the record indicates that peak discharge occurs in late spring and early summer. The timing of a majority of the peak flow values for Canyon Creek indicate that the stream flow hydrograph is dominated by snowmelt and not individual precipitation events (USGS); however, the October 10, 1911 value indicates that the stream hydrology may also be subject to occasional significant variations in response to precipitation events.

The only currently maintained USGS gauging station pertinent to the watershed is gage number 09146200 located on the Uncompahgre River near Ridgway, Colorado. From the measuring point at station 09146200 the Uncompahgre River drains an area of 149 square miles and has an average annual discharge (water years 1958 to 1996) of 166 cfs. Again, stream flow values reported on a monthly basis indicate that the flow regime in the Uncompahgre River is largely dominated by snowmelt, with the highest mean monthly discharge values occurring in June and the minimum mean monthly discharge values occurring in February (USGS).

Mean annual precipitation as totaled from the University of Delaware (UD) database is 18.70 inches, with a two- year, twenty-four hour rainfall of 1.5 inches (Dunne and Leopold 1978). The net annual precipitation as calculated from precipitation and evapotranspiration data obtained from the UD is 6.73 inches.

4.0 ANALYTICAL DATA

4.1 DATA VALIDATION AND INTERPRETATION

The sample data collected during this SI were reviewed using the HRS guidelines for analytical interpretation (Office of the Federal Register 1990). As reported in the analytical results Tables 1 through 4, elevated concentrations of contaminants, as noted by shaded values, are determined by sample concentrations based on the following:

X If the **background** analyte concentration is greater than its Sample Quantitation Limit (SQL), and if the **release sample** analyte concentration is greater than its SQL, three times greater than the background, and five times greater than the blank concentration.

X If the **background** analyte concentration is not greater than its SQL and if the **release sample** analyte concentration is greater than its SQL, greater than the background, and five times greater than the blank analyte concentration.

All data analyzed by the CLP RAS laboratories were validated by TechLaw Inc., Lakewood, Colorado. The complete data validation report, laboratory forms, and SQL calculations are included in Appendix C, under separate cover.

5.0 SOURCE CHARACTERIZATION

5.1 SOURCE SAMPLE LOCATIONS

CDPHE collected 14 solid matrix waste source samples. These samples consisted of three tailings samples from the Camp Bird Historic tailings pile (CB-HT-01A through CB-HT-03A); Three tailings samples from the recently inactivated tailings pile (CB-WS-01A through CB-WS-03A); Four tailings samples collected from the Atlas Mill streamside tailings pile (AT-WS-1 through AT-WS-4); one waste rock sample (AT-WR-01) collected from the Atlas Mill waste rock pile; one waste rock sample (SC-WS-01)collected from the pile at the Upper Sneffels Creek Adit; one waste rock sample (HC-WS-01) collected from the Highland Chief Waste rock dump; one fine grained tailings sample (IB-WS-01) collected from streamside tailings present along Imogene Creek downstream of the Upper Camp Bird mine ;and three waste rock samples (DN-WS-01 through DN-WS-03) collected from three piles located on the Dread Not group of claims (Figure 2).

CDPHE collected field measurements at each waste rock/tailings pile source identified during either the September 1998 site reconnaissance or the September 1999 sampling portion of the investigation. Based on the measured lengths, widths and approximated depths, CDPHE calculated the following volumes for the piles:

Table 1

Source Dimensions and Volumes

Canyon Creek Watershed Assessment

Source Name	Length (ft)	Width (ft)	Depth (ft)	Volume (Cu. Yd.)	Source of Information
Camp Bird Historic Tailings	Not Collected	Not Collected	Not Collected	146,225	Federal Resources 1998
Camp Bird Inactive Tailings	Not Collected	Not Collected	Not Collected	326,295	Federal Resources 1998
Atlas Tailings - Upper Pile	570	130	3	8,230	CDPHE 1998
Atlas Tailings - Lower Pile	520	160	5	15,400	CDPHE 1998
Atlas Waste Rock Dump	100	30	40	2,000	CDPHE 1999
Dread-Not Upper Waste Rock Pile	100	100	30	5500	CDPHE 1998
Dread-Not Lower Waste Rock Pile	80	52	15	2300	CDPHE 1998
Sneffels Creek Waste Rock Dump	40	15	3	67	CDPHE 1999
Imogene Creek -Upper Pile Stream Side Tailings	200	70	6	3100	CDPHE 1999
Imogene Creek -Lower Pile Stream Side Tailings	70	26	4	270	CDPHE 1999

Field personnel collected samples from the 0 to 2 foot depth interval within the pile/waste rock materials utilizing decontaminated stainless steel hand augers, spoons and shovels. Sampling depth intervals are listed with the analytical results (Table 4).

5.2 SOURCE ANALYTICAL RESULTS

Source samples were analyzed for TAL inorganic contaminants (Table 7). Inorganic substances detected in the Camp Bird Historic Tailings pile included the following with the highest concentration in parentheses: Aluminum (9020 parts per million (ppm)), antimony (3.80 ppm), arsenic (134 ppm), barium (240 ppm), cadmium (12.7 ppm), chromium (13.4 ppm),cobalt (23 ppm), copper (1120 ppm), lead (4430 ppm), manganese (5820 ppm), nickel (4.60 ppm), silver (20.8 ppm), vanadium (15.9 ppm), and zinc (2130 ppm). Mercury was the only analyte not detected in the pile materials.

Analysis of the Camp Bird inactive tailings materials indicated the presence of the following (highest concentration given in parentheses): Aluminum (7500 ppm); antimony (7.2 ppm); arsenic (57.1 ppm);barium (239 ppm); beryllium (1.0 ppm); cadmium (28.5 ppm); chromium (4 ppm); cobalt (25.2 ppm); copper (642 ppm); lead (1730 ppm); manganese (13000 ppm); nickel (4.9 ppm); silver (36.8 ppm); thallium (2.5 ppm); vanadium (15.2 ppm); zinc (6230 ppm). In addition, total cyanide analysis indicated the presence of cyanide at a concentration of (0.25 ppm) in the tailings materials.

Atlas tailings samples exhibited the highest concentrations of inorganic contaminants along the Sneffels Creek riparian corridor. Analysis of tailings samples collected within two feet of the pile surface indicated the presence of the following analytes (maximum concentration listed in parentheses): Aluminum (2560 ppm); antimony (159 ppm); arsenic (358 ppm);barium (2730 ppm); beryllium (0.29 ppm); cadmium (44.9 ppm); chromium (1.50 ppm); cobalt (4.80 ppm); copper (540 ppm); lead (16,800 ppm); mercury (2.2 ppm); manganese (2740 ppm); nickel (1.10 ppm); silver (164 ppm); thallium (2.5 ppm); vanadium (9.3 ppm); and, zinc (8250 ppm).

A comparison of the reported analyte levels for the Atlas Tailings pile samples indicated that the maximum reported concentrations of arsenic and lead exceeded both Region IX Preliminary Remediation Goals (PRGs) and Region III Risk Based Concentrations (RBCs) for industrial soils in all samples collected. Although the Atlas tailings pile is not situated in an industrial setting, the expected frequency of human contact and likely time of exposure to source materials in the remote setting is more comparable to an industrial setting than a residential exposure situation.

Atlas waste rock material sample, AM-WR-01, consisted of a single grab sample collected from the coarse-grained material aggregated at the base of the former Atlas Mill building. CDPHE collected this sample from the 0-1 foot depth interval utilizing a disposable plastic scoop. Analysis of this sample indicated the presence of arsenic (258 mg/kg), lead (1050 mg/kg), silver (26.7 mg/kg) and zinc

(122 mg/kg). The level of arsenic in the waste rock materials is elevated above Superfund Chemical Data Matrices (SCDM) Reference Dose Screening Concentration (Rfd), Region IX PRG and Region III RBC benchmark.

Analysis of the Dread Not mine upper and lower pile materials indicates that the upper and lower piles contain respective arsenic concentrations of 866 mg/kg and 1020 mg/kg as well as respective lead values of 2120 and 3060 mg/kg. These levels are elevated above SCDM Rfds, Region IX PRGs and Region III RBCs. In addition, field personnel also collected samples of fine-grained materials located at the base of an old foundation at the Dread Not Group of claims. Analysis of these materials indicated the presence of arsenic (3510 mg/kg), lead (11,100 mg/kg) and manganese (46,200 mg/kg) concentrations exceeding SCDM Rfd benchmarks and Region IX PRGs. However, reported manganese levels, while in excess of SCDM and Region IX benchmarks, do not exceed Region III RBCs.

CDPHE also collected waste rock dump samples from the waste rock pile materials situated at the opening of the Sneffels Creek adits. Analysis of this sample indicates the presence of arsenic (30.5 mg/kg) and lead (11800 mg/kg) in the waste rock materials that exceed SCDM Rfds, Region IX PRGs and Region III RBC benchmarks.

During the September 21 through 23 sampling effort CDPHE personnel also identified an additional stream-side tailings pile situated along Imogene Creek approximately 0.1 mile downstream of the Upper Camp Bird workings. These tailings appear to have been slurried downstream from the Upper Camp Bird Complex and have accumulated in four to six foot deep slicks lining both sides of the the drainage. The material is extremely fine-grained and is eroding directly into the Imogene Creek channel. After measuring the dimensions of the piles, project personnel collected a single grab sample for total metals analysis. The resulting data indicated the presence of arsenic (30.5 mg/kg), cadmium (69.2 mg/kg), and lead (11,800 mg/kg) in the materials. The reported cadmium level exceeds the SCDM Rfd benchmark but neither the Region IX PRG nor Region III RBC for industrial soils. However, the arsenic and lead values exceed all three benchmarks for the streamside tailings materials.

CDPHE also collected sample HC-WS-01 from the 0-1 foot depth interval in the Highland Chief waste rock dump. This waste rock dump is situated immediately below the mine adit and consists of fine to medium-grained, light-tan to whitish-gray waste rock materials. The pile is situated immediately adjacent to the Imogene Pass Road and there are no physical barriers to access. Analysis

of the sample indicated concentrations of arsenic (37.6 mg/kg) and lead (21,000 mg/kg) in the pile materials. These levels exceed Region IX PRGs, Region III RBCs, and SCDM Rfds specified for the analytes.

6.0 SURFACE WATER PATHWAY

6.1 SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

CDPHE collected a total of 22 collocated surface water and sediment samples during the Canyon Creek Watershed SI. In addition, field personnel collected two duplicate, one rinsate and two Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples to comply with QA/QC requirements. Locations of the samples are shown on Figure 2.

Field samplers also collected seven adit discharge samples as follows: sample CB-AS-1 from the Camp Bird No. 14 level adit; CB-AS-2 and CB-AS-4 from two separate draining adits associated with the Upper Camp Bird mine workings; HC-AS-1 from the Highland Chief adit; AM-SP-1 from a seep present at the base of the Atlas Mine tailings pile; SC-AS-1 from the Sneffels Creek adit; and, US-AS-1 from the Upper Sneffels Creek adit.

CDPHE collected background samples YB -SW/SE-01and IB-SW/SE-1 upgradient of the site sources on Sneffels and Imogene Creeks, respectively.

Field personnel attempted to bracket those sources located proximal to the drainages along Sneffels, Governor=s, and Imogene Creeks as well as at locations along Canyon Creek downstream of site sources. Additional samples consisted of surface water and sediment samples collected from Canyon Creek above the confluence with the Uncompahgre River as well as at locations on the Uncompahgre River both up and downstream of its confluence with Canyon Creek. CDPHE conducted stream gauging activities at each surface water and adit sample location in the Canyon Creek watershed.

CDPHE also collected ten percent of the sediment samples for organic analysis. These analyses included volatile organics, pesticide/PCB and BNA/extractable analyses. Sediment samples submitted for organic analysis consisted of samples CC-SE-01, CC-SE-02 and YB-SE-04.

6.2 SURFACE WATER/SEDIMENT ANALYTICAL RESULTS

Surface water and sediment analytical results for both total and dissolved metals are presented in Tables 4 through 6. In addition, adit discharge sample results (total and dissolved are presented in Tables 8 and 9). A comparison of the analyte concentrations in surface water and adit samples to Numeric and Table Value Standards is also included in Tables 10 and 11.

Organic analysis of sediment samples did not indicate the presence of organic contamination in any of the sediment samples collected from the watershed. Since there were no significant detections reported for any of the samples, the data has not been tabulated; however, the data reports are included in Appendix B of this report.

Sneffels Creek/Yankee Boy Basin

Analytical results from the Yankee Boy Basin samples collected along Sneffels Creek above the confluence with Governor Creek did not indicate an appreciable increase in either dissolved or total metal analyte concentrations attributable to waste sources/ adit discharges located within the upper portions of Yankee Boy Basin. A review of the surface water data indicates that both dissolved and total concentrations of manganese, and zinc exhibit significance above background in samples YB-SW-4, YB-SW-5, YB-SW-6 and YB-SW-7 when compared to upgradient sample YB-SW-1. Dissolved zinc and manganese concentrations increase significantly in Sneffels Creek at the confluence of Governor Creek and show an additional slight increase downstream of the Atlas tailings/mill area. This increase in both dissolved and total zinc and manganese concentrations appear to be mainly attributable to the contribution from sources within Governors Basin with a small component attributable to the influence of the flood plain tailings on zinc concentrations in the drainage. During the investigation, CDPHE personnel noted the presence of springs originating from the Atlas Tailings pile at several locations. The discharge from these springs originated on the pile surface and most likely entered Sneffels Creek near the pile. Total metals analysis of water from one of these springs (Sample AM-SP-01) indicated the presence of aluminum (497 µg/l), arsenic (11.70 µg/l), cadmium (5.90 µg/l), copper (42.9 µg/l), iron (2420 µg/l), lead (661 µg/l), manganese (664 µg/l), silver (15.30 µg/l) and zinc (1170 µg/l). A comparison of these levels to both numeric and table value standards for Canyon Creek indicates that cadmium, copper, iron, lead, silver and zinc levels exceed acute table value standards established for Canyon Creek; however, with the exception of zinc, these elevated levels do not appear to degrade the water quality in Sneffels Creek. In-stream zinc

concentrations exceed chronic Table Value Standards in Sneffels Creek from above the Atlas mine and mill downstream to the confluence with Imogene Creek.

Dissolved zinc levels within Sneffels Creek remain constant (ranging from 71.6 µg/l to 82.7 µg/l) to a point in the creek immediately above the confluence with Imogene Creek. CDPHE collected sample YB-SW-07 from Sneffels Creek above the Camp Bird mine complex and below the Probable Point of Entry (PPE) of the Highland Chief mine discharge and an un-named tributary that drains Silver Basin and discharges to Sneffels Creek. Analysis of YB-SW-07 indicated that the concentration of zinc increased by a factor of two at this location (from an average of 75.5 µg/l to 143 µg/l). In addition, stream discharge, as measured by CDPHE personnel, increased between YB-SW-6 and YB-SW-7 from 10.92 to 17.57 cubic feet per second (cfs). This increase in flow coupled with an increase in zinc concentrations suggests that there is a significant loading source situated between the Camp Bird and the upper workings of the Revenue mine. Visual observations indicate that the un-named drainage contributes a significant flow to Sneffels Creek and suggests that this drainage may be a significant source of zinc loading to the creek in this area.

CDPHE collocated all sediment and surface water samples collected from Sneffels Creek. A review of the data generated from sediment sample analysis indicates that levels of antimony, chromium, mercury and zinc are significantly elevated above background concentrations in select samples collected from Sneffels Creek downstream of the Atlas Tailings pile (Table 6). Specifically, sample YB-SE-5 collected from a location approximately 100 feet below the Atlas Tailings Pile indicated that levels of mercury (0.11 mg/kg), were significantly elevated in stream sediments; however, the reported mercury value is below the Contract Required Detection Limit (CRDL) and above the Instrument Detection Limit (IDL). Field personnel collected additional sample, YB-SE-6 from Sneffels Creek above the Revenue Mine and approximately 2000 feet downstream of the Atlas Tailings pile. Analysis of YB-SE-6 indicated the presence of chromium (7.4 mg/kg), zinc (1380 mg/kg), and cyanide (0.44 mg/kg) in sediments downstream of the Atlas Tailings pile. These levels attenuate past the Revenue Mine and do not exhibit significance above background from this point to the headwaters of Canyon Creek.

Governor Basin

Previous investigations conducted by the Colorado Geological Survey (CGS) indicate that the Virginius and Humbolt Mines discharge a large volume of water to Governor Creek. At the Humbolt Mine, water runs over the waste rock dump. Bright orange and red-brown precipitates coat the rocks

along the drainage extending below the dump. Previous water quality parameters collected from the adit discharge indicates substantial degradation from the initial surface expression (discharge 15 gpm, pH of 5.8 and conductivity of 100 ΦS/cm) of the discharge after it infiltrates and issues from the waste rock dump (discharge 5 gpm, pH of 3.6 and conductivity of 500 ΦS/cm).

Samples of water collected by CGS personnel from below the waste rock dump indicated the potential for severe degradation of surface water quality in Governor Creek. Specifically, concentrations of aluminum, cadmium, copper, iron, lead, manganese, and zinc exceeded the numeric standards for the Canyon Creek drainage by an order of magnitude (CGS 1997).

The volume of material present within the Virginius waste rock dump is estimated at approximately 38,000 cubic yards of materials. Effluent from the mine infiltrates the waste rock dump and issues from the base in several locations (CGS 1997).

CDPHE collected samples from the two streams discharging from Governor Basin to Sneffels Creek. Sample GB-SW-1 was collected from Governor Creek immediately below the Mountain Top Mine while sample GB-SW-2 was collected from an un-named creek draining Governor Basin and discharging to Sneffels Creek upstream of the Revenue Mine.

Analysis of sample GB-SW-1 indicated the presence of total and dissolved concentrations of aluminum, antimony, arsenic, cadmium, copper, lead, manganese, and zinc significantly elevated above background levels reported for samples YB-SW-1 and IB-SW-1. In addition, dissolved cadmium, and lead concentrations exceeded chronic Table Value Standards for the Canyon Creek drainage while dissolved zinc levels exceeded both chronic and acute Table Value Standards (Table 10).

Samples collected from Sneffels Creek below the confluence with Governor Creek indicate that dissolved zinc concentrations increase above chronic Table Value Standards. This increase indicates that sources present within the Governor Basin contribute significant concentrations of zinc to Sneffels Creek.

CDPHE collected sample GB-SW-02 from an un-named tributary draining Governor Basin to the east. This tributary conveys flow from Governor Basin past the Atlas Mine adit and waste rock dump and discharges to Sneffels Creek above the Revenue Mine. Dissolved analysis of this sample indicates concentrations of aluminum, cadmium, manganese and zinc that exhibit significance above

background. In addition, the concentration of dissolved cadmium exceeds the chronic Table Value Standard while the manganese and zinc concentrations exceed both chronic and acute standards (CWQCC 1999).

Sample YB-SW-6 collected from Sneffels Creek above the Revenue Mine and below the confluence with the un-named tributary indicates a slight increase in dissolved manganese and zinc concentrations when compared to the sample results reported for YB-SW-5. The reported values for lead exceeds the chronic Table Value Standard while dissolved zinc exceeds both acute and chronic standards.

A comparison of sediment sample results from sediment sample GB-SE-1 collected from Governor Creek below the Mountain Top Mine to the highest analyte-specific value for background samples YB-SE-1 or IB-SE-1 indicates that stream sediments downstream of the Mountain Top Mine contain elevated levels of antimony (35.3 mg/kg), arsenic (390 mg/kg), cadmium (10.2 mg/kg), copper 227 (mg/kg), lead (2,220 mg/kg), manganese (6520 mg/kg), mercury (0.12 mg/kg), silver (28.1 mg/kg), zinc (1680 mg/kg) and cyanide (0.50 mg/kg). These levels are some of the highest detected in sediments throughout the entire Canyon Creek watershed investigation and indicate a release of inorganic contaminants from site sources situated along Governor Creek.

Additional sediment sample GB-SE-2, collected from the un-named creek draining Governor Basin to the south contained elevated levels of manganese (6630 mg/kg) and zinc (1620 mg/kg); however, none of the other analytes elevated in GB-SE-1 were elevated in this drainage.

Imogene Basin

Analysis of samples collected from Imogene Creek indicates a significant increase in cadmium, copper, lead, manganese and zinc concentrations in the drainage immediately below the Upper Camp Bird mine workings when compared to background sample IB-SW-1.

Sample CB-AS-2 was collected from the Hidden Treasure Mine adit located immediately to the north of the Upper Camp Bird Mine workings. This adit discharges at a rate of approximately 35 gpm and flows for approximately 1/4 mile to its confluence with Imogene Creek immediately below the Upper Camp Bird Mine workings. Analysis of CB-AS-2 for total metals indicates concentrations of copper (363 µg/l), iron (7330 µg/l), and zinc (4850 µg/l) exceeding table value and numeric standards specified for this drainage (CWQCC 1999).

Field personnel collected sample CB-AS-4 from the Camp Bird 300 Level adit. Analysis of this sample for total metals indicated a zinc concentration of (243 µg/l). This concentration exceeds acute TVS criteria for zinc as specified for the Imogene Creek drainage; however, the TVS are listed for dissolved metals and the concentration for this sample is reported as total metals.

Field personnel collected sample IB-SW-02A from Imogene Creek immediately below the confluence of the drainages originating from both the Upper Camp Bird and Hidden Treasure mines. Analysis of IB-SW-02A indicated that dissolved concentrations of lead, manganese and zinc are significantly elevated above those same analytes detected in background sample IB-SW-1. A comparison of the reported concentrations to TVS for the drainage indicates that dissolved concentrations of cadmium (1.50 µg/l), copper (8.50 µg/l), and lead (3.60 µg/l) exceeded chronic table value standards specified for the drainage. The reported zinc concentration (375 µg/l) exceeds the acute TVS.

Sample collection progressed downstream to location IB-SW-2B at the PPE of stream side tailings below the Upper Camp Bird workings. Total and dissolved metals analysis indicated respective concentrations of cadmium (1.3 µg/l and 1.2 µg/l), copper (10.7 µg/l and 5.3 µg/l), manganese (dissolved only at 9.9 µg/l), and zinc (295 µg/l and 286 µg/l) at levels exhibiting significance above background in Imogene Creek adjacent to the pile. The dissolved cadmium concentration exceeds the TVS chronic level while the reported dissolved zinc level exceeds both chronic and acute standards (Table 9).

Both total and dissolved levels of cadmium, copper, manganese and zinc attenuate gradually (but still remain above both chronic and acute Table Value Standards) to a point immediately above the Camp Bird Mine. At this point the influence of the No. 14 level adit discharge appears to increase the calcium and manganese levels in the stream. The increase in calcium and manganese levels result in a higher hardness value for Imogene Creek below the No. 14 adit and effectively increases the hardness dependant TVS for the stream at this point. Based on the increased hardness value, none of the dissolved analytes exceed TVS in Imogene Creek from the PPE of the No. 14 adit discharge to the confluence with Canyon Creek. Above the PPE for the No. 14 discharge, dissolved zinc concentrations exceed both chronic and acute TVS criteria (CWQCC 1999).

Based on a review of the total and dissolved data generated during the SI, there appears to be a significant loading of zinc to Imogene Creek from both the Hidden Treasure and Camp Bird 300 level adits (Table 12). Loading calculations utilizing measured flows and reported zinc levels indicated that the discharge from the Hidden Treasure adit (sample CB-AS-2) accounts for a majority of the zinc

loading in the upper reaches of Imogene Creek. From the PPE of both the Camp Bird 300 level and the Hidden Treasure adits the concentration of zinc exceeds the applicable TVS criteria and remains fairly constant or attenuates slightly downstream of the adits for approximately 2.6 miles to the PPE of the Camp Bird No. 14 level adit. At the PPE of the No. 14 level adit discharge, the high calcium concentration of the discharge coupled with increased flow volume results in an increase in the allowable contaminant levels and the achievement of both chronic and acute TVS criteria in Imogene Creek. This condition exists for a distance of approximately 250 feet from the PPE of the No. 14 level adit to a point below the confluence with Canyon Creek.

Sediment samples collected from Imogene Creek downstream of the Upper Camp Bird complex indicated concentrations of several inorganic substances significantly elevated above background levels detected in sample IB-SE-1. Specific elevated analytes include copper (307 mg/kg), mercury (0.24 mg/kg), and silver (6.7 mg/kg). These analytes were elevated in sample IB-SE-2A collected from Imogene Creek immediately below the Upper Camp Bird Mine complex. However, sample IB-SE-2B collected from Imogene Creek approximately 0.25 mile downstream at the PPE of the stream side tailings contained elevated levels of total cyanide (0.18 mg/kg) but the concentration of copper, mercury and zinc, were not significantly elevated at this location.

Project personnel collected sediment sample IB-SE-3 from Imogene Creek immediately below the confluence with Richmond Creek. A comparison of inorganic analytes to background levels did not indicate the presence of contaminant concentrations exhibiting significance above background. CDPHE personnel did collect an additional sediment sample from Imogene Creek immediately above the Camp Bird No. 14 Level adit and associated mine workings. Analysis of this sample did indicate levels of silver (4.0 mg/kg) and mercury (0.14 mg/kg) in significantly elevated concentrations.

Sediment sample IB-SE-4 was collected from Imogene Creek below the Camp Bird No. 14 level adit and associated waste rock dump/tailings pile. Analysis of this sample indicated that cadmium (13.7 mg/kg), copper (574 mg/kg), lead (1640 mg/kg), manganese (9970 mg/kg), silver (16.1 mg/kg) and zinc (4660 mg/kg) were present in concentrations significantly elevated above background.

Canyon Creek

Canyon Creek originates at the confluence of both Imogene and Sneffels Creeks at the Lower Camp Bird mine complex. In determining significance above background CDPHE compared analyte levels to the highest concentration in background samples collected from either Imogene (IB-SW/SE-1) or

Sneffels (YB-SW/SE-1) Creek. Based on this comparison, levels of antimony, copper, manganese, mercury and zinc are elevated in surface water sample CC-SW-1 collected from the headwaters of Canyon Creek. The levels of the aforementioned analytes are significantly elevated above background concentrations for the entire length of Canyon Creek extending from the Camp Bird Mine complex to the confluence with the Uncompahgre River at Ouray; however, with the exception of zinc, the reported levels do not exceed TVS criteria established for the Canyon Creek drainage. Zinc concentrations reported for samples CC-SW-02 and CC-SW-03 indicate an exceedance of chronic standards for Canyon Creek from the PPE of the Camp Bird tailings to a point on the stream immediately below the tailings piles; however, the zinc concentrations progressively attenuate downstream of the piles. Zinc levels in the reach of Canyon Creek from location CC-SW-02 to CC-SW-03 consistently exceeds chronic Table Value Standards; however, this exceedance appears to be attributable to a decrease in water hardness through this reach rather than through an increase in zinc loading attributable to the tailings piles.

Although exhibiting significance above background for the entire length of Canyon Creek, manganese concentrations do not exceed the Numeric Standard of 1000 µg/l as specified for Canyon Creek in the Stream Classifications and Water Quality Standards for the Gunnison and Lower Dolores River Basins (CWQCC 1999).

Total metals and cyanide analysis of sediment samples indicated elevated levels of copper, mercury, silver and zinc in concentrations exhibiting significance above background in samples CC-SE-1 and CC-SE-2. These sample locations are centered in Canyon Creek immediately below the confluence of Imogene and Sneffels Creeks and immediately downstream of both the Lower Camp Bird Mine workings as well as the PPE of Camp Bird Historic tailings. The concentrations of the aforementioned analytes indicate that sources situated near the Camp Bird complex are contributing sediment contamination to the stream in this area. The levels of copper and zinc attenuate rapidly downstream of the tailings pile and do not exhibit significance above background at any other sample location situated below the Camp Bird tailings pile to the confluence of the creek with the Uncompahgre River.

Mercury levels detected in stream sediments from the headwaters to the Uncompahgre River are generally low and are found in concentrations below the Contract Required Detection Limit (CRDL) but above the Instrument Detection Limit (IDL). The mercury concentrations for these samples have been qualified internally by the laboratory as estimated.

Silver, thallium and vanadium concentrations exhibit significance above background in sample CC-SE-5 collected from Canyon Creek immediately above the confluence with the Uncompahgre River.

However, silver concentrations at CC-SE-5 are approximately one order of magnitude less than those reported for samples CC-SE-1 through CC-SE-3 collected near the Camp Bird mine and are present in estimated concentrations below the CRDL but above the IDL. Thallium was also present at levels below the CRDL and above the IDL and the associated numeric value is also estimated. Vanadium is present in this sample at a concentration of 82 mg/kg but was not detected in any of the upstream samples collected on Canyon Creek. The decrease in sediment sample concentrations suggests that site-related contamination attenuates downstream of the Camp Bird and that the contribution from any intermediate sources situated between the Camp Bird complex and the Uncompahgre River is minimal.

Uncompahgre River

CDPHE collected two samples from the Uncompahgre River. Field personnel collected samples UR-SW-01 and UR-SW-02 from points immediately above, and approximately 1000 feet below, the confluence with Canyon Creek. A review of the analytical data indicates that flow from Canyon Creek has a beneficial effect on water quality within the Uncompahgre River. Total aluminum, arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel and zinc levels exhibit an approximate 50% reduction in concentrations in the Uncompahgre River immediately below the confluence with Canyon Creek. Dissolved concentrations for the same analytes exhibit an even greater reduction in concentration with samples collected from downstream of the confluence exhibiting an approximate 75% reduction in dissolved concentrations when compared to the upstream sample results.

A comparison of dissolved metals results to both numeric and table value standards indicates copper, iron, and zinc values in excess of the specified levels for the Uncompahgre River at sampling locations up and downstream of the confluence with Canyon Creek (CWQCC 1999). These results indicate that sources located along the Uncompahgre River upstream of Canyon Creek have a more significant impact on water quality in the drainage than do sources located within the Canyon Creek watershed; however, a review of the analytical results for samples collected throughout the Canyon Creek drainage have identified several adit/waste sources that contribute to metal loading and degrade water quality within the Canyon Creek watershed.

Sediment sample results from Uncompahgre River samples collected both upstream and downstream of the confluence with Canyon Creek did not indicate an appreciable increase in sediment contamination attributable to Canyon Creek. Concentrations for the Uncompahgre River sediments collected downstream of Canyon Creek showed lower Target Analyte List (TAL) metals

concentrations than upstream samples. These levels also indicate that sources present upstream of Canyon Creek along the Uncompahgre River have a more significant impact on the river environment than do those sources situated within the Canyon Creek watershed.

6.3 ATTRIBUTION AND SURFACE WATER/SEDIMENT TARGETS

Sneffels Creek/Yankee Boy Basin

Surface water and sediment samples collected from Sneffels Creek in the upper reaches of Yankee Boy Basin did not indicate a release to the drainage from piles or adits associated with either Upper Sneffels Creek adits or the Sneffels Creek adits. The single detection of mercury (1.6 µg/l) in the dissolved fraction of surface water sample YB-SW-2 appears to be anomalous. The total metals fraction did not indicate the presence of mercury in stream water at this location. A historical review of mining and milling operations in the Yankee Boy Basin did not indicate the presence of a mill site in the upper reaches of the basin that utilized amalgamation for ore processing.

A review of the surface water data indicates that both dissolved and total concentrations of manganese, and zinc exhibit significance above background in samples YB-SW-4, YB-SW-5, YB-SW-6 and YB-SW-7 when compared to upgradient sample YB-SW-1. Dissolved zinc and manganese concentrations increase significantly in Sneffels Creek at the confluence of Governor Creek and increase slightly again downstream of the Atlas tailings/mill area. This increase in both dissolved and total zinc and manganese concentrations appears attributable to the contribution of sources within Governor Basin and possibly to a lesser extent to the influence of the flood plain tailings on zinc concentrations in the drainage.

Mass balance analysis based on loading calculations indicates that the dissolved zinc load in Sneffels Creek above the confluence with Governor Creek is approximately 1 lb/day. Below the Governor Creek confluence the load increases to approximately 4.5 lbs/day with a majority of the loading attributable to Governor Creek (Table 12).

The presence of elevated levels of both manganese and zinc in the Governor Basin drainage, coupled with the increased zinc levels in the Sneffels Creek drainage downstream of the confluence is indicative of significant sources of zinc loading present within Governor Basin. The specific source is undetermined but is most likely attributable to sources associated with the Mountain Top, Humbolt

and Virginius mines. Based on the exceedance of zinc standards in Sneffels Creek downstream of the confluence of Governor Creek it is apparent that sources within Governor basin contribute largely to the degradation of water quality in the drainage.

The presence of zinc and manganese concentrations exceeding water quality standards in seeps originating near the Atlas tailings pile, coupled with the slight increase in zinc concentrations downstream of the pile suggests that the Atlas Tailings may also contribute slightly to elevated zinc and manganese levels in Sneffels Creek. Zinc loads also increase by approximately 0.8 lbs/day in Sneffels Creek below the Atlas Tailings pile indicating some contribution from sources associated with the Atlas Tailings pile.

Zinc concentrations in Sneffels Creek show an additional increase in the reach below the Revenue Mine and above the Camp Bird complex. Stream flow increased from 10.92 cfs at sampling location YB-SW-6 located above the Revenue mine to 17.57 cfs at location YB-SW-7 situated below the un-named drainage and immediately above the confluence of Sneffels and Imogene Creeks. Dissolved zinc concentrations also increased from 82.7 µg/l to 143 µg/l between the two stations. Subsequently, zinc load also showed a marked increase from 4.87 lbs/day above the Revenue Mine to 13.54 lbs/day below both the Revenue and the un-named tributary. This increase suggests that there are significant zinc sources associated with either the Revenue Mine or the Silver Basin area.

Analysis of sediment samples collected below the PPE of contaminants from the Atlas Tailings pile indicate that the tailings materials are entering Sneffels Creek downstream of the mill/pile area. Sediment samples indicate that levels of mercury are slightly elevated above background and are also present in pile materials adjacent to the creek; however, the level detected in downstream sediments are present above the IDL but below the CRDL and have been qualified as such. Additional sediment analysis conducted for sample YB-SE-6 collected approximately 2000 feet downstream of the PPE and immediately above the Revenue mine indicated the presence of chromium, zinc and cyanide at levels exhibiting significance above background. The cyanide concentration was detected above the IDL but below the CRDL. Chromium, zinc and cyanide are all present in the Atlas Tailings materials and their presence in sediments downstream of the Atlas mill may be attributable to the offsite migration and transport of sediments from pile materials during high-flow events.

Imogene Creek

Sources situated in the upper reaches of Imogene Creek consist of draining adits associated with the Camp Bird 300 level workings and the Hidden Treasure mine. Flow measurements and analytical

results indicate that the zinc load entering Imogene Creek in the upper reaches is fairly low (approximately 1.80 lbs/day) below the upper workings. The primary source of loading in this area is the Hidden Treasure adit. During the September 1999 SI, field and laboratory measurements indicated that the Hidden Treasure adit discharged approximately 1.05 lbs/day of total zinc to Imogene Creek possibly indicating that the remaining 0.75 lbs/day of zinc in the upper reach is attributable to discharge from the Camp Bird 300 level and base flow originating from underneath the waste rock dumps and overburden piles lining the creek in the Upper Imogene Creek basin.

CDPHE collected sample IB-SW-2B from Imogene Creek immediately below the stream side tailings piles. The zinc load at this location appears to remain constant at approximately 1.85 lbs/day and does not indicate that the pile serves as an additional source of dissolved zinc for the drainage. Zinc loading increases below the confluence with Richmond Basin to approximately 2.90 lbs/day and again to 3.90 lbs/day at sample location IB-SW-3 collected below the Yellow Rose Mine and the confluence of Richmond Basin. This increase in loading is indicative of a contribution of mines and associated waste sources to Imogene Creek in the vicinity. Specifically, there appear to be some minor zinc loading attributable to sources situated within the Richmond Basin as well as sources associated with the Yellow Rose mine.

Zinc loading to Imogene Creek increases to approximately 21.5 lbs/day below the PPE for the Camp Bird No. 14 level adit; however, due to the high concentration of calcium associated with the adit, the hardness value also increases significantly in this reach. Since the water quality table value standards calculations are hardness based, the increased hardness value associated with the high calcium load results in the attainment of water quality standards for the stream reach below the PPE of the No. 14 level adit despite the large increase in zinc loading from the portal discharge.

Sediment sample analysis indicates that copper (307 mg/kg), mercury (0.24 mg/kg), and silver (6.7 mg/kg) concentrations are significantly elevated in Imogene Creek below the Upper Camp Bird complex. The elevated copper concentrations may be attributable to the numerous waste rock dumps that line the upper portions of the Imogene Creek drainage and are susceptible to erosion and migration to the drainage.

Sediment analysis conducted below the PPE of the stream-side tailings to Imogene Creek indicated the presence of cyanide (0.18 mg/kg) in elevated concentrations; however, the reported cyanide concentration is above the IDL but below the CRDL and has been qualified by the laboratory. In addition, analysis of the tailings materials did not indicate the presence of cyanide within the stream-

side tailings. The lack of significant cyanide detections may be attributable to the heterogeneous nature of the materials and the lack of cyanide containing materials within the single grab sample collected from the pile. Additional characterization activities conducted at the tailings may indicate the presence of cyanide within the pile.

Sediment samples collected farther downstream did not indicate a significant increase in metals concentrations until sample location IB-SE-3A collected from Imogene Creek immediately above the Camp Bird No. 14 level. Analysis of this sample indicated the presence of elevated copper (225 mg/kg), mercury (0.14 mg/kg) and silver (4.0 mg/kg) concentrations. The increase in these analytes may be attributable to releases from sources within the Richmond Basin, or some of the intervening mines such as the Yellow Rose , Bankers National, or the U. S. Depository Mines located along the drainage downstream of the confluence with Richmond Creek.

Canyon Creek

The zinc concentrations remain below Table Value Standards from the PPE of the No.14 level adit to sample location CC-SW-03. Field personnel collected sample CC-SW-03 from Canyon Creek midway along the inactive tailings pile approximately 500 feet downstream of the headwaters of Canyon Creek. At this point the calcium concentration attenuates slightly and the subsequent reduction in hardness results in the reported zinc levels exceeding chronic water quality criteria for the stream; however, the zinc concentrations remain below acute standards (Table 9). Mass balance analysis for Canyon Creek indicate that the combination of flows from Imogene and Sneffels Creeks increase zinc loading to approximately 37 lbs/day. The zinc load ranges from approximately 37 to 40 lbs/day from the headwaters of Canyon Creek to sample location CC-SW-04 located approximately 1.8 miles downstream. At CC-SW-04, zinc load decreases to approximately 30 lbs/day and remains fairly constant for the remainder of the drainage to its confluence with the Uncompahgre River. The consistent zinc load downstream of CC-SW-04 suggests that there are few additional sources of zinc loading on Canyon Creek downstream of the Camp Bird Complex. In addition, at location CC-SW-4 the zinc concentrations attenuate to levels below the chronic standards and water quality within the stream stabilizes with no analytes exceeding Table Value Standards for the remainder of the drainage.

Analysis of Canyon Creek sediments downstream of the Lower Camp Bird complex indicates that levels of mercury, silver and zinc are elevated in bedload materials downstream of the tailings piles. Reported mercury levels are elevated in Canyon Creek from the headwaters to the confluence with the Uncompahgre River; however, the levels were detected below the CRDL and above the IDL.

Additional visual observations indicate that tailings are present in the creek drainage and, despite recent re-vegetation attempts, continue to migrate from both the inactive and historic tailings impoundments.

6.3.1 Surface Water/Sediment Targets

Canyon Creek from the confluence of its tributaries Sneffels and Imogene Creeks to its convergence with the Uncompahgre River is designated as Use Protected (UP) and classified as an Aquatic Life, Cold water Class 2, Recreation Class 2 water supply stream by the Colorado Water Quality Control Commission (CWQCC).

Use protected waters are waters that the water quality control commission has determined do not warrant the special protection provided by the outstanding waters designation or the anti-degradation review process. Waters designated as use-protected meet the following criteria: Use classifications include aquatic life cold or warm water class 2; The existing quality for Table 1 parameters (i.e. dissolved oxygen, pH and fecal colliform) Table II parameters (i.e. chronic un-ionized ammonia and nitrate) and Table III parameters (i.e. chronic cadmium, chronic copper, chronic lead, chronic manganese, chronic selenium, chronic silver and chronic zinc) are worse than those specified for aquatic class 1, recreation class 1 and (for nitrate) domestic water supply uses; and, the waters are subject to significant existing point source discharges and the quality is currently maintained better than standards only because the treatment achieved by existing dischargers exceeds requirements of federal and state law and may not be maintained at that level in the future.

Waters may also be designated as use-protected even though none of the preceding criteria apply if the commission determines that due to the presence of natural or irreversible human-induced pollution for parameters other than the aforementioned parameters that the quality of waters in question should not be considered better than necessary to support aquatic life class 1 and recreation class 1 uses.

Fish populations are present in Canyon Creek to a point approximately 2 of the distance from Ouray to the Camp Bird Mine. There is little natural reproduction in the creek with a majority of the fish existing in the drainage because of the stocking efforts (Hebein 1998).

A review of the analytical data collected during the SI indicated that levels of copper, manganese and zinc were significantly elevated through the entire stream length of Canyon Creek from its headwaters to the confluence with the Uncompahgre River. Although these levels are significantly elevated with

regard to background levels, they do not exceed stream standards in the portion of the drainage that serves as a fishery.

Based on the USFWS Wetland Inventory Maps for the area, the actual wetland frontage that is subject to contaminant releases within the 15-mile in-stream target distance limit watershed is 8.6 miles; however, visual observations indicate that the length of wetland frontage along the riparian wetland corridor is more extensive than depicted on the Wetland Inventory Map. Wetland vegetation consists of willows, sedges and rushes that occur in discontinuous areas along the riparian corridor in all of the drainages. The extent of actual frontage was not quantified during the SI due to the discontinuous nature of the wetland areas and the wide area covered by the investigation; however, CDPHE relied on field observations instead of the wetland inventory maps and estimated the extent of impacted wetland frontage by measuring the stream distance between sample locations that exhibit significance above background. Since the wetland frontage is discontinuous CDPHE estimated impacted wetlands by counting only one side of the drainage as a jurisdictional wetland.

Based on this assumption, there are approximately 5 miles of wetland frontage subject to low level mercury contamination in sediments (concentrations below the CRDL and above the IDL) existing along the 15-mile In stream target distance limit. An additional 0.1 mile of wetland frontage is subjected to arsenic contaminated sediments attributable to the Atlas Tailings pile. Silver contamination is elevated in stream sediments from sample location IB-SE-2A approximately 2.35 miles downstream to location CC-SE-3 situated below the Camp Bird tailings piles.

Cyanide analysis indicates a single elevated concentration in sediments at the PPE of the stream side tailings along Imogene Creek. Based on this single concentration and the measured length of the tailings deposits, CDPHE estimates a wetland frontage of approximately 200 feet is impacted by elevated cyanide levels in Imogene Creek sediments.

Aqueous samples indicate that 7.70 miles of impacted wetland frontage is subject to elevated levels of copper, manganese and zinc. This figure includes frontage along Imogene, Sneffels and Canyon Creeks. The elevated contaminant levels are attributable to adits, mines and mills situated throughout the drainage.

Wetland types within the watershed include Palustrine and Riverene unconsolidated bottom, permanently flooded, and Palustrine emergent and Palustrine scrub/shrub wetlands. In Canyon Creek down gradient of the PPE for site contaminants at the Camp Bird historic tailings pile, wetlands consist of isolated pockets of Riverene unconsolidated bottom, permanently flooded wetlands.

Wetland frontage becomes more frequent on the Uncompahgre River downstream of the confluence with Canyon Creek. The highest diversity and density of wetlands are present along the Uncompahgre riparian corridor approximately 4.5 miles downstream of Ouray. The wetland type changes from predominantly Riverene unconsolidated bottom to a mixture of Riverene unconsolidated bottom to Palustrine shrub/scrub and Palustrine emergent- type wetlands (US Department of the Interior (USDOI) 1995).

Threatened and Endangered species in the area include the arctic draba (*draba fladnizensis*) Global Rank of G4 and a state rank of S2S3, imperiled (6 to 20 occurrences) to rare (21 to 100 occurrences) in Colorado. The arctic draba is an annual/winter annual plant characterized by white flowers in several to many rosettes originating from slender caudices (Weber 1976). The arctic draba occurs in wet meadows, on bare soil in dry tundra, and in rocky areas characterized by both wet and dry conditions in alpine and subalpine areas (Colorado Natural Heritage Program 1998). Based on this description, the arctic draba may potentially be encountered in either upland areas or wetland meadowlands present in the Ouray area.

There are no surface water intakes in either Canyon Creek or the Uncompahgre River down gradient of site sources (CWQCD 1996).

7.0 GROUNDWATER PATHWAY

7.1 GROUNDWATER SAMPLE LOCATIONS

CDPHE did not identify any wells located proximal to site sources that warranted sampling. Based on the lack of groundwater receptors, CDPHE did not collect any groundwater samples during the September 20 through 23, 1999 sampling effort. The Sampling and Analysis Plan (SAP) called for the collection of opportunity groundwater samples if any likely receptors were identified during the field portion of the SI; however, after collecting samples from the areas near the former mine and millsites, CDPHE was unable to identify any likely receptors. The alluvial aquifer in the area is fairly shallow and discontinuous throughout the watershed and there is minimal opportunity for the migration of site related contaminants to receptors that in all cases are situated at distances exceeding one mile from site sources. In addition, conversations with nearby property owners indicate that drinking water is derived from springs that originate at elevations situated high up on the valley wall. These springs and seeps have little communication with the shallow alluvium and are located at large distances from site sources. These distances, coupled with the spring elevations, minimize the likelihood of contaminant impacts occurring from former mines and mills situated in the upper reaches of the watershed.

7.2 GROUNDWATER TARGETS

Ground water use in the Canyon Creek drainage site appears to be limited to the portion of the drainage approximately one mile below the Camp Bird Mine. The Town of Ouray (population 644) receives its drinking water supply from Weehawken Spring situated along the Camp Bird Road 1.8 miles down gradient of the Camp Bird Mine site. Water is piped from this spring to a concrete spring box, after accumulating in the spring box, the water is piped to a chlorination station prior to storage in a supply tank for eventual dissemination to the public.

There are four drinking water wells within a four mile radius of the Camp Bird Mine and mill site (State Engineer 1998). The Camp Bird Mine and mill is situated on the boundary of the Uncompahgre Primitive Area and the surrounding terrain is wilderness with no permanent human population; however, the wells identified within the four mile target distance limit consist of four domestic wells located approximately 2 miles to the northeast of the Camp Bird Mine complex. These wells serve individual residences situated along the Camp Bird road access corridor to the Uncompahgre Primitive Area. There are a total of approximately 12 houses existing along the Camp Bird Road access corridor (CDPHE 1998). Houses that do not have wells receive their drinking water from springs and spring

collection boxes situated along the steep valley walls down stream of the Camp Bird Mine and Mill (Rosemeyer 1998). These spring collection boxes are significantly elevated above the valley floor and are most likely free of potential influences from mines and mill sites present upstream on the Canyon Creek watershed. In addition, the discontinuous nature of the alluvial deposits and the significant distance of the four domestic wells from site sources significantly reduces the likelihood of a release of site related contaminants to domestic wells within the drainage.

CDPHE estimated the total number of potential groundwater receptors based on the U.S. Department of Commerce, Bureau of Census data estimate of 2.88 individuals per household for Ouray County. The State Engineer's well permit data base indicates that the possible ground water use within the four mile target distance limit is distributed as follows:

Distance (Miles)	**Population**
On-site	0
0 - 1/4	0
1/4 - 2	0
2 - 1	0
1 - 2	653
2 - 3	0
3 - 4	3
Total	**656**

Site sources are uncontained with regard to the groundwater migration pathway. The tailings materials and waste rock piles present in the Canyon Creek watershed are subject to continual weathering from exposure to precipitation and, in some cases, direct inundation and erosion from surface water (CDPHE 1998).

Ore materials in the area have the potential for acid generation and waste rock derived from individual mine workings may facilitate inorganic contaminant migration via metals mobilization; however, the availability for contaminant migration to nearby receptors is offset by the relatively large distance and discontinuous nature of the groundwater aquifers in the area.

8.0 SOIL EXPOSURE AND AIR PATHWAY ANALYSIS

The risk posed to human health via the soil exposure pathway for the sources identified is considered minimal. However, reports by Camp Bird employees indicate that there are occasional incidents of trespassing by individuals on All-Terrain Vehicles (ATVs) who drive their vehicles across the Camp Bird tailings pile (Rosemeyer 1998).

There are no persons living on-site or within 200 feet of any of the identified sources. Site observations made during the September 1998 reconnaissance documented evidence that tailings from the Camp Bird impoundment are blowing offsite into the surrounding area. The tailings piles show numerous small ripple marks and dunes of tailings materials have accumulated on the leeward side of some of the impoundment features. In addition, the Canyon Creek stream bottom has tailings materials visible within the stream bottom matrix. The exact mechanism of deposition to the stream bed is probably a combination of aeolian and fluvial transport mechanisms (CDPHE 1998).

Analysis of the Camp Bird tailings materials, both the inactive and historic tailings, indicated the presence of the following analytes (maximum concentrations given in parentheses): arsenic (134 mg/kg), barium (240 mg/kg), cadmium (28.5 mg/kg), chromium (13.4 mg/kg), copper (1120 mg/kg), lead (1730 mg/kg), silver (36.8 mg/kg), vanadium (15.9 mg/kg), zinc (6320 mg/kg) and cyanide (2.2 mg/kg).

During the September 1999 investigation, CDPHE personnel noted that the surface of the tailings materials had been re-graded and covered with an approximate 1.5 foot layer of topsoil. However, the sides of the tailings piles in certain portions of the pile remained uncovered and were still available for transport via both wind and water erosion.

The Atlas Tailings pile also showed evidence of trespass. During the SI field personnel noticed the presence of vehicle (ATV-type) tracks on the surface as well as the presence of several fire-rings on the surface of the tailings pile. In addition, some of the tailings materials were present on the north side of Sneffels Creek in areas that showed signs of frequent camping activities (i.e. well worn paths, fire-rings, camp litter and refuse).

Analysis of the Atlas Tailings materials indicated the presence of arsenic, barium, cadmium, lead, mercury, silver, vanadium and zinc within the top two feet of the tailings profile. A comparison of the analyte levels to Superfund Chemical Data Matrices (SCDM) reference dose screening concentrations health based standards indicates that the concentrations of antimony and arsenic exceed the SCDM standards. In addition, lead

values (maximum concentration 16,800 mg/kg) exceed both Region IX Preliminary Remedial Goals (PRGs) and Region III Risk Based Concentrations (RBCs) in the pile materials.

Nearby sensitive environments include wetland frontage associated with Sneffels Creek. Based on visual observations and estimates there are approximately 11.5 miles of wetland frontage within the Canyon Creek watershed (exact acreage is unknown).

The risk posed to residential receptors via the soil exposure pathway for the sources identified is considered minimal. There are no persons living on-site or within 200 feet of any of the identified sources. The major exposure route appears to be to the recreational population that frequents the area and may utilize the tailings surfaces for camping or ATV riding.

9.0 SUMMARY

The Canyon Creek watershed study area is located in the Ouray Mining District located on the northern edge of the San Juan Volcanic Region in southwestern Colorado. The watershed encompasses an area of approximately 25 square miles and is comprised of several smaller sub-watersheds including Yankee Boy Basin, Governor Basin, Imogene Basin, Silver Basin and Richmond Basin. Sources in the area consist of abandoned and inactive mine and mill sites distributed over the entire watershed. Waste piles and draining adits account for the major contributors of metals to the stream system. In addition to tailings piles, waste rock dumps and draining adits, collapsed foundations and various debris piles associated with the historic mining activity in the area are located throughout the basin.

CDPHE conducted field work at the site the week of September 21, 1999. The investigation involved the collection of samples from 64 separate locations for laboratory analysis as well as the collection of non-sampling information. CDPHE has utilized this information to evaluate the characteristics and quantity of waste materials and the likelihood of the off -site migration of contaminants via the surface water pathway. Surface water samples collected throughout the drainage, indicate significant sources of zinc loading to the surface water in the study area. Elevated concentrations of zinc in Sneffels Creek extend downstream of the confluence with Governor Basin to the confluence with Imogene Creek and beyond to the confluence with the Uncompahgre River. Total metals concentrations of manganese follow the same trend as zinc within the Sneffels Creek drainage. Total manganese levels become significantly elevated from the PPE of contaminants from the Atlas mill downstream to the confluence with Imogene Creek. The total manganese concentrations remain elevated for the remainder of the Canyon Creek Drainage to the confluence with the Uncompahgre

River. In addition, samples collected near the Atlas mill area indicate the presence of cyanide and lead in Sneffels Creek proximal to the site; however, the reported cyanide concentration is below the Contract Required Detection Limit (CRDL) but above the Instrument Detection Limit (IDL). The reported lead value in surface water sample YB-SW-4 is not present in the data reported for the duplicate sample (YB-SW-8).

Dissolved concentrations of copper in Sneffels Creek indicate a significant increase downstream of the Atlas mine and mill area. The reported concentrations, while elevated above background, are still below the Table Value Standards published for the drainage.

Analysis of samples collected from the Imogene Basin indicate levels of aluminum, cadmium, copper, lead, manganese and zinc in concentrations significantly elevated above background levels. A majority of these analyte concentrations remain elevated for the entire length of Imogene Creek from below the Upper Campbird (200 Level adit) to the confluence with Sneffels Creek. However, although these analyte concentrations are elevated above background, the reported levels for copper and manganese are below the Table Value Standards published for the drainage. The reported values indicate the presence of lead in the upgradient sample on Imogene Creek at levels exceeding chronic but below acute standards for the drainage. The elevated lead levels in the background sample for Imogene Creek indicate the possible presence of naturally occurring lead source areas within the drainage.

A comparison of the analytical results from Governor=s Basin to background levels on Sneffels Creek indicate that the concentrations of aluminum, antimony, arsenic, cadmium, copper, lead, manganese, and zinc to the Canyon Creek drainage are significantly elevated above background levels. The reported levels for cadmium, lead, manganese and zinc exceed chronic standards established for the basin. Potential contributing sources in this area include the Humbolt and Virginius mines as well as the Mountain Top mine located in the lower portion of the basin.

A comparison of zinc levels to Table Value Standards published for the drainage indicate that Sneffels Creek meets water quality criteria from its headwaters downstream to the confluence with the creek draining Governor Basin. From this point Sneffels Creek exceeds chronic standards for zinc until its confluence with the un-named creek draining Silver Basin. At this junction Sneffels Creek exceeds both chronic and acute Table Value Standards until its confluence with Imogene Creek. At the confluence of Imogene and Sneffels Creek (the headwaters of Canyon Creek), the zinc concentration falls below both the chronic and acute table value standards primarily due to the increased calcium load generated from the Camp Bird No. 14 level adit. At this location, zinc loads and concentrations actually increase to the system; however, the zinc standards are hardness based and the increased calcium concentration associated with the Camp Bird No. 14 Level adit

discharge results in an increase in water hardness in both Imogene and Canyon Creek below the No. 14 Level adit. Due to the increased hardness attributable to the calcium loading , the allowable zinc concentrations increase and the resulting Table Value Standards are higher than the instream concentration of zinc. Approximately 500 feet downstream of the confluence with Imogene Creek (sample location CC-SW-2) the calcium concentration attenuates rapidly and subsequently, the zinc TVS decreases. From this point, the zinc concentrations are higher than the chronic TVS. Zinc levels remain above the chronic TVS at sample location CC-SW-3 situated 0.5 miles downstream of the Camp Bird Tailings; however, the levels drop below chronic standards prior to sample location CC-SW/SE-4 located 2 miles downstream of CC-SW-3. From location CC-SW-4 the zinc levels meet both chronic and acute standards for the remainder of the Canyon Creek watershed until the confluence with the Uncompahgre River.

Mass balance calculations based on loading analysis indicate that the major sources of zinc loading to the watershed include: the creek draining Governor Basin (approximate load of 4 lbs/day); the drainage originating in Silver Basin (approximate load of 9 lbs/day); small loading from the upper portions of Imogene Basin (approximately 4 lbs/day); and, the most significant load, attributable to the No. 14 level portal and mine workings associated with the lower Camp Bird Mine and Mill complex (calculated total zinc load of approximately 17 lbs/day to Imogene Creek below the No. 14 level portal).

The zinc load attenuates in Canyon Creek from the Camp Bird complex downstream to the confluence with the Uncompahgre River. Since the load reduces for the remainder of the stream length, it appears that there are little or no additional sources of zinc contributing to contaminant loads downstream of the Camp Bird complex. This reduction in zinc load is also indicative that zinc settles out of the stream water downstream of the major contributors. Based on the samples collected and the resulting data it is apparent the major contributors are located near the upper reaches of the watershed and that the effects of mining are largely confined to the upper portions of the watershed.

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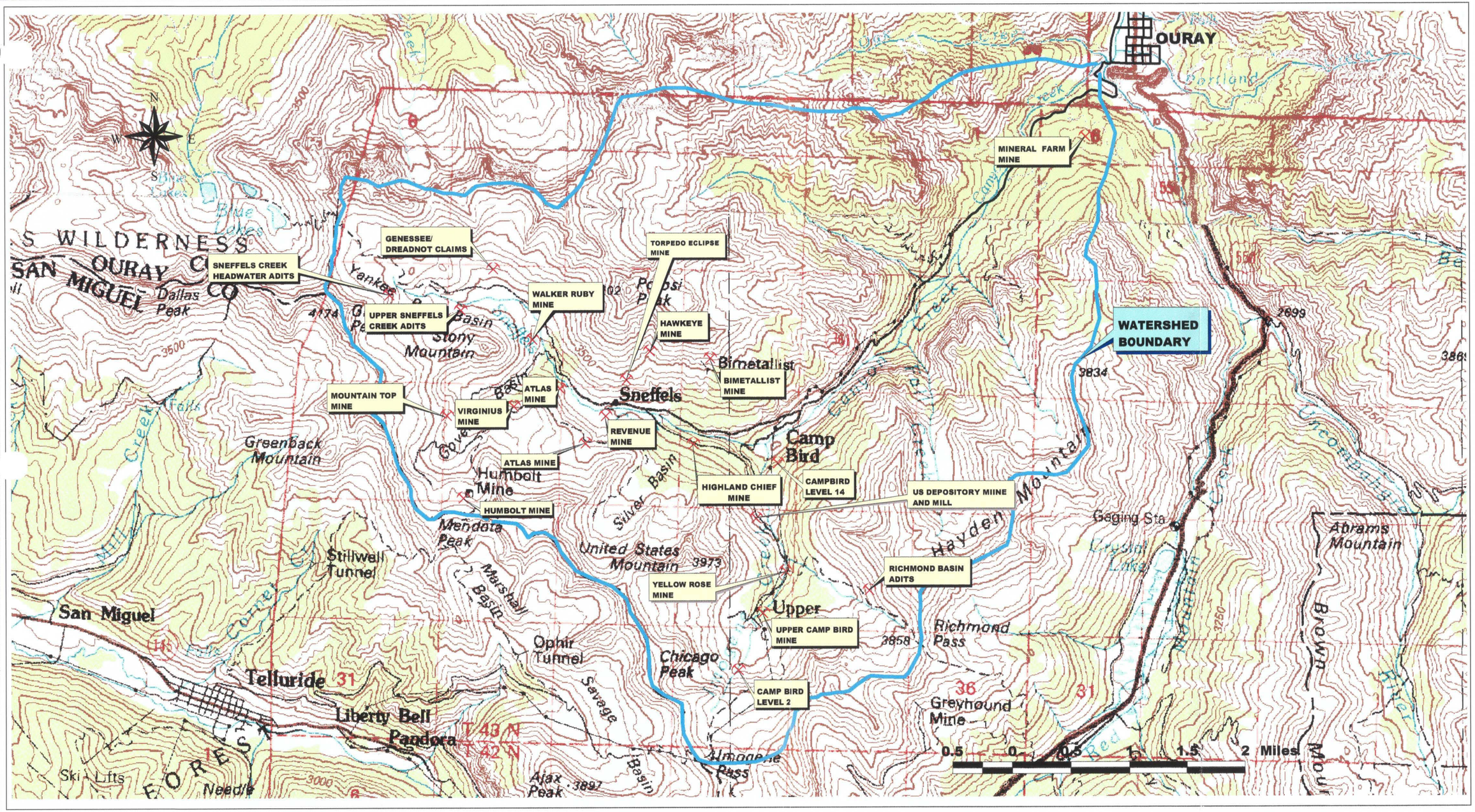


FIGURE 1 - SITE LOCATION MAP

Canyon Creek Watershed

Ouray County, Colorado

Colorado Department of Public Health and Environment

Hazardous Materials and Waste Management Division

Project Manager: Kevin Mackey
February 2000
Q:/sams/projects/pasi/canyoncr
/arcview/canyoncreek.apr

N
W E
S

Oak Creek
Weehawken Ck.
Sneffels Creek
Governor Ck.
Canyon Creek
Fall Creek
Thistledown Ck.
Impgene Ck.
Uncompahgre River
Red Mountain Creek

Ouray

UR-SW/SE-2
UR-SW/SE-1
CC-SW/SE-5
CC-SW/SE-4
CC-SW/SE-3
CC-SW/SE-1
CC-SW/SE-2
SW-17
SW-16
YB-SW/SE-1
SC-AS-1
YB-SW/SE-2
US-AS-1
YB-SW/SE-3
GB-SW/SE-1
YB-SW/SE-5
YB-SW/SE-6
YB-SW/SE-4
AM-SP-1
GB-SW/SE-2
HC-AS-1
YB-SW/SE-7
CB-AS-1
IB-SW/SE-4
IB-SW/SE-3A
IB-SW/SE-3
IB-SW/SE-2B
IB-SW/SE-1
CB-AS-2
CB-AS-4
IB-SW/SE-2A

Campbird Level 14
Campbird Level 2

WATERSHED BOUNDARY

- Surface Water/Sediment Sample Location
A - Adit Sample Location
- Waste Source Sample Location
- Seep Sample Location
- Stream Segment Exceeds Acute TVS for Zinc
- Stream Segment Exceeds Chronic TVS for Zinc

1 0 1 2 Miles

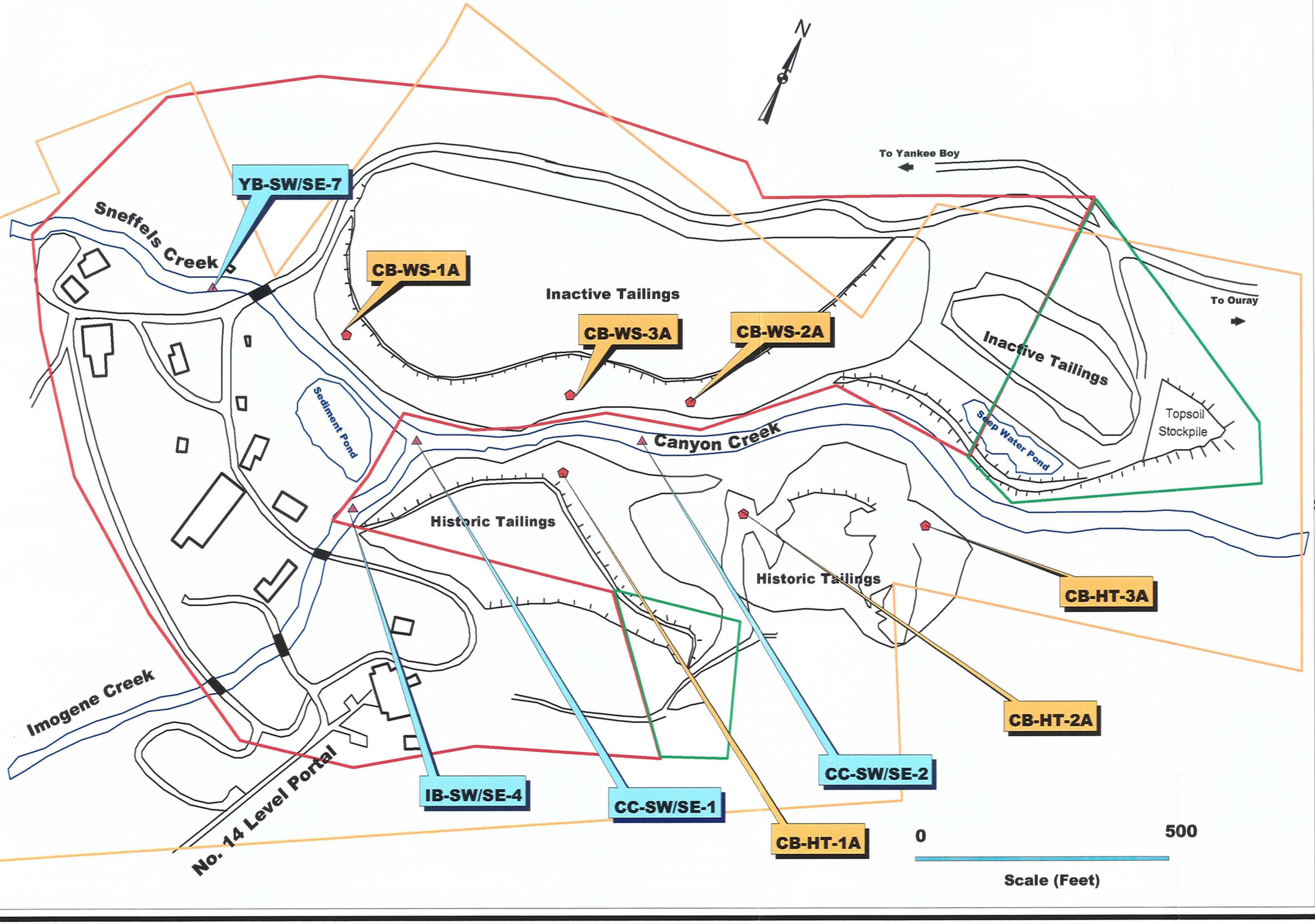
FIGURE 2
SAMPLE LOCATION MAP

Canyon Creek Watershed
Ouray County, Colorado

STATE OF COLORADO 1876

Colorado Department of Public Health and Environment

Hazardous Materials and Waste Mangement Division



- Surface Water/Sediment Location
- Waste Source Sample Location
- Patented Claim Boundary
- Permit Area Boundary
- Permit Boundary Extension

Figure 3

Camp Bird Mine Complex

Sample Location Map

Colorado Department of Public Health and Environment

Hazardous Materials and Waste Management Division

Source: Denver Knight Piesold Environmental Consultants (3/17/90)

TABLE 2: SAMPLE TYPE, LOCATION AND RATIONALE CANYON CREEK WATERSHED

Sample Type	Sample No.	Location	Rationale
SOURCE SAMPLES	CB-WS-01A	Camp Bird inactive tailings at a depth between 0-2 feet bgs.	Characterize and quantify Fine-Grained Tailings pile materials.
	CB-WS-02A	Camp Bird inactive tailings at a depth between 0-2 feet bgs.	Characterize and quantify Fine-Grained Tailings pile materials.
	CB-WS-03A	Camp Bird inactive Tailings at a depth between 0-2 feet bgs.	Characterize and quantify Active Tailings pile materials.
	CB-HT-01A	Camp Bird Historic Tailings at a depth between 0-2 feet bgs.	Characterize and quantify Historic Tailings pile materials.
	CB-HT-02A	Camp Bird Historic Tailings at a depth between 0-2 feet bgs.	Characterize and quantify Historic Tailings pile materials.
	CB-HT-03AB	Camp Bird Historic Tailings at a depth between 0-2 feet bgs.	Characterize and quantify Historic Tailings pile materials.
	AT-WS-01	Atlas Mill Tailings at a depth between 0-2 feet.	Characterize and quantify Atlas Mill Tailings pile materials.
	AT-WS-02	Atlas Mill Tailings at a depth between 0-2 feet.	Characterize and quantify Atlas Mill Tailings pile materials.
	AT-WS-03	Atlas Mill Tailings at a depth between 0-2 feet.	Characterize and quantify Atlas Mill Tailings pile materials.
	AT-WS-04	Atlas Mill Tailings at a depth between 0-2 feet.	Characterize and quantify Atlas Mill Tailings pile materials.
	AM-WR-01	Atlas Mine Waste Rock Pile at a depth between 0-2 feet.	Characterize waste rock materials.
	HC-WS-01	Highland Chief Mine Waste Rock pile at a depth between 0 - 2 feet.	Characterize waste rock materials.
	SC-WS-01	Sneffels Creek adit Waste Rock pile at a depth between 0 - 2 feet.	Characterize waste rock materials.
	DN-WS-01	Genessee-Dread Not Waste Rock pile at a depth between 0 - 2 feet.	Characterize waste rock materials.
	DN-WS-02	Genessee-Dread Not Waste Rock pile at a depth between 0 - 2 feet.	Characterize waste rock materials.
	DN-WS-03	Genessee-Dread Not Waste Rock pile at a depth between 0 - 2 feet.	Characterize waste rock materials.

TABLE 2: SAMPLE TYPE, LOCATION AND RATIONALE CANYON CREEK WATERSHED

Sample Type	Sample No.	Location	Rationale
SOURCE SAMPLES	IB-WS-01	Opportunity sample from fine-grained tailings piles situated adjacent to Imogene Creek downstream of the Upper Camp Bird Mine/Mill.	Characterize and Quantify waste source materials.
SURFACE WATER	UR-SW-01	Uncompahgre River Downstream of Bear Creek.	Provide baseline data for the Uncompahgre River above the confluence of Canyon Creek.
	UR-SW-02	Uncompahgre River Downstream of Canyon Creek.	Test for metals contribution and loading from sources on Canyon Creek.
	CC-SW-01	Up gradient surface water sample collected from headwaters of Canyon Creek below confluence of Sneffels and Imogene Creeks.	Characterize conditions upstream of Camp Bird Mine and Mill.
	CC-SW-02	Surface water sample collected from Canyon Creek immediately adjacent to the Camp Bird tailings piles..	Test for an observed release by chemical analysis of site related contaminants to fisheries and wetlands associated with Canyon Creek drainage.
	CC-SW-03	Downgradient surface water sample collected on Canyon Creek approximately 0.25 mile downstream of the Camp Bird Mine and Mill.	Test for extent of contaminant migration and quantify fisheries and wetlands potentially impacted by site releases.
	CC-SW-04	Downgradient surface water sample collected on Canyon Creek approximately 2 miles downstream of the Camp Bird Mine and Mill.	Test for extent of contaminant migration and quantify fisheries and wetlands potentially impacted by site releases.
	CC-SW-05	Downgradient surface water sample collected on Canyon Creek Above confluence with Uncompahgre River.	Document extent of contaminant migration and quantify fisheries and wetlands potentially impacted by site releases.
	IB-SW-01	Background surface water sample collected from the headwaters of Imogene Creek upstream of the Camp Bird No. 2 level portal.	Characterize background conditions on Imogene Creek.
	IB-SW-02A	Surface water sample collected from Imogene Creek downstream of the Upper Camp Bird Mine/Mill.	Test for metals contribution to Canyon Creek watershed from Upper Camp Bird Mine workings and determine loading contribution .

TABLE 2: SAMPLE TYPE, LOCATION AND RATIONALE CANYON CREEK WATERSHED

Sample Type	Sample No.	Location	Rationale
SURFACE WATER	IB-SW-02B	Surface water sample collected from Imogene Creek adjacent to stream side tailings.	Test for metals contribution to Canyon Creek watershed from Upper Camp Bird Mine tailings and determine loading contribution .
	IB-SW-03	Surface water sample collected from Imogene Creek below confluence with Richmond Creek.	Test for metals contribution to Imogene Creek from Up gradient sources.
	IB-SW-03A	Surface water sample collected from Imogene Creek immediately above the Camp Bird No. 14 Level adit.	Test for metals contribution to Imogene Creek from sources upgradient of Camp Bird No. 14 level adit.
	IB-SW-04	Surface water sample collected from Imogene Creek immediately above the confluence with Sneffels Creek.	Test for attenuation of metals from Up gradient sources and test for contribution from Camp Bird Mine and Mill.
	GB-SW-01	Surface water sample collected from Governor Creek upstream of the confluence with Sneffels Creek.	Test for metals contribution and loading to Governor Creek from additional adits located below the Mountain Top mine and mill.
	GB-SW-02	Surface water sample collected from an un-named drainage discharging from Governor Basin to the east of Governor Creek.	Test for metals contribution and loading to Sneffels Creek from additional sources located within Governor Basin.
	YB-SW-01	Background surface water sample collected on Sneffels Creek upstream of potential source areas in Yankee Boy Basin.	Characterize background conditions on Sneffels Creek upstream of mine sources in Yankee Boy Basin.
	YB-SW-02	Surface water sample collected from Sneffels Creek upstream of the Walker Ruby Mine.	Test for, and quantify the contribution of metals loading to Sneffels Creek from sources upstream of the Walker Ruby Mine.
	YB-SW-03	Surface water sample collected from Sneffels Creek downstream of the Walker Ruby Mine.	Test for, and quantify the contribution of metals loading to Sneffels Creek from sources near the Walker Ruby Mine.
	YB-SW-04	Surface water sample collected from Sneffels Creek immediately adjacent to the Atlas Mine tailings pile.	Test for, and quantify metals loading to Sneffels Creek from sources near the Atlas Mine.
	YB-SW-05	Surface water sample collected from Sneffels Creek downstream of the Revenue Mine.	Test for, and quantify metals loading from Revenue Mine to Sneffels Creek.

TABLE 2: SAMPLE TYPE, LOCATION AND RATIONALE CANYON CREEK WATERSHED

Sample Type	Sample No.	Location	Rationale
SURFACE WATER	YB-SW-06	Surface water sample collected from Sneffels Creek below the confluence with Silver Basin Creek.	Test for, and quantify metals loading from Silver Basin Creek and Highland Chief Mine to Sneffels Creek.
	YB-SW-07	Surface water sample collected from Sneffels Creek immediately above the confluence with Imogene Creek.	Test for, and quantify metals loading from sources in Yankee Boy Basin to Canyon Creek.
SEDIMENT	UR-SE-01	Uncompahgre River Upstream of the confluence with Canyon Creek.	Provide baseline data for the Uncompahgre River above the confluence of Canyon Creek.
	UR-SE-02	Uncompahgre River Downstream of the confluence with Canyon Creek.	Test for metals contribution and loading from sources on Canyon Creek.
	CC-SE-01	Up gradient sediment sample collected from headwaters of Canyon Creek below confluence of Sneffels and Imogene Creeks.	Characterize conditions upstream of Camp Bird Mine and Mill.
	CC-SE-02	Sediment sample collected from Canyon Creek immediately adjacent to the Camp Bird tailings piles.	Test for an observed release by chemical analysis of site related contaminants to fisheries and wetlands associated with Canyon Creek drainage.
	CC-SE-03	Downgradient sediment sample collected on Canyon Creek approximately 0.25 mile downstream of the Camp Bird Mine and Mill.	Test for extent of contaminant migration and quantify fisheries and wetlands potentially impacted by site releases.
	CC-SE-04	Downgradient sediment sample collected on Canyon Creek approximately 2 miles downstream of the Camp Bird Mine and Mill.	Test for extent of contaminant migration and quantify fisheries and wetlands potentially impacted by site releases.
	CC-SE-05	Downgradient sediment sample collected on Canyon Creek Above confluence with Uncompahgre River.	Document extent of contaminant migration and quantify fisheries and wetlands potentially impacted by site releases.
	IB-SE-01	Background sediment sample collected from the headwaters of Imogene Creek upstream of the Camp Bird No. 2 level portal.	Characterize background conditions on Imogene Creek.
	IB-SE-02B	Sediment sample collected from Imogene Creek below the Upper Camp Bird Mine site.	Test for metals contribution to Canyon Creek watershed from Upper Camp Bird Mine workings and determine loading contribution .

TABLE 2: SAMPLE TYPE, LOCATION AND RATIONALE CANYON CREEK WATERSHED

Sample Type	Sample No.	Location	Rationale
	IB-SW-03A	Sediment sample collected from Imogene Creek immediately above the Camp Bird No. 14 Level adit.	Test for metals contribution to Imogene Creek from sources upgradient of Camp Bird No. 14 level adit.
	IB-SE-03	Sediment sample collected from Imogene Creek below confluence with Richmond Creek.	Test for metals contribution to Imogene Creek from Up gradient sources.
	IB-SE-04	Sediment sample collected from Imogene Creek immediately above the confluence with Sneffels Creek.	Test for attenuation of metals from Up gradient sources and test for contribution from Camp Bird Mine and Mill.
	GB-SE-01	Sediment sample collected from Governor Creek upstream of the confluence with Sneffels Creek.	Test for metals contribution and loading to Governor Creek from additional adits located below the Mountain Top mine and mill.
	GB-SE-02	Sediment sample collected from un-named Governor Basin Drainage above confluence with Sneffels Creek.	Test for metals contribution to Sneffels Creek from additional sources in Governor Basin.
	YB-SE-01	Background sediment sample collected on Sneffels Creek upstream of potential source areas in Yankee Boy Basin.	Characterize background conditions on Sneffels Creek upstream of mine sources in Yankee Boy Basin.
SEDIMENT	YB-SE-02	Sediment sample collected from Sneffels Creek upstream of the Walker Ruby Mine.	Test for, and quantify the contribution of metals loading to Sneffels Creek from sources upstream of the Walker Ruby Mine.
	YB-SE-03	Sediment sample collected from Sneffels Creek downstream of the Walker Ruby Mine.	Test for, and quantify the contribution of metals loading to Sneffels Creek from sources near the Walker Ruby Mine.
	YB-SE-04	Sediment sample collected from Sneffels Creek immediately adjacent to the Atlas Mine tailings pile.	Test for, and quantify metals loading to Sneffels Creek from sources near the Atlas Mine.
	YB-SE-05	Sediment sample collected from Sneffels Creek downstream of the Revenue Mine.	Test for, and quantify metals loading from Revenue Mine to Sneffels Creek.
	YB-SE-06	Sediment sample collected from Sneffels Creek below the confluence with Silver Basin Creek.	Test for, and quantify metals loading from Silver Basin Creek and Highland Chief Mine to Sneffels Creek.

TABLE 2: SAMPLE TYPE, LOCATION AND RATIONALE CANYON CREEK WATERSHED

Sample Type	Sample No.	Location	Rationale
	YB-SE-07	Sediment sample collected from Sneffels Creek immediately above the confluence with Imogene Creek.	Test for, and quantify metals loading from sources in Yankee Boy Basin to Canyon Creek.
MINE ADIT SAMPLES	CB-AS-01	Adit discharge sample collected from the number 14 mine portal adit.	Characterize adit discharge and quantify contribution to metals loading in nearby surface water.
	HM-AS-01	Adit discharge sample collected from the Hawkeye mine adit.	Characterize adit discharge and quantify contribution to metals loading in nearby surface water.
	BM-AS-01	Adit discharge sample collected from the bimetallist Mine adit.	Characterize adit discharge and quantify contribution to metals loading in nearby surface water.
	AM-AS-01	Adit discharge sample collected from the Atlas Mine adit.	Characterize adit discharge and quantify contribution to metals loading in nearby surface water.
MINE ADIT SAMPLES	VM-AS-01	Adit discharge sample collected from the Virginius mine adit.	Characterize adit discharge and quantify contribution to metals loading in nearby surface water.
	HU-AS-01	Adit discharge sample collected from the Humbolt mine adit.	Characterize adit discharge and quantify contribution to metals loading in nearby surface water.
	SC-AS-01	Adit discharge sample collected from adits near the upper reaches of Sneffels Creek.	Characterize adit discharge and quantify contribution to metals loading in nearby surface water.
	US-AS-01	Adit discharge sample collected from adits discharging to the headwaters of Sneffels Creek.	Characterize adit discharge and quantify contribution to metals loading in nearby surface water.
	TE-AS-01	Adit discharge sample collected from the torpedo Eclipse mine adit.	Characterize adit discharge and quantify contribution to metals loading in nearby surface water.
	DN-AS-01	Adit discharge sample collected from the Dread Not/Genessee mine adit.	Characterize adit discharge and quantify contribution to metals loading in nearby surface water.

TABLE 2: SAMPLE TYPE, LOCATION AND RATIONALE CANYON CREEK WATERSHED

Sample Type	Sample No.	Location	Rationale
	AD-OP-01	Opportunity adit discharge sample collected from any previously unidentified mine adits.	Characterize adit discharge and quantify contribution to metals loading in nearby surface water.
	AD-OP-02	Opportunity adit discharge sample collected from any previously unidentified mine adits.	Characterize adit discharge and quantify contribution to metals loading in nearby surface water.
QA/QC SAMPLES	YB-SW-08	Duplicate of YB-SW-04.	Test ability to repeat results.
	IB-SW-05	Duplicate of IB-SW-04.	Test ability to repeat results.
	CC-SW-07	Rinsate Blank.	Test for introduction of contamination from decontamination procedures.
QA/QC SAMPLES	CC-SW-08	Rinsate Blank.	Test for introduction of contamination from decontamination procedures.
	CC-SW-09	Trip Blank.	Test for introduction of contamination from field conditions and sample handling procedures.
	CC-SW-10	Field Blank.	Test for introduction of contamination from field conditions and sample handling procedures.
	CC-SW-11	Field Blank.	Test for introduction of contamination from field conditions and sample handling procedures.

TABLE 3
Non-Sampling Data Collection Rationale

Data Element	Data Collection Strategy and Rationale
Ground Water	Record well construction and use for any additional domestic wells located within the Canyon Creek Watershed.
Sensitive Environments	Locate, assess, and photograph any wetlands observed, meeting the 40 CFR 230.3 definition along any of the drainages within the watershed. Observe drainages for indicators or evidence of use as a fishery.
Surface Water Pathway	Locate and identify any seeps from waste sources and draining adits within the Canyon Creek Watershed.

Table 4 CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Surface Water Samples - Total Metals - micrograms/liter (ug/l)
Page 1 of 3

Sample I.D.	**YB-SW-1**		**YB-SW-2**		**YB-SW-3**		**YB-SW-4**		**YB-SW-5**		**YB-SW-6**		**YB-SW-7**		**YB-SW-8**	
Traffic Report No.	**MHES18**		**MHES20**		**MHES22**		**MHES24**		**MHES26**		**MHES28**		**MHES30**		**MHES71**	
Location Description	Background Sneffels Creek		Sneffels Ck. Below P.P.E. of Adits		Sneffels Ck. Below Govnr Basin		Sneffels Ck. @ P.P.E. of Atlas Tailings		Sneffels Ck. Below Atlas Tailings		Sneffels Ck. Above Revenue Mine		Sneffels Ck. Above Imogene Creek		Duplicate of YB-SW-4	
Flow (cfs)																
pH	8.68		6.92		7.18		7.09		7.14		7.28		7.79		7.09	
Conductivity	136.2		158		145		158		162		169		174		158	
Hardness	**50.06**		**55.68**		**54.81**		**59.22**		**59.67**		**54.14**		**69.58**		**60.26**	
Analyte	**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**	
Aluminum	9.0	76.5 B		193 B		131		189 B		108		61.7 U		73.9		102 B
Antimony	3.0	3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U
Arsenic	3.0	3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U
Barium	1.0	40.2 B		40.8 B		44.8 B		46.3 B		45.2 B		43.5 B		40.9 B		45.5 B
Beryllium	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Cadmium	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Calcium	8.0	16700.00		19200		19000	J	20400	J	20600	J	20000	J	24600	J	20800
Chromium	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Cobalt	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Copper	1.0	1.0 U		1.0 U		1.0 U		2.5 B		2.5 B		1.0 B		1.2 B		2.4 B
Iron	13.0	125		279		142		159 J		82.7 J		33.3 J		80.5 J		72.8 B
Lead	1.0	2.2 U		3.4 U		2.3 U	1.0	9.1		4.3 U		3.4 U		2.6 U		4.1 U
Magnesium	11.0	2030.00		1880		1790	J	2010	J	2000	J	1020	J	1980	J	2020
Manganese	1.0	10.5 B		21.3		14.1 B	1.0	114 J	1.0	111 J	1.0	66.8 J	1.0	108 J	1.0	109 J
Mercury	0.1	0.10 U		0.10 U		0.10 U		0.10 UJ		0.10 UJ		0.10 UJ		0.10 UJ		0.10 UJ
Nickel	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Potassium	34.0	334 B		370 B		369 B		467 B		437 B		780 B		381		425
Selenium	4.0	4.0 U		4.0 U		4.0 U		4.0 U		4.0 U		4.0 U		4.0 U		4.0 U
Silver	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Sodium	16.0	774 B		857 B		1060 B		1530 J		1540 J	3.0	365000 J		1940 J		1580 J
Thallium	3.0	3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U
Vanadium	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Zinc	1.0	12.4 U		18.2 B		19.7 B	1.0	76.7 J	1.0	77.2 J	1.0	53.0 J	1.0	143 J	1.0	76.1 J
Cyanide	2.0	NC		NC		NC		2.0 U	2.0	3.0 B	2.0	2.0 B		2.0 U		2.0 U

U = not detected. J = estimate because quality control criteria (QCC) were not met.
UJ = not detected and detection limit (DL) is estimated because QCC were not met.
B = estimate because anlayte is present at concentration below the contract required detection limit (CRDL).
BJ = estimate because analyte is present below CRDL and QCC were not met.
Shaded where analyte concentration exhibits significance above background.

Table 4 CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Surface Water Samples - Total Metals - micrograms/liter (ug/l)
Page 2 of 3

Sample I.D.	**GB-SW-1**		**GB-SW-2**		**IB-SW-1**		**IB-SW-2A**		**IB-SW-2B**		**IB-SW-3**		**IB-SW-3A**		**CC-SW-08**
Traffic Report No.	**MHES16**		**MHES81**		**MHES08**		**MHES10**		**MHES67**		**MHES12**		**MHES79**		MHES 77
Location Description	Govnr Ck. Below Mtn. Top Mine		Un-named Ck. Draining Govnr Basin		Background Imogene Basin		Imogene Ck. Below Upper Camp Bird		Imogene Ck. @ PPE of Streamside Tlgs.		Imogene Ck. Below Richmond Ck.		Imogene Ck. Above Camp Bird Mine		Equipment Rinsate Blank
Flow (cfs)	2.33		1.00		0.01		0.90		1.20		2.53		3.21		NA
pH	7.1		7.18		8.39		6.91		7.01		NC		8.07		NA
Conductivity	174		NC		NC		NC		NC		NC		155		NA
Hardness	**59.46**		**83.03**		**59.13**		**50.52**		**60.13**		**57.96**		**60.41**		NA
Analyte	**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		
Aluminum		216		64.4	9.0	100 B		39.5 B		72.2 B		128 B		180 B	17.7 J
Antimony		3.0 U		3.0 U	3.0	3.0 U		3.0 U		3.0 U		3.0 U		3.0 U	3.0 U
Arsenic	10.0	6.2 B		3.0 U	3.0	3.0 B		3.0 U		3.0 U		3.0 U		3.0 U	3.0 U
Barium		45.9 B		21.8 B	1.0	39.6 B		33.7 B		40.5 B		42.2 B		41.7 B	1.0 U
Beryllium		1.0 U		1.0 U	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U	1.0 U
Cadmium	1.0	1.7 B	1.0	1.8 B	1.0	1.0 U	1.0	1.6 B	1.0	1.3 B		1.0 B		1.0 B	1.0 U
Calcium	J	20100		30200	8.0	22300		18700		22200		21300		22000	73.1 J
Chromium		1.0 U		1.0 U	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U	1.0 U
Cobalt		1.0 U		1.4 B	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U	1.0 U
Copper	1.0	9.9 B		1.4 B	1.0	1.0 U	1.0	10.7 B	1.0	7.5 B	1.0	5.8 B	1.0	6.0 B	1.0 U
Iron		65.0 J	13.0	523	13.0	77.4 B		79.9 B		100		140		161	13.0 J
Lead	1.0	12.2		2.0 U	1.0	3.5		5.8		5.5 U		5.3 U		7.4	1.3 U
Magnesium	J	2250		1850	11.0	838		929		1140		1160		1330	27.0 UJ
Manganese	1.0	629 J	1.0	1550	1.0	5.5 B	1.0	20.9		14.5 B		15.8		15.4	1.0 UJ
Mercury		0.10 U		0.10 U	0.1	0.10 U		0.10 U		0.10 U		0.10 U		0.10 UJ	0.10 UJ
Nickel		1.0 U		1.0 U	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U	1.0 U
Potassium		569		364 B	34.0	458 B		382		401 B		419 B		373	34.0 U
Selenium		4.0 U		4.0 U	4.0	4.0 U		4.0 U		4.0 U		4.0 U		4.0 U	4.0 U
Silver		1.0 U		1.0 U	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U	1.0 U
Sodium		2910 J		2320 B	16.0	986 B		1020 B		1120 B		1380 B		1560 B	75.9 J
Thallium		3.0 U		3.0 U	3.0	3.0 U		3.0 U		3.0 U		3.0 U		3.0 U	3.0 U
Vanadium		1.0 U		1.0 U	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U	1.0 U
Zinc	1.0	340 J	1.0	679	1.0	12.2 U	1.0	349	1.0	295	1.0	229	1.0	244	8.5 J
Cyanide	2.0	2.0 U		NC		NC		NC		NC		NC		NC	2.0 U

U = not detected. J = estimate because quality control criteria (QCC) were not met.
UJ = not detected and detection limit (DL) is estimated because QCC were not met.
B = estimate because anlayte is present at concentration below the contract required detection limit (CRDL).
BJ = estimate because analyte is present below CRDL and QCC were not met.
Shaded where analyte concentration exhibits significance above background.

Table 4 CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Surface Water Samples - Total Metals - micrograms/liter (ug/l)

Sample I.D.	IB-SW-4		IB-SW-5		CC-SW-1		CC-SW-2		CC-SW-3		CC-SW-4		CC-SW-5		UR-SW-1		UR-SW-2	
Traffic Report No.	**MHES14**		**MHES73**		**MHER98**		**MHES00**		**MHES02**		**MHES05**		**MHES06**		**MHER94**		**MHER96**	
Location Description	Imogene Ck. Above Canyon Ck.		Duplicate of IB-SW-4		Confl. Of Imogene and Sneffels Cks.		Canyon Ck. @ PPE of Camp Bird Tlgs.		Canyon Ck. Below Camp Bird Tlgs.		Canyon Ck. 1.5 Miles Below Camp Bird		Canyon Ck. Above Confl. Uncompahgre R.		Uncompahgre R. Above Canyon Ck.		Uncompahgre R. Below Canyon Ck.	
Flow (cfs)	14.23				31.42		31.93		36.52		45.99		44.62		NC		NC	
pH	7.05		7.05		7.53		7.57		7.76		7.78		7.84		5		5.21	
Conductivity	843		843		517		486		421		351		373		495		456	
Hardness	**417.84**		**415.14**		**237.41**		**197.67**		**196.28**		**161.29**		**175.26**		**211.86**		**181.25**	
Analyte	**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**	
Aluminum		68.0 B		58.8 B		108 B		212	9.0	977		9.0 UJ	9.0	404	9.0	8430		4170
Antimony		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U
Arsenic		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.6 B		3.0 U		8.1 B		4.7 B
Barium		27.8 B		27.3 B		34.9 B		37.3 B		48.4 B		42.5 B		52.4 B		51.5 B		59.3 B
Beryllium		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Cadmium	1.0	1.4 B	1.0	1.6 B		1.0 U		1.0 U	1.0	1.1 B		1.0 U		1.0 U	1.0	2.2 B	1.0	1.2 B
Calcium	8.0	163000	8.0	162000		91300	J	75500		74600		61000	J	66100		76700		66700
Chromium		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.7 B		1.0 U
Cobalt		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		13.4 B		6.8 B
Copper	1.0	14.1 B	1.0	13.0 B	1.0	7.1 B	1.0	6.0 B	1.0	14.7 B	1.0	1.3 B	1.0	3.4 B		328		162
Iron	13.0	268	13.0	236 J		177 J	13.0	238 J	13.0	1220 J		32.9 B	13.0	353 J	13.0	8680	13.0	4400
Lead	1.0	12.1	1.0	8.4		6.3		8.8	1.0	52.3		1.0 U		4.8 U		16.9		11.3 U
Magnesium	11.0	2630	11.0	2580		2290		2220		2430		2180		2480		4940		3570
Manganese	1.0	117	1.0	106 J	1.0	121	1.0	119 J	1.0	319 J	1.0	57.6	1.0	76.5 J	1.0	638		323
Mercury		0.10 U		0.10 UJ		0.10 U		0.10 U		0.10 U		0.10 U		0.10 U		0.10 UJ		0.10 UJ
Nickel		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		10.9 B		5.4 B
Potassium		645 B		8350 J		558		546 B		759 B		451 B		705 B		1140 B		865 B
Selenium		4.0 U		4.0 U		4.0 U		4.0 U		4.0 U		4.0 U		4.0 U		4.0 U		4.0 U
Silver		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Sodium		8750		8350 J		5170		4360 B		4270 B		3700 B		4960 J		7540		5320
Thallium		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U	10	3.5 B		3.0 U		3.0 U		3.0 U
Vanadium		1.0 U		1.0 U		1.0 U		1.0 U	1.0	1.5 B		1.0 U		1.0 U		3.0 B		1.5 B
Zinc	1.0	334	1.0	328 J	1.0	228 J	1.0	215 J	1.0	276 J	1.0	120 J	1.0	116 J		484		289
Cyanide		NC		2.0 U		2.0 U		2.0 U		2.0 U		2.0 U	2.0	5.1 B		NC		NC

U = not detected. J = estimate because quality control criteria (QCC) were not met.
UJ = not detected and detection limit (DL) is estimated because QCC were not met.
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BJ = estimate because analyte is present below CRDL and QCC were not met.
Shaded where analyte concentration exhibits significance above background.

Table 5 CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Surface Water Samples - Dissolved Metals - micrograms/liter (ug/l)
1 of 3

Sample I.D.	YB-SW-1		YB-SW-2		YB-SW-3		YB-SW-4		YB-SW-5		YB-SW-6		YB-SW-7		YB-SW-8	
Traffic Report No.	**MHES19**		**MHES21**		**MHES23**		**MHES25**		**MHES27**		**MHES29**		**MHES31**		**MHES72**	
Location Description	Background		Sneffels Ck. Below		Sneffels Ck. Below		Sneffels Ck. @		Sneffels Ck. Below		Sneffels Ck. Above		Sneffels Ck. Above		Duplicate of	
	Sneffels Creek		P.P.E. of Adits		Govnr Basin		P.P.E. of Atlas Tailings		Atlas Tailings		Revenue Mine		Imogene Creek		YB-SW-04	
Flow (cfs)	3.53		4.01		9.39		10.96		10.48		10.92		17.57			
pH	8.68		6.92		7.18		7.09		7.14		7.28		7.79			
Conductivity	136.2		158		145		158		162		169		174			
Hardness																
Analyte	**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**	
Aluminum	9.0	9.0 UJ		9.0 UJ		9.0 UJ		9.0 UJ		9.6 J	9.0	37.3 U		26.2 U		34.3 U
Antimony	3.0	3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U
Arsenic	3.0	3.0 B		3.0 U		3.0 U		3.8 B		3.6 B		3.0 U		3.0 U		3.0 U
Barium	1.0	38.5 B		39.1 B		40.5 B		43.8 B		43.0 B		44.6 U		41.5 B		44.4 B
Beryllium	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Cadmium	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Calcium	8.0	16900		20300		18400		20400		43.0 B		21200		25500		21100
Chromium	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Cobalt	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Copper	1.0	1.0 U		1.0 U		1.0 U	1.0	1.1 B	1.0	1.2 B	1.0	1.3 B		1.0 U	1.0	1.2 B
Iron	13.0	19.5 B		13.0 U		16.2 B		13.0 U		13.0 U		14.7 B		14.5 B		13.0 U
Lead	1.0	1.9 B		1.1 U		1.9 U		1.2 B		1.2 U	1.0	2.8 B	1.0	2.6 B		1.7 B
Magnesium	11.0	2060 B		1940 B		1720 B		1990 B		1950 B		2070		2050 B		2030 B
Manganese	1.0	1.4 B		3.1 B		5.8 B	1.0	101	1.0	103	1.0	115	1.0	106	1.0	102
Mercury	0.1	0.10 U	0.1	1.6		0.10 U		0.10 U		0.10 U		0.10 U		0.10 U		0.10 U
Nickel	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Potassium	34.0	300 B		310 B		312 B		372 B		380 B		413		385 B		393 B
Selenium	4.0	4.0 U		4.0 U		4.0 U		4.0 U		4.0 U		3.0 U		3.0 U		3.0 U
Silver	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Sodium	16.0	738 B		824 B		970 B		1470 B		1450 B		1570		2030 B		1540 B
Thallium	3.0	3.0 U		3.0 U	3	3.1 B		3.0 U		3.0 U		3.0 UJ		3.0 UJ		3.0 U
Vanadium	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Zinc	1.0	7.6 B		16.6 J		19.5 J	20	71.6 J	20	71.3 J	20	82.7	20	143	20	68.9 J
Cyanide		NC		NC		NC		NC		NC		NC		NC		NC

U = not detected. J = estimate because quality control criteria (QCC) were not met.
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Shaded where analyte concentration exhibits significance above background.

Table 5 CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Surface Water Samples - Dissolved Metals - micrograms/liter (ug/l)
2 of 3

Sample I.D.	GB-SW-1		GB-SW-2		IB-SW-1		IB-SW-2A		IB-SW-2B		IB-SW-3		IB-SW-3A	
Traffic Report No.	**MHES17**		**MHES82**		**MHES09**		**MHES11**		**MHES68**		**MHES13**		**MHES80**	
Location Description	Govnr Ck. Below Mtn. Top Mine		Un-named Ck. Draining Govnr Basin		Background Imogene Basin		Imogene Ck. Below Upper Camp Bird		Imogene Ck. @ PPE of Streamside Tlgs.		Imogene Ck. Below Richmond Ck.		Imogene Ck. Above Camp Bird Mine	
Flow (cfs)	2.33		1.00		0.01		0.9		1.2		2.53		3.21	
pH	7.1		7.18		8.39		6.91		7.01		NC		8.07	
Conductivity	174		NC		NC		NC		NC		NC		155	
Hardness														
Analyte	**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**	
Aluminum	9.0	27.8 B	200	31.7 U	9.0	9.0 U	200	15.4 B		32.3 U	200	20.0 B		26.4 U
Antimony	3.0	4.7 B		3.0 U	3.0	3.0 U		3.0 U		3.0 U		3.0 U		3.0 U
Arsenic	3.0	7.2 B		3.0 U	3.0	3.4 B		3.0 U		3.0 U		3.0 U		3.0 U
Barium		47.4 B		21.5 B	1.0	39.1 B		34.0 B		37.8 B		41.3 B		40.1 B
Beryllium		1.0 U		1.0 U	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Cadmium	1.0	1.4 B	1.0	1.7 B	1.0	1.0 U	1.0	1.5 B	1.0	1.2 B		1.0 U	1.0	1.1 B
Calcium		20700		30200	8.0	22700		19000		21000		21500		22700
Chromium		1.0 U		1.0 U	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Cobalt		1.0 U		1.1	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Copper	1.0	4.4 B		1.0 U	1.0	1.0 U	1.0	8.5 B	1.0	5.3 B	1.0	4.5 B	1.0	3.8 B
Iron		13.0 U		40.7	13.0	13.0 U		28.5 B		20.6 B		17.8 B		13.8 B
Lead	1.0	14.8		1.0 U	1.0	2.0 B	1.0	3.6		3.0 U		2.1 B		1.0 U
Magnesium		2350 B		1820 B	11.0	849 B		951 B		1070 B		1170 B		1320 B
Manganese	1.0	653	1.0	1520	1.0	1.3 B	1.0	22.5	1.0	9.9 B	1.0	10.4 B	1.0	3.0 B
Mercury		0.10 U		0.10 U	0.1	0.10 U		0.10 U		0.10 U		0.10 U		0.10 U
Nickel		1.0 U		1.1 B	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Potassium		486 B		387 B	34.0	412 B		383 B		389 B		361 B		344 B
Selenium		4.0 U		3.0 U	4.0	4.0 U		4.0 U		3.0 U		4.0 U		3.0 U
Silver		1.0 U		1.0 U	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Sodium		2800 B		2270 B	16.0	967 B		983 B		1100 B		1330 B		1580 B
Thallium		3.0 U		3.0 U	3.0	3.0 U		3.0 U		3.0 UJ		3.0 U		3.0 U
Vanadium		1.0 U		1.0 U	1.0	1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Zinc	1.0	332 J	1.0	599 J	1.0	9.5 J	1.0	375 J	1.0	286	1.0	214 J	1.0	222 J
Cyanide		NC		NC		NC		NC		NC		NC		NC

U = not detected. J = estimate because quality control criteria (QCC) were not met.
UJ = not detected and detection limit (DL) is estimated because QCC were not met.
B = estimate because anlayte is present at concentration below the contract required detection limit (CRDL).
BJ = estimate because analyte is present below CRDL and QCC were not met.
Shaded where analyte concentration exhibits significance above background.

Table 5 CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Surface Water Samples - Dissolved Metals - micrograms/liter (ug/l)
3 of 3

Sample I.D.	IB-SW-4		IB-SW-05		CC-SW-1		CC-SW-2		CC-SW-3		CC-SW-4		CC-SW-5		UR-SW-1		UR-SW-2	
Traffic Report No.	MHES15		MHES74		MHER99		MHES01		MHES03		MHES04		MHES07		MHER95		MHER97	
Location Description	Imogene Ck. Above Canyon Ck.		Duplicate of IB-SW-4		Confl. Of Imogene and Sneffels Cks.		Canyon Ck. @ PPE of Camp Bird Tlgs.		Canyon Ck. Below Camp Bird Tlgs.		Canyon Ck. 1.5 Miles Below Camp Bird		Canyon Ck. Above Confl. Uncompahgre R.		Uncompahgre R. Above Canyon Ck.		Uncompahgre R. Below Canyon Ck.	
Flow (cfs)																		
pH	7.05				7.53		7.57		7.76		7.78		7.84		5		5.21	
Conductivity	843				517		486		421		351		373		495		456	
Hardness																		
Analyte	**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**	
Aluminum		9.0 U	9.00	34.9 B		15.2 B		9.0 U		10.1 B		32.3 U		9.0 U		5820		56.7 B
Antimony		3.0 U		3.0 U	3.0	3.3 B		3.0 U		3.0 U		3.0 U		3.0 U		3.5 U		3.0 U
Arsenic		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U
Barium		26.4 B		26.7 B		34.5 B		34.8 B		36.6 B		33.0 B		47.7 B		47.1 B		81.8 B
Beryllium		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Cadmium		1.0 U	1.00	1.3 B		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.7 B		1.0 U
Calcium		156000		161000		92300		73900		74000		32600		65700		74600		65000
Chromium		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Cobalt		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		13.1 B		5.2 B
Copper	1.0	2.1 B	1.00	2.6 B	1.0	1.9 B	1.0	1.4 B	1.0	1.3 B		1.0 U	1.0	1.3 B		304		38.4
Iron		13.0 U	13.00	37.1 B		17.4 B		13.0 U		13		20.7 J		13.2 B		733		262
Lead		2.0 B		1.8 B		3.6		2.0 B		1.6 B		2.1 B		4.0 U		9.5		3.3
Magnesium	11.0	2520 B	11.00	2560 B		2330 B		2160 B		2200 B		274		2400 B		4760		3620 B
Manganese	1.0	87.3	1.00	87.3	1.0	101	1.0	98	1.0	117	1.0	7.6 B	1.0	57.9		619		250
Mercury		0.10 U		0.10 U	0.1	0.14 B		0.10 U		0.10 U		0.10 U		0.10 U		0.10 U		0.10 U
Nickel		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		9.7 B		3.7 B
Potassium		579 B		657 B		517 B		456 B		495 B		657 B		565 B		945 B		864 B
Selenium		4.0 U		3.0 U		4.0 U		4.0 U		4.0 U		4.0 U		4.0 U		4.0 U		4.0 U
Silver		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Sodium		7920		8430		5220		4250 B		4210 B		362000		4840 B		6830		4940 B
Thallium	3.0	3.2 B		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U	3.0	3.8 B		3.0 U		3.0 U
Vanadium		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Zinc	1.0	281 J	1.0	283 J	1.0	218 J	1.0	199 J	1.0	196 J		17.9 B	1.0	103 J	1.0	471 J	1.0	206 J
Cyanide		NC		NC		NC		NC		NC		NC		NC		NC		NC

U = not detected. J = estimate because quality control criteria (QCC) were not met.
UJ = not detected and detection limit (DL) is estimated because QCC were not met.
B = estimate because anlayte is present at concentration below the contract required detection limit (CRDL).
BJ = estimate because analyte is present below CRDL and QCC were not met.
Shaded where analyte concentration exhibits significance above background.

Table 6 CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Sediment Samples - Total Metals - milligrams/kilogram (mg/kg)
1 OF 3

Sample I.D.	YB-SE-1		YB-SE-2		YB-SE-3		YB-SE-4		YB-SE-5		YB-SE-6		YB-SE-7	
Traffic Report No.	MHES44		MHES45		MHES46		MHES47		MHES48		MHES49		MHES50	
Location Description	Background Sneffels Creek		Sneffels Ck. Below P.P.E. of Adits		Sneffels Ck. Below Ruby Trust Mine		Sneffels Ck. @ P.P.E. of Atlas Tailings		Sneffels Ck. Below Atlas Tailings		Sneffels Ck. Above Revenue Mine		Sneffels Ck. Above Imogene Creek	
Analyte	SQL		SQL		SQL		SQL		SQL		SQL		SQL	
Aluminum		10200 J		7700 J		18600		16200		20400		18700		20200
Antimony	0.76	1.3 B		1.6 B		1.3 J	0.74	4.1 J	0.74	3.9 J		2.8 J		1.3 J
Arsenic		34.8 J		35.7 J		31.6 J		40.7 J		57.8 J		64.0 J		10.6 J
Barium		204		354		109		201		235		270		85.4
Beryllium		0.42 B		0.48 B		0.67		0.73 B		0.84 B		1.0 B		0.47 B
Cadmium		1.7		3.2		1.0 B		2.2		2.9		6.2		1.5
Calcium		3010		2940		14000		11000		13500		8860		17700
Chromium		2.2 B		3.3		4.6		3.3		4.1	0.33	7.4		3.6
Cobalt		10.8 B		17.6		12.8		13.1		15.7		15.0 B		10.4 B
Copper		17.6		15.5		12.9		23.2		29.1		31.1		15.7
Iron		30200		27600		30100		28900		34500		36000		23700
Lead		396		203		22.7 J		171 J		287		123 J		133 J
Magnesium		7240		5380		8980		7650		10100		7450		8820
Manganese		1200		2260		828		1760		2180		2610		1250
Mercury	0.06	0.06 U		0.05 U		0.05 U		0.05 U	0.06	0.11 B		0.08 U		0.06 U
Nickel		3.3 B		4.5 B		4.1 B		3.8		4.5 B		6.3 B		2.8 B
Potassium		1380		1190 B		1530		1770		2040		2080		865 B
Selenium		1.0 U		0.98 U		1.0 U		1.0 U		1.0 U		1.3 U		1.0 U
Silver		1.8 B		1.6 J		0.25 UJ		3.7 J		4.8		2.2 J		0.25 UJ
Sodium		260 B		278 J		552 B		512 B		497		498 B		629 B
Thallium		2.6		1.9 B		1.7 B		1.7 B		1.9 B		2.0 B		0.85 B
Vanadium		25		24.4		42.7		37.2		46.5		48.9		33.4
Zinc		161		418		97.7		346		479		1380		327
Cyanide		NC		NC	0.13	0.13 U	0.13	0.13 U	0.12	0.12 U	0.17	0.44 B		0.13 U

U = not detected. J = estimate because quality control criteria (QCC) were not met.
UJ = not detected and detection limit (DL) is estimated because QCC were not met.
B = estimate because anlayte is present at concentration below the contract required detection limit (CRDL).
BJ = estimate because analyte is present below CRDL and QCC were not met.
Shaded where analyte concentration exhibits significance above background.

Table 6 CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Sediment Samples - Total Metals - milligrams/kilogram (mg/kg)
2 OF 3

Sample I.D.	GB-SE-1		GB-SE-2		IB-SE-1		IB-SE-2A		IB-SE-2B		IB-SE-3		IB-SE-3A	
Traffic Report No.	**MHES43**		**MHER87**		**MHES39**		**MHES40**		**MHER75**		**MHES41**		**MHER77**	
Location Description	Govnr Ck. Below Mtn. Top Mine		Un-named Ck. Draining Govnr Basin		Background Imogene Basin		Imogene Ck. Below Upper Camp Bird		Imogene Ck. @ PPE of Streamside Tlgs.		Imogene Ck. Below Richmond Ck.		Imogene Ck. Above Camp Bird Mine	
Analyte	**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**	
Aluminum		8780		17300 J	4.86	8530 J		9920 J		8730		7140 J		10500 J
Antimony	0.77	35.3 J		2.5 B	1.6	1.6 U		1.1 U		0.79 UJ		0.71 U		0.76 U
Arsenic	0.77	390		136 J	1.6	127 J		25.5 J		16.1		17.2 J		18.3 J
Barium	0.26	203		183	0.54	219		146		157		108		110
Beryllium	0.26	1.1		0.88 B	0.54	1.1 B		0.85 B		0.50 B		0.44 B		0.56 B
Cadmium	0.26	10.2		9.2	0.54	3.1		6.8		3.8		5.4		7.7
Calcium		3020		7810		9090		8040		6090		5630		7550
Chromium	0.26	2.1 B		3.4	0.54	4.5 B		3.6 B		1.6 B		2.2 B		3.1
Cobalt	0.26	18.7		19.3	0.54	7.4 B		11.6 B		6.2 B		9.7 B		12.6 B
Copper	0.26	227		22.1	0.54	59.1	0.38	307		152		124	0.25	225
Iron		25500		38900		15300		15700		12200		14400		16700
Lead	0.26	2220		367	0.54	425		1020		589		450		732
Magnesium		4170		10000		1860 B		2420		2170		3460		5390
Manganese	0.26	6520	2.94	6630	0.54	1800		3100		1310		1740		2170
Mercury		0.12		0.06 U	0.14	0.14 U	0.09	0.24		0.05 U		0.05 U	0.06	0.14
Nickel		5.3 B		4.3 B	0.54	4.0 B		2.8 B		1.6 B		2.5 B		3.2 B
Potassium		1780		1350		1510 B		2120		2790		1030 B		1570
Selenium		1.0 UJ		1.1 U	2.2	2.2 U		1.5 B		1.0 U		0.95 U		1.0 U
Silver	0.26	28.1		1.7 J	0.54	0.91 J	0.38	6.7 J		1.7 B		1.5 J	0.25	4.0 J
Sodium		340 J		434 J		677 J		432 J		402 B		304 J		323 J
Thallium	0.77	0.77 U		0.80 U	1.6	1.6 U		1.1 U		0.79 U		0.71 U		0.82
Vanadium		19.1		38.9	0.54	15.4 B		12.4 B		11.5 B		12.6		17.6
Zinc	0.26	1680 J	0.27	1620	0.54	473		918		766 J		954		1290
Cyanide	0.12	0.50 B		NC		NC		NC	0.13	0.18 B		NC		NC

U = not detected. J = estimate because quality control criteria (QCC) were not met.
UJ = not detected and detection limit (DL) is estimated because QCC were not met.
B = estimate because anlayte is present at concentration below the contract required detection limit (CRDL).
BJ = estimate because analyte is present below CRDL and QCC were not met.
Shaded where analyte concentration exhibits significance above background.

Table 6 CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Sediment Samples - Total Metals - milligrams/kilogram (mg/kg)
3 OF 3

Sample I.D.	IB-SE-4		CC-SE-1		CC-SE-2		CC-SE-3		CC-SE-4		CC-SE-5		UR-SE-1		UR-SE-2	
Traffic Report No.	**MHES42**		**MHES34**		**MHES35**		**MHES36**		**MHES37**		**MHES38**		**MHES32**		**MHES33**	
Location Description	Imogene Ck. Above Canyon Ck.		Confl. Of Imogene and Sneffels Cks.		Canyon Ck. @ PPE of Camp Bird Tlgs.		Canyon Ck. Below Camp Bird Tlgs.		Canyon Ck. 1.5 Miles Below Camp Bird		Canyon Ck. Above Confl. Uncompahgre R.		Uncompahgre R. Above Canyon Ck.		Uncompahgre R. Below Canyon Ck.	
Analyte	**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**	
Aluminum		6410 J		14700		14200		17700		18600		19500		14900 J		18800 J
Antimony		1.2 B		2.0 J		1.4 J		1.3 J		0.84 J		1.1 J		2.2 B		0.77 U
Arsenic		28.4 J		24.4		17.3		19.3		2.8		7.3		38.6 J		10.5 J
Barium		106		123		73.2		72.1		80.5		201		379		146
Beryllium		0.66 B		0.71 B		0.72 B		0.57 B		0.55 B		0.86 B		0.76 B		0.69 B
Cadmium	0.27	13.7		9.2		9.1		3.6		0.87 B		1.7		2.9		1.6
Calcium		12800		16700		16100		20500		20000		23900		21500		21400
Chromium		2.7		3.9		3.4		2.8		2.8		7.2		6		4
Cobalt		18.7		12.6 B		12.1 B		11.4 B		8.8 B		11.8 B		13.7		11.6 B
Copper	0.27	574	0.25	242	0.25	281		126		12.8		38.7		90		69.5
Iron		21700		23700		20400		19200		17900		36300		34300		23000
Lead	0.27	1640		731		600		310		29		56.4		174		63.8
Magnesium		3000		6200		6650		7010		7070		7730		8550		8030
Manganese	0.27	9970		3040		3250		2390		659		1140		1420		965
Mercury		0.06 U	0.06	0.08 B	0.06	0.09 B	0.06	0.07 B	0.05	0.06 B	0.06	0.07 B		0.06 U		0.06 U
Nickel		3.2 B		3.2 B		3.1 B		2.8 B		2.5 B		4.4 B		5.2 B		4.4 B
Potassium		1140 B		1370		1170 B		1120 B		1240 B		1740		1620		1460
Selenium		1.0 U		1.0 UJ		1.0 UJ		0.98 U		1.1 UJ		1.0 UJ		1.1 U		1.0 U
Silver	0.27	16.1 J	0.25	6.6	0.25	6.7	0.24	4.8		0.27 U	0.26	0.42 B		1.8 B		0.65 B
Sodium		285 J		535 B		506 J		569 J		750 J		715 J		647 B		656 B
Thallium		0.77 U		0.76 U		0.76 U		0.73 U		0.81 U	0.77	1.2 B		2.0 B		1.00 B
Vanadium		10.4 B		32.6		29.8		30.6		36.8	0.26	82		48.4		34.9
Zinc	0.27	4660	0.25	1940 J	0.25	1990 J		781 J		145 J		223 J		397		273
Cyanide		NC		0.12 U		0.12 U		0.12 U		0.13 U		0.12 U		NC		NC

U = not detected. J = estimate because quality control criteria (QCC) were not met.
UJ = not detected and detection limit (DL) is estimated because QCC were not met.
B = estimate because anlayte is present at concentration below the contract required detection limit (CRDL).
BJ = estimate because analyte is present below CRDL and QCC were not met.
Shaded where analyte concentration exhibits significance above background.

Table 7 CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Waste Source Samples - Total Metals - milligrams/kilogram (mg/kg)
Page 1 of 2

Sample I.D.	CB-HT-01A		CB-HT-02A		CB-HT-03A		CB-WS-01A		CB-WS-02A		CB-WS-03A		AT-WS-01		AT-WS-02		Reference Standards		
Traffic Report No.	MHER70		MHER72		MHER73		MHER74		MHER76		MHER78		MHER80		MHER81		Industrial	Industrial	
Location Description	Camp Bird Historic Tailings (West End)		Camp Bird Historic Tailings (Center)		Camp Bird Historic Tailings (East End)		Camp Bird Inactive Tailings (West End)		Camp Bird Inactive Tailings (Center)		Camp Bird Inactive Tailings (North Pile)		Atlas Tailings West End		Atlas Tailings West-Central		Region IX PRG	Region III RBC	SCDM HSBM Rfd
Depth Interval	0 - 2'		0 - 2'		0 - 2'		0 - 2'		0 - 2'		0 - 2'		0 - 1.5'		0.5 - 1'				
Analyte	SQL		SQL		SQL		SQL		SQL		SQL		SQL		SQL				
Aluminum		3830		6710		9020		7500		3970		4930		2080		2560	100000	1000000	NP
Antimony		3.8 J		3.1 J		2.2 J		7.2 J		0.81 J		4.4 J		159 J		84 J	680	820	31
Arsenic		71.5		134		86.1		57.1		40.5		23.7		331		358	2	610	0.43
Barium		190		67.7		240		239		38.6 B		213		2730		1850	100000	140000	5500
Beryllium		0.24 U		0.81 B		1.3 B		1.0 B		0.74 B		0.31		0.25 U		0.24 U	1.1	1.3	0.15
Cadmium		2.1		12.7		8.1		28.5		22.8		11.5		5.6		9.8	850	1000	39
Calcium		1990		13200		5270		21400		11700		9700		354 B		584 B	NP		NP
Chromium		2.1 B		1.9 B		13.4		2.8		1.9		4		1.5 B		0.94 B	1600	1000000	390
Cobalt		3.4 B		23		18.3		25.2		14.2		12.2 B		0.25 U		0.24 U		120000	NP
Copper		287		680		1120		642		543		380		137		67.5	63000	76000	NP
Iron		36100		51300		41000		50500		23500		38900		25900		22400			NP
Lead		1610		1630		4430		1730		1540		1480		16800		6390	1200	400*	NP
Magnesium		1660		3680		3260		3620		1840		2070		117 B		143 B			NP
Manganese		1150		5820		5380		13000		4350		1630		145		105	8300	61000	11000
Mercury		0.05 U		0.06 U		0.06 U		0.05 U		0.05 U		0.07 U		1.7		2.2	510	610	23
Nickel		0.43 B		4.2 J		4.6 B		4.9 J		2.3 B		2.6 B		0.25 U		0.24 U	34000	41000	1600
Potassium		1690		1310		2810		1520		875 B		1500		1790		1810			NP
Selenium		1.8 J		1.0 UJ		1.1 J		0.86 J		0.85 UJ		0.98 UJ		2.3 J		1.8 J	8500	10000	390
Silver		16.8		20.8		26		36.8		23		10.2		164		141	8500	10000	390
Sodium		364 J		355 J		374 J		304 J		243 J		333 J		331 J		342 J			NP
Thallium		2.9		2.0 B		1.3 B		0.65 U		0.64 U		2.5		2.5		1.9 B			NP
Vanadium		12.6		12.5 B		15.9		15.2		7.9 B		9.6 B		9.3 B		8.0 B	12000	14000	550
Zinc		332 J		2130 J		1920 J		6230 J		5030 J		2210 J		1090 J		1620 J	100000	610000	23000
Cyanide		0.14 B		0.23 B		2.2		0.15 B		0.25 B		0.12 U		0.13 B		0.12 U			1600

U = not detected. J = estimate because quality control criteria (QCC) were not met.
UJ = not detected and detection limit (DL) is estimated because QCC were not met.
B = estimate because anlayte is present at concentration below the contract required detection limit (CRDL).
BJ = estimate because analyte is present below CRDL and QCC were not met.
NP - Standard Not Published

Table 7 CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Waste Source Samples - Total Metals - milligrams/kilogram (mg/kg)
2 of 2

Sample I.D.	AT-WS-03		AT-WS-04		AM-WR-01		HC-WS-01		DN-WS-01		DN-WS-02		DN-WS-03		SC-WS-01		IB-WS-01		Reference Standards		
Traffic Report No.	**MHER82**		**MHER83**		**MHER86**		**MHER85**		**MHER90**		**MHER91**		**MHER92**		**MHER84**		**MHER88**				
Location Description	Atlas Tailings (East-Central)		Atlas Tailings (Eastern End)		Atlas Mill Waste Rock Dump		Highland Chief Waste Rock Dump		Dread Not Mine Upper Pile		Dread Not Mine Lower Pile		Fines at Base of Dread Not Mine		Sneffels Ck. Waste Rock Dump		Tailings Below Upper Camp Bird		**Region IX PRG**	**Region III RBC**	**SCDM HSBM Rfd**
Depth Interval	0 - 2'		0 - 1.5'		1 - 1.5'		0 - 1'		0 - 0.5'		0 - 0.5'		0 - 1'		0 - 1'		0 - 2'				
Analyte	**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**				
Aluminum		1110		1100		2220		2610		2260 J		2010		965 J		6560 J		11600 J	100000	1000000	NP
Antimony		67.3 J		20 J		13.2 J		6.4 B		15.2		16.3 J		110		3.8 J		0.78 U	680	820	31
Arsenic		135		98		258		37.6		866 J		1020		3510 J		103 J		30.5 J	2	610	0.43
Barium		52.7		130		25.4 B		162		1790		56.5		2930		998		542	100000	140000	5500
Beryllium		0.29		0.28 B		0.22 U		0.24 U		0.22 U		0.23 U		0.24 U		0.26 B		0.98 B	1.1	1.3	0.15
Cadmium		44.9		28.6		0.99 B		15.6		2		2.2		93.1		3.0 J		69.2	850	1000	39
Calcium		21800		18700		293 B		222 B		1140		216 B		2200		698 B		22000	NP		NP
Chromium		0.46 B		0.22 U		0.29 B		1.7 B		0.22 U		0.23 U		2.5		2.7		1.1 B	1600	1000000	390
Cobalt		4.8 B		3.5 B		0.42 B		1.4 B		0.22 U		0.34 B		3.2 B		5.2 J		15.5		120000	NP
Copper		540		212		33.2		492		12.2		35.3		193		19.9		2950	63000	76000	NP
Iron		15800		12200		16700		17300		24600		32800		40900		45400		24500			NP
Lead		3720		1960		1050		21000		2120		3060		11100		716		11800	1200	400*	NP
Magnesium		369		278 B		170 B		163 B		98.5 B		93.6 B		812 B		2930		2960			NP
Manganese		2740		2570		103		45.2		135		101		46200		1070		5790	8300	61000	11000
Mercury		0.17		0.12		0.08 B		0.7		0.71		0.59		1.1		0.19		4.4	510	610	23
Nickel		1.1 B		0.70 B		0.22 U		0.24 U		0.22 U		0.23 U		0.59 B		0.97 J		1.7 B	34000	41000	1600
Potassium		781 B		811 B		2730		2320		2710		3720		1140 B		1720		4310			NP
Selenium		0.89 UJ		0.87 UJ		0.87 U		5.2 J		2.2		1.2 J		0.97 U		8.5		9.8	8500	10000	390
Silver		120		65.5		26.7		29.8		43.4 J		25.1		195 J		7.2 J		58.3 J	8500	10000	390
Sodium		318 J		289 J		374 B		357 B		307 J		345 J		283 J		321 J		314 J			NP
Thallium		0.67 U		0.65 U		2.3		1.2 B		10.4		4.5		3.6 U		3.8 J		0.94 B			NP
Vanadium		2.8 B		2.9 B		7.3 B		5.6 B		20.4		11.2 B		5.6 B		36.6		17.8	12000	14000	550
Zinc		8250 J		5140 J		122		2670 J		273		326 J		14200		407		15000	100000	610000	23000
Cyanide		0.11 U		0.11 U		0.11 U		0.11 U		NC		0.11 U		NC		NC		NC			1600

U = not detected. J = estimate because quality control criteria (QCC) were not met.
UJ = not detected and detection limit (DL) is estimated because QCC were not met.
B = estimate because anlayte is present at concentration below the contract required detection limit (CRDL).
BJ = estimate because analyte is present below CRDL and QCC were not met.
NP - Standard Not Published

Table 8 CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Adit Discharge Samples - Total Metals - micrograms/liter (mg/l)

Sample I.D.	CB-AS-1		CB-AS-2		CB-AS-4		US-AS-1		SC-AS-1		AM-SP-1		HC-AS-1	
Traffic Report No.	**MHES51**		**MHES69**		**MHES70**		**MHES61**		**MHES65**		**MHES57**		**MHES53**	
Location Description	Camp Bird No. 14 Level Adit		Hidden Treasure Adit Upper Camp Bird		Camp Bird 300 Level Adit		Upper Sneffels Ck. Adit		Sneffels Ck. Adit		Atlas Mill Seep Area		Highland Chief Adit	
Flow (cfs)	7.25		0.04		0.01		0.36		0.01		0.01		0.01	
pH	7.65		5.80		8.32		7.00		7.12		NC		6.89	
Conductivity	1105.00		NC		NC		715.00		187.00		NC		NC	
Hardness	**613.03**		**60.35**		**75.60**		**358.19**		**65.34**		**60.64**		**72.05**	
Analyte	**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**		**SQL**	
Aluminum		43.2 U		338.00		77.50		21.00		83.1 B		497.00		770.00
Antimony		3.0 U		3.0 U		3.0 U		3.0 U		3.0 U		9.6 B		3.0 U
Arsenic		3.0 U		4.6 B		3.0 U		3.0 U		6.8 B		11.70		6.8 B
Barium		20.5 B		18.1 B		33.7 B		10.8 B		33.0 B		120 B		66.7 B
Beryllium		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Cadmium		1.2 B		23.60		1.0 U		1.0 U		4.1 B		5.90		4.5 B
Calcium		240000.00		22800.00		28000.00		134000.00		21500.00		21400.00		26100.00
Chromium		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Cobalt		1.0 U		5.1 B		1.0 U		1.0 U		1.4 B		1.3 B		5.6 B
Copper		19.2 B		363.00		1.6 B		1.0 U		5.6 B		42.90		51.90
Iron		339.00		7330.00		56.9 B		291.00		1200.00		2420.00		6480.00
Lead		12.00		77.20		4.90		1.5 U		44.40		661.00		584.00
Magnesium		3340.00		830.00		1380.00		5730.00		2830.00		1750.00		1670.00
Manganese		163.00		966.00		8.4 B		124.00		402.00		664.00		568.00
Mercury		0.10 U		0.10 UJ		0.10 UJ		0.10 UJ		0.10 UJ		0.10 UJ		0.10 U
Nickel		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		3.6 B
Potassium		848 B		205.00		497 B		680 B		374 B		789.00		810 B
Selenium		4.0 U		4.0 U		4.0 U		4.0 U		4.0 U		4.0 U		4.0 U
Silver		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		15.30		1.0 U
Sodium		12700.00		1070 B		1680 B		2940.00		1040 B		1110 B		1370 B
Thallium		3.0 U		3.0 U		3.0 U		3.0 U		3.20		3.0 U		3.0 U
Vanadium		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U		1.0 U
Zinc		440.00		4850.00		243.00		40.50		1020.00		1170.00		921.00
Cyanide		NC		NC		NC		NC		NC		NC		NC

U = not detected. J = estimate because quality control criteria (QCC) were not met.
UJ = not detected and detection limit (DL) is estimated because QCC were not met.
B = estimate because anlayte is present at concentration below the contract required detection limit (CRDL).
BJ = estimate because analyte is present below CRDL and QCC were not met.
Shaded where analyte concentration exhibits significance above background.

Table 9 - CANYON CREEK WATERSHED
ADIT SAMPLES - DISSOLVED METALS - micrograms/liter (ug/l)

Sample I.D.	CB-AS-1		US-AS-1		SC-AS-1		CC-SW-08	
Traffic Report No.	MHES52		MHES62		MHES66		MHES 78	
Location Description	Camp Bird No. 14 Level Adit		Upper Sneffels Ck. Adit		Sneffels Ck. Adit		Rinsate Blank	
Flow (cfs)	**7.25**		0.36		0.01			
pH	7.65		7.00		7.12		NA	
Conductivity	1105.00		715.00		187.00		NA	
Hardness								
Analyte	SQL		SQL		SQL		SQL	
Aluminum	9.0	24.5 U	9.0	20.6 U	9.0	25.0 U	9.0	19.5 U
Antimony	3.0	3.0 U	3.0	3.0 U	3.0	3.0 U	3.0	3.0 U
Arsenic	3.0	3.0 U	3.0	3.0 U	3.0	4.1 B	3.0	3.0 U
Barium	1.0	19.9 B	1.0	11.1 B	1.0	32.2 B	1.0	1.0 U
Beryllium	1.0	1.0 U	1.0	1.0 U	1.0	1.0 U	1.0	1.0 U
Cadmium	1.0	1.1 B	1.0	1.0 U	1.0	4.1 B	1.0	1.0 U
Calcium	8.0	237000.00	8.0	138000.00	8.0	21000.00	8.0	36.2 U
Chromium	1.0	1.0 U	1.0	1.0 U	1.0	1.0 U	1.0	1.0 U
Cobalt	1.0	1.0 U	1.0	1.0 U	1.0	1.5 B	1.0	1.0 U
Copper	1.0	1.5 B	1.0	1.0 U	1.0	2.3 B	1.0	1.0 U
Iron	13.0	14.6 B	13.0	105.00	13.0	525.00	13.0	13.0 U
Lead	1.0	1.6 B	1.0	1.9 B	1.0	4.5 U	1.0	1.0 U
Magnesium	11.0	3270 B	11.0	5840.00	11.0	2750 B	11.0	22.6 U
Manganese	1.0	140.00	1.0	128.00	1.0	391.00	1.0	1.0 U
Mercury	0.1	0.10 U	0.1	0.10 U	0.1	0.10 U	0.1	0.10 U
Nickel	1.0	1.0 U	1.0	1.0 U	1.0	1.1 B	1.0	1.0 U
Potassium	34.0	859 B	34.0	728 B	34.0	388 B	34.0	34.0 U
Selenium	4.0	3.0 U	4.0	3.0 U	4.0	3.0 U	4.0	3.0 U
Silver	1.0	1.0 U	1.0	1.0 U	1.0	1.0 U	1.0	1.0 U
Sodium	16.0	12500.00	16.0	3040 B	16.0	1020 B	16.0	64.4 B
Thallium	3.0	3.0 U	3.0	3.0 U	3.0	3.0 U	3.0	3.0 U
Vanadium	1.0	1.0 U	1.0	1.0 U	1.0	1.0 U	1.0	1.0 U
Zinc	1.0	259.00	1.0	41.10	1.0	991.00	1.0	4.5 J
Cyanide								

U = not detected. J = estimate because quality control criteria (QCC) were not met.
UJ = not detected and detection limit (DL) is estimated because QCC were not met.
B = estimate because anlayte is present at concentration below the contract required detection limit (CRDL).
BJ = estimate because analyte is present below CRDL and QCC were not met.
Shaded where analyte concentration exhibits significance above background.

TABLE 10 - CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
SURFACE WATER SAMPLES TOTAL (T) and DISSOLVED (D) METALS KEY ANALYTES - micrograms per liter (ug/L)

Sample I.D.	YB-SW-01	YB-SW-02	YB-SW-03	YB-SW-04	YB-SW-05	YB-SW-06	YB-SW-07
Flow (cfs)	3.53	4.01	9.39	10.96	10.48	10.92	17.57
Hardness	50.06	55.68	54.81	59.22	59.67	54.14	69.58
Arsenic T	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U
Arsenic D	3.00 U	3.00 U	3.00 U	3.80 B	3.60 B	3.00 U	3.00 U
Arsenic Numeric Standard T	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Aluminum T	76.50	193.00 B	131.00	189.00 B	108.00 J	61.70 U	73.90
Aluminum D	9.00 UJ	9.00 UJ	9.00 UJ	9.00 UJ	9.60 J	37.30 U	26.20 U
Barium T	40.20 B	40.80 B	40.80 B	46.30 B	45.20 B	43.50 B	25.60
Barium D	38.50 B	39.10 B	40.50 B	43.80 B	43.00 B	44.60 U	41.50 B
Cadmium T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Cadmium D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Cadmium TVS Chronic	0.66	0.72	0.71	0.75	0.76	0.70	0.85
Cadmium TVS Acute	1.80	2.03	1.99	2.17	2.19	1.96	2.61
Calcium T	16700.00	19200.00	19000.00	20400.00 J	20600.00 J	20000.00 J	24600.00
Calcium D	16900.00	20300.00 J	18400.00 J	20400.00 J	43.00 B	21200.00	25500.00 J
Chromium T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chromium D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chromium TVS Chronic	117.44	128.14	126.50	134.76	135.61	125.22	153.79
Chromium TVS Acute	985.27	1075.06	1061.28	1130.59	1137.75	1050.59	1290.24
Copper T	1.00 U	1.00 U	1.00 U	2.50 B	2.50 B	1.00 B	1.20 B
Copper D	1.00 U	1.00 U	1.00 U	1.10 B	1.20 B	1.30 B	1.00 U
Copper TVS Chronic	6.55	7.17	7.07	7.56	7.61	7.00	8.67
Copper TVS Acute	9.24	10.22	10.07	10.83	10.90	9.95	12.60
Iron T	125.00	279.00	142.00	159.00 J	82.70 J	33.30 J	80.50 J
Iron D	19.50 B	13.00 U	16.20 B	13.00 U	13.00 U	14.70 B	14.50 B
Iron Numeric Std T (Chronic)	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Lead T	2.20 U	3.40 U	2.30 U	9.10	4.30 U	3.40 U	2.60 U
Lead D	1.90 B	1.10 U	1.90 U	1.20 B	1.20 U	2.80 B	2.60 B
Lead TVS Chronic	1.46	1.70	1.66	1.85	1.87	1.63	2.33
Lead TVS Acute	31.36	37.24	36.31	41.13	41.64	35.59	53.36
Magnesium T	2030.00 B	1880.00	1790.00 J	2010.00 J	2000.00 J	1020.00 J	1980.00 J
Magnesium D	2060.00 B	1940.00 B	1720.00 B	1990.00 B	1950.00 B	2070.00	2050.00 B
Manganese T	10.50 B	21.30	14.10 B	114.00 J	111.00	66.80 J	108.00 J
Manganese D	1.40 B	3.10 B	5.80 B	101.00	103.00	115.00	106.00
Manganese Numeric Std D (Chronic)	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Mercury T	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ	0.10 UJ	0.10 U
Mercury D	0.10 U	1.60	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Mercury Numeric Std T (Chronic)	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Nickel T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Nickel D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Nickel TVS Chronic	56.49	61.25	60.52	64.18	64.56	59.96	72.55
Nickel TVS Acute	546.78	592.87	585.81	621.23	624.88	580.33	702.24
Selenium T	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
Selenium D	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
Selenium TVS Chronic	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Selenium TVS Acute	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Silver T	1.00 U	1.00 U	3.00 U	1.00 U	1.00 U	1.00 U	1.00 B
Silver D	1.00 UJ	1.00 UJ	1.00	1.00 UJ	1.00 UJ	1.00 U	1.00 UJ
Silver TVS Chronic	0.10	0.12	0.11	0.13	0.13	0.11	0.17
Silver TVS Acute	0.62	0.74	0.72	0.83	0.84	0.71	1.09
Zinc T	12.40 U	18.20 B	19.70 B	76.70 J	77.20	53.00 J	143.00
Zinc D	7.60 B	16.60 J	19.50 J	71.60 J	71.30 J	82.70	143.00
Zinc TVS Chronic	58.97	64.54	63.68	67.99	68.44	63.02	77.95 J
Zinc TVS Acute	65.11	71.26	70.31	75.07	75.56	69.58	86.06

U = not detected. J = estimate because quality control criteria (QCC) were not met.

UJ = not detected and detection limit (DL) is estimated because QCC were not met. .

B = estimate because anlayte is present at concentration below the contract required detection limit (CRDL)

BJ = estimate because analyte is present below CRDL and QCC were not met.

Shaded where analyte concentration exceeds either Numeric or Table Value stream standard.

TVS= Table Value Standards are hardness based for dissolved metals concentrations

TABLE 10 - CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
SURFACE WATER SAMPLES TOTAL (T) and DISSOLVED (D) METALS KEY ANALYTES - micrograms per liter (ug/L)

Sample I.D.	IB-SW-01	IB-SW-02A	IB-SW-02B	IB-SW-03	IB-SW-03A	IB-SW-04	IB-SW-05	GB-SW-02
Flow (cfs)	0.01	0.90	1.20	3.21	0.00	14.23	0.00	1.00
Hardness	59.13	50.52	60.13	57.96	59.67	417.84	415.14	83.03
Aluminum T	100.00 B	39.50 B	72.20 B	128.00 B	108.00 J	68.00 U	58.80 B	64.40 J
Aluminum D	9.00 U	15.40 B	32.30 U	20.00 B	26.40 UJ	9.00 U	34.90	31.70 U
Arsenic T	3.00 B	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U
Arsenic D	3.40 B	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U
Arsenic Numeric Standard T	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Barium T	39.60 B	33.70 B	40.50 B	42.20 B	45.20 B	27.80 B	27.30 B	21.80 B
Barium D	39.10 B	34.00 B	37.80 B	41.30 B	40.10 B	26.40 B	26.70 B	21.50 B
Cadmium T	1.00 U	1.60 B	1.30 B	1.00 B	1.00 U	1.40 B	1.60 B	1.80 B
Cadmium D	1.00 U	1.50 B	1.20 B	1.00 U	1.10 B	1.00 U	1.00 U	1.70 B
Cadmium TVS Chronic	0.75	0.66	0.76	0.74	0.76	3.49	3.47	0.98
Cadmium TVS Acute	2.17	1.82	2.21	2.12	2.19	19.68	19.54	3.18
Calcium T	22300.00	18700.00	22200.00	21300.00	20600.00 J	163000.00 J	162000.00	30200.00
Calcium D	22700.00	19000.00	21000.00	21500.00	22700.00	156000.00	161000.00	30200.00
Chromium T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chromium D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chromium TVS Chronic	134.61	118.32	136.46	132.42	135.61	667.64	664.10	177.74
Chromium TVS Acute	1129.31	992.68	1144.83	1110.96	1137.75	5601.27	5571.58	1491.15
Copper T	1.00 U	10.70 B	7.50 B	5.80 B	2.50 B	14.10 B	13.00 B	1.40 B
Copper D	1.00 U	8.50 B	5.30 B	4.50 B	3.80 B	2.10 B	2.60 B	1.00 U
Copper TVS Chronic	7.55	6.60	7.66	7.42	7.61	40.12	39.90	10.09
Copper TVS Acute	10.81	9.32	10.98	10.61	10.90	68.23	67.81	14.88
Iron T	77.40	79.90 B	100.00	140.00	82.70 J	268.00	236.00 J	523.00
Iron D	13.00 U	28.50 B	20.60 B	17.80 B	13.80 B	13.00 U	37.10 B	40.70
Iron Numeric Std T (Chronic)	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Lead T	3.50	5.80	5.50 U	5.30 U	7.40	12.10	8.40	2.00 U
Lead D	2.00 B	3.60	3.00 U	2.10 B	1.00 U	2.00 B	1.80 B	1.00 U
Lead TVS Chronic	1.85	1.48	1.89	1.80	1.87	29.51	29.24	2.99
Lead TVS Acute	41.04	31.82	42.16	39.73	41.64	964.76	954.71	70.99
Magnesium T	838.00	929.00	1140.00	1160.00	2000.00 J	2630.00 J	2580.00 J	1850.00 B
Magnesium D	849.00 B	951.00 B	1070.00 B	1170.00 B	1320.00 B	2520.00 B	2560.00 B	1820.00 B
Manganese T	5.50 B	20.90	14.50 B	15.80 J	111.00	117.00	106.00 J	1550.00
Manganese D	1.30 B	22.50	9.90 B	10.40 B	3.00 B	87.30	87.30	1520.00
Manganese Numeric Std D (Chronic)	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Mercury T	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ	0.10 UJ	0.10 UJ	0.10 U
Mercury D	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Mercury Numeric Std T (Chronic)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Nickel T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Nickel D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.10 B
Nickel TVS Chronic	64.11	56.88	64.93	63.15	64.56	283.35	281.95	82.98
Nickel TVS Acute	620.58	550.59	628.49	611.22	624.88	2742.64	2729.15	803.17
Selenium T	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
Selenium D	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	3.00 U	3.00 U
Selenium TVS Chronic	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Selenium TVS Acute	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Silver T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Silver D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 UJ	1.00 U
Silver TVS Chronic	0.13	0.10	0.13	0.13	0.13	3.74	3.70	0.23
Silver TVS Acute	0.82	0.63	0.85	0.80	0.84	23.82	23.55	1.48
Zinc T	12.20 U	349.00	295.00	229.00	244.00	334.00	328.00 J	679.00
Zinc D	9.50 J	375.00 J	286.00	214.00 J	222.00 J	281.00 J	283.00 J	599.00 J
Zinc TVS Chronic	67.91	59.43	68.88	66.77	68.44	356.00	354.05	90.54
Zinc TVS Acute	74.98	65.62	76.05	73.72	75.56	393.05	390.90	99.96

U = not detected. J = estimate because quality control criteria (QCC) were not met.

UJ = not detected and detection limit (DL) is estimated because QCC were not met.

B = estimate because anlayte is present at concentration below the contract required detection limit (CRDL).

BJ = estimate because analyte is present below CRDL and QCC were not met.

Shaded where analyte concentration exceeds either Numeric or Table Value stream standard.

TVS= Table Value Standards are hardness based for dissolved metals concentrations

TABLE 10 - CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
SURFACE WATER SAMPLES TOTAL (T) and DISSOLVED (D) METALS KEY ANALYTES - micrograms per liter (ug/L)

Sample I.D.	CC-SW-01	CC-SW-02	CC-SW-03	CC-SW-04	CC-SW-05	UR-SW-01	UR-SW-02	GB-SW-01
Flow (cfs)	31.42	31.93	36.52	45.99	44.62	0.00	0.00	2.33
Hardness	237.41	197.67	196.28	161.29	175.26	211.86	181.25	59.46
Aluminum T	108.00 B	212.00	977.00 B	9.00 U	404.00	8430.00	4170.00	216.00
Aluminum D	15.20 B	9.00 U	10.10 B	32.30 U	9.00 U	5820.00	56.70 B	27.80
Arsenic T	3.00 U	3.00 U	3.00 U	3.60 B	3.00 U	8.10 B	4.70 B	6.20 B
Arsenic D	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	7.20 B
Arsenic Numeric Standard T	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Barium T	34.90 B	37.30 U	48.40 U	42.50 B	52.40 B	51.50 B	59.30 B	45.90 B
Barium D	34.50 B	34.80 B	36.60 B	33.00 B	47.70 B	47.10 B	81.80 B	47.40
Cadmium T	1.00 U	1.00 U	1.10 B	1.00 U	1.00 U	2.20 B	1.20 B	1.70
Cadmium D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.70 B	1.00 U	1.40 B
Cadmium TVS Chronic	2.24	1.94	1.93	1.65	1.76	2.05	1.81	0.75
Cadmium TVS Acute	10.40	8.46	8.39	6.73	7.39	9.15	7.67	2.18
Calcium T	91300.00	75500.00	74600.00	61000.00	66100.00	76700.00	66700.00	20100.00
Calcium D	92300.00	73900.00	74000.00	32600.00	65700.00	74600.00	65000.00	20700.00 J
Chromium T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.70 B	1.00 U	1.00 U
Chromium D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chromium TVS Chronic	420.21	361.66	359.59	306.18	327.73	382.80	336.87	135.21
Chromium TVS Acute	3525.38	3034.21	3016.82	2568.73	2749.56	3211.57	2826.25	1134.33
Copper T	7.10 B	6.00 B	14.70 B	1.30 B	3.40 B	328.00	162.00	9.90 B
Copper D	1.90 B	1.40 B	1.30 B	1.00 B	1.30 B	304.00	38.40	4.40 B
Copper TVS Chronic	24.75	21.17	21.04	17.79	19.10	22.46	19.65	7.58
Copper TVS Acute	40.05	33.70	33.48	27.83	30.09	35.98	31.06	10.87
Iron T	177.00 J	238.00 J	1220.00 J	32.90	353.00 J	8680.00	4400.00 J	65.00 J
Iron D	17.40 B	13.00 U	13.00	20.70 J	13.20 B	733.00	262.00	13.00 U
Iron Numeric Std T (Chronic)	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Lead T	6.30	8.80	52.30	1.00 U	4.80 U	16.90	11.30 U	12.20
Lead D	3.60	2.00 B	1.60 B	2.10 B	4.00 U	9.50	3.30	14.80
Lead TVS Chronic	13.25	10.22	10.12	7.66	8.62	11.27	9.04	1.86
Lead TVS Acute	387.22	288.06	284.81	207.43	237.21	322.20	250.43	41.40
Magnesium T	2290.00	2220.00 J	2430.00	2180.00 B	2480.00 J	4940.00	3570.00	2250.00 J
Magnesium D	2330.00 B	2160.00 B	2200.00 B	274.00	2400.00 B	4760.00	3620.00 B	2350.00 B
Manganese T	0.10 U	119.00 J	319.00 J	57.60 B	76.50 J	638.00	323.00	629.00 J
Manganese D	101.00	98.00	117.00	7.60 B	57.90	619.00	250.00	653.00
Manganese Numeric Std D (Chronic)	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Mercury T	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ	0.10 UJ	0.10 UJ	0.10 U
Mercury D	0.14 B	0.10 U	0.10 U	0.10 U	0.10	0.10 U	0.10 U	0.10 U
Mercury Numeric Std T (Chronic)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Nickel T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	10.90 B	5.40 B	1.00 U
Nickel D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	9.70 B	3.70 B	1.00 U
Nickel TVS Chronic	184.39	160.42	159.57	137.45	146.41	169.10	150.19	64.38
Nickel TVS Acute	1784.74	1552.77	1544.51	1330.43	1417.12	1636.82	1453.76	623.14
Selenium T	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
Selenium D	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
Selenium TVS Chronic	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Selenium TVS Acute	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Silver T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Silver D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Silver TVS Chronic	1.42	1.03	1.02	0.73	0.84	1.16	0.89	0.13
Silver TVS Acute	9.01	6.57	6.49	4.63	5.34	7.41	5.66	0.83
Zinc T	228.00 U	215.00 J	276.00 J	120.00 J	116.00 J	484.00	289.00	340.00 J
Zinc D	218.00 J	199.00 J	196.00 J	17.90 B	103.00 J	471.00 J	206.00 J	332.00 J
Zinc TVS Chronic	220.51	188.81	187.69	158.92	170.51	200.23	143.00 J	68.22
Zinc TVS Acute	243.46	208.45	207.22	175.46	188.26	221.07	193.69	75.32

U = not detected. J = estimate because quality control criteria (QCC) were not met.

UJ = not detected and detection limit (DL) is estimated because QCC were not met. B = estimate because anlayte is present at concentration below the contract required detection limit (CRDL).

BJ = estimate because analyte is present below CRDL and QCC were not met.

Shaded where analyte concentration exceeds either Numeric or Table Value stream standard.

TVS= Table Value Standards are hardness based for dissolved metals concentrations

TABLE 11 - CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
ADIT SAMPLES TOTAL (T) and DISSOLVED (D) METALS KEY ANALYTES - micrograms per liter (ug/L)

SAMPLE I.D.	CB-AS-1	US-AS-1	SC-AS-1	HC-AS-1	CB-AS-2	CB-AS-4	AM-SP-1
Flow (cfs)	7.25	0.36	0.01	NC	0.04	NC	NC
Hardness	613.03	358.19	65.34	72.05	60.35	75.60	60.64
Aluminum T	43.20 U	21.00 U	83.10 B	770.00 B	338.00 J	77.50 U	497.00
Aluminum D	24.50 U	20.60 U	25.00 U	NC	NC	NC	NC
Arsenic T	3.00 U	3.00 U	6.80 B	6.80 B	4.60 B	3.00 U	11.70
Arsenic D	3.00	3.00	4.10 B	NC	NC	NC	NC
Arsenic Numeric Standard T	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Barium T	20.50 B	10.80 B	6.80 B	66.70 B	18.10 B	33.70 B	120.00 B
Barium D	19.90 B	11.10 B	32.20 B	NC	NC	NC	NC
Cadmium T	1.20 B	1.00 U	4.10 B	4.50 B	23.60 U	1.00 U	5.90
Cadmium D	1.10 B	1.00 U	4.10 B	NC	NC	NC	NC
Cadmium TVS Chronic	4.71	3.09	0.81	0.88	0.76	0.91	0.77
Cadmium TVS Acute	30.33	16.54	2.43	2.71	2.22	2.86	2.23
Calcium T	240000.00	134000.00	21500.00	26100.00 J	22800.00 J	28000.00	21400.00
Calcium D	237000.00	138000.00	21000.00	NC	NC	NC	NC
Chromium T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00
Chromium D	1.00 U	1.00 U	1.00 U	NC	NC	NC	NC
Chromium TVS Chronic	913.87	588.51	146.07	158.24	136.87	164.60	137.41
Chromium TVS Acute	7667.04	4937.43	1225.48	1327.62	1148.29	1380.96	1152.85
Copper T	19.20 B	1.00 U	5.60 B	5.60 B	363.00 B	1.60 B	42.90
Copper D	1.50 B	1.00 U	2.30 B	NC	NC	NC	NC
Copper TVS Chronic	55.68	35.18	8.22	8.94	7.68	9.31	7.71
Copper TVS Acute	97.91	59.01	11.88	13.02	11.02	13.63	11.07
Iron T	339.00	291.00	1200.00	6480.00 J	7330.00 J	56.90 B	2420.00
Iron D	14.60 B	105.00	525.00	NC	NC	NC	NC
Iron Numeric Std T (Chronic)	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Lead T	12.00	1.50 U	44.40	584.00	77.20 U	4.90	661.00
Lead D	1.60 B	1.90 B	4.50 U	NC	NC	NC	NC
Lead TVS Chronic	50.80	23.72	2.13	2.44	1.90	2.62	1.92
Lead TVS Acute	1791.60	752.32	48.21	56.46	42.41	61.02	42.74
Magnesium T	3340.00 B	5730.00	2830.00	1670.00	830.00 J	1380.00 J	1750.00
Magnesium D	3270.00 B	5840.00	2750.00 B	NC	NC	NC	NC
Manganese T	163.00	124.00	402.00	568.00 J	966.00	8.40 B	664.00
Manganese D	140.00	128.00	391.00	NC	NC	NC	NC
Manganese Numeric Std D (Chronic)	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
Mercury T	0.10 U	0.10 U	0.10 UJ	0.10 U	0.10 UJ	0.10 UJ	0.10 UJ
Mercury D	0.10 U	0.10 U	0.10 U	NC	NC	NC	NC
Mercury Numeric Std T (Chronic)	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Nickel T	1.00 U	1.00 U	1.00 U	3.60 B	1.00 U	1.00 U	1.00 U
Nickel D	1.00 U	1.00 U	1.10 B	NC	NC	NC	NC
Nickel TVS Chronic	379.18	252.05	69.16	74.50	65.11	77.27	65.35
Nickel TVS Acute	3670.19	2439.67	669.47	721.10	630.25	747.95	632.57
Selenium T	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
Selenium D	3.00 U	3.00 U	3.00 U	NC U	NC U	NC U	NC U
Selenium TVS Chronic	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Selenium TVS Acute	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Silver T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	15.30
Silver D	1.00 UJ	1.00 UJ	1.00 U	NC UJ	NC UJ	NC U	NC UJ
Silver TVS Chronic	7.24	2.87	0.15	0.18	0.13	0.20	0.14
Silver TVS Acute	46.05	18.27	0.98	1.16	0.85	1.26	0.86
Zinc T	440.00	40.50	1020.00	921.00	4850.00	243.00 J	1170.00
Zinc D	259.00	41.10	991.00	NC J	NC J	NC	NC
Zinc TVS Chronic	492.61	312.45	73.90	80.29	69.09	83.63	69.38 J
Zinc TVS Acute	543.88	344.96	81.60	88.64	76.28	92.33	76.60

U = not detected. J = estimate because quality control criteria (QCC) were not met.

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BJ = estimate because analyte is present below CRDL and QCC were not met.

Shaded where analyte concentration exceeds either Numeric or Table Value stream standard.

TVS= Table Value Standards are hardness based for dissolved metals concentrations

NC= Sample Not Collected

Table 12 - CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Loading Calculations - Total (T) and Dissolved (D) - Key Analytes - pounds/day (lbs/day)

Sample I.D.	YB-SW-01	YB-SW-02	YB-SW-03	YB-SW-04	YB-SW-05	YB-SW-06	YB-SW-07
	Background Sneffels Creek	Sneffels Ck. Below P.P.E. of Adits	Sneffels Ck. Below Govnr Basin	Sneffels Ck. @ P.P.E. of Atlas Tailings	Sneffels Ck. Below Atlas Tailings	Sneffels Ck. Above Revenue Mine	Sneffels Ck. Above Imogene Creek
Flow (cfs)	3.53	4.01	9.39	10.96	10.48	10.92	17.57
Arsenic T	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U
Arsenic D	3.00 U	3.00 U	3.00 U	3.80 B	3.60 B	3.00 U	3.00 U
Arsenic Load T (lbs/day)	0.06	0.06	0.15	0.18	0.17	0.18	0.28
Arsenic Load D (lbs/day)	0.06	0.06	0.15	0.22	0.20	0.18	0.28
Aluminum T	76.50	193.00 B	131.00	189.00 B	108.00 J	61.70 U	73.90
Aluminum D	9.00 UJ	9.00 UJ	9.00 UJ	9.00 UJ	9.60 J	37.30 U	26.20 U
Aluminum Load T (lbs/day)	1.46	4.17	6.63	11.17	6.10	3.63	7.00
Aluminum Load D (lbs/day)	0.17	0.19	0.46	0.53	0.54	2.20	2.48
Barium T	40.20 B	40.80 B	40.80 B	46.30 B	45.20 B	43.50 B	25.60
Barium D	38.50 B	39.10 B	40.50 B	43.80 B	43.00 B	44.60 U	41.50 B
Barium Load T (lbs/day)	0.76	0.88	2.06	2.74	2.55	2.56	2.42
Barium Load D (lbs/day)	0.73	0.85	2.05	2.59	2.43	2.63	3.93
Cadmium T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Cadmium D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Cadmium Load T (lbs/day)	0.02	0.02	0.05	0.06	0.06	0.06	0.09
Cadmium Load D (lbs/day)	0.02	0.02	0.05	0.06	0.06	0.06	0.09
Calcium T	16700.00	19200.00	19000.00	20400.00 J	20600.00 J	20000.00 J	24600.00
Calcium D	16900.00	20300.00 J	18400.00 J	20400.00 J	43.00 B	21200.00	25500.00 J
Calcium Load T (lbs/day)	317.75	414.99	961.63	1205.12	1163.64	1177.18	2329.68
Calcium Load D (lbs/day)	321.55	438.76	931.26	1205.12	2.43	1247.81	2414.91
Chromium T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chromium D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chromium Load T (lbs/day)	0.02	0.02	0.05	0.06	0.06	0.06	0.09
Chromium Load D (lbs/day)	0.02	0.02	0.05	0.06	0.06	0.06	0.09
Copper T	1.00 U	1.00 U	1.00 U	2.50 B	2.50 B	1.00 B	1.20 B
Copper D	1.00 U	1.00 U	1.00 U	1.10 B	1.20 B	1.30 B	1.00 U
Copper Load T (lbs/day)	0.02	0.02	0.05	0.15	0.14	0.06	0.11
Copper Load D (lbs/day)	0.02	0.02	0.05	0.06	0.07	0.08	0.09
Iron T	125.00	279.00	142.00	159.00 J	82.70 J	33.30 J	80.50 J
Iron D	19.50 B	13.00 U	16.20 B	13.00 U	13.00 U	14.70 B	14.50 B
Iron Load T (lbs/day)	2.38	6.03	7.19	9.39	4.67	1.96	7.62
Iron Load D (lbs/day)	0.37	0.28	0.82	0.77	0.73	0.87	1.37
Lead T	2.20 U	3.40 U	2.30 U	9.10	4.30 U	3.40 U	2.60 U
Lead D	1.90 B	1.10 U	1.90 U	1.20 B	1.20 U	2.80 B	2.60 B
Lead Load T (lbs/day)	0.04	0.07	0.12	0.54	0.24	0.20	0.25
Lead Load D (lbs/day)	0.04	0.02	0.10	0.07	0.07	0.16	0.25
Magnesium T	2030.00 B	1880.00	1790.00 J	2010.00 J	2000.00 J	1020.00 J	1980.00 J
Magnesium D	2060.00 B	1940.00 B	1720.00 B	1990.00 B	1950.00 B	2070.00	2050.00 B
Magnesium Load T (lbs/day)	38.62	40.63	90.60	118.74	112.97	60.04	187.51
Magnesium Load D (lbs/day)	39.20	41.93	87.05	117.56	110.15	121.84	194.14
Manganese T	10.50 B	21.30	14.10 B	114.00 J	111.00	66.80 J	108.00 J
Manganese D	1.40 B	3.10 B	5.80 B	101.00	103.00	115.00	106.00
Manganese Load T (lbs/day)	0.20	0.46	0.71	6.73	6.27	3.93	10.23
Manganese Load D (lbs/day)	0.03	0.07	0.29	5.97	5.82	6.77	10.04
Mercury T	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ	0.10 UJ	0.10 U
Mercury D	0.10 U	1.60	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Mercury Load T (lbs/day)	0.00	0.00	0.01	0.01	0.01	0.01	0.01
Mercury Load D (lbs/day)	0.00	0.03	0.01	0.01	0.01	0.01	0.01
Nickel T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Nickel D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Nickel Load T (lbs/day)	0.02	0.02	0.05	0.06	0.06	0.06	0.09
Nickel Load D (lbs/day)	0.02	0.02	0.05	0.06	0.06	0.06	0.09
Selenium T	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
Selenium D	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
Selenium Load T (lbs/day)	0.08	0.09	0.20	0.24	0.23	0.24	0.38
Selenium Load D (lbs/day)	0.08	0.09	0.20	0.24	0.23	0.24	0.38
Silver T	1.00 U	1.00 U	3.00 U	1.00 U	1.00 U	1.00 U	1.00 B
Silver D	1.00 UJ	1.00 UJ	1.00	1.00 UJ	1.00 UJ	1.00 U	1.00 UJ
Silver Load T (lbs/day)	0.02	0.02	0.15	0.06	0.06	0.06	0.09
Silver Load D (lbs/day)	0.02	0.02	0.05	0.06	0.06	0.06	0.09
Zinc T	12.40 U	18.20 B	19.70 B	76.70 J	77.20	53.00 J	143.00
Zinc D	7.60 B	16.60 J	19.50 J	71.60 J	71.30 J	82.70	143.00
Zinc Load T (lbs/day)	0.24	0.39	1.00	4.53	4.36	3.12	13.54
Zinc Load D (lbs/day)	0.14	0.36	0.99	4.23	4.03	4.87	13.54

Table 12 - CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Loading Calculations - Total (T) and Dissolved (D) - Key Analytes - pounds/day (lbs/day)
Page 2 of 3

Sample I.D.	IB-SW-01 Background Imogene Basin	IB-SW-02A Imogene Ck. Below Upper Camp Bird	IB-SW-02B Imogene Ck. @ PPE of Streamside Tlgs.	IB-SW-03 Imogene Ck. Below Richmond Ck.	IB-SW-03A Imogene Ck. Above Camp Bird Mine	IB-SW-04 Imogene Ck. Above Canyon Ck.	GB-SW-02 Un-named Ck. Draining Govnr Basin
Flow (cfs)	0.01	0.90	1.20	2.53	3.26	14.23	1.00
Aluminum T	100.00 B	39.50 B	72.20 B	128.00 B	108.00 J	68.00 U	64.40 J
Aluminum D	9.00 U	15.40 B	32.30 U	20.00 B	26.40 UJ	9.00 U	31.70 U
Aluminum Load T (lbs/day)	0.00	0.19	0.47	1.75	1.90	5.22	0.35
Aluminum Load D (lbs/day)	0.00	0.07	0.21	0.27	0.46	0.69	0.17
Arsenic T	3.00 B	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U
Arsenic D	3.40 B	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U
Arsenic Load T (lbs/day)	0.00	0.01	0.02	0.04	0.05	0.23	0.02
Arsenic Load D (lbs/day)	0.00	0.01	0.02	0.04	0.05	0.23	0.02
Barium T	39.60 B	33.70 B	40.50 B	42.20 B	45.20 B	27.80 B	21.80 B
Barium D	39.10 B	34.00 B	37.80 B	41.30 B	40.10 B	26.40 B	21.50 B
Barium Load T (lbs/day)	0.00	0.16	0.26	0.58	0.79	2.13	0.12
Barium Load D (lbs/day)	0.00	0.16	0.24	0.56	0.70	2.02	0.12
Cadmium T	1.00 U	1.60 B	1.30 B	1.00 B	1.00 U	1.40 B	1.80 B
Cadmium D	1.00 U	1.50 B	1.20 B	1.00 U	1.10 B	1.00 U	1.70 B
Cadmium Load T (lbs/day)	0.00	0.01	0.01	0.01	0.02	0.11	0.01
Cadmium Load D (lbs/day)	0.00	0.01	0.01	0.01	0.02	0.08	0.01
Calcium T	22300.00	18700.00	22200.00	21300.00	20600.00 J	163000.00 J	30200.00
Calcium D	22700.00	19000.00	21000.00	21500.00	22700.00	156000.00	30200.00
Calcium Load T (lbs/day)	0.96	90.71	143.59	290.46	361.97	12502.05	162.78
Calcium Load D (lbs/day)	0.98	92.17	135.83	293.19	398.87	11965.15	162.78
Chromium T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chromium D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chromium Load T (lbs/day)	0.00	0.00	0.01	0.01	0.02	0.08	0.01
Chromium Load D (lbs/day)	0.00	0.00	0.01	0.01	0.02	0.08	0.01
Copper T	1.00 U	10.70 B	7.50 B	5.80 B	2.50 B	14.10 B	1.40 B
Copper D	1.00 U	8.50 B	5.30 B	4.50 B	3.80 B	2.10 B	1.00 U
Copper Load T (lbs/day)	0.00	0.05	0.05	0.08	0.04	1.08	0.01
Copper Load D (lbs/day)	0.00	0.04	0.03	0.06	0.07	0.16	0.01
Iron T	77.40	79.90 B	100.00	140.00	82.70 J	268.00	523.00
Iron D	13.00 U	28.50 B	20.60 B	17.80 B	13.80 B	13.00 U	40.70
Iron Load T (lbs/day)	0.00	0.39	0.65	1.91	1.45	20.56	2.82
Iron Load D (lbs/day)	0.00	0.14	0.13	0.24	0.24	1.00	0.22
Lead T	3.50	5.80	5.50 U	5.30 U	7.40	12.10	2.00 U
Lead D	2.00 B	3.60	3.00 U	2.10 B	1.00 U	2.00 B	1.00 U
Lead Load T (lbs/day)	0.00	0.03	0.04	0.07	0.13	0.93	0.01
Lead Load D (lbs/day)	0.00	0.02	0.02	0.03	0.02	0.15	0.01
Magnesium T	838.00	929.00	1140.00	1160.00	2000.00 J	2630.00 J	1850.00 B
Magnesium D	849.00 B	951.00 B	1070.00 B	1170.00 B	1320.00 B	2520.00 B	1820.00 B
Magnesium Load T (lbs/day)	0.04	4.51	7.37	15.82	35.14	201.72	9.97
Magnesium Load D (lbs/day)	0.04	4.61	6.92	15.95	23.19	193.28	9.81
Manganese T	5.50 B	20.90	14.50 B	15.80 J	111.00	117.00	1550.00
Manganese D	1.30 B	22.50	9.90 B	10.40 B	3.00 B	87.30	1520.00
Manganese Load T (lbs/day)	0.00	0.10	0.09	0.22	1.95	8.97	8.35
Manganese Load D (lbs/day)	0.00	0.11	0.06	0.14	0.05	6.70	8.19
Mercury T	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ	0.10 UJ	0.10 U
Mercury D	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Mercury Load T (lbs/day)	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Mercury Load D (lbs/day)	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Nickel T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Nickel D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.10 B
Nickel Load T (lbs/day)	0.00	0.00	0.01	0.01	0.02	0.08	0.01
Nickel Load D (lbs/day)	0.00	0.00	0.01	0.01	0.02	0.08	0.01
Selenium T	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
Selenium D	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	3.00 U
Selenium Load T (lbs/day)	0.00	0.02	0.03	0.05	0.07	0.31	0.02
Selenium Load D (lbs/day)	0.00	0.02	0.03	0.05	0.07	0.31	0.02
Silver T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Silver D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Silver Load T (lbs/day)	0.00	0.00	0.01	0.01	0.02	0.08	0.01
Silver Load D (lbs/day)	0.00	0.00	0.01	0.01	0.02	0.08	0.01
Zinc T	12.20 U	349.00	295.00	229.00	244.00	334.00	679.00
Zinc D	9.50 J	375.00 J	286.00	214.00 J	222.00 J	281.00 J	599.00 J
Zinc Load T (lbs/day)	0.00	1.69	1.91	3.12	4.29	25.62	3.66
Zinc Load D (lbs/day)	0.00	1.82	1.85	2.92	3.90	21.55	3.23

Table 12 - CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Loading Calculations - Total (T) and Dissolved (D) - Key Analytes - pounds/day (lbs/day)

Sample I.D.	CC-SW-01 Confl. Of Imogene and Sneffels Cks.	CC-SW-02 Canyon Ck. @ PPE of Camp Bird Tlgs.	CC-SW-03 Canyon Ck. Below Camp Bird Tlgs.	CC-SW-04 Canyon Ck. 1.5 Miles Below Camp Bird	CC-SW-05 Canyon Ck. Above Confl. Uncompahgre R.	GB-SW-01 Govnr Ck. Below Mtn. Top Mine
Flow (cfs)	31.42	31.93	36.52	45.99	44.62	2.33
Hardness	227.98	188.53	186.32	152.32	165.06	50.19
Aluminum T	108.00 B	212.00	977.00 B	9.00 U	404.00	216.00
Aluminum D	15.20 B	9.00 U	10.10 B	32.30 U	9.00 U	27.80
Aluminum Load T (lbs/day)	18.29	36.49	192.32	2.23	97.16	2.71
Aluminum Load D (lbs/day)	2.57	1.55	1.99	8.01	2.16	0.35
Arsenic T	3.00 U	3.00 U	3.00 U	3.60 B	3.00 U	6.20 B
Arsenic D	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	7.20 B
Arsenic Load T (lbs/day)	0.51	0.52	0.59	0.89	0.72	0.08
Arsenic Load D (lbs/day)	0.51	0.52	0.59	0.74	0.72	0.09
Barium T	34.90 B	37.30 U	48.40 U	42.50 B	52.40 B	45.90 B
Barium D	34.50 B	34.80 B	36.60 B	33.00 B	47.70 B	47.40
Barium Load T (lbs/day)	5.91	6.42	9.53	10.54	12.60	0.58
Barium Load D (lbs/day)	5.84	5.99	7.20	8.18	11.47	12.82
Cadmium T	1.00 U	1.00 U	1.10 B	1.00 U	1.00 U	1.70
Cadmium D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.40 B
Cadmium Load T (lbs/day)	0.17	0.17	0.22	0.25	0.24	0.02
Cadmium Load D (lbs/day)	0.17	0.17	0.20	0.25	0.24	0.02
Calcium T	91300.00	75500.00	74600.00	61000.00	66100.00	20100.00
Calcium D	92300.00	73900.00	74000.00	32600.00	65700.00	20700.00 J
Calcium Load T (lbs/day)	15462.00	12993.75	14684.47	15121.05	15897.17	252.43
Calcium Load D (lbs/day)	15631.36	12718.39	14566.37	8081.09	15800.97	259.97
Chromium T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chromium D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chromium Load T (lbs/day)	0.17	0.17	0.20	0.25	0.24	0.01
Chromium Load D (lbs/day)	0.17	0.17	0.20	0.25	0.24	0.01
Copper T	7.10 B	6.00 B	14.70 B	1.30 B	3.40 B	9.90 B
Copper D	1.90 B	1.40 B	1.30 B	1.00 B	1.30 B	4.40 B
Copper Load T (lbs/day)	1.20	1.03	2.89	0.32	0.82	0.12
Copper Load D (lbs/day)	0.32	0.24	0.26	0.25	0.31	0.06
Iron T	177.00 J	238.00 J	1220.00 J	32.90	353.00 J	65.00 J
Iron D	17.40 B	13.00 U	13.00	20.70 J	13.20 B	13.00 U
Iron Load T (lbs/day)	29.98	40.96	240.15	8.16	84.90	0.82
Iron Load D (lbs/day)	2.95	2.24	2.56	5.13	3.17	0.16
Lead T	6.30	8.80	52.30	1.00 U	4.80 U	12.20
Lead D	3.60	2.00 B	1.60 B	2.10 B	4.00 U	14.80 U
Lead Load T (lbs/day)	1.07	1.51	10.29	0.25	1.15	0.15
Lead Load D (lbs/day)	0.61	0.34	0.31	0.52	0.96	0.19
Magnesium T	838.00	929.00	1140.00	1160.00	2000.00 J	1850.00 B
Magnesium D	849.00 B	951.00 B	1070.00 B	1170.00 B	1320.00 B	1820.00 B
Magnesium Load T (lbs/day)	141.92	159.88	224.40	287.55	481.00	23.23
Magnesium Load D (lbs/day)	143.78	163.67	210.62	290.03	317.46	22.86
Manganese T	0.10 U	119.00 J	319.00 J	57.60 B	76.50 J	629.00 J
Manganese D	101.00	98.00	117.00	7.60 B	57.90	653.00
Manganese Load T (lbs/day)	0.02	20.48	62.79	14.28	18.40	7.90
Manganese Load D (lbs/day)	17.10	16.87	23.03	1.88	13.93	8.20
Mercury T	0.10 U	0.10 U	0.10 U	0.10 UJ	0.10 UJ	0.10 U
Mercury D	0.14 B	0.10 U	0.10 U	0.10 U	0.10	0.10 U
Mercury Load T (lbs/day)	0.02	0.02	0.02	0.02	0.02	0.00
Mercury Load D (lbs/day)	0.02	0.02	0.02	0.02	0.02	0.00
Nickel T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Nickel D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Nickel Load T (lbs/day)	0.17	0.17	0.20	0.25	0.24	0.01
Nickel Load D (lbs/day)	0.17	0.17	0.20	0.25	0.24	0.01
Selenium T	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
Selenium D	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
Selenium Load T (lbs/day)	0.68	0.69	0.79	0.99	0.96	0.05
Selenium Load D (lbs/day)	0.68	0.69	0.79	0.99	0.96	0.05
Silver T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Silver D	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Silver Load T (lbs/day)	0.17	0.17	0.20	0.25	0.24	0.01
Silver Load D (lbs/day)	0.17	0.17	0.20	0.25	0.24	0.01
Zinc T	228.00 U	215.00 J	276.00 J	120.00 J	116.00 J	340.00 J
Zinc D	218.00 J	199.00 J	196.00 J	17.90 B	103.00 J	332.00 J
Zinc Load T (lbs/day)	38.61	37.00	54.33	29.75	27.90	4.27
Zinc Load D (lbs/day)	36.92	34.25	38.58	4.44	24.77	4.17

Table 13 - CANYON CREEK WATERSHED - ANALYTICAL RESULTS REPORT
Adit Loading Calculations - Total (T) and Dissolved (D) - Key Analytes - pounds/day (lbs/day)

SAMPLE I.D.	CB-AS-1 Camp Bird No. 14 Level Adit	US-AS-1 Upper Sneffels Ck. Adit	SC-AS-1 Sneffels Ck. Adit	HC-AS-1 Highland Chief Adit	CB-AS-2 Hidden Treasure Adit Upper Camp Bird	CB-AS-4 Camp Bird 300 Level Adit	AM-SP-1 Atlas Mill Seep Area
Flow (cfs)	7.25	0.36	0.01	0.01	0.04	0.01	0.01
Hardness	613.03	358.19	65.34	72.05	60.35	75.60	60.64
Aluminum T	43.20 U	21.00 U	83.10 B	770.00 B	338.00 J	77.50 U	497.00
Aluminum D	24.50 U	20.60 U	25.00 U	0.00	0.00	0.00	0.00
Aluminum Load T (lbs/day)	1.69	0.04	0.00	0.04	0.07	0.00	0.03
Aluminum Load D (lbs/day)	0.96	0.04	0.00	0.00	0.00	0.00	0.00
Arsenic T	3.00 U	3.00 U	6.80 B	6.80 B	4.60 B	3.00 U	11.70
Arsenic D	3.00	3.00	4.10 B	0.00	0.00	0.00	0.00
Arsenic Load T (lbs/day)	0.12	0.01	0.00	0.00	0.00	0.00	0.00
Arsenic Load D (lbs/day)	0.12	0.01	0.00	0.00	0.00	0.00	0.00
Barium T	20.50 B	10.80 B	6.80 B	66.70 B	18.10 B	33.70 B	120.00 B
Barium D	19.90 B	11.10 B	32.20 B	0.00	0.00	0.00	0.00
Barium Load T (lbs/day)	0.80	0.02	0.00	0.00	0.00	0.00	0.01
Barium Load D (lbs/day)	0.78	0.02	0.00	0.00	0.00	0.00	0.00
Cadmium T	1.20 B	1.00 U	4.10 B	4.50 B	23.60 U	1.00 U	5.90
Cadmium D	1.10 B	1.00 U	4.10 B	0.00	0.00	0.00	0.00
Cadmium Load T (lbs/day)	0.05	0.00	0.00	0.00	0.01	0.00	0.00
Cadmium Load D (lbs/day)	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Calcium T	240000.00	134000.00	21500.00	26100.00 J	22800.00 J	28000.00	21400.00
Calcium D	237000.00	138000.00	21000.00	0.00	0.00	0.00	0.00
Chromium T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00
Chromium D	1.00 U	1.00 U	1.00 U	0.00	0.00	0.00	0.00
Chromium Load T (lbs/day)	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Chromium Load D (lbs/day)	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Copper T	19.20 B	1.00 U	5.60 B	5.60 B	363.00 B	1.60 B	42.90
Copper D	1.50 B	1.00 U	2.30 B	0.00	0.00	0.00	0.00
Copper Load T (lbs/day)	0.75	0.00	0.00	0.00	0.08	0.00	0.00
Copper Load D (lbs/day)	0.06	0.00	0.00	0.00	0.00	0.00	0.00
Iron T	339.00	291.00	1200.00	6480.00 J	7330.00 J	56.90 B	2420.00
Iron D	14.60 B	105.00	525.00	0.00	0.00	0.00	0.00
Iron Load T (lbs/day)	13.25	0.56	0.06	0.35	1.58	0.00	0.13
Iron Load D (lbs/day)	0.57	0.20	0.03	0.00	0.00	0.00	0.00
Lead T	12.00	1.50 U	44.40	584.00	77.20 U	4.90	661.00
Lead D	1.60 B	1.90 B	4.50 U	0.00	0.00	0.00	0.00
Lead Load T (lbs/day)	0.47	0.00	0.00	0.03	0.02	0.00	0.04
Lead Load D (lbs/day)	0.06	0.00	0.00	0.00	0.00	0.00	0.00
Magnesium T	3340.00 B	5730.00	2830.00	1670.00	830.00 J	1380.00 J	1750.00
Magnesium D	3270.00 B	5840.00	2750.00 B	0.00	0.00	0.00	0.00
Magnesium Load T (lbs/day)	130.52	11.12	0.15	0.09	0.18	0.07	0.09
Magnesium Load D (lbs/day)	127.78	11.33	0.15	0.00	0.00	0.00	0.00
Manganese T	163.00	124.00	402.00	568.00 J	966.00	8.40 B	664.00
Manganese D	140.00	128.00	391.00	0.00	0.00	0.00	0.00
Manganese Load T (lbs/day)	6.37	0.24	0.02	0.03	0.21	0.00	0.04
Manganese Load D (lbs/day)	5.47	0.25	0.02	0.00	0.00	0.00	0.00
Mercury T	0.10 U	0.10 U	0.10 UJ	0.10 U	0.10 UJ	0.10 UJ	0.10 UJ
Mercury D	0.10 U	0.10 U	0.10 U	0.00	0.00	0.00	0.00
Mercury Load T (lbs/day)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mercury Load D (lbs/day)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel T	1.00 U	1.00 U	1.00 U	3.60 B	1.00 U	1.00 U	1.00 U
Nickel D	1.00 U	1.00 U	1.10 B	0.00	0.00	0.00	0.00
Nickel Load T (lbs/day)	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Nickel Load D (lbs/day)	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Selenium T	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U	4.00 U
Selenium D	3.00 U	3.00 U	3.00 U	0.00 U	0.00 U	0.00 U	0.00 U
Selenium Load T (lbs/day)	0.16	0.01	0.00	0.00	0.00	0.00	0.00
Selenium Load D (lbs/day)	0.12	0.01	0.00	0.00	0.00	0.00	0.00
Silver T	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	15.30
Silver D	1.00 UJ	1.00 UJ	1.00 U	0.00 UJ	0.00 UJ	0.00 U	0.00 UJ
Silver Load T (lbs/day)	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Silver Load D (lbs/day)	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Zinc T	440.00	40.50	1020.00	921.00	4850.00	243.00 J	1170.00
Zinc D	259.00	41.10	991.00	0.00 J	0.00 J	0.00	0.00
Zinc Load T (lbs/day)	17.19	0.08	0.05	0.05	1.05	0.01	0.06
Zinc Load D (lbs/day)	10.12	0.08	0.05	0.00	0.00	0.00	0.00