SITE INSPECTION
Blue Ridge and Amity Mine Sites

Ochoco National Forest, Crook County, Oregon

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April 2002

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1.0 INTRODUCTION AND OBJECTIVES

Cascade Earth Sciences (CES) was retained by the U.S. Forest Service (USFS), Ochoco National Forest (ONF) on September 12, 2001, to perform a Site Inspection (SI) at a two historic mercury mining sites, Blue Ridge and Amity Mines, both in Crook County, Oregon (herein referred to as the Site(s) or the Mine(s)). The inspection followed the U.S. Environmental Protection Agency (EPA) publication, *Guidance for Performing Site Inspections Under CERCLA* (EPA, 1991).

During the investigation, it was discovered that an area previously assumed to be part of the Amity Mine, was actually a third mine, Devil's Food Mine. Devil's Food Mine is therefore discussed in this SI as a separate mine.

The SI included sampling and analysis of soil, waste piles, tissue, concrete, water and sediment samples from the Sites and vicinity. This SI was performed under Forest Service (FS) Contract Number 53-04N0-1-5046, and followed the Field Operation Plan (FOP) developed by CES, and approved by the USFS on September 27, 2001 (CES, 2001a). The FOP was developed based on the Preliminary Assessments (PAs) for the Amity and Blue Ridge Mine Sites, conducted by CES in 2000 (CES, 2000a and b), and the Statement of Work (SOW) provided by the USFS in the request for proposals dated August 21, 2001. The FOP is located in Appendix A.

In general, the objectives of the SI were to (1) assess the immediate or potential threat that (mining) wastes pose to human health and/or the environment, and (2) collect sufficient information to support a decision regarding the need for further action. The information was collected in general accordance with *Comprehensive Environmental Response Compensation and Liability Act* (CERCLA) protocols and documentation requirements for assessments involving hazardous substances. Specifically, as outlined in the EPA guidance document, *Guidance for Performing Site Inspections Under CERCLA* (U.S. EPA, 1992), "the sampling locations are strategically planned to identify the substances present, determine whether hazardous substances are being released to the environment, and determine whether hazardous substances have impacted specific targets."

The Site descriptions and operational histories are presented in Section 2. Section 3 outlines the specific exposure pathways and presents the results of the SI. Conclusions and recommendations are presented in Section 4. Appendices include the Field Operations Plan, Site photographs, Threatened and Endangered Species Assessment Report, well logs, tables and figures from Preliminary Assessments of both Sites, laboratory analytical reports, Quality Assurance / Quality Control (QA/QC) Report, boring logs, waste pile calculations, General information forms, maps of historical mine workings, and photocopies of the title pages from references. Plates include pertinent maps showing the watershed boundaries, the 1- and 4-mile radii from the Sites, as well as the 15-mile downstream reach from the Sites, and wetlands.

2.0 SITE DESCRIPTION, OPERATIONAL HISTORY AND WASTE CHARACTERISTICS

The three Mines are in close proximity to each other. Therefore, much of the information relating to location is for all the Sites and will not be repeated. The following sections give a

specific description of the Site locations and an operation history of the Sites. Photographs of the Sites and sampling locations are included in Appendix B. No regulatory removal actions have been undertaken at the Sites, though PAs were conducted in November of 2000, which are discussed in Section 3. In addition, no permits, violations, and/or regulatory inspections have been document at the Sites. General Information Forms are included in Appendix C. Historical maps, sketches and miscellaneous information are included in Appendix D. Title pages of cited references, including personnel communications, are included in Appendix E.

2.1 Blue Ridge Mine

2.1.1 Description and Location

The Blue Ridge Mine, including the adjacent Number One Mine, is located in the southeast quarter of Section 15, Township 14 South, Range 20 East of the Willamette Meridian and the latitude and longitude coordinates are North 44° 35' 62" and West 120° 31' 17" (Figure 1). The Blue Ridge Mine Site is bordered on the south by Canyon Creek Road (Forest Service Road [FR]) 42) and to the west by FR 200. On the U.S. Geological Survey (USGS) 7.5 Minute Topographic Map, Lookout Mt., Oregon (USGS, 1990), the elevation of the mine is approximately 4880 feet above mean sea level (MSL); in addition, the area is designated as an open pit mine (Figure 1) and several structures are evident. Winter Creek, a tributary to Johnson Creek, borders the area to the north, and Johnson Creek is located to the south approximately 200 feet lower in elevation. The Site is moderately vegetated with large pines, brush, and open areas of grass. Vegetation along the waste piles is much less than the rest of the site, and absent on several piles.

Figure 2, the Blue Ridge Mine Site Layout, shows the locations of pertinent structures and features associated with the Mine. Several structures remain intact, including the "Four Horsemen Hotel" and an ore processing building. The former condenser tube foundation, as well as several pieces of clay condenser pipe, remains on-site. The cement kiln foundation is also still standing. There are several concrete slabs, which were likely foundations for former refining or milling buildings. Surface topography has been altered significantly by the past activities at the Site. An open trench and several large waste piles are the most significant features of the area.

There are two shafts at the Blue Ridge Mine (Figure 2), Shaft #1 (Number One shaft) and Shaft #2 (Blue Ridge Mine shaft). The location of Shaft #1 is estimated based on historical maps (Brooks, 1963); however the exact location could not be determined in the field. The collar of Shaft #2 is exposed; however, the actual shaft is partially collapsed. Groundwater seeps into the trench, and eventually flows into a small detention pond before leaving the Site. There are also several depressions that were excavated at the site. The most recent miner (Frank Reid) created a shallow settling pond, approximately 50 feet west of Winter Creek (Figure 2). It appears that, after the ore was concentrated for processing, the sluice material was piped to the settling pond where the solids could settle out and the overflow water was returned to Winter Creek to be recycled and used again in the concentrating effort. In addition, a smaller settling "pit" was constructed immediately below the concrete slab of a former mill building (approximately 100 feet southwest of the settling pond, Figure 2), likely for the same purpose.

A second processing area exists south of the main Site across FS 42 (Figure 2). This area includes a wooden rock hopper, a concrete rotary kiln foundation and a deep concrete vault. A small waste pile is also located within this area.

Trash and debris, consisting of boards, plastic bottles and jugs, corrugated tin, empty 55-gallon drums and an old engine/generator, litter the entire site. In addition, an above ground fuel tank was reportedly located near the processing building, but had been removed at the time of the SI. An underground tank located west of the bunkhouse (Figure 2) is presumed to have held heating oil; however, the tank was empty at the time of the visit.

2.1.2 Operational History and Waste Characteristics

The information in this section was obtained from Quicksilver in Oregon (Schuette, 1938 and Brooks, 1963) and Quicksilver Deposits in Oregon (Brooks, 1971). These three sources supply the majority of information about mercury mines in the State of Oregon. Additional information was obtained in Cultural Resource Reports from the Forest Service (USDA, 1996) and from a conversation with Bill Reid (personal communication, Bill Reid, 2001). The following information is a chronological summary of the operational history of the Blue Ridge Mine.

- 1929 - Discovery of mercury in the Johnson Creek Area by W. J. Wesserling.
- 1930 - Development of the Blue Ridge Mine, including the adjacent Number One Mine, by W. J. Wesserling (*Westerling* in the 1938 reference). Original mine consisted of 8 lode and placer claims located by W.J. and Ida Wesserling, W.J. La Porte, Edna Reichen and Lloyd Barney.
- 1930 - The Blue Ridge Mercury Company (BRMC) organized to operate the mine. Furnace and kiln erected for processing the ore. Production of 7 flasks.
- 1931 - Installation of Allis-Chalmers rotary furnace in August 1931. Production of 10 flasks.
- 1931 - Western Resources Inc. (WRI) leased the Mine from the BRMC in late 1931.
- 1933 - Production of 26 flasks under management of William Endicott of WRI.
- 1933 - Deed to Mine given to W. Endicott. Shaft sunk to 100-foot level and drifting done.
- 1935 - Oregon Cinnabar Inc. leased the property. Two 10-pipe banks of retorts installed.
- 1936 - Two flasks produced.
- 1937 - W.E. Shenker acquires property.
- 1937 - Site visit by Schuette observed a shaft 8 feet by 16 feet, approximately 100 feet deep, and containing about 100 feet of drifting, at the Site. (The presumed location of the shaft is labeled as Shaft #2 on Figure 2).
- 1937 - 15 flasks produced.
- 1938 - C.T. Takahashi acquired property. Central Oregon Quicksilver Mines, Inc. organized as operating company.
- 1938 - 30 flasks produced.
- 1939 - 8 flasks produced
- 1940 - 54 flasks produced
- 1938 to 1940 - Production at various mills surrounding the area (i.e., Horse Heaven, Mother Lode, and Taylor Ranch Mines).
- 1941 - Cinnabar Mines, Inc. organized to work both the Blue Ridge and Number One Mines.
- 1942 - A 75-ton Gould rotary furnace and condenser system installed at the Site.
- 1942 - 81 flasks produced.
- 1943 - 9 flasks produced.
- 1944 - 3 flasks produced by Gilkey Brothers.

- 1944 - Furnace and equipment removed from property.
- 1945 - Number one Mining Co. taken over by Central Oregon Quicksilver Mines, Inc and included with Blue Ridge Claims.
- 1952 - Roy C. Stanton acquired the property.
- 1953 - Mine leased to Fred Weber. Weber installed jigs, a washing plant and concentrating tables.
- 1954 - 6 flasks produced
- 1955 - 8 flasks produced in a small retort.
- 1957 - Mia Mines, Inc., headed by Frank Reid and Dick Toole, leased the property and erected gravity concentration mill. Reportedly, produced small amounts of mercury in small portable retorts. No recorded amounts.
- 1958 - Property reverted to Stanton and the mill was eventually moved to the Independent Mine.
- 1959 to 1995 - Frank Reid worked and operated the Blue Ridge Mine. It is not known the exact amount of mercury that was produced during this time.

The following information is a chronological summary of the operational history of the Number One Mine, which consisted of nine mining claims adjacent to the Blue Ridge Mine, and included Shaft #1 (Figure 2).

- 1930 - Number One Mine claimed by H. LaPorte, W.H. Higgins, A.N. Whealdon, and others
- 1930 - R.R. Whiting and D. Green lease the claims
- 1930 - 20 flasks of mercury were produced with two D-tube Retorts
- 1931 - Claim reverts back to Number One Mining Co. with R. R. Whiting retained as engineer and manager.
- 1931- 10 flasks of mercury were produced with two D-tube Retorts.
- 1932 - Number One had an inclined shaft sunk to 110 feet and drifting at the 26-, 57- and 110-foot levels.
- 1934 - One flask produced by Robert Osborne
- 1939 - 4 flasks of mercury produced using Whiting's retort at the Taylor Ranch Mine.
- 1940 - 7 flasks of mercury produced using Whiting's retort at the Taylor Ranch Mine.
- 1941 - Cinnabar Mines, Inc., organized to work both the Blue Ridge and Number One Mines.

2.2 Amity Mine

2.2.1 Description and Location

The Amity Mine Site is located in the western half of the southwest quarter of Section 15, Township 14 South, Range 20 East of the Willamette Meridian and the latitude and longitude coordinates are North 44° 35' 02" and West 120° 32' 18" (Figure 1). The Mine is bordered on the south by Johnson Creek and on the north by FR 42. The Amity Mine is identified on the USGS 7.5 Minute Topographic Map, Lookout Mt., Oregon (USGS, 1990) and has an elevation of approximately5000 feet above MSL.

Figure 3 shows the Site layout for the Amity Mine. Several structures are evident, a wooden rock hopper and a concrete foundation with large timber frame building are still present. The exact use of the building is not known, but it is believed to have housed the furnace (USDA, 1996). The building may also have housed condenser tubes. A small brick base near the Adit B

is thought to have been part of a small retort foundation. Across Johnson Creek to the south are several areas where structures have existed in the past. These were housing for the Mine residents. Currently, only ruins and debris litter the area; no mine waste or activities were apparent.

Surface topography has been altered by the past activities at the Site and features reported in Brooks (1963) are not immediately obvious at the Site. Mine workings are reported to include four adits, a glory hole, and a shaft about 50 feet deep. Two of the adits, A and B, are apparent due to depressions in the land surface. The upper two adits have not been found and are presumed to have been destroyed when FS Road 42 was constructed. Several large waste piles are the most significant surficial features.

The Site is moderately vegetated with large pines, brush, and open areas of grass. Along the waste piles, vegetation is sparse and several piles are barren. Groundwater emanates from Adit A, which is marked as a spring on the USGS topographic map (USGS, 1990). The water flows out from the adit and ponds approximately 100 feet downslope, creating a small marshy area on a bench below the access dirt road to the Mine. The flow continues and eventually discharges into Johnson Creek.

2.2.2 Operational History and Waste Characteristics

The Amity Mine is also known as the Paulsen and Saylor Mine, Johnson Creek Mine, International Mercury Inc., and Homestake Mercury Mine. The information in this section was obtained from Quicksilver in Oregon (Schuette, 1938 and Brooks, 1963) and Quicksilver Deposits in Oregon (Brooks, 1971). The following information is a chronological summary of the operational history of the Amity Mine.

- 1929 - W.J. Wesserling established the Site in 1929.
- 1930 - Martin Paulsen and Ivan Saylor formed the Johnson Creek Mercury Company (JCMC) and leased and developed the property.
- 1930 - 17 flasks of mercury were produced with a small retort.
- 1931 - 166 flasks produced from eight large D-tube retorts.
- 1932 - 67 flasks produced with the D-tube retort before the JCMC dissolved. Development to date includes tramways, trails, flumes, ditches pipelines, buildings, shafts and tunnels.
- 1933 - The property reverted to W. J. Wesserling.
- 1933 - No production only mine development.
- 1935 - Lawsuits involving ownership of the mine; the mine is purchased by Ernest D. Maltby.
- 1937 - Ownership transferred to Homestake Mercury Mines (HMM), which Maltby was president.
- 1937 - Three tunnels, 125, 150 and 300 feet on are on property and a 4th started.
- 1941 - Florence Cochran, Robert Olson and Lewis Mills, shareholders in HMM begin operating the mine and living there year round.
- 1942 - Two flasks were produced with a small retort. Labor difficult to get because of WW II.
- 1944 - One flask produced. J. E. Morris, A. R. Morris and E.B. Benson formed the Amity Mining Company and leased the property from HMM.
- 1945 - Four flasks produced.
- 1946 - Eight flasks produced.
- 1947 - Two flasks produced.

- 1948 - Two flasks produced.
- 1949 - A 25-ton Herreshoff furnace installed, six flasks produced.
- 1950 - Five flasks produced.
- 1952 - A. R. Erspamer and E. B. Benson created the Ochoco Mining Company and purchased the mine equipment and leased the property from Homestake, with Owen Pigmon as manager.
- 1953 – Lease taken over by the Ochoco Mining Company
- 1954 - Owen Pigmon acquired a sublease from the Ochoco Mining Company.
- 1954 - Pigmon produced 76 flasks of mercury, but paid no royalties to Erspamer.
- 1955 - 46 flasks produced.
- 1956 – Seven flasks produced.
- 1956 - Legal proceedings involving lack of royalties between Erspamer and Pigmon caused termination of the mine operation.
- 1958 - Mining equipment, including the Herreshoff furnace and retort, removed from the mine.
- 1960 - Jennings Felix and F. Cochran acquired property from HMM.
- 1980 - Pacific Mining and Development Company recorded claim of Amity Mine with Crook County Courthouse (but not with BLM) and moved a caretaker into a housing structure.

2.3 Devils Food Mine

2.3.1 Description and Location

The Devil's Food Mine is located approximately 700 feet west of and approximately 200 feet higher in elevation than Amity Mine in the southeast quarter of Section 16, Township 14 South, Range 20 East. Figure 3 shows the location of Devil's Food Mine in relation to Amity Mine. There are no structures related to Devil's Food Mine. There is a steep waste pile along the slope near a trench that may have been the site of the original adit. There are numerous trenches along the hillside, which are between 15 to 20 feet deep, 25 to 40 feet across and approximately 100 feet in length. They are about 70 feet apart and extend approximately 1,000 feet across the hillside at an elevation of approximately 5240 feet above MSL. In addition, a 25-foot highwall exists in the trench on the north side of the waste pile. A shaft exists approximately 400 feet northwest of the Devil's Food Mine trench (Figure 3). The shaft is likely a raise from the adit.

2.3.2 Operational History and Waste Characteristics

The Devil's Food Mine is listed as a prospect in Brooks' 1963. However, there is no reference of the Mine in Schuette's 1938, Quicksilver in Oregon. Brooks did report some information about the mine, which is presented below. The Devils Food Mine is also known as the Westbrook prospect. The following information is a chronological summary of the operational history of the Devil's Food Mine.

- 1932 - Robert Osborne and J.H. Shelton located the prospect.
- 1933 to 1943 - William Endicott owned the claim, which coincides with the same time that Endicott operated the Blue Ridge Mine. Possibly produced 1 flask. Endicott had excavated an adit 130 feet long, which has since caved.
- 1954 - Owen Pigmon relocated the prospect and sold it on contract to Orion Mining and Development Co.
- 1957 - Bulldoze trenching conducted under a Defense Minerals Exploration contract.

3.0 PATHWAYS AND ENVIRONMENTAL HAZARD ASSESSMENT

3.1 Groundwater Exposure Pathway

3.1.1 Geology

Regional geologic information presented in this section was obtained from Orr and Orr (1999). Site-specific geology was compiled from Brooks (1963) and the USFS (2002), as well as site-specific reconnaissance performed by a CES hydrogeologist and soil scientist. All work was overseen by a CES geologist registered in the State of Oregon.

The Ochoco Mountains are part of the Blue Mountain Physiographic Region, which comprises nearly all of the hilly and mountainous areas in north-central and northeastern Oregon. The Ochoco Mountains are comprised of volcanic rocks, such as andesite, basalt flows, rhyolite, and breccias of the Clarno Formation. These are some of the oldest volcanic rocks originating in Oregon, erupting during late Eocene and early Oligocene time, approximately 45 to 35 million years ago (Orr and Orr, 1999). These volcanic rocks are underlain by older Cretaceous and Jurassic marine deposits, which are exposed in a few areas to the north of the Sites.

According to the USFS, dormant landslide terrain, comprised of volcanic rocks from the Clarno Formation, underlies the Amity Mine, and is also present above the Blue Ridge Mine. Massive rotational slump and earthflow landslides were probably active throughout the past one million years. Although landslide debris has reached equilibrium on hill slopes, toe slopes adjacent to streams have a potential for re-activation (USFS, 2000).

Tectonic deformation of the Clarno Formation took place in the area. Faulting, shearing and hydrothermal alteration of the volcanic rocks produced localized areas of mineralization. No faults are known to be continuous for more than a few hundred feet. Ore bodies tended to localize at intersections within the younger fracture systems. The Johnson Creek Fault Zone (JCFZ) is the main fault in the Johnson Creek area, trending approximately north 60° east, and dipping 70 to 80° south. The JCFZ extends from the Mother Lode Mine in the southwest, to the Blue Ridge Mine in the northeast and encompasses Devils Food and Amity Mines (Plate 1).

The Blue Ridge Mine is the northeastern-most mine along the JCFZ. Geology at Blue Ridge Mine consists of andesite flows, agglomerates and some pyroclastics of the Clarno Formation. Locally these rocks are intruded by dense black porphyritic basalt. A small lens of the Oligocene age John Day Formation, consisting of bedded tuffs, lapilli tuffs and tuffaceous sedimentary rocks, underlies the southeastern portion of Blue Ridge Mine. Early Miocene age Picture Gorge Basalt outcrops to the northeast of Blue Ridge Mine across Winter Creek (Ferns and Brooks (1983). Landslide debris deposits occur along Winter Creek.

The rocks at Blue Ridge Mine are cut by a series of faults and fractures that roughly parallel the JCFZ striking north 60° east. These in turn are cut and progressively offset to the northwest by faults striking north 40° west. Fault displacement on the northwest trending faults does not exceed 80 feet. Movement is thought to have been horizontal and to have occurred after the cinnabar was deposited (Brooks, 1963).

Gouge zones as much as 20 feet wide have developed along the intersection of the faults creating the zones of alteration and mineralization in which the mercury ore is found. At the Blue Ridge Mine, cinnabar mineralization extends into walls and along fractures, occurring as fracture fillings, and is disseminated throughout the altered rock. Alteration minerals, occurring in thin veinlets and fracture fillings, include chalcedony, calcite, limonite, marcasite, with occasional small blebs of gilsonite. Ore consists of mainly soft, wet, clay-rich fault gouge, irregularly impregnated with small amounts of calcite and chalcedony. The mined ore bodies were small pods, or lenses and nearly vertical shoots, a few tens of feet long.

Geology at the Amity Mine consists of dark gray to black andesite flows, breccias and agglomerates of the Clarno Formation cut by northeast trending faults and dikes. According to Brooks, (1963) drifting from crosscuts in Adit A encountered two sub-parallel faults zones lying 30 to 40 feet apart. The fault zones strike N 70 ^{o} east and dip 70-80 ^{o} S, roughly parallel to the JCFZ. The southern fault zone contained 2 to 3 feet of wet, light colored meal-like gouge containing numerous porcelain-textured clay seams and fracture and dissemination fillings. Marcasite is locally abundant. Both sides of the gouge zone walls are sheared and altered over a width of several feet. The northern gouge zone lies within a basalt or andesite dike and ranges from 3 to 6 feet in width. The composition is similar to the southern zone except the walls are more altered and less stable. Little production was made from any of the Adit A workings.

Brooks states a cross cut in Adit B intersects a prominent gouge zone about 250 feet from the portal. The zone is 2 to 3 feet wide and strikes N 64° E and dips 75° S, paralleling the JCFZ (Plate 1). The gouge is of similar composition to the southern gouge zone in Adit A, and may be continuation of it. The crosscut continues through about 2 feet of sheared andesite, a basalt dike about 2 feet wide and again into sheared andesite. About 15 feet further the crosscut intersects a 3-foot zone of brecciated andesite. Beyond the breccia, the crosscut ends in massive, relatively unaltered basalt containing occasional calcite veinlets.

Most of the ore recovered from the Amity Mine is said to have been taken from a small high-grade shoot lying about 130 feet northeast of the Adit B crosscut-drift intersection and extending from the surface to approximately 15 feet below the level of Adit B. The mercury ore was found in highly altered and mineralized zones trending northeast along fault fractures and fissures. Alteration minerals and cinnabar occur as in the Blue Ridge Mine fault gouge. Brooks also states that north trending cross faults are seen to cut the main fracture trends in the road cut above Amity Adits A and B. Presently all adits are collapsed and inaccessible.

Geology at Devils Food Mine is similar to that of the Amity Mine. The rocks are mainly altered andesite flows, tuffs and agglomerates of the Clarno Formation. The workings occur in a part of the JCFZ which trends N 70° to 80° in this area. Several cross faults, trending N 10° E, have been exposed in trenches. A dense, relatively unaltered basalt dike forms the footwall of the fault zone for about 100 feet in the middle of the (bulldozed) trenches. A 3 to 12-foot wide zone of intensely sheared andesite exists along the dike. The andesite is altered to kaolinite and impregnated with calcite and chalcedony. There is scattered pyrite. Cinnabar occurs as fracture fillings and disseminated through altered rock. Two or three small pockets of high-grade disseminated ore (90 pounds of mercury per ton) were encountered, though most of the material

is very low grade. Beyond the ends of the dike, the exposed fault zone is less mineralized but locally contains minor cinnabar.

3.1.2 Hydrogeology

The Mines are all located within the Johnson Creek subwatershed of the Howard/Johnson watershed. This, in turn, is part of the Upper Crooked River Watershed. A review of the State of Oregon Water Resources Department (WRD) database for water wells within a 4-mile radius of the Site shows one well located at the Blue Ridge Mine. A copy of the state well log is included in Appendix G. The well is located approximately 50 feet west of the former bunkhouse (Figure 2). The well was constructed in 1969 by the former mine resident. The total depth of the well is approximately 130 feet below ground surface (BGS). The driller's log states that various basalt layers and "shale" rock were penetrated using a rotary rig. During drilling, water was first encountered at approximately 22 feet BGS. The water well report states that the well could provide approximately 55 gallons per minute (gpm), and the well was used as the water supply for the resident miner. Currently, the well is not in use, though it is not officially abandoned. During the PA performed in November 2000 by CES, a groundwater sample was collected from the well and no metals were detected above the practical quantification limits (PQL).

Brooks (1963) states shallow groundwater in the Blue Ridge Mine area made mining difficult. The presence of seeps along the trench also indicates that groundwater is shallow (within 20 feet of the surface) in the area. The presence of numerous faults and dikes in the vicinity suggests that a shallow aquifer in the area may not be laterally extensive. Faults can act as aquifer boundaries and limit lateral flow. The gouge and fracture mineralization reported in the area of the Mines (Brooks, 1963) indicates that the fault zones may be areas of low permeability, thereby inhibiting lateral flow in the shallow subsurface. Likely, the shallow groundwater discharges locally to Winter Creek.

Although groundwater emanates from Adit A at Amity Mine, it may originate from deeper within the hillside. Due to the numerous faults, (and associated gouge and mineralization) in the area, the shallow groundwater is not presumed to be extensive, but rather discharges to Johnson Creek. Due to the remoteness of the Sites, to date there have not been site specific studies or references regarding groundwater in the area to verify this assumption or establish the connectivity between possible shallow and deeper groundwater systems.

3.1.3 Targets

Targets are defined as receptors that are located within the target distance for a particular pathway. For the groundwater pathway, the target distance has been defined as 4-miles and example targets are drinking water wells, wellhead protection areas, etc. There are no homes within a 4-mile radius of the Sites (Plate 1). Big Summit Prairie is approximately 2 miles east of the Blue Ridge Mine, and a ranch house exists approximately 4 miles further on the privately owned prairie, used mainly for cattle ranching. There are no water well reports registered with the state for the Prairie. The nearest listed water well is located approximately 6 miles north of the Sites, on the other side of the Round Mountain. According to the WRD database, the well is reportedly 64 feet deep and is used for water supply at the Walton Lake Campground. Other municipal/domestic water supply wells in the area are located at the Big Summit Ranger Station and Cold Springs Guard Station, approximately 6.5 miles west and 8.8 miles east of the Sites, respectively. There are no permanent populations

associated with the stations. There are no wellhead protection areas within a 4-mile radius of the Sites.

Based on these observations, groundwater is not believed to be used for drinking within the vicinity of the Site. Beneficial water use of the groundwater in the area is likely to provide base flow to both Winter Creek and Johnson Creek.

3.1.4 Groundwater Exposure Pathway Summary

Based on the information presented above and the results of the water sample collected from the on-site well at the Blue Ridge Mine during the PA, no release of hazardous substances from the Mines to local groundwater is suspected. Furthermore, because groundwater is not believed to be used as drinking water in the vicinity of the Mines, the groundwater exposure pathway does not appear to be complete and requires no further investigation. However, groundwater that emerges in springs and seeps at both Sites will be referred to as surface water for the SI evaluation, and is further discussed in the following section.

3.2 Surface Water Exposure Pathway

3.2.1 Hydrologic Setting

3.2.1.1 Blue Ridge Mine

Winter Creek, a tributary to Johnson Creek, borders the Blue Ridge Mine to the northeast, and Johnson Creek is to the south and approximately 200 feet lower in elevation (Plate 1). According the USGS 7½ minute quadrangle maps, the watershed for Winter Creek is approximately 990 acres is size. Winter Creek joins Johnson Creek approximately one-mile downstream from the Blue Ridge Site. Also shown on Plate 1, are 1- and 4-mile radius circles from the Site.

Groundwater seeps into the trench at the Blue Ridge Mine. A small silt laden pool, approximately 8 feet by 6 feet by 4 feet deep is located in the trench. Water continues to flow through the trench eventually reaching a small surface water detention pond located approximately 500 feet southeast from the trench, see Figure 2. From the detention pond, the water flows southeast to an open meadow/marsh. The marsh is approximately 1500 square feet in area; however, the size may vary seasonally. During the time of the field event, water did not flow beyond the marshy area. However, observations have not been made during the high flow season, and evidence suggests that during high flow events, water from the marsh may reach Winter Creek. Overland flow (i.e. sheet flow) across the main mining complex at the Blue Ridge Mine would flow southeast and potentially into Winter Creek. However, there is no evidence (i.e. gullies, drainages) that during normal precipitation events, that overland flow would reach Winter Creek, most would probably infiltrate into the surrounding soils. At the main mining complex, the nearest structure to the probably point of entry (PPE) into Winter Creek are the process building, and condenser tube and retort foundations, which are located approximately 100 feet and 150 feet, respectively, west of Winter Creek.

Overland flow at the secondary processing complex would flow south and potentially into Johnson Creek. However, overland flow during normal precipitation events would most likely

infiltrate into the surrounding soils, or be intercepted by FR 152 and wetland areas. The nearest structure to the PPE into Johnson Creek are the concrete foundation and waste pile (WP-F), which are located approximately 300 and 250 feet north of Johnson Creek, respectively.

3.2.1.2 Amity Mine and Devil's Food Mine

The Amity Mine, including the Devil's Food Mine, is bordered by Johnson Creek to the south. Johnson Creek emerges from a spring approximately 1.7 miles west, and upgradient of the Amity Mine, below the Independent Mine (a known abandoned mercury mine). According the USGS 7½ minute quadrangle maps, the Johnson Creek watershed above the Amity Mine is approximately 1,860 acres (Plate 1). Various springs and unnamed tributaries flow into Johnson Creek upgradient of the Amity Mine. At the Amity Mine, a seep emanates from Adit A, which eventually discharges into Johnson Creek. Overland flow at the Amity Mine flows south and potentially into Johnson Creek. However, most of the overland flow during normal precipitation events would most likely infiltrate into surrounding soils or be intercepted by FR 152.

Johnson Creek flows east for approximately 4 miles until joining Elliot Creek, 2 miles before the confluence with the North Fork Crooked River. The North Fork Crooked River flows south and west, for approximately 37 miles, before joining the Crooked River. The Crooked River flows west approximately 10 miles and eventually discharges into the Prineville Reservoir.

3.2.2 Targets

For the surface water pathway, the target distance has been defined as 15-miles, and example targets are surface water intakes supplying drinking water, sensitive environments (i.e. wetlands), and aquatic organisms.

3.2.2.1 Local Surface Water Use

Plate 2 shows the 15-mile downstream limit from the Blue Ridge Mine (16 miles downstream from Amity Mine). There are no reservoirs or other surface water bodies within the 15-mile downstream reach of the Sites, nor are there permanent residences. There is one campground located approximately 17.5 miles downstream from Blue Ridge Mine, Deep Creek Campground, on the North Fork Crooked River. Based on the information CES gathered, the campground does not use the river for a source of drinking water.

3.2.2.2 Wetlands

Maps outlining designated wetland areas were prepared by the National Wetlands Inventory (NWI), a division of the U.S. Fish and Wildlife Service. The document was prepared primarily by analysis of high altitude aerial photographs. Wetlands were identified based on vegetation, visible hydrology, and geography in accordance with Classification of Wetlands and Deepwater Habitats of the United States (USDI, 1979). The wetlands map is included as Plate 3.

A review of the NWI map indicates that the detention pond at the Blue Ridge Mine is designated as a Palustrine seasonally flooded area with unconsolidated bottom (PUSCA). In addition, seasonally flooded areas of Winter Creek, near the Blue Ridge Mine are designated as Palustrine scrub shrub

seasonally flooded areas (PSSC). Riverine, intermittent, streambed (R4SBC) classification has been given to Winter Creek headwaters area. Each of the areas discussed above are considered "listed" on the NWI. The marshy area south of the Blue Ridge Mine, is not designated on the NWI map.

The NWI map designates seasonally flooded areas of Johnson Creek near the Amity Mine as Palustrine scrub shrub seasonally flooded areas (PSSC) (USF&W, 1995). Along Johnson Creek, approximately two miles downstream from the Amity Mine, Palustrine emergent seasonally flooded (PEMC) areas, Palustrine scrub shrub temporarily flooded areas (PSSA), and Riverine, upper perennial, permanently flooded areas with unconsolidated bottom (R3UBH) exist.

3.2.2.3 Aquatic Threatened and Endangered Species and Habitat

To address aquatic habitat conditions of threatened and endangered (T&E) species and listed species of concern (SOC) in Winter and Johnson Creeks, reconnaissance surveys were conducted beginning downgradient of the Mines, adjacent and within the mine disturbance zone, and upgradient of the Mines. CES contracted Entrix to perform the surveys. A list of T&E species and SOC is included in the "*Ochoco Mines Threatened and Endangered Species Survey and Habitat Assessment*" report included in Appendix G. The following is a summary of the findings presented in the report.

Upstream of the lower impounded area in Winter Creek, sporadic pockets of standing water were observed within the stream channel, but no flowing water was evident. The stream channel substrate was dominated by cobble, with gravel and sporadic boulder also present. No caddis fly larvae were observed within these ponded segments. A second impoundment, formerly used as the historic water supply for the Blue Ridge Mine site, created a pond with standing water several feet deep. This impoundment, similar to the impoundment downstream, created a wetland, with a moderately dense alder thicket interspersed with aspen in those areas with slightly less moisture. Approximately 20 feet upstream from the upper end of the upper impoundment, a limited continuous flow of 1 gpm was observed. At this point, continuing upstream, large caddis fly larvae resembling *Apatania sp.* (listed SOC) could be found beneath gravel and cobble in areas where flow was not stagnant.

Conditions in Johnson Creek were more supportive of aquatic life, as flows were consistent below, within and above the Amity Mine. Flows increased slightly downstream relative to the upstream areas observed. Redband rainbow trout fry were consistently seen in pool habitats below the Amity Mine. Within the mine disturbance zone, only a single trout fry was observed. Physical disturbance of the riparian corridor by cattle was evident in all locations along Johnson Creek, and was particularly heavy around the former mine area. The stream gradient in this location was slightly lower than that downstream and upstream of the Mine, favoring sediment deposition, and habitat more marsh-like than a stream corridor with typical pool-riffle conformation generally supportive of salmonids. No trout fry were observed upstream of the Amity Mine; however, it must be recognized that the stream was not formally surveyed for fish abundance, as no electroshocking equipment was used, and not all habitat along the stream corridor was explored. Thus, qualitatively, it appeared that more trout were occupying the stream habitat below the Amity Mine than above it; however, this finding needs to be confirmed, and compared against physical habitat metrics in the stream, particularly flow, to determine the reasons for fish distribution and abundance.

In summary, aquatic habitats in both Winter and Johnson Creek are capable of supporting the inland redband trout (listed SOC), although conditions in Winter Creek are less favorable due to the ephemeral flows, and the mine related impoundments that may restrict habitat access, when low flows are present. Qualitatively, it appeared that more redband trout were occupying the stream below the Amity Mine than at and above it; this is most likely due to influences from grazing pressure, mine impacts related to the adit discharge, and sedimentation of the creek from waste piles. Caddis fly larvae resembling *Apatania sp.* (listed SOC) were identified in Winter Creek, but were not observed in Johnson Creek.

3.2.3 Previous Studies Related to Surface Water and Stream Sediment

3.2.3.1 Oregon DOGAMI Stream Sediment Study

In September of 1982, the Oregon DOGAMI, under contract with the USFS, conducted a stream sediment sampling program in the western part of the ONF (Ferns and Brooks, 1983). The 1982 geochemical survey consisted of 352 stream sediment samples in the ONF. A mean background concentration of 0.041 parts per million (ppm) was determined for mercury, with a standard deviation of 0.027 ppm. Results higher than 0.095 ppm were considered "anomalous". Samples collected near the Blue Ridge Mine are shown on Figure 2 in Appendix H, and results are tabulated on Table 2 of Appendix H. Samples collected near the Amity Mine are shown on Figure 1 of Appendix I and tabulated on Table 2 of Appendix I. The samples collected near the mines, both upstream and downstream, had anomalous values for mercury.

3.2.3.2 Preliminary Assessments

In November 2000, CES performed Preliminary Assessments (PAs) at the Blue Ridge Mine and Amity Mine (CES, 2000a and b). The analytical results and field measurements for the Blue Ridge Mine are tabulated in Table 3 of Appendix H; and the locations are shown on Figure 2 of Appendix H. The analytical results and field measurements for the Amity Mine are tabulated in Table 3 of Appendix I; and the locations are shown on Figure 2 of Appendix I. Sample numbers refer to those given in the respective tables. The following outlines the information presented in the PA report related to the surface water pathway.

- Six surface water samples and one groundwater sample were collected from the Blue Ridge Mine, and four surface water samples were collected from the Amity Mine. Samples were analyzed for total metals, pH, and hardness.
- Six sediment samples were collected at the Blue Ridge Mine and four sediment samples were collected at the Amity Mine. Sediment samples were analyzed for total metals and pH.
- One sediment sample collected at Blue Ridge Mine was analyzed for methyl mercury.
- No metals were detected above the PQL in any surface water sample collected from the Amity or Blue Ridge Mines.
- Mercury was detected in all sediment samples at the Blue Ridge Mine. Concentrations ranged from 0.14 milligrams per kilogram (mg/kg) to 238 mg/kg.
- Mercury was not detected above the PQL in any sediment sample collected at the Amity Mine.
- Further investigations of mercury in surface water and sediment are warranted, specifically to determine if mercury concentrations in surface water exceed the ODEQ freshwater chronic criteria of 0.012 microgram per liter (ug/L) for total mercury.

3.2.4 Site Inspection Analytical Results – Blue Ridge Mine

The following sections present the surface water and stream sediment analytical results for SI conducted at the Blue Ridge Mine. Sample locations are shown on Figure 4, analytical results are tabulated in Tables 1 and 2, and the laboratory reports are located in Appendix J. Photographs of selected sampling locations are included in Appendix B. All appropriate samples identified in the SOW and FOP were collected. Changes to the sampling program were made during the field event after discussion and concurrence with the USFS representative. A complete report of the QA/QC procedures is included in Appendix K. Field activities were conducted from October 3 through 7, 2001; the reader is referred to the FOP (CES, 2001) for sampling procedure and protocols.

3.2.4.1 Surface Water Analytical Results

A total of six surface water samples were collected at the Blue Ridge Mine during the SI field activities in October 2001; two from Winter Creek and four from on-site surface water. Samples were analyzed for total metals using the following multi-element suite: antimony (Sb), arsenic (As), beryllium (Be), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni), selenium (Se), silver (Ag), thallium (Tl), and zinc (Zn). Calcium (Ca) and magnesium (Mg) were also analyzed in the total metal suite to calculate hardness. In addition to metals, pH, specific conductivity (SC), total dissolved solids (TDS), alkalinity, and sulfate were analyzed and field measurements were made for temperature, pH, SC, dissolved oxygen (DO) and oxidation/reduction potential (Eh).

With the exception of lead and mercury, no other metals were detected above the PQL in any of the water samples collected. Lead was detected at 0.0017 μg/L in one sample (SW-BR-1), which was collected from the detention pond. Total mercury concentrations ranged from 0.0014 ug/L to 33.7 ug/L, with an average concentration of 5.84 ug/L. The lowest concentration of total mercury, 0.0014 μg/L, was detected in SW-BR-3, located in Winter Creek upstream from the Mine. The highest concentration of total mercury was detected at 33.7 μg/L in SW-BR-5, collected from pore water in the trench pool. Procedures for pore water sampling are described in the FOP. Four of the six samples exhibited total mercury concentrations above the ODEQ freshwater chronic criteria for aquatic life of 0.012 ug/L, and only one sample exceeded the ODEQ freshwater acute criteria for aquatic life of 2.4 ug/L. The two water samples collected from Winter Creek did not exceed the ODEQ freshwater chronic criteria for aquatic life.

Wet chemistry results are presented in Table 1 and are summarized as follows: pH ranged from 6.6 to 7.2 standard units (su), alkalinity ranged from 105 to 161 mg/L, conductivity ranged from 223 to 293 microsiemans (uS), hardness as calcium carbonate ($CaCO_3$) ranged from 98 to 136 mg/L, TDS ranged from 150 to 180 mg/L, and sulfate was not detected above the method detection limit (MDL) of 10 mg/L. Field parameters measured, and their respective ranges, included temperature (7.4 – 10.6 ^{o}C), pH (6.5 – 7.8 su), specific conductivity (201 – 276 uS), DO (0 – 6 mg/L), and Eh (36 – 126 millivolts (mv)).

3.2.4.2 Stream Sediment Results

A total of five sediment samples were collected from Blue Ridge Mine and Winter Creek. Samples were analyzed for the 13 total metals suite (Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn), and pH. The results are tabulated in Table 2; however, there are no regulatory clean-up standards for sediment. As with the surface water results, mercury appears to be the main metal of concern. The highest detected total mercury concentrations in sediment are located in the pool within the trench (SS-BR-5, 306 mg/kg), followed by the sample from the detention pond (SS-BR-1, 99 mg/kg). Total mercury was detected in the sediment sample from the marshy area south of Mine (SS-BR-2, 13.2 mg/kg). In addition, total mercury was detected at 0.93 and 9.1 mg/kg in the sediment samples collected from upstream and downstream, respectively, locations in Winter Creek. The concentration of mercury in sediment samples correlates well with the concentration of mercury in surface water samples. The locations with the highest mercury concentration in sediment, also exhibited the highest mercury concentrations in water. The concentration of mercury detected in all sediment samples is higher than the mean background concentration determined in the DOGAMI study. Laboratory pH ranged from 6.5 su in SS-BR-2, to 7.0 su in SS-BR-1 and SS-BR-5.

3.2.5 Site Inspection Analytical Results – Amity Mine

The following sections present the surface water and stream sediment analytical results for the Amity Mine SI. Sample locations are shown on Figure 5, analytical results are tabulated in Tables 3 and 4, and the laboratory analytical reports are located in Appendix J. All appropriate samples identified in the SOW and FOP were collected. Changes to the sampling program were made during the field event after discussion and concurrence with the USFS representative. A complete discussion of the QA/QC procedures is included in Appendix K. Field activities were conducted from October 3 – 7, 2001; the reader is referred to the FOP (CES, 2001) for sampling procedure and protocols.

3.2.5.1 Surface Water Results

A total of seven surface water samples were collected at or near the Amity Mine during the SI; five from Johnson Creek and two from the drainage emanating from Adit A. Samples were analyzed for the 13 total metals (Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn). Ca and Mg were also analyzed in order to calculate hardness. In addition to metals, pH, SC, TDS, alkalinity, SC, and sulfate were analyzed, and field measurements were made for temperature, pH, SC, DO and Eh.

With the exception of mercury and lead, no other metals were detected above the PQL in any of the seven water samples collected. Lead was detected at 0.0043 µg/L in one sample SW-A-2, collected on the bench downgradient of the Adit A discharge. This concentration exceeds the ODEQ freshwater chronic criteria for aquatic life for lead (0.003 µg/L). The discharge from Adit A (SW-A-1) had the lowest mercury concentration in surface water samples at 0.0025 µg/L. Three of the seven samples (SW-A-2, JC-A-3, and JC-A-8) exhibited total mercury concentrations above the ODEQ freshwater chronic criteria for aquatic life, but no samples had mercury concentrations above the ODEQ freshwater acute criteria for aquatic life. The sample collected below Adit A, but before the discharge reaches Johnson Creek (SW-A-2), had the

highest concentration of total mercury at 0.39 µg/L. Two samples collected in Johnson Creek, immediately below the Adit A discharge (JC-A-3 and JC-A-8), had total mercury detected at 0.0143 and 0.0276 µg/L, respectively. Sample JC-A-7, collected immediately upstream of the confluence of the adit discharge and Johnson Creek, exhibited a concentration of total mercury at 0.0071 µg/L. The samples collected upstream the mine area (JC-A-5) exhibited a total mercury concentration of 0.0087 µg/L. This sample location was selected to be representative of background surface water quality, yet it has similar chemistry to surface water immediately upstream of the confluence of the adit discharge and Johnson Creek. These results indicate that there may have been historic releases from another source in the headwaters of the watershed, possibly the Independent Mine, or that background concentrations are naturally elevated.

Wet chemistry results are presented in Table 3 and are summarized as follows: pH ranged from 6.9 to 7.8 su, alkalinity ranged from 91 to 223 mg/L, SC ranged from 183 to 495 uS, hardness as calcium carbonate ($CaCO_3$) ranged from 72 to 222 mg/L, TDS ranged from 130 to 280 mg/L, and sulfate ranged from the MDL to 30 mg/L. Field parameters measured, and their respective ranges, included temperature (3.5 – 10.6 ^{o}C), pH (7.2 – 8.04 su), SC (165 – 469 uS), DO (0 – 8.4 mg/L), and Eh (-50 – 148 mv).

3.2.5.2 Stream Sediment Results

A total of eight sediment samples were collected from the Amity Mine and Johnson Creek. Samples were analyzed for the 13 total metals suite (Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn), and pH. As with the surface water results, mercury appears to be the metal of concern. Laboratory pH ranged from 6.7 su in SS-A-8, to 7.8 su in SS-A-2. The results are tabulated in Table 4.

The highest concentration of total mercury in sediment was detected in sample SS-A-8 at 38.6 mg/kg, collected in Johnson Creek immediately downstream of the confluence of the adit discharge and Johnson Creek. The sample collected from the collapsed adit (SS-A-1), exhibited a total mercury concentration of 1.59 mg/kg, whereas the sample below the adit, but upstream of Johnson Creek (SS-A-2), had a concentration of 28.8 mg/kg of total mercury. The sample collected downstream in Johnson Creek (SS-A-6), had 4.0 mg/kg of total mercury detected. Total mercury was detected at 0.67 mg/kg in the sediment sample collected upgradient of the Amity Mine Site (SS-A-5), and at 0.66 mg/kg in the sample collected immediately upstream to the confluence with the adit discharge (SS-A-7). This indicates that there may have been historic releases from another source upstream of the Mine (i.e. Independent Mine), or that background concentrations are naturally elevated. The concentration of mercury detected in all sediment samples is higher than the mean background concentration determined in the DOGAMI study. The concentration of mercury in sediment samples correlates well with the concentrations of mercury in surface water. The locations with the highest mercury concentration of sediment also exhibit the highest mercury concentrations in water and the indication of a possible other mercury source upstream.

3.2.6 Surface Water Exposure Pathway Summary

Although total mercury concentrations in sediment and surface water in Winter Creek increase from upgradient to downgradient of the Blue Ridge Mine, it does not appear that the Blue Ridge

Mine is significant impacting surface water or sediment in Winter Creek or Johnson Creek. However, the on-site surface water and sediment appears to be significantly impacted with mercury. Surface water and sediment samples collected from the trench exhibited total mercury concentrations of 33.7 ug/L and 306 mg/kg, respectively. However, surface water and sediment samples collected from the marsh area below the Mine decreased significantly in total mercury concentrations to 0.175 ug/L and 13.2 mg/kg, respectively.

Based on the data gathered and presented, off site migration of mercury via the surface water route into Johnson Creek is occurring at the Amity Mine, and is potentially impacting habitat of several listed SOC. This is evident when comparing the water and sediment analytical results from immediately upstream and downstream of the confluence of the adit discharge and Johnson Creek, and the apparent lack of redband trout in the area around and upstream of the Amity Mine. Total mercury increases from 0.0071 ug/L, in the upstream surface water sample, to 0.0276 ug/L in the downstream surface water sample. Moreover, total mercury in sediment significantly increases from the upstream sample (0.66 mg/kg) to the downstream sample (38.6 mg/kg). However, analytical results from the farthest downstream sample indicates that significant dilution/dispersion is accruing in Johnson Creek, as total mercury in surface water and sediment decreases by nearly an order of magnitude to 0.0037 ug/L and 4.0 mg/kg, respectively. The water sample collected upstream from Amity Mine (JC-A-5) has a higher total mercury concentration than the water sample collected downstream from Amity Mine (JC-A-6), which indicates that there may have been historic releases from another source upstream of the Mine (i.e. Independent Mine), or that background concentrations are naturally elevated.

The Oregon DOGAMI study (Ferns and Brooks, 1983) determined a background concentration of mercury in sediment to be 0.041 mg/kg in the area surrounding the Mines. Concentrations above 0.095 mg/kg in the DOGAMI study were considered anomalous. The concentrations of mercury detected in sediments upstream and downstream of the Amity Mine (SS-A-5 and SS-A-7) had mercury detected at 0.67 and 0.66 mg/kg, respectively, seven times higher than a value considered anomalous, further supporting that the Amity Mine is potentially impacting aquatic habitat in Johnson Creek.

3.3 Soil Exposure Pathway

3.3.1 Targets

3.3.1.1 Local Use

There are no onsite workers, occupied structures or people who live within a 4-mile radius of the Mines. Public use of the Mines and vicinity is most likely minimal, though public access records are not maintained**.** Access is currently not restricted by fencing, nor were any “No Trespassing” signs noted during the SI. Sheep were observed grazing at the Blue Ridge Mine; therefore, at the request of the USFS, tissue samples of vegetation from the waste piles, as well as in undisturbed areas, were collected for metals analysis. In general, land uses in this area are limited to cattle grazing, limited timber harvesting, firewood cutting, recreation (hiking, fishing, camping, hunting, etc.) and some minerals prospecting.

The Sites are not currently occupied on a regular basis and may never be occupied for extensive periods. Therefore, the risk of long-term exposure to contaminants at the Sites is considered low. However, the soil and air exposure pathways are considered complete, because hikers, hunters, and campers still have the potential to occupy the Mines.

3.3.1.2 Terrestrial Threatened and Endangered Species and Habitat

To address terrestrial habitat conditions of T&E species and SOC at the Mines, reconnaissance surveys were conducted beginning downgradient of the Mines, adjacent and within the mine disturbance zone, and upgradient of the Mines. CES contracted Entrix to perform the surveys. A list of T&E species and SOC is included in the "*Ochoco Mines Threatened and Endangered Species Survey and Habitat Assessment*" report included in Appendix G. The following is a summary of the findings presented in the report.

Plant species were identified at each sample location and their approximate cover was visually estimated by a certified wetlands scientist. Cover was estimated for woody species in a 5-meter radius plot and a 2-meter radius plot for herbaceous species. Plant community composition was compared between uphill and downhill sites. The wildlife habitat representative of the site was evaluated at each sample location to provide representation for the ability of the habitat to provide conditions needed for listed wildlife species. In addition to this habitat characterization, 15-minute point counts were conducted at each station, and all wildlife species observed or heard were recorded.

The buildings and waste piles have affected the plant communities and wildlife habitat through their physical habitat disturbance. Current and ongoing disturbance from road noise, grazing pressure, and timber harvest play a larger role in determining species use of available habitats than the continued presence of historical mine operations. Direct, acute mine impacts to plant communities resulted from the land clearing for roads, structures, and maintenance at the Mines. However, it appears likely that these areas will restore naturally over a long period of time. The lack of vegetation on waste piles appears to be a combination of several factors, high metals concentrations, poor drainage, high compaction of materials, and lack of sufficient organic matter and nutrients. After re-establishment, the Mine sites will provide habitat similar to the areas around them. Indirect, chronic impacts from potentially toxic constituents in the mines could not be determined from the survey conducted. However, tissue samples collected from the waste piles exhibited an increase in metals concentration compared with tissue samples collected from background areas. None of the mine impacts currently recognized would appear to completely prevent the use of the habitats by T&E species and SOC whose range would overlap with the Mine areas. However, the physical disturbance at the Mines has reduced the habitat quality, which would limit the number of individuals potentially supported from the available habitat.

In general, wildlife habitat above and below the Mine were generally more favorable for supporting T&E species and SOC, simply because the clearing for the Mines has removed or altered habitat components preferred by many of the species. However, no T&E or SOC were observed during the survey. The bats listed as SOC may represent exceptions to this conclusion, as many of the species' are known to utilize old structures and mine shafts. It is notable,

however, that no bat species were observed during the surveys, nor were signs of bats evident around mine shafts or old structures.

3.3.2 Previous Studies Related to Soil and Waste Piles

3.3.2.1 Blue Ridge Mine PA

Previous analytical results for soil and waste piles from the Blue Ridge Mine Site were obtained in the PA conducted by CES in November 2000 (CES, 2000a). The results are tabulated in Table 1 of Appendix H. A summary is presented below. Sample numbers refer to those listed in the table. A map is provided in Appendix H showing the locations of the samples. The following outlines the information presented in the PA report related to soil and waste piles.

- Three background soil, nine site soil, and nine composite waste pile samples were collected and analyzed for total metals and pH analysis.
- Eight bulk material samples (i.e. concrete, wood, etc.) were collected and analyzed for total mercury.
- Based on laboratory results, mercury appears to be the main COC at the site.
- Total mercury concentrations in background soil samples ranged from 0.2 to 0.32 mg/kg;
- Total mercury concentrations in site soil samples ranged from 3.2 to 517 mg/kg;
- Total mercury concentrations in waste pile samples ranged from 40 to 790 mg/kg;
- No soil sample, and only two composite waste pile samples, exceeded the EPA Industrial Preliminary Remediation Goal (PRG) for mercury of 610 mg/kg.
- Soil and waste pile pH ranged from 5.6 to 7.6 su.
- Based on the results of the bulk sampling and analysis, site wood structures and concrete are likely impacted by mercury.
- The vertical and lateral extent of mercury impacted soil and waste piles needs to be determined.

3.3.2.2 Amity Mine PA

Previous analytical results for soil and waste piles from the Amity Mine Site were obtained in the PA conducted by CES in November 2000 (CES, 2000b). The results are tabulated in Table 1 of Appendix I. A summary is presented below. Sample numbers refer to those listed in the table. A map is included in the appendix for reference to locations. The following outlines the information presented in the PA report related to soil and waste piles.

- Three background soil, seven site soil, and six composite waste pile samples were collected and analyzed for total metals and pH analysis.
- Based on laboratory results, mercury appears to be the main COC at the site.
- Total mercury concentrations in background soil samples ranged from 0.8 to 24.7 mg/kg;
- Total mercury concentrations in site soil samples ranged from 334 to 6,250 mg/kg;
- Total mercury concentrations in waste pile samples ranged from 7.9 to 420 mg/kg;
- Six of the seven site soil sample, and none of the waste pile samples, exceeded the EPA Industrial Preliminary Remediation Goal (PRG) for mercury of 610 mg/kg.
- Soil and waste pile pH ranged from 5.9 to 7.9 su.
- The vertical and lateral extent of mercury impacted soil and waste piles needs to be determined.

3.3.2.3 Devils Food Mine

One waste sample was collected at the Devil's Food Mine during the Amity PA (CES 2000b). Sample A-WS-6 had total mercury detected at 22.1 mg/kg. The complete analytical results are tabulated in Table 1 of Appendix I.

3.3.3 Site Inspection Analytical Results – Blue Ridge Mine

The following sections present the background soil, site soil, waste pile, and tissue analytical results for the Blue Ridge Mine. Sample locations for soils are shown on Figure 6, and waste pile and tissue samples are shown on Figure 7. Analytical results for background soils are tabulated in Table 5 and for Site soils and waste piles in Table 6. Miscellaneous samples collected from pipes, burnt material, ore hopper material, concrete from foundations, etc. are tabulated in Table 7 and tissue results are tabulated in Table 8. The laboratory reports are located in Appendix J. A discussion of QA/QC procedures is included in Appendix K.

3.3.3.1 Background Soil Analytical Results

Background soil samples were collected from six areas around the Blue Ridge Mine; four from the main mine complex and two from the secondary processing area. Sample locations (S-BR-12, -13, -14, -15, –20, and -21) were selected to provide representative chemistry of undisturbed areas around the Mine. Samples were analyzed for 13 total metals (Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn), sulfate, total sulfur, acid base accounting (ABAs), and pH. Laboratory results are summarized in Table 5, with the mean concentrations for metals that consistently exceeded the PQL listed as follows:

Mean Concentrations of Metals in Background Soils (Results in mg/kg)

Ag	As	Be	Cd	Cr	Cu	Hg	Ni	Pb	Zn
0.87	1.0	0.8	0.8	42	44	0.8	29	5.3	65

Sulfate and total sulfur results were generally at or below the PQL. ABAs were only analyzed on three of the background samples, which exhibited an acid base potential (ABP) ranging from +9 to +14 t $CaCO_3$/Kt (ABP units are presented as tons of calcium carbonate needed to neutralize a kiloton of waste). ABP is the result of the acid neutralizing potential (ANP) minus the acid generating potential (AGP). A negative ABP indicates that the acid generating potential is greater than the acid neutralization potential, and thus the sample has the potential to produce acid rock drainage (ARD). Background soil pH ranged from 5.5 to 6.5 su, with a mean concentration of 5.9 su, indicating slightly acidic soils.

3.3.3.2 Soil Analytical Results

A total of 26 soil samples were collected during the SI at the Blue Ridge Mine. Samples were collected using a hand auger from areas around the site, specifically from the processing building area, condenser tube and rotary kiln foundation area, various concrete foundations, and the secondary processing area. Sampling intervals and depths were predetermined by the USFS; however, on several occasions, the number of samples and sampling depth was changed based on

field observation and after discussion with the USFS. Samples were analyzed for 13 total metals (Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn), sulfate, total sulfur, ABAs, and pH.

Eleven soil samples were collected in the area around the primary process building and within the settling pond. Samples collected around the process building ranged from below the PQL in sample S-BR-2-1' to 2,400 mg/kg in sample S-BR-3-1' for total mercury. Samples collected within the settling pond ranged from 201 mg/kg in S-BR-8-2' to 524 mg/kg in S-BR-9-1' for total mercury. Sulfate and total sulfur concentrations for all samples were at or below the PQL. All of the samples in this area exhibited a positive value for ABP. Moreover, the pH of the soil samples ranged from 6.1 to 7.6 su.

Four soil samples were collected near two concrete foundations and one pit on the north side of FR 202. Total mercury analysis in this area ranged from 830 mg/kg in S-BR-25-1' (small pit) to 3,420 mg/kg in S-BR-18 (northernmost foundation). The ABP in the soil samples ranged from –17 t $CaCO_3$/Kt in sample S-BR-24 to +52 t $CaCO_3$/Kt in sample S-BR-18. Sulfate ranged from below the MDL to 0.25% in S-BR-24; total sulfur ranged from 0.06% to 0.51% also in sample S-BR-24. In addition, pH ranged from 3.2 su in sample S-BR-24 to 7.5 su in sample S-BR-18. The negative ABP value and low pH for S-BR-24, along with the elevated sulfate and total sulfur, indicates that soils in this area have the potential to generating ARD.

In the area around the condenser tubes and rotary kiln foundations, six soil samples were collected for analysis. Total mercury range from below the MDL to 25.8% in sample S-BR-7-0'. The ABP ranged from –1 in sample S-BR-5-1' to +21 in sample S-BR-6-0', while the pH ranged from 6.1 su in sample S-BR-5-1' to 6.8 su in sample S-BR-5-0'. Total sulfur and sulfate concentrations in all samples were at or below the PQL.

Five soil samples were collected in the area surrounding the secondary processing area near FR 42. Total mercury ranged from 139 mg/kg in S-BR-16-1' to 2,590 mg/kg in S-BR-19-1' (near the #2 wooden hopper). The ABP values were all positive and the pH was relatively neutral for all the soil samples in this area. In addition, total sulfur and sulfate was at or below the PQL in all soil samples.

In summary, ten soil samples, ranging from 794 mg/kg to 258,000 mg/kg total mercury, exceeded the EPA Industrial PRG standard for mercury of 610 mg/kg. These include: S-BR-3-1', S-BR-5-0', S-BR-7-0', S-BR-17-1', S-BR-18, S-BR-19-0', S-BR-19-1', S-BR-24, S-BR-25 and S-BR-25-1'. Each of these samples are located near former processing/refining areas. The highest mercury concentration, 258,000 mg/kg was detected in sample S-BR-7-0', collected adjacent to the former condenser tube foundation. This extremely high concentration is likely due to spillage of elemental mercury in the area. Arsenic concentrations exceed the PRG Industrial standard of 2.7 mg/kg in seven soil samples: S-BR-9-1.5'; S-BR-7-0'; S-BR-10-1'; S-BR-18; S-BR-24; S-BR-25 and S-BR-25-1'. The highest arsenic concentration was detected in sample S-BR-24 at 25.6 mg/kg. In general, high arsenic concentrations were detected in samples with high mercury concentrations. No other metal concentration exceeds the corresponding Industrial PRG standard. The following table presents the mean concentrations of metals in site soils and the enrichment relative to mean concentrations of background soils. As the table shows, arsenic and mercury are the metals that are most enriched when compared to background soils.

Mean Concentrations of Metals in Site Soils and Enrichment Value as Compared to Background Soil Concentrations (Results in mg/kg)

	Ag	As	Be	Cd	Cr	Cu	Hg	Ni	Pb	Zn
Mean Conc. Site Soils	0.10	3.0	0.6	0.7	36	75	10660*	53	6.5	61
Mean Background Soils	0.87	1.0	0.8	0.8	42	44	0.8	29	5.3	65
Enrichment Value**	*0.1x*	***3.0x***	*0.8x*	*0.9x*	*0.9x*	***1.7x***	***13325x***	***1.8x***	***1.2x***	*0.9x*

* - Mean value for mercury includes a concentration of 258,000 mg/kg. It is possible that this value is an outlier. The mean mercury concentrations without this value is 766 mg/kg, which corresponds to an enrichment value of 957x.

** - The enrichment value is equal to the number of times ("x") the site soils are greater or less than the background soils (i.e. the mean concentration of arsenic in site soils is 3 times greater than background soils). Values greater than 1 times the background are bolded.

3.3.3.3 Waste Pile Analytical Results

A total of 17 waste pile samples were collected during the SI at the Blue Ridge Mine. Samples were collected from all waste piles (WP-A, -B, -C, -D, -E, -F) from borings advanced with either a track mounted hollow stem auger or hand auger. Waste pile and sampling locations are shown on Figure 7, and boring logs are included in Appendix L. Sampling intervals and depths were predetermined by the USFS; however, on several occasions the number of samples and sampling depth was changed based on field observation and concurrence with the USFS. Samples were analyzed for 13 total metals (Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn), sulfate, total sulfur, ABAs, and pH. The volume of waste piles was estimated by measuring the base of the pile, height and slopes of sides. The piles were not surveyed, nor are they linear features; therefore the volumes listed are rough estimates. Waste pile calculations are in Appendix M.

WP-A has a total volume of approximately 1,300 cubic yards (CY). One boring was advanced at WP-A and samples were collected at 5, 15, and 18 feet BGS. Total mercury ranged from 1.09 mg/kg at 18 feet (native material) to 295 mg/kg at 5 feet. Sulfate and total sulfur was at or below the PQL for each sample. The ABP indicates that the waste material has an acid neutralization potential and neutral pH.

One boring was advanced at WP-B, which has a volume of approximately 5,800 CY. Samples were collected at 5 and 15 feet BGS. Total metals, sulfate, and total sulfur concentrations appeared to be relatively low when compared to other site samples. Moreover, ABP and pH did not indicate the potential for ARD.

WP-C is approximately 6,900 CY in volume. Two borings were advanced at WP-C, with samples being collected at 5, 10, and 15 feet BGS in boring WP-BR-4 and 5, 10, and 17 feet BGS in boring WP-BR-6. Total metals, sulfate, and total sulfur concentrations appeared to be relatively low when compared to other site samples. In addition, ABP and pH did not indicate the potential for ARD.

WP-D is approximately 190 CY in volume, and one boring was advanced, with sampling being collected at 3 and 10 feet BGS. As with WP-B and WP-C, total metals, sulfate, and total sulfur concentrations appeared to be relatively low when compared to other site samples. ABP and pH did not indicate the potential for ARD.

WP-E, located approximately 50 feet west of the process building, is estimated at 15 CY in volume. One sample was collected at 2 feet BGS from WP-E. Sample WP-BR-8-2' exhibited a concentration of total mercury at 585 mg/kg, which is significantly higher than any other waste sample collected at the site, but still below the PRG of 610 mg/kg. Total sulfur and sulfate was below the PQL, and ABP and pH did not indicate the potential for ARD.

One boring was advanced at WP-F, which has an estimated volume of 80 CY. Samples were collected at the surface, and 2.5 and 8 feet BGS. Similar to the other waste piles at the Mine, total metals, sulfate, and total sulfur concentrations appeared to be relatively low when compared to other site samples, and ABP and pH did not indicate the potential for ARD.

In summary, total mercury detected in waste piles ranging from 1.09 to 585 mg/kg. Mercury was not detected in waste pile samples at concentrations above the Industrial PRG standard for mercury of 610 mg/kg. The highest concentration, 585 mg/kg, detected in WS-BR-8-2', is located in waste pile WP-E, west of the process building (Figure 7). Sample WS-BR-1-5' exhibited total mercury at 295 mg/kg and is located in WP-A, adjacent to the trench. Concentrations of mercury generally decreased with depth; higher concentrations were detected in the shallow samples. Arsenic was detected in waste piles at concentrations ranging from 1.1 mg/kg to 3.4 mg/kg. The highest concentration of arsenic was detected in sample WP-BR-9-0' which is located in waste pile WP-F, in the secondary processing area. No other waste pile sample had arsenic detected above the Industrial PRG standard of 2.7 mg/kg. Saturated paste pH in waste piles ranged from 7.1 to 8.4 su; in addition, no waste pile sample exhibited acid generating potential. The following table presents the mean concentrations of metals in waste piles and the enrichment relative to mean concentrations of background soil. As the table shows, mercury is the metals that is most enriched when compared to background soil.

Mean Concentrations of Metals in Waste Piles and Enrichment Values as Compared to Background Soil Concentrations (Results in mg/kg)

	Ag	As	Be	Cd	Cr	Cu	Hg	Ni	Pb	Zn
Mean Conc. Waste Piles	0.06	1.0	0.6	0.7	46	53	92	64	2.3	58
Mean Background Soils	0.87	1.0	0.8	0.8	42	44	0.8	29	5.3	65
Enrichment Value*	*0.1x*	*1.0x*	*0.8x*	*0.9x*	***1.1x***	***1.2x***	***115x***	***2.2x***	*0.4x*	*0.9x*

* - The enrichment value is equal to the number of times ("x") the waste piles are greater or less than the background soils (i.e. the mean concentration of mercury in waste piles is 115 times greater than background soils). Values greater than 1 times the background are bolded.

3.3.3.4 Miscellaneous Samples

Analytical results for the material in pipes, building concrete, burnt material etc. are tabulated in Table 7 and shown on Figure 7. Mercury concentrations exceed the Industrial PRG standard in four of the seven samples: material in the hopper (PBH-BR-3), the small steel pipe (SSP-BR-7); the slurry settling structure (SSS-BR-6) and the black material in front of the process building (PB-BR-5).

Arsenic concentrations ranged from 1.6 mg/kg to 7.7 mg/kg. The highest concentrations were detected in the black material located on the floor inside (PR-BR-4) and outside (PB-BR-5) the process building. Material in the slurry settling structure and retort foundation also exceed the PRG Industrial standard for arsenic.

3.3.3.5 Vegetation Tissue Analytical Results

Six plant tissue samples were collected for metals analysis. As the waste piles are not well vegetated, a reconnaissance was performed first to determine which species of plant was abundant and widespread enough for the sampling program. Bluebunch wheatgrass (*Agropyron spicatum*) was selected. The area was divided into zones. Three samples were collected from areas determined to be background zones (TIS-1 through TIS-3) and three samples from waste piles (TIS-4 through TIS-6). All samples consisted of leaves and stems of Bluebunch wheatgrass. TIS-1 was collected from the background area directly north of the Site. TIS-2 was collected northeast of the Site across Winter Creek. TIS-3 was collected near the marshy area south of the Site. TIS-4 was collected on the waste pile WP-A. TIS-5 was collected on the waste pile WP-B, and TIS-6 was collected on the waste pile WP-C.

The locations and concentration of mercury in tissue samples is shown on Figure 7. Results are tabulated in Table 8. Results of the tissue sampling show higher mercury concentrations in the grasses growing directly on the waste piles. The background samples did not have mercury detected above a PQL of 0.12 mg/kg. The highest concentration of mercury was detected in the vegetation collected from WP-A, TIS-BR-4, at 9.0 mg/kg. Only one other sample had mercury above 1.0 mg/kg: TIS-BR-5, collected on WP-B, had mercury detected at 5.7 mg./kg. Arsenic was not detected above the MDL of 0.2 mg/kg.

3.3.4 Site Inspection Analytical Results – Amity Mine

The following sections present the background soil, site soil and waste pile analytical results for the Amity Mine. Sample locations are shown on Figure 8. Analytical results for background soils are tabulated in Table 9. Site soils and waste pile analytical results are presented in Table 10. The laboratory reports are located in Appendix J.

3.3.4.1 Background Soil Analytical Results

Background soil samples were collected from four areas around the Amity Mine. Sample locations (S-A-13, -14, -15, and –16) were selected to provide representative chemistry of undisturbed areas around the Mine. Samples were analyzed for 13 total metals (Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn) and pH. In addition, S-A-15, was analyzed for sulfate, total sulfur and ABAs. Laboratory results are summarized in Table 9, with the mean concentrations for metals that consistently exceeded the PQL listed as follows:

Mean Concentrations of Metals in Background Soils (Results in mg/kg)

Ag	As	Be	Cd	Cr	Cu	Hg	Ni	Pb	Zn
0.08	1.1	0.5	0.59	23.6	29.9	0.39	23.3	5.22	55.8

Sulfate and total sulfur results were below the MDL and the ABP was +7 t $CaCO_3$/Kt for S-A-15. Background soil pH ranged from 5.5 to 5.9 su, with a mean concentration of 5.7 su, indicating slightly acidic soils.

3.3.4.2 Soil Analytical Results

A total of 15 soil samples were collected during the SI at the Amity Mine. Samples were collected using a hand auger from areas around the site, specifically areas around the ore hopper, furnace building, and areas adjacent to and downgradient of waste piles. Sampling intervals and depths were predetermined by the USFS; however, on several occasions the number of samples and sampling depth was changed based on field observation and concurrence with the USFS. Two samples (S-A-8a and S-A-8b) collected from an apparent former explosive chamber, were analyzed only for total Kjeldahl nitrogen (TKN) to determine the presence/absence of explosives. The remaining samples were analyzed for 13 total metals (Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Th, and Zn), and pH. Six soil samples were analyzed for sulfate, total sulfur, and ABAs.

Eight soil samples were collected in the area around the ore hopper and furnace building. Samples were collected at the surface and 1 foot BGS from four locations (S-A-3, -5, -6, and -7). Total mercury concentrations ranged from 4.26 mg/kg in S-A-7-1' (west of the furnace building) to 2,770 mg/kg in S-A-3-0' (near the ore hopper). Total arsenic ranged from below the PQL to 8.2 mg/kg in S-A-5-0' (east of the furnace building). All other metals were either below the MDL or relatively low, when compared with background soil concentrations. Laboratory pH ranged from 4.1 su in S-A-3-0' to 7.4 in S-A-5-1', and ABP ranged from –20 t $CaCO_3$/Kt (S-A-5-1') to +9 t $CaCO_3$/Kt (S-A-6-1'). Total sulfur and sulfate concentrations were all at or below the respective PQL. Samples S-A-8a and S-A-8b had TKN detected at 0.31 and 0.21 mg/kg respectively, indicating the absence of residual explosive substance.

Five soil samples were collected in areas adjacent to and downgradient of WP-A and WP-C. Total mercury and arsenic concentrations ranged from 4.44 mg/kg and 0.65 mg/kg, respectively in S-A-10-5' (along the toe of WP-C and Johnson Creek), to 3.52 mg/kg and 420 mg/kg, respectively in S-A-9 (along the toe of WP-A). All other metals were either below the MDL or relatively low, when compared with background soil concentrations. Laboratory pH was neutral for all samples, and ABP was 10 and 15 t $CaCO_3$/Kt in S-A-11-5' and S-A-10-5', respectively.

In summary, two soil samples (S-A-3-0' and S-A-5-0') exceed the Industrial PRG standard for mercury. The highest concentration of total mercury (2,770 mg/kg), was detected in soil sample S-A-3-0, located adjacent to the ore hopper. Total arsenic concentrations exceed the Industrial PRG standard in four soil samples. In general, soils with high mercury concentrations had high arsenic concentrations, and the soils near the processing area had the highest arsenic concentrations. High mercury and arsenic concentrations have been detected in soils near the former furnace building and ore hopper in both the PA and SI, indicating that spillage of processed mercury during refining/processing may have led to the contaminated soil in these areas. Based on the results of the TKN analyses, it does not appear that explosive residue exists at the Mine. The following table presents the mean concentrations of metals in site soils and the enrichment relative to mean concentrations of background soils. As the table shows, mercury is the metal that is most enriched when compared to background soils.

Mean Concentrations of Metals in Site Soils and Enrichment Value as Compared to Background Soil Concentrations (Results in mg/kg)

	Ag	As	Be	Cd	Cr	Cu	Hg	Ni	Pb	Zn
Mean Conc. Site Soils	0.06	2.14	0.2	0.37	36.8	46.0	375	58.1	4.18	62.7
Mean Background Soils	0.08	1.1	0.5	0.59	23.6	29.9	0.39	23.3	5.22	55.8
Enrichment Value*	*0.8x*	***1.9x***	*0.4x*	*0.6x*	***1.6x***	***1.5x***	***961x***	***2.5x***	*0.8x*	***1.1x***

* - The enrichment value is equal to the number of times ("x") the site soils are greater or less than the background soils (i.e. the mean concentration of mercury in site soils is 961 times greater than background soils). Values greater than 1 times the background are bolded.

3.3.4.3 Waste Pile Analytical Results

A total of 10 waste pile samples were collected during the SI at the Amity Mine. Samples were collected from all waste piles (WP-A, -B, and -C) from borings advanced with a track mounted hollow stem auger. Waste pile and sampling locations are shown on Figure 8, and boring logs are included in Appendix L. Sampling intervals and depths were predetermined by the USFS; however, on several occasions the number of samples and sampling depth was changed based on field observation and concurrence with the USFS. Samples were analyzed for 13 total metals (Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn), sulfate, total sulfur, ABAs, and pH. The volume of waste piles was estimated by measuring the base of the pile, height and slopes of sides. The piles were not surveyed, nor are they linear features; therefore the volumes listed are rough estimates. Waste pile volume calculations are included in Appendix M.

One boring (WP-A-1) was advanced at WP-A which has a volume of approximately 11,600 CY. The boring was advanced to a total depth of 45 feet BGS, and samples from the 10, 25 and 35 foot depths were submitted for laboratory analysis. Additional samples were collected but based on field observations were not submitted for analysis. Total mercury ranged from 198 mg/kg at the 10 foot sample to 0.81 mg/kg at the 35 foot sample (collected from native material beneath the pile). All other metals, sulfate, and total sulfur concentrations were below the PQL, or appeared to be relatively low. Moreover, ABP and pH did not indicate the potential for ARD.

WP-B was estimated to have a total volume of 3,400 CY. One boring (WP-A-3) was advanced at WP-B; with samples being collected at 5, 10, and 15 feet BGS. Arsenic was the only metal which appeared to be elevated, which ranged from below the PQL to 4.9 mg/kg at the 5-foot sample. All other metals, sulfate, and total sulfur concentrations appeared to below the PQL, or relatively low when compared to other site samples. In addition, ABP and pH did not indicate the potential for ARD.

Two borings (WP-A-4, and -5) were advanced at WP-C, which is approximately 8000 CY in volume. Samples were collected at 10 and 20 feet BGS in both borings. Total mercury ranged from 3.73 mg/kg in WP-A-4-20' to 611 mg/kg in WP-A-4-10'. All other metals, sulfate, and total sulfur concentrations appeared to below the PQL, or relatively low when compared to other site samples. In addition, ABP and pH did not indicate the potential for ARD.

In summary, the highest concentration of mercury in the waste piles was detected in sample WP-A-4-10' with 611 mg/kg, located in WP-C. No other waste pile sample had mercury detected over 200 mg/kg, and all mercury concentrations decrease with depth. Total arsenic concentrations exceed the Industrial PRG in three waste pile samples: WP-A-3-10';

WP-A-4-10'; and WP-A-3-5'. The highest arsenic concentration was measured at 4.9 mg/kg in WP-A-3-5. Samples located in waste pile WP-B near the former furnace building may be processed tailings, a result of burning ore material. The following table presents the mean concentrations of metals in waste piles and the enrichment relative to mean concentrations of background soils. As the table shows, mercury is the metal that is most enriched when compared to background soils.

Mean Concentrations of Metals in Waste Piles and Enrichment Values as Compared to Background Soil Concentrations (Results in mg/kg)

	Ag	As	Be	Cd	Cr	Cu	Hg	Ni	Pb	Zn
Mean Conc. Waste Piles	0.07	1.7	0.7	0.41	68	61	111	106	2.02	69
Mean Background Soils	0.08	1.1	0.5	0.59	23.6	29.9	0.39	23.3	5.22	55.8
Enrichment Value*	*0.9x*	***1.5x***	***1.4x***	*0.7x*	***2.9x***	***2.0x***	***285x***	***4.5x***	*0.4x*	***1.2x***

* - The enrichment value is equal to the number of times ("x") the waste piles are greater or less than the background soils (i.e. the mean concentration of mercury in waste piles is 285 times greater than background soils). Values greater than 1 times the background are bolded.

3.3.5 Site Inspection Analytical Results – Devil's Food Mine

The following sections present the soil and waste pile analytical results for the Devil's Food Mine. Sample locations with mercury concentrations are shown on Figure 8, analytical results are tabulated in Table 11, and the laboratory reports are located in Appendix J.

3.3.5.1 Soil Analytical Results

Four soil samples were collected from two locations at Devil's Food Mine and analyzed for 13 total metals (Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn), and pH. Two of the samples were analyzed for sulfate, total sulfur, and ABAs. Sample location, S-A-1, was collected in the trench in an area where cattails grow, indicating that the area is wet part of the year. The other location, S-A-2, was collected in a gully leading into the trench. Total mercury was detected at 7.2 mg/kg in the trench sample and 86.8 mg/kg in the gully sample above the trench. The highest total arsenic concentration was detected in the gully sample at 1.04 mg/kg. There is no acid generating potential in either soil sample, and sulfate and total sulfur concentrations were below the PQL. The laboratory pH for all four samples was 6.8 su.

3.3.5.2 Waste Pile Analytical Results

One boring was advanced in the waste pile at Devil's Food Mine, and samples were collected at 10, 15 and 20 feet BGS. The waste pile estimated to have a volume of 1700 CY. Samples were analyzed for 13 total metals (Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn), pH, sulfate, total sulfur, and ABAs. The 10-foot sample had total mercury detected at 12.7 mg/kg, and all other metals, sulfate, and total sulfur were below the PQL or considered relatively low. In addition, ABP and pH did not indicate the potential for ARD.

3.3.6 Soil Exposure Pathway Summary

Soil and waste material containing concentrations of mercury and arsenic above the respective Industrial PRGs have been identified at the Mines, which correlates well with the analytical results presented in the PAs. As outlined in the previous sections, metal concentrations in site soil and waste piles, specifically mercury and arsenic, are also significantly higher than that the concentrations identified in background soil samples collected around the Mines. Based on the mercury concentrations, the main source of contamination appears to be the soils surrounding the historic ore processing structures and equipment and, to a lesser extent, waste piles. However, there are currently no residents or workers occupying the Mines or near vicinity and the Industrial PRGs are based on a daily exposure of 8 hours per day for 5 days per week. Therefore, the risk of long-term exposure to contaminants by human receptors is low. However, the soil exposure pathway is still considered complete. It is likely that reducing the mobility and transportation of the soil and waste surrounding the Mines will have a net positive affect on both the air and surface water pathway through reducing the amount of soil particles that are entrained in water and air, which are subsequently transported off-site. Given the location of the Mines, and because the risk to ecological receptors has yet to be determined, further assessment of risk-based concentrations for both human and ecological receptors is recommended.

3.4 Air Exposure Pathway

Mercury was likely released to the air during the processing as vapors and as dust and particulate matter. Currently, the most likely air pathway is due to inhalation of particulate matter. As with soil exposure, this pathway is considered complete because mercury and arsenic impacted soil and waste material is concentrated at the surface where human and ecological receptors could be exposed to particulate matter. Because the air pathway is related and linked to the soil exposure pathway, addressing and/or eliminating the soil exposure pathway will likely render the air exposure pathway incomplete. Therefore, further assessment of the air pathway is not recommended.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Relevant conclusions and recommendations are presented below.

4.1 Blue Ridge Mine

- Based on the information presented in this SI, no release of hazardous substances from the Blue Ridge Mine to local groundwater is suspected. Furthermore, because groundwater is not believed to be used as drinking water in the vicinity of the Blue Ridge Mine, the groundwater exposure pathway does not appear to be complete. Therefore, additional investigation and characterization of the groundwater pathway is not warranted.

- On-site surface water (seep water from the trench flowing to the marsh) appears to be impacted by the Mine. This is evident based on water samples collected from on-site water, which exhibited concentrations of mercury well above the ODEQ freshwater chronic criteria, and one sample above the ODEQ freshwater acute criteria.

- Off-site surface water (Winter and Johnson Creek) surrounding the Blue Ridge Mine does not appear to be impacted by the Mine. This is based on water samples collected from creeks, which indicate that the concentrations of mercury and other metals are well below the ODEQ freshwater chronic and acute criteria. However, the surface water pathway is considered complete with respect to both human and ecological receptors, because evidence exists that hazardous substances have been released to on-site surface water.

- Site soils, and to a lesser extent site waste piles, appear to be impacted by activities associated with the Mine. This is based on 12 soil samples (collected from areas adjacent to historic ore processing structures and equipment) exhibiting concentrations of arsenic and/or mercury that exceed the EPA Industrial PRGs. Waste pile samples did not exceed the Industrial PRGs for mercury; however, two samples exceeded the arsenic Industrial PRG. Furthermore, mean concentrations of several metals (mainly mercury and arsenic) in site soil and waste pile samples were well above the mean concentrations of metals in background soil samples. Therefore, the soil exposure pathway is considered complete for both human and ecological receptors, and a release of hazardous substances has been documented in this SI.

- On-site vegetation appears to be impacted by activities associated with the Mine. The concentrations of mercury in plant tissue samples collected from waste piles were, on average, two orders of magnitude higher than the concentrations measured in tissue samples collected from background locations. Because of this, and the fact that ecological receptors were observed feeding on vegetation at and surrounding the Mine, the potential exists that ecological receptors could be impacted and there is a complete pathway.

- The most likely air exposure pathway is inhalation of dust or particulate matter. However, most of the particulate matter in the air originates from the soil, waste piles, equipment, and buildings that currently exist at the Site. Therefore, remediation of the Site should address any air pathway concerns. Given this, and the remote location and limited use of the Mine, no further assessment into site-specific levels of compounds in the air is recommended.

4.2 Amity Mine

- Based on the information presented in this SI, no release of hazardous substances from the Amity Mine to local groundwater is suspected. Furthermore, because groundwater is not believed to be used as drinking water in the vicinity of the Amity Mine, the groundwater exposure pathway does not appear to be complete. Therefore, additional investigation and characterization of the groundwater pathway is not warranted.

- On-site surface water appears to be impacted by the Amity Mine. A water sample collected from the on-site drainage from Adit A, immediately above the confluence with Johnson Creek, exhibited mercury and lead concentrations greater than the ODEQ freshwater chronic criteria. However, a water sample collected directly from the discharge from Adit A did not exceed ODEQ freshwater chronic criteria for either lead or mercury. This is most likely due to the on-site water entraining mercury and lead enriched sediment from surrounding soil and waste piles.

- Johnson Creek also appears to be impacted by the Amity Mine. Two water samples collected from Johnson Creek, downstream of the confluence of the adit discharge, exceeded the ODEQ freshwater chronic criteria. Also, redband trout were observed below the Amity Mine; however, in the vicinity and above the Mine, no redband trout were observed. This is most likely due to influences from grazing pressure, mine impacts related to the adit discharge, and sedimentation of the creek from adjacent waste piles (i.e. waste pile WP-C). This pathway is considered complete with respect to both human and ecological receptors (redband trout), and there is evidence that hazardous substances have been released to surface water.

- Site soils and waste piles appear to be impacted by activities associated with the Mine. This is based on seven soil and waste samples, which exhibited concentrations of arsenic and/or mercury that exceed the EPA Industrial PRGs. In addition, because of its proximity to Johnson Creek, WP-C appears to be impacting the local surface water and should be included in a removal action at the Site. Furthermore, mean concentrations of several metals (mainly mercury and arsenic) in site soil and waste pile samples were well above the mean concentrations of metals in background soil samples. Therefore, the soil exposure pathway is considered complete for both human and ecological receptors, and a release of hazardous substances has been documented in this SI.

- The most likely air exposure pathway is inhalation of dust or particulate matter. However, most of the particulate matter in the air originates from the soil, waste piles, equipment, and buildings that currently exist at the Site. Therefore, remediation of the Site should address any air pathway concerns. Given this, and the remote location and limited use of the Mine, no further assessment into site-specific levels of compounds in the air is recommended.

4.3 Devil's Food Mine

- Based on the information presented in this SI, no release of hazardous substances from the Devil's Food Mine to local surface water and groundwater is suspected. Furthermore, because groundwater is not believed to be used as drinking water in the vicinity of the Mine and the distance from Johnson Creek, the surface water and groundwater exposure pathways does not appear to be complete. Therefore, additional investigation and characterization of the surface water and groundwater pathways is not warranted.

- Site soils and waste piles do not appear to be impacted by activities associated with the Devil's Food Mine. Soil and waste pile samples did not exceed the EPA Industrial PRG for the metals analyzed. Therefore, the soil exposure pathway does not appear to be

complete. However, because of the proximity to the Amity Mine and the lack of vegetation on the waste piles, if a removal action is undertaken at the Amity Mine, waste piles, equipment and debris should be included in the removal action and the Mine should be recontoured and revegetated.

- The most likely air exposure pathway is inhalation of dust or particulate matter. However, most of the particulate matter in the air originates from the soil and waste piles that currently exist at the Site. Therefore, remediation of the Site should address any air pathway concerns. Given this, and the remote location and limited use of the Devil's Food Mine, no further assessment into site-specific levels of compounds in the air is recommended.

4.4 Recommendations

Based on the information gathered as part of the SI and presented in this report, CES recommends that a streamlined Engineering Evaluation / Cost Analysis (EECA) be performed on selective portions and pathways of the Mines as identified above. Specifically, areas in which impacted soil and waste exceeded the PRG values for mercury and arsenic; and surface water and sediment are enriched with mercury. In addition, as part of the EECA, a risk assessment should be performed to assess the human and ecological impacts and establish removal cleanup standards. Addressing the physical dangers (i.e. opened adits and shafts, steep slopes, and deteriorated buildings) associated with Mines would also be included in the EECA.

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Table 1. Water Analytical Results
Blue Ridge Mine Site, Ochoco National Forest, Crook County, Oregon

Sample I.D. [1]	Antimony, total	Arsenic, total	Beryllium, total	Cadmium, total	Chromium, total	Copper, total	Lead, total	Mercury, total	Nickel, total	Selenium, total	Silver, total	Thallium, total	Zinc, total	pH (lab)	Alkalinity, total	Conductivity @ 25C	Hardness as CaCO3	Calcium, dissolved	Magnesium, dissolved	Residue, Filterable (TDS) @180	Sulfate	Field Measured Parameters				
																						Temp	Field pH	Specific Conductivity	Dissolved Oxygen	Oxidation-Reduction Potential (Eh)
	mg/L							ug/L	mg/L					su	mg/L	uS	mg/L	mg/L	mg/L	mg/L	mg/L	^{o}C	su	uS	mg/L	mv
SW-BR-1	<0.0002	0.0010B	<0.002	0.0002B	0.02B	0.03B	0.0017	**0.264**	0.03B	<0.001	<0.0001	0.00022B	0.03B	6.6	161	293	136	32.4	13.3	160	<10	9.4	6.9	260	3.4	36
SW-BR-2	<0.0002	<0.0005	<0.002	<0.0001	<0.01	<0.01	0.0003B	**0.175**	<0.01	<0.001	<0.0001	0.00022B	0.01B	7.0	133	282	133	31.2	13.4	180	<10	9.2	7.6	276	3.8	NC
WC-BR-3	<0.0002	<0.0005	<0.002	<0.0001	<0.01	<0.01	<0.0001	0.0014	<0.01	<0.001	<0.0001	0.00006B	<0.01	7.2	124	257	113	29.6	9.5	170	10B	10.6	7.8	233	6	126
WC-BR-4	<0.0002	<0.0005	<0.002	<0.0001	<0.01	<0.01	<0.0001	0.0035	<0.01	<0.001	<0.0001	<0.00001	<0.01	6.8	105	223	98	25.1	8.7	150	10B	8.6	7.1	201	4.6	123
SW-BR-5	<0.0002	<0.0005	<0.002	<0.0001	<0.01	<0.01	0.0004B	**33.7**	0.02B	<0.001	<0.0001	0.00005B	0.01B	6.6	123	261	122	28.8	12.1	160	10B	10.1	7.5	235	5	90
SW-BR-6	<0.0002	0.0006B	<0.002	<0.0001	<0.01	<0.01	0.0003B	**0.92**	<0.01	<0.001	<0.0001	<0.00001	0.01B	7.0	113	247	118	27.9	11.8	160	<10	7.4	6.5	220	0	105
Standards																										
ODEQ Fresh Water Chronic Criteria	1.6	NL	0.005	0.001	NL	0.012	0.003	0.012	0.16	0.04	0.0001	0.04	0.11													
ODEQ Fresh Water Acute Criteria	9.0	NL	0.130	0.004	NL	0.02	0.082	2.4	1.4	0.26	0.0041	1.4	0.12													

NOTES: [1] Samples were collected on October 3-7, 2001 by CES. Analysis was conducted by ACZ Laboratories, Inc. in Steamboat Springs, CO.
mg/L = milligrams per liter
ug/L = micrograms per liter
su = standard units
uS = micro siemans
mv = millivolts
< value = analyte not detected above method detection limit (MDL)
B = analyte detected between method detection limit (MDL) and practical quantification limit (PQL)
NC = Not collected
NL = No value is listed for total arsenic or total chromium
Bolded values indicate that the value exceeds one or more standard

Table 2. Sediment Analytical Results
Blue Ridge Mine Site, Ochoco National Forest, Crook County, Oregon

Sample ID [1]	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	pH, Saturated Paste
	mg/kg													su
SS-BR-1	<0.08	1.0B	<0.2	0.83	49	61	3.29	99	91	0.5B	0.13	0.13	49	7.0
SS-BR-2	<0.08	1.2	0.4B	1.22	32	53	6.27	13.2	33	<0.2	0.16	0.11	90	6.5
SS-BR-3	<0.08	1.0B	<0.2	0.78	32	38	2.81	0.93	25	<0.2	0.10B	0.05B	52	6.9
SS-BR-4	<0.08	0.6B	0.4B	0.47	25	28	2.16	9.1	19	<0.2	0.07B	0.04B	49	6.8
SS-BR-5	<0.08	1.2	<0.2	0.86	76	57	3.80	306	178	0.2B	0.10	0.25	61	7.0

NOTES: [1] Samples were collected on October 3-7, 2001 by CES. Analysis was conducted by ACZ Laboratories, Inc. in Steamboat Springs, CO.
su = standard units
mg/kg = milligrams per kilogram
< value = analyte not detected above MDL
B = analyte detected between method detection limit (MDL) and practical quantification limit (PQL)
NL = not listed

Table 3. Water Analytical Results
Amity Mine Site, Ochoco National Forest, Crook County, Oregon

Sample I.D. [1]	Antimony, total	Arsenic, total	Beryllium, total	Cadmium, total	Chromium, total	Copper, total	Lead, total	Mercury, total	Nickel, total	Selenium, total	Silver, total	Thallium, total	Zinc, total	pH (lab)	Alkalinity, total	Conductivity @ 25C	Hardness as CaCO3	Calcium, dissolved	Magnesium, dissolved	Residue, Filterable (TDS) @180	Sulfate	Field Measured Parameters				
																						Temp	Field pH	Specific Conductivity	Dissolved Oxygen	Oxidation-Reduction Potential
	mg/L							ug/L	mg/L					su	mg/L	uS	mg/L	mg/L	mg/L	mg/L	mg/L	^{o}C	su	uS	mg/L	mv
SW-A-1	<0.0002	0.0005B	<0.002	<0.0001	<0.01	<0.01	<0.0001	0.0025	<0.01	<0.001	<0.0001	<0.00001	<0.01	7.0	222	495	220	36.0	31.6	280	30	10.6	7.2	460	0	-50
SW-A-2	<0.0002	0.001B	<0.002	<0.0001	0.02B	0.01B	**0.0043**	**0.39**	0.03B	<0.001	<0.0001	0.00006B	0.03B	7.8	223	485	222	36.3	31.9	280	30	7.3	8.04	469	8.4	148
JC-A-3	<0.0002	<0.0005	<0.002	<0.0001	<0.01	0.03B	<0.0001	**0.0143**	<0.01	<0.001	<0.0001	<0.00001	<0.01	7.4	128	274	121	25.2	14.2	170	<10	5.6	7.45	264	7.4	98
JC-A-5	<0.0002	0.0006B	<0.002	<0.0001	<0.01	<0.01	<0.0001	0.0087	<0.01	<0.001	<0.0001	<0.00001	<0.01	7.4	91	183	72	18.0	6.5	130	10B	7.3	7.6	165	4.8	97
SW-BR-5	<0.0002	<0.0005	<0.002	<0.0001	<0.01	<0.01	<0.0001	0.0037	<0.01	<0.001	<0.0001	<0.00001	<0.01	7.7	152	318	145	30.8	16.5	200	20	6.1	7.8	274	5.3	79
JC-A-7	<0.0002	<0.0005	<0.002	<0.0001	<0.01	<0.01	<0.0001	0.0071	<0.01	<0.001	<0.0001	<0.00001	<0.01	6.9	94	196	84	20.6	8.0	130	<10	3.5	7.4	186	7.8	132
JC-A-8	<0.0002	<0.0005	<0.002	<0.0001	<0.01	<0.01	0.0001B	**0.0276**	<0.01	<0.001	<0.0001	0.00009B	<0.01	7.0	119	251	112	23.9	12.7	160	10B	4.3	7.8	248	7.9	104
Standards																										
ODEQ Fresh Water Chronic Criteria	1.6	NL	0.005	0.001	NL	0.012	0.003	0.012	0.16	0.04	0.0001	0.04	0.11													
ODEQ Fresh Water Acute Criteria	9.0	NL	0.130	0.004	NL	0.02	0.082	2.4	1.4	0.26	0.0041	1.4	0.12													

NOTES:
[1] Samples were collected on October 3-7, 2001 by CES. Analysis was conducted by ACZ Laboratories, Inc. in Steamboat Springs, CO.
mg/L = milligrams per liter
ug/L = micrograms per liter
su = standard units
uS = micro siemans
< value = analyte not detected above method detection limit (MDL)
B = analyte detected between method detection limit (MDL) and practical quantification limit (PQL)
NL = No value is listed for total arsenic or total chromium
Bolded values indicate that the value exceeds one or more standard

Table 4. Sediment Analytical Results
Amity Mine Site, Ochoco National Forest, Crook County, Oregon

Sample ID [1]	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	pH, Saturated Paste
	mg/kg													su
SS-A-1	<0.08	2.2	<0.2	0.66	33	34	4.90	1.59	26	<0.2	0.08B	0.04B	59	7.1
SS-A-2	<0.08	0.9B	0.3B	0.71	18	21	3.71	28.8	22	<0.2	0.10B	0.07B	43	7.8
SS-A-3	<0.08	1.3	<0.2	0.82	32	34	3.93	15.6	29	<0.2	0.10B	0.08B	64	6.9
SS-A-4	<0.08	0.6B	<0.2	0.45	28	29	2.71	4.59	20	<0.2	0.07B	0.04B	54	6.9
SS-A-5	<0.08	0.6B	<0.2	0.59	32	39	3.23	0.67	23	<0.2	0.08B	0.03B	59	7.0
SS-A-6	<0.08	0.7B	<0.2	0.53	27	29	2.49	4.00	21	<0.2	0.08B	0.03B	51	7.3
SS-A-7	<0.08	<0.5	<0.2	0.35	29	32	2.32	0.66	22	<0.2	0.04B	<0.02	55	7.1
SS-A-8	<0.08	1.0B	<0.2	0.65	31	39	5.12	38.6	30	<0.2	0.09B	0.05B	72	6.7

NOTES: [1] Samples were collected on October 3-7, 2001 by CES. Analysis was conducted by ACZ Laboratories, Inc. in Steamboat Springs, CO.
su = standard units
mg/kg = milligrams per kilogram
< value = analyte not detected above MDL
B = analyte detected between method detection limit (MDL) and practical quantification limit (PQL)
NL = not listed

Table 5. Background Soil Analytical Results
Blue Ridge Mine Site, Ochoco National Forest, Crook County, Oregon

Sample ID [1]	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	Sulfate	Total Sulfur	Acid-Base Accounting: Acid Generation Potential	Acid-Base Accounting: Acid Neutralization Potential	Acid-Base Accounting: Acid-Base Potential	pH (lab)
	mg/kg													%		t CaCO3/Kt [2]			su
S-BR-12	<0.08	1.7	0.8B	1.14	15	28	6.56	1.4B	17	<0.2	0.13	0.11	69	NA	NA	NA	NA	NA	6.2
S-BR-13	<0.08	1.1	0.7B	0.93	23	29	5.06	0.5B	19	<0.2	0.10	0.07B	46	NA	NA	NA	NA	NA	5.6
S-BR-14	<0.08	0.9B	0.8B	0.95	58	109	3.61	0.28	31	<0.2	0.10B	0.06B	99	<0.01	0.01B	0	14	14	5.5
S-BR-15	<0.08	1.0	0.8B	0.49	15	29	6.73	1.57	13	<0.2	0.05B	0.06B	50	<0.01	0.13	4B	23	19	6.5
S-BR-20	<0.08	0.5B	0.6B	0.44	35	41	3.24	0.44	37	<0.1	0.05B	0.04B	74	0.02B	0.02B	1B	10	9	5.6
S-BR-21	<0.08	0.9B	0.8B	0.84	107	27	6.67	0.33	59	<0.1	0.09B	0.10B	53	NA	NA	NA	NA	NA	5.7
Mean [3]	-	1.02	0.75	0.80	42.2	43.8	5.31	0.75	29.3	-	0.87	0.07	65.2	-	-	-	15.7	14	5.85
PRG Industrial	820	2.7	2,200	810	450	76,000	750	610	41,000	10,000	10,000	130	100,000						

NOTES:

[1] Samples were collected on October 3-7, 2001 by CES. Analysis was conducted by ACZ Laboratories, Inc. in Steamboat Springs, CO.

[2] t CaCO3/Kt = tons of calcium carbonate needed to neutralize 1000 tons of waste/soil. Negative number indicates lack of $CaCO_3$; positive value indicates excess.

[3] Results denoted with a "B" are included in the mean value.

mg/kg = milligrams per kilogram

su = standard units

< value = analyte not detected above MDL

B = analyte detected between method detection limit (MDL) and practical quantification limit (PQL)

NA = not analyzed

PRG = Preliminary Remediation Goals - USEPA Region 9 (November, 2000).

Table 6. Soil and Waste Analytical Results
Blue Ridge Mine Site, Ochoco National Forest, Crook County, Oregon

Sample ID [1]	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	Sulfate	Total Sulfur	Acid-Base Accounting: Acid Generation Potential	Acid-Base Accounting: Acid Neutralization Potential	Acid-Base Accounting: Acid-Base Potential	pH (lab)
	mg/kg													%		t CaCO3/Kt [2]			su
SOIL																			
Process Building Area																			
S-BR-1-0'	<0.08	0.5B	0.5B	0.88	22	140	4.08	200	30	0.7	0.10B	0.06B	54	0.03B	0.03B	1B	14	13	6.4
S-BR-1-1'	<0.08	<0.5	0.6B	1.01	22	174	3.15	16.9	29	0.3B	0.10	0.03B	55	<0.01	<0.01	0	12	12	6.3
S-BR-2-0'	<0.08	0.7B	0.7B	1.05	36	158	3.36	15.2	32	<0.1	0.12	0.05B	59	0.02B	0.03B	1B	13	12	6.1
S-BR-2-1'	<0.08	<0.5	0.6B	1.07	22	164	1.91	1.2B	32	<0.1	0.11	0.04B	54	<0.01	<0.01	0	15	15	6.2
S-BR-3-0'	<0.08	1.3B	0.5B	0.45	26	43	2.33	600B	41	1.5	0.04B	0.25	34	0.05B	0.08B	3B	80	78	7.6
S-BR-3-1'	<0.08	1.1B	0.5B	0.49	43	43	2.34	**2400**	54	1.6	0.05B	0.28	42	0.04B	0.07B	2B	89	87	7.6
S-BR-8-2'	<0.08	2.2	0.4B	0.63	24	38	3.57	201	40	0.2B	0.08B	0.11	39	<0.01	0.03B	1B	11	10	6.7
S-BR-9-1'	<0.08	2	0.5B	0.82	20	59	3.86	524	31	0.2B	0.11	0.08B	56	0.03B	0.05B	2B	10	8	6.8
S-BR-9-1.5'	<0.08	**3.0**	0.5B	0.55	19	46	3.58	244	41	<0.1	0.08B	0.14	41	<0.01	0.03B	1B	22	21	6.5
S-BR-10-1'	<0.08	**6.1**	0.4B	0.25	17	52	3.90	495	31	0.4	0.04B	0.13	46	<0.01	0.08B	3B	11	8	6.2
S-BR-11	<0.08	1.2	0.6B	0.67	33	43	3.35	496	70	0.2B	0.07B	0.25	52	0.01B	0.01B	0	35	34	7.5
Foundations and Pit Area																			
S-BR-18	0.10B	**6.4**	0.5B	0.50	66	80	13.50	**3420**	132	0.3B	0.15	0.20	187	0.02B	0.12	4B	56	52	7.5
S-BR-24	0.30B	**25.6**	<0.4	0.40	23	55	21.40	**917**	17	0.6	0.14	0.19	85	0.25	0.51	16	<1	-17	3.2
S-BR-25-0'	<0.08	**6.5**	0.5B	0.33	30	62	4.56	**1010**	58	0.7	0.05B	0.19	62	0.07B	0.16	5	13	8	7.0
S-BR-25-1'	0.09B	**4.5**	0.6B	0.40	46	65	6.42	**830**	71	0.6	0.07B	0.24	75	<0.01	0.06B	2B	17	15	6.7
Kiln and Condenser Area																			
S-BR-5-0'	<0.08	1.3B	0.6B	1.10	30	69	39.90	**794**	30	0.5	0.19	0.09B	73	0.03B	0.05B	2B	19	18	6.8
S-BR-5-1'	<0.08	1.1B	0.7B	1.21	33	84	7.44	98	22	<0.1	0.23	0.09B	49	<0.01	0.01B	0	<1	-1	6.1
S-BR-6-0'	<0.08	1.0B	0.7B	1.20	38	75	4.66	67	30	<0.1	0.16	0.08B	57	<0.01	<0.01	0	21	21	6.3
S-BR-6-1'	<0.08	1.0B	0.6B	1.17	37	80	6.85	<0.4	29	<0.1	0.17	0.08B	61	<0.01	0.02B	1B	21	20	6.5
S-BR-7-0'	<0.08	1.1B	0.7B	1.30	34	71	5.24	**258000**	23	1.3	0.19	0.10	52	0.01B	0.01B	0	20	19	6.6
S-BR-7-1'	<0.08	1.2	0.7B	0.91	46	104	1.94	187	26	<0.1	0.13	0.05B	54	0.03B	0.06B	2B	13	11	6.5
Secondary Kiln and Processing Area																			
S-BR-16-0'	<0.08	1.0	0.5B	0.57	40	35	4.14	345	52	<0.2	0.06B	0.07B	66	0.03B	0.03B	1B	129	128	7.5
S-BR-16-1'	<0.08	1.0	0.5B	0.46	44	42	4.23	139	50	<0.2	0.07B	0.07B	66	0.03B	0.03B	1B	72	71	7.5
S-BR-17-1'	<0.08	**2.7**	0.6B	0.35	61	57	7.81	**1790**	127	1.7	0.07B	0.24	65	<0.01	0.03B	1B	113	112	7.8
S-BR-19-0'	<0.08	1.8	0.6B	0.40	66	47	3.38	**1780**	139	0.5B	0.06B	0.35	49	<0.01	0.02B	1B	84	84	7.7
S-BR-19-1'	<0.08	2.0	0.6B	0.38	60	59	2.85	**2590**	133	0.3	0.05B	0.36	54	0.02B	0.05B	2B	76	75	7.6

(continued)

Table 6. Soil and Waste Analytical Results *(continued)*
Blue Ridge Mine Site, Ochoco National Forest, Crook County, Oregon

Sample ID [1]	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	Sulfate	Total Sulfur	Acid-Base Accounting: Acid Generation Potential	Acid-Base Accounting: Acid Neutralization Potential	Acid-Base Accounting: Acid-Base Potential	pH (lab)
	mg/kg													%		t CaCO3/Kt [2]			su
WASTE																			
WP-A																			
WP-BR-1-5'	<0.08	1.5	0.6B	0.46	54	74	2.33	295	79	0.4B	0.04B	0.25	64	<0.01	<0.01	0	31	31	7.5
WP-BR-1-15'	<0.08	0.9B	0.9B	0.88	18	40	5.41	5.03	15	<0.2	0.09B	0.11	57	<0.01	0.03B	1	12	11	7.2
WP-BR-1-18'	<0.08	0.4B	0.8B	0.90	9B	40	2.12	1.09	24	<0.2	0.08B	0.03B	75	0.02B	0.02B	1	21	20	7.3
WP-B																			
WP-BR-2-'5	<0.08	1.1	0.4B	0.32	31	62	1.09	19.1	38	<0.2	0.03B	0.05B	59	<0.01	<0.01	0	18	18	7.4
WP-BR-2-15'	<0.08	0.08B	<0.04	0.36	28	53	0.91	2.97	32	<0.2	0.05B	0.04B	51	0.02B	0.02B	1	19	19	7.8
WP-C																			
WP-BR-4-5'	<0.08	0.8B	0.6B	0.68	38	54	1.97	121	52	<0.2	0.06B	0.16	64	<0.01	<0.01	0	20	20	8.0
WP-BR-4-10'	<0.08	0.6B	0.8B	0.98	55	49	1.60	45.7	45	<0.2	0.08B	0.11	70	<0.01	<0.01	0	19	19	8.0
WP-BR-4-15'	<0.08	0.5B	0.8B	1.15	62	45	1.77	9.52	38	<0.2	0.08B	0.09B	68	<0.01	<0.01	0	17	17	7.8
WP-BR-6-5'	<0.08	0.7B	0.6B	0.86	38	55	2.11	132	43	<0.2	0.07B	0.09B	65	0.02B	0.02B	1	21	20	7.5
WP-BR-6-10'	<0.08	0.7B	0.8B	1.06	35	72	2.59	25.9	35	<0.2	0.09B	0.07B	71	<0.01	<0.01	0	18	18	7.6
WP-BR-6-17'	<0.08	1.1	0.5B	0.62	63	88	2.39	57.3	57	<0.2	0.05B	0.07B	57	NA	NA	NA	NA	NA	8.3
WP-D																			
WP-BR-7-3'	<0.08	0.7B	0.7B	0.58	42	55	2.51	184	50	<0.2	0.06B	0.10B	64	0.01B	0.01B	0	19	19	7.5
WP-BR-7-10'	<0.08	0.3B	0.7B	0.91	36	66	1.62	28.2	24	<0.2	0.07B	0.03B	47	<0.01	<0.01	0	18	18	7.1
WP-E																			
WP-BR-8-2'	<0.08	1.3	0.7B	0.41	70	47	2.84	585	191	<0.2	0.04B	0.27	56	0.03B	0.06B	2B	30	29	7.8
WP-F																			
WP-BR-9-0'	<0.08	**3.4**	<0.4	0.37	81	31	3.71	20.2	159	<0.2	0.03B	0.21	40	NA	NA	NA	NA	NA	8.0
WP-BR-9-2.5'	<0.08	**2.3**	<0.4	0.30	68	28	2.29	29.7	128	<0.2	0.02B	0.20	33	0.02B	<0.01	1B	55	55	8.4
WP-BR-9-8'	<0.08	0.7B	0.5B	0.52	61	50	2.29	5.34	79	<0.2	0.04B	0.09B	52	0.01B	0.01B	0	53	53	8.0
Standards																			
PRG Industrial	820	2.7	2,200	810	450	76,000	750	610	41,000	10,000	10,000	130	100,000						

NOTES:
[1] Samples were collected on October 3-7, 2001 by CES. Analysis was conducted by ACZ Laboratories, Inc. in Steamboat Springs, CO.
[2] t CaCO3/Kt = tons of calcium carbonate needed to neutralize 1000 tons of waste/soil. Negative number indicates lack of $CaCO_3$; positive value indicates excess.
su = standard units
mg/kg = milligrams per kilogram
< value = analyte not detected above MDL
B = analyte detected between method detection limit (MDL) and practical quantification limit (PQL)
NA = not analyzed
PRG = Preliminary Remediation Goals - USEPA Region 9 (November, 2000).
Bolded values indicate that the value exceeds the standard

Table 7. Miscellaneous Analytical Results
Blue Ridge Mine Site, Ochoco National Forest, Crook County, Oregon

Sample ID [1]	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	Sulfate	Total Sulfur	Acid-Base Accounting: Acid Generation Potential	Acid-Base Accounting: Acid Neutralization Potential	Acid-Base Accounting: Acid-Base Potential	pH (lab)
	mg/kg													%		t CaCO3/Kt [2]			su
RKF2-BR-1	NA	**4.9**	NA	NA	NA	NA	NA	144	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RKF-BR-2	NA	2.4	NA	NA	NA	NA	NA	32.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PBH-BR-3	<0.08	1.9	0.5B	0.35	55	38	2.97	**2650**	114	0.4B	0.05B	0.30	44	NA	NA	NA	NA	NA	7.7
PB-BR-4	0.67	**7.7**	<0.4	7.20	25	58	65.8	165	71	1.4	0.09B	0.04B	239	1.4	1.77	55	19	-36	NA
PB-BR-5	<0.08	**7.6**	0.4B	0.24	149	70	5.08	**1380**	80	0.2B	0.05B	0.23	88	NA	NA	NA	NA	NA	NA
SSS-BR-6	NA	**6.5**	NA	NA	N	NA	NA	**790**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SSP-BR-7	NA	1.6	NA	NA	N	NA	NA	**1190**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PRG Industrial	820	2.7	2,200	810	450	76,000	750	610	41,000	10,000	10,000	130	100,000						

NOTES: [1] Samples were collected on October 3-7, 2001 by CES. Analysis was conducted by ACZ Laboratories, Inc. in Steamboat Springs, CO.
[2] t CaCO3/Kt = tons of calcium carbonate needed to neutralize 1000 tons of waste/soil. Negative number indicates lack of $CaCO_3$; positive value indicates excess.
NA = not analyzed
su = standard units
mg/kg = milligrams per kilogram
< value = analyte not detected above MDL
B = analyte detected between method detection limit (MDL) and practical quantification limit (PQL)
PRG = Preliminary Remediation Goals - USEPA Region 9 (November, 2000).

Sample Descriptions:

RKF2-BR-1	Concrete sample taken from rotary kiln foundation secondary processing area.
RKF-BR-2	Material collected from inside the condenser tube foundation
PBH-BR-3	Material collected from the hopper at the process building.
PB-BR-4	Material collected from the process building floor adjacent to the kiln.
PB-BR-5	Material collected from outside the process building.
SSS-BR-6	Material collected from the slurry/settling structure.
SSP-BR-7	Material collected from small steel pipe in road to process building.

Table 8. Plant Tissue Analytical Results
Blue Ridge Mine Site, Ochoco National Forest, Crook County, Oregon

Sample ID [1]	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
	mg/kg												
TIS-BR1	<0.08	<0.2	<0.4	<0.04	<2	4B	0.62	0.07B	<2	0.6B	0.05B	0.07B	28
TIS-BR-2	<0.08	<0.2	<0.4	<0.04	<2	10	0.7	0.07B	<2	0.4B	<0.05	0.41	20
TIS-BR-3	<0.08	<0.2	<0.4	<0.04	<2	3B	0.3B	0.12B	<2	<0.2	<0.05	<0.05	14
TIS-BR-4	<0.08	<0.2	<0.4	<0.04	<2	4B	0.7	9.0	3B	<0.2	<0.05	<0.05	12
TIS-BR-5	<0.08	<0.2	<0.4	<0.04	<2	4B	0.38	5.7	<2	0.2B	<0.02	<0.02	17
TIS-BR-6	<0.08	<0.2	<0.4	<0.04	<2	3B	0.46	0.73	<2	<0.2	<0.02	<0.02	10

NOTES: [1] Samples were collected on October 3-7, 2001 by CES. Analysis was conducted by ACZ Laboratories, Inc. in Steamboat Springs, CO.
< value = analyte not detected above MDL
B= analyte detected between method detection limit (MDL) and practical quantification limit (PQL)
NL = not listed
mg/kg = milligrams per kilogram

Table 9. Background Soil Analytical Results
Amity Mine Site, Ochoco National Forest, Crook County, Oregon

Sample ID [1]	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	Sulfate	Total Sulfur	Acid-Base Accounting: Acid Generation Potential	Acid-Base Accounting: Acid Neutralization Potential	Acid-Base Accounting: Acid-Base Potential	pH (lab)
	mg/kg													%		t CaCO3/Kt [2]			su
S-A-13	<0.03	0.85	0.4B	0.68	26.1	25.3	4.05	1.01	36.5	0.09B	0.072	0.082	47.6	NA	NA	NA	NA	NA	5.9
S-A-14	<0.04	0.5B	0.3B	0.63	21	37	4.31	0.12B	26	0.2B	0.08	0.06	59	NA	NA	NA	NA	NA	5.5
S-A-15	<0.09	1.1	0.6B	0.49	34.3	37.3	6.71	0.30	18.5	0.25B	0.09B	0.07B	53.7	<0.01	0.01B	0	8	7	5.6
S-A-16	<0.05	2.0	0.6B	0.55	13	20	5.79	0.12B	12	0.2B	0.08B	0.09B	63	NA	NA	NA	NA	NA	5.6
Mean[3]	-	1.1	0.48	0.59	23.6	29.9	5.22	0.39	23.3	0.19	0.081	0.0755	55.8	-	-	-	-	-	5.7
PRG Industrial	820	2.7	2,200	810	450	76,000	750	610	41,000	10,000	10,000	130	100,000						

NOTES:

[1] Samples were collected on October 3-7, 2001 by CES. Analysis was conducted by ACZ Laboratories, Inc. in Steamboat Springs, CO.

[2] t CaCO3/Kt = tons of calcium carbonate needed to neutralize 1000 tons of waste/soil. Negative number indicates lack of $CaCO_3$; positive value indicates excess.

[3] Results denoted with a "B" are included in the mean value.

su = standard units

mg/kg = milligrams per kilogram

< value = analyte not detected above MDL

B = analyte detected between method detection limit (MDL) and practical quantification limit (PQL)

NA = not analyzed

Table 10. Soil and Waste Analytical Results
Amity Mine Site, Ochoco National Forest, Crook County, Oregon

Sample ID [1]	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	Sulfate	Total Sulfur	Acid-Base Accounting: Acid Generation Potential	Acid-Base Accounting: Acid Neutralization Potential	Acid-Base Accounting: Acid-Base Potential	pH (lab)
	mg/kg													%		t CaCO3/Kt [2]			su
SOIL																			
Ore Hopper and Furnace Building Area																			
S-A-3-0'	<0.03	**5.10**	<0.2	0.18	52.1	69.9	8.74	**2770**	72.0	0.13B	0.054	0.776	61.9	NA	NA	NA	NA	NA	4.1
S-A-3-1'	<0.04	0.48B	0.3B	0.37	27.2	32.8	2.84	130	70.1	<0.09	0.042B	0.083	64.6	0.06B	0.08B	3	3	1	4.3
S-A-5-0'	0.05B	**8.2**	0.2B	0.36	33	53	6.96	**897**	93	0.5B	0.06	0.21	141	NA	NA	NA	NA	NA	7.0
S-A-5-1'	0.04B	**4.70**	0.2B	0.48	36.3	43.7	6.40	272	59.5	0.48	0.067	0.143	83.4	0.95	1.05	33	13	-20	7.4
S-A-6-0'	<0.04	1.0	0.4B	0.41	20	43	4.05	77.9	22	0.2B	0.05	0.06	54	NA	NA	NA	NA	NA	6.8
S-A-6-1'	<0.03	0.59	0.3	0.52	32.7	38.3	3.55	45.1	26.6	0.12B	0.070	0.071	60.3	0.01B	0.01B	0	10	9	6.6
S-A-7-0'	<0.04	0.41B	<0.2	0.43	36.1	31.4	4.92	22.1	30.7	0.25B	0.055	0.059	55.3	NA	NA	NA	NA	NA	6.7
S-A-7-1'	<0.02	0.40	<0.2	0.46	33	31	3.73	4.26	31	0.2B	0.058	0.065	52	<0.01	0.02B	1	7	6	6.7
Areas Adjacent to Waste Piles																			
S-A-9	<0.02	**3.52**	0.3B	0.26	52	64	2.86	420	126	0.2B	0.043	0.348	61	NA	NA	NA	NA	NA	7.5
S-A-10-0'	0.05B	1.15	0.3B	0.259	38.8	58.5	3.400	158	76.2	0.18B	0.053	0.175	46.0	NA	NA	NA	NA	NA	7.7
S-A-10-5'	<0.02	0.65	<0.2	0.47	25	40	1.67	4.44	32	0.2B	0.059	0.045	42	<0.01	<0.01	0	15	15	7.5
S-A-11-0'	0.04B	0.95	0.3B	0.248	58.6	59.8	2.930	69	89.3	<0.09	0.049	0.253	55.8	NA	NA	NA	NA	NA	7.6
S-A-11-5'	<0.04	0.69	<0.2	0.42	33.2	32.1	2.29	5.38	27.4	0.24B	0.055	0.045B	37.2	0.02B	0.03B	1	11	10	7.5
WASTE																			
WP-A																			
WP-A-1-10'	<0.08	1.9	0.5B	0.31	51	54	1.87	198	90	<0.2	0.06B	0.013	51	0.04B	0.06B	2	38	36	7.9
WP-A-1-25'	<0.08	1.3	0.9B	0.38	93	62	2.11	96.5	179	1.1	0.04B	0.35	64	0.43	0.85	27	38	11	7.8
WP-A-1-35'	<0.08	1.0B	0.9B	0.29	24	54	1.81	0.81	21	<0.2	0.05B	0.02B	41	<0.01	<0.01	0	17	17	7.3
WP-B																			
WP-A-3-5'	<0.8	**4.9**	0.9B	0.27	92	58	2.42	17.9	170	<0.2	0.04B	0.31	83	0.04B	0.07B	2B	68	66	7.7
WP-A-3-10'	<0.08	**3.3**	0.7B	0.30	80	63	2.11	5.00	153	<0.2	0.04B	0.31	69	0.03B	0.09B	3B	33	30	7.7
WP-A-3-15'	<0.08	0.4B	0.8B	0.63	70	69	1.55	3.07	60	<0.2	0.24	0.11	98	<0.01	<0.01	0	7	7	7.9
WP-C																			
WP-A-4-10'	<0.08	**2.7**	0.7B	0.36	84	74	3.01	**611**	199	<0.2	0.06B	0.46	95	0.25	1.06	33	34	1	8.0
WP-A-4-20'	<0.08	0.3B	0.6B	0.56	60	55	1.10	3.73	59	<0.2	0.07B	0.03B	75	<0.01	0.01	0	17	17	7.7
WP-A-5-10'	<0.08	0.8B	0.9B	0.42	61	88	2.68	171	95	<0.2	0.06B	0.19	70	<0.01	0.18	6	32	27	8.5
WP-A-5-20'	<0.08	0.3B	<0.4	0.54	65	29	1.58	4.2	32	<0.2	0.07B	0.03B	43	<0.01	<0.01	0	<1	0	7.7
Standards																			
PRG Industrial	820	2.7	2,200	810	450	76,000	750	610	41,000	10,000	10,000	130	100,000						

NOTES:
[1] Samples were collected on October 3-7, 2001 by CES. Analysis was conducted by ACZ Laboratories, Inc. in Steamboat Springs, CO.
[2] t CaCO3/Kt = tons of calcium carbonate needed to neutralize 1000 tons of waste/soil. Negative number indicates lack of $CaCO_3$; positive value indicates excess.
su = standard units
mg/kg = milligrams per kilogram
< value = analyte not detected above MDL
Bolded values indicate that the value exceeds the standard
NA = not analyzed
B = analyte detected between method detection limit (MDL) and practical quantification limit (PQL)
PRG = Preliminary Remediation Goals - USEPA Region 9 (November, 2000)

Table 11. Soil and Waste Analytical Results
Devil's Food Mine Site, Ochoco National Forest, Crook County, Oregon

Sample ID [1]	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	Sulfate	Total Sulfur	Acid-Base Accounting: Acid Generation Potential	Acid-Base Accounting: Acid Neutralization Potential	Acid-Base Accounting: Acid-Base Potential	pH (lab)
	mg/kg													%		t CaCO3/Kt [2]			su
Soil																			
S-A-1-0'	<0.04	0.74	0.3B	0.64	53.2	65.4	3.08	7.20	111	0.12B	0.121	0.084	51.4	NA	NA	NA	NA	NA	6.6
S-A-1-1'	<0.03	0.92	0.2B	0.56	42.8	58.4	3.13	6.88	89.1	0.14B	0.075	0.078	48.8	0.03B	0.03B	1B	10	9	6.8
S-A-2-0'	<0.07	0.6B	<0.1	0.41	35.3	52.6	2.11	3.29	143	0.14B	0.05B	0.06B	47.7	NA	NA	NA	NA	NA	6.8
S-A-2-1'	<0.04	1.04	<0.2	0.29	104	53.6	2.62	86.8	247	0.11B	0.053	0.200	57.6	0.01B	0.01B	0	12	12	6.8
Waste																			
WP-A-6-10'	<0.08	0.7B	0.5B	0.76	47	50	2.54	12.7	111	<0.2	0.09B	0.09B	49	<0.01	<0.01	0	15	15	7.0
WP-A-6-15'	<0.08	0.4B	1.1B	1.23	42	50	2.65	0.8B	46	<0.2	0.14	0.04B	80	<0.01	0.01B	0	12	11	7.4
WP-A-6-20'	<0.08	<0.2	0.8B	1.22	27	65	2.47	0.9B	23	<0.2	0.12	0.02B	67	<0.01	<0.01	0	22	22	7.8
Standards																			
PRG Industrial	820	2.7	2,200	810	450	76,000	750	610	41,000	10,000	10,000	130	100,000						

NOTES:

[1] Samples were collected on October 3-7, 2001 by CES. Analysis was conducted by ACZ Laboratories, Inc. in Steamboat Springs, CO.

[2] t CaCO3/Kt = tons of calcium carbonate needed to neutralize 1000 tons of waste/soil. Negative number indicates lack of $CaCO_3$; positive value indicates excess.

su = standard units

mg/kg = milligrams per kilogram

< value = analyte not detected above MDL

B = analyte detected between method detection limit (MDL) and practical quantification limit (PQL)

NA = not analyzed

PRG = Preliminary Remediation Goals - USEPA Region 9 (November, 2000).

FIGURES

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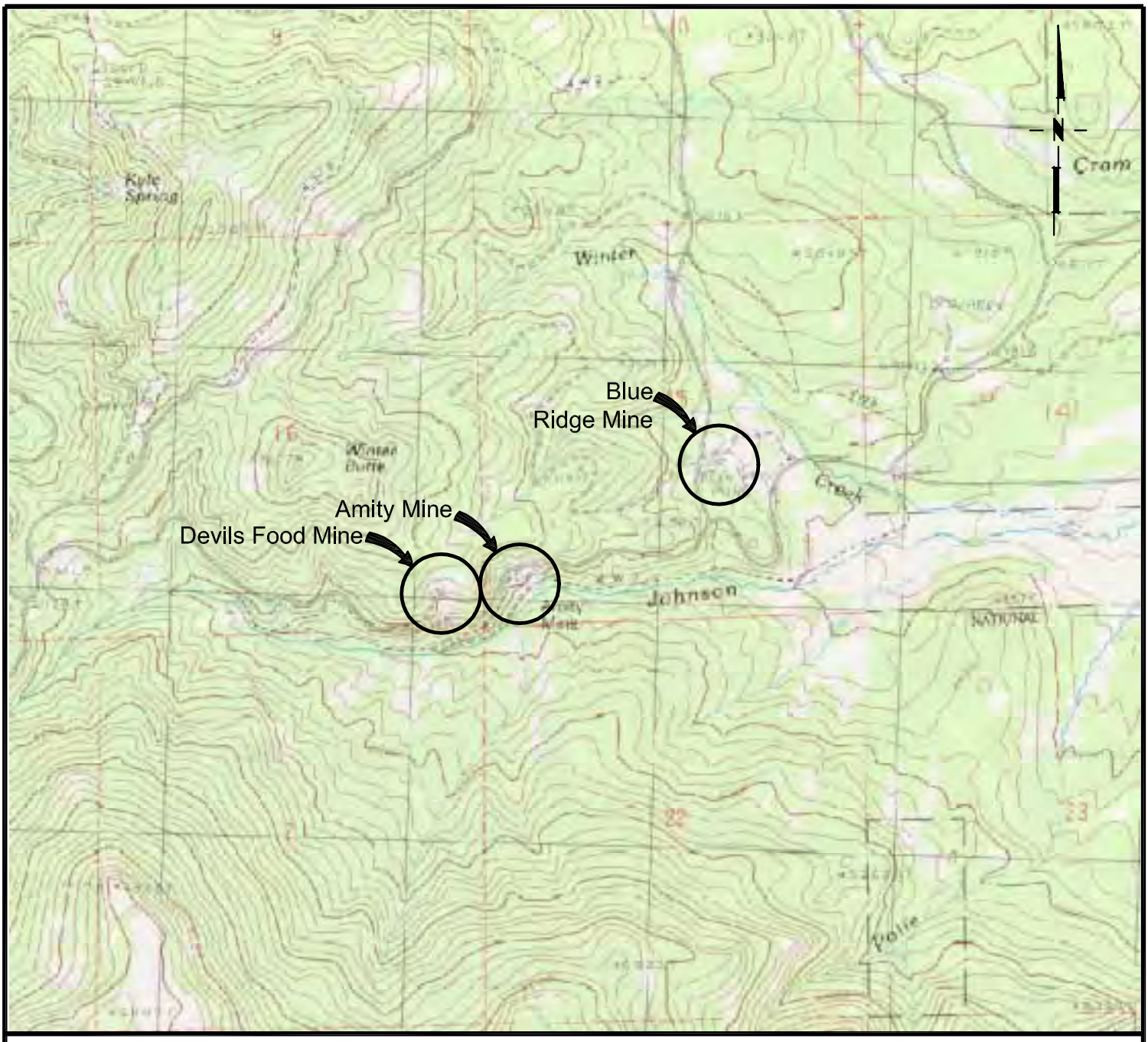
Figure 8.	**Soil and Waste Pile Sampling Locations and Mercury Concentrations – Amity / Devil's Food Mines**



SCALE 1 INCH = 2,000 FEET

1 1/2 0 1 MILE

CONTOUR INTERVAL = 40 FEET

Figure 1. Site Location Map

(SOURCE: 7.5 MIN USGS TOPOGRAPHIC MAP OF LOOKOUT MOUNTAIN, OR 1990)

PROJECT NUMBER: 2140031	SITE INSPECTION FOR BLUE RIDGE AND AMITY MINES
DATE: 1/7/02	
DWG BY: DJM / DWG NO: 2140031A1	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company

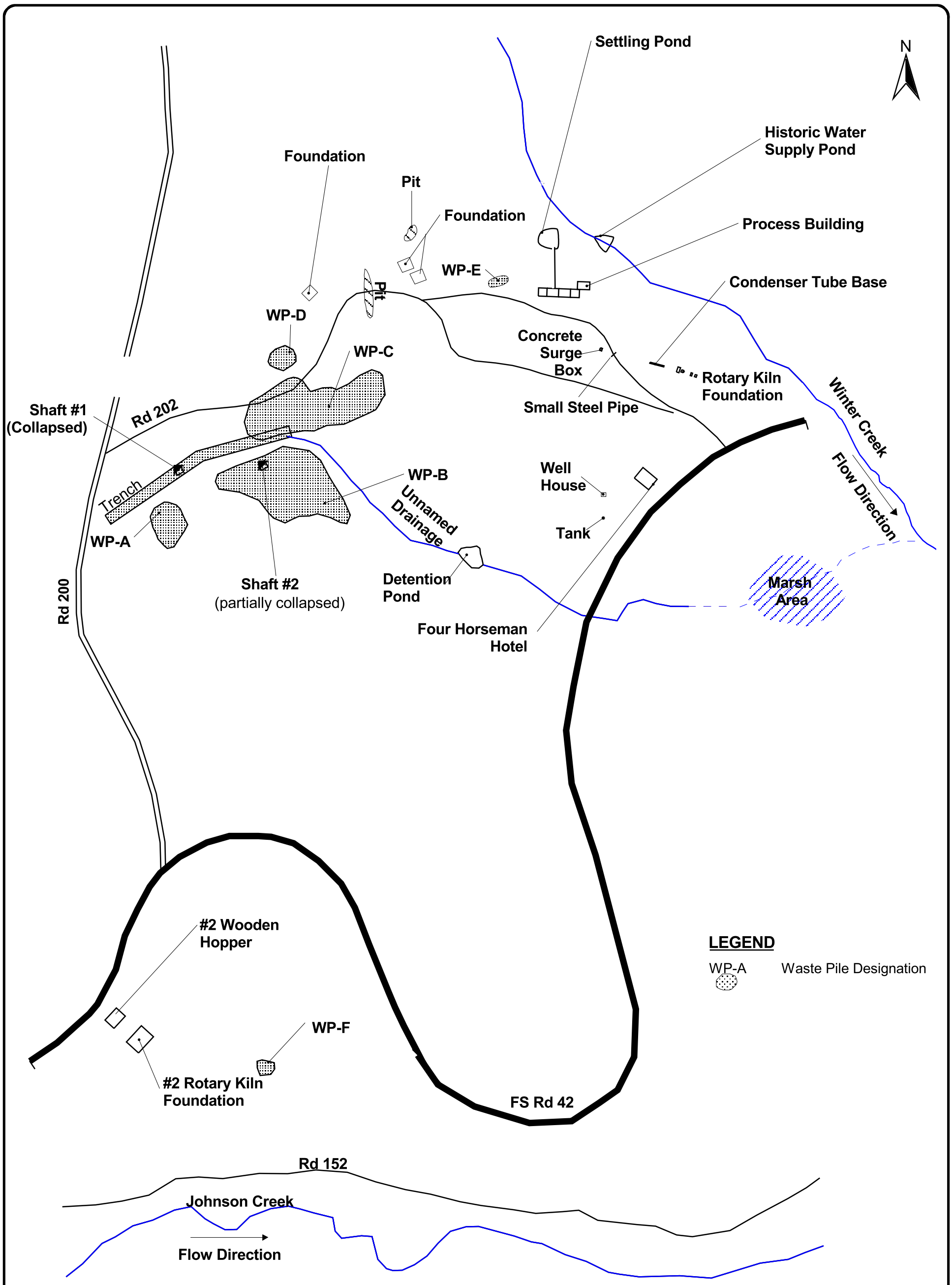


Figure 2. Site Layout - Blue Ridge Mine

SOURCE: USDA Forest Service R-6 Pacific Northwest Region

PROJECT NUMBER: 2140031	SITE INSPECTION FOR BLUE RIDGE AND AMITY MINES
DATE 11/07/01	
DWG BY JP / DWG NO:	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company

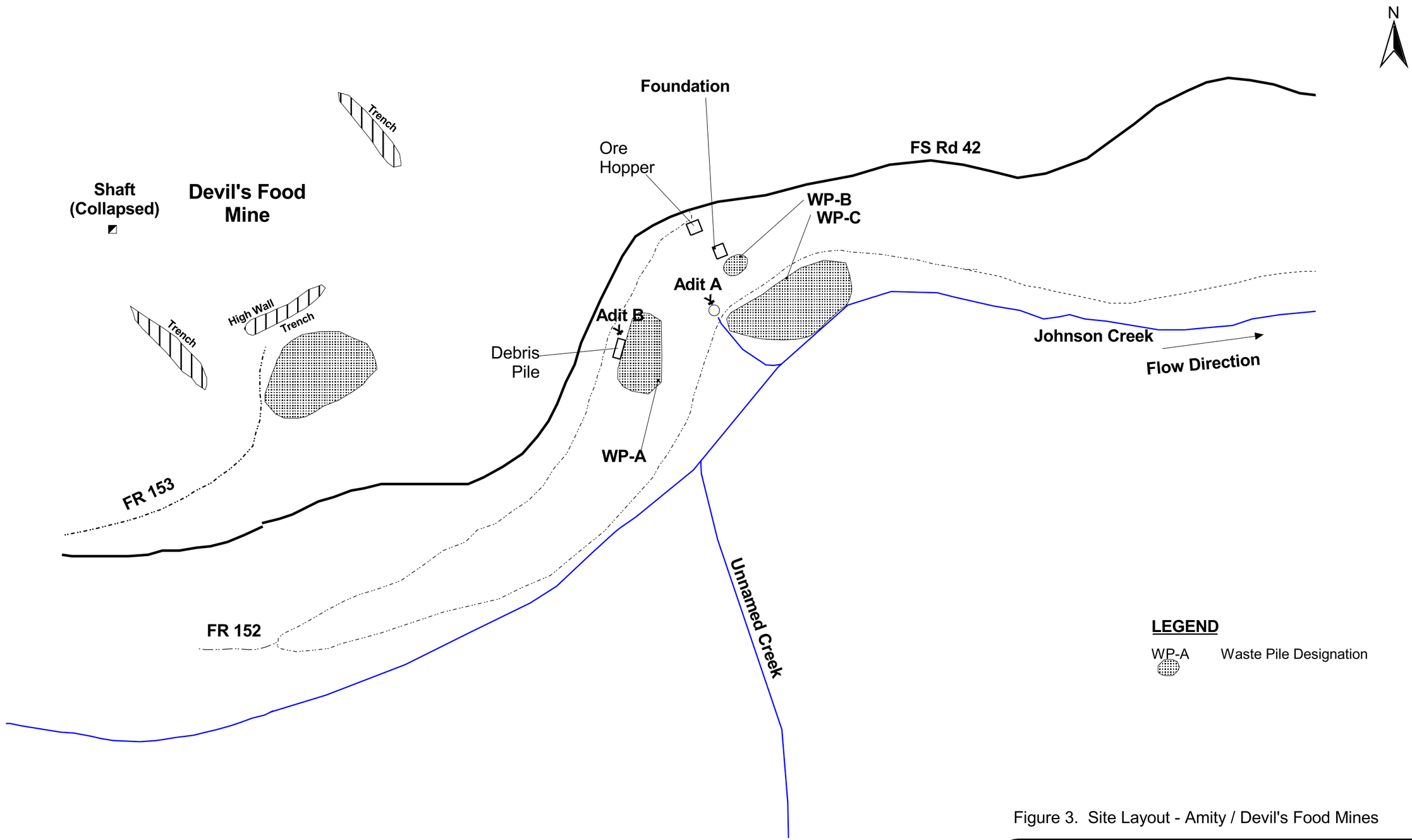


Figure 3. Site Layout - Amity / Devil's Food Mines

PROJECT NUMBER: 2140031	SITE INSPECTION FOR BLUE RIDGE AND AMITY MINES
DATE 11/12/01	
DWG BY JP / DWG NO:	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company

SOURCE: USDA Forest Service R-6 Pacific Northwest Region

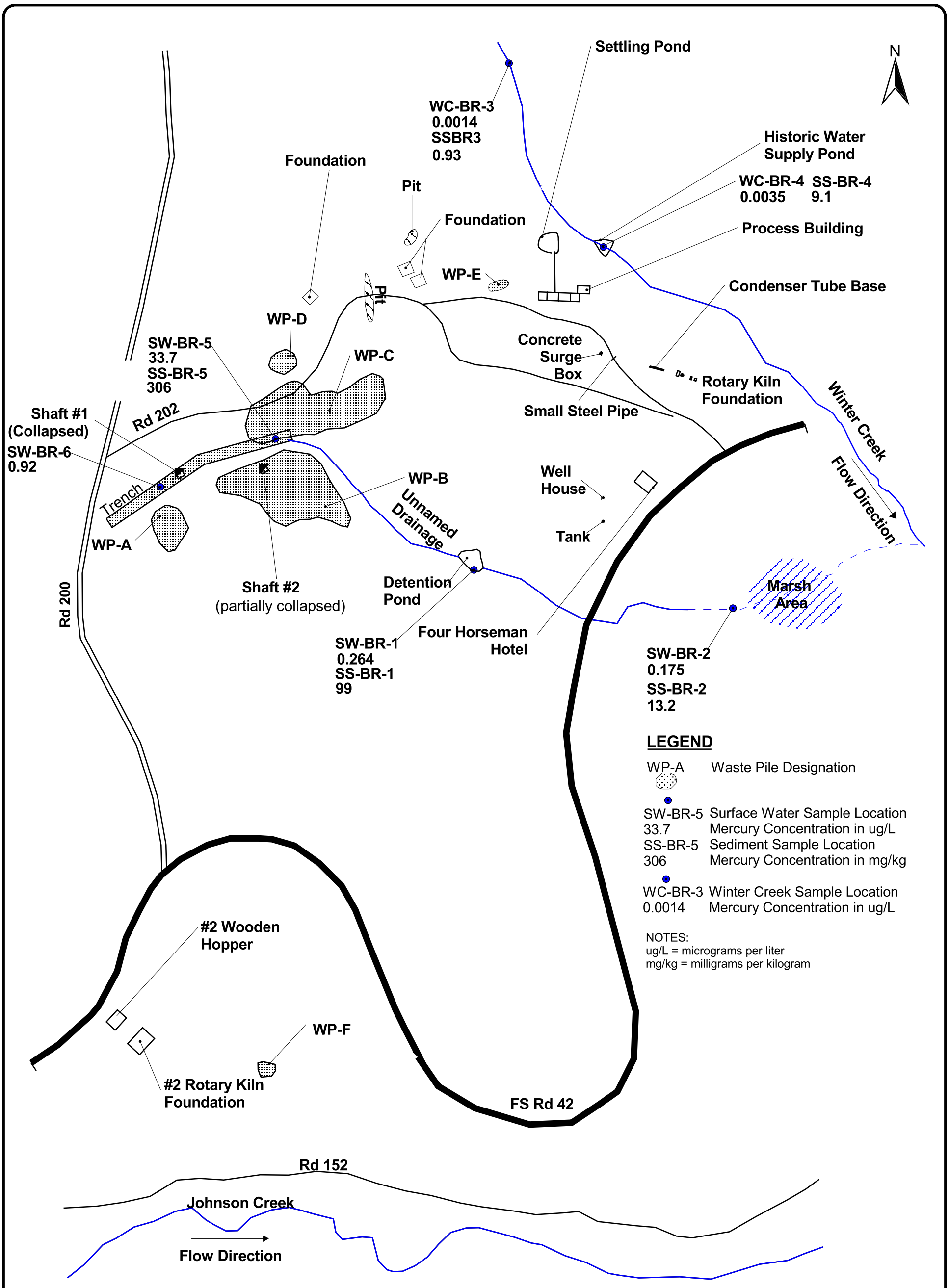
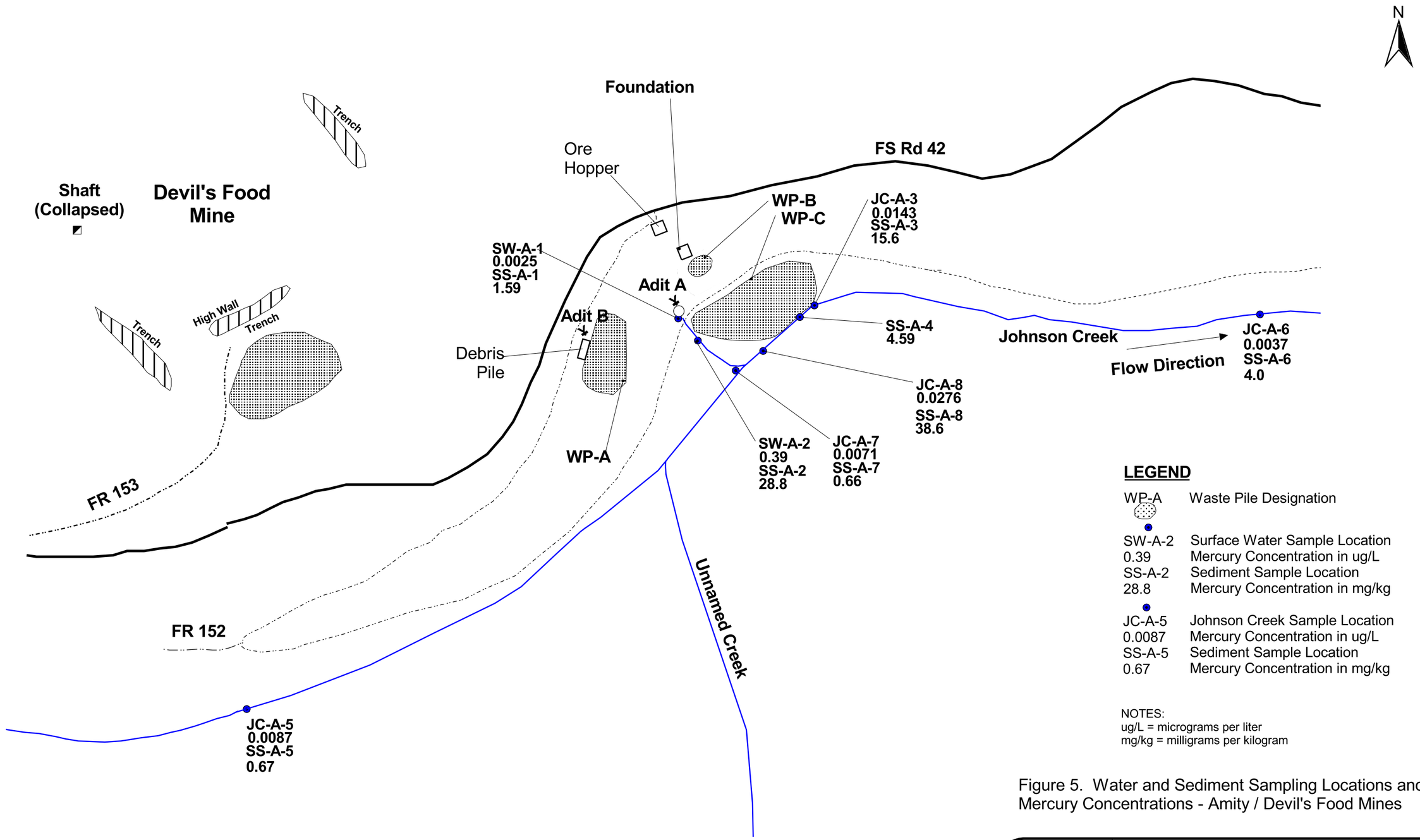


Figure 4. Water and Sediment Sampling Locations and Mercury Concentrations - Blue Ridge Mine

PROJECT NUMBER: 2140031	SITE INSPECTION FOR BLUE RIDGE AND AMITY MINES
DATE 11/07/01	
DWG BY JP / DWG NO:	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company

SOURCE: USDA Forest Service R-6 Pacific Northwest Region



LEGEND

WP-A	Waste Pile Designation
SW-A-2	Surface Water Sample Location
0.39	Mercury Concentration in ug/L
SS-A-2	Sediment Sample Location
28.8	Mercury Concentration in mg/kg
JC-A-5	Johnson Creek Sample Location
0.0087	Mercury Concentration in ug/L
SS-A-5	Sediment Sample Location
0.67	Mercury Concentration in mg/kg

NOTES:
ug/L = micrograms per liter
mg/kg = milligrams per kilogram

Figure 5. Water and Sediment Sampling Locations and Mercury Concentrations - Amity / Devil's Food Mines

PROJECT NUMBER: 2140031	SITE INSPECTION FOR BLUE RIDGE AND AMITY MINES
DATE 12/6/01	
DWG BY JP / DWG NO:	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CES CASCADE EARTH SCIENCES A Valmont Industries Company

SOURCE: USDA Forest Service R-6 Pacific Northwest Region

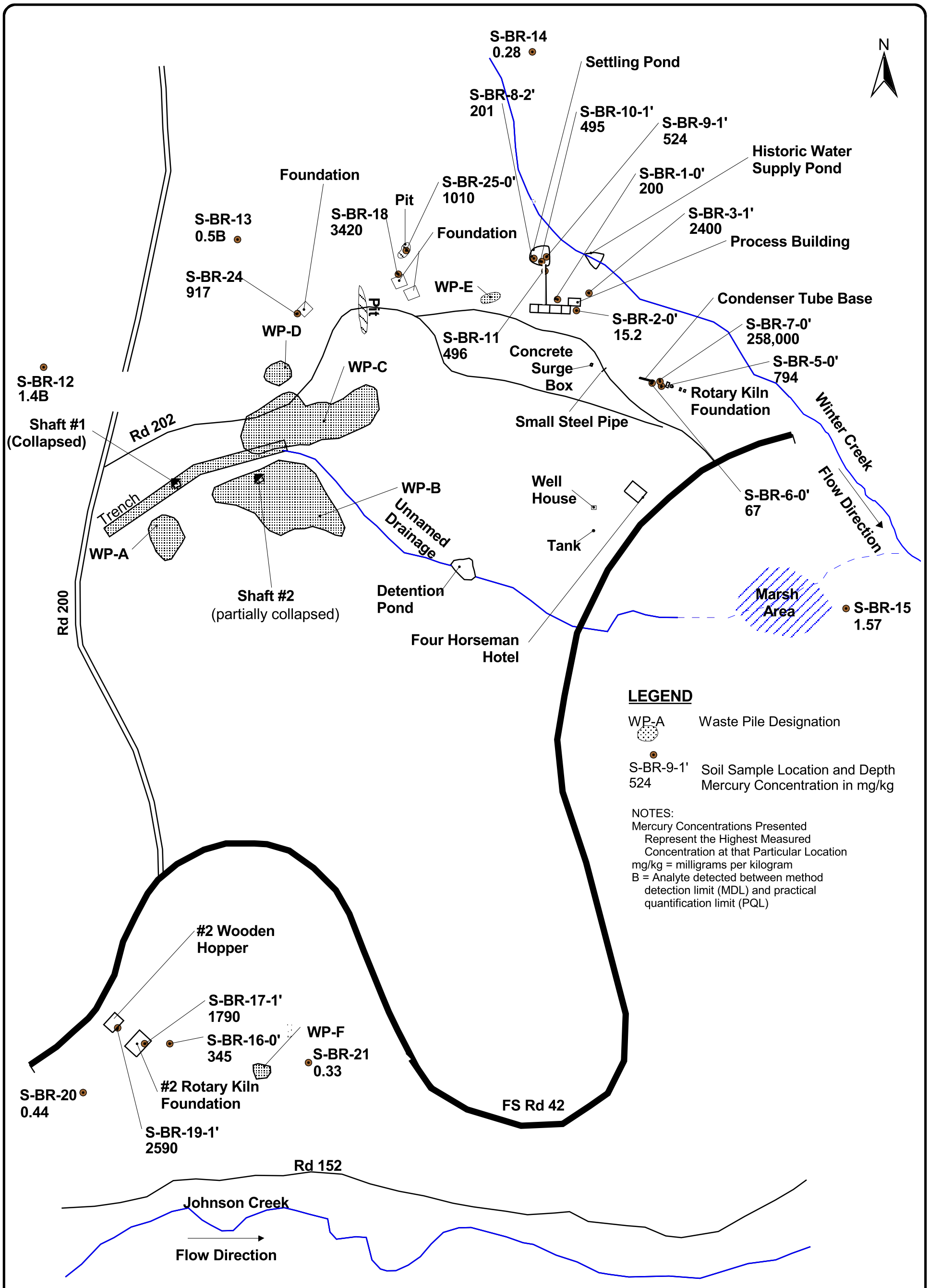


Figure 6. Soil Sampling Locations and Mercury Concentrations - Blue Ridge Mine

PROJECT NUMBER: 2140031	SITE INSPECTION FOR BLUE RIDGE AND AMITY MINES
DATE 11/07/01	
DWG BY JP / DWG NO:	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CES CASCADE EARTH SCIENCES A Valmont Industries Company

SOURCE: USDA Forest Service R-6 Pacific Northwest Region

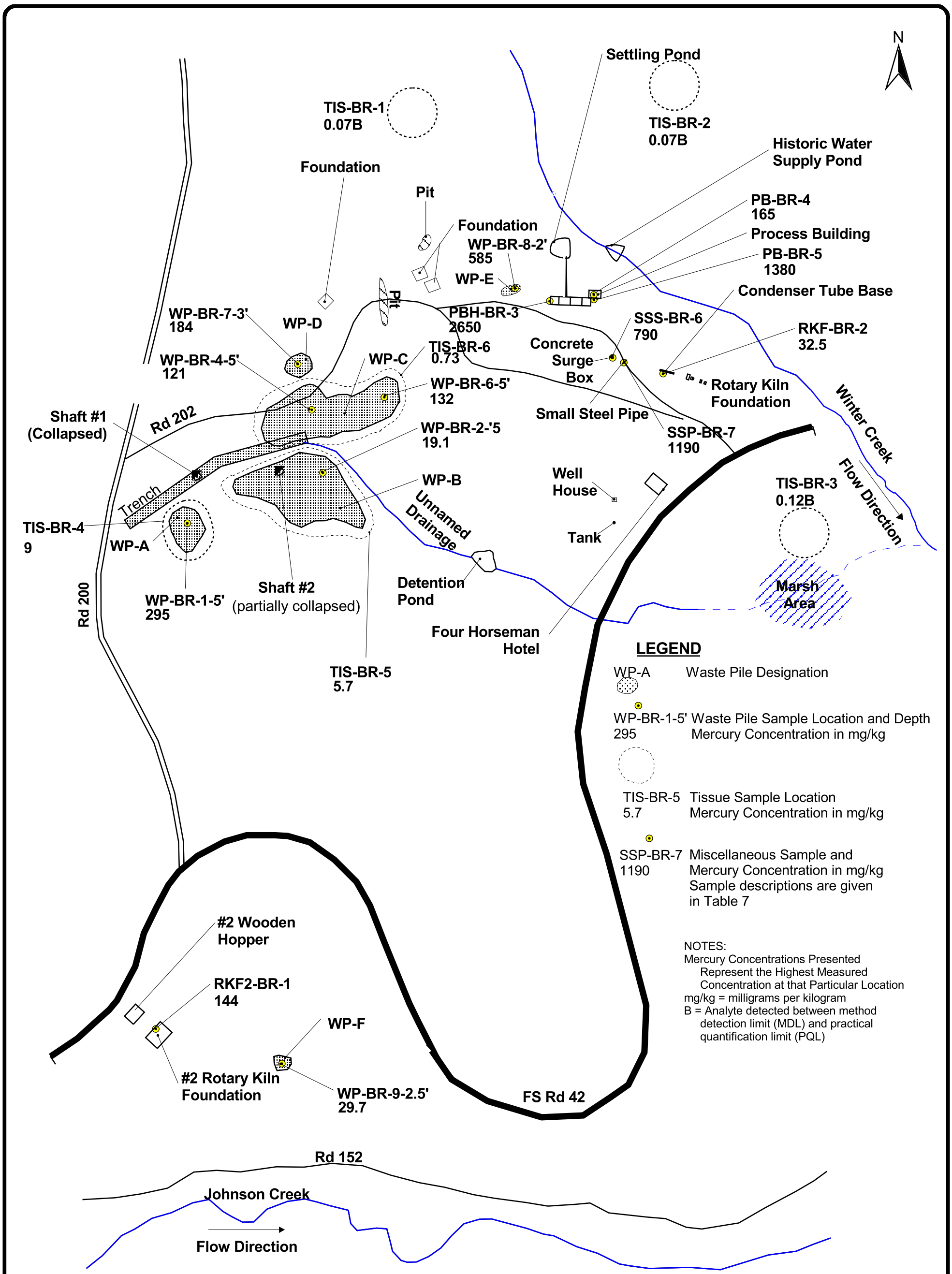
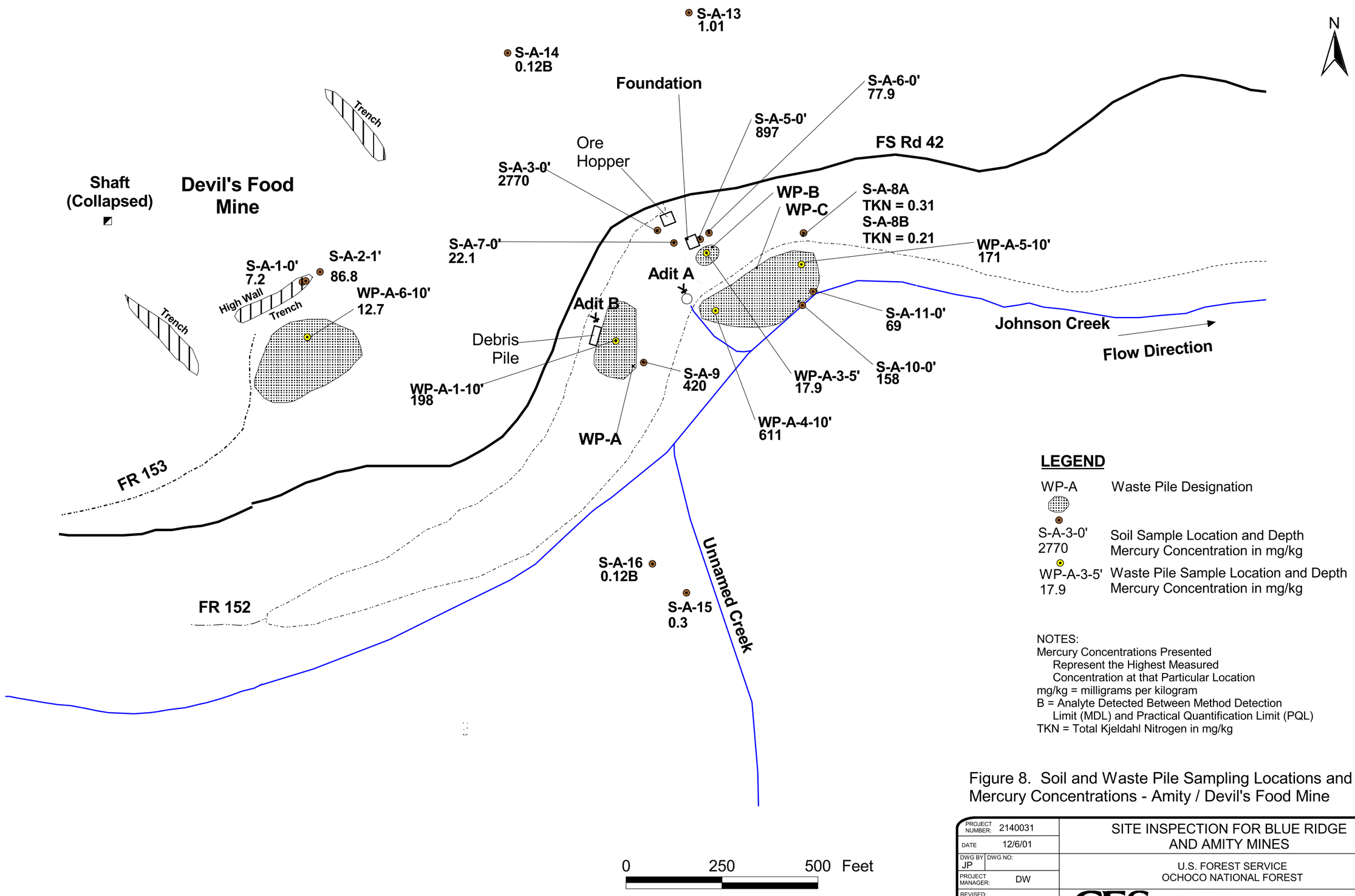


Figure 7. Waste Pile and Tissue Sampling Locations and Mercury Concentrations - Blue Ridge Mine

0 200 400 Feet

SOURCE: USDA Forest Service R-6 Pacific Northwest Region

PROJECT NUMBER: 2140031	SITE INSPECTION FOR BLUE RIDGE AND AMITY MINES
DATE 11/07/01	
DWG BY JP / DWG NO:	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CES CASCADE EARTH SCIENCES A Valmont Industries Company



LEGEND

WP-A	Waste Pile Designation
S-A-3-0' 2770	Soil Sample Location and Depth Mercury Concentration in mg/kg
WP-A-3-5' 17.9	Waste Pile Sample Location and Depth Mercury Concentration in mg/kg

NOTES:
Mercury Concentrations Presented Represent the Highest Measured Concentration at that Particular Location
mg/kg = milligrams per kilogram
B = Analyte Detected Between Method Detection Limit (MDL) and Practical Quantification Limit (PQL)
TKN = Total Kjeldahl Nitrogen in mg/kg

Figure 8. Soil and Waste Pile Sampling Locations and Mercury Concentrations - Amity / Devil's Food Mine

PROJECT NUMBER: 2140031	SITE INSPECTION FOR BLUE RIDGE AND AMITY MINES
DATE 12/6/01	
DWG BY JP / DWG NO:	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company

SOURCE: USDA Forest Service R-6 Pacific Northwest Region

PLATES

Plate 1 **Topographic Map with Estimated Watershed Boundaries and the 1- and 4-mile radii from Sites**
Plate 2 **Topographic Map with 15 Mile Downstream Reach**
Plate 3 **National Wetlands Inventory Quadrangle Map**

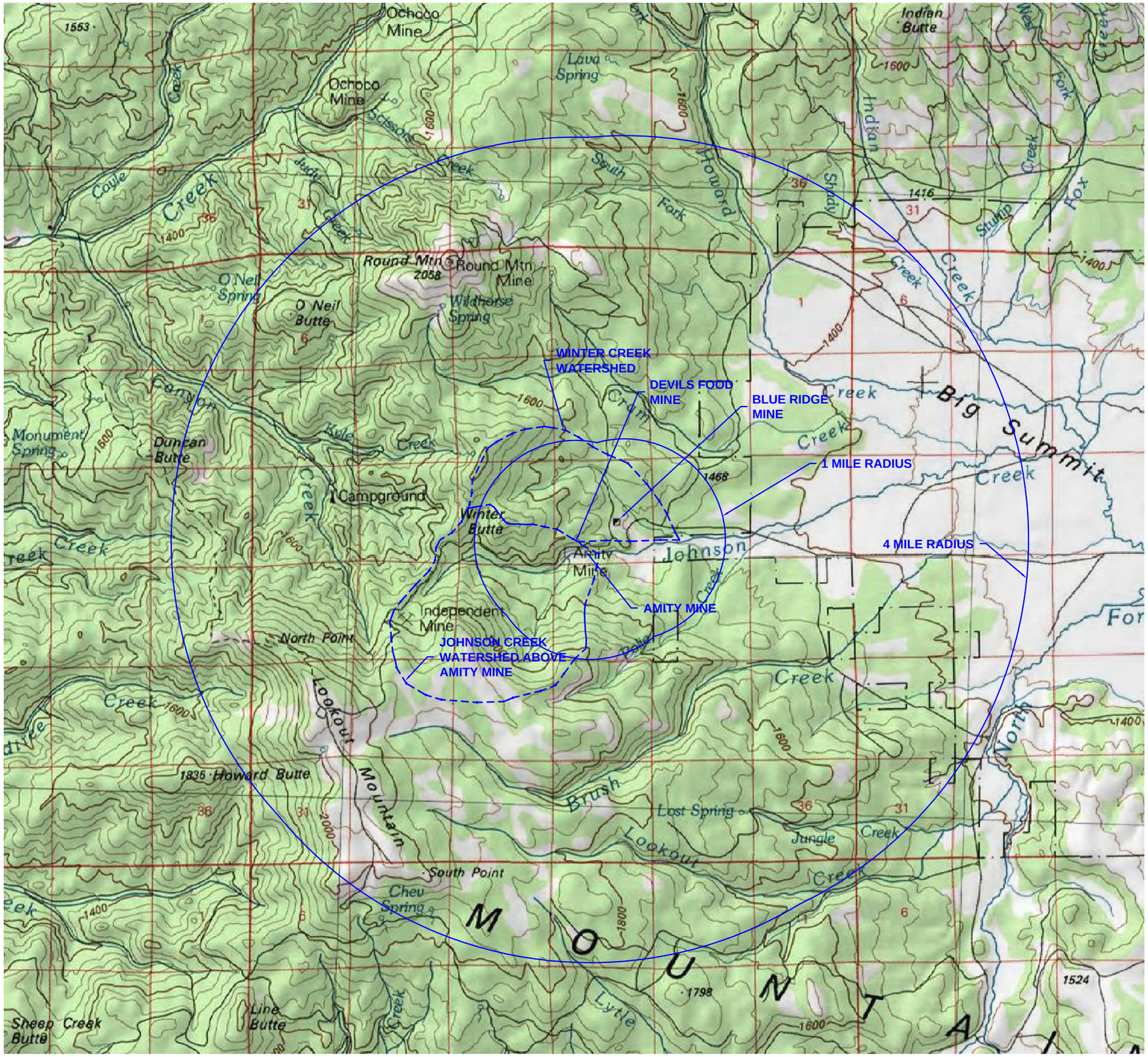


Plate 1 - Topographic Map with Estimated Watershed Boundaries and the 1- and 4-mile radii from Sites

0 4000 FEET
SCALE
(LOCATIONS ARE APPROXIMATE)

PROJECT NUMBER: 2140031	SITE INSPECTION FOR BLUE RIDGE AND AMITY MINES
DATE: 3/11/02	
DWG BY: DJM / DWG NO: 2140031x1	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company

(SOURCE: NATIONAL GEOGRAPHIC MAPS ON CD)

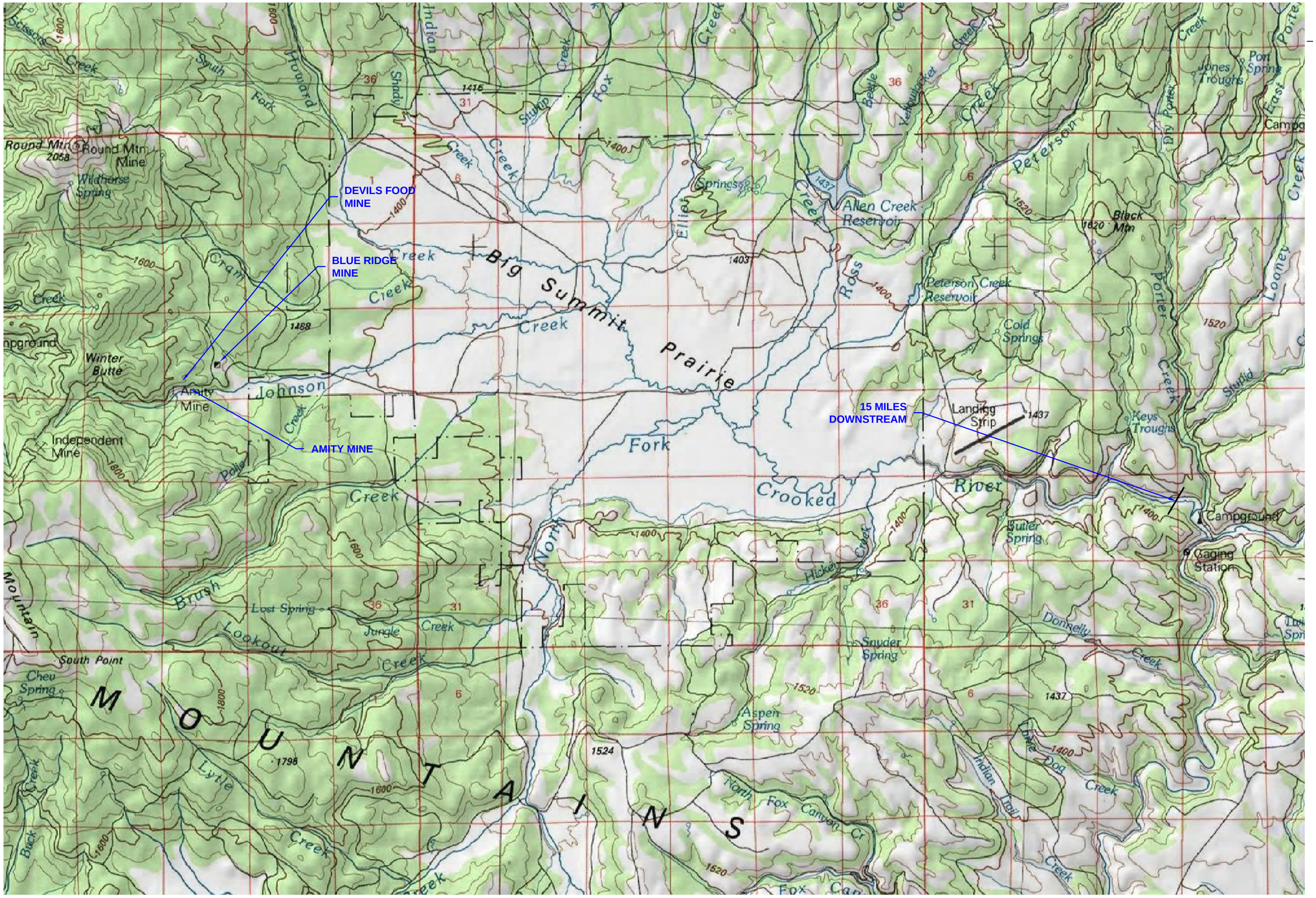


Plate 2 - Topographic Map with 15 Mile Downstream Reach

PROJECT NUMBER: 2140031	SITE INSPECTION FOR BLUE RIDGE AND AMITY MINES
DATE: 3/11/02	
DWG BY: DJM / DWG NO: 2140031x2	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company

(SOURCE: NATIONAL GEOGRAPHIC MAPS ON CD)

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Appendix F. State Well Log
Appendix G. Threatened and Endangered Species Survey
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Appendix I. Preliminary Assessment Amity Mine - Tables and Figures
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Appendix K. Field and Laboratory Quality Assurance / Quality Control
Appendix L. Boring Logs
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Appendix A.

Field Operations Plan

FIELD OPERATION PLAN
Site Inspection of the Blue Ridge and Amity Mines
Crook County, Oregon

September 2001

FIELD OPERATIONS PLAN
Site Inspection of the Blue Ridge and Amity Mines
Crook County, Oregon

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PN: 2140031/ September 2001

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Appendix A. Threatened and Endangered Species and Species of Concern
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1.0 INTRODUCTION

The United States Forest Service (USFS) has requested that Cascade Earth Sciences (CES) perform a Site Inspection (SI) at the Blue Ridge and Amity Mines (Sites). The inspection will follow the US Environmental Protection Agency (USEPA) guidelines for performing a SI. The SI will determine the threat to human health and the environment identified during the Preliminary Assessments (PAs) at the Sites. The scope of the inspection is to collect source samples to quantify hazardous substances onsite and collect media samples to determine migration of hazardous substances from the Sites.

This document comprises the Field Operations Plan, and includes a generic Work Plan for both Sites, a site-specific Sampling and Analysis Plan (SAP), and an Investigation Derived Waste Plan (IDWP). In addition, a stand-alone site-specific health and safety plan (HASP) has also been prepared for planned field activities and is included as an appendix herein.

2.0 BACKGROUND

The Blue Ridge and Amity Mine Sites are both located in the Ochoco National Forest (ONF) in Crook County approximately 33 miles east of Prineville, Oregon (Figure 1). The Blue Ridge Mine is located in the southeast quarter of Section 15, Township 14 South, Range 20 East of the Willamette Meridian, and the Amity Mine is located approximately one mile to the west in the southwest quarter of Section 15. Cinnabar, and other mercury containing minerals, were mined and processed at both sites.

2.1 Blue Ridge Mine Site

The Blue Ridge Mine Site is bordered on the south by Canyon Creek Road (Forest Service Road [FR] 42) and to the west by FR 200. CES performed a Preliminary Assessment (PA) at this Site in November 2000. Winter Creek, a tributary to Johnson Creek , borders the area to the north. Winter Creek flows to Johnson Creek south of the site, dropping approximately 200 feet in elevation across the site. Pertinent remaining structures include: the “Four Horsemen Hotel”, an ore processing building, the former condenser tube foundation, two cement kiln foundations, a wooden rock hopper, and a concrete vault. Several pieces of clay condenser pipe also remain on-site. The mine has been in operation to some extent from 1930 to 1995.

Surface topography has been altered significantly by the past activities at the site. A large open trench and several large waste rock piles are the most significant features of the area. The main shaft opening is partially exposed, even though the shaft itself has caved. In 1937, the extent of the 8-foot by 16-foot shaft was reportedly 100 feet deep, with about 100 feet of drifting. Groundwater seeps into the trench and flows to a surface water detention pond and eventually to a swampy area south of FR42.

2.2 Amity Mine Site

The Amity Mine is bordered on the south by Johnson Creek and on the north by Canyon Creek Road FR 42. A spring emerges from an adit on the site and flows south toward Johnson Creek. Pertinent remaining structures include a wooden rock hopper, and a concrete foundation with large timber framing. The exact use of the building formerly associated with the concrete foundation is not known, but it is thought to be a former mill building. The building may also have housed condenser tubes. A small brick base near a second adit is thought to have been part of a small retort foundation. Evidence of other structures existing in the past was observed in the Preliminary Assessment (PA), conducted by CES in 2000-2001.

Surface topography has been altered by the past activities at the Site. Several large waste rock piles are the most significant surface disturbances observed at the Amity Site. The Site is moderately vegetated with large pines, brush, and open areas of grass. Vegetation is sparse near the waste rock piles, and several piles are barren. The main adit opening is partially exposed, even though the adit itself has caved. Groundwater emanates from the caved adit and ponds approximately 100 feet downslope, creating a small marshy area below the access road to the mine. During the field event for the PA, this area did not appear to flow into Johnson Creek, though freezing conditions at the time may have restricted the flow.

Public use of the Sites and vicinity is most likely minimal, though public access roads are maintained. Access is currently not restricted by fencing or signs. Public access is generally limited to recreational activities such as hunting, rock collecting or firewood cutting. Although no permanent campground is maintained, primitive camping is allowed throughout the National Forests and may occur at either Site. There is an extensive forest service road network that provides access to the area.

3.0 WORK PLAN

3.1 Preliminary Field Work

Field activities are planned to begin on Tuesday October 2, 2001, and continue through the weekend until approximately Monday, October 8, 2001. Personnel scheduled to perform work during field operations include:

MaryAnn Amann (CES)	Team Leader, Safety Officer
Jason Pulley (CES)	Staff Scientist, H&S Monitoring
Colleen Barrett (CES)	Field Technician, H & S Monitoring

All personnel who will be performing work during the field investigation are trained to work in hazardous environments as defined by the Occupational Safety and Health Act (OSHA) 1910.120. Other personnel who will periodically be on site may include:

Dennis Boles (USFS)	On-Scene Coordinator

CES staff will drive directly to the Site on October 2, 2001, and will subsequently check in with Dennis Boles via cell phone upon arrival. Dennis Boles will be available by telephone, and will be available on site throughout field operations. Planned field activities are presented below.

3.2 Planned Field Activities

3.2.1 Inventory Mine Site Features

Staff will inspect the Sites and inventory all mine-related features including: waste rock dumps, tailings dumps, mine pits, adits, mine drainages, and other potential sources of contamination or hazards. The inventory will include photographs, an assessment of condition, and a survey of each noted feature (discussed below).

3.2.2 Waste Source, Soil, Sediment, Water, and Tissue Sampling

Sampling activities at both Sites will include collection of mining and milling waste; soil in the vicinity of mining and milling operations; soil in upgradient or background locations; surface water, sediment, and sediment pore-space water from onsite drainages, and opportunity samples to characterize areas of concern observed during the site reconnaissance. In addition, tissue samples of vegetation from waste sources and undisturbed areas, and bulk material samples (i.e. concrete, powder, etc.) will be collected at the Blue Ridge Mine. Air samples will not be collected as part of this SI. Due to remoteness of the site, it is believed that the air pathway is incomplete.

Samples will be collected according to the procedures outlined in Section 4.2. Samples will be collected from the locations described in Tables 1 and 2, and depicted on Figure 2 and 3. Proposed sampling locations are based on the specific sampling requirements as outlined in the Statement of Work (SOW), and information gathered during several visits to the Sites with USFS personnel.

In summary, a total of 30 waste source, 36 soil, 6 surface water, 5 sediment, 9 bulk material, 7 tissue (including 1 duplicate), 6 duplicate, and 2 split samples will be collected for analysis from the Blue Ridge Mine Site A total of 21 waste source, 25 soil, 9 surface water, 8 sediment, 5 duplicate samples and 2 split samples will be collected for analysis from the Amity Mine Site. In addition, 12 opportunity samples will be collected in the vicinity of the mines. Five of the opportunity samples will be collected at the Independent Mine, upgradient from the Amity Mine. Further details on sampling are included in the Sampling Plan below.

3.2.3 Site Survey

The spatial and vertical location of all source areas and significant mining-related features will be surveyed via Global Positioning Satellite (GPS). The spatial location will also be measured to a common datum, such as the abandoned well and the junction at the road to verify the GPS survey. Vertical locations will be estimated by interpolation on USGS 7.5 minute quadrangle maps. Important environmental features will also be surveyed.

3.3 Documentation

Field logbooks, documentation logs, and photographs will be used to document data collection activities. Information generated from field sampling activities will be documented on the appropriate forms, which include the following:

- field parameter log,
- chain-of-custody record,
- USFS Daily Field Report, and
- location sketches.

Some operations, such as selection of sampling locations, may be altered based on what is discovered during field activities. The field team leader is responsible for recording information including weather conditions, field crew members, visitors to the site, samples collected, the date and time of sample collection, procedures used, any field data collected and any deviations from this work plan.

3.4 Post Activities

Prior to leaving the site, all disturbances to the environment will be minimized. Trash, used equipment, and all other field materials will be removed. All auger holes will be backfilled with bentonite. The site will be left as close to its condition prior to SI field activities as possible.

Prior to leaving the Site, the project team leader will be available to provide a briefing of the field activities to the client project manager.

4.0 SAMPLING AND ANALYSIS PLAN

The objective of the SI is to collect analytical and non-sampling data to identify hazardous substances at the Sites and to determine whether hazardous substances have been released to the environment and whether substances have, or have the potential to, impact human health and the environment. Section 4 outlines the Sampling and Analysis Plan for conducting the SI at both Sites.

4.1 Collection Of Non-Sampling Data

Non-sampling data collection activities will include the verification of population and environmental information as well as new information. This will be accomplished by performing a thorough site reconnaissance of the Sites. Additional activities may be completed from the office; however, specific activities include the following for both Sites:

- Survey the spatial distribution and location, via GPS, of all source areas and significant onsite features;
- Determine the approximate dimensions and volume of all potential onsite source areas and note containment features;
- Determine the apparent overland flow paths for surface water;

- Determine the approximate distance to the nearest individual regularly occupied structure and the approximate distance to the nearest drinking water well, if possible; and
- Survey the Sites for Threatened and Endangered (T&E) species as well as Species of Concern (SOC), as listed in Appendix A, and discussed below.

4.1.1 Threatened and Endangered Species and Species of Concern Survey

The following tasks will be completed to address potential mine impacts on T&E species and SOC occupying habitats near the Amity and Blue Ridge mine sites. CES has contracted ENTRIX to perform the survey. Following field reconnaissance and survey, a technical memorandum will be included as an appendix that qualitatively characterizes species diversity and abundance among Site locations (upstream of the uppermost mine, within the mine habitat area, and downstream of the mines). Specifically, the memorandum will consider whether conditions downstream of the Sites reflect biological differences that cannot be attributed to physical factors unrelated to mine operations.

Task 1. Map and Characterize Wildlife and Aquatic Habitat in Field Reconnaissance

The wildlife habitats on the Site will be mapped based on plant communities using aerial photographs and maps provided initially by the USFS. During Site reconnaissance, the habitat maps will be modified as necessary. Representative locations from each habitat upstream, within and downstream of the Sites will be explored and habitat associations characterized. Specifically, the habitats will be characterized by dominant plant species and unique habitat features, such as the presence of caves, cliffs, perch trees, or aquatic conditions. Sightings of aquatic, amphibious and terrestrial species will be recorded, as observed, although no formal quantitative studies will be conducted.

Task 2. Identify Presence of T&E Species and their Critical Habitat

Critical habitat, for T&E species and habitat criteria for SOC will be identified prior to field reconnaissance based on the Atlas of Oregon Wildlife and other relevant field guides. Habitat at the project site will be compared to the critical habitat and/or habitat criteria for each species. Site areas with and without habitat for the listed species, candidate species and species of concern will be confirmed during field reconnaissance.

4.2 Sampling Activities And Procedures

Samples will be collected from the locations described in Tables 1 and 2, and depicted on Figure 2 and 3. Proposed sampling locations are based on the specific sampling requirements as outlined in the Statement of Work (SOW), included as Appendix B and information gathered during several visits to the Sites with USFS personnel. A summary of sample collection, preservation and holding times is presented in Table 3.

4.2.1 Waste Source and Soil Sampling

Waste source samples will be collected using a track mounted hollow-stem auger (HSA) drilling rig; and soil samples will be collected using either a stainless steel hand auger or a split-spoon sampler with the track mounted HSA. A total of 12 borings will be advanced at the Blue Ridge Mine and a total of 6 borings will be advanced at the Amity Mine. Samples will be collected at various depths below ground surface (BGS). Cores will be logged for depth, lithology, and other characteristics prior to collecting the sample. Samples will be collected in plastic zipper lock-type bags. Approximately ½ gallon of sample material will be collected. Soil and waste rock samples will be placed in an iced cooler and kept at approximately 4°C until arrival at the laboratory. Sample and boring locations are depicted on Figure 2 for the Blue Ridge Mine and Figure 3 for the Amity Mine. Analytical requirements and sampling depths are presented in Tables 1 and 2.

4.2.2 Surface Water Sampling

A total of 6 surface water samples will be collected at the Blue Ridge Mine, two will be collected from Winters Creek, and the remaining will be collected from onsite ponds, intermittent streams, and a marsh. A total of 9 surface water samples will be collected at the Amity Mine, 6 from Johnson Creek and 3 from the discharge of Adit A. One duplicate surface water sample will be collected from each mine site and one split surface water sample collected.

Surface water samples will be collected from the center of the stream or discharge using a decontaminated sampling beaker; the water will subsequently be decanted into the appropriate sample container supplied by the laboratory. Samples will be placed in an iced cooler and kept at approximately 4°C until arrival at the laboratory. Special sampling and handling procedures for low-level mercury analysis (EPA method 1631) are included in Appendix C.

CES field personnel will collect water from the pore space in stream gravels where the substrate exceeds one foot depth. A pore space sample will also be collected if there is no surface water present in the marsh area across from the Blue Ridge Mine Site. To collect the pore space samples in the streambed, a drive point will be driven into the substrate to the maximum depth attainable. The drive point, made of schedule 40 PVC pipe, has a six-inch screen interval to allow for a discrete sample interval. A PVC extension will be attached to the drive point and sample tubing will be inserted inside the PVC pipe. Field personnel will extract the sample using a peristaltic pump. Field parameters will be measured and the appropriate containers filled. The drive point will be left in place, though the extension and sample tubing will be removed after the sample is collected.

4.2.3 Sediment Sampling

A total of 5 sediment samples will be collected at the Blue Ridge Mine; 2 will be collected from Winters Creek, and the remaining will be collected from onsite ponds, intermittent drainages, and a marsh. A total of 7 sediment samples will be collected at the Amity Mine, 5 will be collected from Johnson Creek, and 2 will be collected from the drainage of Adit A. One duplicate sample from each mine site and one split sample will be collected.

Sediment samples will be collected by scooping sediment with a decontaminated stainless steel trowel; the sediment will then be placed in a stainless steel bowl and mixed thoroughly. This will separate large gravels and water from the sediment. Sediment will then be placed in laboratory-supplied clean 16-ounce glass jars with Teflon lids. Samples will be placed in an iced cooler and kept at approximately 4°C until arrival at the laboratory.

4.2.4 Bulk Sampling

Building materials samples will be collected in bulk and submitted to the laboratory for preparation prior to analysis. Building materials include concrete, residue and possibly wood. Sampling equipment will include a hammer, chisel, saw, and power drill equipped with a hollow-core bit. An extended small diameter bit may also be necessary for drilling into the narrow pipes to dislodge sediments.

For the residue that is in pipes, a hammer will be used to tap the pipe and loosen material from the walls. A thin, narrow strip of PVC pipe will be used to scrape the inside of the pipe and remove the residue. If needed, a narrow drill bit will be used to dislodge the material. The residue will be collected into a small zipper lock-type bag.

For concrete, the sample will be broken into small pieces using a hammer and chisel. The pieces will be placed in a zipper lock-type bag and submitted to the laboratory. The laboratory will crush the samples to obtain fine materials for analysis.

For wood, enough material will be collected to fill a pint size zipper lock-type bag. The material will be shredded at the laboratory to attain a representative sample of appropriate particle size for analysis.

All samples will be collected into pre-labeled plastic zipper lock-type bags, sealed, and placed into another zipper lock-type bag. Following sample collection, the unique sample identification name/number will also be written on the object sampled. All sampling equipment will be decontaminated prior to collection of the next sample.

4.2.5 Tissue Sampling

Tissue samples of grasses will be collected at the Blue Ridge Mine due to the observation of grazing activities. CES will collect seven samples to assure a limited degree of statistical integrity: three samples from waste rock piles, three samples in undisturbed areas, and one duplicate sample. Also for statistical integrity, the inflorescence of the same species of grass will be sampled at each location. The samples will be collected into a pint size zipper lock type baggies. Samples will be placed in an iced cooler and kept at approximately 4°C until arrival at the laboratory.

4.3 Target Analytes

CES has contracted with ACZ Laboratory, in Steamboat Springs, Colorado, to perform all of the analysis. Split samples will be analyzed by North Creek Analytical Laboratory in Portland, Oregon. All soil, waste source, and sediment samples will be analyzed in the laboratory for pH, sulfur forms, and the total concentrations of the 13 metals (Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn). In addition, five samples collected from within the presumed most impacted areas and one background soil sample will be analyzed for acid-base accounting (ABAs). Bulk materials will be analyzed for mercury and arsenic only. The soil sample collected from the powder house at the Amity Mine (sample number S-A-8) will be analyzed for total Keldjahl nitrogen, to determine if explosive residue is present.

Surface water and sediment pore space samples will be analyzed in the field for pH, temperature, conductivity, total dissolved solids (TDS), dissolved oxygen (DO), and oxidation reduction potential (ORP). Water samples will be analyzed in the laboratory for: pH, TDS, hardness as calcium carbonate ($CaCO_3$), acidity as $CaCO_3$, alkalinity as $CaCO_3$, sulfur, conductivity, and the 13 metals listed above. In addition, the water samples will have low level mercury analysis by EPA Method 1631, which will detect concentrations below the freshwater chronic criteria for the protection of aquatic life of 0.012 micrograms per liter.

4.4 Decontamination Methods

All sampling equipment (bowls, trowels, augers, etc.) will be stainless steel, and will be decontaminated before sampling. Equipment decontamination consists of a tap water rinse, a soap and tap water wash, a dilute HNO_3 rinse (10 parts DI water to 1 part concentrated HNO_3) and a DI water rinse followed by air drying. Decontamination water will be discharge directly to soils at the Sites.

4.5 Sampling Designation and Labeling

The following sample numbering system will be used to identify samples collected during field operations:

Soil Sample Number Example: WP-A-1-5’

Where:

WP	=	Waste Pile (“S” for soil, “SS” for sediment)
A	=	Amity Mine (“BR” for Blue Ridge Mine)
1	=	Sample Number
5’	=	Depth of sample from ground surface

Water Sample Number Example: JC-A-7 (or SW-A-1)

Where:

SW	=	Surface Water
JC	=	Johnson Creek (“WC” for Winters Creek)

A	=	Amity Mine ("BR" for Blue Ridge Mine)
1	=	Sample Number

All sample identification labels will be engraved onto sheet metal and stapled onto wooden stakes. The stakes will be installed into the ground surface to a depth of at least 8 inches. At locations where this is not possible, the stake will be secured by placing rocks around it. An orange survey flag will also be placed near the stake to facilitate future sighting of the markers.

5.0 QUALITY ASSURANCE AND QUALITY CONTROL PLAN

The following standards will be maintained during sampling and analysis to ensure that the data generated for the assessment meets data quality objectives outlined in *Data Quality Objectives for Remedial Response Activities, Development Process* (EPA, 1987). All laboratory and field data will be subject to EPA Level II QA/QC standards. All values between the method detection limit (MDL) and the practical quantitation limit (PQL) will be noted on the laboratory analytical reports. Table 2 presents sampling information, including data quality objectives, analysis methods, preservation, and holding times. Table 3 lists the method detection and reporting limits for the priority pollutants analysis.

5.1 Field QA/QC

According to USEPA Quality Assurance/ Quality Control Guidelines, at least one duplicate and one equipment rinsate blank should be analyzed for each ten samples collected. The intent of these guidelines is to assess the precision of field sampling, and assure that contamination has not occurred in the field and that decontamination procedures were followed. However, based on the number of samples proposed above, this will add an additional 18 samples to the analytical costs. CES suggests that the number of QA/QC samples could be decreased to one duplicate for each 15 samples and one equipment rinsate blank for each 25 soil samples in an effort to reduce analytical costs, while maintaining adequate QA/QC. In addition, a split sample of each matrix will be collected and analyzed by a different laboratory to check the contract laboratory's handling and analytical techniques.

Field duplicate samples will be collected for each medium sampled (waste source, soil, sediment, and water) and will be submitted for laboratory analysis. One duplicate sample will be collected for every 15 waste source and soil samples, and for every 10 sediment, water and tissues samples. The total number of duplicate samples to be collected are: 7 waste source and soil samples, 2 water samples, 2 sediment samples, and 1 tissue sample. Duplicate samples will be submitted to the laboratory "blind" along with the Site samples. Duplicate samples not submitted to the laboratory will be held for use in case of lost or broken samples.

The low level mercury analysis (Method 1631) for water samples has special field blank procedures. These procedures are described in Appendix C.

Equipment rinsate blank samples will be collected during sampling activities to test for cross-contamination between samples. The blank will be prepared by passing distilled water over

decontaminated sampling equipment. Two rinsate samples will be collected from the soil sampling equipment decontamination rinsate and two rinsate samples will be collected from the decontaminated augers used to drill into the waste piles, for a total of four rinsate blank samples. The rinsate samples will be collected in the cleaned sampling bucket and then poured into the appropriate sample containers. The rinsate samples will be given unique labels. The samples will be analyzed for the 13 metals (Table 1).

All samples will be collected in laboratory-supplied jars and bottles, labeled and transported according to the protocol described above. A chain-of-custody will be maintained from the time of sample collection until the time the samples are received by the analytical laboratory. The chain-of-custody will be signed by anyone who accepts responsibility for the samples, except the shipper. Shipping documents will represent custody of the samples by the shipper.

5.2 Laboratory QA/QC

The laboratory will follow all requirements for analysis and reporting under the USEPA Level II protocols (USEPA, 1987), including, laboratory blanks, laboratory duplicates, matrix spikes and matrix spike duplicates. All samples will be analyzed within the holding times specified for the individual analytical procedure. All values between the MDL and the PQL will be noted on the laboratory analytical reports. Any sample analysis completed after the specified holding time will be noted in the laboratory analytical report. All analytical reports will be reviewed to see that all spikes, duplicates and lab blanks are within acceptable limits.

6.0 HEALTH AND SAFETY PLAN

The health and safety plan has been prepared as a separate document, and is included as Appendix D.

7.0 INVESTIGATION-DERIVED WASTES PLAN

CES does not expect to generate any wastes during this field investigation. All wastes generated from decontamination procedures will be left on-Site. Cuttings from the drilling operations will be left on the waste rock piles.

8.0 REFERENCES

USEPA, 1991 *Guidance for Performing Site Inspections Under CERCLA.*

Table 1A. Waste Source Sample Collection Program Summary
U.S. Forest Service, Ochoco National Forest, Blue Ridge Mine

Media	Sample ID	Depth	Location	Field Parameters	Laboratory Analysis		
					Total Metals[2]	Sulfur/ Sulfide	Paste pH
Waste Source	WP-BR-1	5', 15' and >5'BP[1]	Open trench waste piles	Description based on Unified Soil Classification System (USCS) description	X	X	X
	WP-BR-2	5', 15' and >5'BP	Open trench waste piles		X	X	X
	WP-BR-3	5', 15' and >5'BP	Open trench waste piles, near shaft		X	X	X
	WP-BR-4	5', 10', 15' and >5'BP	Open trench waste piles		X	X	X
	WP-BR-5	5', 10', 15' and >5'BP	Open trench waste piles		X	X	X
	WP-BR-6	5', 10', 15' and >5'BP	Waste pile area		X	X	X
	WP-BR-7	5', 10', 15' and >5'BP	Waste pile area		X	X	X
	WP-BR-8	2' and >5'BP	Process building foundation waste pile		X	X	X
	WP-BR-9	0', half and >1'BP	#2 Site		X	X	X
	WP-BR-10	5'	Duplicate sample of WP-BR-2-5'		X	X	X
	WP-BR-11	15'	Duplicate sample of WP-BR-4-15'		X	X	X
	WP-BR-12	5'	Split of WP-BR-5-5'		X	X	X

[1] BP = below waste material/native soil interface
[2] Target Analyte List = Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn

Table 1B. Soil Sample Collection Program Summary
U.S. Forest Service, Ochoco National Forest, Blue Ridge Mine

Media	Sample ID	Depth	Location	Field Parameters	Laboratory Analysis		
					Total Metals[1]	Sulfur/ Sulfide	Paste pH
Soil	S-BR-1	0' and 1'	Native material at process building	Description based on	X	X	X
	S-BR-2	0' and 1'	Native material at process building	Unified Soil Classification	X	X	X
	S-BR-3	0' and 1'	Native material at process building	System (USCS) description	X	X	X
	S-BR-4	0'	Duplicate of S-BR-1-0'		X	X	X
	S-BR-5	0' and 1'	Rotary kiln foundation		X	X	X
	S-BR-6	0' and 1'	Rotary kiln foundation		X	X	X
	S-BR-7	0' and 1'	Rotary kiln foundation		X	X	X
	S-BR-8	1', 5' and 10'	Settling pond		X	X	X
	S-BR-9	1', 5' and 10'	Settling pond		X	X	X
	S-BR-10	1', 5' and 10'	Settling pond		X	X	X
	S-BR-11	0'	Pipeline at settling pond		X	X	X
	S-BR-12	> OG horizon	Background soil sample #1 to be determined		X	X	X
	S-BR-13	> OG horizon	Background soil sample #2 to be determined		X	X	X
	S-BR-14	> OG horizon	Background soil sample #3 to be determined		X	X	X
	S-BR-15	> OG horizon	Background soil sample #4 to be determined		X	X	X
	S-BR-16	0' and 1'	#2 rotary kiln foundation		X	X	X
	S-BR-17	0' and 1'	#2 rotary kiln foundation		X	X	X
	S-BR-18	0' and 1'	#2 rotary kiln foundation		X	X	X
	S-BR-19	0' and 1'	#2 hopper downhill side		X	X	X
	S-BR-20		#2 background soil sample #1 to be determined		X	X	X
		> OG horizon					
	S-BR-21		#2 background soil sample #2 to be determined		X	X	X
		> OG horizon					
	S-BR-22	> OG horizon	Duplicate of background soil sample S-BR-20		X	X	X
	S-BR-23	1'	Split of S-BR-9-1'		X	X	X

[1] Target Analyte List = Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn
> OG = sample to be collected beneath the organic horizon

Table 1C. Surface Water and Sediment Sample Collection Program Summary
U.S. Forest Service, Ochoco National Forest, Blue Ridge Mine

Media	Sample ID	Location	Field Parameters [1]	Laboratory Analysis								
				Total Metals[2]	Hardness as $CaCO^3$	SC	TDS	Alkalinity as $CaCO_3$	Acidity as $CaCO_3$	pH	Sulfur/ Sulfide	Sulfate
Surface Water	SW-BR-1	Detention pold below trench	SC, pH, Temp, DO and ORP	X	X	X	X	X	X	X		X
	SW-BR-2	Marshy area across road		X	X	X	X	X	X	X		X
	WC-BR-3	Winter Creek upstream from settling pond		X	X	X	X	X	X	X		X
	WC-BR-4	Winter Creek dowstream from settling pond		X	X	X	X	X	X	X		X
	SW-BR-5	Small pond in trench		X	X	X	X	X	X	X		X
	SW-BR-6	Small stream above trench impoundment		X	X	X	X	X	X	X		X
	SW-BR-7	Duplicate sample of WC-BR-4		X	X	X	X	X	X	X		X
Sediment	SS-BR-1	Same as SW-BR-1		X						X	X	
	SS-BR-2	Same as SW-BR-2		X						X	X	
	SS-BR-3	Same as SW-BR-3		X						X	X	
	SS-BR-4	Same as SW-BR-4		X						X	X	
	SS-BR-5	Same as SW-BR-5		X						X	X	
	SS-BR-6	Duplicate sample of SS-BR-4		X						X	X	

[1] Field Parameters: SC = specific conductivity; Temp = Temperature; DO = dissolved oxygen; ORP = oxydation reduction potential

[2] Target Analyte List = Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn

$CaCO_3$ = calcium carbonate

TDS = total dissolved solids

Table 1D. Bulk Sample Collection Program Summary
U.S. Forest Service, Ochoco National Forest, Blue Ridge Mine

Media	Sample ID	Location	Total Mercury and Arsenic Analysis
Bulk	PB-BR-1	Deteriorating concrete floor	X
	PB-BR-2	Deteriorating concrete floor	X
	PB-BR-3	Deteriorating concrete floor	X
	PB-BR-4	Deteriorating concrete floor	X
	PB-BR-5	Dark gray material in front of door to kiln	X
	SSS-BR-6	Material within slurry/settling structure	X
	SSP-BR-7	Material in small steel pipe in road to process building	X
	RKF-BR2-8	#2 Rotary Kiln Floor	X
	RKF-BR2-9	#2 Rotary Kiln Floor	X

PB = Process Building
SSS = Slurry/settling structure
SSP = Small steel pipe
RKF = Rotary Kiln Foundation

Table 1E. Tissue Sample Collection Program Summary
U.S. Forest Service, Ochoco National Forest, Blue Ridge Mine

Media	Sample ID	Location	Target Analytes [1]
Tissue	TIS-BR-1	Background Area	X
	TIS-BR-2	Background Area	X
	TIS-BR-3	Background Area	X
	TIS-BR-4	Waste Rock Piles	X
	TIS-BR-5	Waste Rock Piles	X
	TIS-BR-6	Waste Rock Piles	X
	TIS-BR-7	Duplicate of TIS-BR-5	X

[1] Target Analyte List = Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn

Table 2A. Waste Source Sample Collection Program Summary
U.S. Forest Service, Ochoco National Forest, Amity Mine

Media	Sample ID	Depth	Location	Field Parameters	Laboratory Analysis	
					Total Metals[2]	Paste pH
Waste Source	WP-A-1	10', 25' and >5'BP[1]	Waste pile near Adit B, 30' deep	Description based on Unified Soil Classification System (USCS) description	X	X
	WP-A-2	10', 25' and >5'BP	Waste pile near Adit B, 30' deep		X	X
	WP-A-3	5', 10', 15' and >5'BP	Waste pile near Mill Building, 15' deep		X	X
	WP-A-4	10', 20', 35' and >5'BP	Waste pile north of Johnson Creek, 40' deep		X	X
	WP-A-5	10', 20', 35' and >5'BP	Waste pile north of Johnson Creek, 40' deep		`X	X
	WP-A-6	15', 30' and >5'BP	No Name Mine waste pile		X	X
	WP-A-7	>5'BP	Duplicate of WP-A-5		X	X

[1] BP = below waste material/native soil interface
[2] Target Analyte List = Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn

Table 2B. Soil Sample Collection Program Summary
U.S. Forest Service, Ochoco National Forest, Amity Mine

Media	Sample ID	Depth	Location	Field Parameters	Laboratory Analysis		
					Total Metals[1]	Paste pH	Nitrogen Compunds
Soil	S-A-1	0' and 1'	No Name Mine adjacent to waste pile, cattail area	Description based on Unified	X	X	
	S-A-2	0' and 1'	No Name Mine adjacent to waste pile, 50' up gradient in channel	Soil Classification System	X	X	
	S-A-3	0' and 1'	Ore hopper and crusher	(USCS) description	X	X	
	S-A-4	0' and 1'	Mill building - North		X	X	
	S-A-5	0' and 1'	Mill building - East		X	X	
	S-A-6	0' and 1'	Mill building - South		X	X	
	S-A-7	0' and 1'	Mill building - West		X	X	
	S-A-8	0'	Powder house				X
	S-A-9	0'	Drainage adjacent to waste pile near Adit B		X	X	
	S-A-10	0'	Drainage adjacent to waste pile near Adit B		X	X	
	S-A-11	0' and 5'	Interface of waste pile and Johnson Creek		X	X	
	S-A-12	0' and 5'	Interface of waste pile and Johnson Creek		X	X	
	S-A-13	>OG horizon	Background soil sample #1 to be determined in field		X	X	
	S-A-14	>OG horizon	Background soil sample #2 to be determined in field		X	X	
	S-A-15	>OG horizon	Background soil sample #3 to be determined in field		X	X	
	S-A-16	>OG horizon	Background soil sample #4 to be determined in field		X	X	
	S-A-17	0'	Duplicate of S-A-4		X	X	
	S-A-18	>OG horizon	Duplicate of S-A-16		X	X	

[1] Target Analyte List = Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn
> OG = sample collected beneath organic horizon

Table 2C. Surface Water and Sediment Sample Collection Program Summary
U.S. Forest Service, Ochoco National Forest, Amity Mine

Media	Sample ID	Location	Field Parameters [1]	Laboratory Analysis								
				Total Metals[2]	Hardness as $CaCO_3$	SC	TDS	Alkalinity as $CaCO_3$	Acidity as $CaCO_3$	pH	Sulfur/ Sulfide	Sulfate
Surface Water	SW-A-1	Adit A at source of spring	SC, pH, Temp, DO and ORP	X	X	X	X	X	X	X		X
	SW-A-2	Adit A road crossing		X	X	X	X	X	X	X		X
	JC-A-3	Johnson Creek in waste pile erosion area		X	X	X	X	X	X	X		X
	JC-A-4	Johnson Creek waste pile erosion area pore space		X	X	X	X	X	X	X		X
	JC-A-5	Johnson Creek up gradient of mine area		X	X	X	X	X	X	X		X
	JC-A-6	Johnson Creek down gradient of mine area		X	X	X	X	X	X	X		X
	JC-A-7	Johnson Creek upstream of discharge from Adit A		X	X	X	X	X	X	X		X
	JC-A-8	Johnson Creek downstream of discharge from Adit A		X	X	X	X	X	X	X		X
	SW-A-9	Adit A prior to discharge into Johnson Creek		X	X	X	X	X	X	X		X
	SW-A-10	Duplicate of SW-A-…		X	X	X	X	X	X	X		X
	SW-A-11	Split of …		X	X	X	X	X	X	X		X
Sediment	SS-A-1	Same as SW-A-1 within channel of spring	Description based on Unified Soil Classification System (USCS) description	X						X	X	
	SS-A-2	Same as SW-A-2 within channel at road crossing		X						X	X	
	SS-A-3	Same as SW-A-3		X						X	X	
	SS-A-4	Same as SW-A-4 (duplicate of SS-A-3)		X						X	X	
	SS-A-5	Same as SW-A-5		X						X	X	
	SS-A-6	Same as SW-A-6		X						X	X	
	SS-A-7	Same as SW-A-7		X						X	X	
	SS-A-8	Same as SW-A-8		X						X	X	
	SS-A-9	Split of …		X						X	X	

[1] Field Parameters: SC = specific conductivity; Temp = Temperature; DO = dissolved oxygen; ORP = oxydation reduction potential

[2] Target Analyte List = Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn

$CaCO_3$ = calcium carbonate

TDS = total dissolved solids

Table 3. Sample Collection, Preservation and Holding Times
U.S. Forest Service, Ochoco National Forest, Blue Ridge Mine

Media	Analytical/Field Measurement[1]	Location	Rationale for Data Collection	Intended Data Use	Means of Obtaining Desired Data Quality	QA/QC Tier Level	Analysis Method	Preservation	Holding Time	Sample Size	Sample Container
Water	Priority Pollutants[2]	Lab	Metals, specifically mercury (Hg), are known to be in the waste material and soil and possibly surface water and sediment at the site	To partially identify the degree and extent of metal contamination at the site	Comparability: consistent sampling techniques described in SAPs will be used. Representativeness: Composite samples will be collected from three discrete areas to provide for variations in contaminant concentrations over a selected area. Accuracy & Precision: Quality control limits for CLP analysis are defined in the CLP statements of analyses. The CLP also defines the laboratory protocol and deliverables designed to meet accuracy and precision targets. Appropriate field QA samples will be collected to evaluate precision. Completeness: Targets are set at a 90% level.	II	EPA 6010B/ 7000 Series EPA 1631 (Hg)	HNO_3; Ice to 4 °C	180 days/Hg 28 days	250 ml	250 ml Poly
Water	pH	Lab				II	EPA Method 150.1	Ice to 4 °C	Immediately	50 ml	50 ml Poly Tube
Water	pH	Field				II	Manufacturer Instructions	NA	NA	NA	NA
Water	Temperature	Field				II	Manufacturer Instructions	NA	NA	NA	NA
Water	Specific Conductivity	Field				II	Manufacturer Instructions	NA	NA	NA	NA
Water	Dissolved Oxygen	Field				II	Manufacturer Instructions	NA	NA	NA	NA
Solid[3]	Priority Pollutants	Lab				II	EPA 6010B/ 7000 Series EPA 7471A (Hg)	Ice to 4 °C	180 days/Hg 28 days	1 gallon	1 gallon Ziplock Bag
Solid	Paste pH	Lab				II	ASA No.9 10-2.31	Ice to 4 °C	30 days	1 gallon	1 gallon Ziplock Bag

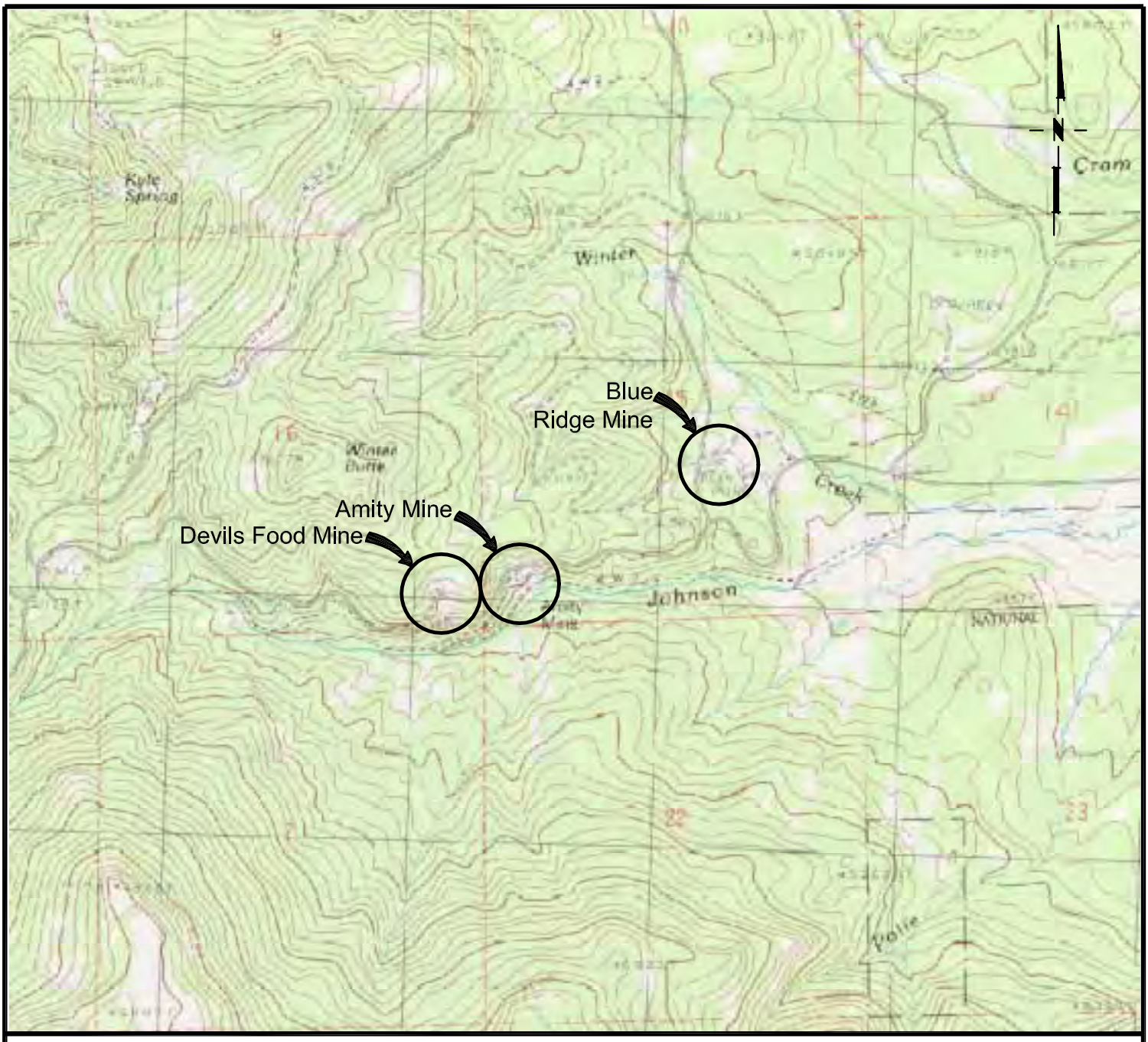
NOTES:

[1]Proposed laboratory is ACZ Labs, Inc. located in Steamboat Springs, Colorado.

[2]Refer to Table 3.

[3]Solid includes soil, waste rock or ore material, and/or sediment matrices.

CLP = certified laboratory protocol.
NA = not applicable.
SAP = sampling and analysis plan.
ml = milliliter



SCALE 1 INCH = 2,000 FEET

1 1/2 0 1 MILE

CONTOUR INTERVAL = 40 FEET

Figure 1. Site Location Map

(SOURCE: 7.5 MIN USGS TOPOGRAPHIC MAP OF LOOKOUT MOUNTAIN, OR 1990)

PROJECT NUMBER: 2140031	SITE INSPECTION FOR BLUE RIDGE AND AMITY MINES
DATE: 1/7/02	
DWG BY: DJM / DWG NO: 2140031A1	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company

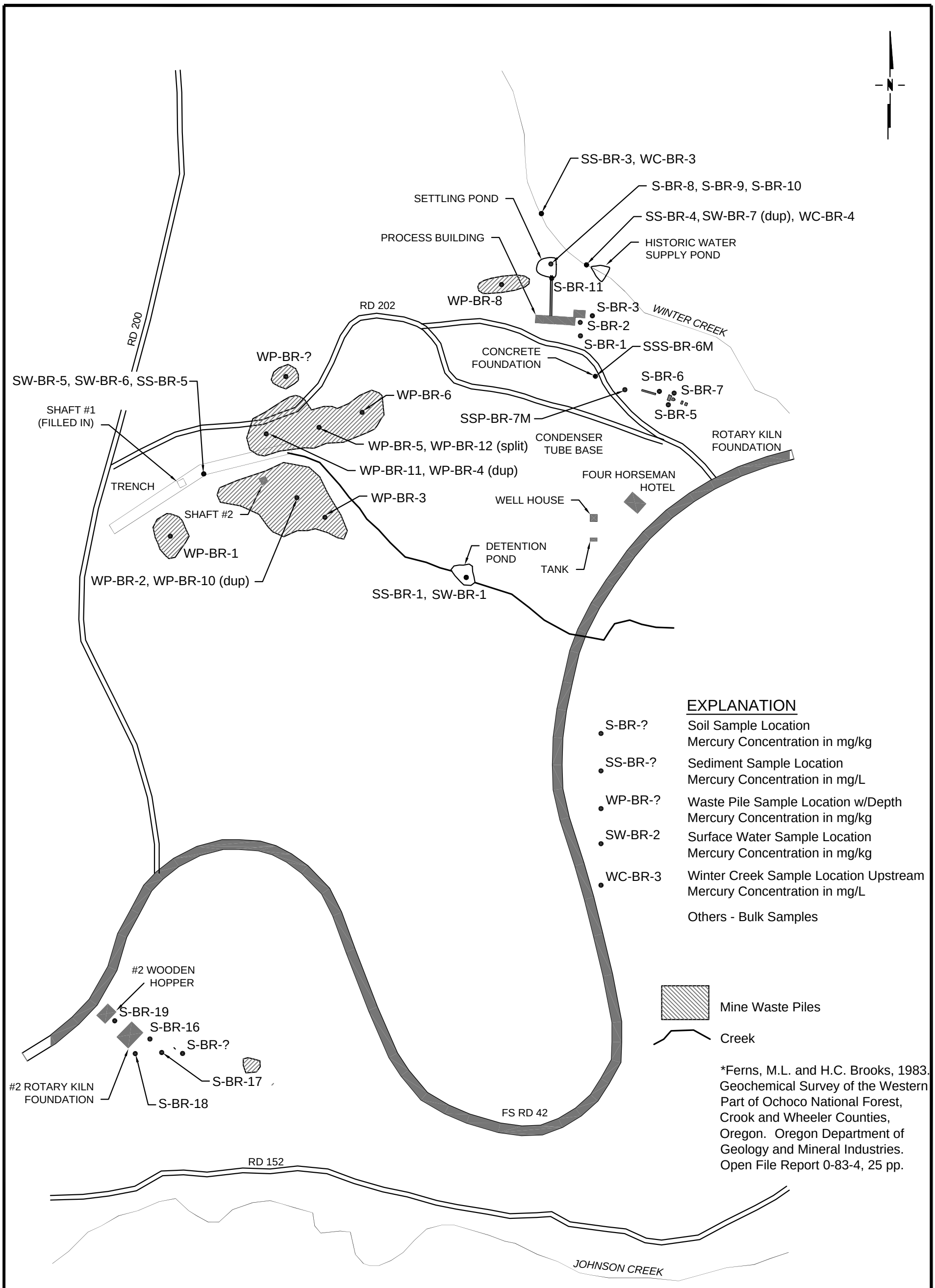
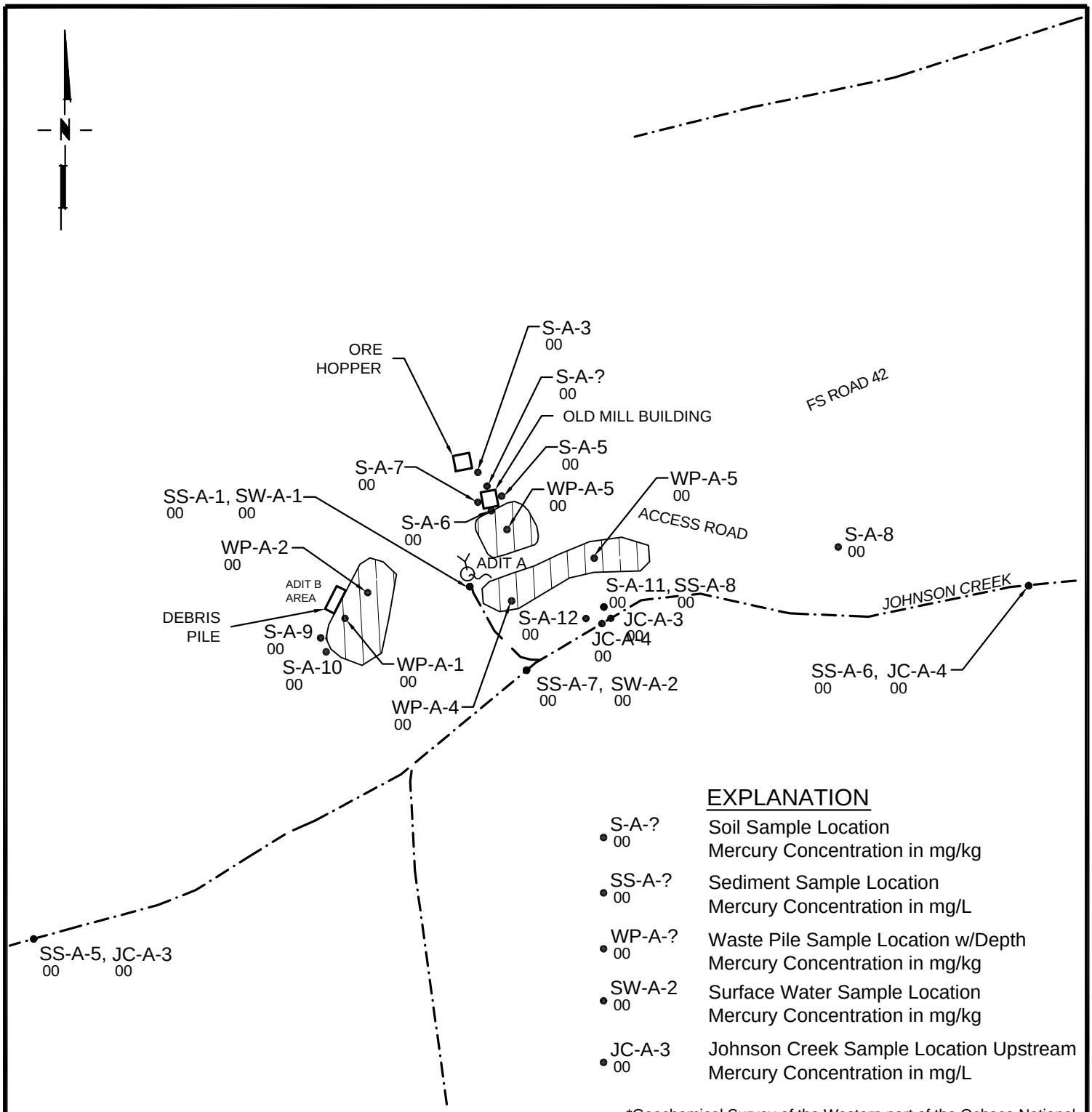


Figure 2. Blue Ridge Sample Locations

SOURCE: USDA Forest Service R-6 Pacific Northwest Region - Blue Ridge Mine PA/SI

0 200 FEET
SCALE
(LOCATIONS ARE APPROXIMATE)

PROJECT NUMBER: 2140031	OCHOCO MINES
DATE: 9/20/01	
DWG BY: DJM / DWG NO: 2140031F2	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company



*Geochemical Survey of the Western part of the Ochoco National Forest, Crook and Wheeler Counties, Oregon. OFR 0-83-4

Figure 3. Amity Sample Locations

EXPLANATION

Mine Waste Piles

Creek

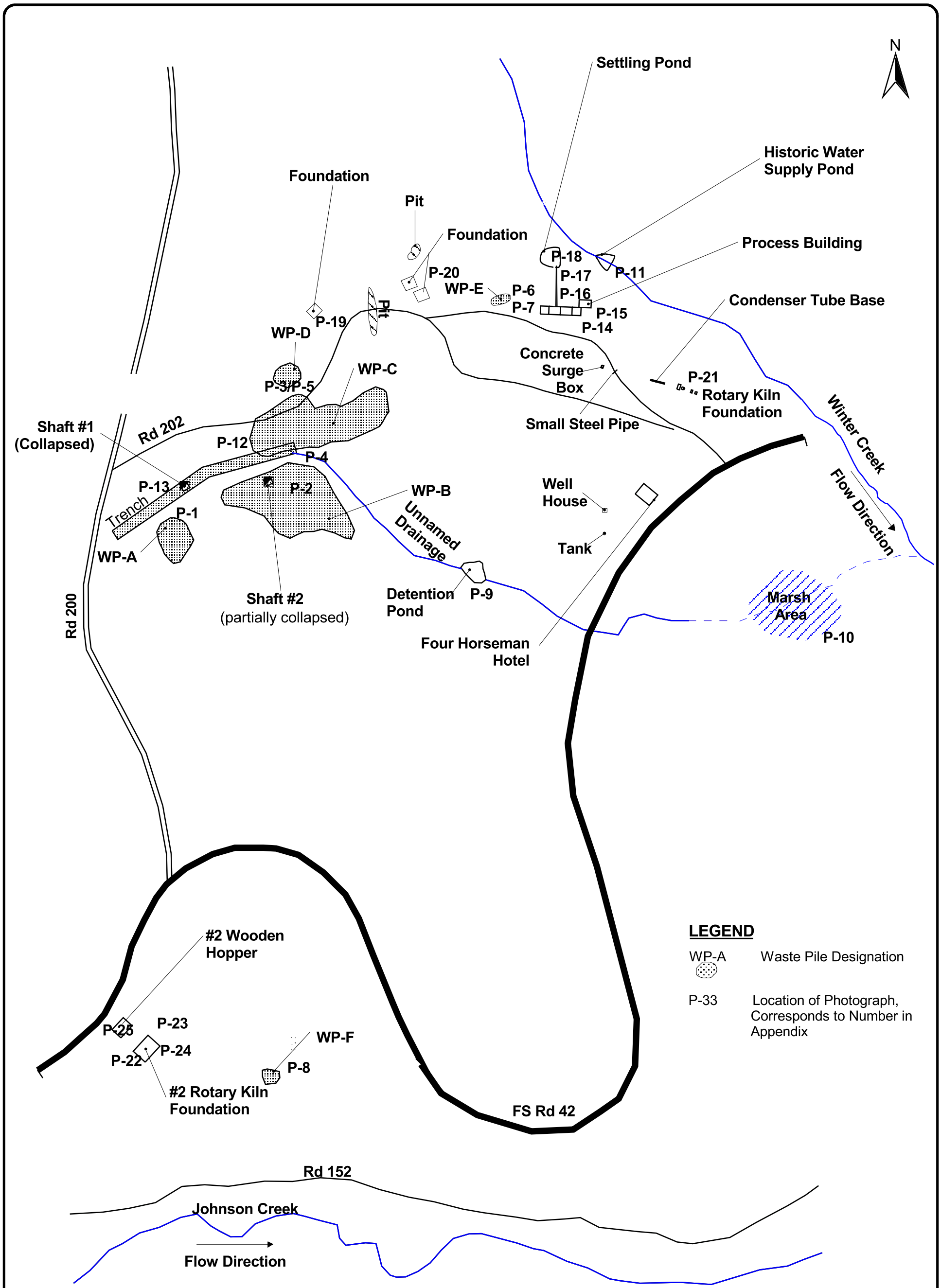
0 300 FEET

SCALE
(LOCATIONS ARE APPROXIMATE)

PROJECT NUMBER: 2140031	OCHOCO MINES
DATE: 9/20/01	
DWG BY: DJM / DWG NO: 2140031F3	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company

Appendix B.

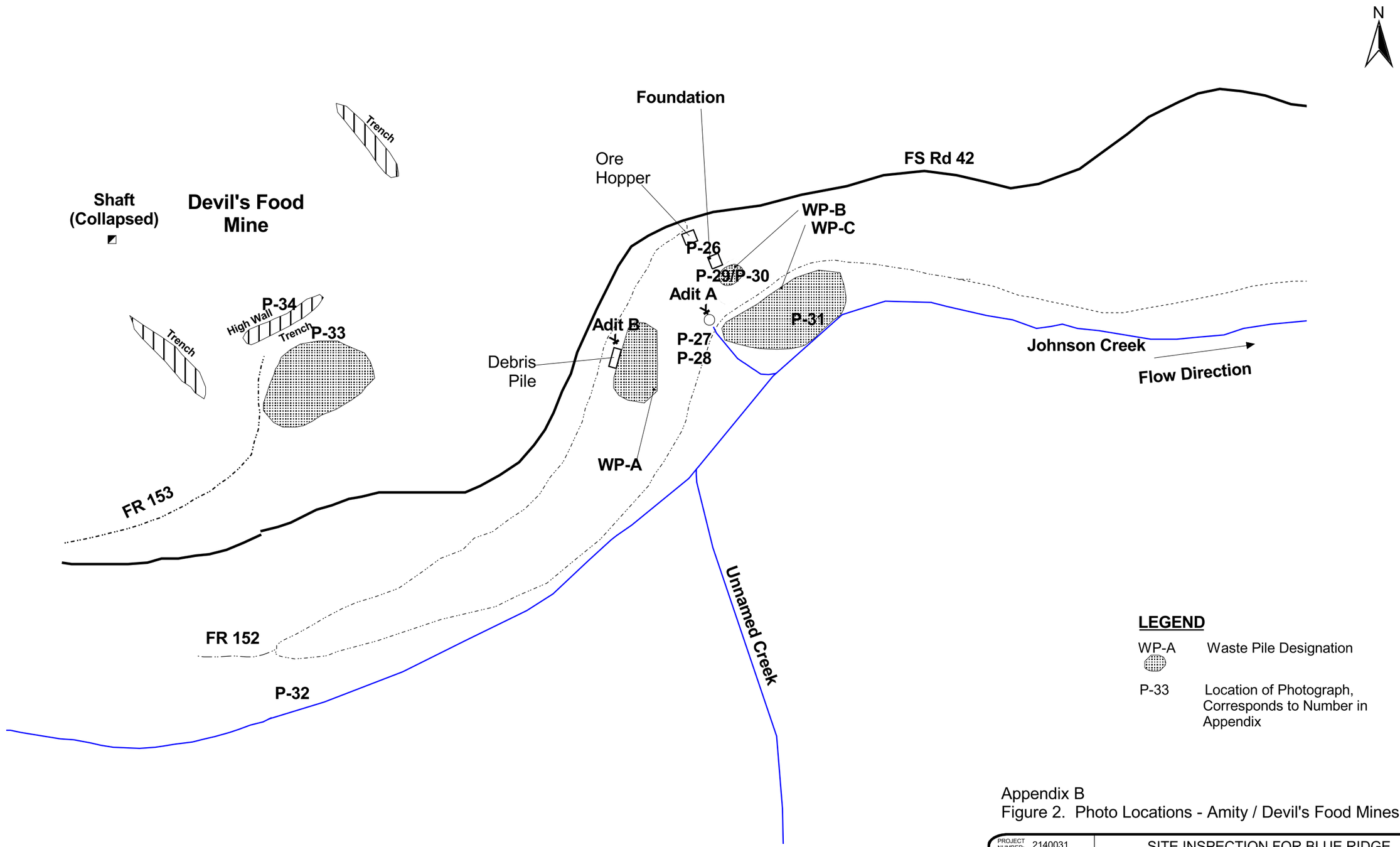
Photographs



SOURCE: USDA Forest Service R-6 Pacific Northwest Region

Appendix B
Figure 1. Photo Locations - Blue Ridge Mine

PROJECT NUMBER: 2140031	SITE INSPECTION FOR BLUE RIDGE AND AMITY MINES
DATE 11/07/01	
DWG BY JP / DWG NO:	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company



LEGEND

WP-A Waste Pile Designation

P-33 Location of Photograph, Corresponds to Number in Appendix

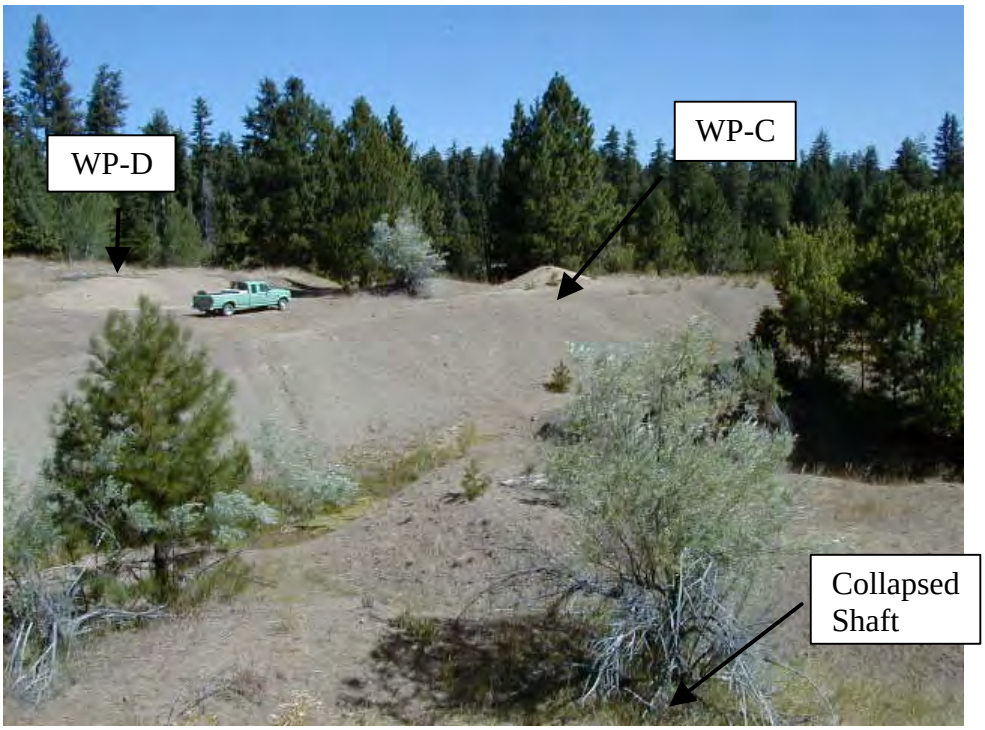
Appendix B
Figure 2. Photo Locations - Amity / Devil's Food Mines

PROJECT NUMBER: 2140031	SITE INSPECTION FOR BLUE RIDGE AND AMITY MINES
DATE 11/12/01	
DWG BY JP / DWG NO:	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company

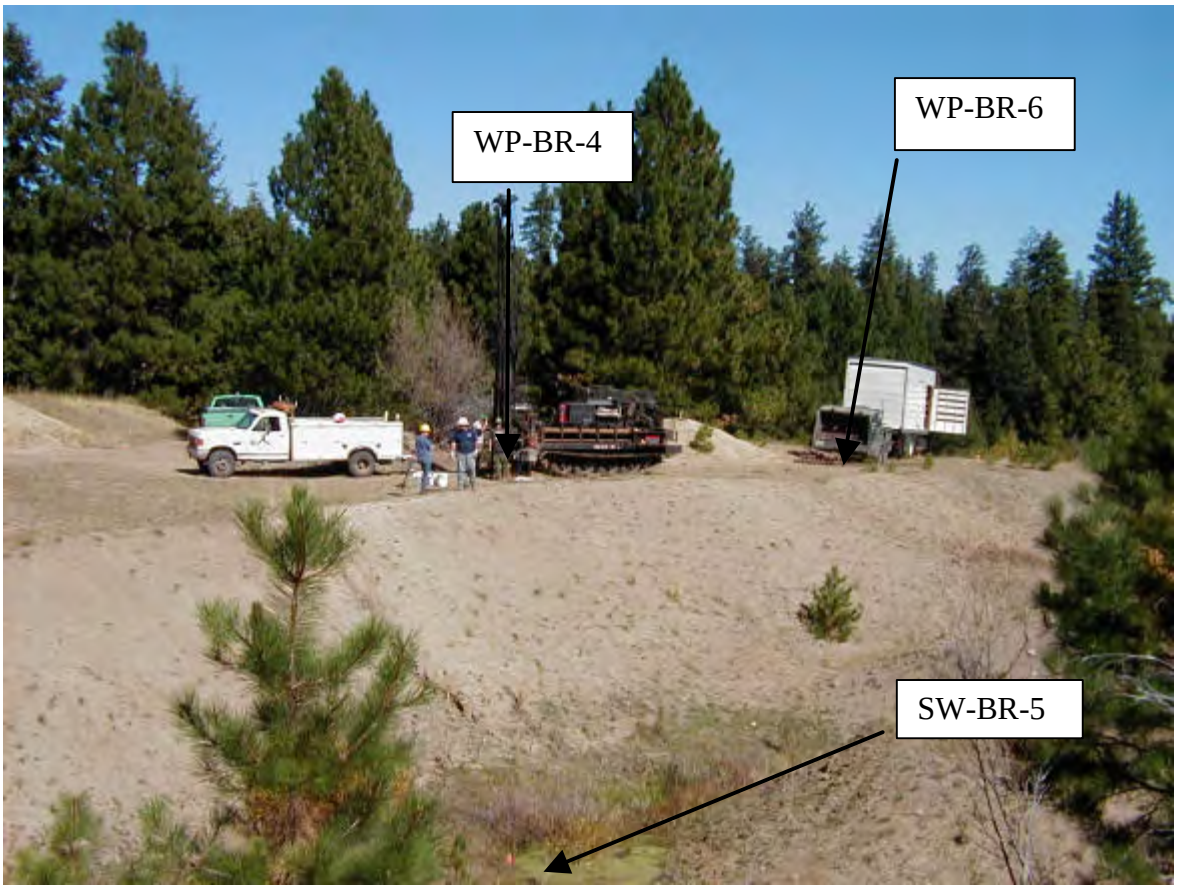
SOURCE: USDA Forest Service R-6 Pacific Northwest Region

Photograph 1. Looking southwest at waste pile WP-A, Blue Ridge Mine.

Photograph 2. View looking west at waste rock piles (WP-B) associated with the trench. The main trench is just out of the Photograph to the north (right).



Photograph 3. View looking northeast across the trench to the waste rock pile WP-C. Note lack of vegetation.



Photograph 4. Looking east at waste pile WP-C, Blue Ridge Mine during boring program.

Photograph 5. View north to WP-D, Blue Ridge Mine.

Photograph 6. View north to WP-E, Blue Ridge Mine.

Photograph 7. View north to WP-E.

Photograph 8. Waste pile (WP-F) in secondary process area. Boring WP-BR-9 located here.

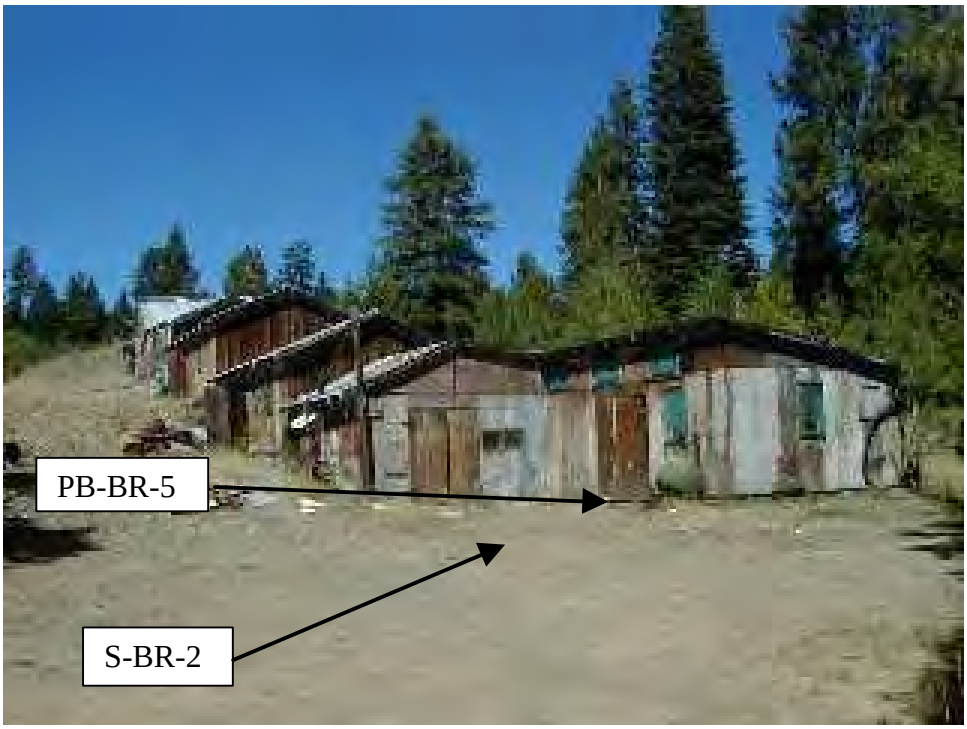
Photograph 9. View north to detention pond at Blue Ridge Mine.

Photograph 10. Looking south at the field south of Blue Ridge Mine.

Photograph 11. Former water supply pond created in Winter Creek for concentrating ore. Note downcutting of bank.

Photograph 12. Small pool in trench at Blue Ridge Mine.

Photograph 13. Main trench at Blue Ridge showing location of SW-BR-6 facing west from SW-BR-5.

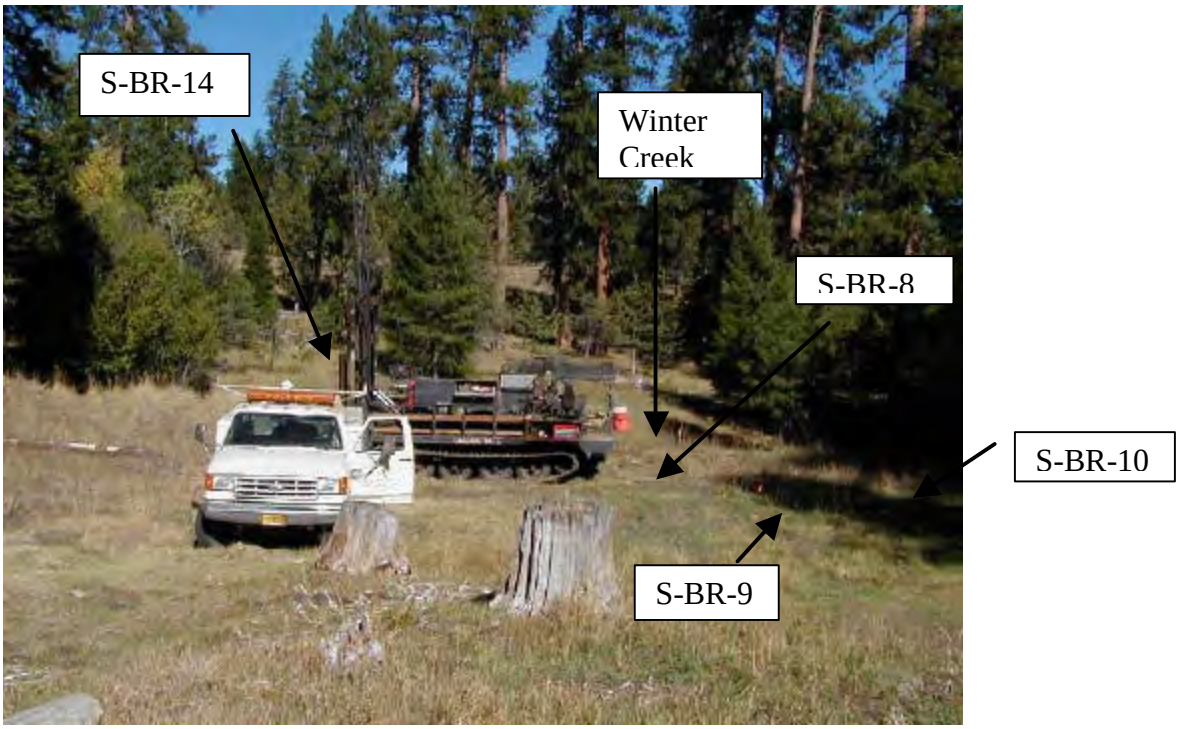


Photograph 14. Looking west at Blue Ridge processing building.

Photograph 15. Looking east from processing building at debris. Winter Creek is beyond trees. Sample S-BR-3 collected in black material pile as indicated.

Photograph 16. North side of process building at Blue Ridge. PVC pipe (within wooden trough) carried sluice water, and fines north to settling pond. Sample S-BR-1 taken below pipe.

Photograph 17. End of PVC sluice pipe emptying into settling pond. Sample S-BR-11 collected from inside pipe.



Photograph 18. Looking east at settling pond north of discharge pipe. Background samples of soil and tissue collected on far side of Winter Creek.

Photograph 19. Looking north from a former mill foundation used for milling. Beyond is a small pit used for settling out the fines created during the refining process.

Photograph 20. View southeast across Blue Ridge showing location of S-BR-24 near former processing building foundation.

Photograph 21. View looking northwest at the Rotary Kiln Foundation. The condenser tube foundation is in the background. Soil Sample S-BR-7 was collected between kiln foundation and condenser foundation (out of view). Sample RKF-BR-2 was collected from inside the condenser tube foundation.

Photograph 22. Looking east at the rotary kiln foundation in the secondary processing area.

Photograph 23. View looking northwest at the concrete vault in secondary processing area.

Photograph 24. Looking west at secondary kiln foundation. Concrete sample RKF2-BR-1 collected from wall.

Photograph 25. Rock hopper in secondary processing area.

Photograph 26. Looking northeast at the rock hopper at Amity Mine.

Photograph 27. Adit A “spring”, Amity Mine.

Photograph 28. Close up of Adit A discharge showing rust colored precipitate.

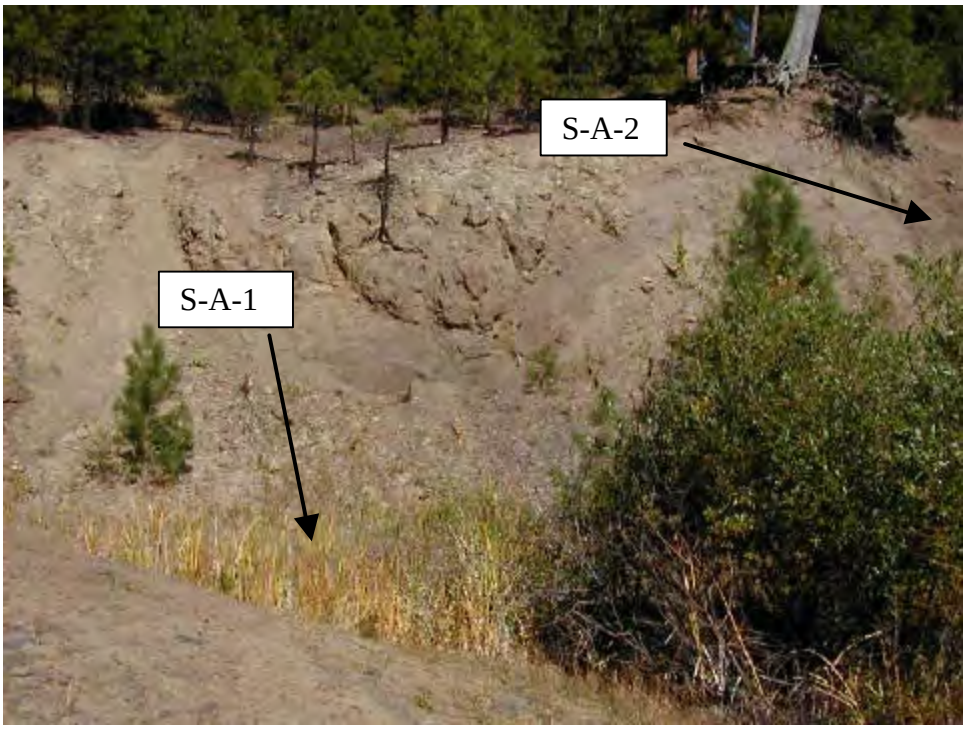
Photograph 29. View northeast at waste pile WP-C near the former furnace building, Amity Mine.

Photograph 30. Bright red soils in WP-C.

Photograph 31. Drilling into WP-B at WP-A-4, Amity Mine.

Photograph 32. Johnson Creek upstream from Amity Mine.

Photograph 33. Installation of boring WP-A-6 at the top of the waste pile at Devil's Food Mine.



Photograph 34. Looking North at the trench at Devils Food Mine.

Appendix C.

General Information Forms

General Information

GENERAL

Region/Station: 6 Forest Number: 7 District No: 1
Congressional District: 02

Project Name: Amity Mine
Project Type: Site Inspection
Regional Priority: NA
5th Level HUC: NA 4th = 17070304 Upper Crooked River
Single Site: Multiple Site: X
List all site names in multiple sites: Amity Mine and Devil's Food Mine

ENVIRONMENT

Watershed Name: Johnson Creek
Regional Watershed Priority:
Watershed size (acres): 1860 acres above the Amity Mine
Size of disturbed area (acres): 12
Nearest surface water source: Johnson Creek
Miles of stream impacted by site: 0.25
303d listed impaired surface water- Yes: No: X
If 303d listed impaired, what are the water quality limited contaminants?

Is the site affecting a Wild and Scenic river - Yes: No: X
Describe potential for a catastrophic failure if not addressed:

Beneficial uses downstream: Fishing, recreation
Nearest critical sensitive area: None
Distance sensitive area is from site: NA
Sensitive species: (Apatania) Cascade caddisfly
T&E species: Interior redband trout
Is the soil environment conducive to contaminant movement - Yes: No: X
Activities in the watershed that also contribute to environmental damage (logging, roads, dredging, grazing, etc.): logging, grazing, roads
Would a removal action have a noticeable positive impact on or reduce the potential future risk of damaged resources - Yes: X No:
Other critical information relating to the environment:

General Information

GENERAL

Region/Station: 6 Forest Number: 7 District No: 1
Congressional District: 02

Project Name: Blue Ridge Mine
Project Type: Site Inspection
Regional Priority:
5th Level HUC: N/A (4th = 17070304 Upper Crooked River)
Single Site: Multiple Site: X
List all site names in multiple sites: Blue Ridge Mine, Number One Mine

ENVIRONMENT

Watershed Name: Winter Creek
Regional Watershed Priority: NA
Watershed size (acres): 990
Size of disturbed area (acres): 115
Nearest surface water source: Winter Creek
Miles of stream impacted by site: 0
303d listed impaired surface water- Yes: No: X
If 303d listed impaired, what are the water quality limited contaminants? NA

Is the site affecting a Wild and Scenic river - Yes: No: X
Describe potential for a catastrophic failure if not addressed: NA

Beneficial uses downstream: Fishing
Nearest critical sensitive area: None
Distance sensitive area is from site: NA
Sensitive species: (Apatania) Cascade caddisfly
T&E species: Interior redband trout
Is the soil environment conducive to contaminant movement - Yes: X No:
Activities in the watershed that also contribute to environmental damage (logging, roads, dredging, grazing, etc.): logging, grazing, roads
Would a removal action have a noticeable positive impact on or reduce the potential future risk of damaged resources - Yes: X No:
Other critical information relating to the environment:

HUMAN HEALTH AND SAFETY

	Within 200 feet of the Site	Within 4 miles of the Site	Within 15 miles of the Site
Year round population based on residences	0	0	NA
Seasonal population based on residences	0	0	1 seasonal residence
Water wells	1	0	4 (1 onsite, 3 out of watershed, campground, R.S)
Surface water intakes	0	0	0

Recreational activities within 200 feet of the site: hunting, hiking
Recreational activities that occur within 15 miles of the site: hunting, fishing, hiking,
Established recreational sites within 200 feet of the site: None
Established recreational sites within 15 miles of the site: Lookout Mountain trailhead 2.5 miles west (upgradient)

Depth to groundwater (feet): ~27'
Beneficial uses downstream: Fishing and recreation
Physical hazards: Collapsed adits and shafts, deteriorated buildings and structure, steep slopes

Hazard	
Dangerous Highwall	No
Subsidence	No
Vertical Opening/Shaft	Collapsed
Dangerous Impoundment	No
Dangerous Pile and Embankment	No
Dangerous Slide	No
Hazardous Equipment or Unstable Structures	Yes
Hazardous Explosive Gases	No
Hazardous Water Body/Ponds	Yes
Solid Waste	Yes
Horizontal Opening/Adit	No

Other critical information relating to health and safety:

MIXED OWNERSHIP INFORMATION

% of the site on NFS land: 100
% of the watershed on NFS land: 100

POTENTIAL CONTAMINATION

	Yes	No
Surface Water Indicators		
High turbidity in surface water		X
Active erosion into surface water	X	
Staining or precipitate/sediments	X	
Aquatic kills		X
Visible plume		X
Discharges to surface water sources (ie., adit drainage or leachate)	X	
Noticeable decline in aquatic population (compared to upstream of the site)		X
Surface water void of life in the area of the mine site		X
Site located in the floodplain/wetland		X
Failing or Inadequate Design		
Oversteepened slopes	X	
Unlined ponds	X	
Inadequate landfill design or dumps		X
Unstable retainment structure	X	
Past Practices		
Uncontrolled landfill/dump	X	
Improper disposal	X	
Chemical/wastes were stored on site in drums/tanks, etc.		X
Past practices at site used hazardous materials		X
Other Indicators		
Stressed vegetation	X	
Dead vegetation or lack of vegetation	X	
Animal kills		X
Visual contaminants		X
Heavily stained soils/salts present		X

Other critical potential contaminant information: _____

_____

ANALYTICAL/DOCUMENTED CONTAMINATION

Media	Distance	Location*	Rate of Discharge/Volume (gpm or cy)	Contaminant	Exceedence	Background
Water	0	SW-BR1	3 gpm	Mercury	0.264 ug/L	0.0014 ug/L
	0	SW-BR2	<1 gpm	Mercury	0.175 ug/L	
	0	SW-BR5	1 gpm	Mercury	33.7 ug/L	
	1000’	SW-BR6	1 gpm	Mercury	0.92 ug/L	
Sediment	0	SS-BR-1	Unknown	Mercury	99 mg/kg	0.93 mg/kg
	0	SS-BR-5	Unknown	Mercury	306 mg/kg	
Soil	0	S-BR7	Unknown	Mercury	258,000 mg/kg	0.84/1.0 mg/kg
	0	S-BR-18	Unknown	Mercury/arsenic	3420 /6.4 mg/kg	
	0	S-BR-19	Unknown	Mercury	2590 mg/kg	
	0	S-BR-3	Unknown	Mercury	2400 mg/kg	
	0	S-BR-17	Unknown	Mercury/arsenic	1790 / 2.7 mg/kg	
	0	S-BR-25	Unknown	Mercury/arsenic	1010 / 6.5 mg/kg	
	0	S-BR-24	Unknown	Mercury/arsenic	917 / 25.6 mg/kg	
	0	S-BR-5	Unknown	Mercury	794 mg/kg	
	0	S-BR-10	Unknown	Mercury/arsenic	495/6.1 mg/kg	
Waste	0	WP-BR-9	97 cy	Arsenic	3.4 mg/kg	NA

*Location refers to Map ID on Figures 4, 6 and 7

ADDITIONAL STUDIES

Biological studies that shows a decrease in the number and lower species diversity downstream of the site: Yes:___ No:___X

Increased mortality in nesting wildlife: Yes:___ No:__X

Other critical contaminant information:_ Mine impacts do not competely prevent habitat use by T&E species, though the disturbance may reduce habitat quality therefore limiting number of individuals supported.

HUMAN HEALTH AND SAFETY

	Within 200 feet of the Site	Within 4 miles of the Site	Within 15 miles of the Site
Year round population based on residences	0	0	0
Seasonal population based on residences	0	0	1 residence
Water wells	0	1	4
Surface water intakes	0	0	0

Recreational activities within 200 feet of the site: hunting and hiking
Recreational activities that occur within 15 miles of the site: hunting, hiking, fishing, camping
Established recreational sites within 200 feet of the site: None
Established recreational sites within 15 miles of the site: Lookout Mountain trailhead 1.5 mile west (upgradient)
Depth to groundwater (feet): Unknown
Beneficial uses downstream: Fishing and recreation
Physical hazards:

Hazard	
Dangerous Highwall	No
Subsidence	No
Vertical Opening/Shaft	No
Dangerous Impoundment	No
Dangerous Pile and Embankment	Yes, WP-B
Dangerous Slide	No
Hazardous Equipment or Unstable Structures	No
Hazardous Explosive Gases	No
Hazardous Water Body/Ponds	Yes, SW-A-2
Solid Waste	Yes
Horizontal Opening/Adit	Yes, collapsed

Other critical information relating to health and safety:

MIXED OWNERSHIP INFORMATION

% of the site on NFS land: 100
% of the watershed on NFS land: 100

POTENTIAL CONTAMINATION

	Yes	No
Surface Water Indicators		
High turbidity in surface water		X
Active erosion into surface water	X	
Staining or precipitate/sediments	X	
Aquatic kills		X
Visible plume		X
Discharges to surface water sources (ie., adit drainage or leachate)	X	
Noticeable decline in aquatic population (compared to upstream of the site)		X
Surface water void of life in the area of the mine site		X
Site located in the floodplain/wetland		X
Failing or Inadequate Design		
Oversteepened slopes	X	
Unlined ponds	X	
Inadequate landfill design or dumps		X
Unstable retainment structure		X
Past Practices		
Uncontrolled landfill/dump	X	
Improper disposal	X	
Chemical/wastes were stored on site in drums/tanks, etc.		X
Past practices at site used hazardous materials		X
Other Indicators		
Stressed vegetation	X	
Dead vegetation or lack of vegetation	X	
Animal kills		X
Visual contaminants	X	
Heavily stained soils/salts present	X	

Other critical potential contaminant information: _____

_____

ANALYTICAL/DOCUMENTED CONTAMINATION

Media	Distance	Location *	Rate of Discharge/Volume (gpm or cy)	Contaminant	Exceedence	Background
Water	0	SW-A-2	1 gpm	Mercury	0.39 ug/L	0.0025 ug/L
	0	JC-A-3	20 gpm	Mercury	0.0143 ug/L	
		JC-A-8	20 gpm	Mercury	0.0276 ug/L	
Soil	0	S-A-3	Unknown	Mercury/arsenic	2770/5.1 mg/kg	0.39/1.1 mg/kg
	0	S-A-5	Unknown	Mercury/arsenic	897/8.2 mg/kg	
	0	S-A-4	Unknown	Mercury/arsenic	419/5.6 mg/kg	
	0	S-A-9	Unknown	Mercury/arsenic	420/3.52 mg/kg	
Waste	0	WP-A-4	3156 cy	Mercury/arsenic	611/2.7 mg/kg	NA
	0	WP-A-3	7900 cy	Mercury/arsenic	17.9/4.9 mg/kg	

*Location refers to Map ID on Figures 5 & 8

ADDITIONAL STUDIES

Biological studies that shows a decrease in the number and lower species diversity downstream of the site: Yes:___ No: X

Increased mortality in nesting wildlife: Yes:___ No: X

Other critical contaminant information: Mine impacts do not competely prevent habitat use by T&E species, though the disturbance may reduce habitat quality therefore limiting number of individuals supported.

Appendix D.

Mine Maps and Miscellaneous Information

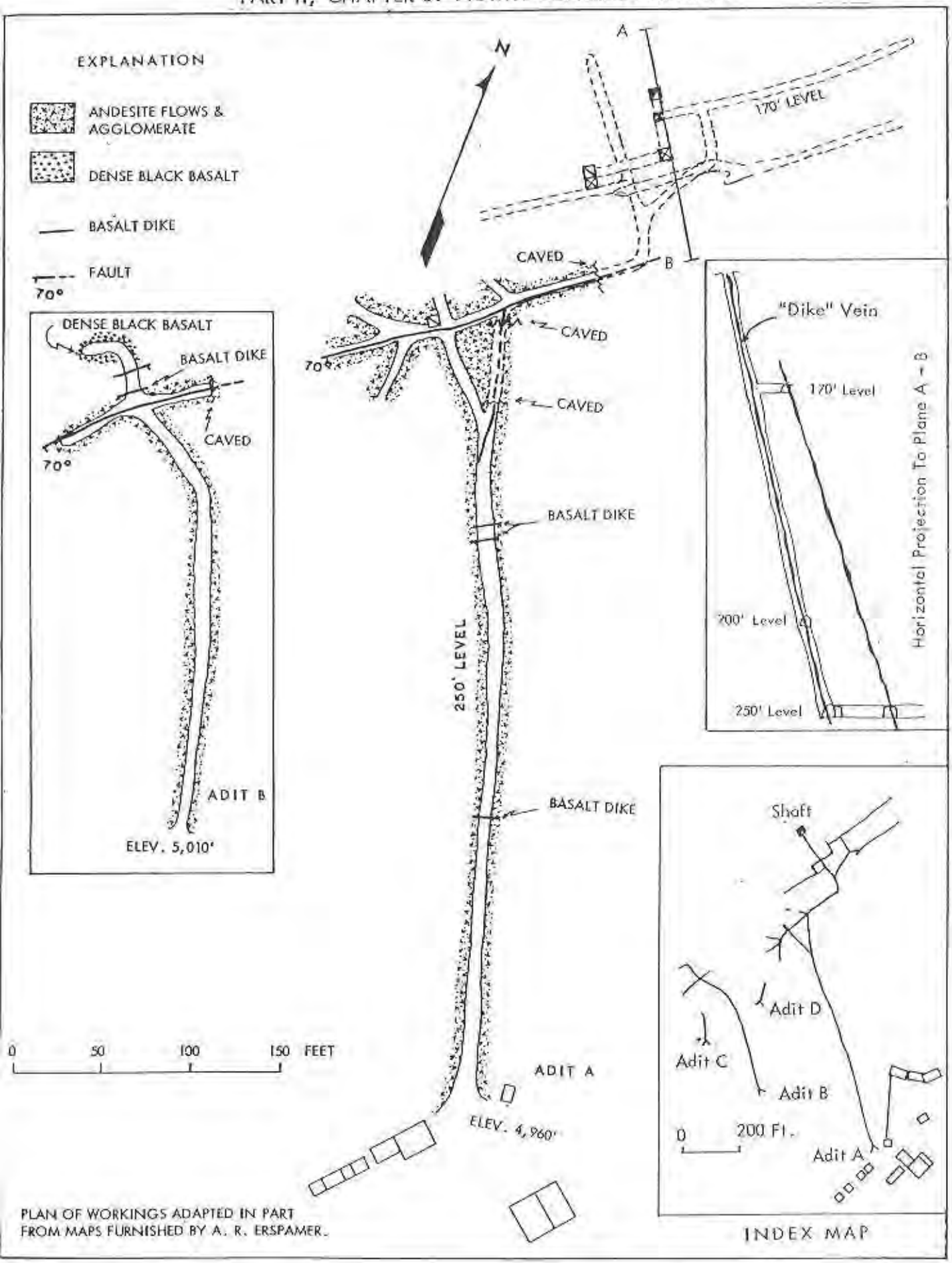


Figure 49. Geologic map of the Amity mine.

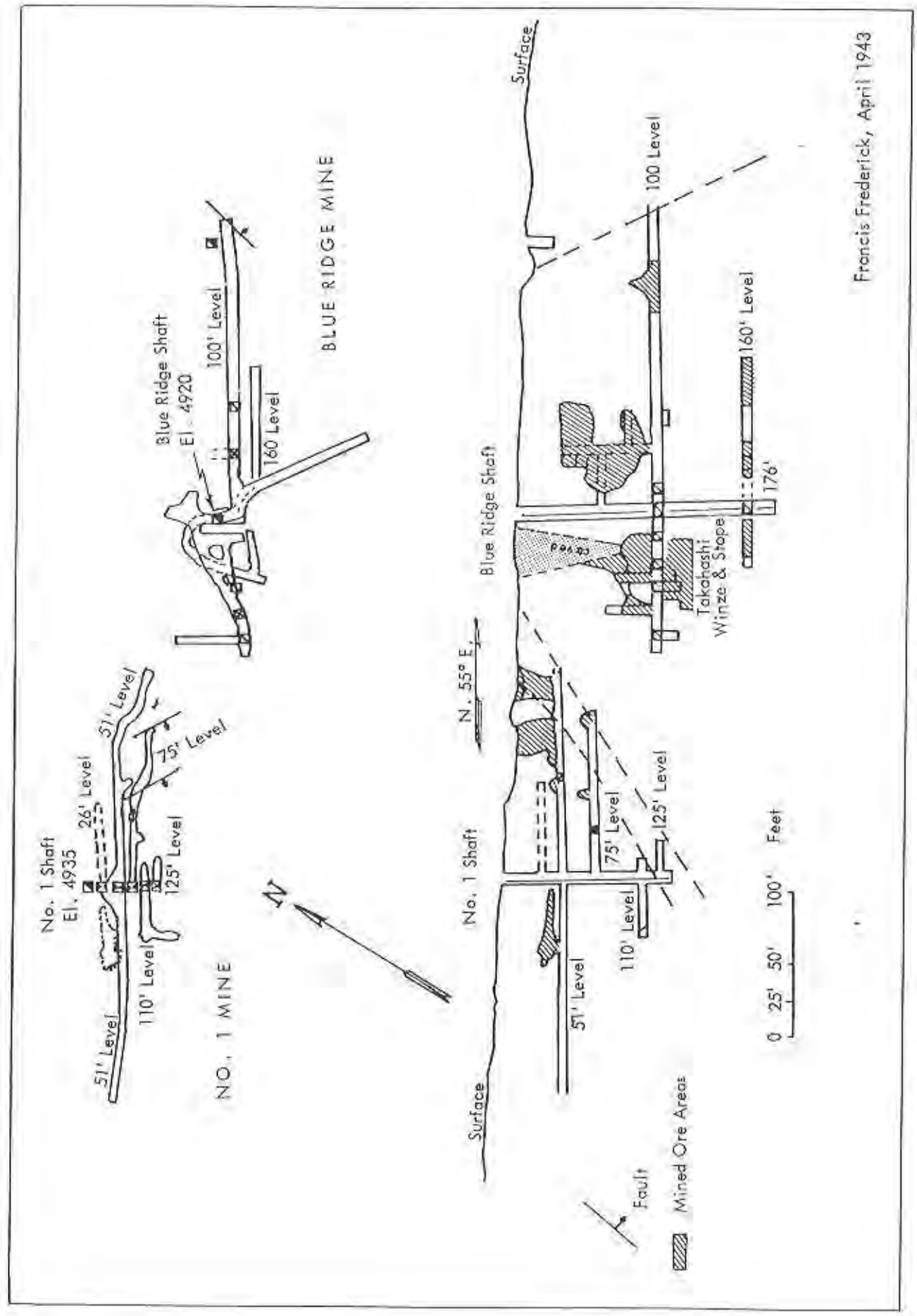


Figure 51. Plan and longitudinal projection of the Blue Ridge shaft and Number One shaft workings.

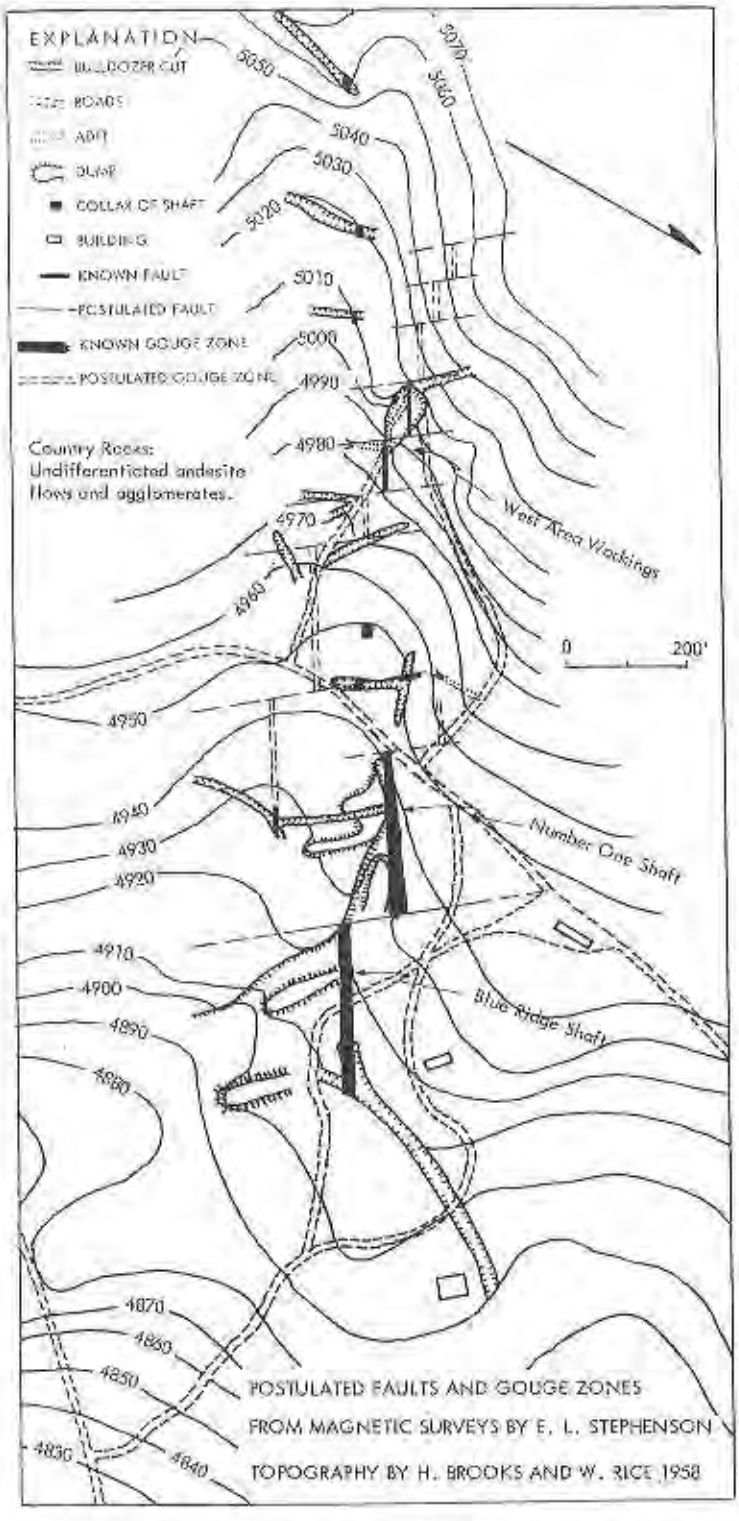


Figure 50. Topographic and geologic map of the Blue Ridge mine.

The 9 claims originally enclosing the Number One mine were located by Hal La Porte, W. H. Higgins, A. N. Whealdon, and others. W. F. Whitely and Donald W. Green of Portland leased the claims in November 1930. In 1931 the lease was reassigned to the Number One Mining Co. and R. R. Whiting was retained as manager and engineer. A map prepared by Whiting shows that in August 1932 the Number One inclined shaft had been sunk to a depth of 110 feet and drifting had been done on the 26-, 57-, and 110-foot levels. According to Whiting, about 30 flasks were produced with two D-tubes during 1930-31. Robert Osborne produced 1 flask from the mine in 1934. Subsequently the company maintained assessment work on the property and during 1939 and 1940 Whiting produced 11 flasks from ore trucked to his retort at the Taylor Ranch mine.

Cinnabar Mines, Inc., J. A. Maller vice-president, was organized in 1941 to work both the Blue Ridge and Number One mines. A 75-ton Gould rotary furnace and condenser system was installed, but after producing 81 flasks in 1942 and 9 early in 1943 from the combined workings, the company ceased operations. The furnace and other equipment were removed from the property in 1944. In that year the Gilkey Brothers cleaned up around the plant site, producing 3 flasks. The Number One Mining Co. property was subsequently taken over by the Central Oregon Quicksilver Mines, Inc., and included in the Blue Ridge group of claims. In 1952 the property was acquired by Roy C. Stanton, and in 1953 was leased to Fred Weber who installed jigs and, later, a washing plant and concentrating tables. Fourteen flasks were produced during 1954-55 from concentrated surface ore treated in a small retort.

In 1957 the property was leased to Mia Mines, Inc., headed by Frank Reid and Dick Toole, who erected a small gravity concentration mill. There is no record of production from their operations, although some ore was treated in the mill. The property reverted to Stanton in late 1958 and the mill has since been moved to the Independent mine.

Figure 50 shows the distribution of the workings; figure 51 gives a plan and sectional view of the Blue Ridge and Number One shafts and also shows the principal stopes. Both shafts are caved at their collars. Additional underground work not shown in figure 51 consists of a 300-foot adit (now caved) in the West adit area.

Geology: The Blue Ridge mine is the northeastern-most of several mines and prospects scattered along the Johnson Creek fault zone. Rocks in the mine area include andesitic flows, agglomerates, and possibly pyroclastics of the Eocene Clarno Formation locally intruded by dense, black, porphyritic basalt. In parts of the surrounding area and for several miles to the east the Clarno Formation is capped by the much younger Ochoco

Appendix E.

Title Pages of Cited References and Conversation Logs

QUICKSILVER
IN OREGON

Bulletin 55
STATE OF OREGON
Department of Geology and Mineral Industries

MISCELLANEOUS PAPER 15

QUICKSILVER DEPOSITS IN OREGON

QUICKSILVER DEPOSITS IN OREGON

by

HOWARD C. BROOKS

1971

MISCELLANEOUS PAPER 15

Issued by
State of Oregon
Department of Geology and Mineral Industries
Portland, Oregon
R. E. Corcoran, State Geologist

ENGINEERING EVALUATION
COST ANALYSIS
Mother Lode Mine
Ochoco National Forest
Crook County, Oregon

Principal Author or Investigator: *John D. Martin, RPG, Managing Geologist*
Kevin Harvey, CPSS, Managing Soil Scientist
Dustin Wasley, EIT, Staff Engineer
Ron A. Doughten, Staff Soil Scientist

Reviewed By: *Terrance M. Rahe, CPSS, Principal*

Prepared for: U.S.D.A. Forest Service
Ochoco National Forest
PO Box 490
Prineville, Oregon 97754

Site Location: Mother Lode Mine
T14S, R20E, Sections 20 and 29
Ochoco National Forest
Crook County, Oregon

Prepared By: Cascade Earth Sciences, Ltd.
7150 Supra Drive SW
Albany, Oregon 97321
(541) 926-7737

PRELIMINARY ASSESSMENT
Blue Ridge Mine Site
Crook County, Oregon

Principal Author and Investigator: *Mary Ann Amann, Staff Geologist II*

Reviewed By: *Kristine Uhlman, CGWP, CPG, Managing Geologist*
John Martin, R.P.G., Principal Geologist

Prepared for: Charles H. Kurtz, Facilities Engineer
USDA Forest Service
Ochoco National Forest
PO Box 490/3160 NE 3rd St
Prineville, Oregon 97754

Site Location: Blue Ridge Mine Site
Ochoco National Forest
Crook County, Oregon

Prepared by: Cascade Earth Sciences
7150 Supra Drive, SW
Albany, Oregon 97321
(541) 926-7737

PN: 2010042/February 2001

PRELIMINARY ASSESSMENT
Amity Mine Site
Crook County, Oregon

Principal Author and Investigator: *Mary Ann Amann, Staff Geologist II*

Reviewed By: *Kristine Uhlman, CGWP, CPG, Managing Geologist*
John Martin, R.P.G., Principal Geologist

Prepared for: Charles H. Kurtz, Facilities Engineer
USDA Forest Service
Ochoco National Forest
PO Box 490/3160 NE 3rd St.
Prineville, Oregon 97754

Site Location: Amity Mine Site
Ochoco National Forest
Crook County, Oregon

Prepared by: Cascade Earth Sciences
7150 Supra Drive, SW
Albany, Oregon 97321
(541) 926-7737

PN: 2010043/February 2001

FIELD OPERATION PLAN
Site Inspection of the Blue Ridge and Amity Mines
Crook County, Oregon

September 2001

3 1819 00031106 4

STATE OF OREGON

DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

1005 State Office Building

Portland, Oregon 97201

OPEN-FILE REPORT O-83-4

GEOCHEMICAL SURVEY OF THE WESTERN PART OF THE OCHOCO NATIONAL FOREST CROOK AND WHEELER COUNTIES, OREGON

By Mark L. Ferns and Howard C. Brooks

Oregon Department of Geology and Mineral Industries

Funded by

U.S. Department of Agriculture - Forest Service

Contract Nos. 43-04H-1-2373 and 53-04H-18591N

U.S. GEOLOGICAL SURVEY DENVER

AUG 17 1983

GEOLOGIC DIVISION

Fifth Edition

Geology of Oregon

Elizabeth L. Orr

William N. Orr

KENDALL/HUNT PUBLISHING COMPANY
4050 Westmark Drive Dubuque, Iowa 52002

CONVERSATION RECORD FORM

Project Name: Ochoco Mines_ Project Number: 2140031 _____

Location: Blue Ridge Mine _____

Date: October 5, 2001 _____ Time: Completed by: MaryAnn Amann_____

Contact: Bill Reid_____ Title: son of former miner Frank Reid _____

Address: Prineville_____ Phone: not available _____

Comments: Mr. Reid was hunting in the area when we were conducting the Site Inspection at the Blue Ridge Mine. He came over to see what was going on. He told us that since Takahashi owned the mine he sent the mercury to Japan so there is no record of how much was produced. Takahashi gave the mine to Stanton after WWII. He mentioned that there is a collapsed shaft west of the mine and gave us directions: up the road to the clear cut, go about ¾ mile where it curves and there is a lot of digging. Shaft is to the left in the forest. He did not go into detail about who worked the shaft or what claim it was on...

His father, Frank Reid died in 1996 at 92 or 93 and there is a memorial plaque for him and also for Mel Wheeler. He said the hotel was for the saw mill – not for the mine. The shaft was 170 feet deep. They had pumped it to keep water out. He said a Chinese man is presumed to have been buried due to a collapse of one of the shafts. _____

Helen Juris is a local historian in Prineville. _____

_____

_____

STATE OF OREGON

Department of Geology and Mineral Industries

BULLETIN No. 4

Quicksilver in Oregon

By C. N. SCHUETTE

PORTLAND, OREGON

1938

United States
Environmental Protection
Agency

Office of Emergency and
Remedial Response
Washington DC 20460

PB92963375

Superfund

9345.1-05

EPA

Guidance for Performing Site Inspections Under CERCLA

Interim Final

REPRODUCED BY
U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL
INFORMATION SERVICE
SPRINGFIELD, VA 22161

LOOKOUT MTN, SE, OREGON

IOTES TO THE USER

Subsystems, Classes, Subclasses, and Water Regimes in *Italics* were developed specifically for NATIONAL WETLANDS INVENTORY mapping.
Some areas designated as R4SB, R4SBW, OR R4SBJ (INTERMITTENT STREAMS) may not meet the definition of wetland.
This map uses the class Unconsolidated Shore (US). On earlier NWI maps that class was designated Beach/Bar (BB), or Flat (FL). Subclasses remain the same in both versions.

U.S. DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

Prepared by National Wetlands Inventory

Base map provided by the United States Geological Survey

1995

AERIAL PHOTOGRAPHY

7 / 82	DATE	/
1:58 000	SCALE	
CIR	TYPE	

INE — **SYSTEM**

2 — INTERTIDAL — **SUBSYSTEM**

AB — AQUATIC BED	RF — REEF	SB — STREAMBED	RS — ROCKY SHORE	US — UNCONSOLIDATED SHORE	EM — EMERGENT	SS — SCRUB-SHRUB	FO — FORESTED	CLASS
1 Aquatic Bed 2 Vascular 3 *Submergent* 4 *Surface*	2 Mollusc 3 Worm	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Persistent 2 Nonpersistent	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	Subclass

TRINE — **SYSTEM**

2 — LITTORAL — **SUBSYSTEM**

RB — ROCK BOTTOM	UB — UNCONSOLIDATED BOTTOM	AB — AQUATIC BED	RS — ROCKY SHORE	US — UNCONSOLIDATED SHORE	EM — EMERGENT	OW — *OPEN WATER: Unknown Bottom*	CLASS
	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 2 Aquatic Moss 3 *Rooted Vascular* 4 *Floating Vascular* 5 *Unknown Submergent* 6 *Unknown Surface*	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	2 Nonpersistent		Subclass

MODIFIERS

Describe wetland and deepwater habitats based on modifiers of the water regime, water chemistry, and classes lower level in the hierarchy. The farming regime may also be applied to the ecological system.

	WATER CHEMISTRY			SOIL	SPECIAL MODIFIERS	
	Coastal Salinity	**Inland Salinity**	**pH Modifiers for all Fresh Water**			
any level of the diurnal, tidal and lunar ex * only used in subsystems	1 Hyperhaline 2 Euhaline 3 Mixohaline (Brackish) 4 Polyhaline 5 Mesohaline 6 Oligohaline 7 Fresh	8 Hypersaline 9 Eusaline 0 Mixosaline 0 Fresh	a Acid b Circumneutral c Alkaline	a Organic b Mineral	b *Beaver* d *Partially Drained/Ditched* f Farmed	h *Diked/Impounded* i Artificial Substrate s Spoil x Excavated

671EA14
Forest Service Number

CULTURAL RESOURCE SITE REPORT
REGION 6-USDA-FOREST SERVICE
SITE UPDATE PAGE

Smithsonian Number

Forest: Ochoco Ranger District: Big Summit County: Crook
Site Name (if any): Blue Ridge Mine

Legal Description: ___1/4___1/4___1/4 NE 1/4, sec. 15 , T. 14 R. 20 , WilM.
___1/4___1/4___1/4 SE 1/4, sec. 15 , T. 14 R. 20 , ___M.

Describe changes in access to the site and site datum: No change in access. Frank Reid, claimant died in November 1996. Status of claim and ownership of buildings may change as a result. To be continued.

SETTING: Basin: Deschutes Sub Basin: Upper Crooked Province: Blue Mtns.
Primary Landform: mountains Primary Position: slopes
Secondary Landform: butte Secondary Position: edge
Elevation (at primary datum point): 4,840 feet
Slope(s): 5 % Aspect: SE Bearing:
Soils: ash loams Color: tan, red-brown Depth: ?
Bedrock(optional):

Flora.	on-site	surrounding site
Overstory:	ponderosa pine, fir, asp[en	same
Understory:	young trees, alder	same
Ground Cover:	grasses and forbes	same

Water Sources:

Name	Type/Class	From Datum Distance	From Datum Degrees	Drainage
Winter Crk	intermittent/III	on site	NA	upper Crooked River

Describe changes in the site's physical data and condition: Residence (tar paper structure east of bunkhouse) and bunkhouse continue to be used by claimant's. Residence not occupied Nov. 1996.

Notes from files @1980?: Blue Ridge Mine, high grade but lower than Champion Mine. Ernie says the building at the mine we've been calling the "hotel" was built to house miners. Ore measured in tons instead of pounds. Blue Ridge was a large operation. Discussion of Retort - old section: gas fired plant, maybe oil, 1930s. Rotary - large tube. This may have been fed continuously. Metal tube inside the tube to _____ ore. Fires inside around interior tube, supported by large cement pedestals. Outlet for vapor was a porcelain pipe. Ernie thinks it was imported from foreign ocuntry. Porcelain and not sast iron Makers mark = "GMP". Condensing tubes were set in cement.

Ernie's father worked here in 1920s before Ernie was born.

Retort is a High Grade. Changed to low grade sytem. Collect -accumulate alot of low grade until you have concentration for a high grade retort system. Run over copper coated plates, riffle tables. Mercury amalgomates on copper contentration tables. Ernie thinks tabels come from Mayflower mines used them. This is one area where gold and cinnabar mining are similar. They thought they could try it at the Blue Ridge Mine.

This represents the entire era of Anucba? mining in central Oregon.

671EA15
Forest Sevice Number

Cultural Resource Site Report
Region 6-USDA-Forest Service
SITE UPDATE PAGE

Smithsonian Number

Forest: Ochoco Ranger District: Big Summit County: Crook
Site Name (if any): Amity Mine

Legal Description: 1/4 SW1/4 SW1/4 SW1/4, sec. 15, T. 14S R. 20E, W. M.
NW1/4 SE1/4 SW1/4 SW1/4, sec. 15, T. 14S R. 20E, W. M.

Describe access to the site and site datum: Follow road 4200 to 4200-177. Turn south on road 4200-177 and follow down hill to Johnson Creek. Turn west along road paralleling the creek and follow road to site. Datum located on northwest base of a 6" dbh ponderosa pine tree along the southern (cont. page 2)

SETTING: Basin: Deschutes Sub Basin: Upper Crooked Province: Blue Mtns.
Primary Landform: Butte Primary Position: Base
Secondary Landform: Drainage Secondary Position: Edge
Elevation (at primary datum point): 5,000 feet
Slope(s): 0 - >50 % Aspect: Southeast Bearing: 150 degrees
Soils: B4, M13 Color: Mid to Dark Brown Depth: at least 50cm
Bedrock (optional): Unknown

Flora:	on-site	surrounding Site
Overstory:	Ponderosa pine, fir,	Same as on-site
Understory:	Willow, immature trees	Same as on-site
Ground cover:	grasses	Same as on-site

Water Surces:

Name	Type/Class	From Datum Distance	Degrees	Drainage Basin
Johnson Creek	:Pern./3	:on-site	: N/A	: Deschutes

Describe changes in the site's physical data and condition: The Amity Mine is located south of road 4200 and consists of two standing structures, the structural remains of a number of buildings and mining features, spoil dirt piles, and several collapsed adits. (cont. page 2)

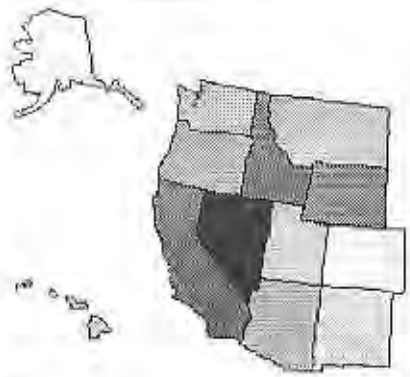
Probable source of impacts/present use:
Short-term: Vandalism, mining activities
Long-term: Erosion, natural deterioration, vandalism, mining activities

Material Collected: Yes: ___ No: X
Present Location of collection: ___
Date(s) Collected: ___
Description of Collected Material: 1. 2.

Project Report Title: Cultural Resource Inventory of the Wildhorse E.A. Area
Author: Thomas E. Churchill
Name of Recorder: Thomas E. Churchill Date: 8/26/1992

MANAGEMENT STATUS CHANGES:
Special Management Area or LRMP Allocation: ___
Management Objectives: ___
Site Classificationn (cf 2361.1): ___ Class I, ___ Class II, ___ Class III
National Register Status: ___ Listed, ___ Eligible, x Insufficient Data
___ LSPMOA Eligible--provide discussion of integrity, applicable research questions, context etc. on OrSHPO LSPMOA form and attach to site form
___ Non-eligible (provide justification on continuation page[s])

Approved: Nancy Masterson : District Archaeologist
Name of Professional Reviewer Title



Western Regional Climate Center

WRCC supports a three-tiered national climate services support program - the partners include: National Climatic Data Center (NCDC), Regional Climate Centers (RCC's), and State Climate Offices.

This program is funded through the Cooperative Institute for Atmospheric Sciences and Terrestrial Applications (CIASTA).

Overview of the Western Regional Climate Center's services.

More about the Western Regional Climate Center.

Disclaimer

For more information, contact
Western Regional Climate Center,
email: wrcc@dri.edu
phone: 775-674-7010
fax: 775-674-7016

NOTICE: Changes of WRCC Physical and virtual addresses.

Climate and Weather Information

- CPC Long-Lead Climate Outlooks (last updated 12/13/2001) January 2002 - 2003
- Western U.S. Climate Historical Summaries Summaries now available for major Western U.S. Cities with Wind, Humidity, Sunshine and Sky Cover information. (NCDC LCD summaries)
- Daily Temperature and Precipitation Data (Western U.S.) NEW
- Station Data Inventories
- NWS City Daily Climate Reports (Western U.S.)
- NWS State 24-Hour Reports (Western U.S.)
- Latest Observations for Western U.S., Alaska and Hawaii
- SNOTEL Data (Oct. 93 till Today is available.)
- Western U.S. NWS Products, Forecasts, etc.
- GOES Satellite Imagery
- Radar Imagery
- Surface Plots and data from RAWS and METAR stations

WRCC Projects

- El Niño, La Niña, and the Western U.S., Alaska and Hawaii
- Climate, Ecosystem, and Fire Applications (CEFA)

- Current weather data plots from WRCC. Includes DRI/SAGE building.
- Current webcam view from DRI-NNSC. NEW
- S. Nevada Community Environmental Monitoring Project (CEMP)

Precipitation Maps

- Precipitation Maps for th Western U.S.
- Precipitation Frequency Maps for the Western U.S. (Return Periods. NOAA Atlas 2)

WRCC/DRI Resources

- DRI Home Page
- WRCC Software Library (Restricted Access)
- Weather Information (DI Access only.)
- DRI LDM logs (ldmd, netcheck, and syscheck)

Sources of more

Appendix F.

State Well Log

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the STATE ENGINEER, SALEM, OREGON 97310 within 30 days from the date of well completion.

RECEIVED OCT 31 1969

WATER WELL REPORT
STATE OF OREGON
(Please type or print)
(Do not write above this line)

CROO 1716

State Well No. 14/20-15

State Permit No.

(1) OWNER:
Name FRANK REID Prineville
Address P.O. BOX B OREGON

(2) TYPE OF WORK (check):
New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:
Rotary ☒ Driven ☐
Cable ☐ Jetted ☐
Dug ☐ Bored ☐

(4) PROPOSED USE (check):
Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) CASING INSTALLED: Threaded ☐ Welded ☐
6" Diam. from +1 ft. to 19 ft. Gage 7
" Diam. from ft. to ft. Gage
" Diam. from ft. to ft. Gage

(6) PERFORATIONS: Perforated? ☐ Yes ☒ No.
Type of perforator used
Size of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

(7) SCREENS: Well screen installed? ☐ Yes ☒ No
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to ft.
Diam. Slot size Set from ft. to ft.

(8) WATER LEVEL: Completed well.
Static level 19 ft. below land surface Date 9/22/69
Artesian pressure lbs. per square inch Date

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? ☐ Yes ☒ No If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " "
Air Lift Complete "
Bailer test 155 gal./min. with ft. drawdown after 1 hrs.
Artesian flow g.p.m. Date
Temperature of water 50 Was a chemical analysis made? ☐ Yes ☒ No

(10) CONSTRUCTION:
Well seal—Material used BENTONITE & Drill cuttings
Depth of seal 19 ft.
Diameter of well bore to bottom of seal 9 in.
Were any loose strata cemented off? ☐ Yes ☒ No Depth
Was a drive shoe used? ☐ Yes ☒ No
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? depth of strata
Method of sealing strata off
Was gravel packed? ☐ Yes ☒ No Size of gravel:
Gravel fed from ft. to ft.

(11) LOCATION OF WELL:
County CROOK Driller's well number
¼ ¼ Section 15 T. 14 S. R. 20 E. W.M.
Bearing and distance from section or subdivision corner

(12) WELL LOG: Diameter of well below casing 6"
Depth drilled 130 ft. Depth of completed well 130 ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level as drilling proceeds. Note drilling rates.

MATERIAL	From	To	SWL
Top Soil & Boulders	0	4	
SHATTERED			
Brown shale Rock	4	22	19
Green shale Rock	22	32	
Grey Basalt (Hard)	32	58	
Green Shale Rock	58	60	
Grey Basalt (Hard)	60	98	
Grey Basalt (Med)	98	104	
" " (Hard)	104	121	
BROKEN BASALT	121	128	
GREY & GREEN SEAMS			
GREY BASALT HARD	128	130	

Work started 9/21 1969 Completed 9/22 1969
Date well drilling machine moved off of well 9/22 1969

Drilling Machine Operator's Certification:
This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.
[Signed] Dick Akins (Drilling Machine Operator) Date 9/22 1969
Drilling Machine Operator's License No. 249

Water Well Contractor's Certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
NAME AKINS WELL DRILLING (Person, firm or corporation) (Type or print)
Address P.O. Box 264 Prineville
[Signed] Dick Akins (Water Well Contractor)
Contractor's License No. 260 Date 10/28 1969

(USE ADDITIONAL SHEETS IF NECESSARY)

Appendix G.

Threatened and Endangered Species Survey

OCHOCO MINES THREATENED AND ENDANGERED SPECIES SURVEY AND HABITAT ASSESSMENT

Prepared for:

Cascade Earth Sciences
Medford, Oregon

Prepared by:

ENTRIX, Inc.
Olympia, WA

Project No. 338201

May 20, 2002

OCHOCO MINES THREATENED AND ENDANGERED SPECIES SURVEY AND HABITAT ASSESSMENT

Prepared for:

Cascade Earth Sciences
225 S. Holly Street
Medford, Oregon 97501

Prepared by:

ENTRIX, Inc.
Jeffrey P Fisher, Ph.D., and Ken Sargeant
148 Rogers Street, NW
Suite 1
Olympia, WA 98502

Project No. 388201

May 20, 2002

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Appendix A:

Figure 1. Amity Mine Site
Figure 2. Blue Ridge Mine Site

Background

The Amity and Blue Ridge Mine sites are located within the Ochoco National Forest in central Oregon, approximately 35 miles east of Prineville. Mercury was mined from the small sites up until the early 1990's. The Amity and Blue Ridge Mine sites are located within approximately 1 mile of one another, bissected by Forest Service Road (FR) 42, and accessed by FR roads #152 and #200, respectively (Figures 1 and 2). The Amity Mine lies within the Johnson Creek watershed, while the Blue Ridge site lies within the Winter Creek drainage. Winter Creek joins Johnson Creek in the Big Summit Prairie. Evidence of past mining activity such as mine shafts, small buildings for processing and tailings embankments remain on the sites.

Amity Mine Site

The Amity Mine site (Figure 1) is located at 44.35.018N latitude 120.322.18W longitude, and is bordered on the south by Johnson Creek and on the north by Canyon Creek Road (FR 42). The Amity site occupies a total of approximatley 12 acres. A spring emerges from an adit on the Amity site and flows south toward Johnson Creek. The main adit opening is partially exposed, even though the adit istelf has caved. Groundwater surfaces from the caved adit and flows approximately 100 ft downslope, creating an elliptical marshy area that intersects the access road. The marsh is dominated by horsetail (genus, species). At the time of the survey, surface flows from this adit appeared to infiltrate back into the ground at this ponded area prior to reaching Johnson Creek. Surface topography would indicate that the adit waters eventually infiltrate the creek, approximately 50 ft below where the adit pond waters infiltrate.

Remaining structures at the Amity site include a wooden rock hopper, and a concrete foundation with large timber framing. The exact use of the building formerly associated with the concrete foundation is not known, but it is thought to be a former mill building. The building may also have housed condenser tubes. A small brick base near a second adit is thought to have been part of a small retort foundation.

Blue Ridge Mine

The Blue Ridge Mine site (Figure 2) is located at 44.35.622 N latitude, 120.31.17 W longitude, north of FR 42 and east of FR 200 from which the site is accessed. It occupies a total surface area of approximatley115 acres. Operations at Blue Ridge were conducted at a small scale, with the most recent owner of the mine operating it solo. The Blue Ridge site has, at the current time, more structures that remain on site, with buildings, foundations, and kiln structures still present. The site is bordered to the north by Winter Creek, an ephemeral, spring-fed tributary of Johnson Creek that was impounded in two locations to support water needs for the mining operation.

Several tailings piles are found on either side of FR 202 which serves as the access road into the mine from FR 200. A large trench bissects the two largest tailings piles on the

site. The trench intercepts groundwater and the bottom of the trench is sparsely vegetated with hydrophilic plants. Relative to the Amity Site, the Blue Ridge Mine Site has had more physical disturbance.

The objectives of this study were three-fold: (1) to characterize wildlife, aquatic and plant communities and habitats, (2) to identify the presence of threatened and endangered species or their critical habitats, and (3) to characterize the potential impacts from the past mining activity on habitat conditions.

Methodology

Site surveys were conducted on October 3rd and 4th, 2001. Fourteen sampling locations were selected to characterize plant communities, wildlife use, and wildlife habitat. Upland survey sites were selected uphill, in the mine site, and downhill. Riparian (streamside) sites were selected upstream, nearest the site, and downstream. In addition, at the larger Blue Ridge site, an additional uphill and tailings site were added.

Plant species were identified at each sample location and their approximate cover was visually estimated by a US Army Corps of Engineers certified wetlands scientist. Cover was estimated for woody species in a 5-m radius plot and a 2-m radius plot for herbaceous species. Plants were identified using *Flora of the Pacific Northwest* (Hitchcock and Cronquist, 1990). Plant community composition was compared between uphill/upstream and downhill/downstream sites. Not all the plants, particularly grasses, were identifiable to species, often because the flowers or seeds had been eaten or had fallen off the plant by the time the survey was conducted in early autumn.

The wildlife habitat representative of the site was evaluated at each sample location to provide representation for the ability of the habitat to provide conditions needed for listed wildlife species. In addition to this habitat characterization, 15-minute point counts were conducted at each station, and all wildlife species observed or heard were recorded.

To address aquatic species potentially present within the habitats, stream habitats were surveyed in an upstream direction, beginning below the mines and proceeding upstream until above the areas of mine impact were clearly distinguishable. Since no electroshocking permit was authorized for this study, fish observations were recorded by an American Fisheries Society fisheries scientist with 20 years experience in the visual identification of temperate zone species in the Pacific Northwest. The species that could inhabit the habitat available, on the basis of previous electroshocking surveys conducted by USFS scientists, were used to confirm visual observations through correspondence with USFS representatives. Aquatic invertebrates were examined in both Winter and Johnson Creeks by examining the underside of at least 10 cobble-size rocks each downstream, within the mine sites, and upstream of mine locations. All impacts to the landscape were recorded, as recognized, whether caused by mining activities or other factors.

Results and Discussion

Plant Species and Communities Identified in Survey

Although the variability in species richness of plants among sample stations was very high (Table 1), the plant community observed at both mine sites could be characterized as open second–growth lodgepole pine (*Pinus contorta*) and grand fir (*Abies grandis*) overstory with occasional Douglas fir (*Psuedotsuga menziesii*) and juniper (*Juniperus occidentalis*) interspersed. The understory was dominated by grasses with occasional shrubs. The dominant grasses observed included bluebunch wheatgrass (*Agropyron spicatum*), pinegrass (*Calamagrostis rubescens*) and Wheeler's bluegrass (*Poa nervosa*). Shrubs were interspersed commonly within the understory, with snowberry (*Symphoricarpos albus*) the most dominant species observed.

Riparian areas were dominated by Sitka Alder (*Alnus sinuate*). Sitka Alder is a large multi-stemmed shrub or small tree. Snowberry and bentgrass (Agrostis spp.) were common in the understory. A variety of other plants were found in the riparian areas, but varied greatly from site to site. Often upland plants species were observed in the plot radius evaluated because the stream hydrology affected effected only a narrow swath of plants. In other areas, wetlands occurred along the stream and common wetland plants were included in the plant community analysis.

Table 1. Percent Coverage of Plant Species at Ochoco Mine Sites, Central Oregon

	Mine		Blue Ridge									Amity						
	Location[1]		UG	UG	TA	OS	DG	DG	OS	DG	UG	UG	OS	DG	UG	OS	DG	
	Sampling Station		1	13	14	3	5	2	4	6	7	8	9	12	7	10	11	
	Habitat Type[2]		U	U	U	U	U	R	R	R	R	U	U	U	R	R	R	
Scientific Name	**Common Name**	**Type**																**Average**
Pinus contorta	Lodgepole pine	tree	30	25	10	25	25			40			30	60				17.5
Abies grandis	Grand fir	tree	15	25		20	40				5	80			5			13.2
Larix occidentalis	Western larch	tree										10						0.7
Juniperus occidentalis	Juniper	tree	+															0.0
Alnus sinuata	Sitka alder	shrub						70	15	20	50				50	30	30	15.4
Symphoricarpos albus	Snowberry	shrub		5					15					45		20	20	7.5
Abies grandis	Grgand fir (sapling)	shrub	+	5				+	+				20			25		3.6
Physocarpus capitatus	Ninebark	shrub										5				10	10	1.8
Pinus contorta	Lodgepole pine (sapling)	shrub	+			+	10						5					1.1
Holodiscus discolor	Oceanspray	shrub						+										0.0
Salix spp.	Willow	shrub																0.0
Agropyron spicatum	Bluebunch wheatgrass	herb	45	45	40	40		10		5	25	45	15		25		10	20.0
Agrostis spp.	Bentgrass	herb							5	50	20				20		60	9.6
Phleum pratense	Timothy	herb		5					5	5			10			55	10	6.4
Poa nervosa	Wheeler's bluegrass	herb	30	35		10					10				10			6.1
Populus tremuloides	Black cottonwood	herb		25						25								3.6
Bromus spp.	Cheatgrass	herb				10	30											2.9
Glyceria elata	Tall managrass	herb						20	5		5				5	10		2.9
Lotus corniculatus	Bird's foot trefoil	herb			5								35					2.9
Scirpus microcarpus	Small-fruited Bulrush	herb						15	25									2.9

Table 1. Percent Coverage of Plant Species at Ochoco Mine Sites, Central Oregon

	Mine		Blue Ridge									Amity						
	Location[1]		UG	UG	TA	OS	DG	DG	OS	DG	UG	UG	OS	DG	UG	OS	DG	
	Sampling Station		1	13	14	3	5	2	4	6	7	8	9	12	7	10	11	
	Habitat Type[2]		U	U	U	U	U	R	R	R	R	U	U	U	R	R	R	
Holocus lanatus	Velvet grass	herb	10				20	5										2.5
Scientific Name	**Common Name**	**Type**																**Average**
Bromus mollis	Soft brome	herb							25							5		2.1
Calamagrostis rubescens	Pinegrass	herb				10							10			5		1.8
Carex obnupta	Slough sedge	herb								20						5		1.8
Geum macrophyllum	Large-leaved avens	herb						+		+	10				10	10		1.4
Juncus acuminatus	Rush	herb						5			5		10		5			1.4
Cirsium vugare	Common thistle	herb								15								1.1
Festuca arundinacea	Tall fescue	herb									+			15	+			1.1
Fragaria virginiana	Strawberry	herb	5				+			5		5						1.1
Yarrow spp.	Yarrow	herb	5		10		+											1.1
Aster subspicatus	Douglas' aster	herb			+											10		0.7
Carex rossii	Ross's sedge	herb						10										0.7
Carex sheldonii	Sheldon's sedge	herb							10									0.7
Carex spp.	Sedge	herb										10						0.7
Galium spp.	Bedstraw	herb										10						0.7
Poa spp.	Bluegrass	herb									10				10			0.7
Anemone piperi	Piper anemone	herb						5		+								0.4
Chrysanthemum maximum	Shasta daisy	herb								5								0.4
Dactylis golomerata	Orchard grass	herb						5										0.4
Equisetum arvense	Field horsetail	herb		5													+	0.4
Erythronium grandiflorum	Avalanche lily	herb															5	0.4
Montia sibirica	Miner's Lettuce	herb									5				5			0.4
Ribes triste	Swamp currant	herb								+	5				5			0.4
Verbascum thapsus	Common mullein	herb		5														0.4

Table 1. Percent Coverage of Plant Species at Ochoco Mine Sites, Central Oregon																		
	Mine		**Blue Ridge**									**Amity**						
	Location[1]		UG	UG	TA	OS	DG	DG	OS	DG	UG	UG	OS	DG	UG	OS	DG	
	Sampling Station		1	13	14	3	5	2	4	6	7	8	9	12	7	10	11	
	Habitat Type[2]		U	U	U	U	U	R	R	R	R	U	U	U	R	R	R	
Veronica americana	American Brooklime	Herb						5										0.4
Scientific Name	**Common Name**	**Type**																**Average**
Cicuta douglasii	Western water hemlock	Herb									+				+			0.0
Epilobium watsonii	Watson's willow herb	herb			+				+		+				+			0.0
Rumex crispus	Curly dock	herb								+								0.0
Streptopus roseus	Purple twistedstalk	herb						+										0.0
Taraxacum officinale	Dandelion	herb									+				+			0.0
Urtica dioica	Stinging nettle	herb						+										0.0

1: DG = downgradient of mines, UG = upgradient of mines, OS = on site of mines, TA = tailings pile (OS)
2: U = upland, R = riparian

Wildlife Species and Habitat Types Observations

The candidate, threatened, endangered species and "species of concern" for Oregon, and their habitat preferences are detailed in Table 2. If the known range of the species does not overlap with the Ochoco National Forest, then it would not be expected to be observed. A full listing of all wildlife species observed during these reconnaissance surveys is provided in Table 3. Sample station locations where the habitat is supportive of the species detailed in Table 2 is discussed in the following text. The following text also provides additional summary information on the findings from the survey at each sampling location. These general observations are applicable to the plant community descriptions as well, as where the sample station locations were co-located (Figure 2).

Conditions at the time of survey were dry and clear, with temperatures ranging from the low 50s to mid 60s. Drilling at the Blue Ridge Mine site during the survey created noise disturbances that likely affected wildlife sitings; however, it did not affect an assessment of the habitat conditions, the principal focus of the study.

Station 1—Upland Habitat Unit, Up-gradient of Blue Ridge Mine Disturbance Zone

This sample station location was positioned up-gradient of mine disturbance at the Blue Ridge site. It was on a gradual slope of approximately 2 percent and could be characterized as upland habitat dominated by lodgepole pine. The station was approximately equidistant between the riparian corridor of Winter Creek to the south and open mixed xerophytic forest/grassland habitat immediately to the north. No listed species were observed, although habitat for several of the species identified in Table 2 was present. During the 15-minute point count, mountain chickadee, raven, Douglas squirrel, and chipmunk were observed, and an unidentified species of woodpecker was heard. Because the site was positioned within edge habitat of two different plant communities, a relatively high diversity of species use was expected and was observed. No threatened, endangered or candidate species were observed, although the habitat was potentially suitable for Canada lynx. All animal species of concern listed in Table 2 could potentially be found in the habitat type represented by Station 1, if only as a transient, except the aquatic, amphibian and reptilian species, the northern goshawk, upland sandpiper, black tern, and Lewis' woodpecker, small-footed bat, and California wolverine.

Station 2—Riparian Habitat Unit, Up-gradient of Blue Ridge Mine Disturbance Zone

This station was located in the riparian zone of Winter Creek, upstream of the Blue Ridge Mine disturbance zone. In this location, spring waters of the creek trickled through the 3-4 ft stream channel at an estimated flow of approximately 25 gpm. Wildlife species observed or heard did not differ from that observed in Station 1 (Table 3) with the addition of American crow. Large caddisfly larvae consistent with the genus *Apatania sp.* were observed beneath several of the rocks in the trickle flow of the creek (max depth of approx. 4"). Of the species detailed in Table 2, the habitat was particularly suitable for the yellow breasted chat and the willow flycatcher. No threatened, endangered or candidate species were observed, although the habitat was potentially suitable for Canada

lynx. All animal species of concern listed in Table 2 could potentially be found in the habitat type represented by Station 8, if only as a transient, including the aquatic and amphibian species, the northern goshawk, upland sandpiper, black tern, and Lewis' woodpecker, small-footed bat, and California wolverine. Use of the aquatic habitat by inland redband trout was not observed during the survey, but higher flows would permit access to the habitat, as there were no absolute barriers identified downstream.

Station 3—Upland Habitat Unit, Within Blue Ridge Mine Disturbance Zone

Station 3 was located within upland open Ponderosa forest in the Blue Ridge Mine disturbance zone, in the same vicinity as CES soil sample S-BR-6. The survey was conducted at 11:00. Only mountain chickadee and Douglas squirrel were observed during the 15-minute point count. No threatened, endangered or candidate species were observed, although the habitat was potentially suitable for Canada lynx. All animal species of concern listed in Table 2 could potentially be found in the habitat type represented by Station 8, if only as a transient, except the aquatic, amphibian and reptilian species, the northern goshawk, upland sandpiper, black tern, and Lewis' woodpecker, small-footed bat, and California wolverine.

Station 4—Riparian Habitat Unit, Within Blue Ridge Mine Disturbance Zone

Station 4 was located in riparian habitat of Winter Creek, within the mine disturbance zone. The station location was positioned in an area of the stream channel formerly impounded for the mine processing. This impoundment created a sediment deposition zone, which has, in turn, been transformed into a wetland. At this location, there was no further surface flow or standing water as had been identified upstream. The shoreline/riparian habitat exhibited downcutting, likely a result of the periodic removal of a coffer dam. Douglas squirrel and mountain chickadee were either observed or heard during the 15-minute point count, but no other species were seen. No threatened, endangered or candidate species were observed, although the habitat was potentially suitable for Canada lynx. All animal species of concern listed in Table 2 could potentially be found in the habitat type represented by Station 4, if only as a transient, except the northern goshawk, upland sandpiper, black tern, and Lewis' woodpecker, small-footed bat, and California wolverine, and northern sagebrush lizard. Use of the aquatic habitat by inland redband trout was not observed during survey because the creek was dry; however, higher flows would permit access to the habitat, as there were no absolute barriers identified downstream. Of the species detailed in Table 2, the habitat was particularly suitable for the yellow breasted chat and the willow flycatcher.

Station 5—Upland Habitat Unit, Downgradient of Blue Ridge Mine

Station 5 was located in upland habitat downgradient of the Blue Ridge Mine site, south of FR of 42 (Figure 2). This station was surveyed at 17:00, shortly before dusk. Habitat was characterized as open uplands with a mixed plant community of conifers, aspens and mixed grasses. Meadowlark, savanna sparrow, Douglas squirrel and Stellar's Jay were either heard or observed (Table 3). Several unidentified passerine birds of the same species were also heard, but not seen. No threatened, endangered or candidate species

were observed, although the habitat was potentially suitable for Canada lynx. All animal species of concern listed in Table 2 could potentially be found in the habitat type represented by Station 5, if only as a transient, except the aquatic, amphibian, and reptilian species, the northern goshawk, upland sandpiper, black tern, and Lewis' woodpecker, small-footed bat, and California wolverine.

Station 6—Riparian Habitat Unit, Downgradient of Blue Ridge Mine

Station 6 was located along the dry channel of Winter Creek, in riparian habitat, south of FR 42 (Figure 2). The site was only approximately 50 ft from the road, and hence was subject to the influences of road noise. Willow and alder were interspersed along the narrow band of riparian habitat along the dry channel, but otherwise, the plant community exhibited low species richness. American robin, Douglas squirrel, Stellar's Jay, white headed woodpecker, and mountain chickadee were observed during a 15-minute point count. No threatened, endangered or candidate species were observed, although the habitat was potentially suitable for Canada lynx. All animal species of concern listed in Table 2 could potentially be found in the habitat type represented by Station 6, if only as a transient, except the northern sagebrush lizard, the northern goshawk, upland sandpiper, black tern, and Lewis' woodpecker, small-footed bat, and California wolverine.

Station 7—Riparian Habitat Unit, Johnson Creek, Up-gradient of Amity Mine

Johnson Creek at this location flowed approximately 10 to 15 gpm, and exhibited a bankfull width of 6 to 8 ft and a wetted width of 2 to 4 ft. The large caddis fly resembling the *Apatania* genus observed in Winter Creek were not seen at this location in Johnson Creek. Ruffed grouse, grey jay, and Douglas squirrel were positively identified during a 15-minute point count at this station. No threatened, endangered or candidate species were observed, although the habitat was potentially suitable for Canada lynx. All animal species of concern listed in Table 2 could potentially be found in the habitat type represented by Station 7, if only as a transient, except the northern sagebrush lizard, the northern goshawk, upland sandpiper, black tern, and Lewis' woodpecker, small-footed bat, and California wolverine.

Station 8—Upland Habitat Unit, Up-gradient of Amity Mine

This station was nestled within a mixed-age and species conifer stand of douglas fir and grand fir, and was facing to the north along a slope with a shallow gradient (~4-5%). Ruffed grouse, Douglas squirrel, and chipmunk were observed or heard during a 15-minute point count. No threatened, endangered or candidate species were observed, although the habitat was potentially suitable for Canada lynx. All animal species of concern listed in Table 2 could potentially be found in the habitat type represented by Station 8, if only as a transient, except the aquatic and amphibian species, the northern goshawk, upland sandpiper, black tern, and Lewis' woodpecker, small-footed bat, and California wolverine.

Station 9—Upland Habitat Unit, Within Amity Mine Disturbance Zone

This station was located adjacent to the access road for the Amity Mine, just to the east of adit A (Figure 2). Little wildlife activity was observed during a 15-minute point count, and the only species recorded was an American crow. No threatened, endangered or candidate species were observed, although the habitat was potentially suitable for Canada lynx. All animal species of concern listed in Table 2 could potentially be found in the habitat type represented by Station 8, if only as a transient, except the aquatic and amphibian species, the northern goshawk, upland sandpiper, black tern, and Lewis' woodpecker, small-footed bat, and California wolverine. Given the physical disturbance and upland sloped characteristics of the site, use of the available habitat by yellow breasted chat and the willow flycatcher would be unlikely.

Station 10—Riparian Habitat Unit, Within Amity Mine Disturbance Zone

This station was located along Johnson Creek between CES sample stations of JC-A-8 and JC-A-4. Douglas squirrel and a house wren were observed during a 15-minute point count. The stream corridor near Station 10 was particularly degraded by cattle grazing, which effected sediment recruitment into the stream at this location. Multiple creek crossings by cattle were evident and stream bed substrate was embedded. No caddis fly larvae were found in the creek bed at this location, which was not unexpected given the physical disturbance to the habitat. A redband rainbow trout fry was observed upstream of the station approximately 100 ft. No threatened, endangered or candidate species were observed, although the habitat was potentially suitable for Canada lynx. All animal species of concern listed in Table 2 could potentially be found in the habitat type represented by Station 8, if only as transient occupants, except for the northern sagebrush lizard the northern goshawk, upland sandpiper, black tern, and Lewis' woodpecker, small-footed bat, and California wolverine.

Station 11—Riparian Habitat Unit, Downgradient of Amity Mine Site

This station was within the riparian zone of Johnson Creek, including the aquatic habitat. The station was positioned approximately ¼ mile downstream of the Amity Mine, and was not affected by physical disturbance of past mining activities. More recent grazing pressure effects on the physical habitat remained evident, like station 10; however, the vegetation community was less disturbed than that observed along the riparian corridor directly downslope from the mine adit. The large *Apatania sp.* caddis fly nymph were not observed in this station, but many were seen in further reconnaissance proceeding upstream from Station 11, yet still dowstream of the Amity Mine. A large, unidentified stonefly larvae was seen under rocks within Station 11. A 15-minute point count resulted in the observation or audible of Douglas squirrel, Stellar jay, and mountain chickadee. In addition, a gray titmouse was also observed. No threatened, endangered or candidate species were observed, although the habitat was marginally suitable for Canada lynx. All animal species of concern listed in Table 2 could potentially be found in the habitat type represented by Station 11, if only as a transient, except the northern sagebrush lizard, the northern goshawk, upland sandpiper, black tern, and Lewis' woodpecker, small-footed bat, and California wolverine.

Station 12—Upland Habitat Unit, Downgradient of Amity Mine Site

This station was positioned along a hillslope above Johnson Creek, downstream of the Amity Mine. The plant community was primarily represented by a monospecific stand of lodgepole pine. Mountain chickadee, Douglas squirrel, and a merlin hawk were observed during a 15-minute point count. All animal species of concern listed in Table 2 could potentially be found in the habitat type represented by Station 13, if only as a transient, except the aquatic and amphibian species, the northern goshawk, upland sandpiper, black tern, and Lewis' woodpecker, small-footed bat, and California wolverine.

Station 13—Upland Habitat Unit, Up-gradient of Blue Ridge Mine, Terrace Above Creek

This station was located in a clearing surrounded by an aspen thicket to the east and mixed conifer stand to the west. Ruffed grouse and chipmunk were observed during a 15- minute point count. Deer scat was scattered around the area, indicating heavy use by these ungulates. No threatened, endangered or candidate species were observed, although the habitat was potentially suitable for Canada lynx. All animal species of concern listed in Table 2 could potentially be found in the habitat type represented by Station 13, if only as a transient, except the aquatic and amphibian species, the northern goshawk, upland sandpiper, black tern, and Lewis' woodpecker, small-footed bat, and California wolverine.

Station 14—Tailings Pile and Trench, Blue Ridge Mine

Station 14 was located atop the large tailings pile south of the trench in the Blue Ridge Mine Site. The survey was conducted at 18:30, near dusk, in order to gauge whether the habitat was occupied by any of the bat species listed in Table 2. Given the ponding of water within the trench, and open mine shaft within the tailings pile, good microhabitat for bats was evident. However, none were observed. Within the ditch, a trickle flow of about 1 gpm was observed. Small mammal burrows were observed within the tailings pile, tentatively identified as Townsend's mole. A small 4 feet deep pond in the center of the ditch supported a healthy population of chorus frogs and duckweed.

Additional Aquatic Habitat Observations

To further address the aquatic habitat conditions in Winter and Johnson Creeks, reconnaissance surveys were conducted moving upstream from the lowermost riparian stations from which point counts were conducted--Station 4 in Winter Creek and Station 11 in Johnson Creek. Observations were made along the stream channel to qualitatively characterize the conditions below, within and upstream of the mine disturbance zones. Upstream of the lower impounded area in Winter Creek (i.e., Station 4), sporadic pockets of standing water were observed within the channel, but no flowing water was evident. The stream channel substrate was dominated by cobble, with gravel and sporadic boulder also present. No caddisfly larvae were observed within these ponded segments. A second impoundment, formerly used as the historic water supply for the Blue Ridge Mine site, created a pond with standing water several feet deep. This impoundment, similar to

the impoundment downstream, created a wetland with a moderately dense alder thicket interspersed with aspen in those areas with slightly less moisture. Approximately 20 ft upstream from the upper end of the upper impoundment, a limited continuous flow of 1 gpm was observed. At this point, continuing upstream, large caddis fly larvae resembling *Apatania sp.* could be found beneath gravel and cobble in areas where flows were not stagnant. The stream channel gradient was limited to no more than approximately 1% up to the headwaters, with a bankfull width of approximately 4 to 6 ft, except in the impounded areas.

Conditions in Johnson Creek were more supportive of aquatic life, as flows were consistent below, within, and above the mine site. Flows increased slightly downstream relative to the upstream areas observed. Redband rainbow trout fry were consistently seen in pool habitats upstream of Station 11. Within the mine disturbance zone around Station 10, only a single trout fry was observed. Physical disturbance of the riparian corridor by cattle was evident in all locations along Johnson Creek, and was particularly heavy around the former mine area. The aquatic habitat disturbance in this area appeared predominantly associated with grazing pressure, as there were multiple locations of streambank erosion. The stream gradient in this location was slightly lower than that downstream and upstream of the mine, favoring sediment deposition and habitat more marsh-like than a stream corridor with typical pool: riffle conformation generally supportive of salmonids. No trout fry were observed upstream of the mine; however, it must be recognized that the stream was not formally surveyed for fish abundance, as no electroshocking equipment was used, and not all habitat along the stream corridor was explored. Thus, qualitatively, it appeared that more trout were occupying the stream habitat below the mine than above it, but this finding would need to be confirmed, and compared against physical habitat metrics in the stream—particularly flow—to determine the reasons for fish distribution and abundance. Notwithstanding the grazing pressures along Johnson Creek, the riparian corridor around Johnson Creek was generally more developed than that of Winter Creek—particularly lower Winter Creek. This difference is likely due to the lack of perrenial flows in Winter Creek, although physical disturbance around the Blue Ridge Mine Site has also affected the abundance and species of vegetation around the Blue Ridge Mine Site.

Table 2. Federally Threatened or Endangered Species in Oregon, and Documentation of Habitat Presence in Amity and Blue Ridge Mine Areas of the Ochoco National Forest

Federal Status	Scientific Name	Common Name	Habitat Type Preference	Habitat Present	Range*
Threatened	*Fellis lynx Canadensis*	Canada lynx	Dense boreal forests	x	x
Threatened	*Haltaeetus leucocephalus*	Bald eagle	Inland lakes and marshes		
Candidate	*Rana luteiventris*	Columbia Spotted Frog	Ponds, springs and marshes	x	x
Species of Concern	*Corynorhinus townsendii pallescens*	Pale western big-eared bat	Roosts in buildings, caves, mines and bridges	x	x
Species of Concern	*Gulo gulo luteus*	California wolverine	Open forests in alpine areas		
Species of Concern	*Lastonycteris noctivagans*	Silver haired bat	Older Douglas fir/ Western hemlock/ ponderosa pine forests	x	x
Species of Concern	*Myotis ciliolabrum*	Small-footed bat	Arid grasslands and desert scrub	x	x
Species of Concern	*Myotis evotis*	Long-eared bat	Forested areas mostly along the edges	x	x
Species of Concern	*Myotis thysanodes*	Fringed bat	Forested or riparian areas	x	x
Species of Concern	*Myotis volans*	Long-legged bat	Coniferous forests	x	x
Species of Concern	*Myotis yumanenis*	Yuma bat	Riparian, desert scrub, moist woodlands, open forests	x	x
Species of Concern	*Accipiter gentiles*	Northern goshawk	Coniferous forests	x	x
Species of Concern	*Bartramia longicauda*	Upland sandpiper	Nest in partially flooded meadows		
Species of Concern	*Chlidonais niger*	Black tern	Alkaline lakes and freshwater marshes		
Species of Concern	*Contopus cooperi*	Olive-sided flycatcher	Coniferous forests	x	x
Species of Concern	*Empidonax trailli adastus*	Willow flycatcher	Stream edges, meadows and marshes	x	x
Species of Concern	*Icteria virens*	Yellow-breasted chat	Riparian woodlands along streams	x	x
Species of Concern	*Melanerpes lewis*	Lewis' woodpecker	Low elevations within open forests	x	x
Species of Concern	*Oreortyx pictus*	Mountain quail	Open forests in the high mountains	x	x
Species of Concern	*Picoides alborlarvatus*	White-headed woodpecker	Ponderosa pine forests	x	x
Species of Concern	*Sceloporus graciosus graciosus*	Northern sagebrush lizard	Sagebrush areas, Juniper woodlands and coniferous forests	x	
Species of Concern	*Oncorhynchus mykiss gibbsi*	Interior redband trout	Large shallow lakes in the Columbia River Basin	x	x
Species of Concern	*Apatania tovala*	Cascades apatanian caddisfly	Small, moderate to slow flowing streams with gravel and cobble substrates	x	x
Species of Concern	*Achnatherum wallowaensis*	Wallowa ricegrass	Nonforested/Scabland		X

Table 3. Wildlife Species Observed at Amity and Blue Ridge Mine Sites

Common Name	Scientific Name	Sample Station Locations Where Seen or Heard	Other Observations
Douglas squirrel	*Tamiasciurus douglasi*	all stations	Generally abundant throughout habitat
Mule deer	*Odocoileus hemionus*	13 (scat)	Excessive grazing pressure seen along Johnson Creek riparian corridor, likely a combination of deer and cattle effect
Yellow Pine chipmunk	*Eutamias amoenus*	8, 13	
Mountain chickadee	*Parus gambeli*	1,2,3,4,11,12	Abundant
Chipping sparrow	*Spizella passerina*	1,2,11	
American crow	*Corvus brachyrhynchos*	2,9	
Common raven	*Corvus corax*	1,2	
Winter wren	*Troglodytes troglodytes*	10,14	
Merlin (Pigeon Hawk)	*Falco columbarius*	12	Seen attacking a chickadee
Ruffed grouse	*Bonasa umbellus*	7,13	Flushed upon entry into sites
White-headed Woodpecker	*Picoides albolarvatus*	6	also observed near S-BR-5 on Blue Ridge Site
Stellar's jay	*Cyanocitta stelleri*	5,6	
American robin	*Turdus migratorius*	6	
Meadowlark	*Sturnella neglecta*	5	
Savannah sparrow	*Passerculus sandwichensis*	5	Open grassland edge habitat supportive of species, other sample stations unlikely to support this species
Bushtit	*Psaltriparus minimus*	11	
Gray jay	*Perisoreus canadensis*	7	
Nighthawk (tentative vocal)	*Chordeiles minor*	14	
Cascade caddisfly (genus I.d. only, presumptive)	*Apatania sp.*	2	abundant in between stations 11 and 10--downgradient of Amity mine; in Winter Creek observed upstream of upper impoundment--within mine disturbance area but not seen below upper impoundment
Water strider	Gerridae	2, 10, 14	Seen in most locations of ponded water in both Johnson and Winter creeks
Stonefly	Plecoptera	11	

Summary

The Amity and Blue Ridge Mines, buildings, and tailings have affected the plant communities and wildlife habitat. Current and ongoing disturbance from road noise, grazing pressure, and timber harvest play a larger role in determining species use of available habitats than the continued presence of historical mine operations. Direct, acute mine impacts to plant communities resulted from the land clearing for roads, structures, and maintenance at the mines. Indirect, chronic impacts from potentially toxic constituents in the mines could not be determined from the threatened and endangered species survey conducted. In the immediate vicinity of the mines, past land clearing has eliminated tree cover and reduced plant cover in general. However, it appears likely that these areas will restore naturally over a long period of time. With restoration, recovery could occur sooner. After re-establishment, the mine sites will provide habitat similar to the areas around them. None of the mine impacts currently recognized would appear to completely prevent the use of the habitats by threatened, endangered, or otherwise listed species whose range would overlap with the mine areas. However, the physical disturbance at the mines has reduced the habitat quality, which would limit the number of individuals potentially supported from the available habitat.

Grasses, shrubs, and tree saplings have re-established in many of the cleared areas and atop the mine tailings piles. However, the tailings piles at the Blue Ridge Mine were mostly devoid of significant plant growth, with species present tolerant of high levels of disturbance (e.g., bluebunch wheatgrass, yarrow). Some of the tailing piles on the Blue Ridge Mine site lacked any tree growth, even young saplings. However, some of the tailing piles at the Blue Ridge Mine site also had young lodgepole pine saplings on them. There could be several reasons for the limited vegetation: the piles may not have had enough time to become re-established; the piles may lack important plant nutrients and organic matter; dehydration; or toxic constituents may be present within tailings pile restricting the species diversity that could grow there. On the basis of the habitat and climate in the area, the most likely scenario to explain the low diversity and abundance of plants on the tailings piles is the lack of soil nutrients and water.

Comparisons were made for the more common species between uphill/upstream on site and downhill and downstream sites. The coverage by Grand fir was lower in the mine sites and downhill sites when compared to the uphill sites (Table 1). However, saplings were healthy and growing in both the mine and downhill sites. This finding would indicate that some clearing may have had an impact, but the sites' soils remain capable of supporting a mature forested community. Sitka Alder and bluebunch wheatgrass cover was lower in the mine sites and downstream when compared to the upstream sites. Bentgrasses and other grass species' cover was higher in the mine sites and downstream, when compared to the upstream sites. These differences are probably due to environmental differences, which may have caused the species composition to change. Specifically, the upstream sites were a little steeper and better drained relative to the downstream sites.. The slightly wetter conditions would favor a decrease in Sitka alder and an increase in bluebunch wheatgrass and bentgrasses.

Wildlife habitats above and below the mine sites were generally more favorable for supporting species listed in Table 2 simply because the clearing for the sites has removed or altered habitat components preferred by many of the species. The bat species may represent exceptions to this conclusion; however, as many of the species are known to utilize old structures and mine shafts. It is notable, however, that no bat species were observed during our surveys, nor were signs of bats evident around mine shafts or old structures. Thus, the mines and buildings may provide habitat for bats, but do not appear to do so at this time.

Aquatic habitats in both Winter and Johnson Creek are capable of supporting the redband rainbow trout, although conditions in Winter Creek are less favorable due to the ephemeral flows, and the mine-related impoundments that may restrict habitat access somewhat when flows are present. Riparian corridor degradation from grazing pressures in Johnson Creek have reduced the habitat quality by contributing fine sediments into the stream channel above a rate that would normally occur, causing gravel embeddedness and altering the morphology of the channel somewhat. Fencing along this stream corridor would greatly improve conditions for this species of concern. No conclusions can be made with respect to potential toxic influences of the mines' past activities on aquatic and wildlife habitats without sediment, soils, and water quality data.

References

Hitchcock, C.L. and A.Cronquist. 1990. Flora of the Pacific Northwest. University of Washington Press, Seattle, WA.

APPEDIX A
FIGURES

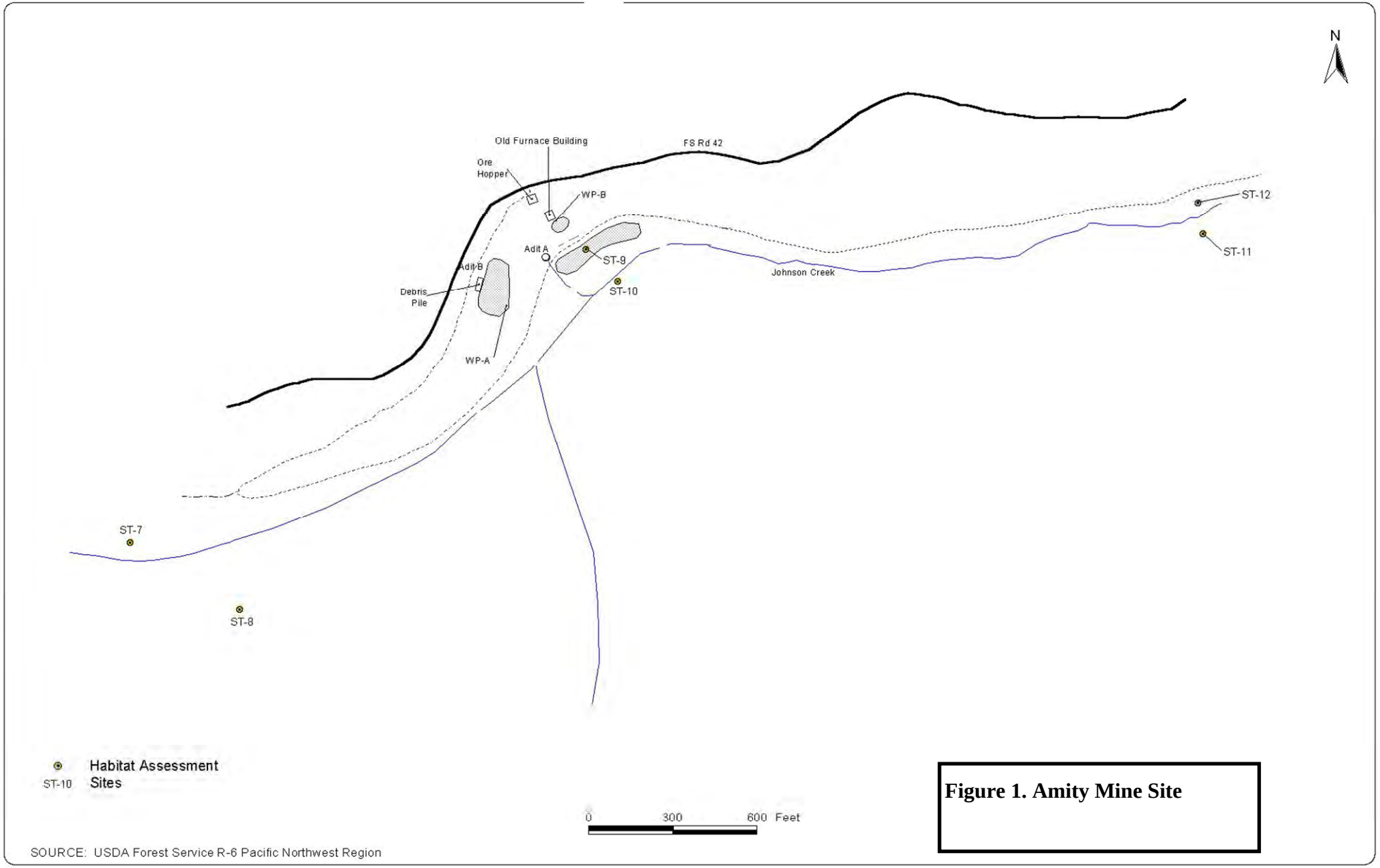


Figure 1. Amity Mine Site

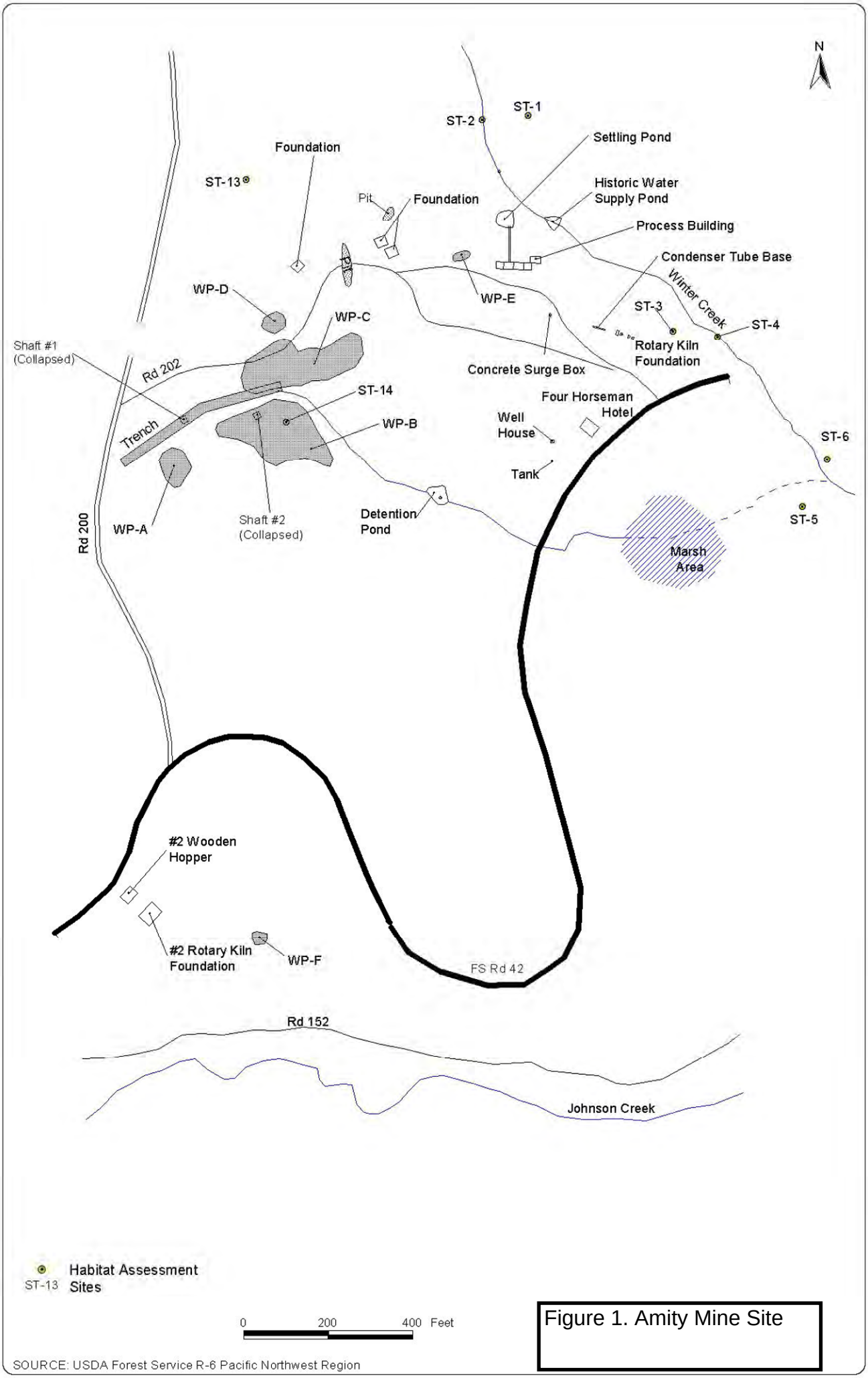


Figure 1. Amity Mine Site

SOURCE: USDA Forest Service R-6 Pacific Northwest Region

Appendix H.

Preliminary Assessment Blue Ridge Mine - Tables and Figures

Table 1. **Soils, Waste Rock, and Sediment Analytical Results**
Blue Ridge Mine Site, Ochoco National Forest, Crook County, Oregon

Sample ID [1]	Antimony [2]	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	pH, Saturated Paste	Solids, Percent
Soils	mg/L													units	
BR S 1	<0.1	1.2 B	<0.3	1.2	41	121	<5	119	49	<0.6	<0.6	0.16 B	63	7.2	79.2
BR S 2	<0.1	1.1 B	<0.2	1.8	28	108	<5	16	23	0.1 B	<0.6	0.11 B	55	6.1	79.9
BR S 3	<0.1	1.1 B	<0.2	1.9	37	83	<5	74	25	0.1 B	<0.6	0.12 B	49	6.4	80.8
BR S 4	<0.1	1.7 B	<0.3	1.7	46	95	22 B	505	30	0.5 B	<0.7	0.12 B	186	6.2	73.9
BR S4 D [3]	<0.1	1.7 B	<0.3	1.6	43	99	33	517	30	0.3 B	<0.7	0.12 B	183	6.3	74.7
BR S 5	<0.1	1.0 B	<0.2	1.4	37	92	56	8.6	25	<0.1	<0.6	<0.06	123	6.4	80.4
BR S 6	<0.7	<3	<0.3	0.9 B	52	57	<6	310	63	0.1 B	<0.7	<0.3	217	7	71.8
BR S 7	<0.1	1.1 B	<0.3	1.4	26	68	<5	3.19	20	<0.1	<0.6	0.1 B	52	6	80.4
BR S 8	<0.1	1.4 B	<0.3	1	23	56	<5	0.32	16	<0.1	<0.6	0.08 B	65	5.6	78.7
BR S 9	<0.1	1.3 B	0.3 B	1.2	28	33	<5	0.22	23	<0.1	<0.7	0.13 B	66	5.6	76.6
BR S 10	<0.1	1.2 B	<0.2	1.3	19	53	<5	0.2	21	<0.1	<0.6	0.07 B	76	5.8	83.7
BR S 12	<0.1	1.9 B	<0.3	0.6 B	64	35	<5	51	111	<0.1	<0.6	0.27 B	42	7.4	77.2
BR S 13	<0.1	1.5 B	<0.3	1.8	42	102	15 B	23	35	0.4 B	<0.8	0.11 B	238	6.1	62.8
Sediments															
BR SS 1	<0.2	<0.9	<0.4	1.1	33	36	<7	6.31	22	<0.2	<0.9	<0.09	50	6	40.9
BR SS 2	<0.2	1 B	<0.4	1.2	59	71	<9	81	93	<0.2	<1	0.1 B	58	6.7	34.5
BR SS 3	<0.1	1 B	<0.2	0.9	26	46	<4	238	56	<0.1	<0.5	0.13 B	42	7.2	62.9
BR SS 4	<0.09	<0.4	<0.2	0.48	14.8	15	<3	0.14	11.2	<0.09	<0.4	<0.04	25.4	6.8	94.9
BR SS 5	<0.1	<0.5	<0.2	0.6	23	28	<4	9.2	17	<0.1	<0.5	<0.05	34	6.3	80.4
BR SS 6	<0.1	1 B	<0.2	0.9	53	51	<4	9.7	30	<0.1	<0.6	<0.06	53	7.2	67.4
Waste															
BR WS 1	<0.1	0.9 B	<0.3	0.6 B	29	68	<5	597	51	0.4 B	<0.7	0.3	53	7	74.6
BR WS 2	<0.1	0.7 B	<0.3	0.5 B	64	29	<5	40	120	0.2 B	<0.7	0.31	36	7.5	76.4
BR WS 3	<0.1	<0.7	0.3 B	0.6 B	26	53	<6	145	50	0.2 B	<0.7	0.2 B	50	6.8	72.1
BR WS 4	<0.1	<0.6	0.4 B	0.6	16	100	<5	211	41	<0.1	<0.6	0.12 B	65	6.8	76.7
BR WS 5	<0.1	1 B	0.3 B	1.0	26	61	<5	80	40	<0.1	<0.7	0.1	51	7.1	69.5
BR WS 6	<0.1	<0.6	<0.2	0.7	32	50	<5	440	44	<0.1	<0.6	0.09 B	53	6.9	75.4
BR WS 7	<0.1	0.7 B	0.3 B	0.7 B	80	54	<6	790	108	0.1 B	<1	0.28 B	55	7.3	69.6
BR WS 8	<0.1	0.9 B	0.4 B	0.6 B	51	51	<6	660	90	0.2 B	<1	0.33 B	63	7.6	67.8
BR WS 9	<0.1	0.9 B	0.6 B	0.8	33	60	<6	210	87	0.2 B	<0.7	1.74	53	7.3	68.1
Standards															
PRG Industrial	**820**	**2.73**	**2200**	**810**	**450**	**76000**	**750**	**613**	**41000**	**10,000**	**10,000**	**130**	**100,000**		
TCLP (mg/l)	1.15	5.0	1.22	0.11	0.6	NL	0.75	0.2	11	5.7	0.14	0.2	4.3	NL	NL

NOTES:

[1] Samples were collected on November 9 and 10, 2000 by CES. Analysis was conducted by ACZ Laboratories, Inc. in Steamboat Springs, Colorado.

[2] EPA method 6010/7000 series and mercury by 7471 CVAA

[3] Sample BR S4D is a duplicate of BR S4

B= analyte detected between method detection limit (MDL) and practical quantification limit (PQL)

< value = analyte not detected above MDL

NL = not listed.

PRG = Preliminary Remediation Goals - USEPA Region 9 (November, 2000).

TCLP = Toxcity Charactreristic Leaching Procedure levels for metals in non-wastewater (40 CFR 268.28, 2000).

Table 2. Mercury Concentrations in Sediments Collected in 1982, DOGAMI Study

DOGAMI - ID	Location	Mercury
414	Johnson Creek, upstream from Amity Mine	1.05
322	Downstream from 414, still upstream from Amity Mine	2.5
415	Winter Creek,upstream from Blue Ridge Mine	0.15
323	Winter Creek, adjacent to Blue Ridge Mine	>5
417	Johnson Creek, near Blue Ridge Mine secondary process area.	3.3
321	Johnson Creek tributary, upstream from Amity Mine and #414	0.195
413	Johnson Creek, upstream from Amity Mine and #414	<5
412	Johnson Creek, upstream from Amity Mine and #414	<5

Notes:
Sample locations are referred to in the Ferns and Brooks, 1983 study.
Concentrations are in parts per million

Table 3. **Surface Water Results**
Blue Ridge Mine Site, Ochoco National Forest, Crook County, Oregon

Sample ID	Antimony, total	Arsenic, total	Beryllium, total	Cadmium, total	Chromium, total	Copper, total	Lead, total	Mercury, total	Nickel, total	Selenium, total	Silver, total	Thallium, total	Zinc, total	pH (lab)	Hardness as CaCO3	Calcium, dissolved	Magnesium, dissolved	Residue, Filterable (TDS) @180
	mg/L													units	mg/L	mg/L	mg/L	mg/L
BR SW 1	<0.0002	<0.001	<0.002	0.0002B	<0.01	<0.01	<0.04	<0.0002	<0.01	<0.001	<0.005	<0.0001	0.01B	7.9	86	19.1	9.3	130
BR SW 2	<0.0002	<0.001	<0.002	0.0008B	0.01B	<0.01	<0.04	0.0015 B	<0.01	<0.001	<0.005	<0.0001	0.02B	7	106	24.4	11	140
BR SW 3	<0.0002	<0.001	<0.002	<0.0002	<0.01	<0.01	<0.04	0.0002 B	<0.01	<0.001	<0.005	<0.0001	0.01B	7.2	121	27.9	12.4	160
BR SW 4	<0.0002	<0.001	<0.002	0.0006B	<0.01	<0.01	<0.04	<0.0002	<0.01	<0.001	<0.005	<0.0001	0.01B	7.5	100	26	8.5	150
BR SW 5	<0.0002	<0.001	<0.002	<0.0002	<0.01	<0.01	<0.04	<0.0002	<0.01	<0.001	<0.005	<0.0001	0.01B	7.7	92	23.1	8.3	140
BR SW 6	<0.0002	<0.001	<0.002	<0.0002	<0.01	<0.01	<0.04	<0.0002	<0.01	<0.001	<0.005	<0.0001	0.01B	7.5	123	28.5	12.7	170
BR SW 7 [2]	<0.0002	<0.001	<0.002	0.0005B	<0.01	<0.01	<0.04	<0.0002	<0.01	<0.001	<0.005	<0.0001	0.01B	7.9	121	28	12.5	160
BR GW 1	<0.0002	<0.001	<0.002	0.0007B	<0.01	<0.01	<0.04	<0.0002	<0.01	<0.001	<0.005	<0.0001	0.01B	7.7	149	31.3	17.1	190
Standards																		
PRGs tap water [3]	0.02	0.00004	0.07	0.02	0.1	1	4E-06	0.01	0.73	0.2	0.2	0.002	11					
Drinking Water Standards [4]	0.006	0.01	0.004	0.005	0.10	1.3	0.015	0.002	0.02	0.05	0.1 [5]	0.002	5 [5]					
Fresh Water Cronic Criteria [6]	1.6	NL	0.005	0.001	NL	0.012	0.003	0.000012	0.16	0.04	0.0001	0.04	0.11					
Fresh Water Acute Criteria [6]	9.0	NL	0.130	0.004	NL	0.02	0.082	0.0024	1.4	0.26	0.0041	1.4	0.12					

Notes:

[1] Samples were collected on November 7-9, 2000 by CES. Analysis was conducted by ACZ Laboratories, Inc. in Steamboat Springs, Colorado.

[2] BR SW 7 is duplicate of BR SW 3

[3] PRG = Preliminary Remediation Goals - USEPA Region 9 (November, 2000).

[4] EPA Safe Drinking Water Standards

[5] EPA National Secondary Drinking Water Regulations are non-enforceable guidelines

[6] ODEQ Water Quality Criteria Summary

NL = No value is listed for total arsenic or total chromium

< value = analyte not detected above MDL

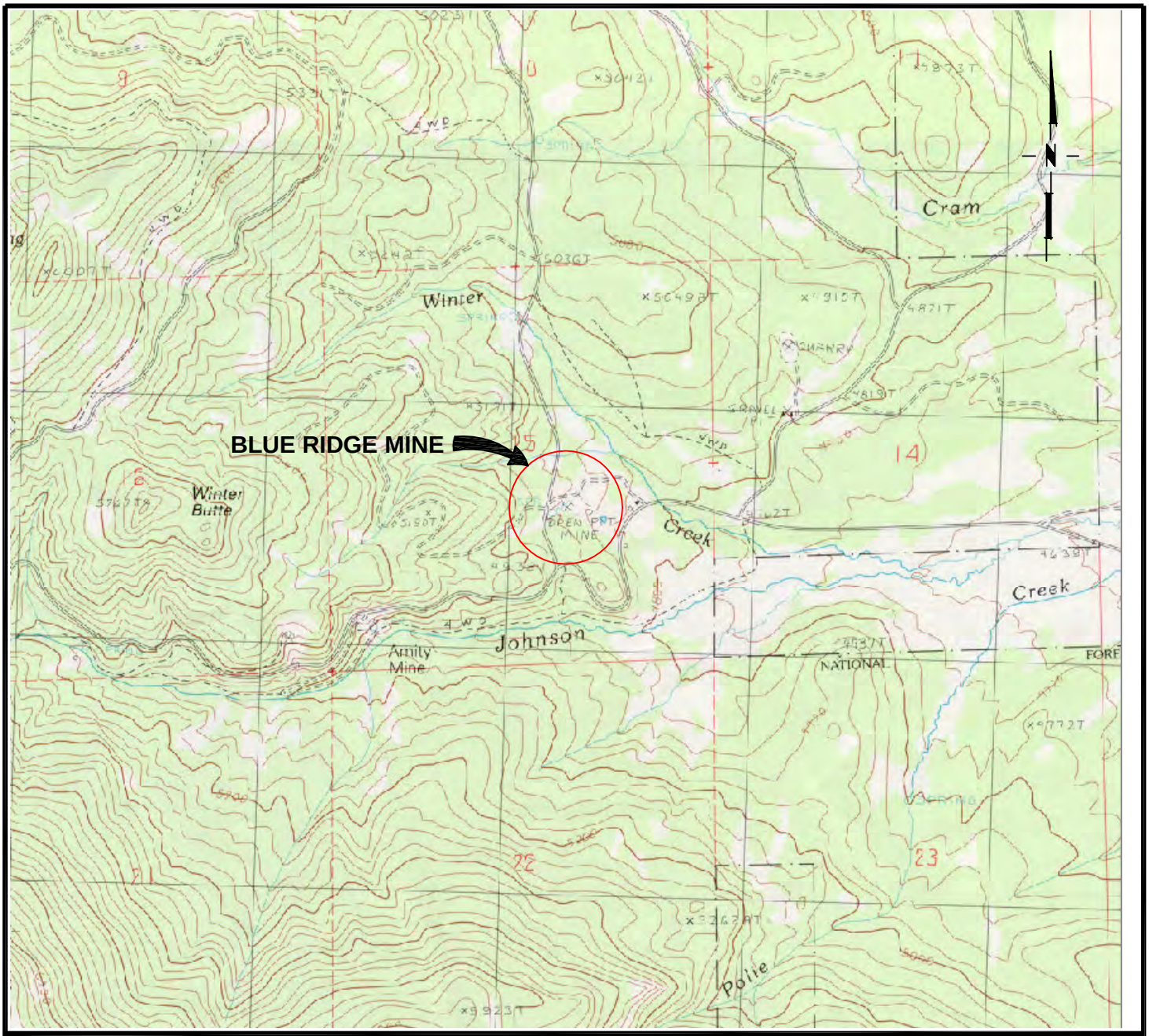
B = analyte detected between method detection limit (MDL) and practical quantification limit (PQL)

Table 4. QA/QC Summary
Blue Ridge Mine Site, Ochoco National Forest, Crook County, Oregon

Sample I.D.[1]	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	pH	Solids
	mg/kg														
BR S 4	<0.1	1.7 B	<0.3	1.7	46	95	22 B	505	30	0.5 B	<0.7	0.12 B	186	6.2	73.9
BR S 11 [1]	<0.1	1.7 B	<0.3	1.6	43	99	33	517	30	0.3 B	<0.7	0.12 B	183	6.3	74.7
% Difference	NA	NA	NA	6.1%	6.7%	4.1%	NA	2.3%	0.0%	NA	NA	NA	1.6%	1.6%	1.1%
Surface Water	mg/L														
BR SW 3	<0.0002	<0.001	<0.002	<0.0002	<0.01	<0.01	<0.04	0.0002 B	<0.01	<0.001	<0.005	<0.0001	0.01B	7.2	121
BR SW 7 [2]	<0.0002	<0.001	<0.002	0.0005B	<0.01	<0.01	<0.04	<0.0002	<0.01	<0.001	<0.005	<0.0001	0.01B	7.9	121
% Difference	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

NOTES:

[1]Samples were collected on November 7-9, 2000 by CES. Analysis was conducted by ACZ Laboratories in Steamboat Springs, Colorado.
B= analyte detected between method detection limit (MDL) and practical quantification limit (PQL)
< value = analyte not detected above MDL
NA = not applicable.

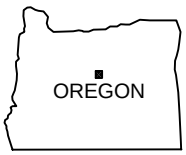


SCALE 1 INCH = 2,000 FEET

1 1/2 0 1 MILE

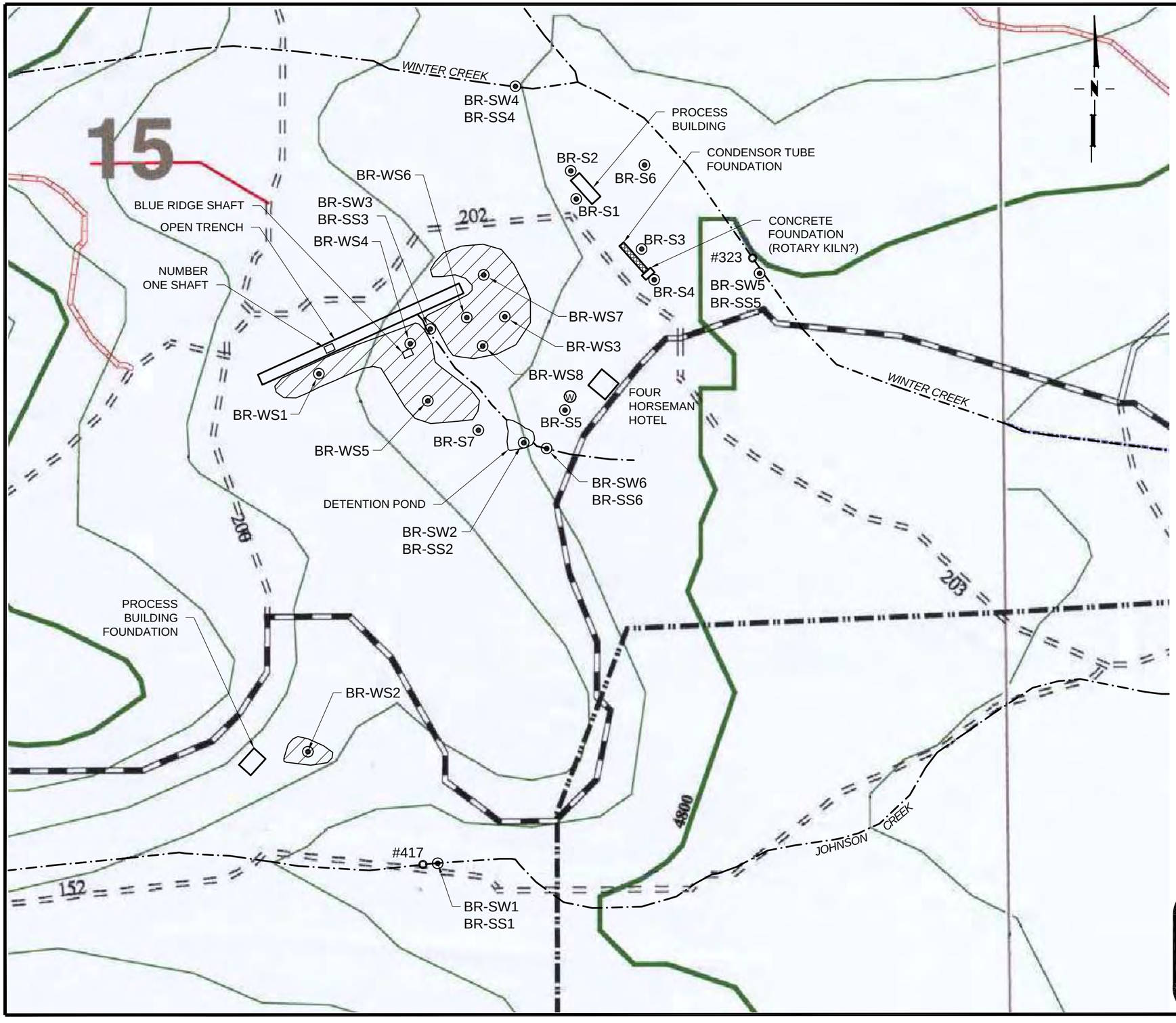
CONTOUR INTERVAL = 40 FEET

Figure 7. Site Location Map



(SOURCE: 7.5 MIN USGS TOPOGRAPHIC MAP OF LOOKOUT MOUNTAIN, OR 1990)

PROJECT NUMBER: 2010042	BLUE RIDGE MINE
DATE: 10/23/00	
DWG BY: DJM / DWG NO: 2010042F1	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: KU	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company



EXPLANATION

- #323 — Approximate Sediment Sample Location, 1983 Survey*
- BR-S4 — Sample Location
- Domestic Well
- Shaft
- Mine Waste Piles
- Creek

* Geochemical Survey of the Western part of the Ochoco National Forest - Crook and Wheeler Counties, Oregon. OFR 0-83-4

0 300 FEET

SCALE
(LOCATIONS ARE APPROXIMATE)
(SOURCE: USFS GIS - OCHOCO N.F.)

Figure 2. Site Map Showing Sample Locations

PROJECT NUMBER: 2010042	BLUE RIDGE MINE
DATE: 10/31/00	
DWG BY: DJM / DWG NO: 2010042F2	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: KU	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company

Appendix I.

Preliminary Assessment Amity Mine - Tables and Figures

Table 1. Soils, Waste Rock, and Sediment Analytical Results
Amity Mine Site, Ochoco National Forest, Crook County, Oregon

Sample ID [1]	Antimony [2]	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	pH, Saturated Paste	Solids, Percent
	mg/Kg													units	%
Soils															
AT S 1	<0.1	1.5 B	<0.3	1.1	23	35	20 B	980	39	0.2 B	<0.7	0.14 B	117	6.4	71.8
AT S 2	<0.1	2 B	0.3 B	0.8	45	55	<6	444	135	0.1 B	<0.7	0.45	214	6.6	66.3
AT S 3	<0.1	34	<0.3	2.6	33	75	47	665	81	0.4 B	<0.7	0.25 B	139	6.6	65.3
AT S 4	<0.1	3 B	<0.3	0.8	57	65	<5.0	1680	189	0.2 B	<0.7	0.56	86	7.2	70.7
AT S 5	<0.1	0.7 B	0.4 B	0.9	62	47	<5.0	24.7	144	0.3 B	<0.6	0.08B	55	6.7	77.4
AT S 6	<0.1	0.6 B	0.3 B	1.4	24	28	<5.0	0.8	19	0.1 B	<0.6	0.08B	61	6.2	73.1
AT S 7	<0.1	0.9 B	<0.3	1.1	23	30	<6	1.71	15	0.1 B	<0.7	<0.07	47	5.9	71
AT S 8 [3]	<0.1	4.3	<0.3	1	29	34	23 B	1440	56	0.4 B	<0.7	0.19 B	97	6.7	65.7
AT S 9	<0.1	6.3	<0.3	1.1	28	48	29	3230	23	4.2	<0.7	0.11 B	187	6.6	70
AT S 10	<0.1	4.6	<0.2	1.4	30	40	15	6250	36	21	<0.6	0.21 B	103	7.3	82.2
AT S 11	<0.1	3.4	0.3 B	0.6 B	47	46	<5.0	334	106	3.4	<0.7	0.28 B	78	7.1	73.4
Sediments															
AT SS 1	<0.1	0.5 B	<0.2	0.67	24.9	19.1	<4.0	<0.02	14.9	<0.09	<0.4	<0.04	37.5	6.9	81.9
AT SS 2	<0.1	1.4 B	<0.2	1.1	20	25	8 B	<0.02	20	<0.1	<0.5	0.07 B	43	7.4	67.8
AT SS 3	<0.1	0.7 B	<0.2	0.6	21	23	<4	0.03 B	22	0.2 B	<0.6	<0.06	34	7.2	59.8
AT SS 4	<0.1	0.5 B	<0.2	0.6	22	19	<4	0.04 B	15	<0.1	<0.5	<0.5	36	7.3	78.4
Waste Rock															
AT WS 1	<0.1	2 B	0.4 B	0.7	48	56	<5	420	118	0.4 B	<0.6	0.41	51	7.8	73.9
AT WS 2	<0.1	2 B	0.3 B	0.7	69	67	<5	117	106	0.2 B	<0.6	0.29 B	61	7.7	73.9
AT WS 3	<0.1	3 B	<0.2	0.5 B	97	57	<5	32.1	172	0.1 B	<0.6	0.68 B	77	7.7	78
AT WS 4	<0.1	<1	0.4 B	0.9	26	55	<5	122	51	0.1 B	<0.7	0.16 B	51	7.7	74.9
AT WS 5	<0.1	<1	0.4 B	0.7	17	61	<5	7.9	37	0.1 B	<0.6	0.17 B	48	7.9	76.4
AT WS 6	<0.1	<1	<0.3	1	58	58	<5	22.1	175	0.1 B	<0.6	0.17 B	57	7.6	76.4
Standards															
PRG Industrial	**820**	**2.70**	**2200**	**810**	**450**	**76000**	**750**	**610**	**41000**	**10,000**	**10,000**	**130**	**100,000**		
TCLP (mg/l)	1.15	5.0	1.22	0.11	0.6	NL	0.75	0.2	11	5.7	0.14	0.2	4.3	NL	NL

NOTES:
[1] Samples were collected on November 9 and 10, 2000 by CES. Analysis was conducted by ACZ Laboratories, Inc. in Steamboat Springs, Colorado.
[2] EPA method 6010/7000 series and mercury by 7471 CVAA
[3] AT S 8 is a duplicate soil sample of AT S 3
B= analyte detected between method detection limit (MDL) and practical quantification limit (PQL)
< value = analyte not detected above MDL
NL = not listed.
PRG = Preliminary Remediation Goals - USEPA Region 9 (November, 2000).
TCLP = Toxcity Charactreristic Leaching Procedure levels for metals in non-wastewater (40 CFR 268.28, 2000).

Table 2. Mercury Concentrations in Sediments Collected in 1982, DOGAMI Study

DOGAMI - ID	Location	Mercury
414	Johnson Creek, upstream from Amity Mine	1.05
322	Downstream from 414, still upstream from Amity Mine	2.5
415	Winter Creek,upstream from Blue Ridge Mine	0.15
323	Winter Creek, adjacent to Blue Ridge Mine	>5
417	Johnson Creek, near Blue Ridge Mine secondary process area.	3.3
321	Johnson Creek tributary, upstream from Amity Mine and #414	0.195
413	Johnson Creek, upstream from Amity Mine and #414	<5
412	Johnson Creek, upstream from Amity Mine and #414	<5

Notes:
Sample locations are referred to in Ferns and Brooks, 1983.
Concentrations are in parts per million

Table 3. **Surface Water Results**
Amity Mine Site, Ochoco National Forest, Crook County, Oregon

Sample I.D. [1]	Antimony, total	Arsenic, total	Beryllium, total	Cadmium, total	Chromium, total	Copper, total	Lead, total	Mercury, total	Nickel, total	Selenium, total	Silver, total	Thallium, total	Zinc, total	pH (lab)	Hardness as CaCO3	Calcium, dissolved	Magnesium, dissolved	Residue, Filterable (TDS) @180	Field Measured Parameters: Temp	Flow Rate [7]	Field pH	Field SC	Dissolved Oxygen
	----------mg/L----------													units	mg/L	mg/L	mg/L	mg/L	(^{o}C)	(gpm)	(su)	(umhos/cm)	(mg/L)[1]
AT SW 1	<0.0002	<0.001	<0.002	0.0005 B	<0.01	<0.01	<0.04	<0.0002	<0.01	<0.001	<0.005	<0.0001	0.01**B**	7.7	63	15.5	5.8	110	0.3	15	7.83	146	15.4
AT SW 2	<0.0002	<0.001	<0.002	<0.0002	<0.01	<0.01	<0.04	<0.0002	<0.01	<0.001	<0.005	<0.0001	0.01**B**	7.9	239	38.1	34.9	280	4.7	0.25	7.95	60	16.0
AT SW 3	<0.0002	<0.001	<0.002	<0.0002	<0.01	<0.01	<0.04	<0.0002	<0.01	<0.001	<0.005	<0.0001	<0.01	7.8	80	17.6	8.7	130	1.1	~30	7.65	172	14.8
AT SW 4	<0.0002	<0.001	<0.002	<0.0002	<0.01	<0.01	<0.04	<0.0002	<0.01	<0.001	<0.005	<0.0001	0.01**B**	7.8	82	18	9.1	130	0.7	~30	8.07	183	15.6
AT SW 5 [2]	<0.0002	<0.001	<0.002	0.0008 B	<0.01	<0.01	<0.04	<0.0002	<0.01	<0.001	<0.005	<0.0001	0.01**B**	7.9	243	38.7	35.6	280	Dup of AT SW 2				
Standards																							
PRGs tap water [3]	0.02	0.00004	0.07	0.02	0.1	1	0.000004	0.01	0.73	0.2	0.2	0.002	11										
Drinking Water Standards [4]	0.006	0.01	0.004	0.005	0.10	1.3	0.015	0.002	0.02	0.05	0.1 [5]	0.002	5 [5]										
Fresh Water Cronic Criteria [6]	1.6	NL	0.005	0.001	NL	0.012	0.003	0.000012	0.16	0.04	0.0001	0.04	0.11										
Fresh Water Acute Criteria [6]	9.0	NL	0.130	0.004	NL	0.02	0.082	0.0024	1.4	0.26	0.0041	1.4	0.12										

NOTES:

[1] Samples were collected on November 9, 2000 by CES. Analysis was conducted by ACZ Laboratories, Inc. in Steamboat Springs, Colorado.

[2] AT SW 5 is duplicate of AT SW 2

[3] PRG = Preliminary Remediation Goals - USEPA Region 9 (November, 2000).

[4] EPA Safe Drinking Water Standards

[5] EPA National Secondary Drinking Water Regulations are non-enforceable guidelines

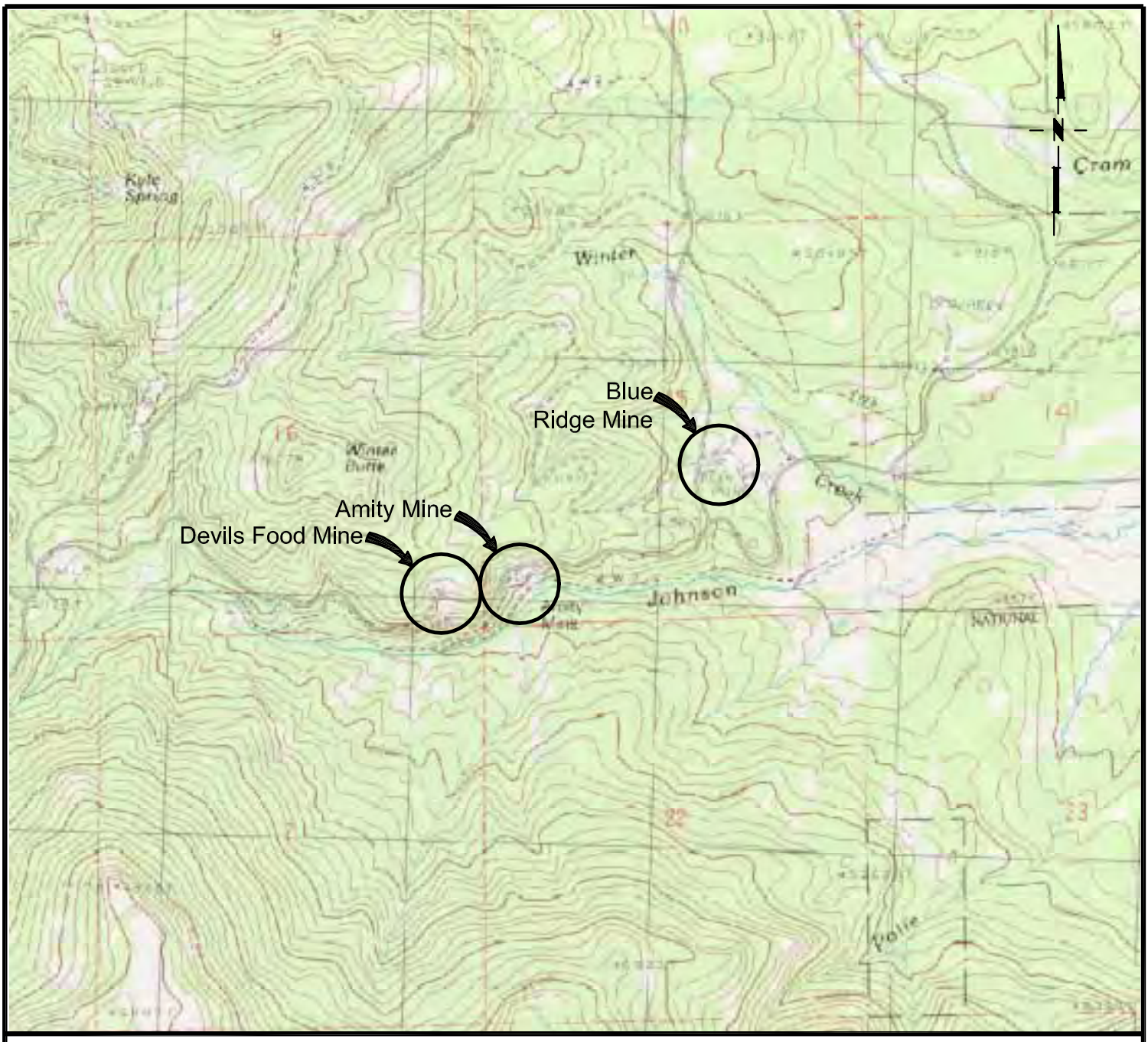
[6] ODEQ Water Quality Criteria Summary

[7] Estimated

NL = No value is listed for total arsenic or total chromium

< value = analyte not detected above MDL

B = analyte detected between method detection limit (MDL) and practical quantification limit (PQL)



SCALE 1 INCH = 2,000 FEET

1 1/2 0 1 MILE

CONTOUR INTERVAL = 40 FEET

Figure 1. Site Location Map

(SOURCE: 7.5 MIN USGS TOPOGRAPHIC MAP OF LOOKOUT MOUNTAIN, OR 1990)

PROJECT NUMBER: 2140031	SITE INSPECTION FOR BLUE RIDGE AND AMITY MINES
DATE: 1/7/02	
DWG BY: DJM / DWG NO: 2140031A1	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: DW	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company

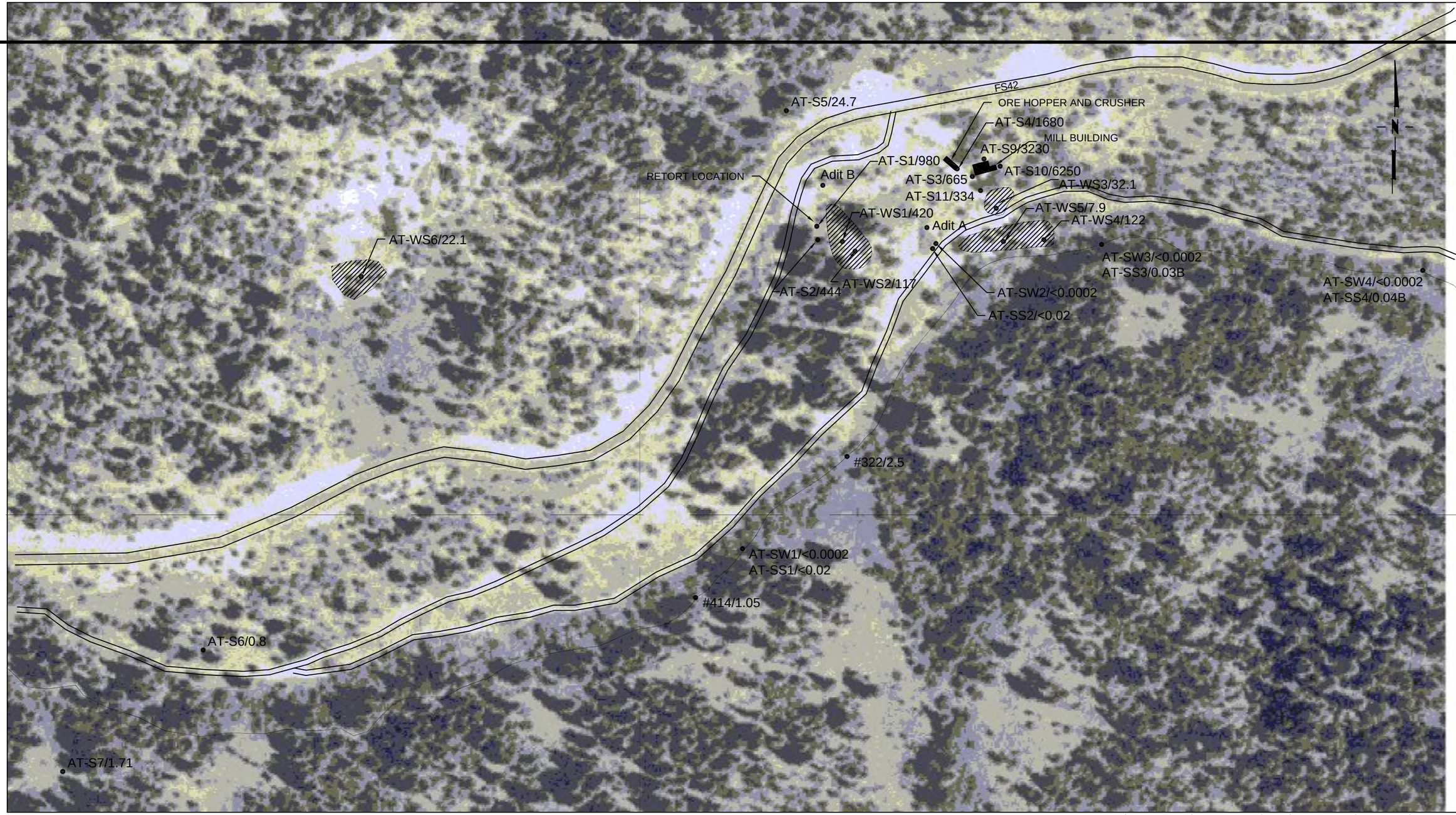


Figure 2. Site Map Showing Sample Locations

EXPLANATION

AT-S7/1.71 • CES Sample ID / Total mercury concentration in mg/kg solid or mg/L water

#414/1.05 DOGAMI 1982 sediment sample location/mercury concentration ppm

Waste Rock Pile

0 180 FEET

SCALE
(LOCATIONS ARE APPROXIMATE)

PROJECT NUMBER: 2010043	AMITY MINE
DATE: 1/15/01	
DWG BY: DJM / DWG NO: 2010043F3	U.S. FOREST SERVICE OCHOCO NATIONAL FOREST
PROJECT MANAGER: KU	
REVISED:	CASCADE EARTH SCIENCES A Valmont Industries Company

Appendix J.

Laboratory Analytical Reports

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

Analytical Report

Mary Ann Amann
Cascade Earth Sciences, LTD.
225 S. Holly St.
Medford, OR 97501

November 05, 2001

Project: L34319

Mary Ann Amann:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 10, 2001. This project has been assigned to ACZ's project number, L34319. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 8.0. The enclosed results relate only to the samples received under L34319. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

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

All samples and sub-samples associated with this project will be disposed of after December 05, 2001. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs.

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

Sue Barkey 05/Nov/01

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

Cascade Earth Sciences, LTD.
Project: L34319

November 05, 2001

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 19 miscellaneous samples from Cascade Earth Sciences, LTD. on October 10, 2001. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L34319. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times.

Sample Analysis

These samples were analyzed for inorganic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The following anomalies were identified during the analysis of these samples:

1. Acidity as CaCO3 was found in the Prep Blank (PBW) at 8.3 mg/L. The control limits are -4 to 4. The data was accepted since the samples were not acidic and contained alkalinity."

2. The Silver values are estimated due to low recoveries in the LCSW. The stock standard for QCS/ICV/CCV, PCN 14833, is precipitating out Silver. The low Silver concentrations were confirmed by ICP analysis. The data was accepted since the problem was confirmed. New stock solution has been ordered.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: SW-BR-1

ACZ ID: ***L34319-01***
Date Sampled: *10/06/01 00:00*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/30/01 22:57	lcj
Arsenic, total	M200.8 ICP-MS	0.0010	B	mg/L	0.0005	0.003	10/30/01 22:57	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/22/01 21:07	ct
Cadmium, total	M200.8 ICP-MS	0.0002	B	mg/L	0.0001	0.0005	10/30/01 22:57	lcj
Calcium, dissolved	M200.7 ICP	32.4		mg/L	0.2	1	10/24/01 11:37	ct
Chromium, total	M200.7 ICP	0.02	B	mg/L	0.01	0.05	10/22/01 21:07	ct
Copper, total	M200.7 ICP	0.03	B	mg/L	0.01	0.05	10/22/01 21:07	ct
Lead, total	M200.8 ICP-MS	0.0017		mg/L	0.0001	0.0005	10/30/01 22:57	lcj
Magnesium, dissolved	M200.7 ICP	13.3		mg/L	0.2	1	10/24/01 11:37	ct
Nickel, total	M200.7 ICP	0.03	B	mg/L	0.01	0.05	10/22/01 21:07	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	10/25/01 15:09	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	11/01/01 5:50	lcj
Thallium, total	M200.8 ICP-MS	0.00022	B	mg/L	5E-05	0.0003	10/30/01 22:57	lcj
Zinc, total	M200.7 ICP	0.03	B	mg/L	0.01	0.05	10/22/01 21:07	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 18:27	jb
Total Hot Plate Digestion	M200.2 ICP						10/17/01 9:55	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 15:19	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		161		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		161		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	293		umhos/cm	1	10	10/11/01 14:24	lc
Hardness as CaCO3	SM2340B - Calculation	136		mg/L	1	7	11/05/01 7:28	calc
Lab Filtration	***						10/11/01 10:55	alp
Lab Filtration & Acidification	***						10/12/01 8:13	haw
pH (lab)	M150.1 - Electrometric	6.6	H	units	0.1	0.1	10/11/01 14:28	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	160		mg/L	10	20	10/12/01 14:07	haw
Sulfate	M375.3 - Gravimetric		U	mg/L	10	20	10/20/01 14:27	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: SW-BR-2

ACZ ID: ***L34319-02***
Date Sampled: *10/06/01 00:00*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/30/01 23:11	lcj
Arsenic, total	M200.8 ICP-MS		U	mg/L	0.0005	0.003	10/30/01 23:11	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/25/01 3:31	ct
Cadmium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/30/01 23:11	lcj
Calcium, dissolved	M200.7 ICP	31.2		mg/L	0.2	1	10/24/01 11:40	ct
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:01	ct
Copper, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:01	ct
Lead, total	M200.8 ICP-MS	0.0003	B	mg/L	0.0001	0.0005	10/30/01 23:11	lcj
Magnesium, dissolved	M200.7 ICP	13.4		mg/L	0.2	1	10/24/01 11:40	ct
Nickel, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:01	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	10/25/01 15:10	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	11/01/01 5:55	lcj
Thallium, total	M200.8 ICP-MS	0.00022	B	mg/L	5E-05	0.0003	10/30/01 23:11	lcj
Zinc, total	M200.7 ICP	0.01	B	mg/L	0.01	0.05	10/22/01 23:01	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 18:36	jb
Total Hot Plate Digestion	M200.2 ICP						10/17/01 9:30	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 15:24	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		133		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		133		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	282		umhos/cm	1	10	10/11/01 14:59	lc
Hardness as CaCO3	SM2340B - Calculation	133		mg/L	1	7	11/05/01 7:28	calc
Lab Filtration	***						10/11/01 10:57	alp
Lab Filtration & Acidification	***						10/12/01 8:16	haw
pH (lab)	M150.1 - Electrometric	7.0	H	units	0.1	0.1	10/11/01 15:03	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	180		mg/L	10	20	10/12/01 14:09	haw
Sulfate	M375.3 - Gravimetric		U	mg/L	10	20	10/20/01 14:28	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: WL-BR-3

ACZ ID: ***L34319-03***
Date Sampled: *10/06/01 14:45*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/30/01 23:16	lcj
Arsenic, total	M200.8 ICP-MS		U	mg/L	0.0005	0.003	10/30/01 23:16	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/25/01 3:35	ct
Cadmium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/30/01 23:16	lcj
Calcium, dissolved	M200.7 ICP	29.6		mg/L	0.2	1	10/24/01 11:44	ct
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:05	ct
Copper, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:05	ct
Lead, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/30/01 23:16	lcj
Magnesium, dissolved	M200.7 ICP	9.5		mg/L	0.2	1	10/24/01 11:44	ct
Nickel, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:05	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	10/25/01 15:14	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	11/01/01 6:00	lcj
Thallium, total	M200.8 ICP-MS	0.00006	B	mg/L	5E-05	0.0003	10/30/01 23:16	lcj
Zinc, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:05	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 18:46	jb
Total Hot Plate Digestion	M200.2 ICP						10/17/01 9:30	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 15:29	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		124		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		124		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	257		umhos/cm	1	10	10/11/01 15:19	lc
Hardness as CaCO3	SM2340B - Calculation	113		mg/L	1	7	11/05/01 7:28	calc
Lab Filtration	***						10/11/01 11:00	alp
Lab Filtration & Acidification	***						10/12/01 8:19	haw
pH (lab)	M150.1 - Electrometric	7.2	H	units	0.1	0.1	10/11/01 15:24	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	170		mg/L	10	20	10/12/01 14:10	haw
Sulfate	M375.3 - Gravimetric	10	B	mg/L	10	20	10/22/01 11:03	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: WL-BR-4

ACZ ID: ***L34319-04***
Date Sampled: *10/06/01 14:30*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/30/01 23:20	lcj
Arsenic, total	M200.8 ICP-MS		U	mg/L	0.0005	0.003	10/30/01 23:20	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/22/01 21:11	ct
Cadmium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/30/01 23:20	lcj
Calcium, dissolved	M200.7 ICP	25.1		mg/L	0.2	1	10/24/01 11:54	ct
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 21:11	ct
Copper, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 21:11	ct
Lead, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/30/01 23:20	lcj
Magnesium, dissolved	M200.7 ICP	8.7		mg/L	0.2	1	10/24/01 11:54	ct
Nickel, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 21:11	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	10/25/01 15:16	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	11/01/01 6:32	lcj
Thallium, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	10/30/01 23:20	lcj
Zinc, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 21:11	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 19:13	jb
Total Hot Plate Digestion	M200.2 ICP						10/17/01 9:55	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 15:33	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		105		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		105		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	223		umhos/cm	1	10	10/11/01 15:29	lc
Hardness as CaCO3	SM2340B - Calculation	98		mg/L	1	7	11/05/01 7:28	calc
Lab Filtration	***						10/11/01 11:02	alp
Lab Filtration & Acidification	***						10/12/01 8:22	haw
pH (lab)	M150.1 - Electrometric	6.8	H	units	0.1	0.1	10/11/01 15:34	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	150		mg/L	10	20	10/12/01 14:12	haw
Sulfate	M375.3 - Gravimetric	10	B	mg/L	10	20	10/22/01 11:05	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: SW-BR-5

ACZ ID: ***L34319-05***
Date Sampled: *10/06/01 16:00*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/30/01 23:34	lcj
Arsenic, total	M200.8 ICP-MS		U	mg/L	0.0005	0.003	10/30/01 23:34	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/18/01 3:08	ct
Cadmium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/30/01 23:34	lcj
Calcium, dissolved	M200.7 ICP	28.8		mg/L	0.2	1	10/24/01 11:58	ct
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/18/01 3:08	ct
Copper, total	M200.7 ICP		U	mg/L	0.01	0.05	10/18/01 3:08	ct
Lead, total	M200.8 ICP-MS	0.0004	B	mg/L	0.0001	0.0005	10/30/01 23:34	lcj
Magnesium, dissolved	M200.7 ICP	12.1		mg/L	0.2	1	10/24/01 11:58	ct
Nickel, total	M200.7 ICP	0.02	B	mg/L	0.01	0.05	10/18/01 3:08	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	10/25/01 15:17	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	11/01/01 6:36	lcj
Thallium, total	M200.8 ICP-MS	0.00005	B	mg/L	5E-05	0.0003	10/30/01 23:34	lcj
Zinc, total	M200.7 ICP	0.01	B	mg/L	0.01	0.05	10/18/01 3:08	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 19:23	jb
Total Hot Plate Digestion	M200.2 ICP						10/16/01 17:30	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 15:38	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		123		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		123		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	261		umhos/cm	1	10	10/11/01 15:39	lc
Hardness as CaCO3	SM2340B - Calculation	122		mg/L	1	7	11/05/01 7:29	calc
Lab Filtration	***						10/11/01 11:04	alp
Lab Filtration & Acidification	***						10/12/01 8:25	haw
pH (lab)	M150.1 - Electrometric	6.6	H	units	0.1	0.1	10/11/01 15:43	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	160		mg/L	10	20	10/12/01 14:13	haw
Sulfate	M375.3 - Gravimetric	10	B	mg/L	10	20	10/22/01 11:07	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: SW-BR-6

ACZ ID: ***L34319-06***
Date Sampled: *10/06/01 16:35*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/30/01 23:39	lcj
Arsenic, total	M200.8 ICP-MS	0.0006	B	mg/L	0.0005	0.003	10/30/01 23:39	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/25/01 3:40	ct
Cadmium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/30/01 23:39	lcj
Calcium, dissolved	M200.7 ICP	27.9		mg/L	0.2	1	10/24/01 12:12	ct
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:17	ct
Copper, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:17	ct
Lead, total	M200.8 ICP-MS	0.0003	B	mg/L	0.0001	0.0005	10/30/01 23:39	lcj
Magnesium, dissolved	M200.7 ICP	11.8		mg/L	0.2	1	10/24/01 12:12	ct
Nickel, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:17	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	10/25/01 15:19	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	11/01/01 6:41	lcj
Thallium, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	10/30/01 23:39	lcj
Zinc, total	M200.7 ICP	0.01	B	mg/L	0.01	0.05	10/22/01 23:17	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 19:32	jb
Total Hot Plate Digestion	M200.2 ICP						10/17/01 9:30	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 15:43	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		113		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		113		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	247		umhos/cm	1	10	10/11/01 15:47	lc
Hardness as CaCO3	SM2340B - Calculation	118		mg/L	1	7	11/05/01 7:29	calc
Lab Filtration	***						10/11/01 11:07	alp
Lab Filtration & Acidification	***						10/12/01 8:27	haw
pH (lab)	M150.1 - Electrometric	7.0	H	units	0.1	0.1	10/11/01 15:55	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	160		mg/L	10	20	10/12/01 14:15	haw
Sulfate	M375.3 - Gravimetric		U	mg/L	10	20	10/22/01 11:09	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: SW-BR-7

ACZ ID: ***L34319-07***
Date Sampled: *10/06/01 16:10*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/30/01 23:43	lcj
Arsenic, total	M200.8 ICP-MS	0.0006	B	mg/L	0.0005	0.003	10/30/01 23:43	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/18/01 3:12	ct
Cadmium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/30/01 23:43	lcj
Calcium, dissolved	M200.7 ICP	29.2		mg/L	0.2	1	10/24/01 12:15	ct
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/18/01 3:12	ct
Copper, total	M200.7 ICP		U	mg/L	0.01	0.05	10/18/01 3:12	ct
Lead, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/30/01 23:43	lcj
Magnesium, dissolved	M200.7 ICP	12.2		mg/L	0.2	1	10/24/01 12:15	ct
Nickel, total	M200.7 ICP		U	mg/L	0.01	0.05	10/18/01 3:12	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	10/25/01 15:23	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	11/01/01 6:46	lcj
Thallium, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	10/30/01 23:43	lcj
Zinc, total	M200.7 ICP		U	mg/L	0.01	0.05	10/18/01 3:12	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 19:41	jb
Total Hot Plate Digestion	M200.2 ICP						10/16/01 17:30	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 15:48	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		125		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		125		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	261		umhos/cm	1	10	10/11/01 15:59	lc
Hardness as CaCO3	SM2340B - Calculation	123		mg/L	1	7	11/05/01 7:29	calc
Lab Filtration	***						10/11/01 11:09	alp
Lab Filtration & Acidification	***						10/12/01 8:30	haw
pH (lab)	M150.1 - Electrometric	7.4	H	units	0.1	0.1	10/11/01 16:06	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	160		mg/L	10	20	10/12/01 14:16	haw
Sulfate	M375.3 - Gravimetric		U	mg/L	10	20	10/22/01 11:11	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: SW-A-1

ACZ ID: ***L34319-08***
Date Sampled: *10/06/01 13:00*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/30/01 23:48	lcj
Arsenic, total	M200.8 ICP-MS	0.0005	B	mg/L	0.0005	0.003	10/30/01 23:48	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/18/01 3:17	ct
Cadmium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/30/01 23:48	lcj
Calcium, dissolved	M200.7 ICP	36.0		mg/L	0.2	1	10/24/01 12:19	ct
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/18/01 3:17	ct
Copper, total	M200.7 ICP		U	mg/L	0.01	0.05	10/18/01 3:17	ct
Lead, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/30/01 23:48	lcj
Magnesium, dissolved	M200.7 ICP	31.6		mg/L	0.2	1	10/24/01 12:19	ct
Nickel, total	M200.7 ICP		U	mg/L	0.01	0.05	10/18/01 3:17	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	11/02/01 12:47	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	11/01/01 6:50	lcj
Thallium, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	10/30/01 23:48	lcj
Zinc, total	M200.7 ICP		U	mg/L	0.01	0.05	10/18/01 3:17	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 19:50	jb
Total Hot Plate Digestion	M200.2 ICP						10/16/01 17:30	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 15:52	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		222		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		222		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	495		umhos/cm	1	10	10/11/01 16:11	lc
Hardness as CaCO3	SM2340B - Calculation	220		mg/L	1	7	11/05/01 7:29	calc
Lab Filtration	***						10/11/01 11:12	alp
Lab Filtration & Acidification	***						10/12/01 8:33	haw
pH (lab)	M150.1 - Electrometric	7.0	H	units	0.1	0.1	10/11/01 16:16	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	280		mg/L	10	20	10/12/01 14:18	haw
Sulfate	M375.3 - Gravimetric	30		mg/L	10	20	10/22/01 11:13	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: SW-A-2

ACZ ID: ***L34319-09***
Date Sampled: *10/06/01 10:20*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/30/01 23:53	lcj
Arsenic, total	M200.8 ICP-MS	0.0010	B	mg/L	0.0005	0.003	10/30/01 23:53	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/18/01 3:21	ct
Cadmium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/30/01 23:53	lcj
Calcium, dissolved	M200.7 ICP	36.3		mg/L	0.2	1	10/24/01 12:23	ct
Chromium, total	M200.7 ICP	0.02	B	mg/L	0.01	0.05	10/18/01 3:21	ct
Copper, total	M200.7 ICP	0.01	B	mg/L	0.01	0.05	10/18/01 3:21	ct
Lead, total	M200.8 ICP-MS	0.0043		mg/L	0.0001	0.0005	10/30/01 23:53	lcj
Magnesium, dissolved	M200.7 ICP	31.9		mg/L	0.2	1	10/24/01 12:23	ct
Nickel, total	M200.7 ICP	0.03	B	mg/L	0.01	0.05	10/18/01 3:21	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	11/02/01 12:49	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	11/01/01 6:55	lcj
Thallium, total	M200.8 ICP-MS	0.00006	B	mg/L	5E-05	0.0003	10/30/01 23:53	lcj
Zinc, total	M200.7 ICP	0.03	B	mg/L	0.01	0.05	10/18/01 3:21	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 20:00	jb
Total Hot Plate Digestion	M200.2 ICP						10/16/01 17:30	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 15:57	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		223		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		223		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	485		umhos/cm	1	10	10/11/01 16:20	lc
Hardness as CaCO3	SM2340B - Calculation	222		mg/L	1	7	11/05/01 7:29	calc
Lab Filtration	***						10/11/01 11:14	alp
Lab Filtration & Acidification	***						10/12/01 8:36	haw
pH (lab)	M150.1 - Electrometric	7.8	H	units	0.1	0.1	10/11/01 16:29	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	280		mg/L	10	20	10/12/01 17:13	alp
Sulfate	M375.3 - Gravimetric	30		mg/L	10	20	10/22/01 11:15	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: JC-A-3

ACZ ID: ***L34319-10***
Date Sampled: *10/06/01 10:37*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/30/01 23:57	lcj
Arsenic, total	M200.8 ICP-MS		U	mg/L	0.0005	0.003	10/30/01 23:57	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/25/01 3:53	ct
Cadmium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/30/01 23:57	lcj
Calcium, dissolved	M200.7 ICP	25.2		mg/L	0.2	1	10/24/01 12:26	ct
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:21	ct
Copper, total	M200.7 ICP	0.03	B	mg/L	0.01	0.05	10/22/01 23:21	ct
Lead, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/30/01 23:57	lcj
Magnesium, dissolved	M200.7 ICP	14.2		mg/L	0.2	1	10/24/01 12:26	ct
Nickel, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:21	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	11/02/01 12:54	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	11/01/01 6:59	lcj
Thallium, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	10/30/01 23:57	lcj
Zinc, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:21	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 20:09	jb
Total Hot Plate Digestion	M200.2 ICP						10/17/01 9:30	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 16:02	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		128		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		128		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	274		umhos/cm	1	10	10/11/01 16:34	lc
Hardness as CaCO3	SM2340B - Calculation	121		mg/L	1	7	11/05/01 7:29	calc
Lab Filtration	***						10/11/01 11:16	alp
Lab Filtration & Acidification	***						10/12/01 8:39	haw
pH (lab)	M150.1 - Electrometric	7.4	H	units	0.1	0.1	10/11/01 16:42	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	170		mg/L	10	20	10/12/01 17:15	alp
Sulfate	M375.3 - Gravimetric		U	mg/L	10	20	10/22/01 11:17	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: JC-A-4

ACZ ID: ***L34319-11***
Date Sampled: *10/06/01 10:41*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/31/01 0:02	lcj
Arsenic, total	M200.8 ICP-MS		U	mg/L	0.0005	0.003	10/31/01 0:02	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/25/01 3:57	ct
Cadmium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/31/01 0:02	lcj
Calcium, dissolved	M200.7 ICP	24.6		mg/L	0.2	1	10/24/01 12:37	ct
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:25	ct
Copper, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:25	ct
Lead, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/31/01 0:02	lcj
Magnesium, dissolved	M200.7 ICP	13.8		mg/L	0.2	1	10/24/01 12:37	ct
Nickel, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:25	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	11/02/01 12:55	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	11/01/01 7:04	lcj
Thallium, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	10/31/01 0:02	lcj
Zinc, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:25	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 20:18	jb
Total Hot Plate Digestion	M200.2 ICP						10/17/01 9:30	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 16:11	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		130		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		130		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	281		umhos/cm	1	10	10/11/01 16:47	lc
Hardness as CaCO3	SM2340B - Calculation	118		mg/L	1	7	11/05/01 7:29	calc
Lab Filtration	***						10/11/01 11:19	alp
Lab Filtration & Acidification	***						10/12/01 8:42	haw
pH (lab)	M150.1 - Electrometric	7.5	H	units	0.1	0.1	10/11/01 16:54	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	170		mg/L	10	20	10/12/01 17:17	alp
Sulfate	M375.3 - Gravimetric	10	B	mg/L	10	20	10/22/01 11:19	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: JC-A-5

ACZ ID: ***L34319-12***
Date Sampled: *10/06/01 13:15*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/31/01 0:07	lcj
Arsenic, total	M200.8 ICP-MS	0.0006	B	mg/L	0.0005	0.003	10/31/01 0:07	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/25/01 4:02	ct
Cadmium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/31/01 0:07	lcj
Calcium, dissolved	M200.7 ICP	18.0		mg/L	0.2	1	10/24/01 12:40	ct
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:29	ct
Copper, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:29	ct
Lead, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/31/01 0:07	lcj
Magnesium, dissolved	M200.7 ICP	6.5		mg/L	0.2	1	10/24/01 12:40	ct
Nickel, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:29	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	11/02/01 9:43	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	11/01/01 7:18	lcj
Thallium, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	10/31/01 0:07	lcj
Zinc, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:29	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 20:27	jb
Total Hot Plate Digestion	M200.2 ICP						10/17/01 9:30	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 16:16	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		91		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		91		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	183		umhos/cm	1	10	10/11/01 16:59	lc
Hardness as CaCO3	SM2340B - Calculation	72		mg/L	1	7	11/05/01 7:29	calc
Lab Filtration	***						10/11/01 11:21	alp
Lab Filtration & Acidification	***						10/12/01 8:45	haw
pH (lab)	M150.1 - Electrometric	7.4	H	units	0.1	0.1	10/11/01 17:06	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	130		mg/L	10	20	10/12/01 17:19	alp
Sulfate	M375.3 - Gravimetric	10	B	mg/L	10	20	10/22/01 11:21	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: JC-A-6

ACZ ID: ***L34319-13***
Date Sampled: *10/06/01 11:40*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/31/01 0:11	lcj
Arsenic, total	M200.8 ICP-MS		U	mg/L	0.0005	0.003	10/31/01 0:11	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/25/01 4:19	ct
Cadmium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/31/01 0:11	lcj
Calcium, dissolved	M200.7 ICP	30.8		mg/L	0.2	1	10/24/01 12:44	ct
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:45	ct
Copper, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:45	ct
Lead, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/31/01 0:11	lcj
Magnesium, dissolved	M200.7 ICP	16.5		mg/L	0.2	1	10/24/01 12:44	ct
Nickel, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:45	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	11/02/01 9:45	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	11/01/01 7:22	lcj
Thallium, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	10/31/01 0:11	lcj
Zinc, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:45	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 20:36	jb
Total Hot Plate Digestion	M200.2 ICP						10/17/01 9:30	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 16:21	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		152		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		152		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	318		umhos/cm	1	10	10/11/01 17:20	lc
Hardness as CaCO3	SM2340B - Calculation	145		mg/L	1	7	11/05/01 7:29	calc
Lab Filtration	***						10/11/01 11:24	alp
Lab Filtration & Acidification	***						10/12/01 8:48	haw
pH (lab)	M150.1 - Electrometric	7.7	H	units	0.1	0.1	10/11/01 17:27	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	200		mg/L	10	20	10/12/01 17:21	alp
Sulfate	M375.3 - Gravimetric	20		mg/L	10	20	10/22/01 11:25	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: JC-A-7

ACZ ID: ***L34319-14***
Date Sampled: *10/06/01 10:00*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/31/01 0:16	lcj
Arsenic, total	M200.8 ICP-MS		U	mg/L	0.0005	0.003	10/31/01 0:16	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/25/01 4:24	ct
Cadmium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/31/01 0:16	lcj
Calcium, dissolved	M200.7 ICP	20.6		mg/L	0.2	1	10/24/01 12:47	ct
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:49	ct
Copper, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:49	ct
Lead, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/31/01 0:16	lcj
Magnesium, dissolved	M200.7 ICP	8.0		mg/L	0.2	1	10/24/01 12:47	ct
Nickel, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:49	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	10/25/01 15:24	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	11/01/01 7:27	lcj
Thallium, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	10/31/01 0:16	lcj
Zinc, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:49	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 20:46	jb
Total Hot Plate Digestion	M200.2 ICP						10/17/01 9:30	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 16:26	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		94		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		94		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	196		umhos/cm	1	10	10/11/01 17:32	lc
Hardness as CaCO3	SM2340B - Calculation	84		mg/L	1	7	11/05/01 7:29	calc
Lab Filtration	***						10/11/01 11:26	alp
Lab Filtration & Acidification	***						10/12/01 8:51	haw
pH (lab)	M150.1 - Electrometric	6.9	H	units	0.1	0.1	10/11/01 17:36	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	130		mg/L	10	20	10/12/01 17:25	alp
Sulfate	M375.3 - Gravimetric		U	mg/L	10	20	10/22/01 11:27	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: JC-A-8

ACZ ID: ***L34319-15***
Date Sampled: *10/06/01 10:59*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/31/01 0:30	lcj
Arsenic, total	M200.8 ICP-MS		U	mg/L	0.0005	0.003	10/31/01 0:30	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/25/01 4:28	ct
Cadmium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/31/01 0:30	lcj
Calcium, dissolved	M200.7 ICP	23.9		mg/L	0.2	1	10/24/01 12:51	ct
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:53	ct
Copper, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:53	ct
Lead, total	M200.8 ICP-MS	0.0001	B	mg/L	0.0001	0.0005	10/31/01 0:30	lcj
Magnesium, dissolved	M200.7 ICP	12.7		mg/L	0.2	1	10/24/01 12:51	ct
Nickel, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:53	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	11/02/01 9:53	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	11/01/01 7:50	lcj
Thallium, total	M200.8 ICP-MS	0.00009	B	mg/L	5E-05	0.0003	11/01/01 7:50	lcj
Zinc, total	M200.7 ICP		U	mg/L	0.01	0.05	10/22/01 23:53	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 21:13	jb
Total Hot Plate Digestion	M200.2 ICP						10/17/01 9:30	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 16:30	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		119		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		119		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	251		umhos/cm	1	10	10/11/01 17:41	lc
Hardness as CaCO3	SM2340B - Calculation	112		mg/L	1	7	11/05/01 7:29	calc
Lab Filtration	***						10/11/01 11:28	alp
Lab Filtration & Acidification	***						10/12/01 8:54	haw
pH (lab)	M150.1 - Electrometric	7.0	H	units	0.1	0.1	10/11/01 17:45	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	160		mg/L	10	20	10/12/01 17:27	alp
Sulfate	M375.3 - Gravimetric	10	B	mg/L	10	20	10/22/01 11:29	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: TW-IND-1

ACZ ID: ***L34319-16***
Date Sampled: *10/06/01 18:30*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/31/01 0:34	lcj
Arsenic, total	M200.8 ICP-MS	0.0010	B	mg/L	0.0005	0.003	10/31/01 0:34	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/25/01 4:33	ct
Cadmium, total	M200.8 ICP-MS	0.0018		mg/L	0.0001	0.0005	10/31/01 0:34	lcj
Calcium, dissolved	M200.7 ICP	22.8		mg/L	0.2	1	10/24/01 15:10	ct
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/23/01 0:05	ct
Copper, total	M200.7 ICP		U	mg/L	0.01	0.05	10/23/01 0:05	ct
Lead, total	M200.8 ICP-MS	0.0012		mg/L	0.0001	0.0005	10/31/01 0:34	lcj
Magnesium, dissolved	M200.7 ICP	6.0		mg/L	0.2	1	10/24/01 15:10	ct
Nickel, total	M200.7 ICP		U	mg/L	0.01	0.05	10/23/01 0:05	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	11/02/01 9:54	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	11/01/01 7:55	lcj
Thallium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	11/01/01 7:55	lcj
Zinc, total	M200.7 ICP	0.03	B	mg/L	0.01	0.05	10/23/01 0:05	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 21:23	jb
Total Hot Plate Digestion	M200.2 ICP						10/17/01 9:30	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 16:35	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		95		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		95		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	204		umhos/cm	1	10	10/11/01 17:50	lc
Hardness as CaCO3	SM2340B - Calculation	82		mg/L	1	7	11/05/01 7:29	calc
Lab Filtration	***						10/11/01 11:31	alp
Lab Filtration & Acidification	***						10/12/01 8:57	haw
pH (lab)	M150.1 - Electrometric	6.9	H	units	0.1	0.1	10/11/01 17:56	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	150		mg/L	10	20	10/12/01 17:29	alp
Sulfate	M375.3 - Gravimetric	10	B	mg/L	10	20	10/22/01 11:31	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: SW-IND-2

ACZ ID: ***L34319-17***
Date Sampled: *10/06/01 18:30*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/31/01 0:39	lcj
Arsenic, total	M200.8 ICP-MS		U	mg/L	0.0005	0.003	10/31/01 0:39	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/25/01 4:46	ct
Cadmium, total	M200.8 ICP-MS		U	mg/L	0.0001	0.0005	10/31/01 0:39	lcj
Calcium, dissolved	M200.7 ICP	15.9		mg/L	0.2	1	10/24/01 15:13	ct
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/23/01 0:09	ct
Copper, total	M200.7 ICP		U	mg/L	0.01	0.05	10/23/01 0:09	ct
Lead, total	M200.8 ICP-MS	0.0001	B	mg/L	0.0001	0.0005	10/31/01 0:39	lcj
Magnesium, dissolved	M200.7 ICP	5.8		mg/L	0.2	1	10/24/01 15:13	ct
Nickel, total	M200.7 ICP		U	mg/L	0.01	0.05	10/23/01 0:09	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	11/02/01 9:56	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	11/01/01 7:59	lcj
Thallium, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	11/01/01 7:59	lcj
Zinc, total	M200.7 ICP		U	mg/L	0.01	0.05	10/23/01 0:09	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/31/01 21:32	jb
Total Hot Plate Digestion	M200.2 ICP						10/17/01 9:30	lcj

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acidity as CaCO3	M2310B		U	mg/L	2	10	10/16/01 16:44	haw
Alkalinity as CaCO3	M2320B							
Bicarbonate as CaCO3		75		mg/L	2	10	10/11/01 0:00	lc
Carbonate as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Hydroxide as CaCO3			U	mg/L	2	10	10/11/01 0:00	lc
Total Alkalinity		75		mg/L	2	10	10/11/01 0:00	lc
Conductivity @25C	M120.1 - Meter	141		umhos/cm	1	10	10/11/01 18:01	lc
Hardness as CaCO3	SM2340B - Calculation	64		mg/L	1	7	11/05/01 7:29	calc
Lab Filtration	***						10/11/01 11:33	alp
Lab Filtration & Acidification	***						10/12/01 9:00	haw
pH (lab)	M150.1 - Electrometric	8.2	H	units	0.1	0.1	10/11/01 18:08	lc
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	110		mg/L	10	20	10/12/01 17:31	alp
Sulfate	M375.3 - Gravimetric		U	mg/L	10	20	10/22/01 11:33	haw

Note: The Silver value is estimated (see case narrative).

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: HSEQBK

ACZ ID: ***L34319-18***
Date Sampled: *10/05/01 00:00*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS		U	mg/L	0.0002	0.001	10/25/01 3:49	lcj
Arsenic, total	M200.8 ICP-MS		U	mg/L	0.0005	0.003	10/25/01 3:49	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/25/01 4:50	ct
Cadmium, total	M200.8 ICP-MS	0.0002	B	mg/L	0.0001	0.0005	10/25/01 3:49	lcj
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/23/01 0:13	ct
Copper, total	M200.7 ICP		U	mg/L	0.01	0.05	10/23/01 0:13	ct
Lead, total	M200.8 ICP-MS	0.0003	B	mg/L	0.0001	0.0005	10/25/01 3:49	lcj
Nickel, total	M200.7 ICP		U	mg/L	0.01	0.05	10/23/01 0:13	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	11/02/01 9:58	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	10/25/01 3:49	lcj
Thallium, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	10/25/01 3:49	lcj
Zinc, total	M200.7 ICP		U	mg/L	0.01	0.05	10/23/01 0:13	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/23/01 21:22	jb
Total Hot Plate Digestion	M200.2 ICP						10/17/01 9:30	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID:
Sample ID: DEQBK

ACZ ID: ***L34319-19***
Date Sampled: *10/04/01 00:00*
Date Received: *10/10/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total	M200.8 ICP-MS	0.0004	B	mg/L	0.0002	0.001	10/25/01 3:54	lcj
Arsenic, total	M200.8 ICP-MS		U	mg/L	0.0005	0.003	10/25/01 3:54	lcj
Beryllium, total	M200.7 ICP		U	mg/L	0.002	0.01	10/25/01 4:55	ct
Cadmium, total	M200.8 ICP-MS	0.0002	B	mg/L	0.0001	0.0005	10/25/01 3:54	lcj
Chromium, total	M200.7 ICP		U	mg/L	0.01	0.05	10/23/01 0:17	ct
Copper, total	M200.7 ICP	0.05	B	mg/L	0.01	0.05	10/23/01 0:17	ct
Lead, total	M200.8 ICP-MS	0.0032		mg/L	0.0001	0.0005	10/25/01 3:54	lcj
Nickel, total	M200.7 ICP	0.02	B	mg/L	0.01	0.05	10/23/01 0:17	ct
Selenium, total	SM 3500-Se C, AA-Hydride		U	mg/L	0.001	0.005	11/02/01 9:59	kdw
Silver, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	10/25/01 3:54	lcj
Thallium, total	M200.8 ICP-MS		U	mg/L	5E-05	0.0003	10/25/01 3:54	lcj
Zinc, total	M200.7 ICP	0.04	B	mg/L	0.01	0.05	10/23/01 0:17	ct

Metals Prep

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Total Digestion	M200.2 ICP-MS						10/23/01 21:30	jb
Total Hot Plate Digestion	M200.2 ICP						10/17/01 9:30	lcj

Report Header Explanations

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

QC Sample Types

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

QC Sample Type Explanations

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

ACZ Qualifiers (Qual)

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

Method References

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

Comments

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

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34319***

Project ID:

Acidity as CaCO3 M2310B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG129947													
WG129947PBW	PBW	10/16/01 15:15				8.3	mg/L		-4	4			X
L34319-10DUP	DUP	10/16/01 16:07			U	U	mg/L				0	20	
L34319-16DUP	DUP	10/16/01 16:40			U	U	mg/L				0	20	

Alkalinity as CaCO3 2320B

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG129701													
WG129701LCSW1	LCSW	10/11/01 10:44	WC011007-7	82		86.5	mg/L	105.5	80	120			
WG129701LCSW2	LCSW	10/11/01 14:42	WC011007-7	82		84.3	mg/L	102.8	80	120			
L34319-02DUP	DUP	10/11/01 15:18			133	134.1	mg/L				0.8	20	
L34319-12DUP	DUP	10/11/01 17:18			91	90.4	mg/L				0.7	20	
L34319-17DUP	DUP	10/11/01 18:20			75	79.8	mg/L				6.2	20	

Antimony, total M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130467													
WG130378LRB	LRB	10/25/01 2:20				U	mg/L		-0.00044	0.00044			
WG130378LFB	LFB	10/25/01 2:25	MS011022-4	.025		.02527	mg/L	101.1	85	115			
WG130378LCSW	LCSW	10/25/01 2:30	MS011011-1	.02		.01965	mg/L	98.3	80	120			
L34236-19LFM	LFM	10/25/01 2:58	MS011022-4	.025	U	.0254	mg/L	101.6	70	130			
L34236-19LFMD	LFMD	10/25/01 3:12	MS011022-4	.025	U	.0253	mg/L	101.2	70	130	0.39	20	
WG130774													
WG130733LRB	LRB	10/30/01 22:43				U	mg/L		-0.00044	0.00044			
WG130733LFB	LFB	10/30/01 22:48	MS011022-4	.025		.02522	mg/L	100.9	85	115			
WG130733LCSW	LCSW	10/30/01 22:52	MS011011-1	.02		.02005	mg/L	100.3	80	120			
L34319-01LFM	LFM	10/30/01 23:02	MS011022-4	.025	U	.01713	mg/L	68.5	70	130			R
L34319-01LFMD	LFMD	10/30/01 23:06	MS011022-4	.025	U	.01761	mg/L	70.4	70	130	2.76	20	

Arsenic, total M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130467													
WG130378LRB	LRB	10/25/01 2:20				U	mg/L		-0.0011	0.0011			
WG130378LFB	LFB	10/25/01 2:25	MS011022-4	.1		.1035	mg/L	103.5	85	115			
WG130378LCSW	LCSW	10/25/01 2:30	MS011011-1	.02		.01946	mg/L	97.3	80	120			
L34236-19LFM	LFM	10/25/01 2:58	MS011022-4	.1	U	.1082	mg/L	108.2	70	130			
L34236-19LFMD	LFMD	10/25/01 3:12	MS011022-4	.1	U	.1078	mg/L	107.8	70	130	0.37	20	
WG130774													
WG130733LRB	LRB	10/30/01 22:43				U	mg/L		-0.0011	0.0011			
WG130733LFB	LFB	10/30/01 22:48	MS011022-4	.1		.1075	mg/L	107.5	85	115			
WG130733LCSW	LCSW	10/30/01 22:52	MS011011-1	.02		.0208	mg/L	104	80	120			
L34319-01LFM	LFM	10/30/01 23:02	MS011022-4	.1	.001	.109	mg/L	108	70	130			
L34319-01LFMD	LFMD	10/30/01 23:06	MS011022-4	.1	.001	.1062	mg/L	105.2	70	130	2.6	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34319***

Project ID:

Beryllium, total M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130032													
WG129924LRB	LRB	10/18/01 0:57				U	mg/L		-0.0044	0.0044			
WG129924LFB	LFB	10/18/01 1:02	II011010-7	.5		.5195	mg/L	103.9	85	115			
WG129924LCSW	LCSW	10/18/01 1:06	II011010-8	1		1.0203	mg/L	102	85	115			
L34276-01LFM	LFM	10/18/01 2:27	II011010-7	.5	U	.4934	mg/L	98.7	70	130			
L34276-01LFMD	LFMD	10/18/01 2:41	II011010-7	.5	U	.5051	mg/L	101	70	130	2.34	20	
WG130115													
WG129977LRB	LRB	10/22/01 19:30				U	mg/L		-0.0044	0.0044			
WG129977LFB	LFB	10/22/01 19:34	II011010-7	.5		.5389	mg/L	107.8	85	115			
WG129977LCSW	LCSW	10/22/01 19:38	II011010-8	1		1.0679	mg/L	106.8	85	115			
L34318-11LFM	LFM	10/22/01 20:51	II011010-7	.5	U	.5301	mg/L	106	70	130			
L34318-11LFMD	LFMD	10/22/01 21:03	II011010-7	.5	U	.5443	mg/L	108.9	70	130	2.64	20	
WG130455													
WG129967LRB	LRB	10/25/01 3:05				U	mg/L		-0.0044	0.0044			
WG129967LFB	LFB	10/25/01 3:09	II011010-7	.5		.5349	mg/L	107	85	115			
WG129967LCSW	LCSW	10/25/01 3:13	II011010-8	1		1.0418	mg/L	104.2	85	115			
L34319-12LFM	LFM	10/25/01 4:11	II011010-7	.5	U	.53	mg/L	106	70	130			
L34319-12LFMD	LFMD	10/25/01 4:15	II011010-7	.5	U	.5272	mg/L	105.4	70	130	0.53	20	

Cadmium, total M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130467													
WG130378LRB	LRB	10/25/01 2:20				U	mg/L		-0.00022	0.00022			
WG130378LFB	LFB	10/25/01 2:25	MS011022-4	.1		.0934	mg/L	93.4	85	115			
WG130378LCSW	LCSW	10/25/01 2:30	MS011011-1	.02		.01942	mg/L	97.1	80	120			
L34236-19LFM	LFM	10/25/01 2:58	MS011022-4	.1	.0219	.115	mg/L	93.1	70	130			
L34236-19LFMD	LFMD	10/25/01 3:12	MS011022-4	.1	.0219	.11345	mg/L	91.6	70	130	1.36	20	
WG130774													
WG130733LRB	LRB	10/30/01 22:43				U	mg/L		-0.00022	0.00022			
WG130733LFB	LFB	10/30/01 22:48	MS011022-4	.1		.09436	mg/L	94.4	85	115			
WG130733LCSW	LCSW	10/30/01 22:52	MS011011-1	.02		.01988	mg/L	99.4	80	120			
L34319-01LFM	LFM	10/30/01 23:02	MS011022-4	.1	.0002	.09405	mg/L	93.9	70	130			
L34319-01LFMD	LFMD	10/30/01 23:06	MS011022-4	.1	.0002	.09236	mg/L	92.2	70	130	1.81	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34319***

Project ID:

Calcium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130406													
WG130406LFB	LFB	10/24/01 11:16	II011023-2	90.02512		84.96	mg/L	94.4	85	115			
L34319-05AS	AS	10/24/01 12:05	II011023-2	90.02512	28.8	113.94	mg/L	94.6	85	115			
L34319-05ASD	ASD	10/24/01 12:08	II011023-2	90.02512	28.8	113.27	mg/L	93.8	85	115	0.59	20	
L34319-15AS	AS	10/24/01 12:58	II011023-2	90.02512	23.9	111.56	mg/L	97.4	85	115			
L34319-15ASD	ASD	10/24/01 13:01	II011023-2	90.02512	23.9	109.98	mg/L	95.6	85	115	1.43	20	
WG130422													
WG130422LFB	LFB	10/24/01 15:06	II011023-2	90.02512		84.28	mg/L	93.6	85	115			
L34322-08AS	AS	10/24/01 15:56	II011023-2	90.02512	38.5	125.09	mg/L	96.2	85	115			
L34322-08ASD	ASD	10/24/01 15:59	II011023-2	90.02512	38.5	124.78	mg/L	95.8	85	115	0.25	20	

Chromium, total M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130032													
WG129924LRB	LRB	10/18/01 0:57				U	mg/L		-0.022	0.022			
WG129924LFB	LFB	10/18/01 1:02	II011010-7	.5		.501	mg/L	100.2	85	115			
WG129924LCSW	LCSW	10/18/01 1:06	II011010-8	1		1.004	mg/L	100.4	85	115			
L34276-01LFM	LFM	10/18/01 2:27	II011010-7	.5	U	.484	mg/L	96.8	70	130			
L34276-01LFMD	LFMD	10/18/01 2:41	II011010-7	.5	U	.495	mg/L	99	70	130	2.25	20	
WG130115													
WG129977LRB	LRB	10/22/01 19:30				U	mg/L		-0.022	0.022			
WG129977LFB	LFB	10/22/01 19:34	II011010-7	.5		.505	mg/L	101	85	115			
WG129977LCSW	LCSW	10/22/01 19:38	II011010-8	1		1.029	mg/L	102.9	85	115			
L34318-11LFM	LFM	10/22/01 20:51	II011010-7	.5	U	.505	mg/L	101	70	130			
L34318-11LFMD	LFMD	10/22/01 21:03	II011010-7	.5	U	.513	mg/L	102.6	70	130	1.57	20	
WG130117													
WG129967LRB	LRB	10/22/01 22:32				U	mg/L		-0.022	0.022			
WG129967LFB	LFB	10/22/01 22:36	II011010-7	.5		.515	mg/L	103	85	115			
WG129967LCSW	LCSW	10/22/01 22:40	II011010-8	1		1.03	mg/L	103	85	115			
L34319-12LFM	LFM	10/22/01 23:37	II011010-7	.5	U	.509	mg/L	101.8	70	130			
L34319-12LFMD	LFMD	10/22/01 23:41	II011010-7	.5	U	.503	mg/L	100.6	70	130	1.19	20	

Conductivity @25C M120.1 - Meter

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG129701													
WG129701LCSW1	LCSW	10/11/01 10:53	WC011007-7	1413		1454	µmhos/cm	102.9	80	120			
WG129701PBW1	PBW	10/11/01 10:56				2.8	µmhos/cm		-4	4			
WG129701LCSW2	LCSW	10/11/01 14:50	WC011007-7	1413		1431	µmhos/cm	101.3	80	120			
WG129701PBW2	PBW	10/11/01 14:54				2.7	µmhos/cm		-4	4			
L34319-02DUP	DUP	10/11/01 15:08			282	279.6	µmhos/cm				0.9	20	
L34319-12DUP	DUP	10/11/01 17:10			183	182.8	µmhos/cm				0.1	20	
L34319-17DUP	DUP	10/11/01 18:12			141	142.1	µmhos/cm				0.8	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34319***

Project ID:

Copper, total M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130032													
WG129924LRB	LRB	10/18/01 0:57				U	mg/L		-0.022	0.022			
WG129924LFB	LFB	10/18/01 1:02	II011010-7	.5		.495	mg/L	99	85	115			
WG129924LCSW	LCSW	10/18/01 1:06	II011010-8	1		.985	mg/L	98.5	85	115			
L34276-01LFM	LFM	10/18/01 2:27	II011010-7	.5	U	.468	mg/L	93.6	70	130			
L34276-01LFMD	LFMD	10/18/01 2:41	II011010-7	.5	U	.477	mg/L	95.4	70	130	1.9	20	
WG130115													
WG129977LRB	LRB	10/22/01 19:30				U	mg/L		-0.022	0.022			
WG129977LFB	LFB	10/22/01 19:34	II011010-7	.5		.519	mg/L	103.8	85	115			
WG129977LCSW	LCSW	10/22/01 19:38	II011010-8	1		1.036	mg/L	103.6	85	115			
L34318-11LFM	LFM	10/22/01 20:51	II011010-7	.5	U	.512	mg/L	102.4	70	130			
L34318-11LFMD	LFMD	10/22/01 21:03	II011010-7	.5	U	.525	mg/L	105	70	130	2.51	20	
WG130117													
WG129967LRB	LRB	10/22/01 22:32				U	mg/L		-0.022	0.022			
WG129967LFB	LFB	10/22/01 22:36	II011010-7	.5		.535	mg/L	107	85	115			
WG129967LCSW	LCSW	10/22/01 22:40	II011010-8	1		1.052	mg/L	105.2	85	115			
L34319-12LFM	LFM	10/22/01 23:37	II011010-7	.5	U	.533	mg/L	106.6	70	130			
L34319-12LFMD	LFMD	10/22/01 23:41	II011010-7	.5	U	.529	mg/L	105.8	70	130	0.75	20	

Lead, total M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130467													
WG130378LRB	LRB	10/25/01 2:20				U	mg/L		-0.00022	0.00022			
WG130378LFB	LFB	10/25/01 2:25	MS011022-4	.1		.09586	mg/L	95.9	85	115			
WG130378LCSW	LCSW	10/25/01 2:30	MS011011-1	.02		.0189	mg/L	94.5	80	120			
L34236-19LFM	LFM	10/25/01 2:58	MS011022-4	.1	.0212	.1184	mg/L	97.2	70	130			
L34236-19LFMD	LFMD	10/25/01 3:12	MS011022-4	.1	.0212	.11835	mg/L	97.2	70	130	0.04	20	
WG130774													
WG130733LRB	LRB	10/30/01 22:43				U	mg/L		-0.00022	0.00022			
WG130733LFB	LFB	10/30/01 22:48	MS011022-4	.1		.1008	mg/L	100.8	85	115			
WG130733LCSW	LCSW	10/30/01 22:52	MS011011-1	.02		.01994	mg/L	99.7	80	120			
L34319-01LFM	LFM	10/30/01 23:02	MS011022-4	.1	.0017	.102	mg/L	100.3	70	130			
L34319-01LFMD	LFMD	10/30/01 23:06	MS011022-4	.1	.0017	.09927	mg/L	97.6	70	130	2.71	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34319***

Project ID:

Magnesium, dissolved M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130406													
WG130406LFB	LFB	10/24/01 11:16	II011023-2	49.98652		47.84	mg/L	95.7	85	115			
L34319-05AS	AS	10/24/01 12:05	II011023-2	49.98652	12.1	59.89	mg/L	95.6	85	115			
L34319-05ASD	ASD	10/24/01 12:08	II011023-2	49.98652	12.1	59.53	mg/L	94.9	85	115	0.6	20	
L34319-15AS	AS	10/24/01 12:58	II011023-2	49.98652	12.7	60.36	mg/L	95.3	85	115			
L34319-15ASD	ASD	10/24/01 13:01	II011023-2	49.98652	12.7	59.31	mg/L	93.2	85	115	1.75	20	
WG130422													
WG130422LFB	LFB	10/24/01 15:06	II011023-2	49.98652		48.14	mg/L	96.3	85	115			
L34322-08AS	AS	10/24/01 15:56	II011023-2	49.98652	20.3	69.29	mg/L	98	85	115			
L34322-08ASD	ASD	10/24/01 15:59	II011023-2	49.98652	20.3	69.4	mg/L	98.2	85	115	0.16	20	

Nickel, total M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130032													
WG129924LRB	LRB	10/18/01 0:57				U	mg/L		-0.022	0.022			
WG129924LFB	LFB	10/18/01 1:02	II011010-7	.5		.505	mg/L	101	85	115			
WG129924LCSW	LCSW	10/18/01 1:06	II011010-8	1		.998	mg/L	99.8	85	115			
L34276-01LFM	LFM	10/18/01 2:27	II011010-7	.5	U	.491	mg/L	98.2	70	130			
L34276-01LFMD	LFMD	10/18/01 2:41	II011010-7	.5	U	.497	mg/L	99.4	70	130	1.21	20	
WG130115													
WG129977LRB	LRB	10/22/01 19:30				U	mg/L		-0.022	0.022			
WG129977LFB	LFB	10/22/01 19:34	II011010-7	.5		.513	mg/L	102.6	85	115			
WG129977LCSW	LCSW	10/22/01 19:38	II011010-8	1		1.032	mg/L	103.2	85	115			
L34318-11LFM	LFM	10/22/01 20:51	II011010-7	.5	U	.504	mg/L	100.8	70	130			
L34318-11LFMD	LFMD	10/22/01 21:03	II011010-7	.5	U	.514	mg/L	102.8	70	130	1.96	20	
WG130117													
WG129967LRB	LRB	10/22/01 22:32				U	mg/L		-0.022	0.022			
WG129967LFB	LFB	10/22/01 22:36	II011010-7	.5		.525	mg/L	105	85	115			
WG129967LCSW	LCSW	10/22/01 22:40	II011010-8	1		1.042	mg/L	104.2	85	115			
L34319-12LFM	LFM	10/22/01 23:37	II011010-7	.5	U	.518	mg/L	103.6	70	130			
L34319-12LFMD	LFMD	10/22/01 23:41	II011010-7	.5	U	.509	mg/L	101.8	70	130	1.75	20	

pH (lab) M150.1 - Electrometric

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG129701													
WG129701LCSW1	LCSW	10/11/01 10:49	WC011007-7	7		6.69	units	95.6	90	110			
WG129701LCSW2	LCSW	10/11/01 14:47	WC011007-7	7		6.67	units	95.3	90	110			
L34319-02DUP	DUP	10/11/01 15:14			7	7.31	units				4.3	20	
L34319-12DUP	DUP	10/11/01 17:15			7.4	7.01	units				5.4	20	
L34319-17DUP	DUP	10/11/01 18:18			8.2	8.16	units				0.5	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34319***

Project ID:

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

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG129787													
WG129787PBW	PBW	10/12/01 13:45				U	mg/L		-20	20			
WG129787LCSW	LCSW	10/12/01 13:46	WC010928-3	259.59		304	mg/L	117.1	80	120			
L34319-08DUP	DUP	10/12/01 14:19			280	278	mg/L				0.7	20	
WG129807													
WG129807PBW	PBW	10/12/01 17:00				U	mg/L		-20	20			
WG129807LCSW	LCSW	10/12/01 17:01	WC011012-8	259.79		268	mg/L	103.2	80	120			
L34319-13DUP	DUP	10/12/01 17:23			200	198	mg/L				1	20	

Selenium, total SM 3500-Se C, AA-Hydride

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130342													
WG130342LRB	LRB	10/25/01 14:41				U	mg/L		-0.0022	0.0022			
WG130342LCSW	LCSW	10/25/01 14:43	II011023-3	.02		.0198	mg/L	99	85	115			
WG130342LFB	LFB	10/25/01 14:44	II011023-5	.01666667		.0164	mg/L	98.4	85	115			
L34319-06LFM	LFM	10/25/01 15:20	II011023-5	.01666667	U	.0187	mg/L	112.2	70	130			
L34319-06LFMD	LFMD	10/25/01 15:22	II011023-5	.01666667	U	.0191	mg/L	114.6	70	130	2.12	20	
WG130659													
WG130659LRB	LRB	11/02/01 9:39				U	mg/L		-0.0022	0.0022			
WG130659LCSW	LCSW	11/02/01 9:40	II011023-3	.02		.019	mg/L	95	85	115			
WG130659LFB	LFB	11/02/01 9:42	II011023-5	.01666667		.0169	mg/L	101.4	85	115			
L34319-13LFM	LFM	11/02/01 9:46	II011023-5	.01666667	U	.0169	mg/L	101.4	70	130			
L34319-13LFMD	LFMD	11/02/01 9:48	II011023-5	.01666667	U	.0167	mg/L	100.2	70	130	1.19	20	
WG130660													
WG130660LRB	LRB	11/02/01 10:58				U	mg/L		-0.0022	0.0022			
WG130660LCSW	LCSW	11/02/01 10:59	II011023-3	.02		.0192	mg/L	96	85	115			
WG130660LFB	LFB	11/02/01 11:01	II011023-5	.01666667		.0171	mg/L	102.6	85	115			
L34319-11LFM	LFM	11/02/01 12:57	II011023-5	.01666667	U	.0165	mg/L	99	70	130			
L34319-11LFMD	LFMD	11/02/01 12:59	II011023-5	.01666667	U	.0171	mg/L	102.6	70	130	3.57	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34319***

Project ID:

Silver, total M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130467													
WG130378LRB	LRB	10/25/01 2:20				U	mg/L		-0.00011	0.00011			
WG130378LFB	LFB	10/25/01 2:25	MS011022-4	.025		.02428	mg/L	97.1	85	115			
WG130378LCSW	LCSW	10/25/01 2:30	MS011011-1	.02		.0164	mg/L	82	80	120			
L34236-19LFM	LFM	10/25/01 2:58	MS011022-4	.025	U	.02403	mg/L	96.1	70	130			
L34236-19LFMD	LFMD	10/25/01 3:12	MS011022-4	.025	U	.0241	mg/L	96.4	70	130	0.29	20	
WG130861													
WG130845LRB	LRB	11/01/01 5:37				U	mg/L		-0.00011	0.00011			
WG130845LFB	LFB	11/01/01 5:41	MS011022-4	.025		.02871	mg/L	114.8	85	115			
WG130845LCSW	LCSW	11/01/01 5:46	MS011011-1	.02		.01293	mg/L	64.7	80	120			X
L34319-03AS	AS	11/01/01 6:04	MS011022-4	.025	U	.02432	mg/L	97.3	70	130			
L34319-03ASD	ASD	11/01/01 6:09	MS011022-4	.025	U	.02473	mg/L	98.9	70	130	1.67	20	
L34319-03LFM	LFM	11/01/01 6:23	MS011022-4	.025	U	.01787	mg/L	71.5	70	130			
L34319-03LFMD	LFMD	11/01/01 6:27	MS011022-4	.025	U	.01799	mg/L	72	70	130	0.67	20	
L34319-14AS	AS	11/01/01 7:32	MS011022-4	.05	U	.05	mg/L	100	70	130			
L34319-14ASD	ASD	11/01/01 7:36	MS011022-4	.05	U	.04918	mg/L	98.4	70	130	1.65	20	
L34319-14LFM	LFM	11/01/01 7:41	MS011028-20	.05	U	.03672	mg/L	73.4	70	130			
L34319-14LFMD	LFMD	11/01/01 7:45	MS011028-20	.05	U	.03626	mg/L	72.5	70	130	1.26	20	

Sulfate M375.3 - Gravimetric

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130201													
WG130201PBW	PBW	10/20/01 14:05				U	mg/L		-20	20			
WG130201LCSW	LCSW	10/20/01 14:06	WC010923-2	100		101	mg/L	101	80	120			
L34319-02DUP	DUP	10/20/01 14:29			U	U	mg/L				0	20	
WG130225													
WG130225PBW	PBW	10/22/01 11:00				U	mg/L		-20	20			
WG130225LCSW	LCSW	10/22/01 11:01	WC010923-2	100		109	mg/L	109	80	120			
L34319-12DUP	DUP	10/22/01 11:23			10	U	mg/L				0	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34319***

Project ID:

Thallium, total M200.8 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130467													
WG130378LRB	LRB	10/25/01 2:20				U	mg/L		-0.00011	0.00011			
WG130378LFB	LFB	10/25/01 2:25	MS011022-4	.05		.04762	mg/L	95.2	85	115			
WG130378LCSW	LCSW	10/25/01 2:30	MS011011-1	.02		.01927	mg/L	96.4	80	120			
L34236-19LFM	LFM	10/25/01 2:58	MS011022-4	.05	U	.04578	mg/L	91.6	70	130			
L34236-19LFMD	LFMD	10/25/01 3:12	MS011022-4	.05	U	.04586	mg/L	91.7	70	130	0.17	20	
WG130774													
WG130733LRB	LRB	10/30/01 22:43				U	mg/L		-0.00011	0.00011			
WG130733LFB	LFB	10/30/01 22:48	MS011022-4	.05		.04807	mg/L	96.1	85	115			
WG130733LCSW	LCSW	10/30/01 22:52	MS011011-1	.02		.0196	mg/L	98	80	120			
L34319-01LFM	LFM	10/30/01 23:02	MS011022-4	.05	.00022	.04795	mg/L	95.5	70	130			
L34319-01LFMD	LFMD	10/30/01 23:06	MS011022-4	.05	.00022	.04698	mg/L	93.5	70	130	2.04	20	
WG130861													
WG130845LRB	LRB	11/01/01 5:37				U	mg/L		-0.00011	0.00011			
WG130845LFB	LFB	11/01/01 5:41	MS011022-4	.05		.04724	mg/L	94.5	85	115			
WG130845LCSW	LCSW	11/01/01 5:46	MS011011-1	.02		.01893	mg/L	94.7	80	120			
L34319-03AS	AS	11/01/01 6:04	MS011022-4	.05	U	.04736	mg/L	94.7	70	130			
L34319-03ASD	ASD	11/01/01 6:09	MS011022-4	.05	U	.04812	mg/L	96.2	70	130	1.59	20	
L34319-03LFM	LFM	11/01/01 6:23	MS011022-4	.05	U	.04723	mg/L	94.5	70	130			
L34319-03LFMD	LFMD	11/01/01 6:27	MS011022-4	.05	U	.04806	mg/L	96.1	70	130	1.74	20	
L34319-14AS	AS	11/01/01 7:32	MS011022-4	.1	U	.09466	mg/L	94.7	70	130			
L34319-14ASD	ASD	11/01/01 7:36	MS011022-4	.1	U	.09498	mg/L	95	70	130	0.34	20	
L34319-14LFM	LFM	11/01/01 7:41	MS011028-20	.1	U	.095	mg/L	95	70	130			
L34319-14LFMD	LFMD	11/01/01 7:45	MS011028-20	.1	U	.0945	mg/L	94.5	70	130	0.53	20	

Zinc, total M200.7 ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130032													
WG129924LRB	LRB	10/18/01 0:57				U	mg/L		-0.022	0.022			
WG129924LFB	LFB	10/18/01 1:02	II011010-7	.5		.509	mg/L	101.8	85	115			
WG129924LCSW	LCSW	10/18/01 1:06	II011010-8	1		1.029	mg/L	102.9	85	115			
L34276-01LFM	LFM	10/18/01 2:27	II011010-7	.5	U	.507	mg/L	101.4	70	130			
L34276-01LFMD	LFMD	10/18/01 2:41	II011010-7	.5	U	.522	mg/L	104.4	70	130	2.92	20	
WG130115													
WG129977LRB	LRB	10/22/01 19:30				U	mg/L		-0.022	0.022			
WG129977LFB	LFB	10/22/01 19:34	II011010-7	.5		.512	mg/L	102.4	85	115			
WG129977LCSW	LCSW	10/22/01 19:38	II011010-8	1		1.036	mg/L	103.6	85	115			
L34318-11LFM	LFM	10/22/01 20:51	II011010-7	.5	.01	.525	mg/L	103	70	130			
L34318-11LFMD	LFMD	10/22/01 21:03	II011010-7	.5	.01	.525	mg/L	103	70	130	0	20	
WG130117													
WG129967LRB	LRB	10/22/01 22:32				U	mg/L		-0.022	0.022			
WG129967LFB	LFB	10/22/01 22:36	II011010-7	.5		.518	mg/L	103.6	85	115			
WG129967LCSW	LCSW	10/22/01 22:40	II011010-8	1		1.037	mg/L	103.7	85	115			
L34319-12LFM	LFM	10/22/01 23:37	II011010-7	.5	U	.511	mg/L	102.2	70	130			
L34319-12LFMD	LFMD	10/22/01 23:41	II011010-7	.5	U	.5	mg/L	100	70	130	2.18	20	

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

Sample Receipt

Cascade Earth Sciences, LTD.

ACZ Project ID: L34319
Date Received: 10/10/2001
Received By: scottu

Receipt Verification

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

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

N/A

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

N/A

Shipping Containers

Cooler Id		Temp (°C)	Rad (µR/hr)
ACZ		5.5	13

Notes

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

Sample Receipt

Cascade Earth Sciences, LTD.

ACZ Project ID: L34319
Date Received: 10/10/2001
Received By: scottu

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	Y < 2	YG< 2	B < 2	BG< 2	O < 2	T >12	P >12	N/A	RAD
L34319-01	SW-BR-1	Y										
L34319-02	SW-BR-2	Y										
L34319-03	WL-BR-3	Y										
L34319-04	WL-BR-4	Y										
L34319-05	SW-BR-5	Y										
L34319-06	SW-BR-6	Y										
L34319-07	SW-BR-7	Y										
L34319-08	SW-A-1	Y										
L34319-09	SW-A-2	Y										
L34319-10	JC-A-3	Y										
L34319-11	JC-A-4	Y										
L34319-12	JC-A-5	Y										
L34319-13	JC-A-6	Y										
L34319-14	JC-A-7	Y										
L34319-15	JC-A-8	Y										
L34319-16	TW-IND-1	Y										
L34319-17	SW-IND-2	Y										
L34319-18	HSEQBK	Y										
L34319-19	DEQBK	Y										

ACZ Laboratories, Inc.

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

CHAIN of CUSTODY

Quote #: Cascade - Blue Ridge **ACZ #:** L34319

CLIENT INFORMATION

Name to appear on Report and Invoice
CES
225 S South Holly
Medford, OR 97501
Attn: Mary Ann Amann Tel: 541-772-2280
Email:

Carbon Copy: **Report:** _____ **Invoice:** _____
Attn: Tel:
Email:

PROJECT INFORMATION

Client Project name and/or PO#:

Shipping Company:
Tracking #:

ANALYSES REQUESTED *(required; attach list)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total 13 Metals	Hardness as CaCO3	Acidity as CaCO3	EC, pH, TDS	Alkalinity as CaCO3	Sulfate	
SW-BR-1	10/6	SW	4	✓	✓	✓	✓	✓	✓	
SW-BR-2	10/6	"	4	✓	✓	✓	✓	✓	✓	
WC-BR-3	10/6 1445		4	✓	✓	✓	✓	✓	✓	
WC-BR-4	10/6 1430		4	✓	✓	✓	✓	✓	✓	
SW-BR-5	10/6 1690		4	✓	✓	✓	✓	✓	✓	
SW-BR-6	10/6 1635		4	✓	✓	✓	✓	✓	✓	
SW-BR-7	10/6 1610		4	✓	✓	✓	✓	✓	✓	
SW-A-1	10/6 1300		4	✓	✓	✓	✓	✓	✓	
SW-A-2	10/6 1020		4	✓	✓	✓	✓	✓	✓	
JC-A-3	10/6 1037		4	✓	✓	✓	✓	✓	✓	
JC-A-4	10/6 1041		4	✓	✓	✓	✓	✓	✓	
JC-A-5	10/6 1315		4	✓	✓	✓	✓	✓	✓	

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

REMARKS

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
CES	10/9/01 1200		
			10-10-01 1000

PAGE _____ Of _____

FRMQA021.01.00.03 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.

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

CHAIN of CUSTODY

Quote #: Cascade - Blue Ridge **ACZ #:**

CLIENT INFORMATION

Name to appear on Report and Invoice

CES
225 S. Holly
Medford, OR 97501

Attn: Mary Ann Amann Tel: 541-779-2280

Email:

Carbon Copy: **Report:** _____ **Invoice:** _____

Attn: Tel:

Email:

PROJECT INFORMATION

Client Project name and/or PO#:

Shipping Company:

Tracking #:

ANALYSES REQUESTED *(required; attach list)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total 13 Metals	Hardness as CaCO3	Acidity as CaCO3	Alkalinity as CaCO3	NH3, pH, TDS	Sulfate	
JC-A-6	10/6 1140	SW	4	✓	✓	✓	✓	✓	✓	
JC-A-7	10/6 1000	↓	4	✓	✓	✓	✓	✓	✓	
JC-A-8	10/6 1059	↓	4	✓	✓	✓	✓	✓	✓	
SW-Ind-1	10/6 1830	↓	4	✓	✓	✓	✓	✓	✓	
SW-Ind-2	10/6 1830	↓	4	✓	✓	✓	✓	✓	✓	
HSEQBK	10/5		1	✓						
DEQBK	10/4		1	✓						

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

REMARKS

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME	PAGE
CES	10/9/01 1200			
			10-10 01 1000	Of

FRMQA021.01.00.03 White - Return with sample. Yellow - Retain for your records.

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

Analytical Report

Mary Ann Amann
Cascade Earth Sciences, LTD.
225 S. Holly St.
Medford, OR 97501

November 27, 2001

Project: L34346

Mary Ann Amann:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 11, 2001. This project has been assigned to ACZ's project number, L34346. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 8.0. The enclosed results relate only to the samples received under L34346. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

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

All samples and sub-samples associated with this project will be disposed of after December 27, 2001. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs.

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

Sue Barkey 27/Nov/01

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

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

Case Narrative

Cascade Earth Sciences, LTD.
Project: L34346

November 27, 2001

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 19 soil samples from Cascade Earth Sciences, LTD. on October 11, 2001. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L34346. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times. Mercury analyzed past the 28 day holding from sample date, but within 28 days from date or sample prep (air drying and sieving).

Sample Analysis

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

All analyses were performed after the sample was air dried at approximately 34C and sieve to minus 2 mm for metals or crush and pulverized for Acid-Base Potential analyses and are reported on a dry weight basis. Residual moisture after air drying typical is in the 1 to 2% range.

The following anomalies were identified during the analysis of these samples:

1. The Antimony, Arsenic, Chromium, Copper, Nickel, Selenium and Zinc values are estimated due to matrix interferences. Either the Matrix Spike (MS) or the Matrix Spike Duplicate (MSD) was out of control limits for these metals.

2. Duplicate precision (RPD) for Chromium, Mercury and Nickel exceed the QC acceptance limit of 20%.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-1-5'

ACZ ID: ***L34346-01***
Date Sampled: *10/04/01 16:55*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 1:35	jb
Arsenic, total (3050)	M6020 ICP-MS	1.5		mg/Kg	0.2	1	11/17/01 1:35	jb
Beryllium, total (3050)	M6010B ICP	0.6	B	mg/Kg	0.4	2	11/14/01 22:29	ct
Cadmium, total (3050)	M6020 ICP-MS	0.46		mg/Kg	0.04	0.2	11/17/01 1:35	jb
Chromium, total (3050)	M6010B ICP	54		mg/Kg	2	10	11/14/01 22:29	ct
Copper, total (3050)	M6010B ICP	74		mg/Kg	2	10	11/14/01 22:29	ct
Lead, total (3050)	M6020 ICP-MS	2.33		mg/Kg	0.04	0.2	11/17/01 1:35	jb
Mercury, total	M7471 CVAA	295	H	mg/Kg	4	20	11/20/01 14:06	kdw
Nickel, total (3050)	M6010B ICP	79		mg/Kg	2	10	11/14/01 22:29	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.4	B	mg/Kg	0.2	1	11/16/01 10:30	kdw
Silver, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/26/01 22:54	lcj
Thallium, total (3050)	M6020 ICP-MS	0.25		mg/Kg	0.02	0.1	11/17/01 1:35	jb
Zinc, total (3050)	M6010B ICP	64		mg/Kg	2	10	11/14/01 22:29	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/16/01 15:00	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	31		t CaCO3/Kt	1	5	11/16/01 15:00	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	31		t CaCO3/Kt	1	5	11/16/01 15:00	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	3.1		%	0.1	0.5	11/15/01 11:23	jp
pH, Corrosivity	M9045	7.5		units	0.1	0.1	11/19/01 8:43	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Residual		0.04	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/14/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:30	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 11:45	bf
Digestion	M3050						11/09/01 13:43	jp
Digestion - Hot Plate	M3050 ICP						11/13/01 17:25	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 11:30	bf

Note: See case narrative for data flags.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-1-15'

ACZ ID: ***L34346-02***
Date Sampled: *10/04/01 17:10*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 1:49	jb
Arsenic, total (3050)	M6020 ICP-MS	0.9	B	mg/Kg	0.2	1	11/17/01 1:49	jb
Beryllium, total (3050)	M6010B ICP	0.9	B	mg/Kg	0.4	2	11/14/01 22:49	ct
Cadmium, total (3050)	M6020 ICP-MS	0.88		mg/Kg	0.04	0.2	11/17/01 1:49	jb
Chromium, total (3050)	M6010B ICP	18		mg/Kg	2	10	11/14/01 22:49	ct
Copper, total (3050)	M6010B ICP	40		mg/Kg	2	10	11/14/01 22:49	ct
Lead, total (3050)	M6020 ICP-MS	5.41		mg/Kg	0.04	0.2	11/17/01 1:49	jb
Mercury, total	M7471 CVAA	5.03	H	mg/Kg	0.04	0.2	11/20/01 11:19	kdw
Nickel, total (3050)	M6010B ICP	15		mg/Kg	2	10	11/14/01 22:49	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 10:39	kdw
Silver, total (3050)	M6020 ICP-MS	0.09	B	mg/Kg	0.02	0.1	11/26/01 22:58	lcj
Thallium, total (3050)	M6020 ICP-MS	0.11		mg/Kg	0.02	0.1	11/17/01 1:49	jb
Zinc, total (3050)	M6010B ICP	57		mg/Kg	2	10	11/14/01 22:49	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/16/01 15:01	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	12		t CaCO3/Kt	1	5	11/16/01 15:01	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	11		t CaCO3/Kt	1	5	11/16/01 15:01	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.2		%	0.1	0.5	11/15/01 11:35	jp
pH, Corrosivity	M9045	7.2		units	0.1	0.1	11/19/01 8:47	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.02	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Residual		0.02	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Total		0.03	B	%	0.01	0.1	11/14/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:31	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 11:47	bf
Digestion	M3050						11/09/01 14:27	jp
Digestion - Hot Plate	M3050 ICP						11/13/01 19:34	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 11:35	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-1-18'

ACZ ID: ***L34346-03***
Date Sampled: *10/04/01 17:20*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 1:53	jb
Arsenic, total (3050)	M6020 ICP-MS	0.4	B	mg/Kg	0.2	1	11/17/01 1:53	jb
Beryllium, total (3050)	M6010B ICP	0.8	B	mg/Kg	0.4	2	11/14/01 23:04	ct
Cadmium, total (3050)	M6020 ICP-MS	0.90		mg/Kg	0.04	0.2	11/17/01 1:53	jb
Chromium, total (3050)	M6010B ICP	9	B	mg/Kg	2	10	11/14/01 23:04	ct
Copper, total (3050)	M6010B ICP	40		mg/Kg	2	10	11/14/01 23:04	ct
Lead, total (3050)	M6020 ICP-MS	2.12		mg/Kg	0.04	0.2	11/17/01 1:53	jb
Mercury, total	M7471 CVAA	1.09	H	mg/Kg	0.04	0.2	11/20/01 11:20	kdw
Nickel, total (3050)	M6010B ICP	24		mg/Kg	2	10	11/14/01 23:04	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 10:41	kdw
Silver, total (3050)	M6020 ICP-MS	0.08	B	mg/Kg	0.02	0.1	11/26/01 23:11	lcj
Thallium, total (3050)	M6020 ICP-MS	0.03	B	mg/Kg	0.02	0.1	11/17/01 1:53	jb
Zinc, total (3050)	M6010B ICP	75		mg/Kg	2	10	11/14/01 23:04	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/16/01 15:03	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	21		t CaCO3/Kt	1	5	11/16/01 15:03	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	20		t CaCO3/Kt	1	5	11/16/01 15:03	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	2.1		%	0.1	0.5	11/15/01 11:47	jp
pH, Corrosivity	M9045	7.3		units	0.1	0.1	11/19/01 8:52	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Residual		0.02	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.02	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Total		0.02	B	%	0.01	0.1	11/14/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:33	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 11:50	bf
Digestion	M3050						11/09/01 14:41	jp
Digestion - Hot Plate	M3050 ICP						11/13/01 20:17	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 11:40	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-2-5'

ACZ ID: ***L34346-04***
Date Sampled: *10/05/01 08:50*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 2:07	jb
Arsenic, total (3050)	M6020 ICP-MS	1.1		mg/Kg	0.2	1	11/17/01 2:07	jb
Beryllium, total (3050)	M6010B ICP	0.4	B	mg/Kg	0.4	2	11/14/01 23:09	ct
Cadmium, total (3050)	M6020 ICP-MS	0.32		mg/Kg	0.04	0.2	11/17/01 2:07	jb
Chromium, total (3050)	M6010B ICP	31		mg/Kg	2	10	11/14/01 23:09	ct
Copper, total (3050)	M6010B ICP	62		mg/Kg	2	10	11/14/01 23:09	ct
Lead, total (3050)	M6020 ICP-MS	1.09		mg/Kg	0.04	0.2	11/17/01 2:07	jb
Mercury, total	M7471 CVAA	19.1	H	mg/Kg	0.2	1	11/20/01 12:49	kdw
Nickel, total (3050)	M6010B ICP	38		mg/Kg	2	10	11/14/01 23:09	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 10:43	kdw
Silver, total (3050)	M6020 ICP-MS	0.03	B	mg/Kg	0.02	0.1	11/26/01 23:29	lcj
Thallium, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	11/17/01 2:07	jb
Zinc, total (3050)	M6010B ICP	59		mg/Kg	2	10	11/14/01 23:09	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/16/01 15:05	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	18		t CaCO3/Kt	1	5	11/16/01 15:05	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	18		t CaCO3/Kt	1	5	11/16/01 15:05	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.8		%	0.1	0.5	11/15/01 11:59	jp
pH, Corrosivity	M9045	7.4		units	0.1	0.1	11/19/01 8:56	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.04	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Residual			U	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/14/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:35	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 11:53	bf
Digestion	M3050						11/09/01 14:55	jp
Digestion - Hot Plate	M3050 ICP						11/13/01 20:59	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 11:45	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-2-15'

ACZ ID: ***L34346-05***
Date Sampled: *10/05/01 10:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 2:11	jb
Arsenic, total (3050)	M6020 ICP-MS	0.8	B	mg/Kg	0.2	1	11/17/01 2:11	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.4	2	11/14/01 23:14	ct
Cadmium, total (3050)	M6020 ICP-MS	0.36		mg/Kg	0.04	0.2	11/17/01 2:11	jb
Chromium, total (3050)	M6010B ICP	28		mg/Kg	2	10	11/14/01 23:14	ct
Copper, total (3050)	M6010B ICP	53		mg/Kg	2	10	11/14/01 23:14	ct
Lead, total (3050)	M6020 ICP-MS	0.91		mg/Kg	0.04	0.2	11/17/01 2:11	jb
Mercury, total	M7471 CVAA	2.97	H	mg/Kg	0.04	0.2	11/20/01 11:25	kdw
Nickel, total (3050)	M6010B ICP	32		mg/Kg	2	10	11/14/01 23:14	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 10:47	kdw
Silver, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	11/26/01 23:34	lcj
Thallium, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/17/01 2:11	jb
Zinc, total (3050)	M6010B ICP	51		mg/Kg	2	10	11/14/01 23:14	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/16/01 15:07	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	19		t CaCO3/Kt	1	5	11/16/01 15:07	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	19		t CaCO3/Kt	1	5	11/16/01 15:07	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.9		%	0.1	0.5	11/15/01 12:11	jp
pH, Corrosivity	M9045	7.8		units	0.1	0.1	11/19/01 9:01	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Residual			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.02	B	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Total		0.02	B	%	0.01	0.1	11/15/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:36	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 11:56	bf
Digestion	M3050						11/09/01 15:10	jp
Digestion - Hot Plate	M3050 ICP						11/13/01 21:42	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 11:50	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-3-2.5'

ACZ ID: ***L34346-06***
Date Sampled: *10/04/01 11:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 2:16	jb
Arsenic, total (3050)	M6020 ICP-MS	2.3		mg/Kg	0.2	1	11/17/01 2:16	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.4	2	11/14/01 23:19	ct
Cadmium, total (3050)	M6020 ICP-MS	0.27		mg/Kg	0.04	0.2	11/17/01 2:16	jb
Chromium, total (3050)	M6010B ICP	61		mg/Kg	2	10	11/14/01 23:19	ct
Copper, total (3050)	M6010B ICP	29		mg/Kg	2	10	11/14/01 23:19	ct
Lead, total (3050)	M6020 ICP-MS	2.65		mg/Kg	0.04	0.2	11/17/01 2:16	jb
Mercury, total	M7471 CVAA	23.3	H	mg/Kg	0.2	1	11/20/01 12:51	kdw
Nickel, total (3050)	M6010B ICP	114		mg/Kg	2	10	11/14/01 23:19	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 10:49	kdw
Silver, total (3050)	M6020 ICP-MS	0.02	B	mg/Kg	0.02	0.1	11/26/01 23:38	lcj
Thallium, total (3050)	M6020 ICP-MS	0.17		mg/Kg	0.02	0.1	11/17/01 2:16	jb
Zinc, total (3050)	M6010B ICP	34		mg/Kg	2	10	11/14/01 23:19	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/16/01 15:09	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	37		t CaCO3/Kt	1	5	11/16/01 15:09	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	36		t CaCO3/Kt	1	5	11/16/01 15:09	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	3.7		%	0.1	0.5	11/15/01 12:23	jp
pH, Corrosivity	M9045	8.6		units	0.1	0.1	11/19/01 9:05	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.02	B	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Residual		0.02	B	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Total		0.03	B	%	0.01	0.1	11/15/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:38	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 11:59	bf
Digestion	M3050						11/09/01 15:24	jp
Digestion - Hot Plate	M3050 ICP						11/13/01 22:25	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 11:55	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-4-5'

ACZ ID: ***L34346-07***
Date Sampled: *10/04/01 10:55*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 2:20	jb
Arsenic, total (3050)	M6020 ICP-MS	0.8	B	mg/Kg	0.2	1	11/17/01 2:20	jb
Beryllium, total (3050)	M6010B ICP	0.6	B	mg/Kg	0.4	2	11/14/01 23:24	ct
Cadmium, total (3050)	M6020 ICP-MS	0.68		mg/Kg	0.04	0.2	11/17/01 2:20	jb
Chromium, total (3050)	M6010B ICP	38		mg/Kg	2	10	11/14/01 23:24	ct
Copper, total (3050)	M6010B ICP	54		mg/Kg	2	10	11/14/01 23:24	ct
Lead, total (3050)	M6020 ICP-MS	1.97		mg/Kg	0.04	0.2	11/17/01 2:20	jb
Mercury, total	M7471 CVAA	121	H	mg/Kg	2	9	11/20/01 14:07	kdw
Nickel, total (3050)	M6010B ICP	52		mg/Kg	2	10	11/14/01 23:24	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 10:51	kdw
Silver, total (3050)	M6020 ICP-MS	0.06	B	mg/Kg	0.02	0.1	11/26/01 23:43	lcj
Thallium, total (3050)	M6020 ICP-MS	0.16		mg/Kg	0.02	0.1	11/17/01 2:20	jb
Zinc, total (3050)	M6010B ICP	64		mg/Kg	2	10	11/14/01 23:24	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/16/01 15:11	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	20		t CaCO3/Kt	1	5	11/16/01 15:11	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	20		t CaCO3/Kt	1	5	11/16/01 15:11	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	2.0		%	0.1	0.5	11/15/01 12:35	jp
pH, Corrosivity	M9045	8.0		units	0.1	0.1	11/19/01 9:10	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Residual			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/15/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:40	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 12:01	bf
Digestion	M3050						11/09/01 15:39	jp
Digestion - Hot Plate	M3050 ICP						11/13/01 23:08	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 12:00	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-4-10'

ACZ ID: ***L34346-08***
Date Sampled: *10/04/01 12:05*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 2:25	jb
Arsenic, total (3050)	M6020 ICP-MS	0.6	B	mg/Kg	0.2	1	11/17/01 2:25	jb
Beryllium, total (3050)	M6010B ICP	0.8	B	mg/Kg	0.4	2	11/14/01 23:29	ct
Cadmium, total (3050)	M6020 ICP-MS	0.98		mg/Kg	0.04	0.2	11/17/01 2:25	jb
Chromium, total (3050)	M6010B ICP	55		mg/Kg	2	10	11/14/01 23:29	ct
Copper, total (3050)	M6010B ICP	49		mg/Kg	2	10	11/14/01 23:29	ct
Lead, total (3050)	M6020 ICP-MS	1.60		mg/Kg	0.04	0.2	11/17/01 2:25	jb
Mercury, total	M7471 CVAA	45.7	H	mg/Kg	0.4	2	11/20/01 13:52	kdw
Nickel, total (3050)	M6010B ICP	45		mg/Kg	2	10	11/14/01 23:29	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 10:57	kdw
Silver, total (3050)	M6020 ICP-MS	0.08	B	mg/Kg	0.02	0.1	11/26/01 23:47	lcj
Thallium, total (3050)	M6020 ICP-MS	0.11		mg/Kg	0.02	0.1	11/17/01 2:25	jb
Zinc, total (3050)	M6010B ICP	70		mg/Kg	2	10	11/14/01 23:29	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/16/01 15:13	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	19		t CaCO3/Kt	1	5	11/16/01 15:13	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	19		t CaCO3/Kt	1	5	11/16/01 15:13	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.9		%	0.1	0.5	11/15/01 12:47	jp
pH, Corrosivity	M9045	8.0		units	0.1	0.1	11/19/01 9:14	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.02	B	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Residual			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/15/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:41	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 12:04	bf
Digestion	M3050						11/09/01 15:53	jp
Digestion - Hot Plate	M3050 ICP						11/13/01 23:51	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 12:05	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-4-15'

ACZ ID: ***L34346-09***
Date Sampled: *10/04/01 12:10*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 2:29	jb
Arsenic, total (3050)	M6020 ICP-MS	0.5	B	mg/Kg	0.2	1	11/17/01 2:29	jb
Beryllium, total (3050)	M6010B ICP	0.8	B	mg/Kg	0.4	2	11/14/01 23:34	ct
Cadmium, total (3050)	M6020 ICP-MS	1.15		mg/Kg	0.04	0.2	11/17/01 2:29	jb
Chromium, total (3050)	M6010B ICP	62		mg/Kg	2	10	11/14/01 23:34	ct
Copper, total (3050)	M6010B ICP	45		mg/Kg	2	10	11/14/01 23:34	ct
Lead, total (3050)	M6020 ICP-MS	1.77		mg/Kg	0.04	0.2	11/17/01 2:29	jb
Mercury, total	M7471 CVAA	9.52	H	mg/Kg	0.09	0.5	11/20/01 12:54	kdw
Nickel, total (3050)	M6010B ICP	38		mg/Kg	2	10	11/14/01 23:34	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 10:59	kdw
Silver, total (3050)	M6020 ICP-MS	0.08	B	mg/Kg	0.02	0.1	11/26/01 23:51	lcj
Thallium, total (3050)	M6020 ICP-MS	0.09	B	mg/Kg	0.02	0.1	11/17/01 2:29	jb
Zinc, total (3050)	M6010B ICP	68		mg/Kg	2	10	11/14/01 23:34	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/16/01 15:14	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	17		t CaCO3/Kt	1	5	11/16/01 15:14	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	17		t CaCO3/Kt	1	5	11/16/01 15:14	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.7		%	0.1	0.5	11/16/01 10:34	jp
pH, Corrosivity	M9045	7.8		units	0.1	0.1	11/19/01 9:18	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Residual		0.03	B	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/15/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:43	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 12:07	bf
Digestion - Hot Plate	M3050 ICP						11/14/01 0:34	jp
Digestion	M3050						11/09/01 16:07	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 12:10	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-5-3'

ACZ ID: ***L34346-10***
Date Sampled: *10/04/01 13:40*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 2:47	jb
Arsenic, total (3050)	M6020 ICP-MS	0.9	B	mg/Kg	0.2	1	11/17/01 2:47	jb
Beryllium, total (3050)	M6010B ICP	0.7	B	mg/Kg	0.4	2	11/14/01 23:44	ct
Cadmium, total (3050)	M6020 ICP-MS	0.74		mg/Kg	0.04	0.2	11/17/01 2:47	jb
Chromium, total (3050)	M6010B ICP	48		mg/Kg	2	10	11/14/01 23:44	ct
Copper, total (3050)	M6010B ICP	60		mg/Kg	2	10	11/14/01 23:44	ct
Lead, total (3050)	M6020 ICP-MS	3.92		mg/Kg	0.04	0.2	11/17/01 2:47	jb
Mercury, total	M7471 CVAA	129	H	mg/Kg	1	5	11/20/01 13:53	kdw
Nickel, total (3050)	M6010B ICP	51		mg/Kg	2	10	11/14/01 23:44	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 11:00	kdw
Silver, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/27/01 0:05	lcj
Thallium, total (3050)	M6020 ICP-MS	0.15		mg/Kg	0.02	0.1	11/17/01 2:47	jb
Zinc, total (3050)	M6010B ICP	76		mg/Kg	2	10	11/14/01 23:44	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/16/01 15:16	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	14		t CaCO3/Kt	1	5	11/16/01 15:16	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	14		t CaCO3/Kt	1	5	11/16/01 15:16	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.4		%	0.1	0.5	11/15/01 13:10	jp
pH, Corrosivity	M9045	7.3		units	0.1	0.1	11/19/01 9:23	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Residual		0.05	B	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/15/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:45	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 12:10	bf
Digestion	M3050						11/09/01 16:51	jp
Digestion - Hot Plate	M3050 ICP						11/14/01 1:59	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 12:15	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-6-5'

ACZ ID: ***L34346-11***
Date Sampled: *10/04/01 10:10*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 3:01	jb
Arsenic, total (3050)	M6020 ICP-MS	0.7	B	mg/Kg	0.2	1	11/17/01 3:01	jb
Beryllium, total (3050)	M6010B ICP	0.6	B	mg/Kg	0.4	2	11/14/01 23:49	ct
Cadmium, total (3050)	M6020 ICP-MS	0.86		mg/Kg	0.04	0.2	11/17/01 3:01	jb
Chromium, total (3050)	M6010B ICP	38		mg/Kg	2	10	11/14/01 23:49	ct
Copper, total (3050)	M6010B ICP	55		mg/Kg	2	10	11/14/01 23:49	ct
Lead, total (3050)	M6020 ICP-MS	2.11		mg/Kg	0.04	0.2	11/17/01 3:01	jb
Mercury, total	M7471 CVAA	132	H	mg/Kg	2	10	11/20/01 13:54	kdw
Nickel, total (3050)	M6010B ICP	43		mg/Kg	2	10	11/14/01 23:49	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 11:02	kdw
Silver, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/27/01 0:18	lcj
Thallium, total (3050)	M6020 ICP-MS	0.09	B	mg/Kg	0.02	0.1	11/17/01 3:01	jb
Zinc, total (3050)	M6010B ICP	65		mg/Kg	2	10	11/14/01 23:49	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/16/01 15:18	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	21		t CaCO3/Kt	1	5	11/16/01 15:18	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	20		t CaCO3/Kt	1	5	11/16/01 15:18	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	2.1		%	0.1	0.5	11/15/01 13:22	jp
pH, Corrosivity	M9045	7.5		units	0.1	0.1	11/19/01 9:36	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Residual		0.02	B	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.02	B	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Total		0.02	B	%	0.01	0.1	11/15/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:46	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 12:13	bf
Digestion	M3050						11/09/01 17:05	jp
Digestion - Hot Plate	M3050 ICP						11/14/01 2:42	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 12:20	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-6-10'

ACZ ID: ***L34346-12***
Date Sampled: *10/04/01 10:20*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 3:05	jb
Arsenic, total (3050)	M6020 ICP-MS	0.7	B	mg/Kg	0.2	1	11/17/01 3:05	jb
Beryllium, total (3050)	M6010B ICP	0.8	B	mg/Kg	0.4	2	11/15/01 0:04	ct
Cadmium, total (3050)	M6020 ICP-MS	1.06		mg/Kg	0.04	0.2	11/17/01 3:05	jb
Chromium, total (3050)	M6010B ICP	35		mg/Kg	2	10	11/15/01 0:04	ct
Copper, total (3050)	M6010B ICP	72		mg/Kg	2	10	11/15/01 0:04	ct
Lead, total (3050)	M6020 ICP-MS	2.59		mg/Kg	0.04	0.2	11/17/01 3:05	jb
Mercury, total	M7471 CVAA	25.9	H	mg/Kg	0.2	1	11/20/01 13:00	kdw
Nickel, total (3050)	M6010B ICP	35		mg/Kg	2	10	11/15/01 0:04	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 11:03	kdw
Silver, total (3050)	M6020 ICP-MS	0.09	B	mg/Kg	0.02	0.1	11/27/01 0:22	lcj
Thallium, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/17/01 3:05	jb
Zinc, total (3050)	M6010B ICP	71		mg/Kg	2	10	11/15/01 0:04	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/16/01 15:20	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	18		t CaCO3/Kt	1	5	11/16/01 15:20	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	18		t CaCO3/Kt	1	5	11/16/01 15:20	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.8		%	0.1	0.5	11/15/01 13:34	jp
pH, Corrosivity	M9045	7.6		units	0.1	0.1	11/19/01 9:41	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Residual			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/15/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/15/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:48	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 12:15	bf
Digestion	M3050						11/09/01 17:19	jp
Digestion - Hot Plate	M3050 ICP						11/14/01 3:25	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 12:25	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-6-17'

ACZ ID: ***L34346-13***
Date Sampled: *10/04/01 10:35*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 3:10	jb
Arsenic, total (3050)	M6020 ICP-MS	1.1		mg/Kg	0.2	1	11/17/01 3:10	jb
Beryllium, total (3050)	M6010B ICP	0.5	B	mg/Kg	0.4	2	11/15/01 0:09	ct
Cadmium, total (3050)	M6020 ICP-MS	0.62		mg/Kg	0.04	0.2	11/17/01 3:10	jb
Chromium, total (3050)	M6010B ICP	63		mg/Kg	2	10	11/15/01 0:09	ct
Copper, total (3050)	M6010B ICP	88		mg/Kg	2	10	11/15/01 0:09	ct
Lead, total (3050)	M6020 ICP-MS	2.39		mg/Kg	0.04	0.2	11/17/01 3:10	jb
Mercury, total	M7471 CVAA	57.3	H	mg/Kg	0.4	2	11/20/01 13:02	kdw
Nickel, total (3050)	M6010B ICP	57		mg/Kg	2	10	11/15/01 0:09	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 11:05	kdw
Silver, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	11/27/01 0:27	lcj
Thallium, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/17/01 3:10	jb
Zinc, total (3050)	M6010B ICP	57		mg/Kg	2	10	11/15/01 0:09	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	8.3		units	0.1	0.1	11/19/01 9:45	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:50	lnc
Digestion	M3050						11/09/01 17:34	jp
Digestion - Hot Plate	M3050 ICP						11/14/01 4:08	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 12:30	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-7-3'

ACZ ID: ***L34346-14***
Date Sampled: *10/04/01 13:52*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 3:14	jb
Arsenic, total (3050)	M6020 ICP-MS	0.7	B	mg/Kg	0.2	1	11/17/01 3:14	jb
Beryllium, total (3050)	M6010B ICP	0.7	B	mg/Kg	0.4	2	11/15/01 0:14	ct
Cadmium, total (3050)	M6020 ICP-MS	0.58		mg/Kg	0.04	0.2	11/17/01 3:14	jb
Chromium, total (3050)	M6010B ICP	42		mg/Kg	2	10	11/15/01 0:14	ct
Copper, total (3050)	M6010B ICP	55		mg/Kg	2	10	11/15/01 0:14	ct
Lead, total (3050)	M6020 ICP-MS	2.51		mg/Kg	0.04	0.2	11/17/01 3:14	jb
Mercury, total	M7471 CVAA	184	H	mg/Kg	2	10	11/20/01 13:55	kdw
Nickel, total (3050)	M6010B ICP	50		mg/Kg	2	10	11/15/01 0:14	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 11:06	kdw
Silver, total (3050)	M6020 ICP-MS	0.06	B	mg/Kg	0.02	0.1	11/27/01 0:31	lcj
Thallium, total (3050)	M6020 ICP-MS	0.10	B	mg/Kg	0.02	0.1	11/17/01 3:14	jb
Zinc, total (3050)	M6010B ICP	64		mg/Kg	2	10	11/15/01 0:14	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/16/01 15:22	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	19		t CaCO3/Kt	1	5	11/16/01 15:22	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	19		t CaCO3/Kt	1	5	11/16/01 15:22	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.9		%	0.1	0.5	11/15/01 13:46	jp
pH, Corrosivity	M9045	7.5		units	0.1	0.1	11/19/01 9:50	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/16/01 0:00	bf
Sulfur Residual		0.01	B	%	0.01	0.1	11/16/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.01	B	%	0.01	0.1	11/16/01 0:00	bf
Sulfur Total		0.01	B	%	0.01	0.1	11/16/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:51	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 12:18	bf
Digestion	M3050						11/09/01 17:48	jp
Digestion - Hot Plate	M3050 ICP						11/14/01 4:51	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 12:35	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-7-10'

ACZ ID: ***L34346-15***
Date Sampled: *10/04/01 14:10*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 3:19	jb
Arsenic, total (3050)	M6020 ICP-MS	0.3	B	mg/Kg	0.2	1	11/17/01 3:19	jb
Beryllium, total (3050)	M6010B ICP	0.7	B	mg/Kg	0.4	2	11/15/01 0:19	ct
Cadmium, total (3050)	M6020 ICP-MS	0.91		mg/Kg	0.04	0.2	11/17/01 3:19	jb
Chromium, total (3050)	M6010B ICP	36		mg/Kg	2	10	11/15/01 0:19	ct
Copper, total (3050)	M6010B ICP	66		mg/Kg	2	10	11/15/01 0:19	ct
Lead, total (3050)	M6020 ICP-MS	1.62		mg/Kg	0.04	0.2	11/17/01 3:19	jb
Mercury, total	M7471 CVAA	28.2	H	mg/Kg	0.2	1	11/20/01 13:04	kdw
Nickel, total (3050)	M6010B ICP	24		mg/Kg	2	10	11/15/01 0:19	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 11:08	kdw
Silver, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/27/01 0:36	lcj
Thallium, total (3050)	M6020 ICP-MS	0.03	B	mg/Kg	0.02	0.1	11/17/01 3:19	jb
Zinc, total (3050)	M6010B ICP	47		mg/Kg	2	10	11/15/01 0:19	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/16/01 15:24	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	18		t CaCO3/Kt	1	5	11/16/01 15:24	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	18		t CaCO3/Kt	1	5	11/16/01 15:24	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.8		%	0.1	0.5	11/15/01 13:58	jp
pH, Corrosivity	M9045	7.1		units	0.1	0.1	11/19/01 9:54	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.02	B	%	0.01	0.1	11/16/01 0:00	bf
Sulfur Residual		0.01	B	%	0.01	0.1	11/16/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/16/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/16/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:53	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 12:21	bf
Digestion	M3050						11/09/01 18:03	jp
Digestion - Hot Plate	M3050 ICP						11/14/01 5:33	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 12:40	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-8-2'

ACZ ID: ***L34346-16***
Date Sampled: *10/04/01 16:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 3:23	jb
Arsenic, total (3050)	M6020 ICP-MS	1.3		mg/Kg	0.2	1	11/17/01 3:23	jb
Beryllium, total (3050)	M6010B ICP	0.7	B	mg/Kg	0.4	2	11/15/01 0:24	ct
Cadmium, total (3050)	M6020 ICP-MS	0.41		mg/Kg	0.04	0.2	11/17/01 3:23	jb
Chromium, total (3050)	M6010B ICP	70		mg/Kg	2	10	11/15/01 0:24	ct
Copper, total (3050)	M6010B ICP	47		mg/Kg	2	10	11/15/01 0:24	ct
Lead, total (3050)	M6020 ICP-MS	2.84		mg/Kg	0.04	0.2	11/17/01 3:23	jb
Mercury, total	M7471 CVAA	585	H	mg/Kg	8	40	11/20/01 14:20	kdw
Nickel, total (3050)	M6010B ICP	191		mg/Kg	2	10	11/15/01 0:24	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 11:14	kdw
Silver, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/27/01 0:40	lcj
Thallium, total (3050)	M6020 ICP-MS	0.27		mg/Kg	0.02	0.1	11/17/01 3:23	jb
Zinc, total (3050)	M6010B ICP	56		mg/Kg	2	10	11/15/01 0:24	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	2	B	t CaCO3/Kt	1	5	11/16/01 15:26	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	30		t CaCO3/Kt	1	5	11/16/01 15:26	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	29		t CaCO3/Kt	1	5	11/16/01 15:26	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	3.0		%	0.1	0.5	11/15/01 14:10	jp
pH, Corrosivity	M9045	7.8		units	0.1	0.1	11/19/01 9:59	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/16/01 0:00	bf
Sulfur Residual		0.04	B	%	0.01	0.1	11/16/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.03	B	%	0.01	0.1	11/16/01 0:00	bf
Sulfur Total		0.06	B	%	0.01	0.1	11/16/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:55	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 12:24	bf
Digestion - Hot Plate	M3050 ICP						11/14/01 6:16	jp
Digestion	M3050						11/09/01 18:17	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 12:45	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-9-0'

ACZ ID: ***L34346-17***
Date Sampled: *10/04/01 09:30*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 3:28	jb
Arsenic, total (3050)	M6020 ICP-MS	3.4		mg/Kg	0.2	1	11/17/01 3:28	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.4	2	11/15/01 0:29	ct
Cadmium, total (3050)	M6020 ICP-MS	0.37		mg/Kg	0.04	0.2	11/17/01 3:28	jb
Chromium, total (3050)	M6010B ICP	81		mg/Kg	2	10	11/15/01 0:29	ct
Copper, total (3050)	M6010B ICP	31		mg/Kg	2	10	11/15/01 0:29	ct
Lead, total (3050)	M6020 ICP-MS	3.71		mg/Kg	0.04	0.2	11/17/01 3:28	jb
Mercury, total	M7471 CVAA	20.2	H	mg/Kg	0.2	1	11/20/01 13:07	kdw
Nickel, total (3050)	M6010B ICP	159		mg/Kg	2	10	11/15/01 0:29	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 11:16	kdw
Silver, total (3050)	M6020 ICP-MS	0.03	B	mg/Kg	0.02	0.1	11/27/01 0:45	lcj
Thallium, total (3050)	M6020 ICP-MS	0.21		mg/Kg	0.02	0.1	11/17/01 3:28	jb
Zinc, total (3050)	M6010B ICP	40		mg/Kg	2	10	11/15/01 0:29	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	8.0		units	0.1	0.1	11/19/01 10:03	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:56	lnc
Digestion - Hot Plate	M3050 ICP						11/14/01 6:59	jp
Digestion	M3050						11/09/01 18:31	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 12:50	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-9-2.5'

ACZ ID: ***L34346-18***
Date Sampled: *10/04/01 10:05*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 3:32	jb
Arsenic, total (3050)	M6020 ICP-MS	2.3		mg/Kg	0.2	1	11/17/01 3:32	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.4	2	11/15/01 0:34	ct
Cadmium, total (3050)	M6020 ICP-MS	0.30		mg/Kg	0.04	0.2	11/17/01 3:32	jb
Chromium, total (3050)	M6010B ICP	68		mg/Kg	2	10	11/15/01 0:34	ct
Copper, total (3050)	M6010B ICP	28		mg/Kg	2	10	11/15/01 0:34	ct
Lead, total (3050)	M6020 ICP-MS	2.29		mg/Kg	0.04	0.2	11/17/01 3:32	jb
Mercury, total	M7471 CVAA	29.7	H	mg/Kg	0.2	1	11/20/01 13:08	kdw
Nickel, total (3050)	M6010B ICP	128		mg/Kg	2	10	11/15/01 0:34	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 11:17	kdw
Silver, total (3050)	M6020 ICP-MS	0.02	B	mg/Kg	0.02	0.1	11/27/01 0:49	lcj
Thallium, total (3050)	M6020 ICP-MS	0.20		mg/Kg	0.02	0.1	11/17/01 3:32	jb
Zinc, total (3050)	M6010B ICP	33		mg/Kg	2	10	11/15/01 0:34	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/16/01 15:28	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	55		t CaCO3/Kt	1	5	11/16/01 15:28	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	55		t CaCO3/Kt	1	5	11/16/01 15:28	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	5.5		%	0.1	0.5	11/15/01 14:22	jp
pH, Corrosivity	M9045	8.4		units	0.1	0.1	11/19/01 10:07	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.01	B	%	0.01	0.1	11/16/01 0:00	bf
Sulfur Residual		0.04	B	%	0.01	0.1	11/16/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/16/01 0:00	bf
Sulfur Total		0.02	B	%	0.01	0.1	11/16/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:58	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 12:27	bf
Digestion	M3050						11/09/01 18:46	jp
Digestion - Hot Plate	M3050 ICP						11/14/01 7:42	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 12:55	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-BR-9-8'

ACZ ID: ***L34346-19***
Date Sampled: *10/04/01 10:10*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/17/01 3:37	jb
Arsenic, total (3050)	M6020 ICP-MS	0.7	B	mg/Kg	0.2	1	11/17/01 3:37	jb
Beryllium, total (3050)	M6010B ICP	0.5	B	mg/Kg	0.4	2	11/15/01 0:39	ct
Cadmium, total (3050)	M6020 ICP-MS	0.52		mg/Kg	0.04	0.2	11/17/01 3:37	jb
Chromium, total (3050)	M6010B ICP	61		mg/Kg	2	10	11/15/01 0:39	ct
Copper, total (3050)	M6010B ICP	50		mg/Kg	2	10	11/15/01 0:39	ct
Lead, total (3050)	M6020 ICP-MS	2.29		mg/Kg	0.04	0.2	11/17/01 3:37	jb
Mercury, total	M7471 CVAA	5.34	H	mg/Kg	0.05	0.2	11/20/01 13:09	kdw
Nickel, total (3050)	M6010B ICP	79		mg/Kg	2	10	11/15/01 0:39	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 11:19	kdw
Silver, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/27/01 0:53	lcj
Thallium, total (3050)	M6020 ICP-MS	0.09	B	mg/Kg	0.02	0.1	11/17/01 3:37	jb
Zinc, total (3050)	M6010B ICP	52		mg/Kg	2	10	11/15/01 0:39	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/16/01 15:29	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	53		t CaCO3/Kt	1	5	11/16/01 15:29	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	53		t CaCO3/Kt	1	5	11/16/01 15:29	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	5.3		%	0.1	0.5	11/15/01 14:34	jp
pH, Corrosivity	M9045	8.0		units	0.1	0.1	11/19/01 10:12	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/16/01 0:00	bf
Sulfur Residual		0.01	B	%	0.01	0.1	11/16/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.01	B	%	0.01	0.1	11/16/01 0:00	bf
Sulfur Total		0.01	B	%	0.01	0.1	11/16/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 10:00	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 12:30	bf
Digestion	M3050						11/09/01 19:00	jp
Digestion - Hot Plate	M3050 ICP						11/14/01 8:25	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/02/01 13:00	bf

Note: See case narrative for data flags.

Report Header Explanations

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

QC Sample Types

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

QC Sample Type Explanations

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

ACZ Qualifiers (Qual)

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

Method References

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

Comments

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

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34346***

Project ID: 2140031

Antimony, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131748													
WG131322PBS	PBS	11/17/01 1:26				U	mg/Kg		-0.12	0.12			
WG131322LCSS	LCSS	11/17/01 1:31	PCN15144	53.7		45.2	mg/Kg		0	113			
L34346-01AS	AS	11/17/01 1:40	MS011022-4	10	U	9.216	mg/Kg	92.2	75	125			
L34346-01ASD	ASD	11/17/01 1:44	MS011022-4	10	U	9.364	mg/Kg	93.6	75	125	1.59	20	
L34346-09MS	MS	11/17/01 2:38	MS011114-20	5	U	.354	mg/Kg	7.1	75	125			X
L34346-09MSD	MSD	11/17/01 2:43	MS011114-20	5	U	.253	mg/Kg	5.1	75	125	33.28	20	X
L34346-19DUP	DUP	11/17/01 3:41			U	U	mg/Kg				0	20	

Arsenic, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131748													
WG131322PBS	PBS	11/17/01 1:26				U	mg/Kg		-0.3	0.3			
WG131322LCSS	LCSS	11/17/01 1:31	PCN15144	177		167.6	mg/Kg		121	233			
L34346-01AS	AS	11/17/01 1:40	MS011022-4	40	1.5	34.37	mg/Kg	82.2	75	125			
L34346-01ASD	ASD	11/17/01 1:44	MS011022-4	40	1.5	34.8	mg/Kg	83.3	75	125	1.24	20	
L34346-09MS	MS	11/17/01 2:38	MS011114-20	20	.5	14.71	mg/Kg	71.1	75	125			X
L34346-09MSD	MSD	11/17/01 2:43	MS011114-20	20	.5	13.77	mg/Kg	66.4	75	125	6.6	20	X
L34346-19DUP	DUP	11/17/01 3:41			.7	.62	mg/Kg				12.1	20	

Beryllium, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131561													
WG131468PBS	PBS	11/14/01 22:19				U	mg/Kg		-0.2	0.2			
WG131468LCSS	LCSS	11/14/01 22:24	PCN15143	62.2		71.87	mg/Kg		48.8	75.9			
L34346-01MS	MS	11/14/01 22:39	II011107-2	100	.6	84.39	mg/Kg	83.8	75	125			
L34346-01MSD	MSD	11/14/01 22:44	II011107-2	100	.6	97.31	mg/Kg	96.7	75	125	14.22	20	
L34346-09DUP	DUP	11/14/01 23:39			.8	.88	mg/Kg				9.5	20	

Cadmium, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131748													
WG131322PBS	PBS	11/17/01 1:26				U	mg/Kg		-0.06	0.06			
WG131322LCSS	LCSS	11/17/01 1:31	PCN15144	191		196.95	mg/Kg		147	235			
L34346-01AS	AS	11/17/01 1:40	MS011022-4	40	.46	39.868	mg/Kg	98.5	75	125			
L34346-01ASD	ASD	11/17/01 1:44	MS011022-4	40	.46	40.52	mg/Kg	100.2	75	125	1.62	20	
L34346-09MS	MS	11/17/01 2:38	MS011114-20	20	1.15	20.74	mg/Kg	98	75	125			
L34346-09MSD	MSD	11/17/01 2:43	MS011114-20	20	1.15	18.956	mg/Kg	89	75	125	8.99	20	
L34346-19DUP	DUP	11/17/01 3:41			.52	.465	mg/Kg				11.2	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34346***

Project ID: 2140031

Chromium, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131561													
WG131468PBS	PBS	11/14/01 22:19				U	mg/Kg		-1	1			
WG131468LCSS	LCSS	11/14/01 22:24	PCN15143	111		117	mg/Kg		88.7	133			
L34346-01MS	MS	11/14/01 22:39	II011107-2	100	54	165.8	mg/Kg	111.8	75	125			
L34346-01MSD	MSD	11/14/01 22:44	II011107-2	100	54	209.1	mg/Kg	155.1	75	125	23.1	20	X
L34346-09DUP	DUP	11/14/01 23:39			62	67.4	mg/Kg				8.3	20	

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131561													
WG131468PBS	PBS	11/14/01 22:19				U	mg/Kg		-1	1			
WG131468LCSS	LCSS	11/14/01 22:24	PCN15143	86		93.8	mg/Kg		70.4	101			
L34346-01MS	MS	11/14/01 22:39	II011107-2	100	74	144	mg/Kg	70	75	125			X
L34346-01MSD	MSD	11/14/01 22:44	II011107-2	100	74	173.5	mg/Kg	99.5	75	125	18.58	20	
L34346-09DUP	DUP	11/14/01 23:39			45	51.2	mg/Kg				12.9	20	

Lead, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131748													
WG131322PBS	PBS	11/17/01 1:26				U	mg/Kg		-0.06	0.06			
WG131322LCSS	LCSS	11/17/01 1:31	PCN15144	110		106.35	mg/Kg		81.2	139			
L34346-01AS	AS	11/17/01 1:40	MS011022-4	40	2.33	40.64	mg/Kg	95.8	75	125			
L34346-01ASD	ASD	11/17/01 1:44	MS011022-4	40	2.33	41.6	mg/Kg	98.2	75	125	2.33	20	
L34346-09MS	MS	11/17/01 2:38	MS011114-20	20	1.77	21.244	mg/Kg	97.4	75	125			
L34346-09MSD	MSD	11/17/01 2:43	MS011114-20	20	1.77	19.316	mg/Kg	87.7	75	125	9.51	20	
L34346-19DUP	DUP	11/17/01 3:41			2.29	2.39	mg/Kg				4.3	20	

Mercury, total M7471 CVAA

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131703													
WG131703PBS	PBS	11/20/01 11:16				U	mg/Kg		-0.088	0.088			
WG131703LCSS	LCSS	11/20/01 11:17	PCN15142	29.6		22.966	mg/Kg		20.2	39.1			
L34346-03MS	MS	11/20/01 11:22	II011115-4	.965	1.09	1.965	mg/Kg	90.7	75	125			
L34346-03DUP	DUP	11/20/01 11:23			1.09	1.884	mg/Kg				53.4	25	X
WG131703LCSS	LCSS	11/20/01 12:47	PCN15142	29.6		32.88	mg/Kg		20.2	39.1			

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131616													
WG131616LCSS	LCSS	11/15/01 11:00	PCN465	100		109.84	%		80	120			
L34346-19DUP	DUP	11/15/01 14:46			5.3	5.03	%				5.2	35	
WG131705													
WG131705LCSS	LCSS	11/16/01 10:00	PCN465	100		114.13	%		80	120			
L34353-05DUP	DUP	11/16/01 12:18			6.8	6.9	%				1.5	35	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34346***

Project ID: 2140031

Nickel, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131561													
WG131468PBS	PBS	11/14/01 22:19				U	mg/Kg		-1	1			
WG131468LCSS	LCSS	11/14/01 22:24	PCN15143	127		137.6	mg/Kg		99.4	155			
L34346-01MS	MS	11/14/01 22:39	II011107-2	100	79	154.9	mg/Kg	75.9	75	125			
L34346-01MSD	MSD	11/14/01 22:44	II011107-2	100	79	191.9	mg/Kg	112.9	75	125	21.34	20	X
L34346-09DUP	DUP	11/14/01 23:39			38	42.9	mg/Kg				12.1	20	

pH, Corrosivity M9045

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131789													
L34346-10DUP	DUP	11/19/01 9:32			7.3	7.09	units				2.9	35	

Selenium, total (3050) M7742 Modified, AA-Hydride

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131568													
WG131322PBS	PBS	11/16/01 10:27				U	mg/Kg		-0.44	0.44			
L34346-01MS	MS	11/16/01 10:32	SI011018-2	4	.4	3.46	mg/Kg	76.5	75	125			
L34346-01MSD	MSD	11/16/01 10:33	SI011018-2	4	.4	3.19	mg/Kg	69.8	75	125	8.12	35	X
L34346-04AS	AS	11/16/01 10:44	II011114-3	3.333334	U	2.67	mg/Kg	80.1	75	125			
L34346-04ASD	ASD	11/16/01 10:46	II011114-3	3.333334	U	2.64	mg/Kg	79.2	75	125	1.13	35	
L34346-19DUP	DUP	11/16/01 11:21			U	U	mg/Kg				0	35	
WG131322LCSS	LCSS	11/16/01 12:09	PCN15144	89.6		71.3	mg/Kg		66.4	113			

Silver, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG132055													
WG131322PBS	PBS	11/26/01 22:45				U	mg/Kg		-0.03	0.03			
WG131322LCSS	LCSS	11/26/01 22:49	PCN15143	184		228.3	mg/Kg		137	232			
L34346-02AS	AS	11/26/01 23:03	MS011120-3	10	.09	9.04	mg/Kg	89.5	75	125			
L34346-02ASD	ASD	11/26/01 23:07	MS011120-3	10	.09	9.108	mg/Kg	90.2	75	125	0.75	20	
L34346-09MS	MS	11/26/01 23:56	MS011114-20	5	.08	3.84	mg/Kg	75.2	75	125			
L34346-09MSD	MSD	11/27/01 0:00	MS011114-20	5	.08	4.236	mg/Kg	83.1	75	125	9.81	20	
L34346-19DUP	DUP	11/27/01 0:58			.04	.056	mg/Kg				33.3	20	T

Sulfur Forms M600/2-78-054 3.2.4

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131493													
WG131493PBS	PBS	11/13/01 12:00				U	%		-0.02	0.02			
WG131493LCSS	LCSS	11/13/01 14:11	PCN11635	1.68		1.75	%		1.334	2.016			
L34346-09DUP	DUP	11/15/01 12:14			U	U	%				0	35	
WG131629													
WG131629PBS	PBS	11/15/01 10:00				U	%		-0.02	0.02			
WG131629LCSS	LCSS	11/15/01 13:24	PCN11635	1.68		1.85	%		1.334	2.016			

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34346***

Project ID: 2140031

Thallium, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131748													
WG131322PBS	PBS	11/17/01 1:26				U	mg/Kg		-0.03	0.03			
WG131322LCSS	LCSS	11/17/01 1:31	PCN15144	157		156.95	mg/Kg		90	225			
L34346-01AS	AS	11/17/01 1:40	MS011022-4	20	.25	19.464	mg/Kg	96.1	75	125			
L34346-01ASD	ASD	11/17/01 1:44	MS011022-4	20	.25	19.772	mg/Kg	97.6	75	125	1.57	20	
L34346-09MS	MS	11/17/01 2:38	MS011114-20	10	.09	9.504	mg/Kg	94.1	75	125			
L34346-09MSD	MSD	11/17/01 2:43	MS011114-20	10	.09	8.636	mg/Kg	85.5	75	125	9.57	20	
L34346-19DUP	DUP	11/17/01 3:41			.09	.101	mg/Kg				11.5	20	

Zinc, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131561													
WG131468PBS	PBS	11/14/01 22:19				U	mg/Kg		-1	1			
WG131468LCSS	LCSS	11/14/01 22:24	PCN15143	371		414.3	mg/Kg		287	456			
L34346-01MS	MS	11/14/01 22:39	II011107-2	100	64	137.8	mg/Kg	73.8	75	125			X
L34346-01MSD	MSD	11/14/01 22:44	II011107-2	100	64	160.8	mg/Kg	96.8	75	125	15.41	20	
L34346-09DUP	DUP	11/14/01 23:39			68	72.3	mg/Kg				6.1	20	

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

Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34346
Date Received: 10/11/2001
Received By: george

Receipt Verification

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

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

N/A

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

N/A

Shipping Containers

Cooler Id		Temp (°C)	Rad (µR/hr)

Notes

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

Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34346
Date Received: 10/12/2001
Received By: george

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	Y < 2	YG< 2	B < 2	BG< 2	O < 2	T >12	P >12	N/A	RAD
L34346-01	WP-BR-1-5'										O	
L34346-02	WP-BR-1-15'										O	
L34346-03	WP-BR-1-18'										O	
L34346-04	WP-BR-2-5'										O	
L34346-05	WP-BR-2-15'										O	
L34346-06	WP-BR-3-2.5'										O	
L34346-07	WP-BR-4-5'										O	
L34346-08	WP-BR-4-10'										O	
L34346-09	WP-BR-4-15'										O	
L34346-10	WP-BR-5-3'										O	
L34346-11	WP-BR-6-5'										O	
L34346-12	WP-BR-6-10'										O	
L34346-13	WP-BR-6-17'										O	
L34346-14	WP-BR-7-3'										O	
L34346-15	WP-BR-7-10'										O	
L34346-16	WP-BR-8-2'										O	
L34346-17	WP-BR-9-0'										O	
L34346-18	WP-BR-9-2.5'										O	
L34346-19	WP-BR-9-8'										O	

ACZ Laboratories, Inc.

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

CHAIN of CUSTODY

Quote #: CASCADE-SOILS/ABA **ACZ #:** L34346

CLIENT INFORMATION

Name to appear on Report and Invoice

CASCADE Earth Sciences
225 S. Holly St.
Medford, OR 97501

Attn: Mary Ann Amann Tel: 541 772-2280

Email: Maryanna@cascade-earth.com

Carbon Copy: **Report:** _____ **Invoice:** _____

Attn: Tel:

Email:

PROJECT INFORMATION

Client Project name and/or PO#:
Ochoco Mines
2140031.

Shipping Company:

Tracking #:

ANALYSES REQUESTED *(required; attach list)*

	SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total (357) 13 metals	PASTE PH	ABA				
1	WP-BR-1-5'	10/4/01 1055	SO	1	✓	✓	✓				
2	WP-BR-1-15'	10/4/01 1710	SO	1	✓	✓					
3	WP-BR-1-18'	10/4/01 1720		1	✓	✓					
4	WP-BR-2-5'	10/5/01 0850		1	✓	✓	✓				
5	WP-BR-2-15'	10/5/01 1000		1	✓	✓					
6	WP-BR-3-2.5	10/4/01 1100		1	✓	✓	✓				
7	WP-BR-4-5'	10/4/01 1055		1	✓	✓	✓				
8	WP-BR-4-10'	10/4/01 1205		1	✓	✓					
9	WP-BR-4-15'	10/4/01 1210		1	✓	✓					
10	WP-BR-5-3'	10/4/01 1340		1	✓	✓					
11	WP-BR-6-5'	10/4/01 1010		1	✓	✓	✓				
12	WP-BR-6-10'	10/4/01 1020		1	✓	✓					

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

REMARKS

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME	PAGE
[signature]	10/9/01 1200			
		[signature]	10-11-01 1000	Of

FRMQA021.01.00.03 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.

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

CHAIN of CUSTODY

Quote #: CASCADE-BLUE Ridge - Soils - ABA. ACZ #: L34346

CLIENT INFORMATION

Name to appear on Report and Invoice

CES
225 Suffolk
Medford, OR 97501

Attn: Mary Anne Mann Tel: 541 779 2280

Email:

Carbon Copy: Report: _____ Invoice: _____

Attn: Tel:

Email:

PROJECT INFORMATION

Client Project name and/or PO#: Ochoco Mines 2140031

Shipping Company:

Tracking #:

ANALYSES REQUESTED *(required; attach list)*

	SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Paste pH	Total Metals	ABA.				
13	WP-BR-6-17'	10/4/01 1035	SO	1	✓	✓					
14	WP-BR-7-3'	10/4/01 1352	SO	1	✓	✓	✓				
	~~WP-BR-7-8'~~	~~10/4/01 1404~~	~~SO~~	~~1~~	~~✓~~	~~✓~~					
15	WP-BR-7-10'	10/4/01 1410	SO	1	✓	✓					
16	WP-BR-8-2'	10/4/01 1600	SO	1	✓	✓	✓				
17	WP-BR-9-0'	10/4/01 0930	SO	1	✓	✓					
18	WP-BR-9-2.5	10/4/01 1005	SO	1	✓	✓	✓				
19	WP-BR-9-8'	10/4/01 1010	SO	1	✓	✓					

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

REMARKS

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
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			10-11-01 100

PAGE _____ Of _____

FRMQA021.01.00.03 White - Return with sample. Yellow - Retain for your records.

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

Analytical Report

Mary Ann Amann
Cascade Earth Sciences, LTD.
225 S. Holly St.
Medford, OR 97501

November 29, 2001

Project: L34337

Mary Ann Amann:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 11, 2001. This project has been assigned to ACZ's project number, L34337. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 8.0. The enclosed results relate only to the samples received under L34337. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

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

All samples and sub-samples associated with this project will be disposed of after December 29, 2001. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs.

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

Sue Barkey 29/Nov/01

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

Cascade Earth Sciences, LTD.
Project: L34337

November 29, 2001

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 16 soil samples from Cascade Earth Sciences, LTD. on October 11, 2001. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L34337. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times. Mercury was analyzed past the 28 day holding from sample date, but within 28 days from date or sample prep (air drying and sieving).

Sample Analysis

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

All analyses were performed after the sample was air dried at approximately 34C and sieve to minus 2 mm for metals or crush and pulverized for Acid-Base Potential analyses and are reported on a dry weight basis. Residual moisture after air drying typical is in the 1 to 2% range.

The following anomalies were identified during the analysis of these samples:

1. The Matrix Spike (MS) and the Matrix Spike Duplicate (MSD) for Total Antimony were out of control limits with recoveries of 4 and 4.7% and 7.1 and 7.3%. Analytical Spikes were run and were within control limits. All other QC was acceptable.

2. The Matrix Spike (MS) for Total Copper were out of control limits with a recovery of 164.1%. Analytical Spikes were run and were within control limits. All other QC was acceptable.

3. The precision (RPD) for the duplicate was out of control limits at 50.4 for Total Copper. The upper limit is 20.

4. The Total Selenium value for L34337-01 is estimated due to matrix interferences. The Matrix Spike (MS), the Matrix Spike Duplicate (MSD), the Analytical Spike (AS), and the Analytical Spike Duplicate (ASD) were all out of control limits in Workgroup 131986.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-BR-1

ACZ ID: ***L34337-01***
Date Sampled: *10/06/01 17:10*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 9:57	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.0	B	mg/Kg	0.2	1	11/14/01 9:57	lcj
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.2	1	11/13/01 0:28	ct
Cadmium, total (3050)	M6020 ICP-MS	0.83		mg/Kg	0.04	0.2	11/14/01 9:57	lcj
Chromium, total (3050)	M6010B ICP	49		mg/Kg	1	5	11/13/01 0:28	ct
Copper, total (3050)	M6010B ICP	61		mg/Kg	1	5	11/13/01 0:28	ct
Lead, total (3050)	M6020 ICP-MS	3.29		mg/Kg	0.04	0.2	11/14/01 9:57	lcj
Mercury, total	M7471 CVAA	99	H	mg/Kg	1	5	11/19/01 16:44	kdw
Nickel, total (3050)	M6010B ICP	91		mg/Kg	1	5	11/13/01 0:28	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.5	B	mg/Kg	0.2	1	11/27/01 16:34	kdw
Silver, total (3050)	M6020 ICP-MS	0.13		mg/Kg	0.02	0.1	11/14/01 9:57	lcj
Thallium, total (3050)	M6020 ICP-MS	0.13		mg/Kg	0.02	0.1	11/14/01 9:57	lcj
Zinc, total (3050)	M6010B ICP	49		mg/Kg	1	5	11/13/01 0:28	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	7.0		units	0.1	0.1	11/13/01 11:44	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 10:00	lnc
Digestion	M3050						11/10/01 14:36	lab
Digestion - Hot Plate	M3050 ICP						11/07/01 22:03	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 12:00	bf/jp

Note: See case narrative for data flags.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-BR-2

ACZ ID: ***L34337-02***
Date Sampled: *10/06/01 00:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 10:10	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.2		mg/Kg	0.2	1	11/14/01 10:10	lcj
Beryllium, total (3050)	M6010B ICP	0.4	B	mg/Kg	0.2	1	11/13/01 0:32	ct
Cadmium, total (3050)	M6020 ICP-MS	1.22		mg/Kg	0.04	0.2	11/14/01 10:10	lcj
Chromium, total (3050)	M6010B ICP	32		mg/Kg	1	5	11/13/01 0:32	ct
Copper, total (3050)	M6010B ICP	53		mg/Kg	1	5	11/13/01 0:32	ct
Lead, total (3050)	M6020 ICP-MS	6.27		mg/Kg	0.04	0.2	11/14/01 10:10	lcj
Mercury, total	M7471 CVAA	13.2	H	mg/Kg	0.2	1	11/19/01 15:44	kdw
Nickel, total (3050)	M6010B ICP	33		mg/Kg	1	5	11/13/01 0:32	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 14:03	kdw
Silver, total (3050)	M6020 ICP-MS	0.16		mg/Kg	0.02	0.1	11/14/01 10:10	lcj
Thallium, total (3050)	M6020 ICP-MS	0.11		mg/Kg	0.02	0.1	11/14/01 10:10	lcj
Zinc, total (3050)	M6010B ICP	90		mg/Kg	1	5	11/13/01 0:32	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	6.5		units	0.1	0.1	11/13/01 11:49	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 10:04	lnc
Digestion	M3050						11/10/01 16:54	lab
Digestion - Hot Plate	M3050 ICP						11/07/01 22:55	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 12:06	bf/jp

Note: See case narrative for data flags.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-BR-3

ACZ ID: ***L34337-03***
Date Sampled: *10/06/01 00:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 10:14	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.0		mg/Kg	0.2	1	11/14/01 10:14	lcj
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.2	1	11/13/01 0:37	ct
Cadmium, total (3050)	M6020 ICP-MS	0.78		mg/Kg	0.04	0.2	11/14/01 10:14	lcj
Chromium, total (3050)	M6010B ICP	32		mg/Kg	1	5	11/13/01 0:37	ct
Copper, total (3050)	M6010B ICP	38		mg/Kg	1	5	11/13/01 0:37	ct
Lead, total (3050)	M6020 ICP-MS	2.81		mg/Kg	0.04	0.2	11/14/01 10:14	lcj
Mercury, total	M7471 CVAA	0.93	H	mg/Kg	0.05	0.2	11/19/01 14:38	kdw
Nickel, total (3050)	M6010B ICP	25		mg/Kg	1	5	11/13/01 0:37	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 14:05	kdw
Silver, total (3050)	M6020 ICP-MS	0.10	B	mg/Kg	0.02	0.1	11/14/01 10:14	lcj
Thallium, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	11/14/01 10:14	lcj
Zinc, total (3050)	M6010B ICP	52		mg/Kg	1	5	11/13/01 0:37	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	6.9		units	0.1	0.1	11/13/01 11:55	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 10:08	lnc
Digestion	M3050						11/10/01 17:40	lab
Digestion - Hot Plate	M3050 ICP						11/07/01 23:47	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 12:12	bf/jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-BR-4

ACZ ID: ***L34337-04***
Date Sampled: *10/06/01 00:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 10:28	lcj
Arsenic, total (3050)	M6020 ICP-MS	0.6	B	mg/Kg	0.2	1	11/14/01 10:28	lcj
Beryllium, total (3050)	M6010B ICP	0.4	B	mg/Kg	0.2	1	11/22/01 2:59	ct
Cadmium, total (3050)	M6020 ICP-MS	0.47		mg/Kg	0.04	0.2	11/14/01 10:28	lcj
Chromium, total (3050)	M6010B ICP	25		mg/Kg	1	5	11/13/01 0:41	ct
Copper, total (3050)	M6010B ICP	28		mg/Kg	1	5	11/13/01 0:41	ct
Lead, total (3050)	M6020 ICP-MS	2.16		mg/Kg	0.04	0.2	11/14/01 10:28	lcj
Mercury, total	M7471 CVAA	9.1	H	mg/Kg	0.2	1	11/19/01 15:45	kdw
Nickel, total (3050)	M6010B ICP	19		mg/Kg	1	5	11/13/01 0:41	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 14:06	kdw
Silver, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/14/01 10:28	lcj
Thallium, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/14/01 10:28	lcj
Zinc, total (3050)	M6010B ICP	49		mg/Kg	1	5	11/13/01 0:41	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	6.8		units	0.1	0.1	11/13/01 12:01	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 10:12	lnc
Digestion	M3050						11/10/01 18:26	lab
Digestion - Hot Plate	M3050 ICP						11/08/01 0:39	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 12:18	bf/jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-BR-5

ACZ ID: ***L34337-05***
Date Sampled: *10/06/01 16:30*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 10:32	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.2		mg/Kg	0.2	1	11/14/01 10:32	lcj
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.2	1	11/13/01 0:46	ct
Cadmium, total (3050)	M6020 ICP-MS	0.86		mg/Kg	0.04	0.2	11/14/01 10:32	lcj
Chromium, total (3050)	M6010B ICP	76		mg/Kg	1	5	11/13/01 0:46	ct
Copper, total (3050)	M6010B ICP	57		mg/Kg	1	5	11/13/01 0:46	ct
Lead, total (3050)	M6020 ICP-MS	3.80		mg/Kg	0.04	0.2	11/14/01 10:32	lcj
Mercury, total	M7471 CVAA	306	H	mg/Kg	2	10	11/19/01 16:45	kdw
Nickel, total (3050)	M6010B ICP	178		mg/Kg	1	5	11/13/01 0:46	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.2	B	mg/Kg	0.2	1	11/16/01 14:08	kdw
Silver, total (3050)	M6020 ICP-MS	0.10		mg/Kg	0.02	0.1	11/14/01 10:32	lcj
Thallium, total (3050)	M6020 ICP-MS	0.25		mg/Kg	0.02	0.1	11/14/01 10:32	lcj
Zinc, total (3050)	M6010B ICP	61		mg/Kg	1	5	11/13/01 0:46	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	7.0		units	0.1	0.1	11/13/01 12:06	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 10:16	lnc
Digestion - Hot Plate	M3050 ICP						11/08/01 1:32	jp
Digestion	M3050						11/10/01 19:12	lab
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 12:24	bf/jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-A-1

ACZ ID: ***L34337-06***
Date Sampled: *10/06/01 09:40*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 10:37	lcj
Arsenic, total (3050)	M6020 ICP-MS	2.2		mg/Kg	0.2	1	11/14/01 10:37	lcj
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.2	1	11/13/01 0:50	ct
Cadmium, total (3050)	M6020 ICP-MS	0.66		mg/Kg	0.04	0.2	11/14/01 10:37	lcj
Chromium, total (3050)	M6010B ICP	33		mg/Kg	1	5	11/13/01 0:50	ct
Copper, total (3050)	M6010B ICP	34		mg/Kg	1	5	11/13/01 0:50	ct
Lead, total (3050)	M6020 ICP-MS	4.90		mg/Kg	0.04	0.2	11/14/01 10:37	lcj
Mercury, total	M7471 CVAA	1.59	H	mg/Kg	0.04	0.2	11/19/01 14:47	kdw
Nickel, total (3050)	M6010B ICP	26		mg/Kg	1	5	11/13/01 0:50	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 14:09	kdw
Silver, total (3050)	M6020 ICP-MS	0.08	B	mg/Kg	0.02	0.1	11/14/01 10:37	lcj
Thallium, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/14/01 10:37	lcj
Zinc, total (3050)	M6010B ICP	59		mg/Kg	1	5	11/13/01 0:50	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	7.1		units	0.1	0.1	11/13/01 12:17	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 10:20	lnc
Digestion	M3050						11/10/01 19:58	lab
Digestion - Hot Plate	M3050 ICP						11/08/01 2:24	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 12:30	bf/jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-A-2

ACZ ID: ***L34337-07***
Date Sampled: *10/06/01 00:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 10:41	lcj
Arsenic, total (3050)	M6020 ICP-MS	0.9	B	mg/Kg	0.2	1	11/14/01 10:41	lcj
Beryllium, total (3050)	M6010B ICP	0.3	B	mg/Kg	0.2	1	11/13/01 1:04	ct
Cadmium, total (3050)	M6020 ICP-MS	0.71		mg/Kg	0.04	0.2	11/14/01 10:41	lcj
Chromium, total (3050)	M6010B ICP	18		mg/Kg	1	5	11/13/01 1:04	ct
Copper, total (3050)	M6010B ICP	21		mg/Kg	1	5	11/13/01 1:04	ct
Lead, total (3050)	M6020 ICP-MS	3.71		mg/Kg	0.04	0.2	11/14/01 10:41	lcj
Mercury, total	M7471 CVAA	28.8	H	mg/Kg	0.2	1	11/19/01 15:47	kdw
Nickel, total (3050)	M6010B ICP	22		mg/Kg	1	5	11/13/01 1:04	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 14:11	kdw
Silver, total (3050)	M6020 ICP-MS	0.10	B	mg/Kg	0.02	0.1	11/14/01 10:41	lcj
Thallium, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/14/01 10:41	lcj
Zinc, total (3050)	M6010B ICP	43		mg/Kg	1	5	11/13/01 1:04	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	7.8		units	0.1	0.1	11/13/01 12:23	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 10:24	lnc
Digestion	M3050						11/10/01 20:44	lab
Digestion - Hot Plate	M3050 ICP						11/08/01 3:16	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 12:36	bf/jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-A-3

ACZ ID: ***L34337-08***
Date Sampled: *10/06/01 00:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 10:46	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.3		mg/Kg	0.2	1	11/14/01 10:46	lcj
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.2	1	11/13/01 1:08	ct
Cadmium, total (3050)	M6020 ICP-MS	0.82		mg/Kg	0.04	0.2	11/14/01 10:46	lcj
Chromium, total (3050)	M6010B ICP	32		mg/Kg	1	5	11/13/01 1:08	ct
Copper, total (3050)	M6010B ICP	34		mg/Kg	1	5	11/13/01 1:08	ct
Lead, total (3050)	M6020 ICP-MS	3.93		mg/Kg	0.04	0.2	11/14/01 10:46	lcj
Mercury, total	M7471 CVAA	15.6	H	mg/Kg	0.2	1	11/19/01 15:49	kdw
Nickel, total (3050)	M6010B ICP	29		mg/Kg	1	5	11/13/01 1:08	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 14:17	kdw
Silver, total (3050)	M6020 ICP-MS	0.10	B	mg/Kg	0.02	0.1	11/14/01 10:46	lcj
Thallium, total (3050)	M6020 ICP-MS	0.08	B	mg/Kg	0.02	0.1	11/14/01 10:46	lcj
Zinc, total (3050)	M6010B ICP	64		mg/Kg	1	5	11/13/01 1:08	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	6.9		units	0.1	0.1	11/13/01 12:28	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 10:28	lnc
Digestion	M3050						11/10/01 21:30	lab
Digestion - Hot Plate	M3050 ICP						11/08/01 4:09	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 12:42	bf/jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-A-4

ACZ ID: ***L34337-09***
Date Sampled: *10/06/01 00:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 6:23	lcj
Arsenic, total (3050)	M6020 ICP-MS	0.6	B	mg/Kg	0.5	3	11/16/01 22:35	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.2	1	11/13/01 1:12	ct
Cadmium, total (3050)	M6020 ICP-MS	0.45		mg/Kg	0.04	0.2	11/14/01 6:23	lcj
Chromium, total (3050)	M6010B ICP	28		mg/Kg	1	5	11/13/01 1:12	ct
Copper, total (3050)	M6010B ICP	29		mg/Kg	1	5	11/13/01 1:12	ct
Lead, total (3050)	M6020 ICP-MS	2.71		mg/Kg	0.04	0.2	11/14/01 6:23	lcj
Mercury, total	M7471 CVAA	4.59	H	mg/Kg	0.04	0.2	11/19/01 14:51	kdw
Nickel, total (3050)	M6010B ICP	20		mg/Kg	1	5	11/13/01 1:12	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 16:04	kdw
Silver, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/14/01 6:23	lcj
Thallium, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/14/01 6:23	lcj
Zinc, total (3050)	M6010B ICP	54		mg/Kg	1	5	11/13/01 1:12	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	6.9		units	0.1	0.1	11/13/01 12:34	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 10:32	lnc
Digestion	M3050						11/10/01 14:36	lab
Digestion - Hot Plate	M3050 ICP						11/08/01 5:01	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 12:48	bf/jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-A-5

ACZ ID: ***L34337-10***
Date Sampled: *10/06/01 13:15*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 6:27	lcj
Arsenic, total (3050)	M6020 ICP-MS	0.6	B	mg/Kg	0.5	3	11/16/01 22:40	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.2	1	11/13/01 1:17	ct
Cadmium, total (3050)	M6020 ICP-MS	0.59		mg/Kg	0.04	0.2	11/14/01 6:27	lcj
Chromium, total (3050)	M6010B ICP	32		mg/Kg	1	5	11/13/01 1:17	ct
Copper, total (3050)	M6010B ICP	39		mg/Kg	1	5	11/13/01 1:17	ct
Lead, total (3050)	M6020 ICP-MS	3.23		mg/Kg	0.04	0.2	11/14/01 6:27	lcj
Mercury, total	M7471 CVAA	0.67	H	mg/Kg	0.04	0.2	11/19/01 14:52	kdw
Nickel, total (3050)	M6010B ICP	23		mg/Kg	1	5	11/13/01 1:17	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 16:09	kdw
Silver, total (3050)	M6020 ICP-MS	0.08	B	mg/Kg	0.02	0.1	11/14/01 6:27	lcj
Thallium, total (3050)	M6020 ICP-MS	0.03	B	mg/Kg	0.02	0.1	11/14/01 6:27	lcj
Zinc, total (3050)	M6010B ICP	59		mg/Kg	1	5	11/13/01 1:17	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	7.0		units	0.1	0.1	11/13/01 12:39	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 10:36	lnc
Digestion	M3050						11/10/01 16:54	lab
Digestion - Hot Plate	M3050 ICP						11/08/01 5:53	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 12:54	bf/jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-A-6

ACZ ID: ***L34337-11***
Date Sampled: *10/06/01 00:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 6:41	lcj
Arsenic, total (3050)	M6020 ICP-MS	0.7	B	mg/Kg	0.5	3	11/16/01 22:44	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.2	1	11/13/01 1:21	ct
Cadmium, total (3050)	M6020 ICP-MS	0.53		mg/Kg	0.04	0.2	11/14/01 6:41	lcj
Chromium, total (3050)	M6010B ICP	27		mg/Kg	1	5	11/13/01 1:21	ct
Copper, total (3050)	M6010B ICP	29		mg/Kg	1	5	11/13/01 1:21	ct
Lead, total (3050)	M6020 ICP-MS	2.49		mg/Kg	0.04	0.2	11/14/01 6:41	lcj
Mercury, total	M7471 CVAA	4.00	H	mg/Kg	0.05	0.2	11/19/01 14:53	kdw
Nickel, total (3050)	M6010B ICP	21		mg/Kg	1	5	11/13/01 1:21	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 16:10	kdw
Silver, total (3050)	M6020 ICP-MS	0.08	B	mg/Kg	0.02	0.1	11/14/01 6:41	lcj
Thallium, total (3050)	M6020 ICP-MS	0.03	B	mg/Kg	0.02	0.1	11/14/01 6:41	lcj
Zinc, total (3050)	M6010B ICP	51		mg/Kg	1	5	11/13/01 1:21	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	7.3		units	0.1	0.1	11/13/01 12:45	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 10:40	lnc
Digestion	M3050						11/10/01 17:40	lab
Digestion - Hot Plate	M3050 ICP						11/08/01 6:46	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 13:00	bf/jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-A-7

ACZ ID: ***L34337-12***
Date Sampled: *10/06/01 00:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 6:54	lcj
Arsenic, total (3050)	M6020 ICP-MS		U	mg/Kg	0.5	3	11/16/01 22:49	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.2	1	11/13/01 1:26	ct
Cadmium, total (3050)	M6020 ICP-MS	0.35		mg/Kg	0.04	0.2	11/14/01 6:54	lcj
Chromium, total (3050)	M6010B ICP	28		mg/Kg	1	5	11/13/01 1:26	ct
Copper, total (3050)	M6010B ICP	32		mg/Kg	1	5	11/13/01 1:26	ct
Lead, total (3050)	M6020 ICP-MS	2.32		mg/Kg	0.04	0.2	11/14/01 6:54	lcj
Mercury, total	M7471 CVAA	0.66	H	mg/Kg	0.05	0.3	11/19/01 14:55	kdw
Nickel, total (3050)	M6010B ICP	22		mg/Kg	1	5	11/13/01 1:26	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 16:12	kdw
Silver, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/14/01 6:54	lcj
Thallium, total (3050)	M6020 ICP-MS		U	mg/Kg	0.02	0.1	11/14/01 6:54	lcj
Zinc, total (3050)	M6010B ICP	55		mg/Kg	1	5	11/13/01 1:26	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	7.1		units	0.1	0.1	11/13/01 12:51	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 10:44	lnc
Digestion	M3050						11/10/01 18:26	lab
Digestion - Hot Plate	M3050 ICP						11/08/01 7:38	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 13:06	bf/jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-A-8

ACZ ID: ***L34337-13***
Date Sampled: *10/06/01 00:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 6:59	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.0	B	mg/Kg	0.5	3	11/16/01 22:53	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.2	1	11/13/01 1:30	ct
Cadmium, total (3050)	M6020 ICP-MS	0.65		mg/Kg	0.04	0.2	11/14/01 6:59	lcj
Chromium, total (3050)	M6010B ICP	31		mg/Kg	1	5	11/13/01 1:30	ct
Copper, total (3050)	M6010B ICP	39		mg/Kg	1	5	11/13/01 1:30	ct
Lead, total (3050)	M6020 ICP-MS	5.12		mg/Kg	0.04	0.2	11/14/01 6:59	lcj
Mercury, total	M7471 CVAA	38.6	H	mg/Kg	0.5	2	11/19/01 15:50	kdw
Nickel, total (3050)	M6010B ICP	30		mg/Kg	1	5	11/13/01 1:30	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 16:13	kdw
Silver, total (3050)	M6020 ICP-MS	0.09	B	mg/Kg	0.02	0.1	11/14/01 6:59	lcj
Thallium, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	11/14/01 6:59	lcj
Zinc, total (3050)	M6010B ICP	72		mg/Kg	1	5	11/13/01 1:30	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	6.7		units	0.1	0.1	11/13/01 12:56	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 10:48	lnc
Digestion	M3050						11/10/01 19:12	lab
Digestion - Hot Plate	M3050 ICP						11/08/01 8:30	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 13:12	bf/jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-Ind-1

ACZ ID: ***L34337-14***
Date Sampled: *10/07/01 18:50*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 7:03	lcj
Arsenic, total (3050)	M6020 ICP-MS	0.8	B	mg/Kg	0.5	3	11/16/01 23:07	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.2	1	11/13/01 1:35	ct
Cadmium, total (3050)	M6020 ICP-MS	0.60		mg/Kg	0.04	0.2	11/14/01 7:03	lcj
Chromium, total (3050)	M6010B ICP	31		mg/Kg	1	5	11/13/01 1:35	ct
Copper, total (3050)	M6010B ICP	34		mg/Kg	1	5	11/13/01 1:35	ct
Lead, total (3050)	M6020 ICP-MS	5.12		mg/Kg	0.04	0.2	11/14/01 7:03	lcj
Mercury, total	M7471 CVAA	0.53	H	mg/Kg	0.05	0.2	11/19/01 14:57	kdw
Nickel, total (3050)	M6010B ICP	16		mg/Kg	1	5	11/13/01 1:35	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.4	B	mg/Kg	0.2	1	11/16/01 16:20	kdw
Silver, total (3050)	M6020 ICP-MS	0.09	B	mg/Kg	0.02	0.1	11/14/01 7:03	lcj
Thallium, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	11/14/01 7:03	lcj
Zinc, total (3050)	M6010B ICP	55		mg/Kg	1	5	11/13/01 1:35	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	5.5		units	0.1	0.1	11/13/01 13:02	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 10:52	lnc
Digestion	M3050						11/10/01 19:58	lab
Digestion - Hot Plate	M3050 ICP						11/08/01 9:22	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 13:18	bf/jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-Ind-2

ACZ ID: ***L34337-15***
Date Sampled: *10/07/01 00:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 7:08	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.2	B	mg/Kg	0.5	3	11/16/01 23:11	jb
Beryllium, total (3050)	M6010B ICP	0.8	B	mg/Kg	0.4	2	11/20/01 19:25	ct
Cadmium, total (3050)	M6020 ICP-MS	0.82		mg/Kg	0.04	0.2	11/14/01 7:08	lcj
Chromium, total (3050)	M6010B ICP	43		mg/Kg	2	10	11/20/01 19:25	ct
Copper, total (3050)	M6010B ICP	46		mg/Kg	2	10	11/20/01 19:25	ct
Lead, total (3050)	M6020 ICP-MS	7.64		mg/Kg	0.04	0.2	11/14/01 7:08	lcj
Mercury, total	M7471 CVAA	1.98	H	mg/Kg	0.05	0.2	11/19/01 15:01	kdw
Nickel, total (3050)	M6010B ICP	19		mg/Kg	2	10	11/20/01 19:25	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.7		mg/Kg	0.1	0.5	11/19/01 14:25	kdw
Silver, total (3050)	M6020 ICP-MS	0.13		mg/Kg	0.02	0.1	11/14/01 7:08	lcj
Thallium, total (3050)	M6020 ICP-MS	0.06	B	mg/Kg	0.02	0.1	11/14/01 7:08	lcj
Zinc, total (3050)	M6010B ICP	71		mg/Kg	2	10	11/20/01 19:25	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	5.4		units	0.1	0.1	11/13/01 13:07	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 10:56	lnc
Digestion - Hot Plate	M3050 ICP						11/15/01 23:40	jp
Digestion	M3050						11/10/01 20:44	lab
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 13:24	bf/jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: SS-A-9

ACZ ID: ***L34337-16***
Date Sampled: *10/06/01 09:45*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 7:12	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.8	B	mg/Kg	0.5	3	11/16/01 23:25	jb
Beryllium, total (3050)	M6010B ICP	0.6	B	mg/Kg	0.4	2	11/20/01 19:43	ct
Cadmium, total (3050)	M6020 ICP-MS	0.62		mg/Kg	0.04	0.2	11/14/01 7:12	lcj
Chromium, total (3050)	M6010B ICP	41		mg/Kg	2	10	11/20/01 19:43	ct
Copper, total (3050)	M6010B ICP	41		mg/Kg	2	10	11/20/01 19:43	ct
Lead, total (3050)	M6020 ICP-MS	4.85		mg/Kg	0.04	0.2	11/14/01 7:12	lcj
Mercury, total	M7471 CVAA	1.26	H	mg/Kg	0.04	0.2	11/19/01 15:02	kdw
Nickel, total (3050)	M6010B ICP	29		mg/Kg	2	10	11/20/01 19:43	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 16:23	kdw
Silver, total (3050)	M6020 ICP-MS	0.08	B	mg/Kg	0.02	0.1	11/14/01 7:12	lcj
Thallium, total (3050)	M6020 ICP-MS	0.03	B	mg/Kg	0.02	0.1	11/14/01 7:12	lcj
Zinc, total (3050)	M6010B ICP	69		mg/Kg	2	10	11/20/01 19:43	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	6.9		units	0.1	0.1	11/13/01 13:18	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:00	lnc
Digestion	M3050						11/10/01 21:30	lab
Digestion - Hot Plate	M3050 ICP						11/16/01 11:10	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 13:30	bf/jp

Note: See case narrative for data flags.

Report Header Explanations

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

QC Sample Types

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

QC Sample Type Explanations

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

ACZ Qualifiers (Qual)

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

Method References

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

Comments

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

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34337***

Project ID: 2140031

Antimony, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131529													
WG131246PBS	PBS	11/14/01 6:14				U	mg/Kg		-0.12	0.12			
WG131246LCSS	LCSS	11/14/01 6:19	PCN15144	53.7		23	mg/Kg		0	113			
L34337-10AS	AS	11/14/01 6:32	MS011022-4	10	U	9.748	mg/Kg	97.5	75	125			
L34337-10ASD	ASD	11/14/01 6:36	MS011022-4	10	U	10.324	mg/Kg	103.2	75	125	5.74	20	
L34339-11MS	MS	11/14/01 8:18	MS011114-20	5	U	.386	mg/Kg	7.7	75	125			X
L34339-11MSD	MSD	11/14/01 8:23	MS011114-20	5	U	.317	mg/Kg	6.3	75	125	19.63	20	X
L34339-12DUP	DUP	11/14/01 8:41			U	U	mg/Kg				0	20	
WG131536													
WG131283PBS	PBS	11/14/01 9:48				U	mg/Kg		-0.12	0.12			
WG131283LCSS	LCSS	11/14/01 9:52	PCN15144	53.7		39.8	mg/Kg		0	113			
L34337-01AS	AS	11/14/01 10:01	MS011022-4	10	U	9.032	mg/Kg	90.3	75	125			
L34337-01ASD	ASD	11/14/01 10:06	MS011022-4	10	U	9.204	mg/Kg	92	75	125	1.89	20	
L34339-23MS	MS	11/14/01 11:53	MS011114-20	5	U	.353	mg/Kg	7.1	75	125			X
L34339-23MSD	MSD	11/14/01 11:57	MS011114-20	5	U	.367	mg/Kg	7.3	75	125	3.89	20	X
L34339-24DUP	DUP	11/14/01 12:15			U	U	mg/Kg				0	20	

Arsenic, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131536													
WG131283PBS	PBS	11/14/01 9:48				U	mg/Kg		-0.3	0.3			
WG131283LCSS	LCSS	11/14/01 9:52	PCN15144	177		171.5	mg/Kg		121	233			
L34339-23MS	MS	11/14/01 11:53	MS011114-20	20	1	19.18	mg/Kg	90.9	75	125			
L34339-23MSD	MSD	11/14/01 11:57	MS011114-20	20	1	19.13	mg/Kg	90.7	75	125	0.26	20	
L34339-24DUP	DUP	11/14/01 12:15			1.1	.83	mg/Kg				28	20	T
WG131743													
WG131246PBS	PBS	11/16/01 21:51				U	mg/Kg		-0.3	0.3			
WG131246LCSS	LCSS	11/16/01 21:55	PCN15144	177		164.6	mg/Kg		121	233			
L34339-11MS	MS	11/16/01 22:09	MS011117-10	20	1	16.29	mg/Kg	76.5	75	125			
L34339-11MSD	MSD	11/16/01 22:13	MS011117-10	20	1	16.19	mg/Kg	76	75	125	0.62	20	
L34339-12DUP	DUP	11/16/01 22:31			1.1	1.11	mg/Kg				0.9	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34337***

Project ID: 2140031

Beryllium, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131286													
WG131188PBS	PBS	11/12/01 23:30				U	mg/Kg		-0.2	0.2			
WG131188LCSS	LCSS	11/12/01 23:35	PCN15143	62.2		60.07	mg/Kg		48.8	75.9			
L34299-01MS	MS	11/12/01 23:48	II011107-2	78.5	U	76.79	mg/Kg	97.8	75	125			
L34299-01MSD	MSD	11/12/01 23:52	II011107-2	78.5	U	79.45	mg/Kg	101.2	75	125	3.41	20	
L34337-14DUP	DUP	11/13/01 1:39			U	U	mg/Kg				0	20	
WG131877													
WG131613PBS	PBS	11/20/01 19:16				U	mg/Kg		-0.2	0.2			
WG131613LCSS	LCSS	11/20/01 19:20	PCN15143	62.2		69.18	mg/Kg		48.8	75.9			
L34337-15MS	MS	11/20/01 19:34	II011107-2	100	.8	92.69	mg/Kg	91.9	75	125			
L34337-15MSD	MSD	11/20/01 19:39	II011107-2	100	.8	93.7	mg/Kg	92.9	75	125	1.08	20	
L34353-06DUP	DUP	11/20/01 20:25			.7	.73	mg/Kg				4.2	20	
WG131990													
WG131188PBS	PBS	11/22/01 1:20				U	mg/Kg		-0.2	0.2			
WG131188LCSS	LCSS	11/22/01 1:24	PCN15143	62.2		58.67	mg/Kg		48.8	75.9			
L34299-01MS	MS	11/22/01 1:43	II011107-2	78.5	U	73.64	mg/Kg	93.8	75	125			
L34299-01MSD	MSD	11/22/01 1:48	II011107-2	78.5	U	78.34	mg/Kg	99.8	75	125	6.19	20	
L34337-14DUP	DUP	11/22/01 3:13			.6	.6	mg/Kg				0	20	

Cadmium, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131529													
WG131246PBS	PBS	11/14/01 6:14				U	mg/Kg		-0.06	0.06			
WG131246LCSS	LCSS	11/14/01 6:19	PCN15144	191		198.55	mg/Kg		147	235			
L34339-11MS	MS	11/14/01 8:18	MS011114-20	20	1.17	20.42	mg/Kg	96.3	75	125			
L34339-11MSD	MSD	11/14/01 8:23	MS011114-20	20	1.17	20.884	mg/Kg	98.6	75	125	2.25	20	
L34339-12DUP	DUP	11/14/01 8:41			1.3	1.291	mg/Kg				0.7	20	
WG131536													
WG131283PBS	PBS	11/14/01 9:48				U	mg/Kg		-0.06	0.06			
WG131283LCSS	LCSS	11/14/01 9:52	PCN15144	191		184.1	mg/Kg		147	235			
L34339-23MS	MS	11/14/01 11:53	MS011114-20	20	.57	19.432	mg/Kg	94.3	75	125			
L34339-23MSD	MSD	11/14/01 11:57	MS011114-20	20	.57	19.556	mg/Kg	94.9	75	125	0.64	20	
L34339-24DUP	DUP	11/14/01 12:15			.57	.467	mg/Kg				19.9	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34337***

Project ID: 2140031

Chromium, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131286													
WG131188PBS	PBS	11/12/01 23:30				U	mg/Kg		-1	1			
WG131188LCSS	LCSS	11/12/01 23:35	PCN15143	111		98.5	mg/Kg		88.7	133			
L34299-01MS	MS	11/12/01 23:48	II011107-2	78.5	U	71.8	mg/Kg	91.5	75	125			
L34299-01MSD	MSD	11/12/01 23:52	II011107-2	78.5	U	74.4	mg/Kg	94.8	75	125	3.56	20	
L34337-14DUP	DUP	11/13/01 1:39			31	32.1	mg/Kg				3.5	20	
WG131877													
WG131613PBS	PBS	11/20/01 19:16				U	mg/Kg		-1	1			
WG131613LCSS	LCSS	11/20/01 19:20	PCN15143	111		120.1	mg/Kg		88.7	133			
L34337-15MS	MS	11/20/01 19:34	II011107-2	100	43	130.6	mg/Kg	87.6	75	125			
L34337-15MSD	MSD	11/20/01 19:39	II011107-2	100	43	134.2	mg/Kg	91.2	75	125	2.72	20	
L34353-06DUP	DUP	11/20/01 20:25			80	85.4	mg/Kg				6.5	20	

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131286													
WG131188PBS	PBS	11/12/01 23:30				U	mg/Kg		-1	1			
WG131188LCSS	LCSS	11/12/01 23:35	PCN15143	86		78.5	mg/Kg		70.4	101			
L34299-01MS	MS	11/12/01 23:48	II011107-2	78.5	21	149.8	mg/Kg	164.1	75	125			X
L34299-01MSD	MSD	11/12/01 23:52	II011107-2	78.5	21	89.5	mg/Kg	87.3	75	125	50.4	20	X
L34337-14DUP	DUP	11/13/01 1:39			34	36.1	mg/Kg				6	20	
WG131877													
WG131613PBS	PBS	11/20/01 19:16				U	mg/Kg		-1	1			
WG131613LCSS	LCSS	11/20/01 19:20	PCN15143	86		93	mg/Kg		70.4	101			
L34337-15MS	MS	11/20/01 19:34	II011107-2	100	46	135.1	mg/Kg	89.1	75	125			
L34337-15MSD	MSD	11/20/01 19:39	II011107-2	100	46	139.9	mg/Kg	93.9	75	125	3.49	20	
L34353-06DUP	DUP	11/20/01 20:25			63	59.1	mg/Kg				6.4	20	

Lead, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131529													
WG131246PBS	PBS	11/14/01 6:14				U	mg/Kg		-0.06	0.06			
WG131246LCSS	LCSS	11/14/01 6:19	PCN15144	110		109.6	mg/Kg		81.2	139			
L34339-11MS	MS	11/14/01 8:18	MS011114-20	20	6.85	26.004	mg/Kg	95.8	75	125			
L34339-11MSD	MSD	11/14/01 8:23	MS011114-20	20	6.85	26.932	mg/Kg	100.4	75	125	3.51	20	
L34339-12DUP	DUP	11/14/01 8:41			5.24	5.54	mg/Kg				5.6	20	
WG131536													
WG131283PBS	PBS	11/14/01 9:48				.028	mg/Kg		-0.06	0.06			
WG131283LCSS	LCSS	11/14/01 9:52	PCN15144	110		100.25	mg/Kg		81.2	139			
L34339-23MS	MS	11/14/01 11:53	MS011114-20	20	4.14	25.02	mg/Kg	104.4	75	125			
L34339-23MSD	MSD	11/14/01 11:57	MS011114-20	20	4.14	26.016	mg/Kg	109.4	75	125	3.9	20	
L34339-24DUP	DUP	11/14/01 12:15			3.94	3.213	mg/Kg				20.3	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34337***

Project ID: 2140031

Mercury, total M7471 CVAA

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131702													
WG131702PBS	PBS	11/19/01 14:34				U	mg/Kg		-0.00044	0.00044			
WG131702LCSS	LCSS	11/19/01 14:35	PCN15142	29.6		21.143	mg/Kg		20.2	39.1			
L34337-03MS	MS	11/19/01 14:40	II011115-4	1.15	.93	1.962	mg/Kg	89.7	75	125			
L34337-03DUP	DUP	11/19/01 14:41			.93	.782	mg/Kg				17.3	25	
WG131702PBS	PBS	11/19/01 15:19				U	mg/Kg		-0.00044	0.00044			
WG131702LCSS	LCSS	11/19/01 15:41	PCN15142	29.6		32.76	mg/Kg		20.2	39.1			

Nickel, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131286													
WG131188PBS	PBS	11/12/01 23:30				U	mg/Kg		-1	1			
WG131188LCSS	LCSS	11/12/01 23:35	PCN15143	127		117	mg/Kg		99.4	155			
L34299-01MS	MS	11/12/01 23:48	II011107-2	78.5	U	71.8	mg/Kg	91.5	75	125			
L34299-01MSD	MSD	11/12/01 23:52	II011107-2	78.5	U	74.9	mg/Kg	95.4	75	125	4.23	20	
L34337-14DUP	DUP	11/13/01 1:39			16	15.7	mg/Kg				1.9	20	
WG131877													
WG131613PBS	PBS	11/20/01 19:16				U	mg/Kg		-1	1			
WG131613LCSS	LCSS	11/20/01 19:20	PCN15143	127		138.2	mg/Kg		99.4	155			
L34337-15MS	MS	11/20/01 19:34	II011107-2	100	19	105.8	mg/Kg	86.8	75	125			
L34337-15MSD	MSD	11/20/01 19:39	II011107-2	100	19	107.2	mg/Kg	88.2	75	125	1.31	20	
L34353-06DUP	DUP	11/20/01 20:25			153	173.6	mg/Kg				12.6	20	

pH, Corrosivity M9045

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131472													
L34337-16DUP	DUP	11/13/01 13:24			6.9	6.96	units				0.9	35	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34337***

Project ID: 2140031

Selenium, total (3050) M7742 Modified, AA-Hydride

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131585													
WG131283PBS	PBS	11/16/01 12:32				U	mg/Kg		-0.44	0.44			
L34337-01MS	MS	11/16/01 12:37	SI011018-2	4	.3	3.4	mg/Kg	77.5	75	125			
L34337-01MSD	MSD	11/16/01 12:38	SI011018-2	4	.3	3.23	mg/Kg	73.3	75	125	5.13	35	R
WG131283LCSS	LCSS	11/16/01 14:01	PCN15144	89.6		68.4	mg/Kg		66.4	113			
L34339-24DUP	DUP	11/16/01 14:21			U	U	mg/Kg				0	35	
WG131586													
WG131246PBS	PBS	11/16/01 15:56				U	mg/Kg		-0.44	0.44			
WG131246LCSS	LCSS	11/16/01 16:02	PCN15144	89.6		68.4	mg/Kg		66.4	113			
L34337-09MS	MS	11/16/01 16:05	SI011018-2	4	U	3.53	mg/Kg	88.3	75	125			
L34337-09MSD	MSD	11/16/01 16:07	SI011018-2	4	U	3.49	mg/Kg	87.3	75	125	1.14	35	
L34339-12DUP	DUP	11/16/01 16:26			.6	.51	mg/Kg				16.2	35	
WG131246LCSS	LCSS	11/16/01 17:45	PCN15144	89.6		78.1	mg/Kg		66.4	113			
WG131712													
WG131189PBS	PBS	11/19/01 14:22				U	mg/Kg		-0.22	0.22			
L34337-15AS	AS	11/19/01 14:27	II011114-3	1.666667	.7	2.27	mg/Kg	94.2	75	125			
L34337-15ASD	ASD	11/19/01 14:28	II011114-3	1.666667	.7	1.8	mg/Kg	66	75	125	23.1	35	R
L34339-18DUP	DUP	11/19/01 15:16			.2	.24	mg/Kg				18.2	35	
WG131189LCSS	LCSS	11/19/01 15:49	PCN15143	85.7		87.1	mg/Kg		63.5	108			
WG131986													
WG131283PBS	PBS	11/27/01 16:31				U	mg/Kg		-0.44	0.44			
L34337-01AS	AS	11/27/01 16:35	II011114-3	3.333334	.5	2.87	mg/Kg	71.1	75	125			X
L34337-01ASD	ASD	11/27/01 16:37	II011114-3	3.333334	.5	2.79	mg/Kg	68.7	75	125	2.83	35	X
L34337-01MS	MS	11/27/01 16:43	SI011018-2	4	.5	2.74	mg/Kg	56	75	125			X
L34337-01MSD	MSD	11/27/01 16:45	SI011018-2	4	.5	2.97	mg/Kg	61.8	75	125	8.06	35	X
L34339-24DUP	DUP	11/27/01 17:01			U	U	mg/Kg				0	35	
WG131283LCSS	LCSS	11/27/01 18:24	PCN15144	89.6		87	mg/Kg		66.4	113			

Silver, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131529													
WG131246PBS	PBS	11/14/01 6:14				U	mg/Kg		-0.03	0.03			
WG131246LCSS	LCSS	11/14/01 6:19	PCN15144	121		98.25	mg/Kg		72.6	218			
L34339-11MS	MS	11/14/01 8:18	MS011114-20	5	.17	4.236	mg/Kg	81.3	75	125			
L34339-11MSD	MSD	11/14/01 8:23	MS011114-20	5	.17	4.376	mg/Kg	84.1	75	125	3.25	20	
L34339-12DUP	DUP	11/14/01 8:41			.19	.19	mg/Kg				0	20	
WG131536													
WG131283PBS	PBS	11/14/01 9:48				U	mg/Kg		-0.03	0.03			
WG131283LCSS	LCSS	11/14/01 9:52	PCN15144	121		207.3	mg/Kg		72.6	218			
L34339-23MS	MS	11/14/01 11:53	MS011114-20	5	.06	4.236	mg/Kg	83.5	75	125			
L34339-23MSD	MSD	11/14/01 11:57	MS011114-20	5	.06	4.288	mg/Kg	84.6	75	125	1.22	20	
L34339-24DUP	DUP	11/14/01 12:15			.07	.071	mg/Kg				1.4	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34337***

Project ID: 2140031

Thallium, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131529													
WG131246PBS	PBS	11/14/01 6:14				U	mg/Kg		-0.03	0.03			
WG131246LCSS	LCSS	11/14/01 6:19	PCN15144	157		156.15	mg/Kg		90	225			
L34339-11MS	MS	11/14/01 8:18	MS011114-20	10	.08	9.528	mg/Kg	94.5	75	125			
L34339-11MSD	MSD	11/14/01 8:23	MS011114-20	10	.08	9.736	mg/Kg	96.6	75	125	2.16	20	
L34339-12DUP	DUP	11/14/01 8:41			.1	.1	mg/Kg				0	20	
WG131536													
WG131283PBS	PBS	11/14/01 9:48				U	mg/Kg		-0.03	0.03			
WG131283LCSS	LCSS	11/14/01 9:52	PCN15144	157		145.5	mg/Kg		90	225			
L34339-23MS	MS	11/14/01 11:53	MS011114-20	10	.07	9.236	mg/Kg	91.7	75	125			
L34339-23MSD	MSD	11/14/01 11:57	MS011114-20	10	.07	9.42	mg/Kg	93.5	75	125	1.97	20	
L34339-24DUP	DUP	11/14/01 12:15			.06	.062	mg/Kg				3.3	20	

Zinc, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131286													
WG131188PBS	PBS	11/12/01 23:30				U	mg/Kg		-1	1			
WG131188LCSS	LCSS	11/12/01 23:35	PCN15143	371		357	mg/Kg		287	456			
L34299-01MS	MS	11/12/01 23:48	II011107-2	78.5	46	126.6	mg/Kg	102.7	75	125			
L34299-01MSD	MSD	11/12/01 23:52	II011107-2	78.5	46	130.5	mg/Kg	107.6	75	125	3.03	20	
L34337-14DUP	DUP	11/13/01 1:39			55	56.9	mg/Kg				3.4	20	
WG131877													
WG131613PBS	PBS	11/20/01 19:16				U	mg/Kg		-1	1			
WG131613LCSS	LCSS	11/20/01 19:20	PCN15143	371		433.4	mg/Kg		287	456			
L34337-15MS	MS	11/20/01 19:34	II011107-2	100	71	156	mg/Kg	85	75	125			
L34337-15MSD	MSD	11/20/01 19:39	II011107-2	100	71	160.7	mg/Kg	89.7	75	125	2.97	20	
L34353-06DUP	DUP	11/20/01 20:25			69	80.3	mg/Kg				15.1	20	

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

Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34337
Date Received: 10/11/2001
Received By: george

Receipt Verification

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

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

SAMPLE SS-BR-7 REC'D BROKEN

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

The client was not contacted. ALERTED PM

Shipping Containers

Cooler Id		Temp (°C)	Rad (µR/hr)
ACZ		6	14

Notes

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

Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34337
Date Received: 10/11/2001
Received By: george

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	Y < 2	YG< 2	B < 2	BG< 2	O < 2	T >12	P >12	N/A	RAD
L34337-01	SS-BR-1										O	
L34337-02	SS-BR-2										O	
L34337-03	SS-BR-3										O	
L34337-04	SS-BR-4										O	
L34337-05	SS-BR-5										O	
L34337-06	SS-A-1										O	
L34337-07	SS-A-2										O	
L34337-08	SS-A-3										O	
L34337-09	SS-A-4										O	
L34337-10	SS-A-5										O	
L34337-11	SS-A-6										O	
L34337-12	SS-A-7										O	
L34337-13	SS-A-8										O	
L34337-14	SS-Ind-1										O	
L34337-15	SS-Ind-2										O	
L34337-16	SS-A-9										O	

ACZ Laboratories, Inc.

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

CHAIN of CUSTODY

Quote #: Cascade-Blue Ridge **ACZ #:** L34337

CLIENT INFORMATION

Name to appear on Report and Invoice

Cascade Earth Sciences
223 S. Holly
Medford, OR 97501

Attn: Mary Ann Amann **Tel:** 541-779-2280

Email:

Carbon Copy: **Report:** _____ **Invoice:** _____

Attn: **Tel:**

Email:

PROJECT INFORMATION

Client Project name and/or PO#:
Oxbow Mines
2140031

Shipping Company:

Tracking #:

ANALYSES REQUESTED *(required; attach list)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total 13 Metals	Paste pH					
SS-BR-1	10/6 1710	SO	1	✓	✓					
SS-BR-2	10/6		1	✓	✓					
SS-BR-3	10/6		1	✓	✓					
SS-BR-4	10/6		1	✓	✓					
SS-BR-5	10/6 1630		1	✓	✓					
BROKEN SS-BR-7	10/6 1620		1	✓	✓					
SS-A-1	10/6 940		1	✓	✓					
SS-A-2	10/6		1	✓	✓					
SS-A-3			1	✓	✓					
SS-A-4			1	✓	✓					
SS-A-5	10/6 1315		1	✓	✓					
SS-A-6			1	✓	✓					

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

REMARKS

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME	PAGE
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		[signature]	10-11-01 1000	Of

FRMQA021.01.00.03 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.

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

CHAIN of CUSTODY

Quote #: Cascade - Blue Ridge **ACZ #:** L34337

CLIENT INFORMATION

Name to appear on Report and Invoice

Cascade Earth Sciences
222 S. Holly
Medford, OR 97501

Attn: Mary Ann Aman **Tel:** 541-772-2280

Email:

Carbon Copy: **Report:** _____ **Invoice:** _____

Attn: **Tel:**

Email:

PROJECT INFORMATION

Client Project name and/or PO#: Ochoco Mines 2140031

Shipping Company:

Tracking #:

ANALYSES REQUESTED *(required; attach list)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total 13 Metals	Paste pH					
SS-A-7	10/6	So	1	✓	✓					
SS-A-8	10/6		1	✓	✓					
SS-Ind-1	10/7 1850		1	✓	✓					
SS-Ind-3	10/7		1	✓	✓					
SS-A-9	10/6 10/1945	So	1	✓	✓					

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

REMARKS

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	10/9/01 1205		
		[signature]	10-11-01 1000

PAGE _____ Of _____

FRMQA021.01.00.03

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

ACZ Laboratories, Inc.
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Analytical Report

Mary Ann Amann
Cascade Earth Sciences, LTD.
225 S. Holly St.
Medford, OR 97501

December 11, 2001

Project: L34351

Mary Ann Amann:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 12, 2001. This project has been assigned to ACZ's project number, L34351. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 8.0. The enclosed results relate only to the samples received under L34351. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

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

All samples and sub-samples associated with this project will be disposed of after January 11, 2002. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs.

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

Sue Barkey 11/Dec/01

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

Cascade Earth Sciences, LTD.
Project: L34351

December 11, 2001

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 6 miscellaneous samples from Cascade Earth Sciences, LTD. on October 12, 2001. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L34351. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times. Mercury was performed after 28 days of sampling but within 28 days after sample preparation.

Sample Analysis

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

All metal analyses, including Mercury, analyzed on air dried/pulverized samples and are reported on a dry weight basis.

The following anomalies were identified during the analysis of these samples:

1. The Total Lead values are estimated. Lead was detected in the prep blank (PBS) at .038 mg/Kg.

2. The Total Silver values are estimated due to matrix interferences. The LCSS was out of control limits with a recovery of 260.8 mg/Kg. The control limits are 137 to 232 mg/Kg.

3. The Total Zinc values are estimated. Zinc was detected in the prep blank (PBS) at 1.4 mg/Kg.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: TIS-BR-1

ACZ ID: ***L34351-01***
Date Sampled: *10/07/01 16:15*
Date Received: *10/12/01*
Sample Matrix: *Plant Tissue*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/22/01 4:35	jb
Arsenic, total (3050)	M6020 ICP-MS		U	mg/Kg	0.2	1	11/22/01 4:35	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.4	2	11/21/01 19:13	ct
Cadmium, total (3050)	M6020 ICP-MS		U	mg/Kg	0.04	0.2	11/22/01 4:35	jb
Chromium, total (3050)	M6010B ICP		U	mg/Kg	2	10	11/21/01 19:13	ct
Copper, total (3050)	M6010B ICP	4	B	mg/Kg	2	10	11/21/01 19:13	ct
Lead, total (3050)	M6020 ICP-MS	0.62		mg/Kg	0.04	0.2	12/01/01 7:03	lcj
Mercury, total	M7471 CVAA	0.07	BH	mg/Kg	0.05	0.2	11/28/01 16:27	kdw
Nickel, total (3050)	M6010B ICP		U	mg/Kg	2	10	11/21/01 19:13	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.6	B	mg/Kg	0.2	1	11/27/01 17:37	kdw
Silver, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	12/01/01 7:03	lcj
Thallium, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	12/01/01 7:03	lcj
Zinc, total (3050)	M6010B ICP	28		mg/Kg	2	10	11/21/01 19:13	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	36.1		%	0.1	0.5	11/05/01 13:06	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Digestion	M3050						11/20/01 15:42	bf
Digestion - Hot Plate	M3050 ICP						11/20/01 14:12	bf
Plant Tissue Pulverization	USDA #60, Method 53						11/20/01 9:45	bf

Note: The Lead and Silver values are estimated (see case narrative). Zinc was present in the Prep Blank at 1.4 mg/Kg.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: TIS-BR-2

ACZ ID: ***L34351-02***
Date Sampled: *10/07/01 16:45*
Date Received: *10/12/01*
Sample Matrix: *Plant Tissue*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/22/01 4:48	jb
Arsenic, total (3050)	M6020 ICP-MS		U	mg/Kg	0.2	1	11/22/01 4:48	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.4	2	11/21/01 19:18	ct
Cadmium, total (3050)	M6020 ICP-MS		U	mg/Kg	0.04	0.2	11/22/01 4:48	jb
Chromium, total (3050)	M6010B ICP		U	mg/Kg	2	10	11/21/01 19:18	ct
Copper, total (3050)	M6010B ICP	10		mg/Kg	2	10	11/21/01 19:18	ct
Lead, total (3050)	M6020 ICP-MS	0.7		mg/Kg	0.1	0.5	12/01/01 7:21	lcj
Mercury, total	M7471 CVAA	0.07	BH	mg/Kg	0.04	0.2	11/28/01 16:29	kdw
Nickel, total (3050)	M6010B ICP		U	mg/Kg	2	10	11/21/01 19:18	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.4	B	mg/Kg	0.2	1	11/27/01 17:39	kdw
Silver, total (3050)	M6020 ICP-MS		U	mg/Kg	0.05	0.3	12/01/01 7:21	lcj
Thallium, total (3050)	M6020 ICP-MS	0.41		mg/Kg	0.05	0.3	12/01/01 7:21	lcj
Zinc, total (3050)	M6010B ICP	20		mg/Kg	2	10	11/21/01 19:18	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	55.5		%	0.1	0.5	11/05/01 13:13	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Digestion	M3050						11/20/01 16:01	bf
Digestion - Hot Plate	M3050 ICP						11/20/01 14:32	bf
Plant Tissue Pulverization	USDA #60, Method 53						11/20/01 10:04	bf

Note: The Lead and Silver values are estimated (see case narrative). Zinc was present in the Prep Blank at 1.4 mg/Kg.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: TIS-BR-3

ACZ ID: ***L34351-03***
Date Sampled: *10/07/01 16:30*
Date Received: *10/12/01*
Sample Matrix: *Plant Tissue*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/22/01 5:10	jb
Arsenic, total (3050)	M6020 ICP-MS		U	mg/Kg	0.2	1	11/22/01 5:10	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.4	2	11/21/01 19:46	ct
Cadmium, total (3050)	M6020 ICP-MS		U	mg/Kg	0.04	0.2	11/22/01 5:10	jb
Chromium, total (3050)	M6010B ICP		U	mg/Kg	2	10	11/21/01 19:46	ct
Copper, total (3050)	M6010B ICP	3	B	mg/Kg	2	10	11/21/01 19:46	ct
Lead, total (3050)	M6020 ICP-MS	0.3	B	mg/Kg	0.1	0.5	12/01/01 7:35	lcj
Mercury, total	M7471 CVAA	0.12	BH	mg/Kg	0.04	0.2	11/28/01 16:30	kdw
Nickel, total (3050)	M6010B ICP		U	mg/Kg	2	10	11/21/01 19:46	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/27/01 17:40	kdw
Silver, total (3050)	M6020 ICP-MS		U	mg/Kg	0.05	0.3	12/01/01 7:35	lcj
Thallium, total (3050)	M6020 ICP-MS		U	mg/Kg	0.05	0.3	12/01/01 7:35	lcj
Zinc, total (3050)	M6010B ICP	14		mg/Kg	2	10	11/21/01 19:46	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	40.4		%	0.1	0.5	11/05/01 13:20	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	M3050 ICP						11/20/01 14:51	bf
Digestion	M3050						11/20/01 16:07	bf
Plant Tissue Pulverization	USDA #60, Method 53						11/20/01 10:23	bf

Note: The Lead and Silver values are estimated (see case narrative). Zinc was present in the Prep Blank at 1.4 mg/Kg.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: TIS-BR-4

ACZ ID: ***L34351-04***
Date Sampled: *10/07/01 16:00*
Date Received: *10/12/01*
Sample Matrix: *Plant Tissue*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/22/01 5:24	jb
Arsenic, total (3050)	M6020 ICP-MS		U	mg/Kg	0.2	1	11/22/01 5:24	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.4	2	11/21/01 19:56	ct
Cadmium, total (3050)	M6020 ICP-MS		U	mg/Kg	0.04	0.2	11/22/01 5:24	jb
Chromium, total (3050)	M6010B ICP		U	mg/Kg	2	10	11/21/01 19:56	ct
Copper, total (3050)	M6010B ICP	4	B	mg/Kg	2	10	11/21/01 19:56	ct
Lead, total (3050)	M6020 ICP-MS	0.7		mg/Kg	0.1	0.5	12/01/01 7:44	lcj
Mercury, total	M7471 CVAA	9.0	H	mg/Kg	0.2	1	11/28/01 17:07	kdw
Nickel, total (3050)	M6010B ICP	3	B	mg/Kg	2	10	11/21/01 19:56	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	12/06/01 11:51	kdw
Silver, total (3050)	M6020 ICP-MS		U	mg/Kg	0.05	0.3	12/01/01 7:44	lcj
Thallium, total (3050)	M6020 ICP-MS		U	mg/Kg	0.05	0.3	12/01/01 7:44	lcj
Zinc, total (3050)	M6010B ICP	12		mg/Kg	2	10	11/21/01 19:56	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	47.7		%	0.1	0.5	11/05/01 13:26	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Digestion - Hot Plate	M3050 ICP						11/20/01 15:04	bf
Digestion	M3050						11/20/01 16:20	bf
Plant Tissue Pulverization	USDA #60, Method 53						11/20/01 10:42	bf

Note: The Lead and Silver values are estimated (see case narrative). Zinc was present in the Prep Blank at 1.4 mg/Kg.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: TIS-BR-5

ACZ ID: ***L34351-05***
Date Sampled: *10/07/01 15:30*
Date Received: *10/12/01*
Sample Matrix: *Plant Tissue*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/22/01 5:28	jb
Arsenic, total (3050)	M6020 ICP-MS		U	mg/Kg	0.2	1	11/22/01 5:28	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.4	2	11/21/01 20:00	ct
Cadmium, total (3050)	M6020 ICP-MS		U	mg/Kg	0.04	0.2	11/22/01 5:28	jb
Chromium, total (3050)	M6010B ICP		U	mg/Kg	2	10	11/21/01 20:00	ct
Copper, total (3050)	M6010B ICP	4	B	mg/Kg	2	10	11/21/01 20:00	ct
Lead, total (3050)	M6020 ICP-MS	0.38		mg/Kg	0.04	0.2	12/01/01 7:58	lcj
Mercury, total	M7471 CVAA	5.7	H	mg/Kg	0.2	1	11/28/01 17:08	kdw
Nickel, total (3050)	M6010B ICP		U	mg/Kg	2	10	11/21/01 20:00	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.2	B	mg/Kg	0.2	1	11/27/01 17:53	kdw
Silver, total (3050)	M6020 ICP-MS		U	mg/Kg	0.02	0.1	12/01/01 7:58	lcj
Thallium, total (3050)	M6020 ICP-MS		U	mg/Kg	0.02	0.1	12/01/01 7:58	lcj
Zinc, total (3050)	M6010B ICP	17		mg/Kg	2	10	11/21/01 20:00	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	34.6		%	0.1	0.5	11/05/01 13:33	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Digestion	M3050						11/20/01 16:38	bf
Digestion - Hot Plate	M3050 ICP						11/20/01 15:23	bf
Plant Tissue Pulverization	USDA #60, Method 53						11/20/01 11:02	bf

Note: The Lead and Silver values are estimated (see case narrative). Zinc was present in the Prep Blank at 1.4 mg/Kg.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: TIS-BR-6

ACZ ID: ***L34351-06***
Date Sampled: *10/07/01 15:00*
Date Received: *10/12/01*
Sample Matrix: *Plant Tissue*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/22/01 5:32	jb
Arsenic, total (3050)	M6020 ICP-MS		U	mg/Kg	0.2	1	11/22/01 5:32	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.4	2	11/21/01 20:05	ct
Cadmium, total (3050)	M6020 ICP-MS		U	mg/Kg	0.04	0.2	11/22/01 5:32	jb
Chromium, total (3050)	M6010B ICP		U	mg/Kg	2	10	11/21/01 20:05	ct
Copper, total (3050)	M6010B ICP	3	B	mg/Kg	2	10	11/21/01 20:05	ct
Lead, total (3050)	M6020 ICP-MS	0.46		mg/Kg	0.04	0.2	12/01/01 8:02	lcj
Mercury, total	M7471 CVAA	0.73	H	mg/Kg	0.04	0.2	11/28/01 16:39	kdw
Nickel, total (3050)	M6010B ICP		U	mg/Kg	2	10	11/21/01 20:05	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/27/01 17:55	kdw
Silver, total (3050)	M6020 ICP-MS		U	mg/Kg	0.02	0.1	12/01/01 8:02	lcj
Thallium, total (3050)	M6020 ICP-MS		U	mg/Kg	0.02	0.1	12/01/01 8:02	lcj
Zinc, total (3050)	M6010B ICP	10		mg/Kg	2	10	11/21/01 20:05	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Moisture Content	M209F, Gravimetric - 105 C	42.1		%	0.1	0.5	11/05/01 13:40	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Digestion	M3050						11/20/01 16:45	bf
Digestion - Hot Plate	M3050 ICP						11/20/01 15:30	bf
Plant Tissue Pulverization	USDA #60, Method 53						11/20/01 11:21	bf

Note: The Lead and Silver values are estimated (see case narrative). Zinc was present in the Prep Blank at 1.4 mg/Kg.

Report Header Explanations

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

QC Sample Types

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

QC Sample Type Explanations

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

ACZ Qualifiers (Qual)

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

Method References

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

Comments

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

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34351***

Project ID: 2140031

Antimony, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131999													
WG131895PBS	PBS	11/22/01 4:26				U	mg/Kg		-0.06	0.06			
WG131895LCSS	LCSS	11/22/01 4:30	PCN15144	53.7		48.4	mg/Kg		0	113			
L34351-01MS	MS	11/22/01 4:39	MS011114-20	5	U	3.836	mg/Kg	76.7	75	125			
L34351-01MSD	MSD	11/22/01 4:43	MS011114-20	5	U	4.036	mg/Kg	80.7	75	125	5.08	20	
L34351-03DUP	DUP	11/22/01 5:19			U	U	mg/Kg				0	20	

Arsenic, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131999													
WG131895PBS	PBS	11/22/01 4:26				U	mg/Kg		-0.15	0.15			
WG131895LCSS	LCSS	11/22/01 4:30	PCN15144	177		178.1	mg/Kg		121	233			
L34351-01MS	MS	11/22/01 4:39	MS011114-20	20	U	16.19	mg/Kg	81	75	125			
L34351-01MSD	MSD	11/22/01 4:43	MS011114-20	20	U	17.04	mg/Kg	85.2	75	125	5.12	20	
L34351-03DUP	DUP	11/22/01 5:19			U	U	mg/Kg				0	20	

Beryllium, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131979													
WG131885PBS	PBS	11/21/01 19:04				U	mg/Kg		-0.2	0.2			
WG131885LCSS	LCSS	11/21/01 19:08	PCN15143	62.2		66.11	mg/Kg		48.8	75.9			
L34351-02MS	MS	11/21/01 19:27	II011107-2	100	U	88.99	mg/Kg	89	75	125			
L34351-02MSD	MSD	11/21/01 19:32	II011107-2	100	U	89.52	mg/Kg	89.5	75	125	0.59	20	
L34351-03DUP	DUP	11/21/01 19:51			U	U	mg/Kg				0	20	

Cadmium, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131999													
WG131895PBS	PBS	11/22/01 4:26				U	mg/Kg		-0.03	0.03			
WG131895LCSS	LCSS	11/22/01 4:30	PCN15144	191		191.7	mg/Kg		147	235			
L34351-01MS	MS	11/22/01 4:39	MS011114-20	20	U	17.316	mg/Kg	86.6	75	125			
L34351-01MSD	MSD	11/22/01 4:43	MS011114-20	20	U	17.84	mg/Kg	89.2	75	125	2.98	20	
L34351-03DUP	DUP	11/22/01 5:19			U	U	mg/Kg				0	20	

Chromium, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131979													
WG131885PBS	PBS	11/21/01 19:04				U	mg/Kg		-1	1			
WG131885LCSS	LCSS	11/21/01 19:08	PCN15143	111		108.4	mg/Kg		88.7	133			
L34351-02MS	MS	11/21/01 19:27	II011107-2	100	U	85.8	mg/Kg	85.8	75	125			
L34351-02MSD	MSD	11/21/01 19:32	II011107-2	100	U	83.8	mg/Kg	83.8	75	125	2.36	20	
L34351-03DUP	DUP	11/21/01 19:51			U	U	mg/Kg				0	20	

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Inorganic QC Summary

Cascade Earth Sciences, LTD.
Project ID: 2140031

ACZ Project ID: ***L34351***

Copper, total (3050) — M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131979													
WG131885PBS	PBS	11/21/01 19:04				U	mg/Kg		-1	1			
WG131885LCSS	LCSS	11/21/01 19:08	PCN15143	86		86.9	mg/Kg		70.4	101			
L34351-02MS	MS	11/21/01 19:27	II011107-2	100	10	98.8	mg/Kg	88.8	75	125			
L34351-02MSD	MSD	11/21/01 19:32	II011107-2	100	10	98.9	mg/Kg	88.9	75	125	0.1	20	
L34351-03DUP	DUP	11/21/01 19:51			3	4	mg/Kg				28.6	20	T

Lead, total (3050) — M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG132354													
WG131895PBS	PBS	12/01/01 6:53				.038	mg/Kg		-0.03	0.03			X
WG131895LCSS	LCSS	12/01/01 6:58	PCN15143	106		112.75	mg/Kg		80.7	131			
L34351-01MS	MS	12/01/01 7:12	MS011114-20	20	.62	19.376	mg/Kg	93.8	75	125			
L34351-01MSD	MSD	12/01/01 7:16	MS011114-20	20	.62	18.548	mg/Kg	89.6	75	125	4.37	20	
L34351-03DUP	DUP	12/01/01 7:39			.3	.86	mg/Kg				96.6	20	T

Mercury, total — M7471 CVAA

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG132085													
WG132085PBS	PBS	11/28/01 16:25				U	mg/Kg		-0.00044	0.00044			
L34351-03MS	MS	11/28/01 16:31	II011127-6	1.005	.12	1.3	mg/Kg	117.4	75	125			
L34351-03DUP	DUP	11/28/01 16:32			.12	.184	mg/Kg				42.1	20	T
WG132085LCSS	LCSS	11/28/01 17:06	PCN15142	29.6		33.23	mg/Kg		20.2	39.1			

Moisture Content — M209F, Gravimetric - 105 C

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131043													
WG131043PBS	PBS	11/05/01 13:00				99.79	%		99.9	100.1			
L34397-02DUP	DUP	11/05/01 14:00			3.9	4.19	%				7.2	35	

Nickel, total (3050) — M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131979													
WG131885PBS	PBS	11/21/01 19:04				U	mg/Kg		-1	1			
WG131885LCSS	LCSS	11/21/01 19:08	PCN15143	127		124.7	mg/Kg		99.4	155			
L34351-02MS	MS	11/21/01 19:27	II011107-2	100	U	86.9	mg/Kg	86.9	75	125			
L34351-02MSD	MSD	11/21/01 19:32	II011107-2	100	U	85	mg/Kg	85	75	125	2.21	20	
L34351-03DUP	DUP	11/21/01 19:51			U	U	mg/Kg				0	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34351***

Project ID: 2140031

Selenium, total (3050) M7742 Modified, AA-Hydride

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131986													
WG131885PBS	PBS	11/27/01 17:30				U	mg/Kg		-0.22	0.22			
L34351-03DUP	DUP	11/27/01 17:42			U	U	mg/Kg				0	20	
L34351-04MS	MS	11/27/01 17:45	SI011119-2	4	.6	4.75	mg/Kg	103.8	75	125			
L34351-04MSD	MSD	11/27/01 17:47	SI011119-2	4	.6	4.78	mg/Kg	104.5	75	125	0.63	20	
WG131885LCSS	LCSS	11/27/01 18:27	PCN15143	85.7		79.5	mg/Kg		63.5	108			
WG132327													
WG131885PBS	PBS	12/06/01 11:38				U	mg/Kg		-0.22	0.22			
WG131885LCSS	LCSS	12/06/01 11:40	PCN15143	85.7		85.2	mg/Kg		63.5	108			
L34351-03DUP	DUP	12/06/01 11:50			U	U	mg/Kg				0	20	
L34351-04MS	MS	12/06/01 11:55	SI011119-2	4	U	3.69	mg/Kg	92.3	75	125			
L34351-04MSD	MSD	12/06/01 11:57	SI011119-2	4	U	3.85	mg/Kg	96.3	75	125	4.24	20	

Silver, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG132354													
WG131895PBS	PBS	12/01/01 6:53				.0108	mg/Kg		-0.015	0.015			
WG131895LCSS	LCSS	12/01/01 6:58	PCN15143	184		260.8	mg/Kg		137	232			X
L34351-01MS	MS	12/01/01 7:12	MS011114-20	5	.05	4.672	mg/Kg	92.4	75	125			
L34351-01MSD	MSD	12/01/01 7:16	MS011114-20	5	.05	4.432	mg/Kg	87.6	75	125	5.27	20	
L34351-03DUP	DUP	12/01/01 7:39			U	U	mg/Kg				0	20	

Thallium, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG132354													
WG131895PBS	PBS	12/01/01 6:53				U	mg/Kg		-0.015	0.015			
WG131895LCSS	LCSS	12/01/01 6:58	PCN15143	145		165.1	mg/Kg		83.1	207			
L34351-01MS	MS	12/01/01 7:12	MS011114-20	10	.07	9.06	mg/Kg	89.9	75	125			
L34351-01MSD	MSD	12/01/01 7:16	MS011114-20	10	.07	8.496	mg/Kg	84.3	75	125	6.43	20	
L34351-03DUP	DUP	12/01/01 7:39			U	U	mg/Kg				0	20	

Zinc, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131979													
WG131885PBS	PBS	11/21/01 19:04				1.4	mg/Kg		-1	1			X
WG131885LCSS	LCSS	11/21/01 19:08	PCN15143	371		379	mg/Kg		287	456			
L34351-02MS	MS	11/21/01 19:27	II011107-2	100	20	109.3	mg/Kg	89.3	75	125			
L34351-02MSD	MSD	11/21/01 19:32	II011107-2	100	20	108.4	mg/Kg	88.4	75	125	0.83	20	
L34351-03DUP	DUP	11/21/01 19:51			14	18.2	mg/Kg				26.1	20	T

ACZ Laboratories, Inc.
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Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34351
Date Received: 10/12/2001
Received By: TONY

Receipt Verification

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

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

N/A

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

N/A

Shipping Containers

Cooler Id		Temp (°C)	Rad (µR/hr)
ACZ		2.2	13

Notes

ACZ Laboratories, Inc.
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Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34351
Date Received: 10/12/2001
Received By: TONY

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	Y < 2	YG< 2	B < 2	BG< 2	O < 2	T >12	P >12	N/A	RAD
L34351-01	TIS-BR-1										O	
L34351-02	TIS-BR-2										O	
L34351-03	TIS-BR-3										O	
L34351-04	TIS-BR-4										O	
L34351-05	TIS-BR-5										O	
L34351-06	TIS-BR-6										O	

ACZ Laboratories, Inc.

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CHAIN of CUSTODY

Quote #: CASCADE - Tissue **ACZ #:** L34351

CLIENT INFORMATION

Name to appear on Report and Invoice

CASCADE EARTH Sciences
225 S. Holly
Medford OR 97501
Attn: Mary Ann Armann Tel: 541 779 2280
Email:

Carbon Copy: **Report:** _____ **Invoice:** _____

Attn: Tel:
Email:

PROJECT INFORMATION

Client Project name and/or PO#:

2140031.

Shipping Company:
Tracking #:

ANALYSES REQUESTED *(required; attach list)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	13 metals						
TIS-BR-1	10/7/01 1615	Tissue	1	✓						
TIS-BR-2	10/7/01 1645		1	✓						
TIS-BR-3	10/7/01 1630		1	✓						
TIS-BR-4	10/7/01 1600		1	✓						
TIS-BR-5	10/7/01 1530		1	✓						
TIS-BR-6.	10/7/01. 1500		1	✓						

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

REMARKS

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[illegible] CES	10/9/01 1212	[illegible]	10/10/01 0805

PAGE 1 OF

FRMQA021.01.00.03 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.
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Analytical Report

Mary Ann Amann
Cascade Earth Sciences, LTD.
225 S. Holly St.
Medford, OR 97501

December 05, 2001

Project: L34358

Mary Ann Amann:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 11, 2001. This project has been assigned to ACZ's project number, L34358. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 8.0. The enclosed results relate only to the samples received under L34358. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

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

All samples and sub-samples associated with this project will be disposed of after January 05, 2002. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs.

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

Sue Barkey 05/Dec/01

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

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

Case Narrative

Cascade Earth Sciences, LTD.
Project: L34358

December 05, 2001

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 7 soil samples from Cascade Earth Sciences, LTD. on October 11, 2001. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L34358. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times except for Mercury.

Sample Analysis

These samples were analyzed for inorganic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The following anomalies were identified during the analysis of these samples:

1. The Total Antimony values are estimated due to matrix interferences on samples L34358-03 through 05. The MS/MSD's were out of control limits.

2. The Total Lead values are estimated due to matrix interferences on samples L34358-03 through 05 and 07. The MS/MSD and the Duplicate Precision were out of control limits.

3. The Total Mercury values are estimated due to matrix interferences on samples L34358-01 through 07. The Duplicate Precision (RPD) was out of control limits.

4. The Total Silver values are estimated due to matrix interferences on samples L34358-03 through 05. The LCSS was out fo control limits.

5. The Total Selenium values are estimated due to matrix interferences on samples L34358-03 through 05. The MS/MSD were out of control limits.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: RKF2-BR-1

ACZ ID: ***L34358-01***
Date Sampled: *10/07/01 10:30*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	M6020 ICP-MS	4.9		mg/Kg	0.2	1	11/16/01 19:23	jb
Mercury, total	M7471 CVAA	144	H	mg/Kg	2	10	11/20/01 16:30	kdw

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:20	bf
Digestion	M3050						11/12/01 23:04	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 16:06	lb

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: RKF-BR-2-0'

ACZ ID: ***L34358-02***
Date Sampled: *10/04/01 16:57*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	M6020 ICP-MS	2.4		mg/Kg	0.2	1	11/16/01 19:36	jb
Mercury, total	M7471 CVAA	32.5	H	mg/Kg	0.8	4	11/20/01 16:32	kdw

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:21	bf
Digestion	M3050						11/13/01 0:09	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 16:13	lb

Note: See case narrative for data flags.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: PBH-BR-3

ACZ ID: ***L34358-03***
Date Sampled: *10/04/01 14:16*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 19:40	jb
Arsenic, total (3050)	M6020 ICP-MS	1.9		mg/Kg	0.2	1	11/16/01 19:40	jb
Beryllium, total (3050)	M6010B ICP	0.5	B	mg/Kg	0.4	2	11/22/01 3:56	ct
Cadmium, total (3050)	M6020 ICP-MS	0.35		mg/Kg	0.04	0.2	11/16/01 19:40	jb
Chromium, total (3050)	M6010B ICP	55		mg/Kg	2	10	11/22/01 3:56	ct
Copper, total (3050)	M6010B ICP	38		mg/Kg	2	10	11/22/01 3:56	ct
Lead, total (3050)	M6020 ICP-MS	2.97		mg/Kg	0.04	0.2	11/16/01 19:40	jb
Mercury, total	M7471 CVAA	2650	H	mg/Kg	90	500	11/28/01 17:22	kdw
Nickel, total (3050)	M6010B ICP	114		mg/Kg	2	10	11/22/01 3:56	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.4	B	mg/Kg	0.1	0.5	12/01/01 16:18	kdw
Silver, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	12/03/01 14:07	lcj
Thallium, total (3050)	M6020 ICP-MS	0.30		mg/Kg	0.02	0.1	11/16/01 19:40	jb
Zinc, total (3050)	M6010B ICP	44		mg/Kg	2	10	11/22/01 3:56	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	7.7		units	0.1	0.1	11/19/01 10:21	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:23	bf
Digestion - Hot Plate	M3050 ICP						11/16/01 16:46	jp
Digestion	M3050						11/30/01 14:40	jp/lb
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 16:21	lb

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: PB-BR-4

ACZ ID: ***L34358-04***
Date Sampled: *10/04/01 14:10*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS	0.67		mg/Kg	0.08	0.4	11/16/01 19:45	jb
Arsenic, total (3050)	M6020 ICP-MS	7.7		mg/Kg	0.2	1	11/16/01 19:45	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.4	2	11/22/01 4:01	ct
Cadmium, total (3050)	M6020 ICP-MS	7.20		mg/Kg	0.04	0.2	11/16/01 19:45	jb
Chromium, total (3050)	M6010B ICP	25		mg/Kg	2	10	11/22/01 4:01	ct
Copper, total (3050)	M6010B ICP	58		mg/Kg	2	10	11/22/01 4:01	ct
Lead, total (3050)	M6020 ICP-MS	65.8		mg/Kg	0.1	0.5	11/26/01 21:07	lcj
Mercury, total	M7471 CVAA	165	H	mg/Kg	4	20	11/20/01 16:34	kdw
Nickel, total (3050)	M6010B ICP	71		mg/Kg	2	10	11/22/01 4:01	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	1.4		mg/Kg	0.1	0.5	12/01/01 16:19	kdw
Silver, total (3050)	M6020 ICP-MS	0.09	B	mg/Kg	0.05	0.3	12/03/01 14:11	lcj
Thallium, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/16/01 19:45	jb
Zinc, total (3050)	M6010B ICP	239		mg/Kg	2	10	11/22/01 4:01	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	55		t CaCO3/Kt	1	5	11/17/01 13:00	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	19		t CaCO3/Kt	1	5	11/17/01 13:00	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	-36		t CaCO3/Kt	1	5	11/17/01 13:00	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.9		%	0.1	0.5	11/16/01 15:45	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.01	B	%	0.01	0.1	11/17/01 0:00	bf
Sulfur Residual		0.36		%	0.01	0.1	11/17/01 0:00	bf
Sulfur Sulfate (HCl extractable)		1.40		%	0.01	0.1	11/17/01 0:00	bf
Sulfur Total		1.77		%	0.01	0.1	11/17/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:25	bf
Crush and Pulverize	USDA No. 1, 1972						11/13/01 11:05	jp
Digestion - Hot Plate	M3050 ICP						11/16/01 16:56	jp
Digestion	M3050						11/30/01 14:57	jp/lb
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 16:28	lb

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: PB-BR-5

ACZ ID: ***L34358-05***
Date Sampled: *10/04/01 14:23*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 20:02	jb
Arsenic, total (3050)	M6020 ICP-MS	7.6		mg/Kg	0.2	1	11/16/01 20:02	jb
Beryllium, total (3050)	M6010B ICP	0.4	B	mg/Kg	0.4	2	11/22/01 4:05	ct
Cadmium, total (3050)	M6020 ICP-MS	0.24		mg/Kg	0.04	0.2	11/16/01 20:02	jb
Chromium, total (3050)	M6010B ICP	149		mg/Kg	2	10	11/22/01 4:05	ct
Copper, total (3050)	M6010B ICP	70		mg/Kg	2	10	11/22/01 4:05	ct
Lead, total (3050)	M6020 ICP-MS	5.08		mg/Kg	0.04	0.2	11/16/01 20:02	jb
Mercury, total	M7471 CVAA	1380	H	mg/Kg	20	80	11/20/01 16:35	kdw
Nickel, total (3050)	M6010B ICP	80		mg/Kg	2	10	11/22/01 4:05	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.2	B	mg/Kg	0.1	0.5	12/01/01 16:25	kdw
Silver, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	12/03/01 14:25	lcj
Thallium, total (3050)	M6020 ICP-MS	0.23		mg/Kg	0.02	0.1	11/16/01 20:02	jb
Zinc, total (3050)	M6010B ICP	88		mg/Kg	2	10	11/22/01 4:05	ct

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:26	bf
Digestion - Hot Plate	M3050 ICP						11/16/01 17:05	jp
Digestion	M3050						11/30/01 15:13	jp/lb
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 16:35	lb

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: SSS-BR-6

ACZ ID: ***L34358-06***
Date Sampled: *10/04/01 15:02*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	M6020 ICP-MS	6.5		mg/Kg	0.2	1	11/16/01 20:07	jb
Mercury, total	M7471 CVAA	790	H	mg/Kg	20	80	11/20/01 16:37	kdw

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:28	bf
Digestion	M3050						11/13/01 6:43	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 16:42	lb

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: SSP-BR-7

ACZ ID: ***L34358-07***
Date Sampled: *10/04/01 10:47*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Arsenic, total (3050)	M6020 ICP-MS	1.6		mg/Kg	0.2	1	11/16/01 20:11	jb
Mercury, total	M7471 CVAA	1190	H	mg/Kg	20	80	11/20/01 16:40	kdw

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:30	bf
Digestion	M3050						11/13/01 7:49	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 16:49	lb

Note: See case narrative for data flags.

Report Header Explanations

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

QC Sample Types

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

QC Sample Type Explanations

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

ACZ Qualifiers (Qual)

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

Method References

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

Comments

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

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34358***

Project ID: 2140031

Antimony, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131747													
WG131445PBS	PBS	11/16/01 18:56				U	mg/Kg		-0.06	0.06			
WG131445LCSS	LCSS	11/16/01 19:00	PCN15144	53.7		23.8	mg/Kg		0	113			
L34339-33AS	AS	11/16/01 19:09	MS011022-4	10	U	9.008	mg/Kg	90.1	75	125			
L34339-33ASD	ASD	11/16/01 19:14	MS011022-4	10	U	9.08	mg/Kg	90.8	75	125	0.8	20	
L34358-04MS	MS	11/16/01 19:53	MS011114-20	5	.67	1.404	mg/Kg	14.7	75	125			X
L34358-04MSD	MSD	11/16/01 19:58	MS011114-20	5	.67	1.351	mg/Kg	13.6	75	125	3.85	20	X
L34358-07DUP	DUP	11/16/01 20:15			U	U	mg/Kg				0	20	

Arsenic, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131747													
WG131445PBS	PBS	11/16/01 18:56				U	mg/Kg		-0.15	0.15			
WG131445LCSS	LCSS	11/16/01 19:00	PCN15144	177		150.7	mg/Kg		121	233			
L34358-04MS	MS	11/16/01 19:53	MS011114-20	20	7.7	23.08	mg/Kg	76.9	75	125			
L34358-04MSD	MSD	11/16/01 19:58	MS011114-20	20	7.7	23.03	mg/Kg	76.7	75	125	0.22	20	
L34358-07DUP	DUP	11/16/01 20:15			1.6	1.12	mg/Kg				35.3	20	T

Beryllium, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131990													
WG131727PBS	PBS	11/22/01 3:18				U	mg/Kg		-0.2	0.2			
WG131727LCSS	LCSS	11/22/01 3:23	PCN15143	62.2		68.76	mg/Kg		48.8	75.9			
L34357-01MS	MS	11/22/01 3:37	II011107-2	100	U	90.52	mg/Kg	90.5	75	125			
L34357-01MSD	MSD	11/22/01 3:42	II011107-2	100	U	91.44	mg/Kg	91.4	75	125	1.01	20	
L34358-05DUP	DUP	11/22/01 4:10			.4	U	mg/Kg				0	20	

Cadmium, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131747													
WG131445PBS	PBS	11/16/01 18:56				U	mg/Kg		-0.03	0.03			
WG131445LCSS	LCSS	11/16/01 19:00	PCN15144	191		165.4	mg/Kg		147	235			
L34358-04MS	MS	11/16/01 19:53	MS011114-20	20	7.2	24.524	mg/Kg	86.6	75	125			
L34358-04MSD	MSD	11/16/01 19:58	MS011114-20	20	7.2	24.292	mg/Kg	85.5	75	125	0.95	20	
L34358-07DUP	DUP	11/16/01 20:15			.35	.257	mg/Kg				30.6	20	T

Chromium, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131990													
WG131727PBS	PBS	11/22/01 3:18				U	mg/Kg		-1	1			
WG131727LCSS	LCSS	11/22/01 3:23	PCN15143	111		116.7	mg/Kg		88.7	133			
L34357-01MS	MS	11/22/01 3:37	II011107-2	100	3	93.1	mg/Kg	90.1	75	125			
L34357-01MSD	MSD	11/22/01 3:42	II011107-2	100	3	95.7	mg/Kg	92.7	75	125	2.75	20	
L34358-05DUP	DUP	11/22/01 4:10			149	140.5	mg/Kg				5.9	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34358***

Project ID: 2140031

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131990													
WG131727PBS	PBS	11/22/01 3:18				U	mg/Kg		-1	1			
WG131727LCSS	LCSS	11/22/01 3:23	PCN15143	86		91.2	mg/Kg		70.4	101			
L34357-01MS	MS	11/22/01 3:37	II011107-2	100	315	379.8	mg/Kg	64.8	75	125			R
L34357-01MSD	MSD	11/22/01 3:42	II011107-2	100	315	434.5	mg/Kg	119.5	75	125	13.43	20	
L34358-05DUP	DUP	11/22/01 4:10			70	65.8	mg/Kg				6.2	20	

Lead, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131747													
WG131445PBS	PBS	11/16/01 18:56				.035	mg/Kg		-0.03	0.03			V
WG131445LCSS	LCSS	11/16/01 19:00	PCN15144	110		95.6	mg/Kg		81.2	139			
L34339-33AS	AS	11/16/01 19:09	MS011022-4	40	4.56	40.2	mg/Kg	89.1	75	125			
L34339-33ASD	ASD	11/16/01 19:14	MS011022-4	40	4.56	40.96	mg/Kg	91	75	125	1.87	20	
L34358-04MS	MS	11/16/01 19:53	MS011114-20	20	56.4	65.36	mg/Kg	44.8	75	125			X
L34358-04MSD	MSD	11/16/01 19:58	MS011114-20	20	56.4	62.56	mg/Kg	30.8	75	125	4.38	20	X
L34358-07DUP	DUP	11/16/01 20:15			2.42	2.303	mg/Kg				5	20	
WG132067													
WG131445PBS	PBS	11/26/01 20:23				.086	mg/Kg		-0.06	0.06			V
WG131445LCSS	LCSS	11/26/01 20:27	PCN15143	106		105.9	mg/Kg		80.7	131			
L34339-33AS	AS	11/26/01 20:45	MS011120-3	40	5.15	43.48	mg/Kg	95.8	75	125			
L34339-33ASD	ASD	11/26/01 20:49	MS011120-3	40	5.15	43.88	mg/Kg	96.8	75	125	0.92	20	
L34358-04MS	MS	11/26/01 21:11	MS011117-10	20	65.8	74.87	mg/Kg	45.4	75	125			X
L34358-04MSD	MSD	11/26/01 21:16	MS011117-10	20	65.8	71.5	mg/Kg	28.5	75	125	4.6	20	X
L34358-07DUP	DUP	11/26/01 21:38			2.8	2.245	mg/Kg				22	20	X

Mercury, total M7471 CVAA

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131704													
WG131704PBS	PBS	11/20/01 14:50				.00026	mg/Kg		-0.00044	0.00044			
WG131704LCSS	LCSS	11/20/01 14:52	PCN15142	29.6		25.386	mg/Kg		20.2	39.1			
L34339-31MS	MS	11/20/01 14:57	II011115-4	1.135	.36	1.72	mg/Kg	119.8	75	125			
L34339-31DUP	DUP	11/20/01 14:58			.36	.548	mg/Kg				41.4	25	T
WG131704LCSS	LCSS	11/20/01 17:20	PCN15142	29.6		36.81	mg/Kg		20.2	39.1			
WG132085													
WG132085PBS	PBS	11/28/01 16:25				U	mg/Kg		-0.00044	0.00044			
L34351-03MS	MS	11/28/01 16:31	II011127-6	1.005	.12	1.3	mg/Kg	117.4	75	125			
L34351-03DUP	DUP	11/28/01 16:32			.12	.184	mg/Kg				42.1	25	T
WG132085LCSS	LCSS	11/28/01 17:06	PCN15142	29.6		33.23	mg/Kg		20.2	39.1			

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131705													
WG131705LCSS	LCSS	11/16/01 10:00	PCN465	100		114.13	%		80	120			
L34353-05DUP	DUP	11/16/01 12:18			6.8	6.9	%				1.5	35	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34358***

Project ID: 2140031

Nickel, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131990													
WG131727PBS	PBS	11/22/01 3:18				U	mg/Kg		-1	1			
WG131727LCSS	LCSS	11/22/01 3:23	PCN15143	127		134.6	mg/Kg		99.4	155			
L34357-01MS	MS	11/22/01 3:37	II011107-2	100	2	89.6	mg/Kg	87.6	75	125			
L34357-01MSD	MSD	11/22/01 3:42	II011107-2	100	2	91	mg/Kg	89	75	125	1.55	20	
L34358-05DUP	DUP	11/22/01 4:10			80	77.8	mg/Kg				2.8	20	

pH, Corrosivity M9045

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131789													
L34358-03DUP	DUP	11/19/01 10:25			7.7	7.77	units				0.9	35	

Selenium, total (3050) M7742 Modified, AA-Hydride

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG132340													
WG132310PBS	PBS	12/01/01 15:46				U	mg/Kg		-0.22	0.22			
WG132310LCSS	LCSS	12/01/01 15:47	PCN15376	95		110.4	mg/Kg		70.4	120			
L34339-25MS	MS	12/01/01 15:50	SI011119-2	2	1.7	2.81	mg/Kg	55.5	75	125			X
L34339-25MSD	MSD	12/01/01 15:56	SI011119-2	2	1.7	3.02	mg/Kg	66	75	125	7.2	35	X
L34339-27AS	AS	12/01/01 16:00	II011126-5	1.666667	.5	1.97	mg/Kg	88.2	75	125			
L34339-27ASD	ASD	12/01/01 16:02	II011126-5	1.666667	.5	1.75	mg/Kg	75	75	125	11.83	35	
L34697-01DUP	DUP	12/01/01 16:28			.2	.24	mg/Kg				18.2	35	

Silver, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG132448													
WG132310PBS	PBS	12/03/01 13:27				U	mg/Kg		-0.015	0.015			
WG132310LCSS	LCSS	12/03/01 13:32	PCN15376	87.1		37	mg/Kg		47.3	127			X
L34358-04AS	AS	12/03/01 14:16	MS011120-3	25	.09	22.64	mg/Kg	90.2	75	125			
L34358-04ASD	ASD	12/03/01 14:20	MS011120-3	25	.09	22.78	mg/Kg	90.8	75	125	0.62	20	
L34697-01DUP	DUP	12/03/01 14:38			.09	.082	mg/Kg				9.3	20	

Sulfur Forms M600/2-78-054 3.2.4

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131629													
WG131629PBS	PBS	11/15/01 10:00				U	%		-0.02	0.02			
WG131629LCSS	LCSS	11/15/01 13:24	PCN11635	1.68		1.85	%		1.334	2.016			

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34358***

Project ID: 2140031

Thallium, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131747													
WG131445PBS	PBS	11/16/01 18:56				U	mg/Kg		-0.015	0.015			
WG131445LCSS	LCSS	11/16/01 19:00	PCN15144	157		132.05	mg/Kg		90	225			
L34358-04MS	MS	11/16/01 19:53	MS011114-20	10	.04	8.604	mg/Kg	85.6	75	125			
L34358-04MSD	MSD	11/16/01 19:58	MS011114-20	10	.04	8.504	mg/Kg	84.6	75	125	1.17	20	
L34358-07DUP	DUP	11/16/01 20:15			.16	.157	mg/Kg				1.9	20	

Zinc, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131990													
WG131727PBS	PBS	11/22/01 3:18				U	mg/Kg		-1	1			
WG131727LCSS	LCSS	11/22/01 3:23	PCN15143	371		416.6	mg/Kg		287	456			
L34357-01MS	MS	11/22/01 3:37	II011107-2	100	386	553.6	mg/Kg	167.6	75	125			X
L34357-01MSD	MSD	11/22/01 3:42	II011107-2	100	386	735.2	mg/Kg	349.2	75	125	28.18	20	X
L34358-05DUP	DUP	11/22/01 4:10			88	69.5	mg/Kg				23.5	20	X

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

Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34358
Date Received: 10/11/2001
Received By: george

Receipt Verification

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

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

N/A

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

N/A

Shipping Containers

Cooler Id		Temp (°C)	Rad (µR/hr)
ACZ		15	15

Notes

ACZ Laboratories, Inc.
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Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34358
Date Received: 10/12/2001
Received By: george

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	Y < 2	YG< 2	B < 2	BG< 2	O < 2	T >12	P >12	N/A	RAD
L34358-01	RKF2-BR-1										O	
L34358-02	RKF-BR-2-0'										O	
L34358-03	PBH-BR-3										O	
L34358-04	PBH-BR-4										O	
L34358-05	PBH-BR-5										O	
L34358-06	SSS-BR-6										O	
L34358-07	SSP-BR-7										O	

ACZ Laboratories, Inc.

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CHAIN of CUSTODY

Quote #: CASCADE - OTHER **ACZ #:** L34358

CLIENT INFORMATION

Name to appear on Report and Invoice

CASCADE EARTH Sciences
225 S. Holly
Medford OR 97501

Attn: Mary Ann Amann **Tel:**

Email:

Carbon Copy: **Report:** _____ **Invoice:** _____

Attn: **Tel:**

Email:

PROJECT INFORMATION

Client Project name and/or PO#:

2140031.

Shipping Company:

Tracking #:

ANALYSES REQUESTED *(required; attach list)*

SAMPLE IDENTIFICATION	DATE:TIME		Matrix	# of Containers	13 metals	Hg	As.	PASTE pH.			
RKF2-BR-1	10/7/01	1030	concrete	1		✓	✓				
RKF-BR-2-0'	10/4/01	1657	SO	1		✓	✓				
PBH-BR-3	10/4/01	1416	SO	1	✓			✓			
PB-BR-4	10/4/01	1410	SO	1	✓						
PB-BR-5	10/4/01	1423	SO	1	✓						
SSS-BR-6	10/4/01	1502	concrete powder	1		✓	✓				
SSP-BR-7	10/4/01	1047	SO	1		✓	✓				

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

REMARKS

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	10/9/01 1200	[signature]	
		[signature]	10-11-01 1000

PAGE 1 Of 1

FRMQA021.01.00.03 White - Return with sample. Yellow - Retain for your records.

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

Analytical Report

Mary Ann Amann
Cascade Earth Sciences, LTD.
225 S. Holly St.
Medford, OR 97501

December 05, 2001

Project: L34339

Mary Ann Amann:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 11, 2001. This project has been assigned to ACZ's project number, L34339. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 8.0. The enclosed results relate only to the samples received under L34339. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

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

All samples and sub-samples associated with this project will be disposed of after January 05, 2002. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs.

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

ACZ Laboratories, Inc.
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Case Narrative

Cascade Earth Sciences, LTD.
Project: L34339

December 05, 2001

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 34 soil samples from Cascade Earth Sciences, LTD. on October 11, 2001. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L34339. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times except for Mercury.

Sample Analysis

These samples were analyzed for inorganic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The following anomalies were identified during the analysis of these samples:

1. The Total Antimony values are estimated due to matrix interferences on samples L34339-01 through 12, and L34339-24 through 34. The MS/MSD's were out of control limits. See QC Summary for recoveries.

2. The Total Lead values are estimated due to matrix interferences on samples L34339-24 through 34. See QC Summary for QC failures.

3. The Total Mercury values are estimated due to matrix interferences on samples L34339-01 through 20, and L34339-29 through 31. The MS was out of control limits in WG131265 and the duplicate precision (RPD) was out of control limits in WG131704.

4. The Total Silver values are estimated due to matrix interferences on samples L34339-33 through 34. The LCSS was out fo control limits.

5. The Total Selenium values are estimated due to matrix interferences on samples L34339-19 through 34.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-1-0'

ACZ ID: ***L34339-01***
Date Sampled: *10/04/01 13:42*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 7:16	lcj
Arsenic, total (3050)	M6020 ICP-MS	0.5	B	mg/Kg	0.5	3	11/16/01 23:29	jb
Beryllium, total (3050)	M6010B ICP	0.5	B	mg/Kg	0.2	1	11/27/01 12:22	ct
Cadmium, total (3050)	M6020 ICP-MS	0.88		mg/Kg	0.04	0.2	11/14/01 7:16	lcj
Chromium, total (3050)	M6010B ICP	22		mg/Kg	1	5	11/27/01 12:22	ct
Copper, total (3050)	M6010B ICP	140		mg/Kg	1	5	11/27/01 12:22	ct
Lead, total (3050)	M6020 ICP-MS	4.08		mg/Kg	0.04	0.2	11/14/01 7:16	lcj
Mercury, total	M7471 CVAA	200	H	mg/Kg	4	20	11/09/01 12:20	kdw
Nickel, total (3050)	M6010B ICP	30		mg/Kg	1	5	11/27/01 12:22	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.7		mg/Kg	0.1	0.5	11/19/01 14:38	kdw
Silver, total (3050)	M6020 ICP-MS	0.10	B	mg/Kg	0.02	0.1	11/14/01 7:16	lcj
Thallium, total (3050)	M6020 ICP-MS	0.06	B	mg/Kg	0.02	0.1	11/14/01 7:16	lcj
Zinc, total (3050)	M6010B ICP	54		mg/Kg	1	5	11/27/01 12:22	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/15/01 12:00	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	14		t CaCO3/Kt	1	5	11/15/01 12:00	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	13		t CaCO3/Kt	1	5	11/15/01 12:00	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.4		%	0.1	0.5	11/09/01 11:27	jp
pH, Corrosivity	M9045	6.4		units	0.1	0.1	11/14/01 11:30	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.03	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.03	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:00	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:34	bf
Digestion	M3050						11/10/01 22:16	lab
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:30	jp

Note: See case narrative for data flags.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-1-1'

ACZ ID: ***L34339-02***
Date Sampled: *10/04/01 13:42*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 7:21	lcj
Arsenic, total (3050)	M6020 ICP-MS		U	mg/Kg	0.5	3	11/16/01 23:34	jb
Beryllium, total (3050)	M6010B ICP	0.6	B	mg/Kg	0.2	1	11/27/01 12:29	ct
Cadmium, total (3050)	M6020 ICP-MS	1.01		mg/Kg	0.04	0.2	11/14/01 7:21	lcj
Chromium, total (3050)	M6010B ICP	22		mg/Kg	1	5	11/27/01 12:29	ct
Copper, total (3050)	M6010B ICP	174		mg/Kg	1	5	11/27/01 12:29	ct
Lead, total (3050)	M6020 ICP-MS	3.15		mg/Kg	0.04	0.2	11/14/01 7:21	lcj
Mercury, total	M7471 CVAA	16.9	H	mg/Kg	0.4	2	11/09/01 11:07	kdw
Nickel, total (3050)	M6010B ICP	29		mg/Kg	1	5	11/27/01 12:29	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.3	B	mg/Kg	0.1	0.5	11/19/01 14:39	kdw
Silver, total (3050)	M6020 ICP-MS	0.10		mg/Kg	0.02	0.1	11/14/01 7:21	lcj
Thallium, total (3050)	M6020 ICP-MS	0.03	B	mg/Kg	0.02	0.1	11/14/01 7:21	lcj
Zinc, total (3050)	M6010B ICP	55		mg/Kg	1	5	11/27/01 12:29	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/15/01 12:01	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	12		t CaCO3/Kt	1	5	11/15/01 12:01	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	12		t CaCO3/Kt	1	5	11/15/01 12:01	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.2		%	0.1	0.5	11/09/01 11:40	jp
pH, Corrosivity	M9045	6.3		units	0.1	0.1	11/14/01 11:40	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.02	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:03	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:35	bf
Digestion	M3050						11/10/01 23:02	lab
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:30	jp

Note: See case narrative for data flags.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-2-0'

ACZ ID: ***L34339-03***
Date Sampled: *10/04/01 13:57*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 7:25	lcj
Arsenic, total (3050)	M6020 ICP-MS	0.7	B	mg/Kg	0.5	3	11/16/01 23:38	jb
Beryllium, total (3050)	M6010B ICP	0.7	B	mg/Kg	0.2	1	11/27/01 12:33	ct
Cadmium, total (3050)	M6020 ICP-MS	1.05		mg/Kg	0.04	0.2	11/14/01 7:25	lcj
Chromium, total (3050)	M6010B ICP	36		mg/Kg	1	5	11/27/01 12:33	ct
Copper, total (3050)	M6010B ICP	158		mg/Kg	1	5	11/27/01 12:33	ct
Lead, total (3050)	M6020 ICP-MS	3.36		mg/Kg	0.04	0.2	11/14/01 7:25	lcj
Mercury, total	M7471 CVAA	15.2	H	mg/Kg	0.4	2	11/09/01 11:08	kdw
Nickel, total (3050)	M6010B ICP	32		mg/Kg	1	5	11/27/01 12:33	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.1	0.5	11/19/01 14:41	kdw
Silver, total (3050)	M6020 ICP-MS	0.12		mg/Kg	0.02	0.1	11/14/01 7:25	lcj
Thallium, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	11/14/01 7:25	lcj
Zinc, total (3050)	M6010B ICP	59		mg/Kg	1	5	11/27/01 12:33	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/15/01 12:03	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	13		t CaCO3/Kt	1	5	11/15/01 12:03	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	12		t CaCO3/Kt	1	5	11/15/01 12:03	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.3		%	0.1	0.5	11/09/01 11:54	jp
pH, Corrosivity	M9045	6.1		units	0.1	0.1	11/14/01 11:50	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.02	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.02	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.03	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:06	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:36	bf
Digestion	M3050						11/10/01 23:48	lab
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:31	jp

Note: See case narrative for data flags.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-2-1'

ACZ ID: ***L34339-04***
Date Sampled: *10/04/01 13:57*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 7:30	lcj
Arsenic, total (3050)	M6020 ICP-MS		U	mg/Kg	0.5	3	11/16/01 23:43	jb
Beryllium, total (3050)	M6010B ICP	0.6	B	mg/Kg	0.2	1	11/27/01 12:36	ct
Cadmium, total (3050)	M6020 ICP-MS	1.07		mg/Kg	0.04	0.2	11/14/01 7:30	lcj
Chromium, total (3050)	M6010B ICP	22		mg/Kg	1	5	11/27/01 12:36	ct
Copper, total (3050)	M6010B ICP	164		mg/Kg	1	5	11/27/01 12:36	ct
Lead, total (3050)	M6020 ICP-MS	1.91		mg/Kg	0.04	0.2	11/14/01 7:30	lcj
Mercury, total	M7471 CVAA	1.2	BH	mg/Kg	0.4	2	11/09/01 11:09	kdw
Nickel, total (3050)	M6010B ICP	32		mg/Kg	1	5	11/27/01 12:36	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.1	0.5	11/19/01 14:43	kdw
Silver, total (3050)	M6020 ICP-MS	0.11		mg/Kg	0.02	0.1	11/14/01 7:30	lcj
Thallium, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/14/01 7:30	lcj
Zinc, total (3050)	M6010B ICP	54		mg/Kg	1	5	11/27/01 12:36	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/15/01 12:04	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	15		t CaCO3/Kt	1	5	11/15/01 12:04	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	15		t CaCO3/Kt	1	5	11/15/01 12:04	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.5		%	0.1	0.5	11/09/01 12:08	jp
pH, Corrosivity	M9045	6.2		units	0.1	0.1	11/14/01 12:00	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:09	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:37	bf
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Digestion	M3050						11/11/01 0:34	lab
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:32	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-3-0'

ACZ ID: ***L34339-05***
Date Sampled: *10/04/01 14:44*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 7:34	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.3	B	mg/Kg	0.5	3	11/16/01 23:47	jb
Beryllium, total (3050)	M6010B ICP	0.5	B	mg/Kg	0.2	1	11/27/01 12:47	ct
Cadmium, total (3050)	M6020 ICP-MS	0.45		mg/Kg	0.04	0.2	11/14/01 7:34	lcj
Chromium, total (3050)	M6010B ICP	26		mg/Kg	1	5	11/27/01 12:47	ct
Copper, total (3050)	M6010B ICP	43		mg/Kg	1	5	11/27/01 12:47	ct
Lead, total (3050)	M6020 ICP-MS	2.33		mg/Kg	0.04	0.2	11/14/01 7:34	lcj
Mercury, total	M7471 CVAA	600	BH	mg/Kg	400	2000	11/09/01 13:08	kdw
Nickel, total (3050)	M6010B ICP	41		mg/Kg	1	5	11/27/01 12:47	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	1.5		mg/Kg	0.1	0.5	11/19/01 14:44	kdw
Silver, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/14/01 7:34	lcj
Thallium, total (3050)	M6020 ICP-MS	0.25		mg/Kg	0.02	0.1	11/14/01 7:34	lcj
Zinc, total (3050)	M6010B ICP	34		mg/Kg	1	5	11/27/01 12:47	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	3	B	t CaCO3/Kt	1	5	11/15/01 12:06	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	80		t CaCO3/Kt	1	5	11/15/01 12:06	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	78		t CaCO3/Kt	1	5	11/15/01 12:06	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	8.0		%	0.1	0.5	11/12/01 9:09	jp
pH, Corrosivity	M9045	7.6		units	0.1	0.1	11/14/01 12:10	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.05	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.05	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.08	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:12	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:37	bf
Digestion	M3050						11/11/01 1:20	lab
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:33	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-3-1'

ACZ ID: ***L34339-06***
Date Sampled: *10/04/01 14:44*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 7:47	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.1	B	mg/Kg	0.5	3	11/16/01 23:52	jb
Beryllium, total (3050)	M6010B ICP	0.5	B	mg/Kg	0.2	1	11/27/01 12:51	ct
Cadmium, total (3050)	M6020 ICP-MS	0.49		mg/Kg	0.04	0.2	11/14/01 7:47	lcj
Chromium, total (3050)	M6010B ICP	43		mg/Kg	1	5	11/27/01 12:51	ct
Copper, total (3050)	M6010B ICP	43		mg/Kg	1	5	11/27/01 12:51	ct
Lead, total (3050)	M6020 ICP-MS	2.34		mg/Kg	0.04	0.2	11/14/01 7:47	lcj
Mercury, total	M7471 CVAA	2400	H	mg/Kg	100	500	11/09/01 12:58	kdw
Nickel, total (3050)	M6010B ICP	54		mg/Kg	1	5	11/27/01 12:51	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	1.6		mg/Kg	0.1	0.5	11/19/01 14:46	kdw
Silver, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	11/14/01 7:47	lcj
Thallium, total (3050)	M6020 ICP-MS	0.28		mg/Kg	0.02	0.1	11/14/01 7:47	lcj
Zinc, total (3050)	M6010B ICP	42		mg/Kg	1	5	11/27/01 12:51	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	2	B	t CaCO3/Kt	1	5	11/15/01 12:07	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	89		t CaCO3/Kt	1	5	11/15/01 12:07	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	87		t CaCO3/Kt	1	5	11/15/01 12:07	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	8.9		%	0.1	0.5	11/12/01 9:39	jp
pH, Corrosivity	M9045	7.6		units	0.1	0.1	11/14/01 12:20	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.04	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.04	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.07	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:15	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:38	bf
Digestion	M3050						11/11/01 2:06	lab
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:33	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-4

ACZ ID: ***L34339-07***
Date Sampled: *10/04/01 13:57*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 7:52	lcj
Arsenic, total (3050)	M6020 ICP-MS	0.6	B	mg/Kg	0.5	3	11/16/01 23:56	jb
Beryllium, total (3050)	M6010B ICP	0.7	B	mg/Kg	0.2	1	11/27/01 12:55	ct
Cadmium, total (3050)	M6020 ICP-MS	1.04		mg/Kg	0.04	0.2	11/14/01 7:52	lcj
Chromium, total (3050)	M6010B ICP	33		mg/Kg	1	5	11/27/01 12:55	ct
Copper, total (3050)	M6010B ICP	151		mg/Kg	1	5	11/27/01 12:55	ct
Lead, total (3050)	M6020 ICP-MS	2.77		mg/Kg	0.04	0.2	11/14/01 7:52	lcj
Mercury, total	M7471 CVAA	9.3	H	mg/Kg	0.4	2	11/09/01 11:18	kdw
Nickel, total (3050)	M6010B ICP	31		mg/Kg	1	5	11/27/01 12:55	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.1	0.5	11/19/01 14:47	kdw
Silver, total (3050)	M6020 ICP-MS	0.12		mg/Kg	0.02	0.1	11/14/01 7:52	lcj
Thallium, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	11/14/01 7:52	lcj
Zinc, total (3050)	M6010B ICP	57		mg/Kg	1	5	11/27/01 12:55	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/15/01 12:09	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	10		t CaCO3/Kt	1	5	11/15/01 12:09	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	10		t CaCO3/Kt	1	5	11/15/01 12:09	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.0		%	0.1	0.5	11/09/01 12:21	jp
pH, Corrosivity	M9045	7.0		units	0.1	0.1	11/14/01 12:30	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.02	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.01	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:18	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:39	bf
Digestion	M3050						11/11/01 2:52	lab
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:34	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-5-0'

ACZ ID: ***L34339-08***
Date Sampled: *10/04/01 16:30*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 7:56	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.3	B	mg/Kg	0.5	3	11/17/01 0:00	jb
Beryllium, total (3050)	M6010B ICP	0.6	B	mg/Kg	0.2	1	11/27/01 12:58	ct
Cadmium, total (3050)	M6020 ICP-MS	1.10		mg/Kg	0.04	0.2	11/14/01 7:56	lcj
Chromium, total (3050)	M6010B ICP	30		mg/Kg	1	5	11/27/01 12:58	ct
Copper, total (3050)	M6010B ICP	69		mg/Kg	1	5	11/27/01 12:58	ct
Lead, total (3050)	M6020 ICP-MS	39.90		mg/Kg	0.04	0.2	11/14/01 7:56	lcj
Mercury, total	M7471 CVAA	794	H	mg/Kg	8	40	11/09/01 12:26	kdw
Nickel, total (3050)	M6010B ICP	30		mg/Kg	1	5	11/27/01 12:58	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.5		mg/Kg	0.1	0.5	11/19/01 14:54	kdw
Silver, total (3050)	M6020 ICP-MS	0.19		mg/Kg	0.02	0.1	11/14/01 7:56	lcj
Thallium, total (3050)	M6020 ICP-MS	0.09	B	mg/Kg	0.02	0.1	11/14/01 7:56	lcj
Zinc, total (3050)	M6010B ICP	73		mg/Kg	1	5	11/27/01 12:58	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	2	B	t CaCO3/Kt	1	5	11/15/01 12:11	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	19		t CaCO3/Kt	1	5	11/15/01 12:11	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	18		t CaCO3/Kt	1	5	11/15/01 12:11	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.9		%	0.1	0.5	11/09/01 12:35	jp
pH, Corrosivity	M9045	6.8		units	0.1	0.1	11/14/01 12:40	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.03	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.03	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.05	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:22	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:40	bf
Digestion	M3050						11/11/01 3:38	lab
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:35	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-5-1'

ACZ ID: ***L34339-09***
Date Sampled: *10/04/01 16:30*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 8:01	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.1	B	mg/Kg	0.5	3	11/17/01 0:05	jb
Beryllium, total (3050)	M6010B ICP	0.7	B	mg/Kg	0.2	1	11/27/01 13:02	ct
Cadmium, total (3050)	M6020 ICP-MS	1.21		mg/Kg	0.04	0.2	11/14/01 8:01	lcj
Chromium, total (3050)	M6010B ICP	33		mg/Kg	1	5	11/27/01 13:02	ct
Copper, total (3050)	M6010B ICP	84		mg/Kg	1	5	11/27/01 13:02	ct
Lead, total (3050)	M6020 ICP-MS	7.44		mg/Kg	0.04	0.2	11/14/01 8:01	lcj
Mercury, total	M7471 CVAA	98	H	mg/Kg	4	20	11/09/01 12:27	kdw
Nickel, total (3050)	M6010B ICP	22		mg/Kg	1	5	11/27/01 13:02	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.1	0.5	11/19/01 14:55	kdw
Silver, total (3050)	M6020 ICP-MS	0.23		mg/Kg	0.02	0.1	11/14/01 8:01	lcj
Thallium, total (3050)	M6020 ICP-MS	0.09	B	mg/Kg	0.02	0.1	11/14/01 8:01	lcj
Zinc, total (3050)	M6010B ICP	49		mg/Kg	1	5	11/27/01 13:02	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/15/01 12:12	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		U	t CaCO3/Kt	1	5	11/15/01 12:12	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	-1		t CaCO3/Kt	1	5	11/15/01 12:12	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3		U	%	0.1	0.5	11/09/01 12:49	jp
pH, Corrosivity	M9045	6.1		units	0.1	0.1	11/14/01 13:00	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.04	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.02	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.01	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:25	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:40	bf
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Digestion	M3050						11/11/01 4:24	lab
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:36	jp

Note: See case narrative for data flags.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-6-0'

ACZ ID: ***L34339-10***
Date Sampled: *10/04/01 16:45*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 8:05	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.0	B	mg/Kg	0.5	3	11/17/01 0:18	jb
Beryllium, total (3050)	M6010B ICP	0.7	B	mg/Kg	0.2	1	11/27/01 13:06	ct
Cadmium, total (3050)	M6020 ICP-MS	1.20		mg/Kg	0.04	0.2	11/14/01 8:05	lcj
Chromium, total (3050)	M6010B ICP	38		mg/Kg	1	5	11/27/01 13:06	ct
Copper, total (3050)	M6010B ICP	75		mg/Kg	1	5	11/27/01 13:06	ct
Lead, total (3050)	M6020 ICP-MS	4.66		mg/Kg	0.04	0.2	11/14/01 8:05	lcj
Mercury, total	M7471 CVAA	67	H	mg/Kg	2	10	11/09/01 12:29	kdw
Nickel, total (3050)	M6010B ICP	30		mg/Kg	1	5	11/27/01 13:06	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.1	0.5	11/19/01 14:57	kdw
Silver, total (3050)	M6020 ICP-MS	0.16		mg/Kg	0.02	0.1	11/14/01 8:05	lcj
Thallium, total (3050)	M6020 ICP-MS	0.08	B	mg/Kg	0.02	0.1	11/14/01 8:05	lcj
Zinc, total (3050)	M6010B ICP	57		mg/Kg	1	5	11/27/01 13:06	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/15/01 12:14	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	21		t CaCO3/Kt	1	5	11/15/01 12:14	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	21		t CaCO3/Kt	1	5	11/15/01 12:14	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	2.1		%	0.1	0.5	11/09/01 13:02	jp
pH, Corrosivity	M9045	6.3		units	0.1	0.1	11/14/01 13:20	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.01	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:28	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:41	bf
Digestion	M3050						11/11/01 5:10	lab
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:37	jp

Note: See case narrative for data flags.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-6-1'

ACZ ID: ***L34339-11***
Date Sampled: *10/04/01 16:45*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 8:10	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.0	B	mg/Kg	0.5	3	11/16/01 22:00	jb
Beryllium, total (3050)	M6010B ICP	0.6	B	mg/Kg	0.2	1	11/27/01 13:09	ct
Cadmium, total (3050)	M6020 ICP-MS	1.17		mg/Kg	0.04	0.2	11/14/01 8:10	lcj
Chromium, total (3050)	M6010B ICP	37		mg/Kg	1	5	11/27/01 13:09	ct
Copper, total (3050)	M6010B ICP	80		mg/Kg	1	5	11/27/01 13:09	ct
Lead, total (3050)	M6020 ICP-MS	6.85		mg/Kg	0.04	0.2	11/14/01 8:10	lcj
Mercury, total	M7471 CVAA		UH	mg/Kg	0.4	2	11/09/01 11:23	kdw
Nickel, total (3050)	M6010B ICP	29		mg/Kg	1	5	11/27/01 13:09	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.1	0.5	11/19/01 14:58	kdw
Silver, total (3050)	M6020 ICP-MS	0.17		mg/Kg	0.02	0.1	11/14/01 8:10	lcj
Thallium, total (3050)	M6020 ICP-MS	0.08	B	mg/Kg	0.02	0.1	11/14/01 8:10	lcj
Zinc, total (3050)	M6010B ICP	61		mg/Kg	1	5	11/27/01 13:09	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/15/01 12:15	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	21		t CaCO3/Kt	1	5	11/15/01 12:15	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	20		t CaCO3/Kt	1	5	11/15/01 12:15	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	2.1		%	0.1	0.5	11/09/01 13:16	jp
pH, Corrosivity	M9045	6.5		units	0.1	0.1	11/14/01 13:30	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.02	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.02	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.02	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:31	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:42	bf
Digestion	M3050						11/11/01 5:56	lab
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:37	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-7-0'

ACZ ID: ***L34339-12***
Date Sampled: *10/04/01 16:40*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 8:27	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.1	B	mg/Kg	0.5	3	11/16/01 22:18	jb
Beryllium, total (3050)	M6010B ICP	0.7	B	mg/Kg	0.2	1	11/27/01 13:13	ct
Cadmium, total (3050)	M6020 ICP-MS	1.30		mg/Kg	0.04	0.2	11/14/01 8:27	lcj
Chromium, total (3050)	M6010B ICP	34		mg/Kg	1	5	11/27/01 13:13	ct
Copper, total (3050)	M6010B ICP	71		mg/Kg	1	5	11/27/01 13:13	ct
Lead, total (3050)	M6020 ICP-MS	5.24		mg/Kg	0.04	0.2	11/14/01 8:27	lcj
Mercury, total	M7471 CVAA	258000	H	mg/Kg	9000	40000	11/09/01 13:09	kdw
Nickel, total (3050)	M6010B ICP	23		mg/Kg	1	5	11/27/01 13:13	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	1.3		mg/Kg	0.1	0.5	11/19/01 15:00	kdw
Silver, total (3050)	M6020 ICP-MS	0.19		mg/Kg	0.02	0.1	11/14/01 8:27	lcj
Thallium, total (3050)	M6020 ICP-MS	0.10		mg/Kg	0.02	0.1	11/14/01 8:27	lcj
Zinc, total (3050)	M6010B ICP	52		mg/Kg	1	5	11/27/01 13:13	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/15/01 12:17	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	20		t CaCO3/Kt	1	5	11/15/01 12:17	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	19		t CaCO3/Kt	1	5	11/15/01 12:17	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	2.0		%	0.1	0.5	11/09/01 13:29	jp
pH, Corrosivity	M9045	6.6		units	0.1	0.1	11/14/01 13:40	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.05	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.01	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.01	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:34	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:43	bf
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Digestion	M3050						11/11/01 8:14	lab
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:38	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-7-1'

ACZ ID: ***L34339-13***
Date Sampled: *10/04/01 16:40*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 10:50	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.2		mg/Kg	0.2	1	11/14/01 10:50	lcj
Beryllium, total (3050)	M6010B ICP	0.7	B	mg/Kg	0.2	1	11/27/01 13:16	ct
Cadmium, total (3050)	M6020 ICP-MS	0.91		mg/Kg	0.04	0.2	11/14/01 10:50	lcj
Chromium, total (3050)	M6010B ICP	46		mg/Kg	1	5	11/27/01 13:16	ct
Copper, total (3050)	M6010B ICP	104		mg/Kg	1	5	11/27/01 13:16	ct
Lead, total (3050)	M6020 ICP-MS	1.94		mg/Kg	0.04	0.2	11/14/01 10:50	lcj
Mercury, total	M7471 CVAA	187	H	mg/Kg	4	20	11/09/01 12:34	kdw
Nickel, total (3050)	M6010B ICP	26		mg/Kg	1	5	11/27/01 13:16	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.1	0.5	11/19/01 15:02	kdw
Silver, total (3050)	M6020 ICP-MS	0.13		mg/Kg	0.02	0.1	11/14/01 10:50	lcj
Thallium, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	11/14/01 10:50	lcj
Zinc, total (3050)	M6010B ICP	54		mg/Kg	1	5	11/27/01 13:16	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	2	B	t CaCO3/Kt	1	5	11/15/01 12:19	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	13		t CaCO3/Kt	1	5	11/15/01 12:19	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	11		t CaCO3/Kt	1	5	11/15/01 12:19	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.3		%	0.1	0.5	11/09/01 13:43	jp
pH, Corrosivity	M9045	6.5		units	0.1	0.1	11/14/01 13:50	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.03	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.03	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.06	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:37	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:44	bf
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Digestion	M3050						11/10/01 22:16	lab
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:39	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-8-2'

ACZ ID: ***L34339-14***
Date Sampled: *10/04/01 15:48*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 10:55	lcj
Arsenic, total (3050)	M6020 ICP-MS	2.2		mg/Kg	0.2	1	11/14/01 10:55	lcj
Beryllium, total (3050)	M6010B ICP	0.4	B	mg/Kg	0.2	1	11/27/01 13:20	ct
Cadmium, total (3050)	M6020 ICP-MS	0.63		mg/Kg	0.04	0.2	11/14/01 10:55	lcj
Chromium, total (3050)	M6010B ICP	24		mg/Kg	1	5	11/27/01 13:20	ct
Copper, total (3050)	M6010B ICP	38		mg/Kg	1	5	11/27/01 13:20	ct
Lead, total (3050)	M6020 ICP-MS	3.57		mg/Kg	0.04	0.2	11/14/01 10:55	lcj
Mercury, total	M7471 CVAA	201	H	mg/Kg	4	20	11/09/01 12:35	kdw
Nickel, total (3050)	M6010B ICP	40		mg/Kg	1	5	11/27/01 13:20	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.2	B	mg/Kg	0.1	0.5	11/19/01 15:03	kdw
Silver, total (3050)	M6020 ICP-MS	0.08	B	mg/Kg	0.02	0.1	11/14/01 10:55	lcj
Thallium, total (3050)	M6020 ICP-MS	0.11		mg/Kg	0.02	0.1	11/14/01 10:55	lcj
Zinc, total (3050)	M6010B ICP	39		mg/Kg	1	5	11/27/01 13:20	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/15/01 12:20	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	11		t CaCO3/Kt	1	5	11/15/01 12:20	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	10		t CaCO3/Kt	1	5	11/15/01 12:20	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.1		%	0.1	0.5	11/09/01 13:57	jp
pH, Corrosivity	M9045	6.7		units	0.1	0.1	11/14/01 14:00	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.09	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.03	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:40	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:44	bf
Digestion	M3050						11/10/01 23:02	lab
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:40	jp

Note: See case narrative for data flags.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-9-1'

ACZ ID: ***L34339-15***
Date Sampled: *10/04/01 15:15*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 10:59	lcj
Arsenic, total (3050)	M6020 ICP-MS	2.0		mg/Kg	0.2	1	11/14/01 10:59	lcj
Beryllium, total (3050)	M6010B ICP	0.5	B	mg/Kg	0.2	1	11/27/01 13:31	ct
Cadmium, total (3050)	M6020 ICP-MS	0.82		mg/Kg	0.04	0.2	11/14/01 10:59	lcj
Chromium, total (3050)	M6010B ICP	20		mg/Kg	1	5	11/27/01 13:31	ct
Copper, total (3050)	M6010B ICP	59		mg/Kg	1	5	11/27/01 13:31	ct
Lead, total (3050)	M6020 ICP-MS	3.86		mg/Kg	0.04	0.2	11/14/01 10:59	lcj
Mercury, total	M7471 CVAA	524	H	mg/Kg	5	20	11/09/01 12:36	kdw
Nickel, total (3050)	M6010B ICP	31		mg/Kg	1	5	11/27/01 13:31	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.2	B	mg/Kg	0.1	0.5	11/19/01 15:05	kdw
Silver, total (3050)	M6020 ICP-MS	0.11		mg/Kg	0.02	0.1	11/14/01 10:59	lcj
Thallium, total (3050)	M6020 ICP-MS	0.08	B	mg/Kg	0.02	0.1	11/14/01 10:59	lcj
Zinc, total (3050)	M6010B ICP	56		mg/Kg	1	5	11/27/01 13:31	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	2	B	t CaCO3/Kt	1	5	11/15/01 12:22	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	10		t CaCO3/Kt	1	5	11/15/01 12:22	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	8		t CaCO3/Kt	1	5	11/15/01 12:22	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.0		%	0.1	0.5	11/09/01 14:10	jp
pH, Corrosivity	M9045	6.8		units	0.1	0.1	11/14/01 14:10	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.02	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.03	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.05	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:44	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:25	bf
Digestion	M3050						11/10/01 23:48	lab
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:40	jp

Note: See case narrative for data flags.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-9-1.5'

ACZ ID: ***L34339-16***
Date Sampled: *10/04/01 16:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 11:03	lcj
Arsenic, total (3050)	M6020 ICP-MS	3.0		mg/Kg	0.2	1	11/14/01 11:03	lcj
Beryllium, total (3050)	M6010B ICP	0.5	B	mg/Kg	0.2	1	11/27/01 13:35	ct
Cadmium, total (3050)	M6020 ICP-MS	0.55		mg/Kg	0.04	0.2	11/14/01 11:03	lcj
Chromium, total (3050)	M6010B ICP	19		mg/Kg	1	5	11/27/01 13:35	ct
Copper, total (3050)	M6010B ICP	46		mg/Kg	1	5	11/27/01 13:35	ct
Lead, total (3050)	M6020 ICP-MS	3.58		mg/Kg	0.04	0.2	11/14/01 11:03	lcj
Mercury, total	M7471 CVAA	244	H	mg/Kg	4	20	11/09/01 12:38	kdw
Nickel, total (3050)	M6010B ICP	41		mg/Kg	1	5	11/27/01 13:35	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.1	0.5	11/19/01 15:11	kdw
Silver, total (3050)	M6020 ICP-MS	0.08	B	mg/Kg	0.02	0.1	11/14/01 11:03	lcj
Thallium, total (3050)	M6020 ICP-MS	0.14		mg/Kg	0.02	0.1	11/14/01 11:03	lcj
Zinc, total (3050)	M6010B ICP	41		mg/Kg	1	5	11/27/01 13:35	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/15/01 12:23	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	22		t CaCO3/Kt	1	5	11/15/01 12:23	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	21		t CaCO3/Kt	1	5	11/15/01 12:23	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	2.2		%	0.1	0.5	11/09/01 14:24	jp
pH, Corrosivity	M9045	6.5		units	0.1	0.1	11/14/01 14:20	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.01	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.02	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.03	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:47	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:25	bf
Digestion	M3050						11/11/01 0:34	lab
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:41	jp

Note: See case narrative for data flags.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-10-1'

ACZ ID: ***L34339-17***
Date Sampled: *10/04/01 15:27*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 11:08	lcj
Arsenic, total (3050)	M6020 ICP-MS	6.1		mg/Kg	0.2	1	11/14/01 11:08	lcj
Beryllium, total (3050)	M6010B ICP	0.4	B	mg/Kg	0.2	1	11/27/01 13:38	ct
Cadmium, total (3050)	M6020 ICP-MS	0.25		mg/Kg	0.04	0.2	11/14/01 11:08	lcj
Chromium, total (3050)	M6010B ICP	17		mg/Kg	1	5	11/27/01 13:38	ct
Copper, total (3050)	M6010B ICP	52		mg/Kg	1	5	11/27/01 13:38	ct
Lead, total (3050)	M6020 ICP-MS	3.90		mg/Kg	0.04	0.2	11/14/01 11:08	lcj
Mercury, total	M7471 CVAA	495	H	mg/Kg	4	20	11/09/01 12:39	kdw
Nickel, total (3050)	M6010B ICP	31		mg/Kg	1	5	11/27/01 13:38	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.4	B	mg/Kg	0.1	0.5	11/19/01 15:13	kdw
Silver, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/14/01 11:08	lcj
Thallium, total (3050)	M6020 ICP-MS	0.13		mg/Kg	0.02	0.1	11/14/01 11:08	lcj
Zinc, total (3050)	M6010B ICP	46		mg/Kg	1	5	11/27/01 13:38	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	3	B	t CaCO3/Kt	1	5	11/15/01 12:25	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	11		t CaCO3/Kt	1	5	11/15/01 12:25	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	8		t CaCO3/Kt	1	5	11/15/01 12:25	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.1		%	0.1	0.5	11/09/01 14:38	jp
pH, Corrosivity	M9045	6.2		units	0.1	0.1	11/14/01 14:30	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.09	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.08	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:50	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:26	bf
Digestion	M3050						11/11/01 1:20	lab
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:42	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-11

ACZ ID: ***L34339-18***
Date Sampled: *10/04/01 14:14*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 11:21	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.2		mg/Kg	0.2	1	11/14/01 11:21	lcj
Beryllium, total (3050)	M6010B ICP	0.6	B	mg/Kg	0.2	1	11/27/01 13:42	ct
Cadmium, total (3050)	M6020 ICP-MS	0.67		mg/Kg	0.04	0.2	11/14/01 11:21	lcj
Chromium, total (3050)	M6010B ICP	33		mg/Kg	1	5	11/27/01 13:42	ct
Copper, total (3050)	M6010B ICP	43		mg/Kg	1	5	11/27/01 13:42	ct
Lead, total (3050)	M6020 ICP-MS	3.35		mg/Kg	0.04	0.2	11/14/01 11:21	lcj
Mercury, total	M7471 CVAA	496	H	mg/Kg	4	20	11/09/01 12:40	kdw
Nickel, total (3050)	M6010B ICP	70		mg/Kg	1	5	11/27/01 13:42	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.2	B	mg/Kg	0.1	0.5	11/19/01 15:14	kdw
Silver, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/14/01 11:21	lcj
Thallium, total (3050)	M6020 ICP-MS	0.25		mg/Kg	0.02	0.1	11/14/01 11:21	lcj
Zinc, total (3050)	M6010B ICP	52		mg/Kg	1	5	11/27/01 13:42	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/15/01 12:26	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	35		t CaCO3/Kt	1	5	11/15/01 12:26	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	34		t CaCO3/Kt	1	5	11/15/01 12:26	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	3.5		%	0.1	0.5	11/12/01 10:08	jp
pH, Corrosivity	M9045	7.5		units	0.1	0.1	11/14/01 14:40	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.01	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.01	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.01	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:53	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:27	bf
Digestion	M3050						11/11/01 2:06	lab
Digestion - Hot Plate	M3050 ICP						11/26/01 11:00	sw
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:43	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-12

ACZ ID: ***L34339-19***
Date Sampled: *10/04/01 12:10*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 11:26	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.7		mg/Kg	0.2	1	11/14/01 11:26	lcj
Beryllium, total (3050)	M6010B ICP	0.8	B	mg/Kg	0.4	2	11/14/01 19:21	ct
Cadmium, total (3050)	M6020 ICP-MS	1.14		mg/Kg	0.04	0.2	11/14/01 11:26	lcj
Chromium, total (3050)	M6010B ICP	15		mg/Kg	2	10	11/14/01 19:21	ct
Copper, total (3050)	M6010B ICP	28		mg/Kg	2	10	11/14/01 19:21	ct
Lead, total (3050)	M6020 ICP-MS	6.56		mg/Kg	0.04	0.2	11/14/01 11:26	lcj
Mercury, total	M7471 CVAA	1.4	BH	mg/Kg	0.4	2	11/09/01 11:36	kdw
Nickel, total (3050)	M6010B ICP	17		mg/Kg	2	10	11/14/01 19:21	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/27/01 16:47	kdw
Silver, total (3050)	M6020 ICP-MS	0.13		mg/Kg	0.02	0.1	11/14/01 11:26	lcj
Thallium, total (3050)	M6020 ICP-MS	0.11		mg/Kg	0.02	0.1	11/14/01 11:26	lcj
Zinc, total (3050)	M6010B ICP	69		mg/Kg	2	10	11/14/01 19:21	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	6.2		units	0.1	0.1	11/14/01 14:50	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:56	lnc
Digestion	M3050						11/11/01 2:52	lab
Digestion - Hot Plate	M3050 ICP						11/13/01 18:05	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:44	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-13

ACZ ID: ***L34339-20***
Date Sampled: *10/04/01 11:30*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 11:30	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.1		mg/Kg	0.2	1	11/14/01 11:30	lcj
Beryllium, total (3050)	M6010B ICP	0.7	B	mg/Kg	0.4	2	11/14/01 19:41	ct
Cadmium, total (3050)	M6020 ICP-MS	0.93		mg/Kg	0.04	0.2	11/14/01 11:30	lcj
Chromium, total (3050)	M6010B ICP	23		mg/Kg	2	10	11/14/01 19:41	ct
Copper, total (3050)	M6010B ICP	29		mg/Kg	2	10	11/14/01 19:41	ct
Lead, total (3050)	M6020 ICP-MS	5.06		mg/Kg	0.04	0.2	11/14/01 11:30	lcj
Mercury, total	M7471 CVAA	0.5	BH	mg/Kg	0.4	2	11/09/01 11:37	kdw
Nickel, total (3050)	M6010B ICP	19		mg/Kg	2	10	11/14/01 19:41	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/27/01 16:48	kdw
Silver, total (3050)	M6020 ICP-MS	0.10		mg/Kg	0.02	0.1	11/14/01 11:30	lcj
Thallium, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/14/01 11:30	lcj
Zinc, total (3050)	M6010B ICP	46		mg/Kg	2	10	11/14/01 19:41	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	5.6		units	0.1	0.1	11/14/01 15:10	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/29/01 11:59	lnc
Digestion	M3050						11/11/01 3:38	lab
Digestion - Hot Plate	M3050 ICP						11/13/01 20:29	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/30/01 14:44	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-14

ACZ ID: ***L34339-21***
Date Sampled: *10/04/01 17:30*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 11:35	lcj
Arsenic, total (3050)	M6020 ICP-MS	0.9	B	mg/Kg	0.2	1	11/14/01 11:35	lcj
Beryllium, total (3050)	M6010B ICP	0.8	B	mg/Kg	0.4	2	11/14/01 19:56	ct
Cadmium, total (3050)	M6020 ICP-MS	0.95		mg/Kg	0.04	0.2	11/14/01 11:35	lcj
Chromium, total (3050)	M6010B ICP	58		mg/Kg	2	10	11/14/01 19:56	ct
Copper, total (3050)	M6010B ICP	109		mg/Kg	2	10	11/14/01 19:56	ct
Lead, total (3050)	M6020 ICP-MS	3.61		mg/Kg	0.04	0.2	11/14/01 11:35	lcj
Mercury, total	M7471 CVAA	0.28	H	mg/Kg	0.04	0.2	11/19/01 15:04	kdw
Nickel, total (3050)	M6010B ICP	31		mg/Kg	2	10	11/14/01 19:56	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/27/01 16:50	kdw
Silver, total (3050)	M6020 ICP-MS	0.10	B	mg/Kg	0.02	0.1	11/14/01 11:35	lcj
Thallium, total (3050)	M6020 ICP-MS	0.06	B	mg/Kg	0.02	0.1	11/14/01 11:35	lcj
Zinc, total (3050)	M6010B ICP	99		mg/Kg	2	10	11/14/01 19:56	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/15/01 12:28	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	14		t CaCO3/Kt	1	5	11/15/01 12:28	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	14		t CaCO3/Kt	1	5	11/15/01 12:28	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.4		%	0.1	0.5	11/12/01 9:23	jp
pH, Corrosivity	M9045	5.5		units	0.1	0.1	11/16/01 14:07	lb
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.04	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.01	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:00	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:28	bf
Digestion	M3050						11/11/01 4:24	lab
Digestion - Hot Plate	M3050 ICP						11/13/01 21:17	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 14:00	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-15

ACZ ID: ***L34339-22***
Date Sampled: *10/04/01 17:55*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 11:39	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.0		mg/Kg	0.2	1	11/14/01 11:39	lcj
Beryllium, total (3050)	M6010B ICP	0.8	B	mg/Kg	0.4	2	11/14/01 20:01	ct
Cadmium, total (3050)	M6020 ICP-MS	0.49		mg/Kg	0.04	0.2	11/14/01 11:39	lcj
Chromium, total (3050)	M6010B ICP	15		mg/Kg	2	10	11/14/01 20:01	ct
Copper, total (3050)	M6010B ICP	29		mg/Kg	2	10	11/14/01 20:01	ct
Lead, total (3050)	M6020 ICP-MS	6.73		mg/Kg	0.04	0.2	11/14/01 11:39	lcj
Mercury, total	M7471 CVAA	1.57	H	mg/Kg	0.04	0.2	11/19/01 15:05	kdw
Nickel, total (3050)	M6010B ICP	13		mg/Kg	2	10	11/14/01 20:01	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/27/01 16:51	kdw
Silver, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	11/14/01 11:39	lcj
Thallium, total (3050)	M6020 ICP-MS	0.06	B	mg/Kg	0.02	0.1	11/14/01 11:39	lcj
Zinc, total (3050)	M6010B ICP	50		mg/Kg	2	10	11/14/01 20:01	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	4	B	t CaCO3/Kt	1	5	11/15/01 12:30	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	23		t CaCO3/Kt	1	5	11/15/01 12:30	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	19		t CaCO3/Kt	1	5	11/15/01 12:30	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	2.3		%	0.1	0.5	11/12/01 10:05	jp
pH, Corrosivity	M9045	6.5		units	0.1	0.1	11/16/01 14:09	lb
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.06	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.09	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.13		%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:02	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:29	bf
Digestion	M3050						11/11/01 5:10	lab
Digestion - Hot Plate	M3050 ICP						11/13/01 22:05	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 14:02	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-16-0'

ACZ ID: ***L34339-23***
Date Sampled: *10/04/01 10:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/14/01 11:44	lcj
Arsenic, total (3050)	M6020 ICP-MS	1.0		mg/Kg	0.2	1	11/14/01 11:44	lcj
Beryllium, total (3050)	M6010B ICP	0.5	B	mg/Kg	0.4	2	11/14/01 20:06	ct
Cadmium, total (3050)	M6020 ICP-MS	0.57		mg/Kg	0.04	0.2	11/14/01 11:44	lcj
Chromium, total (3050)	M6010B ICP	40		mg/Kg	2	10	11/14/01 20:06	ct
Copper, total (3050)	M6010B ICP	35		mg/Kg	2	10	11/14/01 20:06	ct
Lead, total (3050)	M6020 ICP-MS	4.14		mg/Kg	0.04	0.2	11/14/01 11:44	lcj
Mercury, total	M7471 CVAA	345	H	mg/Kg	8	40	11/09/01 15:13	kdw
Nickel, total (3050)	M6010B ICP	52		mg/Kg	2	10	11/14/01 20:06	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/27/01 16:53	kdw
Silver, total (3050)	M6020 ICP-MS	0.06	B	mg/Kg	0.02	0.1	11/14/01 11:44	lcj
Thallium, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/14/01 11:44	lcj
Zinc, total (3050)	M6010B ICP	66		mg/Kg	2	10	11/14/01 20:06	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/15/01 12:00	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	129		t CaCO3/Kt	1	5	11/15/01 12:00	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	128		t CaCO3/Kt	1	5	11/15/01 12:00	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	12.9		%	0.1	0.5	11/12/01 10:38	jp
pH, Corrosivity	M9045	7.5		units	0.1	0.1	11/16/01 14:11	lb
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.05	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.03	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.03	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:04	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:30	bf
Digestion	M3050						11/11/01 5:56	lab
Digestion - Hot Plate	M3050 ICP						11/13/01 22:53	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 14:04	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-16-1'

ACZ ID: ***L34339-24***
Date Sampled: *10/04/01 10:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 4:37	jb
Arsenic, total (3050)	M6020 ICP-MS	1.0		mg/Kg	0.2	1	11/16/01 4:37	jb
Beryllium, total (3050)	M6010B ICP	0.5	B	mg/Kg	0.4	2	11/14/01 20:11	ct
Cadmium, total (3050)	M6020 ICP-MS	0.46		mg/Kg	0.04	0.2	11/16/01 4:37	jb
Chromium, total (3050)	M6010B ICP	44		mg/Kg	2	10	11/14/01 20:11	ct
Copper, total (3050)	M6010B ICP	42		mg/Kg	2	10	11/14/01 20:11	ct
Lead, total (3050)	M6020 ICP-MS	4.23		mg/Kg	0.04	0.2	11/16/01 4:37	jb
Mercury, total	M7471 CVAA	139	H	mg/Kg	5	20	11/09/01 15:15	kdw
Nickel, total (3050)	M6010B ICP	50		mg/Kg	2	10	11/14/01 20:11	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/27/01 16:55	kdw
Silver, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/17/01 5:07	lcj
Thallium, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/16/01 4:37	jb
Zinc, total (3050)	M6010B ICP	66		mg/Kg	2	10	11/14/01 20:11	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/15/01 12:06	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	72		t CaCO3/Kt	1	5	11/15/01 12:06	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	71		t CaCO3/Kt	1	5	11/15/01 12:06	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	7.2		%	0.1	0.5	11/12/01 11:08	jp
pH, Corrosivity	M9045	7.5		units	0.1	0.1	11/16/01 14:14	lb
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.03	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.03	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.03	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:06	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:31	bf
Digestion - Hot Plate	M3050 ICP						11/13/01 23:41	jp
Digestion	M3050						11/11/01 8:14	lab
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 14:06	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-17-1'

ACZ ID: ***L34339-25***
Date Sampled: *10/04/01 09:50*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 5:21	jb
Arsenic, total (3050)	M6020 ICP-MS	2.7		mg/Kg	0.2	1	11/17/01 5:52	lcj
Beryllium, total (3050)	M6010B ICP	0.6	B	mg/Kg	0.4	2	11/14/01 20:16	ct
Cadmium, total (3050)	M6020 ICP-MS	0.35		mg/Kg	0.04	0.2	11/16/01 5:21	jb
Chromium, total (3050)	M6010B ICP	61		mg/Kg	2	10	11/14/01 20:16	ct
Copper, total (3050)	M6010B ICP	57		mg/Kg	2	10	11/14/01 20:16	ct
Lead, total (3050)	M6020 ICP-MS	7.81		mg/Kg	0.04	0.2	11/16/01 5:21	jb
Mercury, total	M7471 CVAA	1790	H	mg/Kg	20	100	11/09/01 15:16	kdw
Nickel, total (3050)	M6010B ICP	127		mg/Kg	2	10	11/14/01 20:16	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	1.7		mg/Kg	0.1	0.5	12/01/01 15:49	kdw
Silver, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/16/01 5:21	jb
Thallium, total (3050)	M6020 ICP-MS	0.24		mg/Kg	0.02	0.1	11/16/01 5:21	jb
Zinc, total (3050)	M6010B ICP	65		mg/Kg	2	10	11/14/01 20:16	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/15/01 12:12	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	113		t CaCO3/Kt	1	5	11/15/01 12:12	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	112		t CaCO3/Kt	1	5	11/15/01 12:12	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	11.3		%	0.1	0.5	11/12/01 11:37	jp
pH, Corrosivity	M9045	7.8		units	0.1	0.1	11/16/01 14:16	lb
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.02	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.01	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.03	B	%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:09	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:32	bf
Digestion	M3050						11/30/01 10:33	jp/lb
Digestion - Hot Plate	M3050 ICP						11/14/01 0:29	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 14:09	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-18

ACZ ID: ***L34339-26***
Date Sampled: *10/04/01 11:38*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS	0.10	B	mg/Kg	0.08	0.4	11/16/01 5:34	jb
Arsenic, total (3050)	M6020 ICP-MS	6.4		mg/Kg	0.2	1	11/17/01 5:56	lcj
Beryllium, total (3050)	M6010B ICP	0.5	B	mg/Kg	0.4	2	11/14/01 20:26	ct
Cadmium, total (3050)	M6020 ICP-MS	0.50		mg/Kg	0.04	0.2	11/16/01 5:34	jb
Chromium, total (3050)	M6010B ICP	66		mg/Kg	2	10	11/14/01 20:26	ct
Copper, total (3050)	M6010B ICP	80		mg/Kg	2	10	11/14/01 20:26	ct
Lead, total (3050)	M6020 ICP-MS	13.50		mg/Kg	0.04	0.2	11/16/01 5:34	jb
Mercury, total	M7471 CVAA	3420	H	mg/Kg	50	200	11/19/01 16:56	kdw
Nickel, total (3050)	M6010B ICP	132		mg/Kg	2	10	11/14/01 20:26	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.3	B	mg/Kg	0.1	0.5	12/01/01 15:57	kdw
Silver, total (3050)	M6020 ICP-MS	0.15		mg/Kg	0.02	0.1	11/16/01 5:34	jb
Thallium, total (3050)	M6020 ICP-MS	0.20		mg/Kg	0.02	0.1	11/16/01 5:34	jb
Zinc, total (3050)	M6010B ICP	187		mg/Kg	2	10	11/14/01 20:26	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	4	B	t CaCO3/Kt	1	5	11/15/01 12:18	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	56		t CaCO3/Kt	1	5	11/15/01 12:18	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	52		t CaCO3/Kt	1	5	11/15/01 12:18	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	5.6		%	0.1	0.5	11/12/01 12:07	jp
pH, Corrosivity	M9045	7.5		units	0.1	0.1	11/16/01 14:18	lb
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Residual		0.12		%	0.01	0.1	11/13/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.02	B	%	0.01	0.1	11/13/01 0:00	bf
Sulfur Total		0.12		%	0.01	0.1	11/13/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:11	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:33	bf
Digestion	M3050						11/30/01 11:22	jp/lb
Digestion - Hot Plate	M3050 ICP						11/14/01 2:05	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 14:11	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-19-0'

ACZ ID: ***L34339-27***
Date Sampled: *10/04/01 10:20*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 5:39	jb
Arsenic, total (3050)	M6020 ICP-MS	1.8		mg/Kg	0.2	1	11/17/01 6:01	lcj
Beryllium, total (3050)	M6010B ICP	0.6	B	mg/Kg	0.4	2	11/14/01 20:31	ct
Cadmium, total (3050)	M6020 ICP-MS	0.40		mg/Kg	0.04	0.2	11/16/01 5:39	jb
Chromium, total (3050)	M6010B ICP	66		mg/Kg	2	10	11/14/01 20:31	ct
Copper, total (3050)	M6010B ICP	47		mg/Kg	2	10	11/14/01 20:31	ct
Lead, total (3050)	M6020 ICP-MS	3.38		mg/Kg	0.04	0.2	11/16/01 5:39	jb
Mercury, total	M7471 CVAA	1780	H	mg/Kg	20	100	11/09/01 15:21	kdw
Nickel, total (3050)	M6010B ICP	139		mg/Kg	2	10	11/14/01 20:31	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.5	B	mg/Kg	0.1	0.5	12/01/01 15:59	kdw
Silver, total (3050)	M6020 ICP-MS	0.06	B	mg/Kg	0.02	0.1	11/16/01 5:39	jb
Thallium, total (3050)	M6020 ICP-MS	0.35		mg/Kg	0.02	0.1	11/16/01 5:39	jb
Zinc, total (3050)	M6010B ICP	49		mg/Kg	2	10	11/14/01 20:31	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/15/01 12:24	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	84		t CaCO3/Kt	1	5	11/15/01 12:24	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	84		t CaCO3/Kt	1	5	11/15/01 12:24	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	8.4		%	0.1	0.5	11/12/01 12:37	jp
pH, Corrosivity	M9045	7.7		units	0.1	0.1	11/16/01 14:21	lb
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Residual		0.04	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Total		0.02	B	%	0.01	0.1	11/14/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:13	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:34	bf
Digestion	M3050						11/30/01 11:39	jp/lb
Digestion - Hot Plate	M3050 ICP						11/14/01 2:53	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 14:13	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-19-1'

ACZ ID: ***L34339-28***
Date Sampled: *10/04/01 10:20*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 5:43	jb
Arsenic, total (3050)	M6020 ICP-MS	2.0		mg/Kg	0.2	1	11/17/01 6:14	lcj
Beryllium, total (3050)	M6010B ICP	0.6	B	mg/Kg	0.4	2	11/14/01 20:36	ct
Cadmium, total (3050)	M6020 ICP-MS	0.38		mg/Kg	0.04	0.2	11/16/01 5:43	jb
Chromium, total (3050)	M6010B ICP	60		mg/Kg	2	10	11/14/01 20:36	ct
Copper, total (3050)	M6010B ICP	59		mg/Kg	2	10	11/14/01 20:36	ct
Lead, total (3050)	M6020 ICP-MS	2.85		mg/Kg	0.04	0.2	11/16/01 5:43	jb
Mercury, total	M7471 CVAA	2590	H	mg/Kg	20	100	11/09/01 15:22	kdw
Nickel, total (3050)	M6010B ICP	133		mg/Kg	2	10	11/14/01 20:36	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.3	B	mg/Kg	0.1	0.5	12/01/01 16:34	kdw
Silver, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	11/16/01 5:43	jb
Thallium, total (3050)	M6020 ICP-MS	0.36		mg/Kg	0.02	0.1	11/16/01 5:43	jb
Zinc, total (3050)	M6010B ICP	54		mg/Kg	2	10	11/14/01 20:36	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	2	B	t CaCO3/Kt	1	5	11/15/01 12:30	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	76		t CaCO3/Kt	1	5	11/15/01 12:30	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	75		t CaCO3/Kt	1	5	11/15/01 12:30	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	7.6		%	0.1	0.5	11/12/01 13:07	jp
pH, Corrosivity	M9045	7.6		units	0.1	0.1	11/16/01 14:23	lb
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Residual		0.04	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.02	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Total		0.05	B	%	0.01	0.1	11/14/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:16	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:35	bf
Digestion	M3050						11/30/01 11:55	jp/lb
Digestion - Hot Plate	M3050 ICP						11/14/01 3:41	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 14:16	jp

Note: See case narrative for data flags.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-20

ACZ ID: ***L34339-29***
Date Sampled: *10/07/01 15:30*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 5:47	jb
Arsenic, total (3050)	M6020 ICP-MS	0.5	B	mg/Kg	0.2	1	11/17/01 6:19	lcj
Beryllium, total (3050)	M6010B ICP	0.6	B	mg/Kg	0.4	2	11/14/01 20:41	ct
Cadmium, total (3050)	M6020 ICP-MS	0.44		mg/Kg	0.04	0.2	11/16/01 5:47	jb
Chromium, total (3050)	M6010B ICP	35		mg/Kg	2	10	11/14/01 20:41	ct
Copper, total (3050)	M6010B ICP	41		mg/Kg	2	10	11/14/01 20:41	ct
Lead, total (3050)	M6020 ICP-MS	3.24		mg/Kg	0.04	0.2	11/16/01 5:47	jb
Mercury, total	M7471 CVAA	0.44	H	mg/Kg	0.04	0.2	11/20/01 14:53	kdw
Nickel, total (3050)	M6010B ICP	37		mg/Kg	2	10	11/14/01 20:41	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.1	0.5	12/01/01 16:05	kdw
Silver, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	11/16/01 5:47	jb
Thallium, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/16/01 5:47	jb
Zinc, total (3050)	M6010B ICP	74		mg/Kg	2	10	11/14/01 20:41	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/15/01 12:36	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	10		t CaCO3/Kt	1	5	11/15/01 12:36	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	9		t CaCO3/Kt	1	5	11/15/01 12:36	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.0		%	0.1	0.5	11/12/01 10:46	jp
pH, Corrosivity	M9045	5.6		units	0.1	0.1	11/16/01 14:26	lb
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Residual		0.03	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.02	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Total		0.02	B	%	0.01	0.1	11/14/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:18	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:36	bf
Digestion	M3050						11/30/01 12:12	jp/lb
Digestion - Hot Plate	M3050 ICP						11/14/01 4:29	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 14:18	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-21

ACZ ID: ***L34339-30***
Date Sampled: *10/07/01 15:45*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 6:01	jb
Arsenic, total (3050)	M6020 ICP-MS	0.9	B	mg/Kg	0.2	1	11/17/01 6:32	lcj
Beryllium, total (3050)	M6010B ICP	0.8	B	mg/Kg	0.4	2	11/14/01 20:56	ct
Cadmium, total (3050)	M6020 ICP-MS	0.84		mg/Kg	0.04	0.2	11/16/01 6:01	jb
Chromium, total (3050)	M6010B ICP	107		mg/Kg	2	10	11/14/01 20:56	ct
Copper, total (3050)	M6010B ICP	27		mg/Kg	2	10	11/14/01 20:56	ct
Lead, total (3050)	M6020 ICP-MS	6.67		mg/Kg	0.04	0.2	11/16/01 6:01	jb
Mercury, total	M7471 CVAA	0.33	H	mg/Kg	0.05	0.2	11/20/01 16:27	kdw
Nickel, total (3050)	M6010B ICP	59		mg/Kg	2	10	11/14/01 20:56	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.1	0.5	12/01/01 16:11	kdw
Silver, total (3050)	M6020 ICP-MS	0.09	B	mg/Kg	0.02	0.1	11/16/01 6:01	jb
Thallium, total (3050)	M6020 ICP-MS	0.10	B	mg/Kg	0.02	0.1	11/16/01 6:01	jb
Zinc, total (3050)	M6010B ICP	53		mg/Kg	2	10	11/14/01 20:56	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	5.7		units	0.1	0.1	11/16/01 14:28	lb

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:20	lnc
Digestion - Hot Plate	M3050 ICP						11/14/01 5:17	jp
Digestion	M3050						11/30/01 12:28	jp/lb
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 14:20	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-22

ACZ ID: ***L34339-31***
Date Sampled: *10/07/01 00:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 6:05	jb
Arsenic, total (3050)	M6020 ICP-MS	0.4	B	mg/Kg	0.2	1	11/17/01 6:37	lcj
Beryllium, total (3050)	M6010B ICP	0.4	B	mg/Kg	0.4	2	11/14/01 21:01	ct
Cadmium, total (3050)	M6020 ICP-MS	0.42		mg/Kg	0.04	0.2	11/16/01 6:05	jb
Chromium, total (3050)	M6010B ICP	30		mg/Kg	2	10	11/14/01 21:01	ct
Copper, total (3050)	M6010B ICP	36		mg/Kg	2	10	11/14/01 21:01	ct
Lead, total (3050)	M6020 ICP-MS	2.71		mg/Kg	0.04	0.2	11/16/01 6:05	jb
Mercury, total	M7471 CVAA	0.36	H	mg/Kg	0.04	0.2	11/20/01 14:55	kdw
Nickel, total (3050)	M6010B ICP	33		mg/Kg	2	10	11/14/01 21:01	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.1	B	mg/Kg	0.1	0.5	12/01/01 16:12	kdw
Silver, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	11/16/01 6:05	jb
Thallium, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/16/01 6:05	jb
Zinc, total (3050)	M6010B ICP	65		mg/Kg	2	10	11/14/01 21:01	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/15/01 12:42	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	11		t CaCO3/Kt	1	5	11/15/01 12:42	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	11		t CaCO3/Kt	1	5	11/15/01 12:42	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.1		%	0.1	0.5	11/12/01 11:28	jp
pH, Corrosivity	M9045	5.5		units	0.1	0.1	11/16/01 14:35	lb
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.05	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Residual			U	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Total		0.01	B	%	0.01	0.1	11/14/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:23	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:37	bf
Digestion	M3050						11/30/01 12:45	jp/lb
Digestion - Hot Plate	M3050 ICP						11/14/01 6:05	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 14:23	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-24

ACZ ID: ***L34339-32***
Date Sampled: *10/04/01 12:01*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS	0.30	B	mg/Kg	0.08	0.4	11/16/01 6:10	jb
Arsenic, total (3050)	M6020 ICP-MS	25.6		mg/Kg	0.2	1	11/17/01 6:41	lcj
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.4	2	11/14/01 21:06	ct
Cadmium, total (3050)	M6020 ICP-MS	0.40		mg/Kg	0.04	0.2	11/16/01 6:10	jb
Chromium, total (3050)	M6010B ICP	23		mg/Kg	2	10	11/14/01 21:06	ct
Copper, total (3050)	M6010B ICP	55		mg/Kg	2	10	11/14/01 21:06	ct
Lead, total (3050)	M6020 ICP-MS	21.40		mg/Kg	0.04	0.2	11/16/01 6:10	jb
Mercury, total	M7471 CVAA	917	H	mg/Kg	8	40	11/09/01 15:23	kdw
Nickel, total (3050)	M6010B ICP	17		mg/Kg	2	10	11/14/01 21:06	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.6		mg/Kg	0.1	0.5	12/01/01 16:14	kdw
Silver, total (3050)	M6020 ICP-MS	0.14		mg/Kg	0.02	0.1	11/16/01 6:10	jb
Thallium, total (3050)	M6020 ICP-MS	0.19		mg/Kg	0.02	0.1	11/16/01 6:10	jb
Zinc, total (3050)	M6010B ICP	85		mg/Kg	2	10	11/14/01 21:06	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	16		t CaCO3/Kt	1	5	11/15/01 12:48	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		U	t CaCO3/Kt	1	5	11/15/01 12:48	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	-17		t CaCO3/Kt	1	5	11/15/01 12:48	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3		U	%	0.1	0.5	11/12/01 12:10	jp
pH, Corrosivity	M9045	3.2		units	0.1	0.1	11/16/01 14:37	lb
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Residual		0.27		%	0.01	0.1	11/14/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.25		%	0.01	0.1	11/14/01 0:00	bf
Sulfur Total		0.51		%	0.01	0.1	11/14/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:25	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:38	bf
Digestion	M3050						11/30/01 13:01	jp/lb
Digestion - Hot Plate	M3050 ICP						11/14/01 6:53	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 14:25	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-25

ACZ ID: ***L34339-33***
Date Sampled: *10/04/01 11:45*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 19:05	jb
Arsenic, total (3050)	M6020 ICP-MS	6.5		mg/Kg	0.2	1	11/16/01 19:05	jb
Beryllium, total (3050)	M6010B ICP	0.5	B	mg/Kg	0.4	2	11/14/01 21:11	ct
Cadmium, total (3050)	M6020 ICP-MS	0.33		mg/Kg	0.04	0.2	11/16/01 19:05	jb
Chromium, total (3050)	M6010B ICP	30		mg/Kg	2	10	11/14/01 21:11	ct
Copper, total (3050)	M6010B ICP	62		mg/Kg	2	10	11/14/01 21:11	ct
Lead, total (3050)	M6020 ICP-MS	4.56		mg/Kg	0.04	0.2	11/16/01 19:05	jb
Mercury, total	M7471 CVAA	1010	H	mg/Kg	20	100	11/09/01 15:27	kdw
Nickel, total (3050)	M6010B ICP	58		mg/Kg	2	10	11/14/01 21:11	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.7		mg/Kg	0.1	0.5	12/01/01 16:15	kdw
Silver, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	12/03/01 13:36	lcj
Thallium, total (3050)	M6020 ICP-MS	0.19		mg/Kg	0.02	0.1	11/16/01 19:05	jb
Zinc, total (3050)	M6010B ICP	62		mg/Kg	2	10	11/14/01 21:11	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	5		t CaCO3/Kt	1	5	11/15/01 12:54	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	13		t CaCO3/Kt	1	5	11/15/01 12:54	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	8		t CaCO3/Kt	1	5	11/15/01 12:54	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.3		%	0.1	0.5	11/12/01 12:51	jp
pH, Corrosivity	M9045	7.0		units	0.1	0.1	11/16/01 14:40	lb
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.04	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Residual		0.05	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.07	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Total		0.16		%	0.01	0.1	11/14/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:27	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:39	bf
Digestion - Hot Plate	M3050 ICP						11/14/01 7:41	jp
Digestion	M3050						11/30/01 13:18	jp/lb
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 14:27	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: S-BR-25-1'

ACZ ID: ***L34339-34***
Date Sampled: *10/04/01 11:45*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS	0.09	B	mg/Kg	0.08	0.4	11/16/01 19:18	jb
Arsenic, total (3050)	M6020 ICP-MS	4.5		mg/Kg	0.2	1	11/16/01 19:18	jb
Beryllium, total (3050)	M6010B ICP	0.6	B	mg/Kg	0.4	2	11/14/01 21:16	ct
Cadmium, total (3050)	M6020 ICP-MS	0.40		mg/Kg	0.04	0.2	11/16/01 19:18	jb
Chromium, total (3050)	M6010B ICP	46		mg/Kg	2	10	11/14/01 21:16	ct
Copper, total (3050)	M6010B ICP	65		mg/Kg	2	10	11/14/01 21:16	ct
Lead, total (3050)	M6020 ICP-MS	6.42		mg/Kg	0.04	0.2	11/26/01 20:54	lcj
Mercury, total	M7471 CVAA	830	H	mg/Kg	20	100	11/09/01 15:28	kdw
Nickel, total (3050)	M6010B ICP	71		mg/Kg	2	10	11/14/01 21:16	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	0.6		mg/Kg	0.1	0.5	12/01/01 16:16	kdw
Silver, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	12/03/01 13:40	lcj
Thallium, total (3050)	M6020 ICP-MS	0.24		mg/Kg	0.02	0.1	11/16/01 19:18	jb
Zinc, total (3050)	M6010B ICP	75		mg/Kg	2	10	11/14/01 21:16	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	2	B	t CaCO3/Kt	1	5	11/15/01 13:00	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	17		t CaCO3/Kt	1	5	11/15/01 13:00	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	15		t CaCO3/Kt	1	5	11/15/01 13:00	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.7		%	0.1	0.5	11/12/01 13:33	jp
pH, Corrosivity	M9045	6.7		units	0.1	0.1	11/16/01 14:42	lb
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.04	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Residual		0.03	B	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/14/01 0:00	bf
Sulfur Total		0.06	B	%	0.01	0.1	11/14/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/30/01 9:29	lnc
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:39	bf
Digestion	M3050						11/30/01 13:34	jp/lb
Digestion - Hot Plate	M3050 ICP						11/14/01 8:29	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/01/01 14:29	jp

Note: See case narrative for data flags.

Report Header Explanations

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

QC Sample Types

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

QC Sample Type Explanations

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

ACZ Qualifiers (Qual)

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

Method References

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

Comments

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

Cascade Earth Sciences, LTD.
Project ID: 2140031

ACZ Project ID: ***L34339***

Antimony, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131529													
WG131246PBS	PBS	11/14/01 6:14				U	mg/Kg		-0.12	0.12			
WG131246LCSS	LCSS	11/14/01 6:19	PCN15144	53.7		23	mg/Kg		0	113			
L34337-10AS	AS	11/14/01 6:32	MS011022-4	10	U	9.748	mg/Kg	97.5	75	125			
L34337-10ASD	ASD	11/14/01 6:36	MS011022-4	10	U	10.324	mg/Kg	103.2	75	125	5.74	20	
L34339-11MS	MS	11/14/01 8:18	MS011114-20	5	U	.386	mg/Kg	7.7	75	125			X
L34339-11MSD	MSD	11/14/01 8:23	MS011114-20	5	U	.317	mg/Kg	6.3	75	125	19.63	20	X
L34339-12DUP	DUP	11/14/01 8:41			U	U	mg/Kg				0	20	
WG131536													
WG131283PBS	PBS	11/14/01 9:48				U	mg/Kg		-0.12	0.12			
WG131283LCSS	LCSS	11/14/01 9:52	PCN15144	53.7		39.8	mg/Kg		0	113			
L34337-01AS	AS	11/14/01 10:01	MS011022-4	10	U	9.032	mg/Kg	90.3	75	125			
L34337-01ASD	ASD	11/14/01 10:06	MS011022-4	10	U	9.204	mg/Kg	92	75	125	1.89	20	
L34339-23MS	MS	11/14/01 11:53	MS011114-20	5	U	.353	mg/Kg	7.1	75	125			X
L34339-23MSD	MSD	11/14/01 11:57	MS011114-20	5	U	.367	mg/Kg	7.3	75	125	3.89	20	X
L34339-24DUP	DUP	11/14/01 12:15			U	U	mg/Kg				0	20	
WG131681													
WG131283PBS	PBS	11/16/01 4:28				U	mg/Kg		-0.12	0.12			
WG131283LCSS	LCSS	11/16/01 4:32	PCN15144	53.7		42.7	mg/Kg		0	113			
L34339-24DUP	DUP	11/16/01 4:41			U	U	mg/Kg				0	20	
WG131436PBS	PBS	11/16/01 4:46				U	mg/Kg		-0.06	0.06			
WG131436LCSS	LCSS	11/16/01 4:50	PCN15144	53.7		21.4	mg/Kg		0	113			
L34305-07MS	MS	11/16/01 5:13	MS011114-20	5	U	.856	mg/Kg	17.1	75	125			X
L34305-07MSD	MSD	11/16/01 5:17	MS011114-20	5	U	.882	mg/Kg	17.6	75	125	2.99	20	X
L34339-25AS	AS	11/16/01 5:26	MS011022-4	10	U	9.58	mg/Kg	95.8	75	125			
L34339-25ASD	ASD	11/16/01 5:30	MS011022-4	10	U	9.744	mg/Kg	97.4	75	125	1.7	20	
L34339-32DUP	DUP	11/16/01 6:14			.3	.264	mg/Kg				12.8	20	
WG131747													
WG131445PBS	PBS	11/16/01 18:56				U	mg/Kg		-0.06	0.06			
WG131445LCSS	LCSS	11/16/01 19:00	PCN15144	53.7		23.8	mg/Kg		0	113			
L34339-33AS	AS	11/16/01 19:09	MS011022-4	10	U	9.008	mg/Kg	90.1	75	125			
L34339-33ASD	ASD	11/16/01 19:14	MS011022-4	10	U	9.08	mg/Kg	90.8	75	125	0.8	20	
L34358-04MS	MS	11/16/01 19:53	MS011114-20	5	.67	1.404	mg/Kg	14.7	75	125			X
L34358-04MSD	MSD	11/16/01 19:58	MS011114-20	5	.67	1.351	mg/Kg	13.6	75	125	3.85	20	X
L34358-07DUP	DUP	11/16/01 20:15			U	U	mg/Kg				0	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34339***

Project ID: 2140031

Arsenic, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131536													
WG131283PBS	PBS	11/14/01 9:48				U	mg/Kg		-0.3	0.3			
WG131283LCSS	LCSS	11/14/01 9:52	PCN15144	177		171.5	mg/Kg		121	233			
L34339-23MS	MS	11/14/01 11:53	MS011114-20	20	1	19.18	mg/Kg	90.9	75	125			
L34339-23MSD	MSD	11/14/01 11:57	MS011114-20	20	1	19.13	mg/Kg	90.7	75	125	0.26	20	
L34339-24DUP	DUP	11/14/01 12:15			1.1	.83	mg/Kg				28	20	T
WG131681													
WG131283PBS	PBS	11/16/01 4:28				U	mg/Kg		-0.3	0.3			
WG131283LCSS	LCSS	11/16/01 4:32	PCN15144	177		174.6	mg/Kg		121	233			
L34339-24DUP	DUP	11/16/01 4:41			1	.87	mg/Kg				13.9	20	
L34339-25AS	AS	11/16/01 5:26	MS011022-4	40	2.9	45.4	mg/Kg	106.3	75	125			
L34339-25ASD	ASD	11/16/01 5:30	MS011022-4	40	2.9	46.12	mg/Kg	108.1	75	125	1.57	20	
L34339-32DUP	DUP	11/16/01 6:14			27.4	25.74	mg/Kg				6.2	20	
WG131743													
WG131246PBS	PBS	11/16/01 21:51				U	mg/Kg		-0.3	0.3			
WG131246LCSS	LCSS	11/16/01 21:55	PCN15144	177		164.6	mg/Kg		121	233			
L34339-11MS	MS	11/16/01 22:09	MS011117-10	20	1	16.29	mg/Kg	76.5	75	125			
L34339-11MSD	MSD	11/16/01 22:13	MS011117-10	20	1	16.19	mg/Kg	76	75	125	0.62	20	
L34339-12DUP	DUP	11/16/01 22:31			1.1	1.11	mg/Kg				0.9	20	
WG131747													
WG131445PBS	PBS	11/16/01 18:56				U	mg/Kg		-0.15	0.15			
WG131445LCSS	LCSS	11/16/01 19:00	PCN15144	177		150.7	mg/Kg		121	233			
L34358-04MS	MS	11/16/01 19:53	MS011114-20	20	7.7	23.08	mg/Kg	76.9	75	125			
L34358-04MSD	MSD	11/16/01 19:58	MS011114-20	20	7.7	23.03	mg/Kg	76.7	75	125	0.22	20	
L34358-07DUP	DUP	11/16/01 20:15			1.6	1.12	mg/Kg				35.3	20	T
WG131755													
L34339-24DUP	DUP	11/17/01 5:11			1	.86	mg/Kg				15.1	20	
WG131436PBS	PBS	11/17/01 5:16				U	mg/Kg		-0.15	0.15			
WG131436LCSS	LCSS	11/17/01 5:20	PCN15144	177		171.6	mg/Kg		121	233			
L34305-07MS	MS	11/17/01 5:43	MS011114-20	20	4.5	25.14	mg/Kg	103.2	75	125			
L34305-07MSD	MSD	11/17/01 5:48	MS011114-20	20	4.5	24.96	mg/Kg	102.3	75	125	0.72	20	
L34339-32DUP	DUP	11/17/01 6:46			25.6	24.19	mg/Kg				5.7	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34339***

Project ID: 2140031

Beryllium, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131555													
WG131470PBS	PBS	11/14/01 19:11				U	mg/Kg		-0.2	0.2			
WG131470LCSS	LCSS	11/14/01 19:16	PCN15143	62.2		66.03	mg/Kg		48.8	75.9			
L34339-19MS	MS	11/14/01 19:31	II011107-2	100	.8	98.95	mg/Kg	98.2	75	125			
L34339-19MSD	MSD	11/14/01 19:36	II011107-2	100	.8	99.74	mg/Kg	98.9	75	125	0.8	20	
L34339-25DUP	DUP	11/14/01 20:21			.6	.54	mg/Kg				10.5	20	
WG132084													
WG132043PBS	PBS	11/27/01 12:15				U	mg/Kg		-0.2	0.2			
WG132043LCSS	LCSS	11/27/01 12:18	PCN15143	62.2		64.05	mg/Kg		48.8	75.9			
L34339-01DUP	DUP	11/27/01 12:25			.5	.57	mg/Kg				13.1	20	
L34631-01MS	MS	11/27/01 13:57	II011126-2	50	43	89.59	mg/Kg	93.2	75	125			
L34631-01MSD	MSD	11/27/01 14:00	II011126-2	50	43	91.4	mg/Kg	96.8	75	125	2	20	

Cadmium, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131529													
WG131246PBS	PBS	11/14/01 6:14				U	mg/Kg		-0.06	0.06			
WG131246LCSS	LCSS	11/14/01 6:19	PCN15144	191		198.55	mg/Kg		147	235			
L34339-11MS	MS	11/14/01 8:18	MS011114-20	20	1.17	20.42	mg/Kg	96.3	75	125			
L34339-11MSD	MSD	11/14/01 8:23	MS011114-20	20	1.17	20.884	mg/Kg	98.6	75	125	2.25	20	
L34339-12DUP	DUP	11/14/01 8:41			1.3	1.291	mg/Kg				0.7	20	
WG131536													
WG131283PBS	PBS	11/14/01 9:48				U	mg/Kg		-0.06	0.06			
WG131283LCSS	LCSS	11/14/01 9:52	PCN15144	191		184.1	mg/Kg		147	235			
L34339-23MS	MS	11/14/01 11:53	MS011114-20	20	.57	19.432	mg/Kg	94.3	75	125			
L34339-23MSD	MSD	11/14/01 11:57	MS011114-20	20	.57	19.556	mg/Kg	94.9	75	125	0.64	20	
L34339-24DUP	DUP	11/14/01 12:15			.57	.467	mg/Kg				19.9	20	
WG131681													
WG131283PBS	PBS	11/16/01 4:28				U	mg/Kg		-0.06	0.06			
WG131283LCSS	LCSS	11/16/01 4:32	PCN15144	191		182.6	mg/Kg		147	235			
L34339-24DUP	DUP	11/16/01 4:41			.46	.404	mg/Kg				13	20	
WG131436PBS	PBS	11/16/01 4:46				U	mg/Kg		-0.03	0.03			
WG131436LCSS	LCSS	11/16/01 4:50	PCN15144	191		194.25	mg/Kg		147	235			
L34305-07MS	MS	11/16/01 5:13	MS011114-20	20	9.94	28.784	mg/Kg	94.2	75	125			
L34305-07MSD	MSD	11/16/01 5:17	MS011114-20	20	9.94	29.14	mg/Kg	96	75	125	1.23	20	
L34339-32DUP	DUP	11/16/01 6:14			.4	.3	mg/Kg				28.6	20	T
WG131747													
WG131445PBS	PBS	11/16/01 18:56				U	mg/Kg		-0.03	0.03			
WG131445LCSS	LCSS	11/16/01 19:00	PCN15144	191		165.4	mg/Kg		147	235			
L34358-04MS	MS	11/16/01 19:53	MS011114-20	20	7.2	24.524	mg/Kg	86.6	75	125			
L34358-04MSD	MSD	11/16/01 19:58	MS011114-20	20	7.2	24.292	mg/Kg	85.5	75	125	0.95	20	
L34358-07DUP	DUP	11/16/01 20:15			.35	.257	mg/Kg				30.6	20	T

Cascade Earth Sciences, LTD.

ACZ Project ID: ***L34339***

Project ID: 2140031

Chromium, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131555													
WG131470PBS	PBS	11/14/01 19:11				U	mg/Kg		-1	1			
WG131470LCSS	LCSS	11/14/01 19:16	PCN15143	111		111.5	mg/Kg		88.7	133			
L34339-19MS	MS	11/14/01 19:31	II011107-2	100	15	110.9	mg/Kg	95.9	75	125			
L34339-19MSD	MSD	11/14/01 19:36	II011107-2	100	15	113.8	mg/Kg	98.8	75	125	2.58	20	
L34339-25DUP	DUP	11/14/01 20:21			61	53.8	mg/Kg				12.5	20	
WG132084													
WG132043PBS	PBS	11/27/01 12:15				U	mg/Kg		-1	1			
WG132043LCSS	LCSS	11/27/01 12:18	PCN15143	111		105.2	mg/Kg		88.7	133			
L34339-01DUP	DUP	11/27/01 12:25			22	23.8	mg/Kg				7.9	20	
L34631-01MS	MS	11/27/01 13:57	II011126-2	50	56	99.9	mg/Kg	87.8	75	125			
L34631-01MSD	MSD	11/27/01 14:00	II011126-2	50	56	102.6	mg/Kg	93.2	75	125	2.67	20	

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131555													
WG131470PBS	PBS	11/14/01 19:11				U	mg/Kg		-1	1			
WG131470LCSS	LCSS	11/14/01 19:16	PCN15143	86		88.8	mg/Kg		70.4	101			
L34339-19MS	MS	11/14/01 19:31	II011107-2	100	28	127.3	mg/Kg	99.3	75	125			
L34339-19MSD	MSD	11/14/01 19:36	II011107-2	100	28	129.4	mg/Kg	101.4	75	125	1.64	20	
L34339-25DUP	DUP	11/14/01 20:21			57	55.2	mg/Kg				3.2	20	
WG132084													
WG132043PBS	PBS	11/27/01 12:15				U	mg/Kg		-1	1			
WG132043LCSS	LCSS	11/27/01 12:18	PCN15143	86		84.1	mg/Kg		70.4	101			
L34339-01DUP	DUP	11/27/01 12:25			140	141.1	mg/Kg				0.8	20	
L34631-01MS	MS	11/27/01 13:57	II011126-2	50	148	195.5	mg/Kg	95	75	125			
L34631-01MSD	MSD	11/27/01 14:00	II011126-2	50	148	202	mg/Kg	108	75	125	3.27	20	

Cascade Earth Sciences, LTD.
Project ID: 2140031

ACZ Project ID: ***L34339***

Lead, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131529													
WG131246PBS	PBS	11/14/01 6:14				U	mg/Kg		-0.06	0.06			
WG131246LCSS	LCSS	11/14/01 6:19	PCN15144	110		109.6	mg/Kg		81.2	139			
L34339-11MS	MS	11/14/01 8:18	MS011114-20	20	6.85	26.004	mg/Kg	95.8	75	125			
L34339-11MSD	MSD	11/14/01 8:23	MS011114-20	20	6.85	26.932	mg/Kg	100.4	75	125	3.51	20	
L34339-12DUP	DUP	11/14/01 8:41			5.24	5.54	mg/Kg				5.6	20	
WG131536													
WG131283PBS	PBS	11/14/01 9:48				.028	mg/Kg		-0.06	0.06			
WG131283LCSS	LCSS	11/14/01 9:52	PCN15144	110		100.25	mg/Kg		81.2	139			
L34339-23MS	MS	11/14/01 11:53	MS011114-20	20	4.14	25.02	mg/Kg	104.4	75	125			
L34339-23MSD	MSD	11/14/01 11:57	MS011114-20	20	4.14	26.016	mg/Kg	109.4	75	125	3.9	20	
L34339-24DUP	DUP	11/14/01 12:15			3.94	3.213	mg/Kg				20.3	20	
WG131681													
WG131283PBS	PBS	11/16/01 4:28				.033	mg/Kg		-0.06	0.06			
WG131283LCSS	LCSS	11/16/01 4:32	PCN15144	110		111.7	mg/Kg		81.2	139			
L34339-24DUP	DUP	11/16/01 4:41			4.23	3.438	mg/Kg				20.7	20	X
WG131436PBS	PBS	11/16/01 4:46				.03	mg/Kg		-0.03	0.03			
WG131436LCSS	LCSS	11/16/01 4:50	PCN15144	110		111	mg/Kg		81.2	139			
L34305-07MS	MS	11/16/01 5:13	MS011114-20	20	8.06	27.336	mg/Kg	96.4	75	125			
L34305-07MSD	MSD	11/16/01 5:17	MS011114-20	20	8.06	27.408	mg/Kg	96.7	75	125	0.26	20	
L34339-25AS	AS	11/16/01 5:26	MS011022-4	40	7.81	46.4	mg/Kg	96.5	75	125			
L34339-25ASD	ASD	11/16/01 5:30	MS011022-4	40	7.81	47.12	mg/Kg	98.3	75	125	1.54	20	
L34339-32DUP	DUP	11/16/01 6:14			21.4	18.992	mg/Kg				11.9	20	
WG131747													
WG131445PBS	PBS	11/16/01 18:56				.035	mg/Kg		-0.03	0.03			V
WG131445LCSS	LCSS	11/16/01 19:00	PCN15144	110		95.6	mg/Kg		81.2	139			
L34339-33AS	AS	11/16/01 19:09	MS011022-4	40	4.56	40.2	mg/Kg	89.1	75	125			
L34339-33ASD	ASD	11/16/01 19:14	MS011022-4	40	4.56	40.96	mg/Kg	91	75	125	1.87	20	
L34358-04MS	MS	11/16/01 19:53	MS011114-20	20	56.4	65.36	mg/Kg	44.8	75	125			X
L34358-04MSD	MSD	11/16/01 19:58	MS011114-20	20	56.4	62.56	mg/Kg	30.8	75	125	4.38	20	X
L34358-07DUP	DUP	11/16/01 20:15			2.42	2.303	mg/Kg				5	20	
WG132067													
WG131445PBS	PBS	11/26/01 20:23				.086	mg/Kg		-0.06	0.06			V
WG131445LCSS	LCSS	11/26/01 20:27	PCN15143	106		105.9	mg/Kg		80.7	131			
L34339-33AS	AS	11/26/01 20:45	MS011120-3	40	5.15	43.48	mg/Kg	95.8	75	125			
L34339-33ASD	ASD	11/26/01 20:49	MS011120-3	40	5.15	43.88	mg/Kg	96.8	75	125	0.92	20	
L34358-04MS	MS	11/26/01 21:11	MS011117-10	20	65.8	74.87	mg/Kg	45.4	75	125			X
L34358-04MSD	MSD	11/26/01 21:16	MS011117-10	20	65.8	71.5	mg/Kg	28.5	75	125	4.6	20	X
L34358-07DUP	DUP	11/26/01 21:38			2.8	2.245	mg/Kg				22	20	X

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34339***

Project ID: 2140031

Mercury, total M7471 CVAA

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131265													
WG131265PBS	PBS	11/09/01 11:03				.00023	mg/Kg		-0.00044	0.00044			
WG131265LCSS	LCSS	11/09/01 11:04	PCN15142	29.6		30	mg/Kg		20.2	39.1			
L34339-05MS	MS	11/09/01 12:55	II011101-4	935	11700	1050	mg/Kg	-1139	75	125			Z
L34339-05DUP	DUP	11/09/01 12:56			11700	3327	mg/Kg				111.4	20	X
WG131267													
WG131267PBS	PBS	11/09/01 14:14				.00035	mg/Kg		-0.00044	0.00044			
WG131267LCSS	LCSS	11/09/01 14:15	PCN15142	29.6		32.04	mg/Kg		20.2	39.1			
L34339-25DUP	DUP	11/09/01 14:24			375	331.22	mg/Kg				12.4	20	
L34339-25MS	MS	11/09/01 15:17	SCN0001144	.96	1790	1848	mg/Kg	6041.7	75	125			Z
L34339-25DUP	DUP	11/09/01 15:19			1790	1803	mg/Kg				0.7	20	
WG131702													
WG131702PBS	PBS	11/19/01 14:34				U	mg/Kg		-0.00044	0.00044			
WG131702LCSS	LCSS	11/19/01 14:35	PCN15142	29.6		21.143	mg/Kg		20.2	39.1			
L34337-03MS	MS	11/19/01 14:40	II011115-4	1.15	.93	1.962	mg/Kg	89.7	75	125			
L34337-03DUP	DUP	11/19/01 14:41			.93	.782	mg/Kg				17.3	20	
WG131702PBS	PBS	11/19/01 15:19				U	mg/Kg		-0.00044	0.00044			
WG131702LCSS	LCSS	11/19/01 15:41	PCN15142	29.6		32.76	mg/Kg		20.2	39.1			
WG131704													
WG131704PBS	PBS	11/20/01 14:50				.00026	mg/Kg		-0.00044	0.00044			
WG131704LCSS	LCSS	11/20/01 14:52	PCN15142	29.6		25.386	mg/Kg		20.2	39.1			
L34339-31MS	MS	11/20/01 14:57	II011115-4	1.135	.36	1.72	mg/Kg	119.8	75	125			
L34339-31DUP	DUP	11/20/01 14:58			.36	.548	mg/Kg				41.4	20	T
WG131704LCSS	LCSS	11/20/01 17:20	PCN15142	29.6		36.81	mg/Kg		20.2	39.1			

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131330													
WG131330LCSS	LCSS	11/09/01 11:00	PCN465	100		106.82	%		80	120			
L34735-08DUP	DUP	11/09/01 15:59			U	.22	%				200	35	T
WG131331													
WG131331LCSS	LCSS	11/12/01 8:00	PCN465	100		98.87	%		80	120			
L34339-34DUP	DUP	11/12/01 14:15			1.7	1.73	%				1.7	35	
WG131332													
WG131332LCSS	LCSS	11/12/01 8:10	PCN465	100		110.6	%		80	120			
L34735-07DUP	DUP	11/12/01 14:36			40.9	42.45	%				3.7	35	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34339***

Project ID: 2140031

Nickel, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131555													
WG131470PBS	PBS	11/14/01 19:11				U	mg/Kg		-1	1			
WG131470LCSS	LCSS	11/14/01 19:16	PCN15143	127		130.5	mg/Kg		99.4	155			
L34339-19MS	MS	11/14/01 19:31	II011107-2	100	17	112.1	mg/Kg	95.1	75	125			
L34339-19MSD	MSD	11/14/01 19:36	II011107-2	100	17	114.6	mg/Kg	97.6	75	125	2.21	20	
L34339-25DUP	DUP	11/14/01 20:21			127	115.2	mg/Kg				9.7	20	
WG132084													
WG132043PBS	PBS	11/27/01 12:15				U	mg/Kg		-1	1			
WG132043LCSS	LCSS	11/27/01 12:18	PCN15143	127		124.9	mg/Kg		99.4	155			
L34339-01DUP	DUP	11/27/01 12:25			30	33.7	mg/Kg				11.6	20	
L34631-01MS	MS	11/27/01 13:57	II011126-2	50	51	95.6	mg/Kg	89.2	75	125			
L34631-01MSD	MSD	11/27/01 14:00	II011126-2	50	51	97.1	mg/Kg	92.2	75	125	1.56	20	

pH, Corrosivity M9045

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131559													
L34339-08DUP	DUP	11/14/01 12:50			6.8	6.82	units				0.3	35	
L34339-20DUP	DUP	11/14/01 15:20			5.6	5.69	units				1.6	35	
WG131728													
L34339-30DUP	DUP	11/16/01 14:33			5.7	5.6	units				1.8	35	

Cascade Earth Sciences, LTD.
Project ID: 2140031

ACZ Project ID: ***L34339***

Selenium, total (3050) M7742 Modified, AA-Hydride

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131712													
WG131189PBS	PBS	11/19/01 14:22				U	mg/Kg		-0.22	0.22			
L34337-15AS	AS	11/19/01 14:27	II011114-3	1.666667	.7	2.27	mg/Kg	94.2	75	125			
L34337-15ASD	ASD	11/19/01 14:28	II011114-3	1.666667	.7	1.8	mg/Kg	66	75	125	23.1	20	R
L34339-18DUP	DUP	11/19/01 15:16			.2	.24	mg/Kg				18.2	20	
WG131189LCSS	LCSS	11/19/01 15:49	PCN15143	85.7		87.1	mg/Kg		63.5	108			
WG131986													
WG131283PBS	PBS	11/27/01 16:31				U	mg/Kg		-0.44	0.44			
L34337-01AS	AS	11/27/01 16:35	II011114-3	3.333334	.5	2.87	mg/Kg	71.1	75	125			X
L34337-01ASD	ASD	11/27/01 16:37	II011114-3	3.333334	.5	2.79	mg/Kg	68.7	75	125	2.83	20	X
L34337-01MS	MS	11/27/01 16:43	SI011018-2	4	.5	2.74	mg/Kg	56	75	125			X
L34337-01MSD	MSD	11/27/01 16:45	SI011018-2	4	.5	2.97	mg/Kg	61.8	75	125	8.06	20	X
L34339-24DUP	DUP	11/27/01 17:01			U	U	mg/Kg				0	20	
L34339-32DUP	DUP	11/27/01 17:28			.4	.46	mg/Kg				14	20	
WG131283LCSS	LCSS	11/27/01 18:24	PCN15144	89.6		87	mg/Kg		66.4	113			
WG132340													
WG132310PBS	PBS	12/01/01 15:46				U	mg/Kg		-0.22	0.22			
WG132310LCSS	LCSS	12/01/01 15:47	PCN15376	95		110.4	mg/Kg		70.4	120			
L34339-25MS	MS	12/01/01 15:50	SI011119-2	2	1.7	2.81	mg/Kg	55.5	75	125			X
L34339-25MSD	MSD	12/01/01 15:56	SI011119-2	2	1.7	3.02	mg/Kg	66	75	125	7.2	20	X
L34339-27AS	AS	12/01/01 16:00	II011126-5	1.666667	.5	1.97	mg/Kg	88.2	75	125			
L34339-27ASD	ASD	12/01/01 16:02	II011126-5	1.666667	.5	1.75	mg/Kg	75	75	125	11.83	20	
L34697-01DUP	DUP	12/01/01 16:28			.2	.24	mg/Kg				18.2	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34339***

Project ID: 2140031

Silver, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131529													
WG131246PBS	PBS	11/14/01 6:14				U	mg/Kg		-0.03	0.03			
WG131246LCSS	LCSS	11/14/01 6:19	PCN15144	121		98.25	mg/Kg		72.6	218			
L34339-11MS	MS	11/14/01 8:18	MS011114-20	5	.17	4.236	mg/Kg	81.3	75	125			
L34339-11MSD	MSD	11/14/01 8:23	MS011114-20	5	.17	4.376	mg/Kg	84.1	75	125	3.25	20	
L34339-12DUP	DUP	11/14/01 8:41			.19	.19	mg/Kg				0	20	
WG131536													
WG131283PBS	PBS	11/14/01 9:48				U	mg/Kg		-0.03	0.03			
WG131283LCSS	LCSS	11/14/01 9:52	PCN15144	121		207.3	mg/Kg		72.6	218			
L34339-23MS	MS	11/14/01 11:53	MS011114-20	5	.06	4.236	mg/Kg	83.5	75	125			
L34339-23MSD	MSD	11/14/01 11:57	MS011114-20	5	.06	4.288	mg/Kg	84.6	75	125	1.22	20	
L34339-24DUP	DUP	11/14/01 12:15			.07	.071	mg/Kg				1.4	20	
WG131681													
L34339-24DUP	DUP	11/16/01 4:41			.14	.079	mg/Kg				55.7	20	T
WG131436PBS	PBS	11/16/01 4:46				U	mg/Kg		-0.015	0.015			
WG131436LCSS	LCSS	11/16/01 4:50	PCN15144	121		110.9	mg/Kg		72.6	218			
L34305-07MS	MS	11/16/01 5:13	MS011114-20	5	.2	4.396	mg/Kg	83.9	75	125			
L34305-07MSD	MSD	11/16/01 5:17	MS011114-20	5	.2	4.42	mg/Kg	84.4	75	125	0.54	20	
L34339-25AS	AS	11/16/01 5:26	MS011022-4	10	.07	10.044	mg/Kg	99.7	75	125			
L34339-25ASD	ASD	11/16/01 5:30	MS011022-4	10	.07	10.052	mg/Kg	99.8	75	125	0.08	20	
L34339-32DUP	DUP	11/16/01 6:14			.14	.123	mg/Kg				12.9	20	
WG131755													
WG131283PBS	PBS	11/17/01 4:58				U	mg/Kg		-0.03	0.03			
WG131283LCSS	LCSS	11/17/01 5:02	PCN15144	121		245.95	mg/Kg		72.6	218			X
L34339-24DUP	DUP	11/17/01 5:11			.07	.05	mg/Kg				33.3	20	T
L34339-27AS	AS	11/17/01 6:05	MS011022-4	10	.05	10.064	mg/Kg	100.1	75	125			
L34339-27ASD	ASD	11/17/01 6:10	MS011022-4	10	.05	10.252	mg/Kg	102	75	125	1.85	20	
L34339-32DUP	DUP	11/17/01 6:46			.13	.118	mg/Kg				9.7	20	
WG132448													
WG132310PBS	PBS	12/03/01 13:27				U	mg/Kg		-0.015	0.015			
WG132310LCSS	LCSS	12/03/01 13:32	PCN15376	87.1		37	mg/Kg		47.3	127			X
L34358-04AS	AS	12/03/01 14:16	MS011120-3	25	.09	22.64	mg/Kg	90.2	75	125			
L34358-04ASD	ASD	12/03/01 14:20	MS011120-3	25	.09	22.78	mg/Kg	90.8	75	125	0.62	20	
L34697-01DUP	DUP	12/03/01 14:38			.09	.082	mg/Kg				9.3	20	

Sulfur Forms M600/2-78-054 3.2.4

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131421													
WG131421PBS	PBS	11/13/01 11:00				U	%		-0.02	0.02			
WG131421LCSS	LCSS	11/13/01 11:16	PCN11635	1.68		1.79	%		1.334	2.016			
L34339-22DUP	DUP	11/13/01 17:00			.13	.1	%				26.1	35	
WG131493													
WG131493PBS	PBS	11/13/01 12:00				U	%		-0.02	0.02			
WG131493LCSS	LCSS	11/13/01 14:11	PCN11635	1.68		1.75	%		1.334	2.016			
L34346-09DUP	DUP	11/15/01 12:14			U	U	%				0	35	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34339***

Project ID: 2140031

Thallium, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131529													
WG131246PBS	PBS	11/14/01 6:14				U	mg/Kg		-0.03	0.03			
WG131246LCSS	LCSS	11/14/01 6:19	PCN15144	157		156.15	mg/Kg		90	225			
L34339-11MS	MS	11/14/01 8:18	MS011114-20	10	.08	9.528	mg/Kg	94.5	75	125			
L34339-11MSD	MSD	11/14/01 8:23	MS011114-20	10	.08	9.736	mg/Kg	96.6	75	125	2.16	20	
L34339-12DUP	DUP	11/14/01 8:41			.1	.1	mg/Kg				0	20	
WG131536													
WG131283PBS	PBS	11/14/01 9:48				U	mg/Kg		-0.03	0.03			
WG131283LCSS	LCSS	11/14/01 9:52	PCN15144	157		145.5	mg/Kg		90	225			
L34339-23MS	MS	11/14/01 11:53	MS011114-20	10	.07	9.236	mg/Kg	91.7	75	125			
L34339-23MSD	MSD	11/14/01 11:57	MS011114-20	10	.07	9.42	mg/Kg	93.5	75	125	1.97	20	
L34339-24DUP	DUP	11/14/01 12:15			.06	.062	mg/Kg				3.3	20	
WG131681													
WG131283PBS	PBS	11/16/01 4:28				U	mg/Kg		-0.03	0.03			
WG131283LCSS	LCSS	11/16/01 4:32	PCN15144	157		156.5	mg/Kg		90	225			
L34339-24DUP	DUP	11/16/01 4:41			.07	.058	mg/Kg				18.8	20	
WG131436PBS	PBS	11/16/01 4:46				U	mg/Kg		-0.015	0.015			
WG131436LCSS	LCSS	11/16/01 4:50	PCN15144	157		158.9	mg/Kg		90	225			
L34305-07MS	MS	11/16/01 5:13	MS011114-20	10	.06	9.948	mg/Kg	98.9	75	125			
L34305-07MSD	MSD	11/16/01 5:17	MS011114-20	10	.06	9.784	mg/Kg	97.2	75	125	1.66	20	
L34339-32DUP	DUP	11/16/01 6:14			.19	.151	mg/Kg				22.9	20	T
WG131747													
WG131445PBS	PBS	11/16/01 18:56				U	mg/Kg		-0.015	0.015			
WG131445LCSS	LCSS	11/16/01 19:00	PCN15144	157		132.05	mg/Kg		90	225			
L34358-04MS	MS	11/16/01 19:53	MS011114-20	10	.04	8.604	mg/Kg	85.6	75	125			
L34358-04MSD	MSD	11/16/01 19:58	MS011114-20	10	.04	8.504	mg/Kg	84.6	75	125	1.17	20	
L34358-07DUP	DUP	11/16/01 20:15			.16	.157	mg/Kg				1.9	20	

Zinc, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131555													
WG131470PBS	PBS	11/14/01 19:11				U	mg/Kg		-1	1			
WG131470LCSS	LCSS	11/14/01 19:16	PCN15143	371		399.6	mg/Kg		287	456			
L34339-19MS	MS	11/14/01 19:31	II011107-2	100	69	162.6	mg/Kg	93.6	75	125			
L34339-19MSD	MSD	11/14/01 19:36	II011107-2	100	69	164.4	mg/Kg	95.4	75	125	1.1	20	
L34339-25DUP	DUP	11/14/01 20:21			65	60.9	mg/Kg				6.5	20	
WG132084													
WG132043PBS	PBS	11/27/01 12:15				1.4	mg/Kg		-1	1			V
WG132043LCSS	LCSS	11/27/01 12:18	PCN15143	371		375.5	mg/Kg		287	456			
L34339-01DUP	DUP	11/27/01 12:25			54	60.2	mg/Kg				10.9	20	
L34631-01MS	MS	11/27/01 13:57	II011126-2	50	144	180.2	mg/Kg	72.4	75	125			R
L34631-01MSD	MSD	11/27/01 14:00	II011126-2	50	144	187.6	mg/Kg	87.2	75	125	4.02	20	

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

Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34339
Date Received: 10/11/2001
Received By: george

Receipt Verification

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

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

N/A

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

N/A

Shipping Containers

Cooler Id		Temp (°C)	Rad (µR/hr)
ACZ		15	15

Notes

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

Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34339
Date Received: 10/11/2001
Received By: george

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	Y < 2	YG< 2	B < 2	BG< 2	O < 2	T >12	P >12	N/A	RAD
L34339-01	S-BR-1-0'										O	
L34339-02	S-BR-1-1'										O	
L34339-03	S-BR-2-0'										O	
L34339-04	S-BR-2-1'										O	
L34339-05	S-BR-3-0'										O	
L34339-06	S-BR-3-1'										O	
L34339-07	S-BR-4										O	
L34339-08	S-BR-5-0'										O	
L34339-09	S-BR-5-1'										O	
L34339-10	S-BR-6-0'										O	
L34339-11	S-BR-6-1'										O	
L34339-12	S-BR-7-0'										O	
L34339-13	S-BR-7-1'										O	
L34339-14	S-BR-8-2'										O	
L34339-15	S-BR-9-1'										O	
L34339-16	S-BR-9-1.5'										O	
L34339-17	S-BR-10-1'										O	
L34339-18	S-BR-11										O	
L34339-19	S-BR-12										O	
L34339-20	S-BR-13										O	
L34339-21	S-BR-14										O	
L34339-22	S-BR-15										O	
L34339-23	S-BR-16-0'										O	
L34339-24	S-BR-16-1'										O	
L34339-25	S-BR-17-1'										O	
L34339-26	S-BR-18										O	
L34339-27	S-BR-19-0'										O	
L34339-28	S-BR-19-1'										O	
L34339-29	S-BR-20										O	
L34339-30	S-BR-21										O	
L34339-31	S-BR-22										O	
L34339-32	S-BR-24										O	
L34339-33	S-BR-25										O	
L34339-34	S-BR-25-1'										O	

ACZ Laboratories, Inc.

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

CHAIN of CUSTODY

Quote #: Cascade - Blue Ridge

ACZ #: L34339

CLIENT INFORMATION

Name to appear on Report and Invoice

Cascade Earth Sciences
222 S. Holly
Medford, OR 97501

Attn: Mary Ann Amann Tel: 541-779-2280

Email:

Carbon Copy: **Report:** _____ **Invoice:** _____

Attn: Tel:

Email:

PROJECT INFORMATION

Client Project name and/or PO#:
Ochoco Mines
2140031

Shipping Company:

Tracking #:

ANALYSES REQUESTED *(required; attach list)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total 13 Metals	Paste pH	ABA	Sulfur/Sulfide			
S-BR-1-0'	10/4 1342	So	1	✓	✓					
S-BR-1-1'	10/4 1342		1	✓	✓	✓				
S-BR-2-0'	10/4 1357		1	✓	✓					
S-BR-2-1'	10/4 1357		1	✓	✓	✓				
S-BR-3-0'	10/4 1444		1	✓	✓					
S-BR-3-1'	10/4 1444		1	✓	✓	✓				
S-BR-4	10/4 1357		1	✓	✓					
S-BR-5-0'	10/4 1630		1	✓	✓					
S-BR-5-1'	10/4 1630		1	✓	✓					
S-BR-6-0'	10/4 1645		1	✓	✓					
S-BR-6-1'	10/4 1645		1	✓	✓					
S-BR-7-0'	10/4 1640		1	✓	✓					

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

REMARKS

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	10/9/01 1205	[signature]	
			10-11-01 1000

PAGE 1 Of 3

FRMQA021.01.00.03

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

ACZ Laboratories, Inc.

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

CHAIN of CUSTODY

Quote #: CASCADE - Blue Ridge **ACZ #:** L34339

CLIENT INFORMATION

Name to appear on Report and Invoice
CASCADE EARTH SCIENCES
227 S. Holly
Medford OR 97501

Carbon Copy: **Report:** ____ **Invoice:** ____

Attn: Mary Ann Amann **Tel:** 541-779-2280

Attn: **Tel:**

Email:

Email:

PROJECT INFORMATION

Client Project name and/or PO#:
Ochoco Mines
2140031

Shipping Company:

Tracking #:

ANALYSES REQUESTED *(required; attach list)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total 13 Metals	PASTE pH	ABA	Sulfur/Sulfide				
S-BR-7-1'	10/4 1640	So	1	✓	✓						
S-BR-8-2'	10/4 1548		1	✓	✓						
S-BR-9-1'	10/4 1515		1	✓	✓						
S-BR-9-1.5'	10/4 1600		1	✓	✓		✓				
S-BR-10-1'	10/4 1527		1	✓	✓	✓					
S-BR-11	10/4 1414		1	✓	✓						
S-BR-12	10/4 1210		1	✓	✓						
S-BR-13	10/4 1130		1	✓	✓						
S-BR-14	10/4 1730		1	✓	✓						
S-BR-15	10/4 1755		1	✓	✓						
S-BR-16-0'	10/4 1000		1	✓	✓						
S-BR-16-1'	10/4 1000	↓	1	✓	✓						

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

REMARKS

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
CES	10/9/01 1205		
			10-11-01 1000

PAGE 2 Of 3

FRMQA021.01.00.03

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

ACZ Laboratories, Inc.

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

CHAIN of CUSTODY

Quote #: Cascade - Blue Ridge **ACZ #:** L34339

CLIENT INFORMATION

Name to appear on Report and Invoice

Cascade Earth Sciences
222 S. Holly
Medford, OR 97501

Attn: Mary Ann Amann Tel: 541-779-2250

Email:

Carbon Copy: **Report:** _____ **Invoice:** _____

Attn: Tel:

Email:

PROJECT INFORMATION

Client Project name and/or PO#: Ochoco Mines 2140031

Shipping Company:

Tracking #:

ANALYSES REQUESTED *(required; attach list)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total 13 Metals	Paste pH	ABA	Sulfur/Sulfide			
S-BR-17-1'	10/4 950	So	1	✓	✓					
S-BR-18	10/4 1138		1	✓	✓	✓				
S-BR-19-0'	10/4 1020		1	✓	✓					
S-BR-19-1'	10/4 1020		1	✓	✓					
S-BR-20	10/7 1530		1	✓	✓	✓				
S-BR-21	10/7 1545		1	✓	✓					
S-BR-22	10/7		1	✓	✓					
S-BR-24	10/4 1201		1	✓	✓					
S-BR-25-0'	10/4 1145		1	✓	✓					
S-BR-25-1'	10/4 1145		1	✓	✓	✓				

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

REMARKS

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
CES	10/9/01 1205		
			10-11-01 1000

PAGE 3 Of 3

FRMQA021.01.00.03 White - Return with sample. Yellow - Retain for your records.

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

Analytical Report

Mary Ann Amann
Cascade Earth Sciences, LTD.
225 S. Holly St.
Medford, OR 97501

December 03, 2001

Project: L34353

Mary Ann Amann:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 11, 2001. This project has been assigned to ACZ's project number, L34353. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 8.0. The enclosed results relate only to the samples received under L34353. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

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

All samples and sub-samples associated with this project will be disposed of after January 03, 2002. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs.

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

Sue Barkey 03/Dec/01

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

ACZ Laboratories, Inc.
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Case Narrative

Cascade Earth Sciences, LTD.
Project: L34353

December 03, 2001

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 14 soil samples from Cascade Earth Sciences, LTD. on October 11, 2001. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L34353. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times except for Mercury, which was analyzed outside of the 28 day hold time.

Sample Analysis

These samples were analyzed for inorganic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The following anomalies were identified during the analysis of these samples:

1. The Total Antimony values are estimated due to matrix interferences. The Matrix Spike (MS) and the Matrix Spike Duplicate (MSD) were out of control limits with recoveries of 4% and 4.7%. The control limits are 75-125%. All other QC was acceptable including the Analytical Spikes and the LCSS.

2. The Total Selenium values are estimated due to matrix interferences. The Matrix Spike (MS) and the Matrix Spike Duplicate (MSD) were out of control limits with recoveries of 68.8% and 71.5%. The control limits are 75-125%. All other QC was acceptable including the Analytical Spikes and the LCSS.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-A-1-10'

ACZ ID: ***L34353-01***
Date Sampled: *10/03/01 08:55*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 8:06	jb
Arsenic, total (3050)	M6020 ICP-MS	1.9		mg/Kg	0.2	1	11/16/01 8:06	jb
Beryllium, total (3050)	M6010B ICP	0.5	B	mg/Kg	0.4	2	11/20/01 19:57	ct
Cadmium, total (3050)	M6020 ICP-MS	0.31		mg/Kg	0.04	0.2	11/16/01 8:06	jb
Chromium, total (3050)	M6010B ICP	51		mg/Kg	2	10	11/20/01 19:57	ct
Copper, total (3050)	M6010B ICP	54		mg/Kg	2	10	11/20/01 19:57	ct
Lead, total (3050)	M6020 ICP-MS	1.87		mg/Kg	0.04	0.2	11/16/01 8:06	jb
Mercury, total	M7471 CVAA	198	H	mg/Kg	2	9	11/08/01 23:42	kdw
Nickel, total (3050)	M6010B ICP	90		mg/Kg	2	10	11/20/01 19:57	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 16:31	kdw
Silver, total (3050)	M6020 ICP-MS	0.06	B	mg/Kg	0.02	0.1	11/16/01 8:06	jb
Thallium, total (3050)	M6020 ICP-MS	0.13		mg/Kg	0.02	0.1	11/16/01 8:06	jb
Zinc, total (3050)	M6010B ICP	51		mg/Kg	2	10	11/20/01 19:57	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	2	B	t CaCO3/Kt	1	5	11/19/01 16:00	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	38		t CaCO3/Kt	1	5	11/19/01 16:00	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	36		t CaCO3/Kt	1	5	11/19/01 16:00	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	3.8		%	0.1	0.5	11/16/01 10:51	jp
pH, Corrosivity	M9045	7.9		units	0.1	0.1	11/19/01 11:20	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Residual		0.02	B	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.04	B	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Total		0.06	B	%	0.01	0.1	11/19/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/01/01 16:30	lb
Crush and Pulverize	USDA No. 1, 1972						11/08/01 13:15	bf
Digestion	M3050						11/09/01 13:31	jp
Digestion - Hot Plate	M3050 ICP						11/16/01 15:00	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 13:20	bf

Note: See case narrative for data flags.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-A-1-25'

ACZ ID: ***L34353-02***
Date Sampled: *10/03/01 09:20*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 8:10	jb
Arsenic, total (3050)	M6020 ICP-MS	1.3		mg/Kg	0.2	1	11/16/01 8:10	jb
Beryllium, total (3050)	M6010B ICP	0.9	B	mg/Kg	0.4	2	11/20/01 20:02	ct
Cadmium, total (3050)	M6020 ICP-MS	0.38		mg/Kg	0.04	0.2	11/16/01 8:10	jb
Chromium, total (3050)	M6010B ICP	93		mg/Kg	2	10	11/20/01 20:02	ct
Copper, total (3050)	M6010B ICP	62		mg/Kg	2	10	11/20/01 20:02	ct
Lead, total (3050)	M6020 ICP-MS	2.11		mg/Kg	0.04	0.2	11/26/01 18:28	lcj
Mercury, total	M7471 CVAA	96.5	H	mg/Kg	0.8	4	11/08/01 22:58	kdw
Nickel, total (3050)	M6010B ICP	179		mg/Kg	2	10	11/20/01 20:02	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride	1.1		mg/Kg	0.2	1	11/16/01 16:43	kdw
Silver, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/16/01 8:10	jb
Thallium, total (3050)	M6020 ICP-MS	0.35		mg/Kg	0.02	0.1	11/16/01 8:10	jb
Zinc, total (3050)	M6010B ICP	64		mg/Kg	2	10	11/20/01 20:02	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	27		t CaCO3/Kt	1	5	11/19/01 16:04	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	38		t CaCO3/Kt	1	5	11/19/01 16:04	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	11		t CaCO3/Kt	1	5	11/19/01 16:04	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	3.8		%	0.1	0.5	11/16/01 11:09	jp
pH, Corrosivity	M9045	7.8		units	0.1	0.1	11/19/01 11:26	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.36		%	0.01	0.1	11/19/01 0:00	bf
Sulfur Residual		0.06	B	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.43		%	0.01	0.1	11/19/01 0:00	bf
Sulfur Total		0.85		%	0.01	0.1	11/19/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/01/01 16:31	lb
Crush and Pulverize	USDA No. 1, 1972						11/08/01 13:18	bf
Digestion	M3050						11/09/01 14:18	jp
Digestion - Hot Plate	M3050 ICP						11/16/01 18:50	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 13:23	bf

Note: See case narrative for data flags.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-A-1-35'

ACZ ID: ***L34353-03***
Date Sampled: *10/03/01 09:45*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 8:14	jb
Arsenic, total (3050)	M6020 ICP-MS	1.0	B	mg/Kg	0.2	1	11/16/01 8:14	jb
Beryllium, total (3050)	M6010B ICP	0.9	B	mg/Kg	0.4	2	11/20/01 20:07	ct
Cadmium, total (3050)	M6020 ICP-MS	0.29		mg/Kg	0.04	0.2	11/16/01 8:14	jb
Chromium, total (3050)	M6010B ICP	24		mg/Kg	2	10	11/20/01 20:07	ct
Copper, total (3050)	M6010B ICP	54		mg/Kg	2	10	11/20/01 20:07	ct
Lead, total (3050)	M6020 ICP-MS	1.81		mg/Kg	0.04	0.2	11/16/01 8:14	jb
Mercury, total	M7471 CVAA	0.81	H	mg/Kg	0.04	0.2	11/08/01 23:44	kdw
Nickel, total (3050)	M6010B ICP	21		mg/Kg	2	10	11/20/01 20:07	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 16:45	kdw
Silver, total (3050)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.1	11/16/01 8:14	jb
Thallium, total (3050)	M6020 ICP-MS	0.02	B	mg/Kg	0.02	0.1	11/16/01 8:14	jb
Zinc, total (3050)	M6010B ICP	41		mg/Kg	2	10	11/20/01 20:07	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/19/01 16:09	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	17		t CaCO3/Kt	1	5	11/19/01 16:09	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	17		t CaCO3/Kt	1	5	11/19/01 16:09	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.7		%	0.1	0.5	11/16/01 11:26	jp
pH, Corrosivity	M9045	7.3		units	0.1	0.1	11/19/01 11:33	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Residual			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/19/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/01/01 16:33	lb
Crush and Pulverize	USDA No. 1, 1972						11/08/01 13:21	bf
Digestion	M3050						11/09/01 14:33	jp
Digestion - Hot Plate	M3050 ICP						11/16/01 22:40	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 13:26	bf

Note: See case narrative for data flags.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-A-2-25'

ACZ ID: ***L34353-04***
Date Sampled: *10/03/01 10:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 8:19	jb
Arsenic, total (3050)	M6020 ICP-MS	1.4		mg/Kg	0.2	1	11/16/01 8:19	jb
Beryllium, total (3050)	M6010B ICP	0.9	B	mg/Kg	0.4	2	11/20/01 20:11	ct
Cadmium, total (3050)	M6020 ICP-MS	0.41		mg/Kg	0.04	0.2	11/16/01 8:19	jb
Chromium, total (3050)	M6010B ICP	115		mg/Kg	2	10	11/20/01 20:11	ct
Copper, total (3050)	M6010B ICP	67		mg/Kg	2	10	11/20/01 20:11	ct
Lead, total (3050)	M6020 ICP-MS	2.08		mg/Kg	0.04	0.2	11/16/01 8:19	jb
Mercury, total	M7471 CVAA	65.9	H	mg/Kg	0.9	5	11/08/01 23:03	kdw
Nickel, total (3050)	M6010B ICP	176		mg/Kg	2	10	11/20/01 20:11	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 16:47	kdw
Silver, total (3050)	M6020 ICP-MS	0.06	B	mg/Kg	0.02	0.1	11/16/01 8:19	jb
Thallium, total (3050)	M6020 ICP-MS	0.35		mg/Kg	0.02	0.1	11/16/01 8:19	jb
Zinc, total (3050)	M6010B ICP	64		mg/Kg	2	10	11/20/01 20:11	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	26		t CaCO3/Kt	1	5	11/19/01 16:13	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	32		t CaCO3/Kt	1	5	11/19/01 16:13	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	7		t CaCO3/Kt	1	5	11/19/01 16:13	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	3.2		%	0.1	0.5	11/16/01 11:43	jp
pH, Corrosivity	M9045	7.8		units	0.1	0.1	11/19/01 11:40	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.36		%	0.01	0.1	11/19/01 0:00	bf
Sulfur Residual		0.09	B	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.37		%	0.01	0.1	11/19/01 0:00	bf
Sulfur Total		0.82		%	0.01	0.1	11/19/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/01/01 16:34	lb
Crush and Pulverize	USDA No. 1, 1972						11/08/01 13:25	bf
Digestion	M3050						11/09/01 14:49	jp
Digestion - Hot Plate	M3050 ICP						11/17/01 2:30	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 13:30	bf

Note: See case narrative for data flags.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-A-3-5'

ACZ ID: ***L34353-05***
Date Sampled: *10/03/01 14:42*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 8:23	jb
Arsenic, total (3050)	M6020 ICP-MS	4.9		mg/Kg	0.2	1	11/16/01 8:23	jb
Beryllium, total (3050)	M6010B ICP	0.9	B	mg/Kg	0.4	2	11/20/01 20:16	ct
Cadmium, total (3050)	M6020 ICP-MS	0.27		mg/Kg	0.04	0.2	11/16/01 8:23	jb
Chromium, total (3050)	M6010B ICP	92		mg/Kg	2	10	11/20/01 20:16	ct
Copper, total (3050)	M6010B ICP	58		mg/Kg	2	10	11/20/01 20:16	ct
Lead, total (3050)	M6020 ICP-MS	2.42		mg/Kg	0.04	0.2	11/16/01 8:23	jb
Mercury, total	M7471 CVAA	17.9	H	mg/Kg	0.2	1	11/08/01 23:45	kdw
Nickel, total (3050)	M6010B ICP	170		mg/Kg	2	10	11/20/01 20:16	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 16:48	kdw
Silver, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/16/01 8:23	jb
Thallium, total (3050)	M6020 ICP-MS	0.31		mg/Kg	0.02	0.1	11/16/01 8:23	jb
Zinc, total (3050)	M6010B ICP	83		mg/Kg	2	10	11/20/01 20:16	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	2	B	t CaCO3/Kt	1	5	11/19/01 16:18	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	68		t CaCO3/Kt	1	5	11/19/01 16:18	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	66		t CaCO3/Kt	1	5	11/19/01 16:18	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	6.8		%	0.1	0.5	11/16/01 12:00	jp
pH, Corrosivity	M9045	7.7		units	0.1	0.1	11/19/01 11:46	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Residual		0.06	B	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.04	B	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Total		0.07	B	%	0.01	0.1	11/19/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/01/01 16:36	lb
Crush and Pulverize	USDA No. 1, 1972						11/08/01 13:28	bf
Digestion	M3050						11/09/01 15:05	jp
Digestion - Hot Plate	M3050 ICP						11/17/01 6:20	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 13:33	bf

Note: See case narrative for data flags.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-A-3-10'

ACZ ID: ***L34353-06***
Date Sampled: *10/03/01 15:50*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 8:28	jb
Arsenic, total (3050)	M6020 ICP-MS	3.3		mg/Kg	0.2	1	11/16/01 8:28	jb
Beryllium, total (3050)	M6010B ICP	0.7	B	mg/Kg	0.4	2	11/20/01 20:21	ct
Cadmium, total (3050)	M6020 ICP-MS	0.30		mg/Kg	0.04	0.2	11/16/01 8:28	jb
Chromium, total (3050)	M6010B ICP	80		mg/Kg	2	10	11/20/01 20:21	ct
Copper, total (3050)	M6010B ICP	63		mg/Kg	2	10	11/20/01 20:21	ct
Lead, total (3050)	M6020 ICP-MS	2.11		mg/Kg	0.04	0.2	11/16/01 8:28	jb
Mercury, total	M7471 CVAA	5.00	H	mg/Kg	0.05	0.2	11/08/01 23:46	kdw
Nickel, total (3050)	M6010B ICP	153		mg/Kg	2	10	11/20/01 20:21	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 16:55	kdw
Silver, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/16/01 8:28	jb
Thallium, total (3050)	M6020 ICP-MS	0.31		mg/Kg	0.02	0.1	11/16/01 8:28	jb
Zinc, total (3050)	M6010B ICP	69		mg/Kg	2	10	11/20/01 20:21	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	3	B	t CaCO3/Kt	1	5	11/19/01 16:23	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	33		t CaCO3/Kt	1	5	11/19/01 16:23	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	30		t CaCO3/Kt	1	5	11/19/01 16:23	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	3.3		%	0.1	0.5	11/16/01 12:35	jp
pH, Corrosivity	M9045	7.7		units	0.1	0.1	11/19/01 11:53	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.02	B	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Residual		0.04	B	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.03	B	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Total		0.09	B	%	0.01	0.1	11/19/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:00	bf
Crush and Pulverize	USDA No. 1, 1972						11/08/01 13:32	bf
Digestion	M3050						11/09/01 15:20	jp
Digestion - Hot Plate	M3050 ICP						11/17/01 10:10	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 13:37	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-A-3-15'

ACZ ID: ***L34353-07***
Date Sampled: *10/03/01 15:55*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 8:32	jb
Arsenic, total (3050)	M6020 ICP-MS	0.4	B	mg/Kg	0.2	1	11/16/01 8:32	jb
Beryllium, total (3050)	M6010B ICP	0.8	B	mg/Kg	0.4	2	11/20/01 20:30	ct
Cadmium, total (3050)	M6020 ICP-MS	0.63		mg/Kg	0.04	0.2	11/16/01 8:32	jb
Chromium, total (3050)	M6010B ICP	70		mg/Kg	2	10	11/20/01 20:30	ct
Copper, total (3050)	M6010B ICP	69		mg/Kg	2	10	11/20/01 20:30	ct
Lead, total (3050)	M6020 ICP-MS	1.55		mg/Kg	0.04	0.2	11/16/01 8:32	jb
Mercury, total	M7471 CVAA	3.07	H	mg/Kg	0.04	0.2	11/08/01 23:47	kdw
Nickel, total (3050)	M6010B ICP	60		mg/Kg	2	10	11/20/01 20:30	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 16:56	kdw
Silver, total (3050)	M6020 ICP-MS	0.24		mg/Kg	0.02	0.1	11/16/01 8:32	jb
Thallium, total (3050)	M6020 ICP-MS	0.11		mg/Kg	0.02	0.1	11/16/01 8:32	jb
Zinc, total (3050)	M6010B ICP	98		mg/Kg	2	10	11/20/01 20:30	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/19/01 16:27	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	7		t CaCO3/Kt	1	5	11/19/01 16:27	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	7		t CaCO3/Kt	1	5	11/19/01 16:27	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	0.7		%	0.1	0.5	11/16/01 12:52	jp
pH, Corrosivity	M9045	7.9		units	0.1	0.1	11/19/01 12:00	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Residual		0.01	B	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/19/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:01	bf
Crush and Pulverize	USDA No. 1, 1972						11/08/01 13:35	bf
Digestion	M3050						11/09/01 15:36	jp
Digestion - Hot Plate	M3050 ICP						11/17/01 17:50	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 13:40	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-A-4-10'

ACZ ID: ***L34353-08***
Date Sampled: *10/03/01 14:05*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 8:54	jb
Arsenic, total (3050)	M6020 ICP-MS	2.7		mg/Kg	0.2	1	11/16/01 8:54	jb
Beryllium, total (3050)	M6010B ICP	0.7	B	mg/Kg	0.4	2	11/20/01 20:34	ct
Cadmium, total (3050)	M6020 ICP-MS	0.36		mg/Kg	0.04	0.2	11/16/01 8:54	jb
Chromium, total (3050)	M6010B ICP	84		mg/Kg	2	10	11/20/01 20:34	ct
Copper, total (3050)	M6010B ICP	74		mg/Kg	2	10	11/20/01 20:34	ct
Lead, total (3050)	M6020 ICP-MS	3.01		mg/Kg	0.04	0.2	11/16/01 8:54	jb
Mercury, total	M7471 CVAA	611	H	mg/Kg	9	40	11/08/01 23:58	kdw
Nickel, total (3050)	M6010B ICP	199		mg/Kg	2	10	11/20/01 20:34	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 16:58	kdw
Silver, total (3050)	M6020 ICP-MS	0.06	B	mg/Kg	0.02	0.1	11/16/01 8:54	jb
Thallium, total (3050)	M6020 ICP-MS	0.46		mg/Kg	0.02	0.1	11/16/01 8:54	jb
Zinc, total (3050)	M6010B ICP	95		mg/Kg	2	10	11/20/01 20:34	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	33		t CaCO3/Kt	1	5	11/19/01 16:32	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	34		t CaCO3/Kt	1	5	11/19/01 16:32	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	1		t CaCO3/Kt	1	5	11/19/01 16:32	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	3.4		%	0.1	0.5	11/16/01 13:09	jp
pH, Corrosivity	M9045	8.0		units	0.1	0.1	11/19/01 12:06	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.60		%	0.01	0.1	11/19/01 0:00	bf
Sulfur Residual		0.21		%	0.01	0.1	11/19/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.25		%	0.01	0.1	11/19/01 0:00	bf
Sulfur Total		1.06		%	0.01	0.1	11/19/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:03	bf
Crush and Pulverize	USDA No. 1, 1972						11/08/01 13:39	bf
Digestion	M3050						11/09/01 15:52	jp
Digestion - Hot Plate	M3050 ICP						11/17/01 21:40	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 13:44	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-A-4-20'

ACZ ID: ***L34353-09***
Date Sampled: *10/03/01 14:15*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 8:59	jb
Arsenic, total (3050)	M6020 ICP-MS	0.3	B	mg/Kg	0.2	1	11/16/01 8:59	jb
Beryllium, total (3050)	M6010B ICP	0.6	B	mg/Kg	0.4	2	11/20/01 20:39	ct
Cadmium, total (3050)	M6020 ICP-MS	0.56		mg/Kg	0.04	0.2	11/16/01 8:59	jb
Chromium, total (3050)	M6010B ICP	60		mg/Kg	2	10	11/20/01 20:39	ct
Copper, total (3050)	M6010B ICP	55		mg/Kg	2	10	11/20/01 20:39	ct
Lead, total (3050)	M6020 ICP-MS	1.10		mg/Kg	0.04	0.2	11/16/01 8:59	jb
Mercury, total	M7471 CVAA	3.73	H	mg/Kg	0.04	0.2	11/08/01 23:50	kdw
Nickel, total (3050)	M6010B ICP	59		mg/Kg	2	10	11/20/01 20:39	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 16:59	kdw
Silver, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/16/01 8:59	jb
Thallium, total (3050)	M6020 ICP-MS	0.03	B	mg/Kg	0.02	0.1	11/16/01 8:59	jb
Zinc, total (3050)	M6010B ICP	75		mg/Kg	2	10	11/20/01 20:39	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/19/01 16:36	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	17		t CaCO3/Kt	1	5	11/19/01 16:36	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	17		t CaCO3/Kt	1	5	11/19/01 16:36	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.7		%	0.1	0.5	11/16/01 13:27	jp
pH, Corrosivity	M9045	7.7		units	0.1	0.1	11/19/01 12:13	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Residual		0.01	B	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/19/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:05	bf
Crush and Pulverize	USDA No. 1, 1972						11/08/01 13:42	bf
Digestion	M3050						11/09/01 16:07	jp
Digestion - Hot Plate	M3050 ICP						11/18/01 1:30	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 13:47	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-A-5-10'

ACZ ID: ***L34353-10***
Date Sampled: *10/03/01 17:27*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 9:03	jb
Arsenic, total (3050)	M6020 ICP-MS	0.8	B	mg/Kg	0.2	1	11/16/01 9:03	jb
Beryllium, total (3050)	M6010B ICP	0.9	B	mg/Kg	0.4	2	11/20/01 20:53	ct
Cadmium, total (3050)	M6020 ICP-MS	0.42		mg/Kg	0.04	0.2	11/16/01 9:03	jb
Chromium, total (3050)	M6010B ICP	61		mg/Kg	2	10	11/20/01 20:53	ct
Copper, total (3050)	M6010B ICP	88		mg/Kg	2	10	11/20/01 20:53	ct
Lead, total (3050)	M6020 ICP-MS	2.68		mg/Kg	0.04	0.2	11/16/01 9:03	jb
Mercury, total	M7471 CVAA	171	H	mg/Kg	8	40	11/09/01 15:30	kdw
Nickel, total (3050)	M6010B ICP	95		mg/Kg	2	10	11/20/01 20:53	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 17:01	kdw
Silver, total (3050)	M6020 ICP-MS	0.06	B	mg/Kg	0.02	0.1	11/16/01 9:03	jb
Thallium, total (3050)	M6020 ICP-MS	0.19		mg/Kg	0.02	0.1	11/16/01 9:03	jb
Zinc, total (3050)	M6010B ICP	70		mg/Kg	2	10	11/20/01 20:53	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	6		t CaCO3/Kt	1	5	11/19/01 16:41	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	32		t CaCO3/Kt	1	5	11/19/01 16:41	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	27		t CaCO3/Kt	1	5	11/19/01 16:41	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	3.2		%	0.1	0.5	11/16/01 13:44	jp
pH, Corrosivity	M9045	8.5		units	0.1	0.1	11/19/01 12:20	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.18		%	0.01	0.1	11/19/01 0:00	bf
Sulfur Residual		0.03	B	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Total		0.18		%	0.01	0.1	11/19/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:06	bf
Crush and Pulverize	USDA No. 1, 1972						11/08/01 13:46	bf
Digestion	M3050						11/09/01 16:23	jp
Digestion - Hot Plate	M3050 ICP						11/18/01 5:20	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 13:51	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-A-5-20'

ACZ ID: ***L34353-11***
Date Sampled: *10/03/01 17:37*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 9:08	jb
Arsenic, total (3050)	M6020 ICP-MS	0.3	B	mg/Kg	0.2	1	11/16/01 9:08	jb
Beryllium, total (3050)	M6010B ICP		U	mg/Kg	0.4	2	11/20/01 20:58	ct
Cadmium, total (3050)	M6020 ICP-MS	0.54		mg/Kg	0.04	0.2	11/16/01 9:08	jb
Chromium, total (3050)	M6010B ICP	35		mg/Kg	2	10	11/20/01 20:58	ct
Copper, total (3050)	M6010B ICP	29		mg/Kg	2	10	11/20/01 20:58	ct
Lead, total (3050)	M6020 ICP-MS	1.58		mg/Kg	0.04	0.2	11/16/01 9:08	jb
Mercury, total	M7471 CVAA	4.2	H	mg/Kg	0.5	2	11/09/01 14:43	kdw
Nickel, total (3050)	M6010B ICP	32		mg/Kg	2	10	11/20/01 20:58	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 17:02	kdw
Silver, total (3050)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	11/16/01 9:08	jb
Thallium, total (3050)	M6020 ICP-MS	0.03	B	mg/Kg	0.02	0.1	11/16/01 9:08	jb
Zinc, total (3050)	M6010B ICP	43		mg/Kg	2	10	11/20/01 20:58	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/19/01 16:46	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3		U	t CaCO3/Kt	1	5	11/19/01 16:46	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/19/01 16:46	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3		U	%	0.1	0.5	11/16/01 14:01	jp
pH, Corrosivity	M9045	7.7		units	0.1	0.1	11/19/01 12:40	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Residual			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/19/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:08	bf
Crush and Pulverize	USDA No. 1, 1972						11/08/01 13:49	bf
Digestion	M3050						11/09/01 16:39	jp
Digestion - Hot Plate	M3050 ICP						11/18/01 9:10	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 13:54	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-A-6-10'

ACZ ID: ***L34353-12***
Date Sampled: *10/05/01 12:50*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 9:12	jb
Arsenic, total (3050)	M6020 ICP-MS	0.7	B	mg/Kg	0.2	1	11/16/01 9:12	jb
Beryllium, total (3050)	M6010B ICP	0.5	B	mg/Kg	0.4	2	11/20/01 21:02	ct
Cadmium, total (3050)	M6020 ICP-MS	0.76		mg/Kg	0.04	0.2	11/16/01 9:12	jb
Chromium, total (3050)	M6010B ICP	47		mg/Kg	2	10	11/20/01 21:02	ct
Copper, total (3050)	M6010B ICP	50		mg/Kg	2	10	11/20/01 21:02	ct
Lead, total (3050)	M6020 ICP-MS	2.54		mg/Kg	0.04	0.2	11/16/01 9:12	jb
Mercury, total	M7471 CVAA	12.7	H	mg/Kg	0.5	2	11/09/01 14:44	kdw
Nickel, total (3050)	M6010B ICP	111		mg/Kg	2	10	11/20/01 21:02	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/16/01 17:04	kdw
Silver, total (3050)	M6020 ICP-MS	0.09	B	mg/Kg	0.02	0.1	11/16/01 9:12	jb
Thallium, total (3050)	M6020 ICP-MS	0.09	B	mg/Kg	0.02	0.1	11/16/01 9:12	jb
Zinc, total (3050)	M6010B ICP	49		mg/Kg	2	10	11/20/01 21:02	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/19/01 16:50	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	15		t CaCO3/Kt	1	5	11/19/01 16:50	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	15		t CaCO3/Kt	1	5	11/19/01 16:50	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.5		%	0.1	0.5	11/16/01 14:18	jp
pH, Corrosivity	M9045	7.0		units	0.1	0.1	11/19/01 12:46	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Residual			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/19/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:10	bf
Crush and Pulverize	USDA No. 1, 1972						11/08/01 13:53	bf
Digestion	M3050						11/09/01 16:54	jp
Digestion - Hot Plate	M3050 ICP						11/18/01 13:00	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 13:58	bf

Note: See case narrative for data flags.

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-A-6-15'

ACZ ID: ***L34353-13***
Date Sampled: *10/05/01 12:40*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 9:16	jb
Arsenic, total (3050)	M6020 ICP-MS	0.4	B	mg/Kg	0.2	1	11/16/01 9:16	jb
Beryllium, total (3050)	M6010B ICP	1.1	B	mg/Kg	0.4	2	11/20/01 21:07	ct
Cadmium, total (3050)	M6020 ICP-MS	1.23		mg/Kg	0.04	0.2	11/16/01 9:16	jb
Chromium, total (3050)	M6010B ICP	42		mg/Kg	2	10	11/20/01 21:07	ct
Copper, total (3050)	M6010B ICP	50		mg/Kg	2	10	11/20/01 21:07	ct
Lead, total (3050)	M6020 ICP-MS	2.65		mg/Kg	0.04	0.2	11/16/01 9:16	jb
Mercury, total	M7471 CVAA	0.8	BH	mg/Kg	0.5	2	11/09/01 14:45	kdw
Nickel, total (3050)	M6010B ICP	46		mg/Kg	2	10	11/20/01 21:07	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/28/01 9:00	kdw
Silver, total (3050)	M6020 ICP-MS	0.14		mg/Kg	0.02	0.1	11/16/01 9:16	jb
Thallium, total (3050)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.1	11/16/01 9:16	jb
Zinc, total (3050)	M6010B ICP	80		mg/Kg	2	10	11/20/01 21:07	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/19/01 16:55	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	12		t CaCO3/Kt	1	5	11/19/01 16:55	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	11		t CaCO3/Kt	1	5	11/19/01 16:55	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.2		%	0.1	0.5	11/16/01 14:36	jp
pH, Corrosivity	M9045	7.4		units	0.1	0.1	11/19/01 12:53	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Residual		0.05	B	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Total		0.01	B	%	0.01	0.1	11/19/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:11	bf
Crush and Pulverize	USDA No. 1, 1972						11/08/01 13:56	bf
Digestion	M3050						11/09/01 17:10	jp
Digestion - Hot Plate	M3050 ICP						11/18/01 16:50	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 14:01	bf

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: WP-A-6-20'

ACZ ID: ***L34353-14***
Date Sampled: *10/05/01 13:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3050)	M6020 ICP-MS		U	mg/Kg	0.08	0.4	11/16/01 9:21	jb
Arsenic, total (3050)	M6020 ICP-MS		U	mg/Kg	0.2	1	11/16/01 9:21	jb
Beryllium, total (3050)	M6010B ICP	0.8	B	mg/Kg	0.4	2	11/20/01 21:12	ct
Cadmium, total (3050)	M6020 ICP-MS	1.22		mg/Kg	0.04	0.2	11/16/01 9:21	jb
Chromium, total (3050)	M6010B ICP	27		mg/Kg	2	10	11/20/01 21:12	ct
Copper, total (3050)	M6010B ICP	65		mg/Kg	2	10	11/20/01 21:12	ct
Lead, total (3050)	M6020 ICP-MS	2.47		mg/Kg	0.04	0.2	11/16/01 9:21	jb
Mercury, total	M7471 CVAA	0.9	BH	mg/Kg	0.5	2	11/09/01 14:47	kdw
Nickel, total (3050)	M6010B ICP	23		mg/Kg	2	10	11/20/01 21:12	ct
Selenium, total (3050)	M7742 Modified, AA-Hydride		U	mg/Kg	0.2	1	11/28/01 9:02	kdw
Silver, total (3050)	M6020 ICP-MS	0.12		mg/Kg	0.02	0.1	11/16/01 9:21	jb
Thallium, total (3050)	M6020 ICP-MS	0.02	B	mg/Kg	0.02	0.1	11/16/01 9:21	jb
Zinc, total (3050)	M6010B ICP	67		mg/Kg	2	10	11/20/01 21:12	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/19/01 17:00	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	22		t CaCO3/Kt	1	5	11/19/01 17:00	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	22		t CaCO3/Kt	1	5	11/19/01 17:00	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	2.2		%	0.1	0.5	11/16/01 14:53	jp
pH, Corrosivity	M9045	7.8		units	0.1	0.1	11/19/01 13:00	bf
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Residual		0.04	B	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/19/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/19/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						11/02/01 13:13	bf
Crush and Pulverize	USDA No. 1, 1972						11/08/01 14:00	bf
Digestion	M3050						11/09/01 17:26	jp
Digestion - Hot Plate	M3050 ICP						11/18/01 20:40	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						11/08/01 14:05	bf

Note: See case narrative for data flags.

Report Header Explanations

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

QC Sample Types

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

QC Sample Type Explanations

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

ACZ Qualifiers (Qual)

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

Method References

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

Comments

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

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34353***

Project ID: 2140031

Antimony, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131686													
WG131323PBS	PBS	11/16/01 7:21				U	mg/Kg		-0.12	0.12			
WG131323LCSS	LCSS	11/16/01 7:26	PCN15143	79.9		43.3	mg/Kg		20.5	139			
L34356-02MS	MS	11/16/01 7:39	MS011114-20	5	U	.202	mg/Kg	4	75	125			X
L34356-02MSD	MSD	11/16/01 7:43	MS011114-20	5	U	.234	mg/Kg	4.7	75	125	14.68	20	X
L34356-03DUP	DUP	11/16/01 8:01			U	U	mg/Kg				0	20	
L34353-07AS	AS	11/16/01 8:36	MS011022-4	10	U	8.956	mg/Kg	89.6	75	125			
L34353-07ASD	ASD	11/16/01 8:41	MS011022-4	10	U	9.148	mg/Kg	91.5	75	125	2.12	20	

Arsenic, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131686													
WG131323PBS	PBS	11/16/01 7:21				U	mg/Kg		-0.3	0.3			
WG131323LCSS	LCSS	11/16/01 7:26	PCN15143	170		158.8	mg/Kg		126	214			
L34356-02MS	MS	11/16/01 7:39	MS011114-20	20	5.2	20.34	mg/Kg	75.7	75	125			
L34356-02MSD	MSD	11/16/01 7:43	MS011114-20	20	5.2	20.04	mg/Kg	74.2	75	125	1.49	20	R
L34356-03DUP	DUP	11/16/01 8:01			.8	.81	mg/Kg				1.2	20	

Beryllium, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131877													
WG131613PBS	PBS	11/20/01 19:16				U	mg/Kg		-0.2	0.2			
WG131613LCSS	LCSS	11/20/01 19:20	PCN15143	62.2		69.18	mg/Kg		48.8	75.9			
L34337-15MS	MS	11/20/01 19:34	II011107-2	100	.8	92.69	mg/Kg	91.9	75	125			
L34337-15MSD	MSD	11/20/01 19:39	II011107-2	100	.8	93.7	mg/Kg	92.9	75	125	1.08	20	
L34353-06DUP	DUP	11/20/01 20:25			.7	.73	mg/Kg				4.2	20	

Cadmium, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131686													
WG131323PBS	PBS	11/16/01 7:21				U	mg/Kg		-0.06	0.06			
WG131323LCSS	LCSS	11/16/01 7:26	PCN15143	184		190.3	mg/Kg		142	226			
L34356-02MS	MS	11/16/01 7:39	MS011114-20	20	.19	19.564	mg/Kg	96.9	75	125			
L34356-02MSD	MSD	11/16/01 7:43	MS011114-20	20	.19	19.2	mg/Kg	95.1	75	125	1.88	20	
L34356-03DUP	DUP	11/16/01 8:01			.37	.308	mg/Kg				18.3	20	

Chromium, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131877													
WG131613PBS	PBS	11/20/01 19:16				U	mg/Kg		-1	1			
WG131613LCSS	LCSS	11/20/01 19:20	PCN15143	111		120.1	mg/Kg		88.7	133			
L34337-15MS	MS	11/20/01 19:34	II011107-2	100	43	130.6	mg/Kg	87.6	75	125			
L34337-15MSD	MSD	11/20/01 19:39	II011107-2	100	43	134.2	mg/Kg	91.2	75	125	2.72	20	
L34353-06DUP	DUP	11/20/01 20:25			80	85.4	mg/Kg				6.5	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34353***

Project ID: 2140031

Copper, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131877													
WG131613PBS	PBS	11/20/01 19:16				U	mg/Kg		-1	1			
WG131613LCSS	LCSS	11/20/01 19:20	PCN15143	86		93	mg/Kg		70.4	101			
L34337-15MS	MS	11/20/01 19:34	II011107-2	100	46	135.1	mg/Kg	89.1	75	125			
L34337-15MSD	MSD	11/20/01 19:39	II011107-2	100	46	139.9	mg/Kg	93.9	75	125	3.49	20	
L34353-06DUP	DUP	11/20/01 20:25			63	59.1	mg/Kg				6.4	20	

Lead, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131686													
WG131323PBS	PBS	11/16/01 7:21				U	mg/Kg		-0.06	0.06			
WG131323LCSS	LCSS	11/16/01 7:26	PCN15143	106		111.1	mg/Kg		80.7	131			
L34356-02MS	MS	11/16/01 7:39	MS011114-20	20	2.91	22.592	mg/Kg	98.4	75	125			
L34356-02MSD	MSD	11/16/01 7:43	MS011114-20	20	2.91	22.188	mg/Kg	96.4	75	125	1.8	20	
L34356-03DUP	DUP	11/16/01 8:01			2.56	2.101	mg/Kg				19.7	20	
WG132067													
WG131323PBS	PBS	11/26/01 18:19				.086	mg/Kg		-0.06	0.06			V
WG131323LCSS	LCSS	11/26/01 18:24	PCN15143	106		116.5	mg/Kg		80.7	131			
L34356-02MS	MS	11/26/01 20:05	MS011114-20	20	3.06	22.892	mg/Kg	99.2	75	125			
L34356-02MSD	MSD	11/26/01 20:09	MS011114-20	20	3.06	23.688	mg/Kg	103.1	75	125	3.42	20	
L34356-03DUP	DUP	11/26/01 20:18			2.71	2.254	mg/Kg				18.4	20	

Mercury, total M7471 CVAA

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131264													
WG131264PBS	PBS	11/08/01 22:36				U	mg/Kg		-0.088	0.088			
WG131264LCSS	LCSS	11/08/01 22:37	PCN15142	29.6		32.22	mg/Kg		20.2	39.1			
L34329-17MS	MS	11/08/01 23:30	SCN0001138	1.09	158	216.8	mg/Kg	5394.5	75	125			Z
L34329-17DUP	DUP	11/08/01 23:31			158	159.5	mg/Kg				0.9	25	
WG131267													
WG131267PBS	PBS	11/09/01 14:14				.00035	mg/Kg		-0.00044	0.00044			
WG131267LCSS	LCSS	11/09/01 14:15	PCN15142	29.6		32.04	mg/Kg		20.2	39.1			
L34339-25DUP	DUP	11/09/01 14:24			375	331.22	mg/Kg				12.4	25	
L34339-25MS	MS	11/09/01 15:17	SCN0001144	.96	1790	1848	mg/Kg	6041.7	75	125			Z
L34339-25DUP	DUP	11/09/01 15:19			1790	1803	mg/Kg				0.7	25	

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131705													
WG131705LCSS	LCSS	11/16/01 10:00	PCN465	100		114.13	%		80	120			
L34353-05DUP	DUP	11/16/01 12:18			6.8	6.9	%				1.5	35	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34353***

Project ID: 2140031

Nickel, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131877													
WG131613PBS	PBS	11/20/01 19:16				U	mg/Kg		-1	1			
WG131613LCSS	LCSS	11/20/01 19:20	PCN15143	127		138.2	mg/Kg		99.4	155			
L34337-15MS	MS	11/20/01 19:34	II011107-2	100	19	105.8	mg/Kg	86.8	75	125			
L34337-15MSD	MSD	11/20/01 19:39	II011107-2	100	19	107.2	mg/Kg	88.2	75	125	1.31	20	
L34353-06DUP	DUP	11/20/01 20:25			153	173.6	mg/Kg				12.6	20	

pH, Corrosivity M9045

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131816													
L34353-10DUP	DUP	11/19/01 12:33			8.5	8.43	units				0.8	35	

Selenium, total (3050) M7742 Modified, AA-Hydride

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131586													
WG131323PBS	PBS	11/16/01 16:28				U	mg/Kg		-0.44	0.44			
WG131323LCSS	LCSS	11/16/01 16:29	PCN15144	89.6		70.4	mg/Kg		66.4	113			
L34353-01AS	AS	11/16/01 16:37	II011114-3	3.333334	U	2.75	mg/Kg	82.5	75	125			
L34353-01ASD	ASD	11/16/01 16:39	II011114-3	3.333334	U	2.61	mg/Kg	78.3	75	125	5.22	35	
L34353-01MS	MS	11/16/01 16:40	SI011018-2	4	U	2.75	mg/Kg	68.8	75	125			X
L34353-01MSD	MSD	11/16/01 16:42	SI011018-2	4	U	2.86	mg/Kg	71.5	75	125	3.92	35	X
L34356-03DUP	DUP	11/16/01 17:12			U	U	mg/Kg				0	35	

Silver, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131686													
WG131323PBS	PBS	11/16/01 7:21				U	mg/Kg		-0.03	0.03			
WG131323LCSS	LCSS	11/16/01 7:26	PCN15143	184		234.7	mg/Kg		137	232			X
L34356-02MS	MS	11/16/01 7:39	MS011114-20	5	.04	4.14	mg/Kg	82	75	125			
L34356-02MSD	MSD	11/16/01 7:43	MS011114-20	5	.04	4.044	mg/Kg	80.1	75	125	2.35	20	
L34356-03DUP	DUP	11/16/01 8:01			.04	.038	mg/Kg				5.1	20	

Sulfur Forms M600/2-78-054 3.2.4

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131711													
WG131711PBS	PBS	11/19/01 8:30				.02	%		-0.02	0.02			
WG131711LCSS	LCSS	11/19/01 9:03	PCN11635	1.68		1.74	%		1.334	2.016			
L34353-14DUP	DUP	11/19/01 17:30			U	U	%				0	35	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34353***

Project ID: 2140031

Thallium, total (3050) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131686													
WG131323PBS	PBS	11/16/01 7:21				U	mg/Kg		-0.03	0.03			
WG131323LCSS	LCSS	11/16/01 7:26	PCN15143	145		163.8	mg/Kg		83.1	207			
L34356-02MS	MS	11/16/01 7:39	MS011114-20	10	.04	9.492	mg/Kg	94.5	75	125			
L34356-02MSD	MSD	11/16/01 7:43	MS011114-20	10	.04	9.184	mg/Kg	91.4	75	125	3.3	20	
L34356-03DUP	DUP	11/16/01 8:01			.05	.038	mg/Kg				27.3	20	T

Zinc, total (3050) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131877													
WG131613PBS	PBS	11/20/01 19:16				U	mg/Kg		-1	1			
WG131613LCSS	LCSS	11/20/01 19:20	PCN15143	371		433.4	mg/Kg		287	456			
L34337-15MS	MS	11/20/01 19:34	II011107-2	100	71	156	mg/Kg	85	75	125			
L34337-15MSD	MSD	11/20/01 19:39	II011107-2	100	71	160.7	mg/Kg	89.7	75	125	2.97	20	
L34353-06DUP	DUP	11/20/01 20:25			69	80.3	mg/Kg				15.1	20	

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

Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34353
Date Received: 10/11/2001
Received By: george

Receipt Verification

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

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

N/A

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

N/A

Shipping Containers

Cooler Id		Temp (°C)	Rad (µR/hr)
ACZ		15	15

Notes

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

Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34353
Date Received: 10/12/2001
Received By: george

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	Y < 2	YG< 2	B < 2	BG< 2	O < 2	T >12	P >12	N/A	RAD
L34353-01	WP-A-1-10'										O	
L34353-02	WP-A-1-25'										O	
L34353-03	WP-A-1-35'										O	
L34353-04	WP-A-2-25'										O	
L34353-05	WP-A-3-5'										O	
L34353-06	WP-A-3-10'										O	
L34353-07	WP-A-3-15'										O	
L34353-08	WP-A-4-10'										O	
L34353-09	WP-A-4-20'										O	
L34353-10	WP-A-5-10'										O	
L34353-11	WP-A-5-20'										O	
L34353-12	WP-A-6-10'										O	
L34353-13	WP-A-6-15'										O	
L34353-14	WP-A-6-20'										O	

ACZ Laboratories, Inc.

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CHAIN of CUSTODY

Quote #: CASCADE - BLUE RIDGE - ABA / -BR-SOIL.

ACZ #: L34353

CLIENT INFORMATION

Name to appear on Report and Invoice

CASCADE EARTH Sciences
225 S. Holly
Medford, OR 97501
Attn Mary Ann Amann Tel: 541-779 2280
Email: Maryanna@cascade-earth.com

Carbon Copy: Report: _____ Invoice: _____

Attn: Tel:

Email:

PROJECT INFORMATION

Client Project name and/or PO#:
Ochoco Mines
2140031

Shipping Company:

Tracking #:

ANALYSES REQUESTED *(required; attach list)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	TOTAL (13 metals)	PASTE pH	ABA.	Sulfur/Sulfide			
WP-A-1-10'	10/3/01 0855	SO	1	✓	✓	✓				
WP-A-1-25'	10/3/01 0920		1	✓	✓	✓				
WP-A-1-35'	10/3/01 0945		1	✓	✓		✓			
WP-A-2-25'	10/3/01 1000		1	✓	✓					
WP-A-3-5'	10/3/01 1442		1	✓	✓	✓				
WP-A-3-10'	1550		1	✓	✓	✓				
WP-A-3-15'	1555		1	✓	✓					
WP-A-4-10'	1405		1	✓	✓	✓				
WP-A-4-20'	1415		1	✓	✓		✓			
WP-A-5-10'	1727		1	✓	✓					
WP-A-5-20'	1737		1	✓	✓					
WP-A-6-10'	10/5/01 1250		1	✓	✓	✓				

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

REMARKS

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	10/9/01 1200	[signature]	
			10-11-01 1000

PAGE 1 Of 2

FRMQA021.01.00.03 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.

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

CHAIN of CUSTODY

Quote #: CASCADE - SOIL **ACZ #:** L 34353

CLIENT INFORMATION

Name to appear on Report and Invoice

SEE other B.

Carbon Copy: **Report:** _____ **Invoice:** _____

Attn: **Tel:**

Email:

Attn: **Tel:**

Email:

PROJECT INFORMATION

Client Project name and/or PO#:

2140031.

Shipping Company:

Tracking #:

ANALYSES REQUESTED *(required; attach list)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	13 metals	Paste PH	sulfide				
WP-A-6-15'	10/8/01 1240	SO	1	✓	✓					
WP-A-6-20'	10/8/01 1300	SO	1	✓	✓	✓				

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

REMARKS

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	10/9/01 1200		
		[signature]	10-11-01 1000

PAGE 2 Of 2

FRMQA021.01.00.03 White - Return with sample. Yellow - Retain for your records.

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

Analytical Report

Mary Ann Amann
Cascade Earth Sciences, LTD.
225 S. Holly St.
Medford, OR 97501

November 30, 2001

Project: L34329

Mary Ann Amann:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 11, 2001. This project has been assigned to ACZ's project number, L34329. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 8.0. The enclosed results relate only to the samples received under L34329. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

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

All samples and sub-samples associated with this project will be disposed of after December 30, 2001. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs.

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

S. Habermehl 30/Nov/01

Scott Habermehl, Project Manager, has reviewed and accepted this report in its entirety.

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

Case Narrative

Cascade Earth Sciences, LTD.

November 30, 2001

Project: L34329

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 24 soil samples from Cascade Earth Sciences, LTD. on October 11, 2001. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L34329. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses were performed within EPA recommended holding times with the following exception:

1. The Mercury analysis required re-testing outside the holding time.

Sample Analysis

These samples were analyzed for inorganic parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The analytical reports may contain footnotes regarding data qualification. In addition the following anomalies have been reported with this project:

1. The Silver stock standard, PCN14833 used in certain confirmatory QC samples (QCS/ICV/CCV) has been precipitating Silver. The silver value was confirmed by ICP analysis to be biased slightly low. A new standard has been ordered. No significant impact of the data would be expected. However, data qualification may be necessary.

2. The total Senium values on L34329-01,-02, -03 have been qualified as estimated due to a potential matrix interference.

3. The silver values on L34329-23 and -24 have been flagged es estimated due to poor digestion efficiency determined by a failure (low bias) of the laboratory control sample. These same two samples have also had their Antimony values qualified as estimated due to a potential matrix interference.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-1-O'

ACZ ID: ***L34329-01***
Date Sampled: *10/07/01 09:10*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.04	0.2	11/07/01 20:06	jb
Arsenic, total (3051)	M6020 ICP-MS	0.74		mg/Kg	0.09	0.5	11/07/01 20:06	jb
Beryllium, total (3051)	M6010B ICP	0.3	B	mg/Kg	0.2	0.9	10/23/01 6:10	ct
Cadmium, total (3051)	M6020 ICP-MS	0.64		mg/Kg	0.02	0.09	11/07/01 20:06	jb
Chromium, total (3051)	M6010B ICP	53.2		mg/Kg	0.9	5	10/29/01 12:35	kr
Copper, total (3051)	M6010B ICP	65.4		mg/Kg	0.9	5	10/23/01 6:10	ct
Lead, total (3051)	M6020 ICP-MS	3.08		mg/Kg	0.02	0.09	11/07/01 20:06	jb
Mercury, total	M7471 CVAA	7.20	H	mg/Kg	0.09	0.5	11/08/01 20:04	kdw
Nickel, total (3051)	M6010B ICP	111		mg/Kg	0.9	5	10/23/01 6:10	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.12	B	mg/Kg	0.09	0.5	10/31/01 11:54	kdw
Silver, total (3051)	M6020 ICP-MS	0.121		mg/Kg	0.009	0.05	11/07/01 20:06	jb
Thallium, total (3051)	M6020 ICP-MS	0.084		mg/Kg	0.009	0.05	11/07/01 20:06	jb
Zinc, total (3051)	M6010B ICP	51.4		mg/Kg	0.9	5	10/23/01 6:10	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	6.6		units	0.1	0.1	11/12/01 9:28	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 8:40	cv/jp
Digestion - Microwave	M3051, HNO3						10/18/01 10:55	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:00	jp

Note: See case narrative for data flags.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-1-1'

ACZ ID: ***L34329-02***
Date Sampled: *10/07/01 09:15*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.03	0.1	11/07/01 20:14	jb
Arsenic, total (3051)	M6020 ICP-MS	0.92		mg/Kg	0.07	0.4	11/07/01 20:14	jb
Beryllium, total (3051)	M6010B ICP	0.2	B	mg/Kg	0.1	0.7	10/23/01 6:22	ct
Cadmium, total (3051)	M6020 ICP-MS	0.56		mg/Kg	0.01	0.07	11/07/01 20:14	jb
Chromium, total (3051)	M6010B ICP	42.8		mg/Kg	0.7	4	10/29/01 12:49	kr
Copper, total (3051)	M6010B ICP	58.4		mg/Kg	0.7	4	10/23/01 6:22	ct
Lead, total (3051)	M6020 ICP-MS	3.13		mg/Kg	0.01	0.07	11/07/01 20:14	jb
Mercury, total	M7471 CVAA	6.88	H	mg/Kg	0.09	0.5	11/08/01 20:05	kdw
Nickel, total (3051)	M6010B ICP	89.1		mg/Kg	0.7	4	10/23/01 6:22	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.14	B	mg/Kg	0.07	0.4	10/31/01 11:56	kdw
Silver, total (3051)	M6020 ICP-MS	0.075		mg/Kg	0.007	0.04	11/07/01 20:14	jb
Thallium, total (3051)	M6020 ICP-MS	0.078		mg/Kg	0.007	0.04	11/07/01 20:14	jb
Zinc, total (3051)	M6010B ICP	48.8		mg/Kg	0.7	4	10/23/01 6:22	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/13/01 11:00	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	10		t CaCO3/Kt	1	5	11/13/01 11:00	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	9		t CaCO3/Kt	1	5	11/13/01 11:00	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.0		%	0.1	0.5	11/08/01 19:46	jp
pH, Corrosivity	M9045	6.8		units	0.1	0.1	11/12/01 9:57	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Residual		0.01	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.03	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Total		0.03	B	%	0.01	0.1	11/12/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 8:43	cv/jp
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:30	bf
Digestion - Microwave	M3051, HNO3						10/18/01 13:48	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:03	jp

Note: See case narrative for data flags.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-2-O'

ACZ ID: ***L34329-03***
Date Sampled: *10/07/01 00:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.07	0.3	11/07/01 20:19	jb
Arsenic, total (3051)	M6020 ICP-MS	0.6	B	mg/Kg	0.2	0.9	11/07/01 20:19	jb
Beryllium, total (3051)	M6010B ICP		U	mg/Kg	0.1	0.7	10/23/01 6:27	ct
Cadmium, total (3051)	M6020 ICP-MS	0.41		mg/Kg	0.03	0.2	11/07/01 20:19	jb
Chromium, total (3051)	M6010B ICP	35.3		mg/Kg	0.7	3	10/29/01 13:03	kr
Copper, total (3051)	M6010B ICP	52.6		mg/Kg	0.7	3	10/23/01 6:27	ct
Lead, total (3051)	M6020 ICP-MS	2.11		mg/Kg	0.03	0.2	11/07/01 20:19	jb
Mercury, total	M7471 CVAA	3.29	H	mg/Kg	0.04	0.2	11/08/01 20:06	kdw
Nickel, total (3051)	M6010B ICP	143		mg/Kg	0.7	3	10/23/01 6:27	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.14	B	mg/Kg	0.07	0.3	10/31/01 12:02	kdw
Silver, total (3051)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.09	11/07/01 20:19	jb
Thallium, total (3051)	M6020 ICP-MS	0.06	B	mg/Kg	0.02	0.09	11/07/01 20:19	jb
Zinc, total (3051)	M6010B ICP	47.7		mg/Kg	0.7	3	10/23/01 6:27	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	6.8		units	0.1	0.1	11/12/01 10:11	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 8:46	cv/jp
Digestion - Microwave	M3051, HNO3						10/18/01 15:43	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:06	jp

Note: See case narrative for data flags.

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-2-1'

ACZ ID: ***L34329-04***
Date Sampled: *10/07/01 00:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.04	0.2	11/07/01 20:36	jb
Arsenic, total (3051)	M6020 ICP-MS	1.04		mg/Kg	0.09	0.4	11/07/01 20:36	jb
Beryllium, total (3051)	M6010B ICP		U	mg/Kg	0.2	0.9	10/23/01 6:39	ct
Cadmium, total (3051)	M6020 ICP-MS	0.29		mg/Kg	0.02	0.09	11/07/01 20:36	jb
Chromium, total (3051)	M6010B ICP	104		mg/Kg	0.9	4	10/29/01 13:11	kr
Copper, total (3051)	M6010B ICP	53.6		mg/Kg	0.9	4	10/23/01 6:39	ct
Lead, total (3051)	M6020 ICP-MS	2.62		mg/Kg	0.02	0.09	11/07/01 20:36	jb
Mercury, total	M7471 CVAA	86.8	H	mg/Kg	0.9	5	11/08/01 20:08	kdw
Nickel, total (3051)	M6010B ICP	247		mg/Kg	0.9	4	10/23/01 6:39	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.11	B	mg/Kg	0.09	0.4	11/12/01 14:35	kdw
Silver, total (3051)	M6020 ICP-MS	0.053		mg/Kg	0.009	0.04	11/07/01 20:36	jb
Thallium, total (3051)	M6020 ICP-MS	0.200		mg/Kg	0.009	0.04	11/07/01 20:36	jb
Zinc, total (3051)	M6010B ICP	57.6		mg/Kg	0.9	4	10/23/01 6:39	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/13/01 11:01	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	12		t CaCO3/Kt	1	5	11/13/01 11:01	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	12		t CaCO3/Kt	1	5	11/13/01 11:01	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.2		%	0.1	0.5	11/08/01 19:26	jp
pH, Corrosivity	M9045	6.8		units	0.1	0.1	11/12/01 10:26	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Residual		0.03	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.01	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Total		0.01	B	%	0.01	0.1	11/12/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 8:49	cv/jp
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:30	bf
Digestion - Microwave	M3051, HNO3						10/18/01 16:40	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:09	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-3-O'

ACZ ID: ***L34329-05***
Date Sampled: *10/05/01 12:06*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.03	0.2	11/07/01 20:41	jb
Arsenic, total (3051)	M6020 ICP-MS	5.10		mg/Kg	0.08	0.4	11/07/01 20:41	jb
Beryllium, total (3051)	M6010B ICP		U	mg/Kg	0.2	0.8	10/23/01 6:43	ct
Cadmium, total (3051)	M6020 ICP-MS	0.18		mg/Kg	0.02	0.08	11/07/01 20:41	jb
Chromium, total (3051)	M6010B ICP	52.1		mg/Kg	0.8	4	10/29/01 13:18	kr
Copper, total (3051)	M6010B ICP	69.9		mg/Kg	0.8	4	10/23/01 6:43	ct
Lead, total (3051)	M6020 ICP-MS	8.74		mg/Kg	0.02	0.08	11/07/01 20:41	jb
Mercury, total	M7471 CVAA	2770	H	mg/Kg	20	100	11/08/01 20:47	kdw
Nickel, total (3051)	M6010B ICP	72.0		mg/Kg	0.8	4	10/23/01 6:43	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.13	B	mg/Kg	0.08	0.4	11/12/01 14:37	kdw
Silver, total (3051)	M6020 ICP-MS	0.054		mg/Kg	0.008	0.04	11/07/01 20:41	jb
Thallium, total (3051)	M6020 ICP-MS	0.776		mg/Kg	0.008	0.04	11/07/01 20:41	jb
Zinc, total (3051)	M6010B ICP	61.9		mg/Kg	0.8	4	10/23/01 6:43	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	4.1		units	0.1	0.1	11/12/01 10:40	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 8:52	cv/jp
Digestion - Microwave	M3051, HNO3						10/18/01 17:38	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:12	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-3-1'

ACZ ID: ***L34329-06***
Date Sampled: *10/05/01 12:06*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.04	0.2	11/07/01 20:45	jb
Arsenic, total (3051)	M6020 ICP-MS	0.48	B	mg/Kg	0.09	0.5	11/07/01 20:45	jb
Beryllium, total (3051)	M6010B ICP	0.3	B	mg/Kg	0.2	0.9	10/23/01 6:47	ct
Cadmium, total (3051)	M6020 ICP-MS	0.37		mg/Kg	0.02	0.09	11/07/01 20:45	jb
Chromium, total (3051)	M6010B ICP	27.2		mg/Kg	0.9	5	10/29/01 13:25	kr
Copper, total (3051)	M6010B ICP	32.8		mg/Kg	0.9	5	10/23/01 6:47	ct
Lead, total (3051)	M6020 ICP-MS	2.84		mg/Kg	0.02	0.09	11/07/01 20:45	jb
Mercury, total	M7471 CVAA	130	H	mg/Kg	2	8	11/08/01 20:49	kdw
Nickel, total (3051)	M6010B ICP	70.1		mg/Kg	0.9	5	10/23/01 6:47	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride		U	mg/Kg	0.09	0.5	11/12/01 14:45	kdw
Silver, total (3051)	M6020 ICP-MS	0.042	B	mg/Kg	0.009	0.05	11/07/01 20:45	jb
Thallium, total (3051)	M6020 ICP-MS	0.083		mg/Kg	0.009	0.05	11/07/01 20:45	jb
Zinc, total (3051)	M6010B ICP	64.6		mg/Kg	0.9	5	10/23/01 6:47	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	3	B	t CaCO3/Kt	1	5	11/13/01 11:03	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	3	B	t CaCO3/Kt	1	5	11/13/01 11:03	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	1		t CaCO3/Kt	1	5	11/13/01 11:03	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	0.3	B	%	0.1	0.5	11/08/01 19:06	jp
pH, Corrosivity	M9045	4.3		units	0.1	0.1	11/12/01 10:55	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Residual		0.08	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.06	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Total		0.08	B	%	0.01	0.1	11/12/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 8:55	cv/jp
Crush and Pulverize	USDA No. 1, 1972						10/16/01 16:30	cv/jp
Digestion - Microwave	M3051, HNO3						10/18/01 18:36	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:15	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-4

ACZ ID: ***L34329-07***
Date Sampled: *10/05/01 12:30*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS	0.06	B	mg/Kg	0.04	0.2	11/07/01 20:49	jb
Arsenic, total (3051)	M6020 ICP-MS	5.6		mg/Kg	0.1	0.5	11/07/01 20:49	jb
Beryllium, total (3051)	M6010B ICP		U	mg/Kg	0.2	1	10/23/01 6:51	ct
Cadmium, total (3051)	M6020 ICP-MS	0.51		mg/Kg	0.02	0.1	11/07/01 20:49	jb
Chromium, total (3051)	M6010B ICP	38		mg/Kg	1	5	10/29/01 13:32	kr
Copper, total (3051)	M6010B ICP	49		mg/Kg	1	5	10/23/01 6:51	ct
Lead, total (3051)	M6020 ICP-MS	7.94		mg/Kg	0.02	0.1	11/07/01 20:49	jb
Mercury, total	M7471 CVAA	419	H	mg/Kg	5	20	11/08/01 20:50	kdw
Nickel, total (3051)	M6010B ICP	72		mg/Kg	1	5	10/23/01 6:51	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.6		mg/Kg	0.1	0.5	11/12/01 14:47	kdw
Silver, total (3051)	M6020 ICP-MS	0.08		mg/Kg	0.01	0.05	11/07/01 20:49	jb
Thallium, total (3051)	M6020 ICP-MS	0.16		mg/Kg	0.01	0.05	11/07/01 20:49	jb
Zinc, total (3051)	M6010B ICP	97		mg/Kg	1	5	10/23/01 6:51	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	4	B	t CaCO3/Kt	1	5	11/13/01 11:05	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	13		t CaCO3/Kt	1	5	11/13/01 11:05	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	9		t CaCO3/Kt	1	5	11/13/01 11:05	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.3		%	0.1	0.5	11/08/01 18:47	jp
pH, Corrosivity	M9045	7.3		units	0.1	0.1	11/12/01 11:09	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.02	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Residual		0.08	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.03	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Total		0.13		%	0.01	0.1	11/12/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 8:58	cv/jp
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:31	bf
Digestion - Microwave	M3051, HNO3						10/18/01 19:33	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:18	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-5-O'

ACZ ID: ***L34329-08***
Date Sampled: *10/05/01 12:22*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS	0.05	B	mg/Kg	0.04	0.2	11/07/01 20:54	jb
Arsenic, total (3051)	M6020 ICP-MS	8.2		mg/Kg	0.1	0.5	11/07/01 20:54	jb
Beryllium, total (3051)	M6010B ICP	0.2	B	mg/Kg	0.2	1	10/23/01 6:55	ct
Cadmium, total (3051)	M6020 ICP-MS	0.36		mg/Kg	0.02	0.1	11/07/01 20:54	jb
Chromium, total (3051)	M6010B ICP	33		mg/Kg	1	5	10/29/01 13:47	kr
Copper, total (3051)	M6010B ICP	53		mg/Kg	1	5	10/23/01 6:55	ct
Lead, total (3051)	M6020 ICP-MS	6.96		mg/Kg	0.02	0.1	11/07/01 20:54	jb
Mercury, total	M7471 CVAA	897	H	mg/Kg	9	40	11/08/01 20:51	kdw
Nickel, total (3051)	M6010B ICP	93		mg/Kg	1	5	10/23/01 6:55	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.5	B	mg/Kg	0.1	0.5	11/12/01 14:48	kdw
Silver, total (3051)	M6020 ICP-MS	0.06		mg/Kg	0.01	0.05	11/07/01 20:54	jb
Thallium, total (3051)	M6020 ICP-MS	0.21		mg/Kg	0.01	0.05	11/07/01 20:54	jb
Zinc, total (3051)	M6010B ICP	141		mg/Kg	1	5	10/23/01 6:55	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	7.0		units	0.1	0.1	11/12/01 11:23	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:02	cv/jp
Digestion - Microwave	M3051, HNO3						10/18/01 20:31	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:22	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-5-1'

ACZ ID: ***L34329-09***
Date Sampled: *10/05/01 12:22*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS	0.04	B	mg/Kg	0.03	0.2	11/07/01 20:58	jb
Arsenic, total (3051)	M6020 ICP-MS	4.70		mg/Kg	0.08	0.4	11/07/01 20:58	jb
Beryllium, total (3051)	M6010B ICP	0.2	B	mg/Kg	0.2	0.8	10/23/01 7:00	ct
Cadmium, total (3051)	M6020 ICP-MS	0.48		mg/Kg	0.02	0.08	11/07/01 20:58	jb
Chromium, total (3051)	M6010B ICP	36.3		mg/Kg	0.8	4	10/29/01 13:54	kr
Copper, total (3051)	M6010B ICP	43.7		mg/Kg	0.8	4	10/23/01 7:00	ct
Lead, total (3051)	M6020 ICP-MS	6.40		mg/Kg	0.02	0.08	11/07/01 20:58	jb
Mercury, total	M7471 CVAA	272	H	mg/Kg	5	20	11/08/01 20:52	kdw
Nickel, total (3051)	M6010B ICP	59.5		mg/Kg	0.8	4	10/23/01 7:00	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.48		mg/Kg	0.08	0.4	11/12/01 12:54	kdw
Silver, total (3051)	M6020 ICP-MS	0.067		mg/Kg	0.008	0.04	11/07/01 20:58	jb
Thallium, total (3051)	M6020 ICP-MS	0.143		mg/Kg	0.008	0.04	11/07/01 20:58	jb
Zinc, total (3051)	M6010B ICP	83.4		mg/Kg	0.8	4	10/23/01 7:00	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	33		t CaCO3/Kt	1	5	11/13/01 11:06	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	13		t CaCO3/Kt	1	5	11/13/01 11:06	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	-20		t CaCO3/Kt	1	5	11/13/01 11:06	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.3		%	0.1	0.5	11/08/01 18:27	jp
pH, Corrosivity	M9045	7.4		units	0.1	0.1	11/12/01 11:38	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.03	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Residual		0.07	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.95		%	0.01	0.1	11/12/01 0:00	bf
Sulfur Total		1.05		%	0.01	0.1	11/12/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:05	cv/jp
Crush and Pulverize	USDA No. 1, 1972						10/16/01 16:40	cv/jp
Digestion - Microwave	M3051, HNO3						10/18/01 21:28	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:25	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-6-O'

ACZ ID: ***L34329-10***
Date Sampled: *10/05/01 12:32*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.04	0.2	11/07/01 21:02	jb
Arsenic, total (3051)	M6020 ICP-MS	1.0		mg/Kg	0.1	0.5	11/07/01 21:02	jb
Beryllium, total (3051)	M6010B ICP	0.4	B	mg/Kg	0.2	1	10/23/01 7:04	ct
Cadmium, total (3051)	M6020 ICP-MS	0.41		mg/Kg	0.02	0.1	11/07/01 21:02	jb
Chromium, total (3051)	M6010B ICP	20		mg/Kg	1	5	10/29/01 14:01	kr
Copper, total (3051)	M6010B ICP	43		mg/Kg	1	5	10/23/01 7:04	ct
Lead, total (3051)	M6020 ICP-MS	4.05		mg/Kg	0.02	0.1	11/07/01 21:02	jb
Mercury, total	M7471 CVAA	77.9	H	mg/Kg	0.8	4	11/08/01 20:18	kdw
Nickel, total (3051)	M6010B ICP	22		mg/Kg	1	5	10/23/01 7:04	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.2	B	mg/Kg	0.1	0.5	11/12/01 12:55	kdw
Silver, total (3051)	M6020 ICP-MS	0.05		mg/Kg	0.01	0.05	11/07/01 21:02	jb
Thallium, total (3051)	M6020 ICP-MS	0.06		mg/Kg	0.01	0.05	11/07/01 21:02	jb
Zinc, total (3051)	M6010B ICP	54		mg/Kg	1	5	10/23/01 7:04	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	6.8		units	0.1	0.1	11/12/01 12:07	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:08	cv/jp
Digestion - Microwave	M3051, HNO3						10/18/01 22:26	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:28	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-6-1'

ACZ ID: ***L34329-11***
Date Sampled: *10/05/01 12:32*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.03	0.2	11/07/01 21:11	jb
Arsenic, total (3051)	M6020 ICP-MS	0.59		mg/Kg	0.08	0.4	11/07/01 21:11	jb
Beryllium, total (3051)	M6010B ICP	0.3	B	mg/Kg	0.2	0.8	10/23/01 7:08	ct
Cadmium, total (3051)	M6020 ICP-MS	0.52		mg/Kg	0.02	0.08	11/07/01 21:11	jb
Chromium, total (3051)	M6010B ICP	32.7		mg/Kg	0.8	4	10/29/01 14:08	kr
Copper, total (3051)	M6010B ICP	38.3		mg/Kg	0.8	4	10/23/01 7:08	ct
Lead, total (3051)	M6020 ICP-MS	3.55		mg/Kg	0.02	0.08	11/07/01 21:11	jb
Mercury, total	M7471 CVAA	45.1	H	mg/Kg	0.9	5	11/08/01 20:19	kdw
Nickel, total (3051)	M6010B ICP	26.6		mg/Kg	0.8	4	10/23/01 7:08	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.12	B	mg/Kg	0.08	0.4	11/12/01 12:57	kdw
Silver, total (3051)	M6020 ICP-MS	0.070		mg/Kg	0.008	0.04	11/07/01 21:11	jb
Thallium, total (3051)	M6020 ICP-MS	0.071		mg/Kg	0.008	0.04	11/07/01 21:11	jb
Zinc, total (3051)	M6010B ICP	60.3		mg/Kg	0.8	4	10/23/01 7:08	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/13/01 11:08	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	10		t CaCO3/Kt	1	5	11/13/01 11:08	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	9		t CaCO3/Kt	1	5	11/13/01 11:08	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.0		%	0.1	0.5	11/08/01 18:08	jp
pH, Corrosivity	M9045	6.6		units	0.1	0.1	11/12/01 12:21	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Residual		0.02	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.01	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Total		0.01	B	%	0.01	0.1	11/12/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:11	cv/jp
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:32	bf
Digestion - Microwave	M3051, HNO3						10/18/01 23:24	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:31	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-7-O'

ACZ ID: ***L34329-12***
Date Sampled: *10/05/01 12:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.04	0.2	11/07/01 21:15	jb
Arsenic, total (3051)	M6020 ICP-MS	0.41	B	mg/Kg	0.09	0.5	11/07/01 21:15	jb
Beryllium, total (3051)	M6010B ICP		U	mg/Kg	0.2	0.9	10/23/01 7:12	ct
Cadmium, total (3051)	M6020 ICP-MS	0.43		mg/Kg	0.02	0.09	11/07/01 21:15	jb
Chromium, total (3051)	M6010B ICP	36.1		mg/Kg	0.9	5	10/29/01 14:15	kr
Copper, total (3051)	M6010B ICP	31.4		mg/Kg	0.9	5	10/23/01 7:12	ct
Lead, total (3051)	M6020 ICP-MS	4.92		mg/Kg	0.02	0.09	11/07/01 21:15	jb
Mercury, total	M7471 CVAA	22.1	H	mg/Kg	0.9	4	11/08/01 22:38	kdw
Nickel, total (3051)	M6010B ICP	30.7		mg/Kg	0.9	5	10/23/01 7:12	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.25	B	mg/Kg	0.09	0.5	11/12/01 12:58	kdw
Silver, total (3051)	M6020 ICP-MS	0.055		mg/Kg	0.009	0.05	11/07/01 21:15	jb
Thallium, total (3051)	M6020 ICP-MS	0.059		mg/Kg	0.009	0.05	11/07/01 21:15	jb
Zinc, total (3051)	M6010B ICP	55.3		mg/Kg	0.9	5	10/23/01 7:12	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	6.7		units	0.1	0.1	11/12/01 12:36	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:14	cv/jp
Digestion - Microwave	M3051, HNO3						10/19/01 0:21	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:34	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-7-1

ACZ ID: ***L34329-13***
Date Sampled: *10/05/01 12:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.02	0.1	11/07/01 21:29	jb
Arsenic, total (3051)	M6020 ICP-MS	0.40		mg/Kg	0.05	0.3	11/07/01 21:29	jb
Beryllium, total (3051)	M6010B ICP		U	mg/Kg	0.2	1	10/23/01 7:16	ct
Cadmium, total (3051)	M6020 ICP-MS	0.46		mg/Kg	0.01	0.05	11/07/01 21:29	jb
Chromium, total (3051)	M6010B ICP	33		mg/Kg	1	5	10/29/01 14:30	kr
Copper, total (3051)	M6010B ICP	31		mg/Kg	1	5	10/23/01 7:16	ct
Lead, total (3051)	M6020 ICP-MS	3.73		mg/Kg	0.01	0.05	11/07/01 21:29	jb
Mercury, total	M7471 CVAA	4.26	H	mg/Kg	0.04	0.2	11/08/01 23:26	kdw
Nickel, total (3051)	M6010B ICP	31		mg/Kg	1	5	10/23/01 7:16	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.2	B	mg/Kg	0.1	0.5	11/12/01 13:00	kdw
Silver, total (3051)	M6020 ICP-MS	0.058		mg/Kg	0.005	0.03	11/07/01 21:29	jb
Thallium, total (3051)	M6020 ICP-MS	0.065		mg/Kg	0.005	0.03	11/07/01 21:29	jb
Zinc, total (3051)	M6010B ICP	52		mg/Kg	1	5	10/23/01 7:16	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/13/01 11:10	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	7		t CaCO3/Kt	1	5	11/13/01 11:10	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	6		t CaCO3/Kt	1	5	11/13/01 11:10	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	0.7		%	0.1	0.5	11/08/01 17:48	jp
pH, Corrosivity	M9045	6.7		units	0.1	0.1	11/12/01 12:50	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.04	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Residual			U	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Total		0.02	B	%	0.01	0.1	11/12/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:17	cv/jp
Crush and Pulverize	USDA No. 1, 1972						10/16/01 16:50	cv/jp
Digestion - Microwave	M3051, HNO3						10/19/01 1:19	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:37	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-8-A

ACZ ID: ***L34329-14***
Date Sampled: *10/05/01 16:30*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:20	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 15:00	jp

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	0.31		%	0.02	0.1	11/02/01 19:19	kc

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-8-B

ACZ ID: ***L34329-15***
Date Sampled: *10/05/01 16:30*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:24	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 15:20	jp

Wet Chemistry

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Nitrogen, total Kjeldahl	M351.2 - TKN by Block Digester	0.21		%	0.02	0.08	11/02/01 19:20	kc

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-9

ACZ ID: ***L34329-16***
Date Sampled: *10/05/01 15:41*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.02	0.1	11/07/01 21:33	jb
Arsenic, total (3051)	M6020 ICP-MS	3.52		mg/Kg	0.05	0.2	11/07/01 21:33	jb
Beryllium, total (3051)	M6010B ICP	0.3	B	mg/Kg	0.2	1	10/23/01 7:29	ct
Cadmium, total (3051)	M6020 ICP-MS	0.26		mg/Kg	0.01	0.05	11/07/01 21:33	jb
Chromium, total (3051)	M6010B ICP	52		mg/Kg	1	5	10/29/01 14:37	kr
Copper, total (3051)	M6010B ICP	64		mg/Kg	1	5	10/23/01 7:29	ct
Lead, total (3051)	M6020 ICP-MS	2.86		mg/Kg	0.01	0.05	11/07/01 21:33	jb
Mercury, total	M7471 CVAA	420	H	mg/Kg	5	20	11/08/01 23:27	kdw
Nickel, total (3051)	M6010B ICP	126		mg/Kg	1	5	10/23/01 7:29	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.2	B	mg/Kg	0.1	0.5	11/12/01 13:01	kdw
Silver, total (3051)	M6020 ICP-MS	0.043		mg/Kg	0.005	0.02	11/07/01 21:33	jb
Thallium, total (3051)	M6020 ICP-MS	0.348		mg/Kg	0.005	0.02	11/07/01 21:33	jb
Zinc, total (3051)	M6010B ICP	61		mg/Kg	1	5	10/23/01 7:29	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	7.5		units	0.1	0.1	11/12/01 13:05	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:27	cv/jp
Digestion - Microwave	M3051, HNO3						10/19/01 2:16	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:40	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-10-O'

ACZ ID: ***L34329-17***
Date Sampled: *10/04/01 13:45*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS	0.05	B	mg/Kg	0.02	0.09	11/07/01 21:37	jb
Arsenic, total (3051)	M6020 ICP-MS	1.15		mg/Kg	0.05	0.2	11/07/01 21:37	jb
Beryllium, total (3051)	M6010B ICP	0.3	B	mg/Kg	0.2	0.9	10/23/01 7:33	ct
Cadmium, total (3051)	M6020 ICP-MS	0.259		mg/Kg	0.009	0.05	11/07/01 21:37	jb
Chromium, total (3051)	M6010B ICP	38.8		mg/Kg	0.9	5	10/29/01 14:44	kr
Copper, total (3051)	M6010B ICP	58.5		mg/Kg	0.9	5	10/23/01 7:33	ct
Lead, total (3051)	M6020 ICP-MS	3.400		mg/Kg	0.009	0.05	11/07/01 21:37	jb
Mercury, total	M7471 CVAA	158	H	mg/Kg	2	9	11/08/01 23:29	kdw
Nickel, total (3051)	M6010B ICP	76.2		mg/Kg	0.9	5	10/23/01 7:33	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.18	B	mg/Kg	0.09	0.5	11/12/01 13:03	kdw
Silver, total (3051)	M6020 ICP-MS	0.053		mg/Kg	0.005	0.02	11/07/01 21:37	jb
Thallium, total (3051)	M6020 ICP-MS	0.175		mg/Kg	0.005	0.02	11/07/01 21:37	jb
Zinc, total (3051)	M6010B ICP	46.0		mg/Kg	0.9	5	10/23/01 7:33	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	7.7		units	0.1	0.1	11/12/01 13:19	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:30	cv/jp
Digestion - Microwave	M3051, HNO3						10/19/01 3:14	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:44	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-10-5'

ACZ ID: ***L34329-18***
Date Sampled: *10/04/01 13:45*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.02	0.1	11/07/01 21:42	jb
Arsenic, total (3051)	M6020 ICP-MS	0.65		mg/Kg	0.05	0.2	11/07/01 21:42	jb
Beryllium, total (3051)	M6010B ICP		U	mg/Kg	0.2	1	10/23/01 7:37	ct
Cadmium, total (3051)	M6020 ICP-MS	0.47		mg/Kg	0.01	0.05	11/07/01 21:42	jb
Chromium, total (3051)	M6010B ICP	25		mg/Kg	1	5	10/29/01 14:52	kr
Copper, total (3051)	M6010B ICP	40		mg/Kg	1	5	10/23/01 7:37	ct
Lead, total (3051)	M6020 ICP-MS	1.64		mg/Kg	0.01	0.05	11/07/01 21:42	jb
Mercury, total	M7471 CVAA	4.44	H	mg/Kg	0.04	0.2	11/08/01 23:32	kdw
Nickel, total (3051)	M6010B ICP	32		mg/Kg	1	5	10/23/01 7:37	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.2	B	mg/Kg	0.1	0.5	11/12/01 13:05	kdw
Silver, total (3051)	M6020 ICP-MS	0.059		mg/Kg	0.005	0.02	11/07/01 21:42	jb
Thallium, total (3051)	M6020 ICP-MS	0.045		mg/Kg	0.005	0.02	11/07/01 21:42	jb
Zinc, total (3051)	M6010B ICP	42		mg/Kg	1	5	10/23/01 7:37	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/13/01 11:11	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	15		t CaCO3/Kt	1	5	11/13/01 11:11	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	15		t CaCO3/Kt	1	5	11/13/01 11:11	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.5		%	0.1	0.5	11/08/01 17:28	jp
pH, Corrosivity	M9045	7.5		units	0.1	0.1	11/12/01 13:34	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Residual			U	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Total			U	%	0.01	0.1	11/12/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:33	cv/jp
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:33	bf
Digestion - Microwave	M3051, HNO3						10/19/01 4:12	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:47	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-11-O'

ACZ ID: ***L34329-19***
Date Sampled: *10/04/01 14:15*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS	0.04	B	mg/Kg	0.02	0.09	11/07/01 21:46	jb
Arsenic, total (3051)	M6020 ICP-MS	0.95		mg/Kg	0.05	0.2	11/07/01 21:46	jb
Beryllium, total (3051)	M6010B ICP	0.3	B	mg/Kg	0.2	0.9	10/23/01 7:41	ct
Cadmium, total (3051)	M6020 ICP-MS	0.248		mg/Kg	0.009	0.05	11/07/01 21:46	jb
Chromium, total (3051)	M6010B ICP	58.6		mg/Kg	0.9	5	10/29/01 14:59	kr
Copper, total (3051)	M6010B ICP	59.8		mg/Kg	0.9	5	10/23/01 7:41	ct
Lead, total (3051)	M6020 ICP-MS	2.930		mg/Kg	0.009	0.05	11/07/01 21:46	jb
Mercury, total	M7471 CVAA	69	H	mg/Kg	1	5	11/08/01 22:49	kdw
Nickel, total (3051)	M6010B ICP	89.3		mg/Kg	0.9	5	10/23/01 7:41	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride		U	mg/Kg	0.09	0.5	11/12/01 14:50	kdw
Silver, total (3051)	M6020 ICP-MS	0.049		mg/Kg	0.005	0.02	11/07/01 21:46	jb
Thallium, total (3051)	M6020 ICP-MS	0.253		mg/Kg	0.005	0.02	11/07/01 21:46	jb
Zinc, total (3051)	M6010B ICP	55.8		mg/Kg	0.9	5	10/23/01 7:41	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	7.6		units	0.1	0.1	11/12/01 13:48	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:36	cv/jp
Digestion - Microwave	M3051, HNO3						10/19/01 5:09	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:50	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-11-5'

ACZ ID: ***L34329-20***
Date Sampled: *10/04/01 14:15*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.04	0.2	11/07/01 21:50	jb
Arsenic, total (3051)	M6020 ICP-MS	0.69		mg/Kg	0.09	0.5	11/07/01 21:50	jb
Beryllium, total (3051)	M6010B ICP		U	mg/Kg	0.2	0.9	10/23/01 7:45	ct
Cadmium, total (3051)	M6020 ICP-MS	0.42		mg/Kg	0.02	0.09	11/07/01 21:50	jb
Chromium, total (3051)	M6010B ICP	33.2		mg/Kg	0.9	5	10/29/01 15:13	kr
Copper, total (3051)	M6010B ICP	32.1		mg/Kg	0.9	5	10/23/01 7:45	ct
Lead, total (3051)	M6020 ICP-MS	2.29		mg/Kg	0.02	0.09	11/07/01 21:50	jb
Mercury, total	M7471 CVAA	5.38	H	mg/Kg	0.08	0.4	11/08/01 23:34	kdw
Nickel, total (3051)	M6010B ICP	27.4		mg/Kg	0.9	5	10/23/01 7:45	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.24	B	mg/Kg	0.09	0.5	11/12/01 14:52	kdw
Silver, total (3051)	M6020 ICP-MS	0.055		mg/Kg	0.009	0.05	11/07/01 21:50	jb
Thallium, total (3051)	M6020 ICP-MS	0.045	B	mg/Kg	0.009	0.05	11/07/01 21:50	jb
Zinc, total (3051)	M6010B ICP	37.2		mg/Kg	0.9	5	10/23/01 7:45	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	1	B	t CaCO3/Kt	1	5	11/13/01 11:13	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	11		t CaCO3/Kt	1	5	11/13/01 11:13	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	10		t CaCO3/Kt	1	5	11/13/01 11:13	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	1.1		%	0.1	0.5	11/08/01 17:09	jp
pH, Corrosivity	M9045	7.5		units	0.1	0.1	11/12/01 14:02	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)			U	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Residual		0.06	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Sulfate (HCl extractable)		0.02	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Total		0.03	B	%	0.01	0.1	11/12/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:39	cv/jp
Crush and Pulverize	USDA No. 1, 1972						11/02/01 10:33	bf
Digestion - Microwave	M3051, HNO3						10/19/01 6:07	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:53	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-13

ACZ ID: ***L34329-21***
Date Sampled: *10/07/01 11:50*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.03	0.1	11/07/01 21:55	jb
Arsenic, total (3051)	M6020 ICP-MS	0.85		mg/Kg	0.07	0.3	11/07/01 21:55	jb
Beryllium, total (3051)	M6010B ICP	0.4	B	mg/Kg	0.1	0.7	10/23/01 7:49	ct
Cadmium, total (3051)	M6020 ICP-MS	0.68		mg/Kg	0.01	0.07	11/07/01 21:55	jb
Chromium, total (3051)	M6010B ICP	26.1		mg/Kg	0.7	3	10/29/01 15:21	kr
Copper, total (3051)	M6010B ICP	25.3		mg/Kg	0.7	3	10/23/01 7:49	ct
Lead, total (3051)	M6020 ICP-MS	4.05		mg/Kg	0.01	0.07	11/07/01 21:55	jb
Mercury, total	M7471 CVAA	1.01	H	mg/Kg	0.04	0.2	11/08/01 23:35	kdw
Nickel, total (3051)	M6010B ICP	36.5		mg/Kg	0.7	3	10/23/01 7:49	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.09	B	mg/Kg	0.07	0.3	11/12/01 14:53	kdw
Silver, total (3051)	M6020 ICP-MS	0.072		mg/Kg	0.007	0.03	11/07/01 21:55	jb
Thallium, total (3051)	M6020 ICP-MS	0.082		mg/Kg	0.007	0.03	11/07/01 21:55	jb
Zinc, total (3051)	M6010B ICP	47.6		mg/Kg	0.7	3	10/23/01 7:49	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	5.9		units	0.1	0.1	11/13/01 11:16	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 8:40	cv/jp
Digestion - Microwave	M3051, HNO3						10/19/01 7:04	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:56	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-14

ACZ ID: ***L34329-22***
Date Sampled: *10/07/01 11:55*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.04	0.2	11/07/01 21:59	jb
Arsenic, total (3051)	M6020 ICP-MS	0.5	B	mg/Kg	0.1	0.5	11/07/01 21:59	jb
Beryllium, total (3051)	M6010B ICP	0.3	B	mg/Kg	0.2	1	10/23/01 7:53	ct
Cadmium, total (3051)	M6020 ICP-MS	0.63		mg/Kg	0.02	0.1	11/07/01 21:59	jb
Chromium, total (3051)	M6010B ICP	21		mg/Kg	1	5	10/29/01 15:28	kr
Copper, total (3051)	M6010B ICP	37		mg/Kg	1	5	10/23/01 7:53	ct
Lead, total (3051)	M6020 ICP-MS	4.31		mg/Kg	0.02	0.1	11/07/01 21:59	jb
Mercury, total	M7471 CVAA	0.12	BH	mg/Kg	0.04	0.2	11/08/01 23:36	kdw
Nickel, total (3051)	M6010B ICP	26		mg/Kg	1	5	10/23/01 7:53	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.2	B	mg/Kg	0.1	0.5	11/12/01 14:55	kdw
Silver, total (3051)	M6020 ICP-MS	0.08		mg/Kg	0.01	0.05	11/07/01 21:59	jb
Thallium, total (3051)	M6020 ICP-MS	0.06		mg/Kg	0.01	0.05	11/07/01 21:59	jb
Zinc, total (3051)	M6010B ICP	59		mg/Kg	1	5	10/23/01 7:53	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	5.5		units	0.1	0.1	11/13/01 11:27	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:00	cv/jp
Digestion - Microwave	M3051, HNO3						10/19/01 8:02	cv/jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 8:59	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-15

ACZ ID: ***L34329-23***
Date Sampled: *10/07/01 12:00*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.09	0.5	10/26/01 7:07	jb
Arsenic, total (3051)	M6020 ICP-MS	1.1		mg/Kg	0.2	1	10/27/01 14:00	jb
Beryllium, total (3051)	M6010B ICP	0.6	B	mg/Kg	0.2	0.9	10/24/01 4:23	ct
Cadmium, total (3051)	M6020 ICP-MS	0.49		mg/Kg	0.05	0.2	10/26/01 7:07	jb
Chromium, total (3051)	M6010B ICP	34.3		mg/Kg	0.9	5	10/24/01 4:23	ct
Copper, total (3051)	M6010B ICP	37.3		mg/Kg	0.9	5	10/24/01 4:23	ct
Lead, total (3051)	M6020 ICP-MS	6.71		mg/Kg	0.05	0.2	10/26/01 7:07	jb
Mercury, total	M7471 CVAA	0.30	H	mg/Kg	0.04	0.2	11/08/01 23:40	kdw
Nickel, total (3051)	M6010B ICP	18.5		mg/Kg	0.9	5	10/24/01 4:23	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.25	B	mg/Kg	0.09	0.5	11/29/01 17:14	kdw
Silver, total (3051)	M6020 ICP-MS	0.09	B	mg/Kg	0.02	0.1	10/26/01 7:07	jb
Thallium, total (3051)	M6020 ICP-MS	0.07	B	mg/Kg	0.02	0.1	10/26/01 7:07	jb
Zinc, total (3051)	M6010B ICP	53.7		mg/Kg	0.9	5	10/24/01 4:23	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Acid Generation Potential (calc)	M600/2-78-054 1.3	0		t CaCO3/Kt	1	5	11/13/01 11:15	bf
Acid Neutralization Potential (calc)	M600/2-78-054 1.3	8		t CaCO3/Kt	1	5	11/13/01 11:15	bf
Acid-Base Potential (calc)	M600/2-78-054 1.3	7		t CaCO3/Kt	1	5	11/13/01 11:15	bf
Neutralization Potential as CaCO3	M600/2-78-054 3.2.3	0.8		%	0.1	0.5	11/08/01 16:29	jp
pH, Corrosivity	M9045	5.6		units	0.1	0.1	11/13/01 11:33	jp
Sulfur Forms	M600/2-78-054 3.2.4							
Sulfur Pyritic (HNO3 extractable)		0.01	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Residual		0.01	B	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Sulfate (HCl extractable)			U	%	0.01	0.1	11/12/01 0:00	bf
Sulfur Total		0.01	B	%	0.01	0.1	11/12/01 0:00	bf

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:20	cv/jp
Crush and Pulverize	USDA No. 1, 1972						10/16/01 17:00	cv/jp
Digestion - Microwave	M3051, HNO3						10/19/01 14:24	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 15:40	jp

Note: See case narrative for data flags.

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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: S-A-16

ACZ ID: ***L34329-24***
Date Sampled: *10/07/01 12:10*
Date Received: *10/11/01*
Sample Matrix: *Soil*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Antimony, total (3051)	M6020 ICP-MS		U	mg/Kg	0.1	0.5	10/26/01 7:12	jb
Arsenic, total (3051)	M6020 ICP-MS	2.0		mg/Kg	0.3	1	10/27/01 14:04	jb
Beryllium, total (3051)	M6010B ICP	0.6	B	mg/Kg	0.2	1	10/24/01 4:27	ct
Cadmium, total (3051)	M6020 ICP-MS	0.55		mg/Kg	0.05	0.3	10/26/01 7:12	jb
Chromium, total (3051)	M6010B ICP	13		mg/Kg	1	5	10/24/01 4:27	ct
Copper, total (3051)	M6010B ICP	20		mg/Kg	1	5	10/24/01 4:27	ct
Lead, total (3051)	M6020 ICP-MS	5.79		mg/Kg	0.05	0.3	10/26/01 7:12	jb
Mercury, total	M7471 CVAA	0.12	BH	mg/Kg	0.05	0.2	11/08/01 23:41	kdw
Nickel, total (3051)	M6010B ICP	12		mg/Kg	1	5	10/24/01 4:27	ct
Selenium, total (3051)	M7742 Modified, AA-Hydride	0.2	B	mg/Kg	0.1	0.5	11/29/01 17:16	kdw
Silver, total (3051)	M6020 ICP-MS	0.08	B	mg/Kg	0.03	0.1	10/26/01 7:12	jb
Thallium, total (3051)	M6020 ICP-MS	0.09	B	mg/Kg	0.03	0.1	10/26/01 7:12	jb
Zinc, total (3051)	M6010B ICP	63		mg/Kg	1	5	10/24/01 4:27	ct

Soil Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
pH, Corrosivity	M9045	5.6		units	0.1	0.1	11/13/01 11:38	jp

Soil Preparation

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Air Dry at 34 Degrees C	USDA No. 1, 1972						10/15/01 9:40	cv/jp
Digestion - Microwave	M3051, HNO3						10/19/01 14:36	jp
Sieve-2000 um (2.0mm)	ASA No.9, 15-4.2.2						10/17/01 16:00	jp

Note: See case narrative for data flags.

Report Header Explanations

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

QC Sample Types

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

QC Sample Type Explanations

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

ACZ Qualifiers (Qual)

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

Method References

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

Comments

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

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34329***

Project ID: 2140031

Antimony, total (3051) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130542													
WG130084PBS	PBS	10/26/01 5:12				U	mg/Kg		-0.06	0.06			
WG130084LCSS	LCSS	10/26/01 5:17	PCN15142	20.1		27.8	mg/Kg		0	115			
L34114-01MS	MS	10/26/01 5:30	MS011001-50	2.75	.3	.42	mg/Kg	4.4	75	125			X
L34165-01AS	AS	10/26/01 5:57	MS011022-4	10.375	4.61	13.998	mg/Kg	90.5	75	125			
L34329-24DUP	DUP	10/26/01 7:16			U	U	mg/Kg				0	20	
WG131101													
WG130025PBS	PBS	11/07/01 19:57				U	mg/Kg		-0.06	0.06			
WG130025LCSS	LCSS	11/07/01 20:01	PCN15142	20.1		48.4	mg/Kg		0	115			
L34329-01MS2	MS	11/07/01 20:10	MS011108-20	2.4	U	.154	mg/Kg	6.4	75	125			X
L34329-03AS	AS	11/07/01 20:23	MS011022-4	8.5	U	7.633	mg/Kg	89.8	75	125			
L34329-22DUP	DUP	11/07/01 22:08			U	U	mg/Kg				0	20	

Arsenic, total (3051) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130617													
WG130084PBS	PBS	10/27/01 12:02				U	mg/Kg		-0.15	0.15			
WG130084LCSS	LCSS	10/27/01 12:07	PCN15142	180		183.7	mg/Kg		128	233			
L34114-01MS	MS	10/27/01 12:20	MS011027-25	11	279	282.4	mg/Kg	30.9	75	125			Z
L34329-24DUP	DUP	10/27/01 14:09			2	1.84	mg/Kg				8.3	20	
WG131101													
WG130025PBS	PBS	11/07/01 19:57				U	mg/Kg		-0.15	0.15			
WG130025LCSS	LCSS	11/07/01 20:01	PCN15142	180		188	mg/Kg		128	233			
L34329-01MS2	MS	11/07/01 20:10	MS011108-20	9.6	.74	8.35	mg/Kg	79.3	75	125			
L34329-22DUP	DUP	11/07/01 22:08			.5	.531	mg/Kg				6	20	

Beryllium, total (3051) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130170													
WG130025PBS	PBS	10/23/01 6:02				U	mg/Kg		-0.2	0.2			
WG130025LCSS	LCSS	10/23/01 6:06	PCN15142	60.3		69.55	mg/Kg		47.3	73.6			
L34329-01MS1	MS	10/23/01 6:18	II011010-7	44.5	.3	40.75	mg/Kg	90.9	75	125			
L34329-22DUP	DUP	10/23/01 7:57			.3	.22	mg/Kg				30.8	20	T
WG130347													
WG130084PBS	PBS	10/24/01 2:26				U	mg/Kg		-0.2	0.2			
WG130084LCSS	LCSS	10/24/01 2:31	PCN15142	60.3		61.67	mg/Kg		47.3	73.6			
L34114-01MS2	MS	10/24/01 2:45	II011010-7	51	4.8	50.38	mg/Kg	89.4	75	125			
L34329-24DUP	DUP	10/24/01 4:32			.6	.59	mg/Kg				1.7	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34329***

Project ID: 2140031

Cadmium, total (3051) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130542													
WG130084PBS	PBS	10/26/01 5:12				U	mg/Kg		-0.027	0.027			
WG130084LCSS	LCSS	10/26/01 5:17	PCN15142	193		191.23	mg/Kg		149	237			
L34114-01MS	MS	10/26/01 5:30	MS011001-50	11	2.66	13.47	mg/Kg	98.3	75	125			
L34329-24DUP	DUP	10/26/01 7:16			.55	.66	mg/Kg				18.2	20	
WG131101													
WG130025PBS	PBS	11/07/01 19:57				U	mg/Kg		-0.027	0.027			
WG130025LCSS	LCSS	11/07/01 20:01	PCN15142	193		197.86	mg/Kg		149	237			
L34329-01MS2	MS	11/07/01 20:10	MS011108-20	9.6	.64	9.26	mg/Kg	89.8	75	125			
L34329-22DUP	DUP	11/07/01 22:08			.63	.728	mg/Kg				14.4	20	

Chromium, total (3051) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130347													
WG130084PBS	PBS	10/24/01 2:26				U	mg/Kg		-0.9	0.9			
WG130084LCSS	LCSS	10/24/01 2:31	PCN15142	116		109	mg/Kg		91	141			
L34114-01MS2	MS	10/24/01 2:45	II011010-7	51	34	80.6	mg/Kg	91.4	75	125			
L34329-24DUP	DUP	10/24/01 4:32			13	15.21	mg/Kg				15.7	20	
WG130674													
WG130025PBS	PBS	10/29/01 12:27				U	mg/Kg		-0.9	0.9			
WG130025LCSS	LCSS	10/29/01 12:31	PCN15142	116		117.9	mg/Kg		91	141			
L34329-01AS	AS	10/29/01 12:42	II011023-2	47	53.2	94.88	mg/Kg	88.7	75	125			
L34329-01MS1	MS	10/29/01 12:45	II011010-7	44.5	53.2	87.36	mg/Kg	76.8	75	125			
L34329-02AS	AS	10/29/01 13:00	II011023-2	35.5	42.8	72.6	mg/Kg	83.9	75	125			
L34329-03AS	AS	10/29/01 13:07	II011023-2	34	35.3	65.46	mg/Kg	88.7	75	125			
L34329-04AS	AS	10/29/01 13:14	II011023-2	44.5	104	142.16	mg/Kg	85.8	75	125			
L34329-05AS	AS	10/29/01 13:21	II011023-2	41.5	52.1	91.17	mg/Kg	94.1	75	125			
L34329-06AS	AS	10/29/01 13:29	II011023-2	45.5	27.2	68.26	mg/Kg	90.2	75	125			
L34329-07AS	AS	10/29/01 13:43	II011023-2	48	38	81.6	mg/Kg	90.8	75	125			
L34329-08AS	AS	10/29/01 13:50	II011023-2	50	33	78.6	mg/Kg	91.2	75	125			
L34329-09AS	AS	10/29/01 13:57	II011023-2	41.5	36.3	74.31	mg/Kg	91.6	75	125			
L34329-10AS	AS	10/29/01 14:05	II011023-2	50	20	65.7	mg/Kg	91.4	75	125			
L34329-11AS	AS	10/29/01 14:12	II011023-2	41.5	32.7	69.99	mg/Kg	89.9	75	125			
L34329-12AS	AS	10/29/01 14:26	II011023-2	47	36.1	77.41	mg/Kg	87.9	75	125			
L34329-13AS	AS	10/29/01 14:34	II011023-2	50	33	79.7	mg/Kg	93.4	75	125			
L34329-16AS	AS	10/29/01 14:41	II011023-2	48	52	94.3	mg/Kg	88.1	75	125			
L34329-17AS	AS	10/29/01 14:48	II011023-2	46.5	38.8	80.37	mg/Kg	89.4	75	125			
L34329-18AS	AS	10/29/01 14:55	II011023-2	48	25	69.3	mg/Kg	92.3	75	125			
L34329-19AS	AS	10/29/01 15:10	II011023-2	45.5	58.6	98.26	mg/Kg	87.2	75	125			
L34329-20AS	AS	10/29/01 15:17	II011023-2	45.5	33.2	74.63	mg/Kg	91.1	75	125			
L34329-21AS	AS	10/29/01 15:24	II011023-2	34.5	26.1	57.58	mg/Kg	91.2	75	125			
L34329-22AS	AS	10/29/01 15:31	II011023-2	48	21	66	mg/Kg	93.8	75	125			
L34329-22DUP	DUP	10/29/01 15:35			21	26.17	mg/Kg				21.9	20	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34329***

Project ID: 2140031

Copper, total (3051) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130170													
WG130025PBS	PBS	10/23/01 6:02				U	mg/Kg		-0.9	0.9			
WG130025LCSS	LCSS	10/23/01 6:06	PCN15142	87.5		94.5	mg/Kg		71.7	103			
L34329-01MS1	MS	10/23/01 6:18	II011010-7	44.5	65.4	107.12	mg/Kg	93.8	75	125			
L34329-22DUP	DUP	10/23/01 7:57			37	40.45	mg/Kg				8.9	20	
WG130347													
WG130084PBS	PBS	10/24/01 2:26				U	mg/Kg		-0.9	0.9			
WG130084LCSS	LCSS	10/24/01 2:31	PCN15142	87.5		89	mg/Kg		71.7	103			
L34114-01MS2	MS	10/24/01 2:45	II011010-7	51	91	138.1	mg/Kg	92.4	75	125			
L34329-24DUP	DUP	10/24/01 4:32			20	22.49	mg/Kg				11.7	20	

Lead, total (3051) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130542													
WG130084PBS	PBS	10/26/01 5:12				U	mg/Kg		-0.027	0.027			
WG130084LCSS	LCSS	10/26/01 5:17	PCN15142	106		106.32	mg/Kg		80.7	131			
L34114-01MS	MS	10/26/01 5:30	MS011001-50	11	48.2	57.31	mg/Kg	82.8	75	125			
L34329-24DUP	DUP	10/26/01 7:16			5.79	5.706	mg/Kg				1.5	20	
WG131101													
WG130025PBS	PBS	11/07/01 19:57				U	mg/Kg		-0.027	0.027			
WG130025LCSS	LCSS	11/07/01 20:01	PCN15142	106		109.54	mg/Kg		80.7	131			
L34329-01MS2	MS	11/07/01 20:10	MS011108-20	9.6	3.08	11.414	mg/Kg	86.8	75	125			
L34329-22DUP	DUP	11/07/01 22:08			4.31	4.19	mg/Kg				2.8	20	

Mercury, total M7471 CVAA

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131263													
WG131263PBS	PBS	11/08/01 19:45				U	mg/Kg		-0.088	0.088			
WG131263LCSS	LCSS	11/08/01 19:46	PCN15142	29.6		31.654	mg/Kg		20.2	39.1			
L34188-13MS	MS	11/08/01 19:54	II011101-4	.95	U	1.082	mg/Kg	113.9	75	125			
L34188-13DUP	DUP	11/08/01 19:55			U	.042	mg/Kg				200	25	T
WG131264													
WG131264PBS	PBS	11/08/01 22:36				U	mg/Kg		-0.088	0.088			
WG131264LCSS	LCSS	11/08/01 22:37	PCN15142	29.6		32.22	mg/Kg		20.2	39.1			
L34329-17MS	MS	11/08/01 23:30	SCN0001138	1.09	158	216.8	mg/Kg	5394.5	75	125			Z
L34329-17DUP	DUP	11/08/01 23:31			158	159.5	mg/Kg				0.9	25	

Neutralization Potential as CaCO3 M600/2-78-054 3.2.3

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131244													
L34329-20DUP	DUP	11/08/01 17:49			1.1	1	%				9.5	35	
WG131244LCSS	LCSS	11/08/01 20:45	PCN465	100		97.02	%		80	120			

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34329***

Project ID: 2140031

Nickel, total (3051) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130170													
WG130025PBS	PBS	10/23/01 6:02				U	mg/Kg		-0.9	0.9			
WG130025LCSS	LCSS	10/23/01 6:06	PCN15142	119		140.2	mg/Kg		82.9	155			
L34329-01MS1	MS	10/23/01 6:18	II011010-7	44.5	111	147.2	mg/Kg	81.3	75	125			
L34329-22DUP	DUP	10/23/01 7:57			26	28.82	mg/Kg				10.3	20	
WG130347													
WG130084PBS	PBS	10/24/01 2:26				U	mg/Kg		-0.9	0.9			
WG130084LCSS	LCSS	10/24/01 2:31	PCN15142	119		123.5	mg/Kg		82.9	155			
L34114-01MS2	MS	10/24/01 2:45	II011010-7	51	39	82.8	mg/Kg	85.9	75	125			
L34329-24DUP	DUP	10/24/01 4:32			12	13.05	mg/Kg				8.4	20	

Nitrogen, total Kjeldahl M351.2 - TKN by Block Digester

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130815													
WG130815PBS	PBS	11/02/01 19:16				U	%		-0.2	0.2			
WG130815LFB	LFB	11/02/01 19:18	WC011024-8	2.5		2.48	%	99.2	85	115			
L34331-01DUP	DUP	11/02/01 19:21			2.3	2.24	%				2.6	35	
L34331-01MS	MS	11/02/01 19:22	SCN0001137	.03265	2.3	2.43	%	398.2	75	125			Z
WG130815LCSS	LCSS	11/02/01 19:59	PCN12366	4.78		5.3	%		3.59	5.98			

pH, Corrosivity M9045

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG131395													
L34329-01DUP	DUP	11/12/01 9:42			6.6	6.61	units				0.2	35	
WG131472													
L34329-21DUP	DUP	11/13/01 11:22			5.9	5.98	units				1.3	35	

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34329***

Project ID: 2140031

Selenium, total (3051) M7742 Modified, AA-Hydride

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130776													
WG130025PBS	PBS	10/31/01 11:51				U	mg/Kg		-0.198	0.198			
WG130025LCSS	LCSS	10/31/01 11:53	PCN15142	83.9		91.7	mg/Kg		53.1	115			
L34329-02MS	MS	10/31/01 12:01	SI011004-1	1.96	.14	1.37	mg/Kg	62.8	75	125			X
L34329-22DUP	DUP	10/31/01 12:05			.1	.1	mg/Kg				0	35	
L34329-24DUP	DUP	11/01/01 11:33			.1	.091	mg/Kg				9.4	35	
WG131229													
WG130025PBS	PBS	11/12/01 12:15				U	mg/Kg		-0.198	0.198			
WG130025LCSS	LCSS	11/12/01 14:31	PCN15142	83.9		92.8	mg/Kg		53.1	115			
L34329-01MS1	MS	11/12/01 14:32	II011010-7	4450	.12	80.9	mg/Kg	90.4	75	125			
L34329-02MS	MS	11/12/01 14:34	SI011004-1	1.96	U	1.49	mg/Kg	76	75	125			
L34329-05AS	AS	11/12/01 14:39	II011106-3	1.38333361	.13	1.277	mg/Kg	82.9	75	125			
L34329-05ASD	ASD	11/12/01 14:40	II011106-3	1.38333361	.13	1.427	mg/Kg	93.8	75	125	11.09	35	
L34329-22DUP	DUP	11/12/01 14:56			.2	U	mg/Kg				200	35	T
WG132260													
WG130084LCSS	LCSS	11/29/01 17:13	PCN15142	83.9		101.5	mg/Kg		53.1	115			
L34329-24DUP	DUP	11/29/01 17:17			.2	.222	mg/Kg				10.4	35	
L34331-01AS	AS	11/29/01 17:25	II011126-5	2.13333376	1.1	2.54	mg/Kg	67.5	75	125			R
L34331-01ASD	ASD	11/29/01 17:27	II011126-5	2.13333376	1.1	3.24	mg/Kg	100.3	75	125	24.22	35	

Silver, total (3051) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130542													
WG130084PBS	PBS	10/26/01 5:12				U	mg/Kg		-0.015	0.015			
WG130084LCSS	LCSS	10/26/01 5:17	PCN15142	68.9		17.16	mg/Kg		41.3	124			X
L34114-01MS	MS	10/26/01 5:30	MS011001-50	2.75	2.98	4.901	mg/Kg	69.9	75	125			X
L34165-01AS	AS	10/26/01 5:57	MS011022-4	10.375	25.8	35.18	mg/Kg	90.4	75	125			
L34329-24DUP	DUP	10/26/01 7:16			.08	.108	mg/Kg				29.8	20	T
WG131101													
WG130025PBS	PBS	11/07/01 19:57				U	mg/Kg		-0.015	0.015			
WG130025LCSS	LCSS	11/07/01 20:01	PCN15142	68.9		18.04	mg/Kg		41.3	124			X
L34329-01MS2	MS	11/07/01 20:10	MS011108-20	2.4	.121	1.97	mg/Kg	77	75	125			
L34329-03AS	AS	11/07/01 20:23	MS011022-4	8.5	.05	7.677	mg/Kg	89.7	75	125			
L34329-22DUP	DUP	11/07/01 22:08			.08	.0893	mg/Kg				11	20	

Sulfur Forms M600/2-78-054 3.2.4

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130716													
WG130716PBS	PBS	11/12/01 9:00				U	%		-0.02	0.02			
WG130716LCSS	LCSS	11/12/01 9:21	PCN11635	1.68		1.83	%		1.334	2.016			

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34329***

Project ID: 2140031

Thallium, total (3051) M6020 ICP-MS

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130542													
WG130084PBS	PBS	10/26/01 5:12				U	mg/Kg		-0.015	0.015			
WG130084LCSS	LCSS	10/26/01 5:17	PCN15142	152		154.18	mg/Kg		87.1	217			
L34114-01MS	MS	10/26/01 5:30	MS011001-50	5.5	5.56	10.423	mg/Kg	88.4	75	125			
L34329-24DUP	DUP	10/26/01 7:16			.09	.095	mg/Kg				5.4	20	
WG131101													
WG130025PBS	PBS	11/07/01 19:57				U	mg/Kg		-0.015	0.015			
WG130025LCSS	LCSS	11/07/01 20:01	PCN15142	152		146.78	mg/Kg		87.1	217			
L34329-01MS2	MS	11/07/01 20:10	MS011108-20	4.8	.084	4.055	mg/Kg	82.7	75	125			
L34329-22DUP	DUP	11/07/01 22:08			.06	.0614	mg/Kg				2.3	20	

Zinc, total (3051) M6010B ICP

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130170													
WG130025PBS	PBS	10/23/01 6:02				U	mg/Kg		-0.9	0.9			
WG130025LCSS	LCSS	10/23/01 6:06	PCN15142	398		407.1	mg/Kg		308	490			
L34329-01MS1	MS	10/23/01 6:18	II011010-7	44.5	51.4	86.07	mg/Kg	77.9	75	125			
L34329-22DUP	DUP	10/23/01 7:57			59	66.78	mg/Kg				12.4	20	
WG130347													
WG130084PBS	PBS	10/24/01 2:26				U	mg/Kg		-0.9	0.9			
WG130084LCSS	LCSS	10/24/01 2:31	PCN15142	398		363.3	mg/Kg		308	490			
L34114-01MS2	MS	10/24/01 2:45	II011010-7	51	296	337.7	mg/Kg	81.8	75	125			
L34329-24DUP	DUP	10/24/01 4:32			63	67.47	mg/Kg				6.9	20	

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

Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34329
Date Received: 10/11/2001
Received By: george

Receipt Verification

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

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

N/A

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

N/A

Shipping Containers

Cooler Id		Temp (°C)	Rad (µR/hr)
ACZ		10	15

Notes

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

Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34329
Date Received: 10/11/2001
Received By: george

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	Y < 2	YG< 2	B < 2	BG< 2	O < 2	T >12	P >12	N/A	RAD
L34329-01	S-A-1-O'										O	
L34329-02	S-A-1-1'										O	
L34329-03	S-A-2-O'										O	
L34329-04	S-A-2-1'										O	
L34329-05	S-A-3-O'										O	
L34329-06	S-A-3-1'										O	
L34329-07	S-A-4										O	
L34329-08	S-A-5-O'										O	
L34329-09	S-A-5-1'										O	
L34329-10	S-A-6-O'										O	
L34329-11	S-A-6-1'										O	
L34329-12	S-A-7-O'										O	
L34329-13	S-A-7-1										O	
L34329-14	S-A-8-A										O	
L34329-15	S-A-8-B										O	
L34329-16	S-A-9										O	
L34329-17	S-A-10-O'										O	
L34329-18	S-A-10-5'										O	
L34329-19	S-A-11-O'										O	
L34329-20	S-A-11-5'										O	
L34329-21	S-A-13										O	
L34329-22	S-A-14										O	
L34329-23	S-A-15										O	
L34329-24	S-A-16										O	

ACZ Laboratories, Inc.

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

CHAIN of CUSTODY

Quote #: CASCADE - Blue Ridge **ACZ #:** L34329

CLIENT INFORMATION

Name to appear on Report and Invoice

CASCADE EARTH SCIENCES
222 S. Holly
MEDFORD, OR 97501

Attn: MARY ANN AMANN Tel: 541-779-2280

Email: maryannaa@cascade-earth.com

Carbon Copy: **Report:** _____ **Invoice:** _____

Attn: Tel:

Email:

PROJECT INFORMATION

Client Project name and/or PO#: Ochoco Mines 2140031

Shipping Company:

Tracking #:

ANALYSES REQUESTED *(required; attach list)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total Metals	Paste pH	TKN	ABA	Sulfide per Sulfur		
S-A-1-0'	10/7/01 910	SD	1	X	X					
S-A-1-1'	10/7/01 915		1	X	X					
S-A-2-0'	10/7/01		1	X	X					
S-A-2-1'	10/7/01		1	X	X					
S-A-3-0'	10/5/01 1200		1	X	X					
S-A-3-1'	10/5/01 1200		1	X	X		✓			
S-A-4	10/5/01 1230		1	X	X					
S-A-5-0'	10/5/01 1222		1	X	X					
S-A-5-1'	10/5/01 1222		1	X	X		✓			
S-A-6-0'	10/5/01 1232		1	X	X					
S-A-6-1'	10/5/01 1232		1	X	X					
S-A-7-0'	10/5/01 1200	✓	1	X	X					

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

REMARKS

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[illegible] CES	10/9/01 1210	[illegible]	
			10-11-01 1000

PAGE 1 Of 2

FRMQA021.01.00.03 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.

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

CHAIN of CUSTODY

Quote #: CASCADE - Blue Ridge

ACZ #: L34329

CLIENT INFORMATION

Name to appear on Report and Invoice

CASCADE EARTH SCIENCES
222 S. Holly
MEDFORD, OR 97501

Attn: MARY ANN AMANN Tel: 541-779-2250

Email: MARYANNA@cascade-earth.com

Carbon Copy: Report: _____ Invoice: _____

Attn: Tel:

Email:

PROJECT INFORMATION

Client Project name and/or PO#:

Shipping Company:

Tracking #:

ANALYSES REQUESTED *(required; attach list)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Total Metals	PASTE pH	TKN	ABA			
S-A-7-1'	10/5/01 1200	So	1	X	X		X			
S-A-8-A	10/5/01 1630		1			X				
S-A-8-B	10/5/01 1630		1			X				
S-A-9	10/5/01 1541		1	X	X					
S-A-10-0'	10/4/01 1345		1	X	X					
S-A-10-5'	10/4/01 1345		1	X	X					
S-A-11-0'	10/4/01 1415		1	X	X					
S-A-11-5'	10/4/01 1415		1	X	X					
S-A-13	10/7/01 1150		1	X	X					
S-A-14	10/7/01 1155		1	X	X					
S-A-15	10/7/01 1200		1	X	X		✓			
S-A-16	10/7/01 1210		1	X	X					

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

REMARKS

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
CES	10/9/01 1210		
			10-11-01 1000

PAGE 2 Of 2

FRMQA021.01.00.03 White - Return with sample. Yellow - Retain for your records.

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

Analytical Report

Mary Ann Amann
Cascade Earth Sciences, LTD.
225 S. Holly St.
Medford, OR 97501

October 29, 2001

Project: L34286

Mary Ann Amann:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 09, 2001. This project has been assigned to ACZ's project number, L34286. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 8.0. The enclosed results relate only to the samples received under L34286. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

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

All samples and sub-samples associated with this project will be disposed of after November 29, 2001. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs.

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

Sue Barkey 29/Oct/01

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

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

Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0473

ACZ ID: ***L34286-01***
Date Sampled: *10/08/01 10:45*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.0012		ug/L	0.0002	0.0005	10/23/01 14:25	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0833

ACZ ID: ***L34286-02***
Date Sampled: *10/08/01 11:00*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.0019		ug/L	0.0002	0.0005	10/23/01 14:38	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: 0468

ACZ ID: ***L34286-03***
Date Sampled: *10/08/01 10:30*
Date Received: *10/09/01*
Sample Matrix: *Ground Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, dissolved	M1631, Atomic Fluorescence	0.264		ug/L	0.004	0.01	10/25/01 15:12	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0474

ACZ ID: ***L34286-04***
Date Sampled: *10/08/01 09:10*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.0015		ug/L	0.0002	0.0005	10/23/01 14:47	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0479

ACZ ID: ***L34286-05***
Date Sampled: *10/08/01 12:35*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.0087		ug/L	0.0002	0.0005	10/23/01 14:52	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: 0325

ACZ ID: ***L34286-06***
Date Sampled: *10/08/01 10:50*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.0011		ug/L	0.0002	0.0005	10/23/01 14:57	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0822

ACZ ID: ***L34286-07***
Date Sampled: *10/08/01 13:30*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.0002	B	ug/L	0.0002	0.0005	10/24/01 10:37	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0831

ACZ ID: ***L34286-08***
Date Sampled: *10/08/01 12:40*
Date Received: *10/09/01*
Sample Matrix: *Ground Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, dissolved	M1631, Atomic Fluorescence	0.57		ug/L	0.02	0.05	10/25/01 15:21	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: 0466

ACZ ID: ***L34286-09***
Date Sampled: *10/08/01 12:50*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.0070		ug/L	0.0002	0.0005	10/24/01 10:50	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0340

ACZ ID: ***L34286-10***
Date Sampled: *10/08/01 12:50*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.0007		ug/L	0.0002	0.0005	10/24/01 11:00	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0471

ACZ ID: ***L34286-11***
Date Sampled: *10/08/01 12:00*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.0071		ug/L	0.0002	0.0005	10/24/01 11:04	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0832

ACZ ID: ***L34286-12***
Date Sampled: *10/08/01 11:55*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.0276		ug/L	0.0002	0.0005	10/24/01 11:09	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0469

ACZ ID: ***L34286-13***
Date Sampled: *10/08/01 12:20*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.0025		ug/L	0.0002	0.0005	10/24/01 11:22	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0472

ACZ ID: ***L34286-14***
Date Sampled: *10/08/01 12:00*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.390		ug/L	0.004	0.01	10/24/01 11:27	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: 0465

ACZ ID: ***L34286-15***
Date Sampled: *10/08/01 11:50*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.0143		ug/L	0.0002	0.0005	10/24/01 11:32	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.

Project ID: 2140031
Sample ID: 0826

ACZ ID: ***L34286-16***
Date Sampled: *10/08/01 11:40*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.0037		ug/L	0.0002	0.0005	10/24/01 11:36	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0475

ACZ ID: ***L34286-17***
Date Sampled: *10/08/01 08:50*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.0035		ug/L	0.0002	0.0005	10/24/01 11:41	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0476

ACZ ID: ***L34286-18***
Date Sampled: *10/08/01 09:00*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.0014		ug/L	0.0002	0.0005	10/24/01 11:50	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0823

ACZ ID: ***L34286-19***
Date Sampled: *10/08/01 11:15*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.175		ug/L	0.002	0.005	10/24/01 12:04	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0827

ACZ ID: ***L34286-20***
Date Sampled: *10/08/01 10:00*
Date Received: *10/09/01*
Sample Matrix: *Ground Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, dissolved	M1631, Atomic Fluorescence	33.7		ug/L	0.1	0.3	10/25/01 15:35	lcj

ACZ Laboratories, Inc.
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Inorganic Analytical Results

Cascade Earth Sciences, LTD.
Project ID: 2140031
Sample ID: 0830

ACZ ID: ***L34286-21***
Date Sampled: *10/08/01 09:45*
Date Received: *10/09/01*
Sample Matrix: *Surface Water*

Metals Analysis

Parameter	EPA Method	Result	Qual	Units	MDL	PQL	Date	Analyst
Mercury, total	M1631, Atomic Fluorescence	0.92		ug/L	0.01	0.03	10/24/01 12:17	lcj

Report Header Explanations

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

QC Sample Types

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

QC Sample Type Explanations

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

ACZ Qualifiers (Qual)

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

Method References

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

Comments

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

Cascade Earth Sciences, LTD. ACZ Project ID: ***L34286***

Project ID: 2140031

Mercury, dissolved M1631, Atomic Fluorescence

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130456													
WG130456PBW	PBW	10/25/01 15:03				U	ug/L		-0.0003	0.0003			
WG130456LCSW	LCSW	10/25/01 15:07	AF010926-3	.005		.00486	ug/L	97.2	75	125			
L34286-03DUP	DUP	10/25/01 15:17			.264	.264	ug/L				0	24	
L34286-08MS	MS	10/25/01 15:26	SCN0001129	.2	.57	.745	ug/L	87.5	75	125			
L34286-08MSD	MSD	10/25/01 15:31	SCN0001129	.2	.57	.738	ug/L	84	75	125	0.94	24	

Mercury, total M1631, Atomic Fluorescence

ACZ ID	Type	Analyzed	PCN/SCN	QC	Sample	Found	Units	Rec	Lower	Upper	RPD	Limit	Qual
WG130336													
WG130336PBW	PBW	10/23/01 14:16				U	ug/L		-0.0003	0.0003			
WG130336LCSW	LCSW	10/23/01 14:20	AF010926-3	.005		.0045	ug/L	90	75	125			
L34286-01MS	MS	10/23/01 14:29	MS010926-4	.002	.0012	.00316	ug/L	98	75	125			
L34286-01MSD	MSD	10/23/01 14:34	MS010926-4	.002	.0012	.00335	ug/L	107.5	75	125		24	
L34286-02DUP	DUP	10/23/01 14:43			.0019	.00188	ug/L				1.1	24	
L34286-13MS	MS	10/23/01 15:38	MS010926-4	.002	.0027	.00458	ug/L	94	75	125			
L34286-13MSD	MSD	10/23/01 15:42	MS010926-4	.002	.0027	.00489	ug/L	109.5	75	125		24	
L34286-14DUP	DUP	10/23/01 15:51			.377	.37	ug/L				1.9	24	
WG130392													
WG130392PBW	PBW	10/24/01 10:28				U	ug/L		-0.0003	0.0003			
WG130392LCSW	LCSW	10/24/01 10:32	AF010926-3	.005		.00502	ug/L	100.4	75	125			
L34286-07MS	MS	10/24/01 10:41	MS010926-4	.002	.0002	.00207	ug/L	93.5	75	125			
L34286-07MSD	MSD	10/24/01 10:46	MS010926-4	.002	.0002	.0021	ug/L	95	75	125	1.44	24	
L34286-09DUP	DUP	10/24/01 10:55			.007	.00715	ug/L				2.1	24	
L34286-17DUP	DUP	10/24/01 11:45			.0035	.00356	ug/L				1.7	24	
L34286-18MS	MS	10/24/01 11:54	MS010926-4	.002	.0014	.00365	ug/L	112.5	75	125			
L34286-18MSD	MSD	10/24/01 11:59	MS010926-4	.002	.0014	.00369	ug/L	114.5	75	125	1.09	24	

ACZ Laboratories, Inc.
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Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34286
Date Received: 10/09/2001
Received By: TONY

Receipt Verification

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

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

N/A

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

N/A

Shipping Containers

Cooler Id		Temp (°C)	Rad (µR/hr)
ACZ		4.0	13

Notes

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

Sample Receipt

Cascade Earth Sciences, LTD.
2140031

ACZ Project ID: L34286
Date Received: 10/10/2001
Received By: TONY

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	Y < 2	YG< 2	B < 2	BG< 2	O < 2	T >12	P >12	N/A	RAD
L34286-01	0473										O	
L34286-02	0833										O	
L34286-03	0468										O	
L34286-04	0474										O	
L34286-05	0479										O	
L34286-06	0325										O	
L34286-07	0822										O	
L34286-08	0831										O	
L34286-09	0466										O	
L34286-10	0340										O	
L34286-11	0471										O	
L34286-12	0832										O	
L34286-13	0469										O	
L34286-14	0472										O	
L34286-15	0465										O	
L34286-16	0826										O	
L34286-17	0475										O	
L34286-18	0476										O	
L34286-19	0823										O	
L34286-20	0827										O	
L34286-21	0830										O	

ACZ Laboratories, Inc.

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

CHAIN of CUSTODY

Quote #: CASCADE-WATER. **ACZ #:** L34286

CLIENT INFORMATION

Name to appear on Report and Invoice

Cascade Earth Sciences
225 S. Holly
Medford, OR 97501

Attn: Mary Ann Tel: 541 779 2280

Email:

Carbon Copy: **Report:** _____ **Invoice:** _____

Attn: Tel:

Email:

PROJECT INFORMATION

Client Project name and/or PO#: Ochoco Mines / Blue Ridge-Amity. 2140031

Shipping Company:

Tracking #:

ANALYSES REQUESTED *(required; attach list)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Hg 1631						
0473	10/8/01 1045	SW	1	✓						
0833	1100		1	✓						
0468	1030	GW	1	✓	HG-D-1631					
0474	0910	DW	1	✓						
0479	1235	SW	1	✓						
0325	1050	DW	1	✓						
0822	1330	DW	1	✓						
0831	1240	GW	1	✓	HG-D-1631					
0466	1250	SW	1	✓						

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

REMARKS

only analyze these #s. Bottles on top of ice are NOT to be Analyzed

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	10/8/01 1500	[signature]	10/09/01 1030

PAGE 1 Of 2

FRMQA021.01.00.03 White - Return with sample. Yellow - Retain for your records.

ACZ Laboratories, Inc.

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

L 34286

CHAIN of CUSTODY

Quote #: CASCADE - WATER. **ACZ #:** ~~L34316~~ 10/10/01

CLIENT INFORMATION

Name to appear on Report and Invoice

CASCADE EARTH Science.
225 S. Holly
Medford, OR 97501

Attn: Mary Ann Amann **Tel:** 541 779 2280

Email: Maryanna@cascade-earth.com.

Carbon Copy: **Report:** ✓ 2 **Invoice:** ✓ 2

Attn: **Tel:**

Email:

PROJECT INFORMATION

Client Project name and/or PO#:
Ochoco Mines
2140031

Shipping Company:

Tracking #:

ANALYSES REQUESTED *(required; attach list)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	Hg 1631						
0340	10/8/01 1250	SW	1	✓						
0471	1200		1	✓						
0832	1155		1	✓						
0469	1220		1	✓						
0472	1210		1	✓						
0465	1150		1	✓						
0826	1140		1	✓						
0475	0850		1	✓						
0476	0900		1	✓						
0823	1115		1	✓						
0827	1000	GW	1	✓	HG-D-1631					
0830	↓ 0945	SW	1	✓						

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

REMARKS

Bottles ONTOP of Ice are NOT TO BE ANALYZED. They are xtra. Equip + Fld Blanks Included in above.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
[signature]	10/8/01 1500	[signature]	10/09/01 1030

PAGE 2 Of 2

FRMQA021.01.00.03 White - Return with sample. Yellow - Retain for your records.

Appendix K.

Field and Laboratory Quality Assurance / Quality Control

1.0 FIELD AND LABORATORY QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Field and laboratory QA/QC objectives and procedures are detailed in the Quality Assurance Project Plan (QAPP) (CES, 1997). The purpose of the QAPP is to establish guidelines necessary to provide information that is representative of subsurface conditions. The QAPP presents a description of field documentation procedures, sample custody procedures, field instrument calibration procedures, procedures for the collection of field QA/QC samples, and laboratory quality assurance methods. The QAPP also includes data validation methods and data management procedures.

ACZ Laboratories, Inc of Steamboat Springs, Colorado was the primary contract laboratory for this project and North Creek Analytical Laboratory located in Beaverton, Oregon was the split laboratory. In order to meet the Level II data validation objectives for this project, CES received Tier II deliverables. This data package included a transmittal letter, sample analytical results, method blank results, and surrogate recovery results where applicable. The results of matrix spiked samples and either duplicate samples or duplicate matrix spike samples, were also included.

Both laboratories' Quality Assurance Manuals address calibration procedures, internal QC checks, QA performance audits; system audits, preventative maintenance, and procedures used to assess data precision, accuracy and completeness. Corrective action is also addressed in the lab's standard operating procedures (SOP). Laboratory QA/QC manuals are available upon request.

1.1 Data Validation

Field observations and activities, and sample locations were logged in field books compiled by on-site personnel. Daily logs included a description of all persons entering and leaving the Site, daily start and completion times, and any problems that were encountered. Photographs were taken to document sampling activities. Quality assurance was maintained in the field using appropriate field documentation and sample custody procedures.

The laboratories in accordance with their SOPs conducted data validation. Errors detected in the process were identified and evaluated in regards to the overall required accuracy of the method and the objectives of the study. Results of the internal laboratory QA/QC procedures such as lab blank, matrix spike, and surrogate analysis were reported as part of the Level II QA/QC report and are summarized on the Analytical Laboratory Data Validation Check Sheet, included in this Appendix. Problems encountered by the labs with regards to chain-of-custody, sample holding times, sample analysis, laboratory contamination, etc., were documented by the lab.

A review of laboratory and field documents indicates that proper chain of custody records were maintained for all samples collected for this project. A record of transfer of possession of the samples was maintained including the custodial signature, dates of possession, time of transfer, and the signature of the persons receiving custody of the samples. The chain of custody forms were complete and included the required information such as sample code number, signature of the collector, date and time of collection and the total number of samples transferred.

Project-related samples were collected for analyses of 13 total metals (Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, and Zn), sulfate, total sulfur, acid -base accounting and pH in soil, waste piles, water and sediment. The laboratory records for this project indicate that a total of 116 samples were collected and submitted for analyses (refer to Tables 1 through 11). In addition, ten blind duplicate samples were analyzed by ACZ and four split samples were analyzed by NCA. As agreed upon prior to the field event, 1 duplicate for every 15 soil and waste samples and 1 duplicate for every 10 water samples would be collected for analysis. A split sample to be analyzed by NCA was also collected for every matrix.

1.2 Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average values. A check on laboratory precision was performed as outlined below.

A field duplicate sample was submitted for soils, waste, sediment and water. The sample was split from another predetermined sample as indicated in the Field Operations Plan (CES, 2001). This duplicate sample was submitted as a blind sample using a false sample number. The true identity of the blind duplicate sample was recorded on field note sheets.

Precision is measured by the relative percent differences (RPDs) between a sample and a duplicate of that sample. Generally, RPD values of 75% or less are considered acceptable for field duplicate QA/QC (Data Quality Objectives for Remedial Response Activities, EPA 540/G-87/004, 1987). Testing laboratories set their own limits for laboratory RPDs. If RPDs fell within laboratory limits, where defined, the precision was considered acceptable.

RPDs were calculated using the following formula:

$$RPD = \frac{(Test1 - Test2)}{((Test1 + Test2)/2)}$$

Where:

Result of Test 1 is the laboratory analytical result of the original sample (e.g., soil or ground water),

Result of Test 2 is the result of the laboratory analysis of the field blind duplicate sample, or the laboratory-derived duplicate of the original sample,

Test1 – Test2 is the Difference,

(Test1 + Test2)/2 is the Average, and

The result is a percentage (times 100) in absolute value.

Precision for mercury concentration in soil, waste and sediment field duplicates was calculated on 10 samples (Tables 1 and 2). Four soil samples were split for duplicate analysis at NCA laboratory.

Precision for duplicate analysis of arsenic ranged from 0 to 35 % and, with one exception, ranged from 20 to 43% for mercury indicating acceptable precision. One duplicate set (S-BR-1-0' and S-BR-4) has an RPD of 182% for mercury. Laboratory precision efforts at ACZ did not meet the guidelines for precision in these and other soil samples analyzed in this batch. The matrix spike was out of control limits and the duplicate precision was out of control limits. NCA results did not exceed the QA/QC guidelines for precision.

RPDs greater than default limits in soil samples could be the result of the following:

1. The sample may not have been thoroughly homogenized in the field before separating the sample into two containers.

2. The variability may be due to inadequate lab QA/QC procedures. As stated in several of the laboratory's QA/QC summaries, many matrix spikes and duplicates for several analytes were out of the control limits. Problems with laboratory QA/QD are bulleted below.

3. Lastly, the natural variability in the sample matrix may contribute to the large RPD between analytical values. This has been called the "nugget effect", meaning that a one particulate of soil may contain a concentrated amount of a particular metal, thus causing the duplicate sample to have a much higher (or lower) concentration of the metal than the official sample. This variability is inherent in solid materials, which cannot be easily thoroughly mixed into a single homogenous mixture as you could obtain with water. This is most likely the cause of the high variability observed in the QA/QC documentation.

Surface water samples had no percent difference because there were no metals detected above the PQL. A summary of QA/QC is shown in Tables 1&2 of this Appendix.

Based on a review of RPDs for field and laboratory QA/QC, precision for the sample results is acceptable.

1.3 Accuracy

Accuracy is a measure of the closeness of the measured value to the "true value." It is a function of techniques and procedures that minimize sampling and analytical error. Field personnel maintained the accuracy in the field by following the sampling procedures outlined in the Field Operations Plan (Appendix A). Duplicate and split samples were collected as outlined in the work plan.

Laboratory accuracy is expressed as percent recovery and is calculated from recovery data as determined by sample spiking with surrogate compounds. A summary of sample matrix spike recovery results is presented at the end of this section.

Since the goal of the SI is to determine areas of that may be impacted from historical mining operations, the reported value for a particular location is the value of the official sample. No other problems with accuracy were identified. Corrective actions were not necessary and therefore none were taken.

Matrix spike recovery was within laboratory control limits of 70% to 130%, except for as noted at the end of the section.

Based on a review of laboratory reports and explanations, accuracy for the sample results is deemed acceptable.

1.4 Comparability

Data from this investigation is either directly comparable, or comparable with defined limitations, to literature data or other applicable criteria such as regulatory requirements.

1.5 Completeness

CES followed the SOW in creating a sampling plan to collect all of the designated samples. Changes to the sampling plan were made in the field after discussion and concurrence with the United States Forest Service (USFS) representative. Therefore all necessary samples were collected in the appropriate areas, shipped under chain of custody, received and analyzed by the laboratory.

Completeness is defined as the total number of samples taken for which valid analytical data are obtained divided by the total number of samples submitted for analyses and multiplied by 100.

Valid results were obtained for 129 (including QA/QC samples) out of 130 samples submitted for analyses. One duplicate sediment jar broke during transport. Based upon this data, completeness for this investigation was determined to be 99%.

Quality assurance and quality control procedures employed during the SI field explorations and sampling fall within accepted tolerance level

1.6 Representativeness

Representativeness is a measure of how closely the measured results reflect the actual concentration of distribution of the chemical compounds in the matrix sampled. The sampling plan design, standard operating procedures, sampling techniques, and sample handling protocols (e.g., storage, preservation, and transportation) have been developed to ensure the collection of representative samples. Representativeness of the data from samples collected as part of this investigation was provided by the sampling methods outlined in the Field Operations Plan (CES, 2001).

All specified sampling protocols were followed. No problems were encountered in obtaining representative samples during the investigation conducted at the Site. Corrective actions were not necessary and therefore none were taken.

1.7 Laboratory QA/QC

Laboratory QA/QC was reasonable, considering the nonhomogeneous nature of many of the samples. Most matrix spike recoveries were within the acceptable limits of 70 -130% with the exception of those listed below. In general, laboratory QA/QC was well documented and adequate for the purposes of this project.

The laboratory followed requirements for analysis and reporting under the EPA Level II protocols (EPA, 1987), including, laboratory blanks, laboratory duplicates, matrix spikes and matrix spike duplicates. All values between the minimum detection level (MDL) and the practical quantitation limit (PQL) were noted on the laboratory analytical reports. Analytical reports were reviewed to determine that all spikes, duplicates and lab blanks were within acceptable limits. Based on the review, the following problems were encountered. The problems are separated by the individual reports received.

All samples were analyzed within the holding times specified for the individual analytical procedure with the exception of mercury. Mercury has a 28-day holding period and analysis took place after this time, although the sample preparation took place within the 28 day holding time.

Project L34329 (ACZ Laboratory Project Number)

- The mercury analysis required re-testing outside the holding time.
- The silver stock standard, PCN14833, used in certain confirmatory QC samples (QCS/ICV/CCV) has been precipitating silver. The silver value was confirmed by ICP analysis to be biased slightly low. A new standard has been ordered. No significant impact of the data would be expected. However, data qualification may be necessary.
- The total selenium values on L34329-01, 02, and 03 have been qualified as estimated due to a potential matrix interference.
- The silver values on L34329-23 and 24 have been flagged as estimated due to poor digestion efficiency determined by a failure (low bias) of the laboratory control sample. These same two samples have also had their antimony values qualified as estimated due to a potential matrix interference.

Project L34339

- All analyses were performed within EPA recommended holding times except for mercury.
- The total antimony values are estimated due to matrix interferences on samples L34339-01 through 12, and L34339-24 through 34. The MS/MSDs were out of control limits. See QC Summary for recoveries (Appendix J).
- The total lead values are estimated due to matrix interferences on samples L34339-24 through 34. See QC Summary for QC failures.
- The total mercury values are estimated due to matrix interferences on samples L34339-01 through 20, and L34339-29 through 31. The MS was out of control limits in WG131265 and the duplicate precision (RPD) was out of control limits in WG131704.

- The total silver values are estimated due to matrix interferences on samples L34339-33 and 34. The LCSS was out of control limits.
- The total selenium values are estimated due to matrix interferences on samples L34339-19 through 34.

Project L34358

- All analyses were performed within EPA recommended holding times except for mercury.
- The total antimony values are estimated due to matrix interferences on samples L34358-03 through 05. The MS/MSDs were out of control limits.
- The total lead values are estimated due to matrix interferences on samples L34358-03 through 05 and 07. The MS/MSD and the duplicate precision (RPD) were out of control limits.
- The total mercury values are estimated due to matrix interferences on samples L34358-01 through 07. The duplicate precision was out of control limits.
- The total silver values are estimated due to matrix interferences on samples L34358-03 through 05. The LCSS was out of control limits.
- The total selenium values are estimated due to matrix interferences on samples L34358-03 through 05. The MS/MSDs were out of control limits.

Project L34351

- All analyses were performed within EPA recommended holding times. Mercury was performed after 28 days of sampling but within 28 days after sample preparation.
- The total lead values are estimated. Lead was detected in the prep blank (PBS) at 0.038 mg/Kg.
- The total silver values are estimated due to matrix interferences. The LCSS was out of control limits with a recovery of 260.8 mg/Kg. The control limits are 137 to 232 mg/Kg.
- The total zinc values are estimated. Zinc was detected in the prep blank (PBS) at 1.4 mg/Kg.

Project L34353

- All analyses were performed within EPA recommended holding times except for mercury, which was analyzed outside of the 28-day hold time.
- The total antimony values are estimated due to matrix interferences. The matrix spike (MS) and the matrix spike duplicate (MSD) were out of control limits with recoveries of 4% and 4.7%. The control limits are 75-125%. All other QC was acceptable including the analytical spikes and the LCSS.
- The total selenium values are estimated due to matrix interferences. The MS and the MSD were out of control limits with recoveries of 68.8% and 71.5%. The control limits are 75-125%. All other QC was acceptable including the analytical spikes and the LCSS.

Project L34346

- All analyses were performed within EPA recommended holding times. Mercury was analyzed past the 28-day holding from sample date, but within 28 days from date or sample prep (air drying and sieving).
- The antimony, arsenic, chromium, copper, nickel, selenium and zinc values are estimated due to matrix interferences. Either the matrix spike (MS) or matrix spike duplicate (MSD) was out of control limits for these metals.

- Duplicate precision (RPD) for chromium, mercury and nickel exceed the QC acceptance limit of 20%.

Project L34337

- All analyses were performed within EPA recommended holding times. Mercury was analyzed past the 28-day holding from sample date, but within 28 days from date or sample prep (air drying and sieving).
- The matrix spike (MS) and the matrix spike duplicate (MSD) for total antimony were out of control limits with recoveries of 4 and 4.7% and 7.1 and 7.3%. Analytical spikes were run and were within control limits. All other QC was acceptable.
- The MS for total copper was out of control limits with a recovery of 164.1%. Analytical spikes were run and were within control limits. All other QC was acceptable.
- The precision (RPD) for the duplicate was out of control limits at 53.4 for total mercury and 50.4 for total copper. The upper limit is 25.
- The total selenium value for L34337-01 is estimated due to matrix interferences. The matrix spike (MS), the matrix spike duplicate (MSD), the analytical spike (AS), and the analytical spike duplicate (ASD) were all out of control limits in Workgroup 131986.

Project L34319

- All analyses were performed within EPA recommended holding times.
- Acidity as CaCO3 was found in the prep blank (PBW) at 8.3 mg/L. The control limits are –4 to 4. The data was accepted since the samples were not acidic and contained alkalinity.
- The sliver values are estimated due to low recoveries in the LCSW. The stock standard for QCS/ICV/CCV, PCN 14833, is precipitating out silver. The low sliver concentrations were confirmed by ICP analysis. The data was accepted since the problem was confirmed. New stock solution has been ordered.

Although there were many problems with selenium, antimony, silver and thallium noted, these metals are not compounds of concern and therefore the data was accepted as valid.

2.0 MERCURY: EPA METHOD 1631

Field QA/QC procedures for the low level mercury sampling were followed by adhering to the sampling requirements of the document: *Method 1669 Sampling Ambient Water for Determination of Metals at EPA Water Quality Criteria Levels* (Appendix A)

Field blanks at every Mine Site were collected as outlined in the FOP. The laboratory did not supply ultra clean sampling equipment as required in the above document. Therefor, to assure that the equipment used did not contribute mercury to the sample, CES collected equipment blanks on every piece of equipment used in the sample collection. Only the pore water samples SW-BR-5 and SW-BR-1 used equipment to collect the sample. All other samples were collected from the stream flow directly into the laboratory-supplied bottle.

The pore water samples had visible sediment in the collection bottle and therefore the lab was requested to filter them according to the 1669 method. This method requires soaking a 0.4 micron filter in 1 Molar reagent grade nitric acid for 48 hours, rinsing the filter five times with reagent water and soaking for an additional 24 hours in reagent water. The laboratory used an

Environmental Express 2 micron filter. The filter was soaked in hydrochloric acid for 24 hours. No other information was obtained from the laboratory in regard to their cleaning procedures. Mercury analysis was not run on the filter to obtain a filter blank analysis.

The results of the equipment blank analysis (Table 3) show that the pore water samples were not contaminated with mercury due to equipment used in sample collection. However, the large size filter, 2 micron versus the required 0.4 micron filter, may have contributed particulate matter to the pore water samples (SW-BR-1 and SW-BR-5). All samples were acidified in the lab. Acidification would dissolve the fine particulate matter and subsequently contribute this material to be analyzed.

The drive point blank and the beaker blank both had a lower concentration of mercury than the field blank collected at Blue Ridge Mine. All three blanks were collected at the Site near the detention pond so that atmospheric contribution would have affected all three samples equally. In addition, because of the greater processing of creating equipment blanks, it would be expected that a higher concentration be detected in the equipment blank than in the field blank where water is only transferred from one bottle to another. Granted this concentration is minute, but all blanks had concentrations at least fives times higher than the MDL.

The low level mercury analysis is only performed at three laboratories nationally. The requirements and procedures to perform the analysis are stringent and rigorous. The contract laboratory for this project, ACZ Labs, Inc. specializes in mining analysis. They recently obtained a clean room to perform the low level metals analyses of Method 1631 and 1669. The clean room procedures have been in operation less than one year. The requests for clean sampling equipment (tubing, filters, etc.) were denied. Even though this is a requirement for the 1631 analysis. It is in the opinion of CES that ACZ Labs have not perfected the methodology required of the low level 1631 analytical method as outlined in the standardization manual. We recommend caution in laboratory selection for similar projects in the future.

This causes uncertainty regarding laboratory procedures. However, the concentration of mercury detected in surface waters should be used as a screening tool to evaluate the impact of historical mining operations on the nearby streams. Even with uncertainty described above, it appears there is mercury in the surface water. The uncertainty does not invalidate the results. Although, a critical question remains as it is not apparent at this time if mercury is in the dissolved or total mercury form. If the mercury is dissolved it will leave the Site and continue downstream (eventually reaching the Deschutes and the Columbia River). If it is total mercury and can be attributed to sediment in the stream, it is possible to stop the migration of it off-site.

Table 1. QA/QC Summary
Blue Ridge Mine Site, Ochoco National Forest, Crook County, Oregon

Sample I.D.[1]	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	Sulfate	Acid-Base Potential	pH
	mg/kg													%		su
WP-BR-3-2.5'	<0.08	2.3	<0.04	0.27	61	29	2.65	23.3	114	<0.2	0.02B	0.17	34	<0.01	36	8.6
WP-BR-9-2.5'	<0.08	2.3	<0.4	0.3	68	28	2.29	29.7	128	<0.2	0.02B	0.2	33	0.02B	55	8.4
RPD	**NC**	**0.0%**	**NC**	**10.5%**	**10.9%**	**3.5%**	**14.6%**	**24.2%**	**11.6%**	**NC**	**NC**	**16.2%**	**3.0%**	**NC**	**41.8%**	**2.4%**
WP-BR-5-3'	<0.08	0.9B	0.7B	0.74	48	60	3.92	129	51	<0.2	0.07B	0.15	76	<0.01	14	7.3
WP-BR-7-3'	<0.08	0.7B	0.7B	0.58	42	55	2.51	184	50	<0.2	0.06B	0.1B	64	0.01B	19	7.5
RPD	**NC**	**NC**	**NC**	**24.2%**	**13.3%**	**8.7%**	**43.9%**	**35.1%**	**2.0%**	**NC**	**NC**	**NC**	**17.1%**	**NC**	**30.3%**	**2.7%**
S-BR-9-1.5'	<0.08	3	0.5B	0.55	19	46	3.58	244	41	<0.1	0.08B	0.14	41	<0.01	22	6.5
S-BR-23-1.5 (NCA)	<.5	3.50	0.73	<.5	52.20	66.30	4.23	288	78.3	0.95	<0.5	<0.5	75.40	NA	NA	6.97
RPD	**NC**	**15.4%**	**NC**	**NC**	**93.3%**	**36.2%**	**16.6%**	**16.5%**	**62.5%**	**NC**	**NC**	**NC**	**59.1%**	**NC**	**NC**	**7.0%**
SS-BR-1	<0.08	1.0B	<0.2	0.83	49	61	3.29	99	91	0.5B	0.13	0.13	49	NA	NA	7.0
SS-BR-1 (NCA)	<1.13	1.81	1.19	<1.13	180	103	5.61	121	248	<1.13	<1.13	<1.13	119	NA	NA	7.60
RPD	**NC**	**NC**	**NC**	**NC**	**114.4%**	**51.2%**	**52.1%**	**20.0%**	**92.6%**	**NC**	**NC**	**NC**	**83.3%**	**NC**	**NC**	**8.2%**
S-BR-20	<0.08	0.5B	0.6B	0.44	35	41	3.24	0.44	37	<0.1	0.05B	0.04B	74	0.02B	9	5.6
S-BR-22	<0.08	0.4B	0.4B	0.42	30	36	2.71	0.36	33	0.1B	0.05B	0.04B	65	<0.01	11	5.5
RPD	**NC**	**NC**	**NC**	**4.7%**	**15.4%**	**13.0%**	**17.8%**	**20.0%**	**11.4%**	**NC**	**NC**	**NC**	**12.9%**	**NC**	**20.0%**	**1.8%**
S-BR-1-0'	<0.08	0.5B	0.5B	0.88	22	140	4.08	200	30	0.7	0.1B	0.06B	54	0.03B	13	6.4
S-BR-4	<0.08	0.6B	0.7B	1.04	33	151	2.77	9.3	31	<0.1	0.12	0.05B	57	<0.01	10	7.0
RPD	**NC**	**NC**	**NC**	**16.7%**	**40.0%**	**7.6%**	**38.2%**	**182.2%**	**3.3%**	**NC**	**NC**	**NC**	**5.4%**	**NC**	**26.1%**	**9.0%**
	mg/L							ug/L	mg/L						ALK	su
SW-BR-5	<0.0002	<0.0005	<0.002	<0.0001	<0.01	<0.01	0.0004B	**33.7**	0.02B	<0.001	<0.0001	0.00005B	0.01B	10	123	6.6
SW-BR-7	<0.0002	0.0006B	<0.002	<0.0001	<0.01	<0.01	<0.0001	NA	<0.01	<0.001	<0.0001	<0.00001	<0.01	10B	125	7.4
RPD	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**1.6%**	**11.4%**

NOTES: [1] Samples were collected on October 3-7, 2001 by CES. Analysis was conducted by ACZ Laboratories in Steamboat Springs, Colorado.
B= analyte detected between method detection limit (MDL) and practical quantification limit (PQL)
< value = analyte not detected above MDL
NCA = Split sample analyzed by North Creek Analytical Laboratory
NA = not analyzed
NC = not calculated
ALK = Total alkalinity
mg/kg = milligrams per kilogram
ug/L = micrograms per liter
RPD = relative percent difference
su = standard units
The jar containing the duplicate sediment sample for Blue Ridge Mine broke during transport and was not analyzed.

Table 2. QA/QC Summary
Amity Mine Site, Ochoco National Forest, Crook County, Oregon

Sample I.D.[1]	Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc	Sulfate	Acid-Base Potential	pH
	mg/kg													%		su
WP-A-1-25'	<0.08	1.3	0.9B	0.38	93	62	2.11	96.5	179	1.1	0.04B	0.35	64	0.43	11	7.8
WP-A-2-25'	<0.08	1.4	0.9B	0.41	115	67	2.08	65.9	176	<0.2	0.06	0.35	64	0.37	7	7.8
RPD	**NC**	**7.4%**	**NC**	**7.6%**	**21.2%**	**7.8%**	**1.4%**	**37.7%**	**1.7%**	**NC**	**NC**	**0.0%**	**0.0%**	**15.0%**	**44.4%**	**0.0%**
WP-A-3-5'	<0.8	4.9	0.9B	0.27	92	58	2.42	17.9	170	<0.2	0.04B	0.31	83	0.04B	0.07B	7.7
WP-A-3-5' (NCA)	<0.5	6.94	0.798	<.5	103.00	53.30	3.33	11.90	181	<.5	<.5	<.5	102.00	NA	NA	7.90
RPD	**NC**	**34.5%**	**12.0%**	**NC**	**11.3%**	**8.4%**	**31.7%**	**40.3%**	**6.3%**	**NC**	**NC**	**NC**	**20.5%**	**NC**	**NC**	**2.6%**
S-A-5-1'	0.04B	4.7	0.2B	0.48	36.3	43.7	6.4	272	59.5	0.48	0.067	0.143	83.4	0.95	-20	7.4
S-A-4	0.06B	5.6	<0.2	0.51	38	49	7.94	419	72	0.6	0.08	0.16	97	0.03B	9	7.3
RPD	**NC**	**17.5%**	**NC**	**6.1%**	**4.6%**	**11.4%**	**21.5%**	**42.5%**	**19.0%**	**22.2%**	**17.7%**	**11.2%**	**15.1%**	**NC**	**527.3%**	**1.4%**
SS-A-1	<0.08	2.2	<0.2	0.66	33	34	4.9	1.59	26	<0.2	0.08B	0.04B	59	NA	NA	7.1
SS-A-9	<0.08	1.8B	0.6B	0.62	41	41	4.85	1.26	29	<0.2	0.08B	0.03B	69	NA	NA	6.9
RPD	**NC**	**NC**	**NC**	**6.3%**	**21.6%**	**18.7%**	**1.0%**	**23.2%**	**10.9%**	**NC**	**NC**	**NC**	**15.6%**	**NC**	**NC**	**2.9%**
	mg/L							ug/L	mg/L						ALK	su
SW-A-1	<0.0002	0.0005B	<0.002	<0.0001	<0.01	<0.01	<0.0001	0.0025	<0.01	<0.001	<0.0001	<0.00001	<0.01	30	222	7.0
SW-A-1 (NCA)	<0.001	<0.001	<0.001	<0.001	0.00312	0.00561	<0.001	<0.0002	0.00514	<0.001	<0.001	<0.001	0.0106	20.3	244	7.4
RPD	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**38.6%**	**9.4%**	**5.6%**
JC-A-3	<0.0002	<0.0005	<0.002	<0.0001	<0.01	0.03B	<0.0001	**0.0143**	<0.01	<0.001	<0.0001	<0.00001	<0.01	<10	274	7.4
JC-A-4	<0.0002	<0.0005	<0.002	<0.0001	<0.01	<0.01	<0.0001	NA	<0.01	<0.001	<0.0001	<0.00001	<0.01	10B	281	7.5
RPD	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**2.5%**	**1.3%**

NOTES:
[1] Samples were collected on October 3-7, 2001 by CES. Analysis was conducted by ACZ Laboratories in Steamboat Springs, Colorado.
B= analyte detected between method detection limit (MDL) and practical quantification limit (PQL)
< value = analyte not detected above MDL
NCA = Split sample analyzed by North Creek Analytical Laboratory
NA = not analyzed
NC - not calculated
ALK = Total alkalinity
mg/kg = milligrams per kilogram
ug/L = micrograms per liter
RPD = relative percent difference
su = standard units

Table 3 Field Blanks for Low Level Mercury Analysis

Bottle ID	Sample ID	Name of Sample	Mercury	Method Detection limit
			ug/L	ug/L
474	BR-FB-1	Blue Ridge Field Blank	0.0015	0.0002
340	FB-Amity	Amity Field Blank	0.0007	0.0002
325	DPB-2	Drive Point Blank	0.0011	0.0002
833	TB-3	Tubing Blank	0.0019	0.0002
473	BB-4	Beaker Blank	0.0012	0.0002

NOTES: Field Blanks were prepared by pouring regeant water from one laboratory filled bottle into a clean bottle at the named location.
Blanks are prepared by pouring reagent water over the equipment tested. Water was collected into a beaker and poured into a clean bottle.
A beaker blank was also prepared because of this procedure.
All equipment used in sampling was tested. The equipment was used in collection of the pore space waters.
All other samples were collected directly into the bottle from the surface flow.
ug/L = Micrograms per liter

ANALYTICAL LABORATORY DATA VALIDATION CHECK SHEET

Summary:	**DATA VALID?**	☑ Yes	☐ No

Job Name: Ochoco Mines Job Number: 2140031

Review Date: 1/7/2002 Lab Name: ACZ Lab Batch ID#: L34346

Chain of Custody			
1. Correct containers used?	☑ Yes	☐ No	☐ NA
2. Correct preservative (if any) used?	☑ Yes	☐ No	☐ NA
3. Signature blocks complete and ending with lab?	☑ Yes	☐ No	☐ NA
4. Analyses requested match analyses reported?	☑ Yes	☐ No	☐ NA
5. Sample identification number matches with lab report?	☑ Yes	☐ No	☐ NA
6. Trip blank submitted?	☐ Yes	☑ No	☐ NA
7. Field blank submitted?	☐ Yes	☑ No	☐ NA
Timing			
8. Samples extracted within holding time?	☑ Yes	☐ No	☐ NA
9. Analysis performed within holding time?	☐ Yes	☑ No	☐ NA
Quality Assurance/Quality Control			
10. Lab blank completed?	☑ Yes	☐ No	☐ NA
11. Lab, field, or trip blank(s) reports contaminants?	☐ Yes	☑ No	☐ NA
If yes, indicate blank type, chemical(s), and concentration(s):			
12. Are reporting limits raised? (If yes, explain in "Comments" at bottom of form)	☐ Yes	☑ No	☐ NA
Accuracy			
13. Surrogate recovery within lab limits? (Default is 70-130%)	☐ Yes	☐ No	☑ NA
Precision			
14. Matrix spike (MS) recovery within 70-130%?	☐ Yes	☑ No	☐ NA
15. Matrix spike duplicate (MSD) recovery within 70-130%?	☐ Yes	☑ No	☐ NA
16. Rel. % Diff (RPD) within lab limits? (Default is 25%)	☐ Yes	☑ No	☐ NA
17. RPD calculation for field duplicates within limits (Default is 75%)	☑ Yes	☐ No	☐ NA

Comments

Mercury analyzed past 28 day hold time from sample date but within 28 days from prep date. MS or MSD out of control limits for Sb, Cr, Cu, Ni, Se, and Zn. RPD for Cr, Hg, and Ni exceed QC limit. Sb, As, Cr, Cu, Ni, Se, and Zn values were estimated due to matrix interferences. RPD for Cr, Hg, and Ni exceed the QC limit of 20%.

Initial Review By: *H. Jason Pulley* Final Review By:

ANALYTICAL LABORATORY DATA VALIDATION CHECK SHEET

Summary:	**DATA VALID?**	☑ Yes	☐ No

Job Name: Ochoco Mines Job Number: 2140031

Review Date: 1/7/2002 Lab Name: ACZ Lab Batch ID#: L34329

Chain of Custody			
1. Correct containers used?	☑ Yes	☐ No	☐ NA
2. Correct preservative (if any) used?	☑ Yes	☐ No	☐ NA
3. Signature blocks complete and ending with lab?	☑ Yes	☐ No	☐ NA
4. Analyses requested match analyses reported?	☑ Yes	☐ No	☐ NA
5. Sample identification number matches with lab report?	☑ Yes	☐ No	☐ NA
6. Trip blank submitted?	☐ Yes	☑ No	☐ NA
7. Field blank submitted?	☐ Yes	☑ No	☐ NA
Timing			
8. Samples extracted within holding time?	☑ Yes	☐ No	☐ NA
9. Analysis performed within holding time?	☐ Yes	☑ No	☐ NA
Quality Assurance/Quality Control			
10. Lab blank completed?	☑ Yes	☐ No	☐ NA
11. Lab, field, or trip blank(s) reports contaminants?	☐ Yes	☑ No	☐ NA
If yes, indicate blank type, chemical(s), and concentration(s):			
12. Are reporting limits raised? (If yes, explain in "Comments" at bottom of form)	☐ Yes	☑ No	☐ NA
Accuracy			
13. Surrogate recovery within lab limits? (Default is 70-130%)	☐ Yes	☐ No	☑ NA
Precision			
14. Matrix spike (MS) recovery within 70-130%?	☐ Yes	☑ No	☐ NA
15. Matrix spike duplicate (MSD) recovery within 70-130%?	☑ Yes	☐ No	☐ NA
16. Rel. % Diff (RPD) within lab limits? (Default is 25%)	☑ Yes	☐ No	☐ NA
17. RPD calculation for field duplicates within limits (Default is 75%)	☑ Yes	☐ No	☐ NA

Comments

Mercury analyzed outside the 28 day hold time; MS for Sb, Se, Ag, outside control limits; LCSS for Se and Ag outside control limits. Se values on L34329-01,-02,-03 are estimated due to matrix interference. Ag stock standard was biased qualification may be necessary. Ag and Sb values on L34329-23 and -24 are estimated due to potential matrix interferences.

Initial Review By: *H. Jason Pulley* Final Review By:

ANALYTICAL LABORATORY DATA VALIDATION CHECK SHEET

Summary:	**DATA VALID?**	☑ Yes	☐ No

Job Name: Ochoco Mines Job Number: 2140031

Review Date: 1/7/2002 Lab Name: ACZ Lab Batch ID#: L34351

Chain of Custody			
1. Correct containers used?	☑ Yes	☐ No	☐ NA
2. Correct preservative (if any) used?	☑ Yes	☐ No	☐ NA
3. Signature blocks complete and ending with lab?	☑ Yes	☐ No	☐ NA
4. Analyses requested match analyses reported?	☑ Yes	☐ No	☐ NA
5. Sample identification number matches with lab report?	☑ Yes	☐ No	☐ NA
6. Trip blank submitted?	☐ Yes	☑ No	☐ NA
7. Field blank submitted?	☐ Yes	☑ No	☐ NA
Timing			
8. Samples extracted within holding time?	☑ Yes	☐ No	☐ NA
9. Analysis performed within holding time?	☐ Yes	☑ No	☐ NA
Quality Assurance/Quality Control			
10. Lab blank completed?	☑ Yes	☐ No	☐ NA
11. Lab, field, or trip blank(s) reports contaminants?	☑ Yes	☐ No	☐ NA
If yes, indicate blank type, chemical(s), and concentration(s):	Zn present in blank at 1.4 mg/kg; Pb at 0.38 mg/kg.		
12. Are reporting limits raised? (If yes, explain in "Comments" at bottom of form)	☐ Yes	☑ No	☐ NA
Accuracy			
13. Surrogate recovery within lab limits? (Default is 70-130%)	☐ Yes	☐ No	☑ NA
Precision			
14. Matrix spike (MS) recovery within 70-130%?	☑ Yes	☐ No	☐ NA
15. Matrix spike duplicate (MSD) recovery within 70-130%?	☑ Yes	☐ No	☐ NA
16. Rel. % Diff (RPD) within lab limits? (Default is 25%)	☑ Yes	☐ No	☐ NA
17. RPD calculation for field duplicates within limits (Default is 75%)	☐ Yes	☐ No	☑ NA

Comments

Hg analyzed outside hold time. Ag LCSS outside control limits. Pb and Zn values are estimated.

Initial Review By: *H. Jason Pulley* Final Review By:

ANALYTICAL LABORATORY DATA VALIDATION CHECK SHEET

Summary:	**DATA VALID?**	☑ Yes	☐ No

Job Name: Ochoco Mines Job Number: 2140031

Review Date: 1/7/2002 Lab Name: ACZ Lab Batch ID#: L34358

Chain of Custody			
1. Correct containers used?	☑ Yes	☐ No	☐ NA
2. Correct preservative (if any) used?	☑ Yes	☐ No	☐ NA
3. Signature blocks complete and ending with lab?	☑ Yes	☐ No	☐ NA
4. Analyses requested match analyses reported?	☑ Yes	☐ No	☐ NA
5. Sample identification number matches with lab report?	☑ Yes	☐ No	☐ NA
6. Trip blank submitted?	☐ Yes	☑ No	☐ NA
7. Field blank submitted?	☐ Yes	☑ No	☐ NA
Timing			
8. Samples extracted within holding time?	☑ Yes	☐ No	☐ NA
9. Analysis performed within holding time?	☐ Yes	☑ No	☐ NA
Quality Assurance/Quality Control			
10. Lab blank completed?	☑ Yes	☐ No	☐ NA
11. Lab, field, or trip blank(s) reports contaminants?	☐ Yes	☑ No	☐ NA
If yes, indicate blank type, chemical(s), and concentration(s):			
12. Are reporting limits raised? (If yes, explain in "Comments" at bottom of form)	☐ Yes	☑ No	☐ NA
Accuracy			
13. Surrogate recovery within lab limits? (Default is 70-130%)	☐ Yes	☐ No	☑ NA
Precision			
14. Matrix spike (MS) recovery within 70-130%?	☐ Yes	☑ No	☐ NA
15. Matrix spike duplicate (MSD) recovery within 70-130%?	☐ Yes	☑ No	☐ NA
16. Rel. % Diff (RPD) within lab limits? (Default is 25%)	☐ Yes	☑ No	☐ NA
17. RPD calculation for field duplicates within limits (Default is 75%)	☐ Yes	☐ No	☑ NA

Comments

Hg analyzed outside of 28 day hold time; MS out of control limits for Sb, Pb, Se, Zn; MSD outdside of control limits for Sb, Pb, Se, Zn; LCSS out of limits for Ag; RPD out of control limits for Pb, Zn. Sb, Pb, Hg, Ag, and Se values are estimated due to matrix interferences.

Initial Review By: *H. Jason Pulley* Final Review By:

ANALYTICAL LABORATORY DATA VALIDATION CHECK SHEET

Summary:	**DATA VALID?**	☑ Yes	☐ No

Job Name: Ochoco Mines Job Number: 2140031

Review Date: 1/7/2002 Lab Name: ACZ Lab Batch ID#: L34339

Chain of Custody			
1. Correct containers used?	☑ Yes	☐ No	☐ NA
2. Correct preservative (if any) used?	☑ Yes	☐ No	☐ NA
3. Signature blocks complete and ending with lab?	☑ Yes	☐ No	☐ NA
4. Analyses requested match analyses reported?	☑ Yes	☐ No	☐ NA
5. Sample identification number matches with lab report?	☑ Yes	☐ No	☐ NA
6. Trip blank submitted?	☐ Yes	☑ No	☐ NA
7. Field blank submitted?	☐ Yes	☑ No	☐ NA
Timing			
8. Samples extracted within holding time?	☑ Yes	☐ No	☐ NA
9. Analysis performed within holding time?	☐ Yes	☑ No	☐ NA
Quality Assurance/Quality Control			
10. Lab blank completed?	☑ Yes	☐ No	☐ NA
11. Lab, field, or trip blank(s) reports contaminants?	☐ Yes	☑ No	☐ NA
If yes, indicate blank type, chemical(s), and concentration(s):			
12. Are reporting limits raised? (If yes, explain in "Comments" at bottom of form)	☐ Yes	☑ No	☐ NA
Accuracy			
13. Surrogate recovery within lab limits? (Default is 70-130%)	☐ Yes	☐ No	☑ NA
Precision			
14. Matrix spike (MS) recovery within 70-130%?	☐ Yes	☑ No	☐ NA
15. Matrix spike duplicate (MSD) recovery within 70-130%?	☐ Yes	☑ No	☐ NA
16. Rel. % Diff (RPD) within lab limits? (Default is 25%)	☐ Yes	☑ No	☐ NA
17. RPD calculation for field duplicates within limits (Default is 75%)	☑ Yes	☐ No	☐ NA

Comments

Hg analyzed outside hold time; MS out of control limits for Sb, Pb, Se; MSD otside of control limits for Sb, Pb, Se
RPD for Pb and Hg outside of laboratory control limits; LCSS for Ag was out of laboratory control limits.
Sb, Pb, Hg, Ag, ans Se values are estimated due to matrix interferences.

Initial Review By: *H. Jason Pulley* Final Review By:

ANALYTICAL LABORATORY DATA VALIDATION CHECK SHEET

Summary:	**DATA VALID?**	☑ Yes	☐ No

Job Name: Ochoco Mines Job Number: 2140031

Review Date: 1/7/2002 Lab Name: ACZ Lab Batch ID#: L34353

Chain of Custody			
1. Correct containers used?	☑ Yes	☐ No	☐ NA
2. Correct preservative (if any) used?	☑ Yes	☐ No	☐ NA
3. Signature blocks complete and ending with lab?	☑ Yes	☐ No	☐ NA
4. Analyses requested match analyses reported?	☑ Yes	☐ No	☐ NA
5. Sample identification number matches with lab report?	☑ Yes	☐ No	☐ NA
6. Trip blank submitted?	☐ Yes	☑ No	☐ NA
7. Field blank submitted?	☐ Yes	☑ No	☐ NA
Timing			
8. Samples extracted within holding time?	☑ Yes	☐ No	☐ NA
9. Analysis performed within holding time?	☐ Yes	☑ No	☐ NA
Quality Assurance/Quality Control			
10. Lab blank completed?	☑ Yes	☐ No	☐ NA
11. Lab, field, or trip blank(s) reports contaminants?	☐ Yes	☑ No	☐ NA
If yes, indicate blank type, chemical(s), and concentration(s):			
12. Are reporting limits raised? (If yes, explain in "Comments" at bottom of form)	☐ Yes	☑ No	☐ NA
Accuracy			
13. Surrogate recovery within lab limits? (Default is 70-130%)	☐ Yes	☐ No	☑ NA
Precision			
14. Matrix spike (MS) recovery within 70-130%?	☐ Yes	☑ No	☐ NA
15. Matrix spike duplicate (MSD) recovery within 70-130%?	☐ Yes	☑ No	☐ NA
16. Rel. % Diff (RPD) within lab limits? (Default is 25%)	☑ Yes	☐ No	☐ NA
17. RPD calculation for field duplicates within limits (Default is 75%)	☑ Yes	☐ No	☐ NA

Comments

Hg analyzed outside of 28 day hold time; MS and MSD for Sb and Se outside of lab control limits. Sb and Se values were estimated due to matrix interference.

Initial Review By: *H. Jason Pulley* Final Review By:

1 November, 2001

Mary Ann Amann
Cascade Earth Sciences - Medford
225 S. Holly St.
Medford, OR 97501

RE: Ocholo Mines

Enclosed are the results of analyses for samples received by the laboratory on 10/10/01 09:42. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Joy D. Chang
Project Manager

Work Orders included in this report:

P1J0368

Cascade Earth Sciences - Medford	Project:	Ocholo Mines	
225 S. Holly St.	Project Number:	2140031	**Reported:**
Medford, OR 97501	Project Manager:	Mary Ann Amann	11/01/01 13:07

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SW-A-1	P1J0368-01	Water	10/06/01 13:00	10/10/01 09:42
WP-A-3-5'	P1J0368-02	Soil	10/03/01 14:42	10/10/01 09:42
S-BR-2.3-1.5	P1J0368-03	Soil	10/04/01 16:00	10/10/01 09:42
SS-BR-1	P1J0368-04	Soil	10/06/01 17:10	10/10/01 09:42

Cascade Earth Sciences - Medford	Project:	Ocholo Mines	
225 S. Holly St.	Project Number:	2140031	**Reported:**
Medford, OR 97501	Project Manager:	Mary Ann Amann	11/01/01 13:07

Total Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
SW-A-1 (P1J0368-01) Water					Sampled: 10/06/01	Received: 10/10/01			
Antimony	ND	0.00100	mg/l	1	EPA 6020	10/18/01	10/20/01	1100792	
Arsenic	ND	0.00100	"	"	"	"	10/22/01	"	
Beryllium	ND	0.00100	"	"	"	"	10/20/01	"	
Cadmium	ND	0.00100	"	"	"	"	"	"	
Chromium	**0.00312**	0.00100	"	"	"	"	"	"	
Copper	**0.00561**	0.00200	"	"	"	"	"	"	
Lead	ND	0.00100	"	"	"	"	"	"	
Mercury	ND	0.000200	"	"	EPA 7470A	10/22/01	10/22/01	1100880	
Nickel	**0.00514**	0.00200	"	"	EPA 6020	10/18/01	10/20/01	1100792	
Selenium	ND	0.00100	"	"	"	"	10/22/01	"	
Silver	ND	0.00100	"	"	"	"	"	"	
Thallium	ND	0.00100	"	"	"	"	"	"	
Zinc	**0.0106**	0.00500	"	"	"	"	10/20/01	"	
WP-A-3-5' (P1J0368-02) Soil					Sampled: 10/03/01	Received: 10/10/01			
Antimony	ND	0.500	mg/kg dry	1	EPA 6020	10/22/01	10/22/01	1100890	
Arsenic	**6.94**	0.500	"	"	"	"	"	"	
Beryllium	**0.798**	0.500	"	"	"	"	"	"	
Cadmium	ND	0.500	"	"	"	"	"	"	
Chromium	**103**	0.500	"	"	"	"	"	"	
Copper	**53.3**	1.00	"	"	"	"	"	"	
Lead	**3.33**	0.500	"	"	"	"	"	"	
Mercury	**11.9**	2.50	"	25	EPA 7471A	10/17/01	10/17/01	1100728	
Nickel	**181**	1.00	"	1	EPA 6020	10/22/01	10/22/01	1100890	
Selenium	ND	0.500	"	"	"	"	"	"	
Silver	ND	0.500	"	"	"	"	"	"	
Thallium	ND	0.500	"	"	"	"	"	"	
Zinc	**102**	2.50	"	"	"	"	"	"	

Cascade Earth Sciences - Medford	Project:	Ocholo Mines	
225 S. Holly St.	Project Number:	2140031	**Reported:**
Medford, OR 97501	Project Manager:	Mary Ann Amann	11/01/01 13:07

Total Metals per EPA 6000/7000 Series Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
S-BR-2.3-1.5 (P1J0368-03) Soil					Sampled: 10/04/01	Received: 10/10/01			
Antimony	ND	0.500	mg/kg dry	1	EPA 6020	10/22/01	10/22/01	1100890	
Arsenic	**3.50**	0.500	"	"	"	"	"	"	
Beryllium	**0.734**	0.500	"	"	"	"	"	"	
Cadmium	ND	0.500	"	"	"	"	"	"	
Chromium	**52.2**	0.500	"	"	"	"	"	"	
Copper	**66.3**	1.00	"	"	"	"	"	"	
Lead	**4.23**	0.500	"	"	"	"	"	"	
Mercury	**288**	20.0	"	200	EPA 7471A	10/17/01	10/17/01	1100728	
Nickel	**78.3**	1.00	"	1	EPA 6020	10/22/01	10/22/01	1100890	
Selenium	**0.950**	0.500	"	"	"	"	"	"	
Silver	ND	0.500	"	"	"	"	"	"	
Thallium	ND	0.500	"	"	"	"	"	"	
Zinc	**75.4**	2.50	"	"	"	"	"	"	
SS-BR-1 (P1J0368-04) Soil					Sampled: 10/06/01	Received: 10/10/01			
Antimony	ND	1.13	mg/kg dry	1	EPA 6020	10/22/01	10/22/01	1100890	
Arsenic	**1.81**	1.13	"	"	"	"	"	"	
Beryllium	**1.19**	1.13	"	"	"	"	"	"	
Cadmium	ND	1.13	"	"	"	"	"	"	
Chromium	**180**	1.13	"	"	"	"	"	"	
Copper	**103**	2.27	"	"	"	"	"	"	
Lead	**5.61**	1.13	"	"	"	"	"	"	
Mercury	**121**	22.7	"	100	EPA 7471A	10/17/01	10/17/01	1100728	
Nickel	**248**	2.27	"	1	EPA 6020	10/22/01	10/22/01	1100890	
Selenium	ND	1.13	"	"	"	"	"	"	
Silver	ND	1.13	"	"	"	"	"	"	
Thallium	ND	1.13	"	"	"	"	"	"	
Zinc	**119**	5.66	"	"	"	"	"	"	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Cascade Earth Sciences - Medford	Project:	Ocholo Mines	
225 S. Holly St.	Project Number:	2140031	**Reported:**
Medford, OR 97501	Project Manager:	Mary Ann Amann	11/01/01 13:07

Conventional Chemistry Parameters per APHA/EPA Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
SW-A-1 (P1J0368-01) Water					Sampled: 10/06/01	Received: 10/10/01			
Acidity	**14.1**	10.0	mg/l	1	EPA 305.2	10/19/01	10/19/01	1100813	
Hardness	**228**	0.660	"	"	SM 2340B	10/22/01	10/23/01	1100910	
Total Dissolved Solids	**286**	20.0	"	"	EPA 160.1	10/10/01	10/11/01	1100450	
pH	**7.41**		pH Units	"	150.1/9040A	10/10/01	10/10/01	1100454	I-05
WP-A-3-5' (P1J0368-02) Soil					Sampled: 10/03/01	Received: 10/10/01			
pH	**7.94**		pH Units	1	150.1/9040A	10/10/01	10/10/01	1100455	A-01
S-BR-2.3-1.5 (P1J0368-03) Soil					Sampled: 10/04/01	Received: 10/10/01			
pH	**6.97**		pH Units	1	150.1/9040A	10/10/01	10/10/01	1100455	A-01
SS-BR-1 (P1J0368-04) Soil					Sampled: 10/06/01	Received: 10/10/01			
pH	**7.60**		pH Units	1	150.1/9040A	10/10/01	10/10/01	1100455	A-01

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Cascade Earth Sciences - Medford	Project:	Ocholo Mines	
225 S. Holly St.	Project Number:	2140031	**Reported:**
Medford, OR 97501	Project Manager:	Mary Ann Amann	11/01/01 13:07

Anions per EPA Method 300.0

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
SW-A-1 (P1J0368-01) Water					Sampled: 10/06/01	Received: 10/10/01			
Sulfate	**20.3**	1.00	mg/l	1	EPA 300.0	10/11/01	10/11/01	1100481	

Cascade Earth Sciences - Medford	Project:	Ocholo Mines	
225 S. Holly St.	Project Number:	2140031	**Reported:**
Medford, OR 97501	Project Manager:	Mary Ann Amann	11/01/01 13:07

Total Alkalinity by Conventional Chemistry Parameters per APHA/EPA Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
SW-A-1 (P1J0368-01) Water					Sampled: 10/06/01	Received: 10/10/01			
Bicarbonate Alkalinity	**244**	10.0	mg/L as CaCO3	1	SM 2320B	10/17/01	10/17/01	1100753	
Carbonate Alkalinity	ND	10.0	"	"	"	"	"	"	
Hydroxide Alkalinity	ND	10.0	"	"	"	"	"	"	
Total Alkalinity	**244**	10.0	"	"	"	"	"	"	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Cascade Earth Sciences - Medford	Project:	Ocholo Mines	
225 S. Holly St.	Project Number:	2140031	**Reported:**
Medford, OR 97501	Project Manager:	Mary Ann Amann	11/01/01 13:07

Percent Dry Weight (Solids) per Standard Methods

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
WP-A-3-5' (P1J0368-02) Soil					Sampled: 10/03/01	Received: 10/10/01			
% Solids	**81.5**	1.00	% by Weight	1	NCA SOP	10/11/01	10/12/01	1100467	
S-BR-2.3-1.5 (P1J0368-03) Soil					Sampled: 10/04/01	Received: 10/10/01			
% Solids	**74.2**	1.00	% by Weight	1	NCA SOP	10/11/01	10/12/01	1100467	
SS-BR-1 (P1J0368-04) Soil					Sampled: 10/06/01	Received: 10/10/01			
% Solids	**44.1**	1.00	% by Weight	1	NCA SOP	10/11/01	10/12/01	1100467	

Total Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1100728 - EPA 7471										
Blank (1100728-BLK1)				Prepared & Analyzed: 10/17/01						
Mercury	ND	0.100	mg/kg							
LCS (1100728-BS1)				Prepared & Analyzed: 10/17/01						
Mercury	1.07	0.100	mg/kg	1.00		107	80-120			
Duplicate (1100728-DUP1)		**Source: P1J0440-01**		Prepared & Analyzed: 10/17/01						
Mercury	ND	0.100	mg/kg dry		ND			28.3	40	
Matrix Spike (1100728-MS1)		**Source: P1J0440-01**		Prepared & Analyzed: 10/17/01						
Mercury	1.21	0.100	mg/kg dry	1.18	ND	96.8	75-125			
Matrix Spike (1100728-MS2)		**Source: P1J0551-02**		Prepared & Analyzed: 10/17/01						
Mercury	1.27	0.100	mg/kg dry	1.10	ND	111	75-125			
Batch 1100792 - EPA 200/3005										
Blank (1100792-BLK1)				Prepared: 10/18/01 Analyzed: 10/20/01						
Antimony	ND	0.00100	mg/l							
Arsenic	ND	0.00848	"							
Beryllium	ND	0.00100	"							
Cadmium	ND	0.00100	"							
Chromium	ND	0.00100	"							
Copper	ND	0.00200	"							
Lead	ND	0.00100	"							
Nickel	ND	0.00200	"							
Selenium	ND	0.00100	"							
Silver	ND	0.00100	"							
Thallium	ND	0.00100	"							
Zinc	ND	0.00500	"							

Total Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1100792 - EPA 200/3005										
LCS (1100792-BS1)				Prepared: 10/18/01	Analyzed: 10/20/01					
Antimony	0.0514	0.00100	mg/l	0.0500		103	80-120			
Arsenic	0.105	0.00100	"	0.100		105	80-120			
Beryllium	0.100	0.00100	"	0.100		100	80-120			
Cadmium	0.100	0.00100	"	0.100		100	80-120			
Chromium	0.104	0.00100	"	0.100		104	80-120			
Copper	0.104	0.00200	"	0.100		104	80-120			
Lead	0.104	0.00100	"	0.100		104	80-120			
Nickel	0.104	0.00200	"	0.100		104	80-120			
Selenium	0.104	0.00100	"	0.100		104	80-120			
Silver	0.0494	0.00100	"	0.0500		98.8	80-120			
Thallium	0.0489	0.00100	"	0.0500		97.8	80-120			
Zinc	0.106	0.00500	"	0.100		106	80-120			
Duplicate (1100792-DUP1)		**Source: P1J0368-01**		Prepared: 10/18/01	Analyzed: 10/20/01					
Antimony	ND	0.00100	mg/l		ND			63.4	20	Q-06
Arsenic	ND	0.00100	"		ND				20	
Beryllium	ND	0.00100	"		ND			119	20	Q-06
Cadmium	ND	0.00100	"		ND			138	20	Q-06
Chromium	0.00271	0.00100	"		0.00312			14.1	20	
Copper	0.00516	0.00200	"		0.00561			8.36	20	
Lead	ND	0.00100	"		ND			47.8	20	Q-06
Nickel	0.00469	0.00200	"		0.00514			9.16	20	
Selenium	ND	0.00100	"		ND				20	
Silver	ND	0.00100	"		ND			37.8	20	Q-06
Thallium	ND	0.00100	"		ND			111	20	Q-06
Zinc	0.00606	0.00500	"		0.0106			54.5	20	Q-06
Matrix Spike (1100792-MS1)		**Source: P1J0368-01**		Prepared: 10/18/01	Analyzed: 10/20/01					
Antimony	0.0528	0.00100	mg/l	0.0500	ND	105	75-125			
Arsenic	0.106	0.00100	"	0.100	ND	106	75-125			
Beryllium	0.104	0.00100	"	0.100	ND	103	75-125			
Cadmium	0.106	0.00100	"	0.100	ND	106	75-125			
Chromium	0.108	0.00100	"	0.100	0.00312	105	75-125			
Copper	0.109	0.00200	"	0.100	0.00561	103	75-125			
Lead	0.110	0.00100	"	0.100	ND	109	75-125			
Nickel	0.107	0.00200	"	0.100	0.00514	102	75-125			

Total Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1100792 - EPA 200/3005										
Matrix Spike (1100792-MS1)		**Source: P1J0368-01**		Prepared: 10/18/01 Analyzed: 10/22/01						
Selenium	0.102	0.00100	mg/l	0.100	ND	102	75-125			
Silver	0.0499	0.00100	"	0.0500	ND	99.4	75-125			
Thallium	0.0443	0.00100	"	0.0500	ND	88.3	75-125			
Zinc	0.108	0.00500	"	0.100	0.0106	97.4	75-125			
Matrix Spike (1100792-MS2)		**Source: P1J0376-09**		Prepared: 10/18/01 Analyzed: 10/24/01						
Antimony	0.0514	0.00100	mg/l	0.0500	ND	102	75-125			
Arsenic	0.104	0.00100	"	0.100	ND	103	75-125			
Beryllium	0.109	0.00100	"	0.100	ND	109	75-125			
Cadmium	0.103	0.00100	"	0.100	ND	103	75-125			
Chromium	0.110	0.00100	"	0.100	0.00370	106	75-125			
Copper	0.171	0.00200	"	0.100	0.0640	107	75-125			
Lead	0.0973	0.00100	"	0.100	0.00213	95.2	75-125			
Nickel	0.106	0.00200	"	0.100	0.00381	102	75-125			
Selenium	0.0736	0.00100	"	0.100	ND	72.6	75-125			Q-02
Silver	0.0537	0.00100	"	0.0500	0.00235	103	75-125			
Thallium	0.0504	0.00100	"	0.0500	ND	100	75-125			
Zinc	0.229	0.00500	"	0.100	0.123	106	75-125			
Batch 1100880 - EPA 7470										
Blank (1100880-BLK1)				Prepared & Analyzed: 10/22/01						
Mercury	ND	0.000200	mg/l							
LCS (1100880-BS1)				Prepared & Analyzed: 10/22/01						
Mercury	0.00442	0.000200	mg/l	0.00500		88.4	80-120			

Total Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1100880 - EPA 7470										
Duplicate (1100880-DUP1)		**Source: P1I0852-01**		Prepared & Analyzed: 10/22/01						
Mercury	ND	0.000200	mg/l		ND				20	
Matrix Spike (1100880-MS1)		**Source: P1I0852-01**		Prepared & Analyzed: 10/22/01						
Mercury	0.00429	0.000200	mg/l	0.00500	ND	85.8	75-125			
Matrix Spike (1100880-MS2)		**Source: P1J0313-03**		Prepared & Analyzed: 10/22/01						
Mercury	0.00500	0.000200	mg/l	0.00500	ND	100	75-125			
Batch 1100890 - EPA 3050										
Blank (1100890-BLK1)				Prepared & Analyzed: 10/22/01						
Antimony	ND	0.500	mg/kg							
Arsenic	ND	0.500	"							
Beryllium	ND	0.500	"							
Cadmium	ND	0.500	"							
Chromium	ND	0.500	"							
Copper	ND	1.00	"							
Lead	ND	0.500	"							
Nickel	ND	1.00	"							
Selenium	ND	0.500	"							
Silver	ND	0.500	"							
Thallium	ND	0.500	"							
Zinc	ND	2.50	"							
LCS (1100890-BS1)				Prepared & Analyzed: 10/22/01						
Antimony	5.81	0.500	mg/kg	5.00		116	80-120			
Arsenic	11.2	0.500	"	10.0		112	80-120			
Beryllium	11.8	0.500	"	10.0		118	80-120			
Cadmium	9.14	0.500	"	10.0		91.4	80-120			
Chromium	9.92	0.500	"	10.0		99.2	80-120			
Copper	10.3	1.00	"	10.0		103	80-120			
Lead	11.8	0.500	"	10.0		118	80-120			
Nickel	10.0	1.00	"	10.0		100	80-120			
Selenium	10.7	0.500	"	10.0		107	80-120			
Silver	5.80	0.500	"	5.00		116	80-120			
Thallium	5.60	0.500	"	5.00		112	80-120			
Zinc	10.0	2.50	"	10.0		100	80-120			

Total Metals per EPA 6000/7000 Series Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1100890 - EPA 3050										
Duplicate (1100890-DUP1)		**Source: P1J0551-01**		Prepared & Analyzed: 10/22/01						
Antimony	ND	0.500	mg/kg dry		ND			79.6	40	Q-06
Arsenic	2.72	0.500	"		3.96			37.1	40	
Beryllium	ND	0.500	"		0.538			13.7	40	
Cadmium	ND	0.500	"		ND				40	
Chromium	28.5	0.500	"		33.1			14.9	40	
Copper	35.6	1.00	"		31.7			11.6	40	
Lead	28.8	0.500	"		21.9			27.2	40	
Nickel	26.9	1.00	"		26.0			3.40	40	
Selenium	ND	0.500	"		0.938			86.4	40	Q-06
Silver	ND	0.500	"		ND			17.5	40	
Thallium	ND	0.500	"		ND			47.0	40	Q-06
Zinc	155	2.50	"		152			1.95	40	
Matrix Spike (1100890-MS1)		**Source: P1J0551-01**		Prepared & Analyzed: 10/22/01						
Antimony	2.09	0.500	mg/kg dry	5.72	ND	34.0	75-125			Q-07
Arsenic	17.4	0.500	"	11.4	3.96	118	75-125			
Beryllium	16.5	0.500	"	11.4	0.538	140	75-125			Q-07
Cadmium	10.7	0.500	"	11.4	ND	93.9	75-125			
Chromium	47.0	0.500	"	11.4	33.1	122	75-125			
Copper	63.8	1.00	"	11.4	31.7	NR	75-125			Q-03
Lead	33.8	0.500	"	11.4	21.9	104	75-125			
Nickel	37.8	1.00	"	11.4	26.0	104	75-125			
Selenium	13.2	0.500	"	11.4	0.938	108	75-125			
Silver	6.94	0.500	"	5.72	ND	119	75-125			
Thallium	6.30	0.500	"	5.72	ND	108	75-125			
Zinc	143	2.50	"	11.4	152	NR	75-125			Q-03

Conventional Chemistry Parameters per APHA/EPA Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1100450 - Wet Chem										
Blank (1100450-BLK1)				Prepared: 10/10/01	Analyzed: 10/11/01					
Total Dissolved Solids	ND	20.0	mg/l							
LCS (1100450-BS1)				Prepared: 10/10/01	Analyzed: 10/11/01					
Total Dissolved Solids	106	20.0	mg/l	100		106	80-120			
Duplicate (1100450-DUP1)		**Source: P1J0224-01**		Prepared: 10/10/01	Analyzed: 10/11/01					
Total Dissolved Solids	3400	200	mg/l		3350			1.48	20	
Batch 1100454 - Wet Chem										
Duplicate (1100454-DUP1)		**Source: P1J0368-01**		Prepared & Analyzed: 10/10/01						
pH	7.38		pH Units		7.41			0.406	25	
Batch 1100455 - Wet Chem										
Duplicate (1100455-DUP1)		**Source: P1J0368-02**		Prepared & Analyzed: 10/10/01						
pH	7.94		pH Units		7.94			0.00	25	
Batch 1100813 - Wet Chem										
Blank (1100813-BLK1)				Prepared & Analyzed: 10/19/01						
Acidity	ND	10.0	mg/l							
Duplicate (1100813-DUP1)		**Source: P1J0368-01**		Prepared & Analyzed: 10/19/01						
Acidity	14.5	10.0	mg/l		14.1			2.80	20	

Conventional Chemistry Parameters per APHA/EPA Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1100910 - EPA 200/3005 Diss										
Blank (1100910-BLK1)				Prepared: 10/22/01		Analyzed: 10/23/01				
Hardness	ND	0.660	mg/l							
LCS (1100910-BS1)				Prepared: 10/22/01		Analyzed: 10/23/01				
Hardness	65.9	0.660	mg/l	66.0		99.8	85-115			
Duplicate (1100910-DUP1)		**Source: P1J0414-01**		Prepared: 10/22/01		Analyzed: 10/23/01				
Hardness	69.2	0.660	mg/l		69.5			0.433	20	
Matrix Spike (1100910-MS1)		**Source: P1J0414-01**		Prepared: 10/22/01		Analyzed: 10/23/01				
Hardness	133	0.660	mg/l	66.0	69.5	96.2	75-125			

Cascade Earth Sciences - Medford	Project: Ocholo Mines	
225 S. Holly St.	Project Number: 2140031	**Reported:**
Medford, OR 97501	Project Manager: Mary Ann Amann	11/01/01 13:07

Anions per EPA Method 300.0 - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1100481 - Wet Chem										
Blank (1100481-BLK1)				Prepared & Analyzed: 10/11/01						
Sulfate	ND	1.00	mg/l							
LCS (1100481-BS1)				Prepared & Analyzed: 10/11/01						
Sulfate	31.4	1.00	mg/l	30.0		105	85-115			
Duplicate (1100481-DUP1)		**Source: P1J0342-01**		Prepared & Analyzed: 10/11/01						
Sulfate	11.7	1.00	mg/l		11.7			0.00	20	
Matrix Spike (1100481-MS1)		**Source: P1J0342-01**		Prepared & Analyzed: 10/11/01						
Sulfate	16.2	1.11	mg/l	4.44	11.7	101	75-125			
Matrix Spike Dup (1100481-MSD1)		**Source: P1J0342-01**		Prepared & Analyzed: 10/11/01						
Sulfate	16.3	1.11	mg/l	4.44	11.7	104	75-125	0.615	20	

Total Alkalinity by Conventional Chemistry Parameters per APHA/EPA Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1100753 - Wet Chem										
Blank (1100753-BLK1)				Prepared & Analyzed: 10/17/01						
Bicarbonate Alkalinity	ND	10.0	mg/L as CaCO3							
Carbonate Alkalinity	ND	10.0	"							
Hydroxide Alkalinity	ND	10.0	"							
Total Alkalinity	ND	10.0	"							
LCS (1100753-BS1)				Prepared & Analyzed: 10/17/01						
Bicarbonate Alkalinity	89.8	10.0	mg/L as CaCO3	100		89.8	85-115			
Carbonate Alkalinity	99.4	10.0	"	100		99.4	85-115			
Total Alkalinity	189	10.0	"	200		94.5	85-115			
Duplicate (1100753-DUP1)		**Source: P1J0368-01**		Prepared & Analyzed: 10/17/01						
Bicarbonate Alkalinity	244	10.0	mg/L as CaCO3		244			0.00	20	
Carbonate Alkalinity	ND	10.0	"		ND				20	
Hydroxide Alkalinity	ND	10.0	"		ND				20	
Total Alkalinity	244	10.0	"		244			0.00	20	

Percent Dry Weight (Solids) per Standard Methods - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1100467 - Dry Weight										
Duplicate (1100467-DUP1)		**Source: P1J0142-05**		Prepared: 10/11/01		Analyzed: 10/12/01				
% Solids	75.6	1.00% by Weight			74.0			2.14	20	
Duplicate (1100467-DUP2)		**Source: P1J0142-06**		Prepared: 10/11/01		Analyzed: 10/12/01				
% Solids	69.1	1.00% by Weight			69.1			0.00	20	
Duplicate (1100467-DUP3)		**Source: P1J0144-01**		Prepared: 10/11/01		Analyzed: 10/12/01				
% Solids	77.7	1.00% by Weight			77.3			0.516	20	
Duplicate (1100467-DUP4)		**Source: P1J0146-01**		Prepared: 10/11/01		Analyzed: 10/12/01				
% Solids	84.1	1.00% by Weight			84.5			0.474	20	
Duplicate (1100467-DUP5)		**Source: P1J0170-02**		Prepared: 10/11/01		Analyzed: 10/12/01				
% Solids	54.5	1.00% by Weight			55.6			2.00	20	

Notes and Definitions

A-01	Hold time does not apply for soil and other wet matrices
I-05	This sample was received outside EPA recommended holding time.
Q-02	The spike recovery for this QC sample is outside of established control limits due to sample matrix interference.
Q-03	The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte already present in the sample.
Q-06	Analyses are not controlled on RPD values from sample concentrations less than 5 times the reporting limit.
Q-07	The recovery of this spike is outside control limits due to sample dilution required from high analyte concentration and/or matrix interferences.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis. MRLs are adjusted if %Solids are less than 50%.
wet	Sample results reported on a wet weight basis (as received)
RPD	Relative Percent Difference

Appendix L.

Boring Logs

PROJECT: OCHOCO MINES	CASCADE EARTH SCIENCES A Valmont Industries Company	PROJECT NUMBER: 2140031	SOIL BORING NUMBER: WP-BR-1
BORING LOCATION: WASTE PILE NEAR FS 200 (BLUE RIDGE)		LOGGED BY: MA CHECKED BY:	PERMIT NO.
DRILLED BY: CASCADE DRILLING		START DATE: 10/4/01	COMPLETION DATE: 10/4/01
DRILLING EQUIPMENT: HOLLOW STEM AUGER		SAMPLING EQUIPMENT: SPLIT SPOON	

SOIL BORING DATA (MEASURED FROM BELOW GROUND SURFACE)

TOTAL DEPTH: 24	BOREHOLE DIA.(IN):	GROUND SURFACE ELEV. (FT MSL):	WATER LEVEL/DATE
BACKFILL INT. 0-24	TYPE: BENTONITE	SURFACE SEAL INT:	TYPE:

GROUP SYMBOL	DESCRIPTION OF LITHOLOGY INTERVAL (FT. B.G.S.)	DEPTH FT. BGS	SAMPLE BLOW COUNT	RECOVERY	TYPE	NUMBER	REMARKS (DRILLING CONDITIONS, PID READINGS, ETC.)
		0					Ground surface
CL	5 CLAYEY SILT: Dark brown with tan, rust, red areas; slightly sticky.	2 4 6 8 10 12 14	6 4 4	18"	SS	WP-BR-1-5'	Advance hole w/HA
ML	15 SILT: Dark brown to black; moist; non-plastic; no discoloration; loose.	16	3 4 5	18"	SS	WP-BR-1-15'	
	18 SILT: Dense; light medium brown with purplish hue; lighter than above.	18 20	17 23 49	18"	SS	WP-BR-1-18'	
	23 BEDROCK: Broken red and dark brown; platy rock.	22	50	3"	SS	WP-BR-1-23'	
	Total Depth = 24'	24 26 28 30 32					Terminate drilling at 24'

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE INFORMATION PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

Surveyed data is accurate to +/- 0.5 feet.

PROJECT: OCHOCO MINES	CASCADE EARTH SCIENCES A Valmont Industries Company	PROJECT NUMBER: 2140031	SOIL BORING NUMBER: WP-BR-2
BORING LOCATION: WASTE PILE NEAR TRENCH		LOGGED BY: MA CHECKED BY:	PERMIT NO.
DRILLED BY: CASCADE DRILLING		START DATE: 10/5/01	COMPLETION DATE: 10/5/01
DRILLING EQUIPMENT: HOLLOW STEM AUGER		SAMPLING EQUIPMENT: SPLIT SPOON	

SOIL BORING DATA (MEASURED FROM BELOW GROUND SURFACE)

TOTAL DEPTH: 15	BOREHOLE DIA.(IN):	GROUND SURFACE ELEV. (FT MSL):	WATER LEVEL/DATE
BACKFILL INT. 0-15	TYPE: BENTONITE	SURFACE SEAL INT:	TYPE:

GROUP SYMBOL	DESCRIPTION OF LITHOLOGY INTERVAL (FT. B.G.S.)	DEPTH FT. BGS	SAMPLE BLOW COUNT	RECOVERY	TYPE	NUMBER	REMARKS (DRILLING CONDITIONS, PID READINGS, ETC.)
		0					Ground surface
CL	5 CLAYEY SILT: Light brown, light gray; little rust; mostly weathered broken rock; reddish brown.	2, 4, 6, 8	10 50	4"	SS	WP-BR-2-5'	Advance hole w/HA
	10 CLAY AND WEATHERED ROCK: Dark brown; fractured.	10, 12	35 50	3"	SS	WP-BR-2-10'	
	15 BROKEN ROCK: Reddish brown; water.	14	17 50	5"	SS	WP-BR-2-15'	
	Total Depth = 15'	16, 18, 20, 22, 24, 26, 28, 30, 32					Terminate drilling at 15'

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE INFORMATION PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

Surveyed data is accurate to +/- 0.5 feet.

PROJECT: OCHOCO MINES	CASCADE EARTH SCIENCES A Valmont Industries Company	PROJECT NUMBER: 2140031	SOIL BORING NUMBER: WP-BR-4
BORING LOCATION: WASTE PILE NEAR TRENCH		LOGGED BY: MA CHECKED BY:	PERMIT NO.
DRILLED BY: CASCADE DRILLING		START DATE: 10/4/01	COMPLETION DATE: 10/4/01
DRILLING EQUIPMENT: HOLLOW STEM AUGER		SAMPLING EQUIPMENT: SPLIT SPOON	

SOIL BORING DATA (MEASURED FROM BELOW GROUND SURFACE)

TOTAL DEPTH: 20	BOREHOLE DIA.(IN):	GROUND SURFACE ELEV. (FT MSL):	WATER LEVEL/DATE
BACKFILL INT. 0-20	TYPE: BENTONITE		SURFACE SEAL INT: TYPE:

GROUP SYMBOL	DESCRIPTION OF LITHOLOGY INTERVAL (FT. B.G.S.)	DEPTH FT. BGS	SAMPLE BLOW COUNT	RECOVERY	TYPE	NUMBER	REMARKS (DRILLING CONDITIONS, PID READINGS, ETC.)
		0					Ground surface
SM	5 SILT; Light and and gray with medium brown. Large angular gravel > 2". Rust mottles.	6	5 14 12	18"	SS	WP-BR-4-5'	Advance hole w/HA
	10 SILT; Light tan with angular gravel with reddish brown weathered gravels > 5", break easily.	10	5 50	3"	SS	WP-BR-4-10'	
	15 SILT AND ROCK; Light tan with rust silt and dark brown broken rock.	16	17 50	3"	SS	WP-BR-4-15'	
	Soft spot at 19', but no advance after drilling 10 minutes.	20	50	0"	SS		
	Total Depth = 20'						Terminate drilling at 20'

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE INFORMATION PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

Surveyed data is accurate to +/- 0.5 feet.

PROJECT: OCHOCO MINES	CASCADE EARTH SCIENCES A Valmont Industries Company	PROJECT NUMBER: 2140031	SOIL BORING NUMBER: WP-BR-6
BORING LOCATION: WASTE PILE NEAR TRENCH		LOGGED BY: MA CHECKED BY:	PERMIT NO.
DRILLED BY: CASCADE DRILLING		START DATE: 10/4/01	COMPLETION DATE: 10/4/01
DRILLING EQUIPMENT: HOLLOW STEM AUGER		SAMPLING EQUIPMENT: SPLIT SPOON	

SOIL BORING DATA (MEASURED FROM BELOW GROUND SURFACE)

TOTAL DEPTH: 17	BOREHOLE DIA.(IN):	GROUND SURFACE ELEV. (FT MSL):	WATER LEVEL/DATE	

BACKFILL INT. 0-17 TYPE: BENTONITE | SURFACE SEAL INT: TYPE:

GROUP SYMBOL	DESCRIPTION OF LITHOLOGY INTERVAL (FT. B.G.S.)	DEPTH FT. BGS	SAMPLE BLOW COUNT	RECOVERY	TYPE	NUMBER	REMARKS (DRILLING CONDITIONS, PID READINGS, ETC.)
		0					Ground surface
SM	5 SANDY SILT; Light brown; some orange fine sand and silt; some angular basalt gravel to 2".	2, 4, 6	5 5 5	18"	SS	WP-BR-6-5'	Advance hole w/HA
SM	10 CLAYEY SILT; medium brown, some angular gravel with reddish (cinnabar) streaks.	8, 10, 12, 14	7 8 9	18"	SS	WP-BR-6-10'	
CL	17 CLAY; Blue clay with yellow, orange and rust colored clay; wet, sticky.	16	13 14 15	18"	SS	WP-BR-6-17'	
	Total Depth = 17'	18, 20, 22, 24, 26, 28, 30, 32					Terminate drilling at 17'

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE INFORMATION PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

Surveyed data is accurate to +/- 0.5 feet.

PROJECT: OCHOCO MINES	CASCADE EARTH SCIENCES A Valmont Industries Company	PROJECT NUMBER: 2140031	SOIL BORING NUMBER: WP-BR-7
BORING LOCATION: WASTE PILE NEAR TRENCH		LOGGED BY: MA CHECKED BY:	PERMIT NO.
DRILLED BY: CASCADE DRILLING		START DATE: 10/4/01	COMPLETION DATE: 10/4/01
DRILLING EQUIPMENT: HOLLOW STEM AUGER		SAMPLING EQUIPMENT: SPLIT SPOON	

SOIL BORING DATA (MEASURED FROM BELOW GROUND SURFACE)

TOTAL DEPTH: 12	BOREHOLE DIA.(IN):	GROUND SURFACE ELEV. (FT MSL):	WATER LEVEL/DATE
BACKFILL INT. 0-12	TYPE: BENTONITE	SURFACE SEAL INT:	TYPE:

GROUP SYMBOL	DESCRIPTION OF LITHOLOGY INTERVAL (FT. B.G.S.)	DEPTH FT. BGS	SAMPLE BLOW COUNT	RECOVERY	TYPE	NUMBER	REMARKS (DRILLING CONDITIONS, PID READINGS, ETC.)
		0					Ground surface
SM	3 SILT; Reddish brown; some clay; light gray and tan; some pink fine sand; trace 1" gravel; rust. change at 4'	2 4	5 4 7	18"	SS	WP-BR-7-3'	Advance hole w/HA
	8 ROCK; Brown, broken gravel size chips, some rust stains.	6 8	12 22 36	18"	SS	WP-BR-7-8'	
	10 ROCK; Pinkish crushed gravel size rock, some brown silt, no clay.; 12 very hard drilling, no advance.	10 12	50	4"	SS	WP-BR-4-10'	
CL	Total Depth = 12'	14 16 18 20 22 24 26 28 30 32					Terminate drilling at 12'

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE INFORMATION PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

Surveyed data is accurate to +/- 0.5 feet.

PROJECT: OCHOCO MINES	CASCADE EARTH SCIENCES A Valmont Industries Company	PROJECT NUMBER: 2140031	SOIL BORING NUMBER: WP-BR-8
BORING LOCATION: WASTE PILE NEAR PROCESS BUILDING BLUE RIDGE MINE		LOGGED BY: MA CHECKED BY:	PERMIT NO.
DRILLED BY: CASCADE DRILLING		START DATE: 10/4/01	COMPLETION DATE: 10/4/01
DRILLING EQUIPMENT: HOLLOW STEM AUGER		SAMPLING EQUIPMENT: SPLIT SPOON	

SOIL BORING DATA (MEASURED FROM BELOW GROUND SURFACE)

TOTAL DEPTH: 6	BOREHOLE DIA.(IN): 6	GROUND SURFACE ELEV. (FT MSL):	WATER LEVEL/DATE
BACKFILL INT. 0-6	TYPE: BENTONITE	SURFACE SEAL INT:	TYPE:

GROUP SYMBOL	DESCRIPTION OF LITHOLOGY INTERVAL (FT. B.G.S.)	DEPTH FT. BGS	SAMPLE BLOW COUNT	RECOVERY	TYPE	NUMBER	REMARKS (DRILLING CONDITIONS, PID READINGS, ETC.)
		0					Ground surface
SM	2 SILT: Multicolored silts; very fine, tan, orange, rust, some brown, reddish, gray; loose.	2	3 4 5	18"	SS	WP-BR-8-2'	Advance hole w/HA
		4					
CL	6 CLAYEY SILT; Medium dark brown (cuttings). Refusal at 6'	6	50	0"			Drilling pushes rig up, can't advance.
	Total Depth = 6'	8					Terminate drilling at 6'
		10					
		12					
		14					
		16					
		18					
		20					
		22					
		24					
		26					
		28					
		30					
		32					

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE INFORMATION PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

Surveyed data is accurate to +/- 0.5 feet.

PROJECT: OCHOCO MINES	CASCADE EARTH SCIENCES A Valmont Industries Company	PROJECT NUMBER: 2140031	SOIL BORING NUMBER: WP-BR-9
BORING LOCATION: WASTE PILE AT NUMBER 2 BLUE RIDGE SOUTH OF FR 42 BLUE RIDGE		LOGGED BY: MA CHECKED BY:	PERMIT NO.
DRILLED BY: CASCADE DRILLING		START DATE: 10/4/01	COMPLETION DATE: 10/4/01
DRILLING EQUIPMENT: HOLLOW STEM AUGER		SAMPLING EQUIPMENT: SPLIT SPOON	

SOIL BORING DATA (MEASURED FROM BELOW GROUND SURFACE)

TOTAL DEPTH: 8	BOREHOLE DIA.(IN): 6	GROUND SURFACE ELEV. (FT MSL):	WATER LEVEL/DATE
BACKFILL INT. 0-8	TYPE: BENTONITE	SURFACE SEAL INT:	TYPE:

GROUP SYMBOL	DESCRIPTION OF LITHOLOGY INTERVAL (FT. B.G.S.)	DEPTH FT. BGS	SAMPLE BLOW COUNT	RECOVERY	TYPE	NUMBER	REMARKS (DRILLING CONDITIONS, PID READINGS, ETC.)
		0					Ground surface
							Advance hole w/HA
	2.5 SILTY SAND: Reddish brown coarse sand and silt; loose; dry; no clay.	2	2 4 4	18"	SS	WP-BR-9-2.5'	
		4					
		6					
ML	8 CLAYEY SILT; Medium dark brown; native soil.	8	3 4 5	18"	SS	WP-BR-9-8'	
	Total Depth = 8'						Terminate drilling at 8'
		10					
		12					
		14					
		16					
		18					
		20					
		22					
		24					
		26					
		28					
		30					
		32					

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE INFORMATION PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

Surveyed data is accurate to +/- 0.5 feet.

PROJECT: OCHOCO MINES	CASCADE EARTH SCIENCES A Valmont Industries Company	PROJECT NUMBER: 2140031	SOIL BORING NUMBER: WP-A-1
BORING LOCATION: WASTE PILE AT ADIT B AMITY MINE		LOGGED BY: MA CHECKED BY:	PERMIT NO.
DRILLED BY: CASCADE DRILLING		START DATE: 10/3/01	COMPLETION DATE: 10/3/01
DRILLING EQUIPMENT: HOLLOW STEM AUGER		SAMPLING EQUIPMENT: SPLIT SPOON	

SOIL BORING DATA (MEASURED FROM BELOW GROUND SURFACE)

TOTAL DEPTH: 45	BOREHOLE DIA.(IN):	GROUND SURFACE ELEV. (FT MSL):	WATER LEVEL/DATE
BACKFILL INT. 0-45	TYPE: BENTONITE		SURFACE SEAL INT: TYPE:

GROUP SYMBOL	DESCRIPTION OF LITHOLOGY INTERVAL (FT. B.G.S.)	DEPTH FT. BGS	SAMPLE BLOW COUNT	RECOVERY	TYPE	NUMBER	REMARKS (DRILLING CONDITIONS, PID READINGS, ETC.)
							Ground surface
SM	0-1 SANDY SILT: Light gray and tan; very soft.	0					Advance hole w/HA
		2					
	4-5 SILTY CLAY: Light brown; dry; plastic.	4					
		6					
		8					
CL	10 SILTY CLAY: Light gray; some rust orange; hard.	10	5 7 7	18"	SS	WP-A-1-10'	
		12					
		14					
		16					
	17 CLAY: Medium brown; moist.						
		18					
	20 CLAYEY SILT: Light gray and orange; some angular black basalt gravel to 1"; medium plasticity.	20	11 12 14	6"	SS	WP-A-1-20'	
		22					
		24					
	25 CLAYEY SILT: Multi-colored, light gray, orange, tan, dark reddish brown.	26	7 8 12	18"	SS	WP-A-1-25'	
CL	27 CLAY: Dark medium brown; moist; very plastic.						
		28					
	30 CLAYEY SILT: Pinkish brown, purple, some light gray; high plasticity; softer @ 32'.	30	13 19 17	18"	SS	WP-A-1-30'	
		32					

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE INFORMATION PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

Surveyed data is accurate to +/- 0.5 feet.

PROJECT: OCHOCO MINES	CASCADE EARTH SCIENCES	PROJECT NUMBER: 2140031	SOIL BORING NO: WP-A-1

GROUP SYMBOL	DESCRIPTION OF LITHOLOGY INTERVAL (FT)	DEPTH (FT)	SAMPLE BLOW COUNT	RECOVERY	TYPE	NUMBER	REMARKS (DRILLING CONDITIONS, PID READINGS, ETC.)
		34					
CL	35 CLAYEY SILT: Purple, red rust spots, mottled with light gray and light tan.	36	22 27 50	18"	SS	WP-A-1-35'	
		38					
	40 SAME AS ABOVE.	40	13 21 30	18"	SS	WP-A-1-40'	
		42					
	45 CLAY: Purplish brown with light gray mottles, rust spots and white crystals; very hard with brownish rock.	44	26 50	4"	SS	WP-A-1-45'	
	Total Depth = 45'	46					Terminate drilling at 45'
		48					
		50					
		52					
		54					
		56					
		58					
		60					
		62					
		64					
		66					
		68					
		70					
		72					
		74					
		76					

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE INFORMATION PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

ALL DEPTHS IN FEET BELOW GROUND SURFACE

PROJECT: OCHOCO MINES	CASCADE EARTH SCIENCES A Valmont Industries Company	PROJECT NUMBER: 2140031	SOIL BORING NUMBER: WP-A-3
BORING LOCATION: WASTE PILE NEAR MILL BLDG AMITY MINE		LOGGED BY: MA CHECKED BY:	PERMIT NO.
DRILLED BY: CASCADE DRILLING		START DATE: 10/3/01	COMPLETION DATE: 10/3/01
DRILLING EQUIPMENT: HOLLOW STEM AUGER		SAMPLING EQUIPMENT: SPLIT SPOON	

SOIL BORING DATA (MEASURED FROM BELOW GROUND SURFACE)

TOTAL DEPTH: 18	BOREHOLE DIA.(IN):	GROUND SURFACE ELEV. (FT MSL):	WATER LEVEL/DATE	
BACKFILL INT. 0-18	TYPE: BENTONITE		SURFACE SEAL INT:	TYPE:

GROUP SYMBOL	DESCRIPTION OF LITHOLOGY INTERVAL (FT. B.G.S.)	DEPTH FT. BGS	SAMPLE BLOW COUNT	RECOVERY	TYPE	NUMBER	REMARKS (DRILLING CONDITIONS, PID READINGS, ETC.)
	0-1 SANDY SILT: Light black and gray; very loose.	0					Ground surface
SM	5 SILT: Bright red, fine sandy and silt powder; loose.	2 4 6	13 10 9	18"	SS	WP-A-3-5	Advance hole w/HA
SM	10 SILT: Red; fine loose powder; some light tan powder.	8 10 12	7 27 18	18"	SS	WP-A-3-10'	
CL	15 CLAYEY SILT: Dark reddish brown with large angular basalt gravel;very hard; native soil	14 16	11 12 20	18"	SS	WP-A-3-15'	
CL	18 CLAYEY SILT: Dark brown with anugular basalt gravel; very tight.	18	12 17 21	2"	SS	WP-A-3-18'	
	Total Depth = 18'	20 22 24 26 28 30 32					Terminate Drilling at 18'

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE INFORMATION PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

Surveyed data is accurate to +/- 0.5 feet.

PROJECT: OCHOCO MINES	CASCADE EARTH SCIENCES A Valmont Industries Company	PROJECT NUMBER: 2140031	SOIL BORING NUMBER: WP-A-4
BORING LOCATION: WASTE PILE BETWEEN MILL & CREEK AMITY MINE		LOGGED BY: MA CHECKED BY:	PERMIT NO.
DRILLED BY: CASCADE DRILLING		START DATE: 10/3/01	COMPLETION DATE: 10/3/01
DRILLING EQUIPMENT: HOLLOW STEM AUGER		SAMPLING EQUIPMENT: SPLIT SPOON	

SOIL BORING DATA (MEASURED FROM BELOW GROUND SURFACE)

TOTAL DEPTH: 25	BOREHOLE DIA.(IN):	GROUND SURFACE ELEV. (FT MSL):	WATER LEVEL/DATE
BACKFILL INT. 0-25	TYPE: BENTONITE	SURFACE SEAL INT:	TYPE:

GROUP SYMBOL	DESCRIPTION OF LITHOLOGY INTERVAL (FT. B.G.S.)	DEPTH FT. BGS	SAMPLE BLOW COUNT	RECOVERY	TYPE	NUMBER	REMARKS (DRILLING CONDITIONS, PID READINGS, ETC.)
							Ground surface
SM	0-1 CLAYEY SILT: Light brown, tan, orange, medium plasiticity.	0					Advance hole w/HA
		2					
	5 SILT: Bright red, fine sandy and silt powder; loose.	4					
		6	13 10 9	18"	SS	WP-A-3-5'	
		8					
	10 SANDY SILT: Light gray and orange; loose, non-plastic;small angular gravel.	10	5 8 10	18"	SS	WP-A-4-10'	
		12					
CL		14					
	cuttings are light orangish brown to brown with reddish tint. gets harder at 19'	16					
		18					
	20 CLAYEY SILT: Reddish brown with angular reddish gravel to 1.5"; no gray or rust; moist; native soil?	20	5 18 19	18"	SS	WP-A-4-20'	
		22					
	25 CLAYEY SILT: same as above.	24	10 12 13	18"	SS	WP-A-4-25'	
	Total Depth = 25'	26					Terminate Drilling at 25'
		28					
		30					
		32					

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE INFORMATION PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

Surveyed data is accurate to +/- 0.5 feet.

PROJECT: OCHOCO MINES	CASCADE EARTH SCIENCES A Valmont Industries Company	PROJECT NUMBER: 2140031	SOIL BORING NUMBER: WP-A-5
BORING LOCATION: WASTE PILE NORTH OF JOHNSON CREEK AMITY MINE		LOGGED BY: MA CHECKED BY:	PERMIT NO.
DRILLED BY: CASCADE DRILLING		START DATE: 10/3/01	COMPLETION DATE: 10/3/01
DRILLING EQUIPMENT: HOLLOW STEM AUGER		SAMPLING EQUIPMENT: SPLIT SPOON	

SOIL BORING DATA (MEASURED FROM BELOW GROUND SURFACE)

TOTAL DEPTH: 23	BOREHOLE DIA.(IN): 6	GROUND SURFACE ELEV. (FT MSL):	WATER LEVEL/DATE
BACKFILL INT. 0-23	TYPE: BENTONITE	SURFACE SEAL INT:	TYPE:

GROUP SYMBOL	DESCRIPTION OF LITHOLOGY INTERVAL (FT. B.G.S.)	DEPTH FT. BGS	SAMPLE BLOW COUNT	RECOVERY	TYPE	NUMBER	REMARKS (DRILLING CONDITIONS, PID READINGS, ETC.)
	0-1 SANDY SILT: Light black and gray; very loose.	0					Ground surface
							Advance hole w/HA
		2					
		4					
		6					
		8					
SM	10 SILT: Light gray with light orange streaks; trace white streaks; trace rust stains; tight; low clay; non-plastic.	10	5 7 8	18"	SS	WP-A-5-10'	
		12					
		14					
		16					
CL	Change in drilling to harder	18					
	20 CLAYEY SILT: Dark reddish brown with large angular basalt gravel;very hard; native soil	20	13 10 9	18"	SS	WP-A-5-20'	
		22	22 24 27	0"	SS	none	
	Total Depth = 23'	24					Terminate Drilling at 23'
		26					
		28					
		30					
		32					
	20 CLAYEY SILT: Dark reddish brown with large angular basalt gravel;very hard; native soil						

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE INFORMATION PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

Surveyed data is accurate to +/- 0.5 feet.

PROJECT: OCHOCO MINES	CASCADE EARTH SCIENCES A Valmont Industries Company	PROJECT NUMBER: 2140031	SOIL BORING NUMBER: WP-A-6
BORING LOCATION: WASTE PILE NEAR EXPOSED TRENCH DEVIL'S FOOD MINE		LOGGED BY: MA CHECKED BY:	PERMIT NO.
DRILLED BY: CASCADE DRILLING		START DATE: 10/5/01	COMPLETION DATE: 10/5/01
DRILLING EQUIPMENT: HOLLOW STEM AUGER		SAMPLING EQUIPMENT: SPLIT SPOON	

SOIL BORING DATA (MEASURED FROM BELOW GROUND SURFACE)

TOTAL DEPTH: 20	BOREHOLE DIA.(IN):	GROUND SURFACE ELEV. (FT MSL):	WATER LEVEL/DATE	
BACKFILL INT. 0-20	TYPE: BENTONITE		SURFACE SEAL INT:	TYPE:

GROUP SYMBOL	DESCRIPTION OF LITHOLOGY INTERVAL (FT. B.G.S.)	DEPTH FT. BGS	SAMPLE BLOW COUNT	RECOVERY	TYPE	NUMBER	REMARKS (DRILLING CONDITIONS, PID READINGS, ETC.)
							Ground surface
	0-1 SILT: Medium brown, little clay.	0					Advance hole w/HA
		2					
		4					
		6					
		8					
SM	10 SILT: Dark and light medium brown; some gray; some clayey silt; some rust color and weathered rock.	10	10 8 7	18"	SS	WP-A-6-10'	
	soft drilling at 12'	12					
		14					
	15 ROCK: Weathered, broken; blue gray and greenish blue rock and clay; very hard.	16	50	5"	SS	WP-A-6-15'	
		18					
	20 ROCK; Gray rock - basalt, refusal	20	50	5.5"	SS		
	Total Depth = 20'						Terminate Drilling at 20'
		22					
		24					
		26					
		28					
		30					
		32					

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE INFORMATION PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS ENCOUNTERED.

Surveyed data is accurate to +/- 0.5 feet.

Appendix M.

Waste Pile Calculations

WP-A			
	Area (ft^2)		22470
	Average Depth (ft)		14
	Volume (CY)		11651
			11600
WP-B			
	Area (ft^2)		11363
	Average Depth (ft)		8
	Volume (CY)		3367
		~	**3400**
WP-C			
	Area (ft^2)		23855
	Average Depth (ft)		9
	Volume (CY)		7952
		~	**8000**
Total Volume Amity WP's			**23000**

** Since most piles are end dumped, volume was calculated using the footprint area x the estimated average depth

WP-A

Area (ft^2)	7500	*** Volume was calcuated with
Average Depth (ft)	10	L*W*H minus ~ 40% (to account
Volume (CY) - Cube	2778	for the missing corners of the
Volume (CY) minus 40%	1700	cube)
Total Volume Devil's Food WP's	**1700**	

WP-A		
	Area (ft^2)	4900
	Depth (ft)	12
	Volume (CY) - Cube	2178
	Volume (CY) minus 40%	1307
		1300
WP-B		
	Area (ft^2)	26000
	Depth (ft)	10
	Volume (CY) - Cube	9630
	Volume (CY) minus 40%	5778
		5800
WP-C		
	Area (ft^2)	24746
	Depth (ft)	12.5
	Volume (CY) - Cube	11456
	Volume (CY) minus 40%	6874
		6900
WP-D		
	Area (ft^2)	2080
	Depth (ft)	4
	Volume (CY) - Cube	308
	Volume (CY) minus 40%	185
		190
WP-E		
	Area (ft^2)	220
	Depth (ft)	3
	Volume (CY) - Cube	24
	Volume (CY) minus 40%	15
		15
WP-F		
	Area (ft^2)	934
	Depth (ft)	4
	Volume (CY) - Cube	138
	Volume (CY) minus 40%	83
		80
Total Volume Blue Ridge WP's		14285

*** Since most are piles, volume was calcuated with L*W*H minus ~ 40% (to account for the missing corners of the cube)