U.S. DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

Geochemical Data for Environmental Studies of Mercury Mines in Nevada

by

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Introduction

The primary objective of this study was to determine if weathering of abandoned mercury mines in Nevada has resulted in any significant effect to surrounding ecosystems. This study is part of a larger U.S. Geological Survey (USGS) project to evaluate the geology, mineral resource potential, and environmental concerns of the Humboldt River Basin, Nevada. Mercury is clearly the primary concern of the mercury mines, but other toxic elements were also evaluated in this study. In this report, we describe the samples collected in 1999 for this study, the methods used for the analysis of the samples, and the geochemical data for these samples.

Mercury is a heavy metal of environmental concern because highly elevated concentrations are toxic to living organisms, and thus, the presence of these abandoned mercury mines is a potential hazard to residents and wildlife when drainage from the mines enters streams and rivers that are part of local ecosystems. Mercury mines in Nevada are part of a broad mercury belt that consists of numerous deposits scattered throughout several tens of thousands of square kilometers, primarily in western and central Nevada (fig. 1). The dominant environmental concern of these mercury mines is inorganic mercury in cinnabar ore and elemental mercury remaining at the mine sites that may potentially erode into streams and rivers. Under certain conditions, inorganic mercury may be converted to organic forms of mercury that are water soluble and can be absorbed by biota in aquatic systems. When organisms are exposed to mercury contamination, mercury generally increases in concentration with increasing trophic position in the food chain (biomagnification).

At the abandoned mercury mines in Nevada, the presence of cinnabar remaining in ore and calcine piles (roasted ore), and any elemental mercury around the mill and retort areas are environmental concerns. For example, in all the districts studied, there is cinnabar visible in the area of the open pit cuts and trenches, ore piles and tailings, as well as in the calcine piles. However, elemental mercury was not observed during the 1999 fieldwork at any mine site in Nevada. Calcines from some deposits contain as much as 2,000 μg/g Hg, suggesting that processing in the rotary furnaces was not always totally efficient. Detrital cinnabar and cobbles containing cinnabar visible in streams drainages below the mines indicate that mercury present at these sites is eroding down gradient from the mines.

We visited mercury mines in eight districts (fig. 1); these mines were selected for study because they represented variability in mine size (mercury production) and host rock geology (Table 1). We studied districts that are within the Humboldt River Basin including the Imlay, Dutch Flat, Poverty Peaks, Goldbanks, and Ivanhoe districts, but also mines in the Antelope Springs, Bottle Creek, and Opalite districts (figs. 2-9) to evaluate any potential differences of mines in these districts. To evaluate environmental concerns of these mercury mines, we measured the concentration of mercury in cinnabar-bearing ore, calcines, stream-sediment (bed sdiments), and stream-water samples collected proximal to several of the mines. However, due to the lack of surface water in the study area, stream water was collected from only Eldorado Canyon downstream from the Eldorado mine in the Imlay district (fig. 2). In addition, we collected sediment and water samples from several sites along the Humboldt River and the Rye Patch Reservoir to establish regional geochemical baselines (Fig. 1). We also analyzed these samples for other trace-elements (including As, Bi, Cd, Cu, Mo, Pb, Sb, and Zn) to evaluate any additional heavy-metal contamination related to the mines.

General Geology and Mineralogy

Mercury deposits in Nevada are found in a wide variety of rock types including sandstone, limestone, chert, granitic rocks, diabase dikes, rhyolitic tuffs and flows, andesites, and metamorphic rocks such as schists and phyllite (Bailey and Phoenix, 1944; Willden, 1964; Johnson, 1977). Ore and gangue minerals are typically found in highly silicified rocks, veins, and vein breccias. One of the most common types of mercury deposit in Nevada is "opalite," which is composed of amorphous and cryptocrystalline quartz including opal. Opalite bodies are typically silicified volcanic tuffs. Siliceous sinter deposits formed by the surface deposition of hot-springs water are also common host rocks. Mineralized vein and vein breccias are common deposit forms in Nevada, especially in sedimentary rocks. Varieties of quartz are the most common gangue, but alunite, gypsum, barite, clay, and carbonate alteration minerals are locally found. The ore mineralogy of these mercury deposits is dominantly cinnabar, with subordinate amounts of metacinnabar, native mercury, calomel, and mercury oxychlorides found in some deposits (Bailey and Phoenix, 1944). Minor amounts of pyrite, marcasite, sphalerite, and stibnite are found with cinnabar ore in a few localities. The mercury deposits in Nevada are generally of Miocene age and are probably related to extensional magmatism (Noble and others, 1988).

Mercury deposits in Nevada were mined between about 1907 and 1991, when the McDermitt mine closed. Mercury mines in Nevada and throughout the United States are not presently operating because of low prices and low demand for mercury, although some minor byproduct mercury is recovered from a few precious metal mines. Historic production from mercury mines in Nevada exceeds 10,000 t (300,000 flasks; 1 flask=76 lbs), about 90 percent of which has come from the McDermitt mine (Willden, 1964; Johnson, 1977; Noble and others, 1988). At most mines in Nevada, mercury ore was processed on site in small retorts or in large rotary furnaces (Bailey and Phoenix, 1944). Geologic characteristics and mercury production of the districts studied are shown in table 1.

Sample Collection and Preparation

Ore, stream-sediment, calcines, and stream-water samples were collected in and around the studied mine sites to evaluate the distribution of mercury and other elements around the sites. Sediment and surface-water samples were also collected from the Humboldt River and the Rye Patch Reservoir to evaluate mercury contents distant from the mines. Stream-sediment samples consisted of channel-bed alluvium. Lake sediment samples were collected along the shoreline of the Rye Patch Reservoir. Sediment samples were composited by collecting material from several localities in the channel, or from several locations just below the waterline for the lake sediments. About 2 kg of stream or lake sediment was screened to minus-10 mesh (2 mm) and collected in a stainless steel gold pan and saved as the sediment sample. Calcine samples collected were grab samples that were not sieved in the field. Prior to analysis, the calcine and stream- and lake-sediment samples were air dried, sieved to minus-80-mesh (0.18 mm), and pulverized to less than 100 mesh (0.15 mm).

Both filtered and unfiltered surface-water samples were collected at each site. All filtered samples were passed through a 0.45-µm sterile membrane. To minimize contamination during water sample collection, bottles for acidified samples were pre-cleaned for 24 hours in 10 percent hydrochloric acid and all sample bottles were rinsed with site water, and collection was made wearing new, unpowdered vinyl gloves, and using disposable filters and syringes at each site. Water samples collected for analysis included: (1) filtered and unfiltered water for mercury analysis collected in glass bottles and preserved with ultra-pure nitric acid saturated with sodium dichromate, (2) filtered and unfiltered water samples for major and trace cation analysis collected in polypropylene bottles and preserved with ultra-pure nitric acid, (3) an unacidified filtered water sample collected for anion analysis, and (4) an unacidified filtered water sample for measurement of alkalinity. Unacidified water samples were kept in an ice cooler in the field and then refrigerated until analysis.

Stream-water characteristics such as conductivity, pH, temperature, turbidity, and Fe^{2+} were also measured in the field at each sample site. Conductivity was measured with an Orion model 130 conductivity meter and was recorded in microsiemens per centimeter (µS/cm). Temperature (°C) and pH were determined using an Orion model 230A pH meter. Turbidity was measured with a DTR-15CE Scientific, Inc. meter in standard nephelometric turbidity units (NTU). Determination of Fe^{2+} was made using CHEMetrics colorimetric field test kits and was measured in mg/L.

Analytical Methods

Samples in this study were analyzed by several single-element and multi-element chemical methods. The sediment and calcine samples were analyzed by XRAL Laboratories of Ontario, Canada, which was contracted by the USGS. The water samples were analyzed by the USGS in Denver, Colorado. Tables 2 and 3 list the elements determined and their limits of determination. A brief description of the methods used is given below. Quality control was addressed with the use of internal (hidden) reference standards, field blanks, and sample site duplicates. Based on analysis of the hidden standards, data precision for the methods used was within 20 percent.

Solid Sample Analysis

Inductively coupled plasma-atomic emission spectrometry

Two separate multi-element inductively coupled plasma-atomic emission spectrometry (ICP-AES) methods were used to measure major, minor, and trace element concentrations in the calcine and sediment samples collected in this study. In the first ICP-AES method, concentrations for 40 elements were determined following decomposition of 0.2 g of sample using a mixture of hydrochloric, nitric, perchloric, and hydrofluoric acids at about 100°C. This procedure is considered to be a total digestion method. The digested sample was aspirated into the ICP-AES discharge where the elemental emission signal was measured simultaneously for the 40 elements. Calibration was performed by standardizing with rock reference materials and a series of multi-element solution standards. This method is similar to that described by Briggs (1996).

The calcine and sediment samples were also analyzed by a 10 element ICP-AES method using a widely used extraction technique similar to the procedure described by Motooka (1988). A 1.0 g sample aliquot was digested with a hydrochloric acid-hydrogen peroxide mixture, which dissolves metals not tightly bound in the silicate lattice of rocks, soils, and stream sediments. The metals were then extracted by a 10 percent aliquot 336-diisobutylketone solution as organic halides. The separated organic phase was pneumatically aspirated into a multichannel ICP instrument where the concentrations of the extracted metals (Ag, As, Au, Bi, Cd, Cu, Mo, Pb, Sb, and Zn) are determined simultaneously. This procedure is a partial digestion, and depending on the type of sample, there may be a significant discrepancy between the proposed value of the reference material and the laboratory value. This is primarily due to the availability of the metal in the sample. Since this is a partial digestion, those metals tightly bound in highly resistant minerals will not be extracted. Elements determined by ICP-AES and their limits of determination are listed in table 2.

Atomic Absorption Spectrophotometry

Mercury and gold were measured in the calcine and sediment samples collected in this study by atomic absorption spectrophotometry (AAS). Mercury was determined by cold-vapor atomic absorption spectrophotometry (CVAAS) using a procedure modified from O'Leary and others (1996). A 0.1 g aliquot of sample was digested with a mixture of sulfuric acid, nitric acid, five percent potassium permanganate, and five percent potassium peroxydisuflate in a water bath for one hour. Excess potassium permanganate was reduced with hydroxylamine sulfate solution and then Hg (II) was reduced to Hg^o with stannous chloride. The mercury vapor was separated and measured using a LEEMAN PS200 automated mercury analyzer.

Gold was determined in the sediment and calcine samples by AAS after collection by fire assay. An assay fusion consists of heating a mixture of 15 g of finely pulverized sample with about three parts of a flux until the product was molten. One of the ingredients of the flux was a lead compound, which was reduced by other constituents of the flux or sample to metallic lead. The latter collects all the gold, together with silver, platinum metals, and small quantities of certain base metals present in the sample and settles to the bottom of the crucible to form a lead button. The gangue of the ore was converted by the flux into a slag sufficiently fluid so that all particles of lead may settle readily through the molten mass. The choice of a suitable flux depends on the character of the ore. The lead button was cupelled to oxidize the lead leaving behind a dore bead containing the precious metals. The dore bead was then transferred to a test tube, dissolved with aqua regia, diluted to a specific volume and analyzed by AAS. Elements determined by AAS and their limits of determination are listed in table 2.

Water Sample Analysis

Inductively Coupled Plasma-Mass Spectrometry

Water samples collected in this study were analyzed by a multi-element inductively coupled plasma-mass spectrometry (ICP-MS) technique following the method of Lamothe and others (1999). The ICP-MS was calibrated using commercially available multi-element standard solutions in conjunction with one USGS standard reference sample. Samples must be acid-preserved prior to analyses; but no digestion was required for the determination of dissolved elements in aqueous samples. Internal standards were added to compensate for matrix effects and instrumental drift. Element isotopes measured were selected to minimize isobaric overlap from other elements and molecular species that might be present. Elements determined by ICP-MS and their limits of determination are listed in table 3.

Atomic Fluorescence

Water samples were analyzed for mercury by atomic fluorescence (AF) using a method modified from Kennedy and Crock (1987). Preserved water samples were analyzed directly. Mercury (II) was reduced to mercury gas with hydroxylamine hydrochloride/sodium chloride and stannous chloride in a flow injection system, releasing the gas into an atomic fluorescence detector where concentration was determined. Elements determined by AF and their limits of determination are listed in table 3.

Ion Chromatography

The anions SO_4^{2-}, NO_3^-, F^-, and Cl^- were determined sequentially by ion chromatography (IC) on filtered water samples using a method modified from d'Angelo and Ficklin (1996). The samples were injected into a DX-120 Dionex Ion Chromatograph where the anions of interest separate through an anion-ion exchange separator column at different rates, depending on the affinity of each species for the ion-exchange resin. The sample then passes into a flow-through conductivity cell where the anions were detected and peak areas were determined. The peak areas of unknown samples were compared with that of five calibration standards for each anion in question to determine sample concentrations. Elements determined by IC and their limits of determination are listed in table 3.

Alkalinity by Titration

Water samples collected in this study were analyzed for alkalinity in the laboratory using an Orion 960 Autochemistry System for preset endpoint alkalinity titration. Titrant (0.01 M H_2SO_4) was added to 50 mL of sample until a pH of 4.5 was reached. Alkalinity was then calculated and reported as mg/L $CaCO_3$.

Description of the Data Tables

Geochemical data are given for the sediment and rock samples in table 4, calcine samples in table 5, and water samples in table 6. Sample numbers in the tables correspond to those in figures 1-9. Field duplicates are numbered with a "D9" prefix in the data tables. Locations taken in the field by GPS are given in latitude and longitude in degrees, minutes, and seconds, as well as in decimal degrees. In the column header, there is an abbreviation for each element determined and the analytical method used as follows: ICP40 (40 element inductively coupled plasma-atomic emission spectrometry), ICP10 (10 element inductively coupled plasma-atomic emission spectrometry), CVAAS (cold-vapor atomic absorption spectrophotometry), AAS (atomic absorption spectrophotometry), ICP-MS (inductively coupled plasma-mass spectrometry), AF (atomic fluorescence), and IC (ion chromatography).

Digital Data

The data in this report are also available as digital data on a CD-ROM in Gray and others (1999). The CD-ROM contains the geochemical data for the samples collected in this study as Excel (.xls) files and the text and figures are in a portable document format (.pdf) file. The geochemical data in this report are also part of the USGS National Geochemical Database in Denver that contains both descriptive geological information and analytical data. This report may also be obtained on the USGS webb site at: greenwood.cr.usgs.gov/pub/open-file-reports/ofr-99-0576/.

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Table 1. Description and production of mercury mines studied.

District	Mines Studied	Host Rocks	Approximate Mercury Production Per District
Imlay	Eldorado (Blackjack)	Veins in Triassic limestone and shale	800 flasks
Dutch Flat	Dutch Flat	Veins in Paleozoic schist and phyllite cut by Tertiary granodiorite	90 flasks
Poverty Peaks	Cahill	Veins in Paleozoic and Triassic limestone and sandstone, and opalite altd volcanic rx	600 flasks
Ivanhoe	Silver Cloud	Opalite altered Tertiary volcanic tuff	>2,000 flasks
Goldbanks	Goldbanks	Opalite altered Tertiary volcanic tuff and breccia	2,700 flasks
Bottle Creek	White Peaks	Veins in Paleozoic and Triassic tuffs and sandstone and Tertiary diabase dikes	4,500 flasks
Antelope Springs	Pershing and Juniper	Veins in Triassic limestone, dolomite conglomerate, and shale	12,500 flasks
Opalite	McDermitt	Opalite altered Tertiary volcanic tuffs	270,000 flasks

Table 2. Limits of determination for sediments, rocks, and calcines by analyzed inductively coupled plasma-atomic emission spectrometry (ICP-AES) and atomic absorption spectrophotometry (AAS).

Reporting limits for the 40 element ICP-AES method

Element	Lower Limit	Upper limit
Aluminum, Al	0.005 %	50 %
Calcium, Ca	0.005 %	50 %
Iron, Fe	0.02 %	25 %
Potassium, K	0.01 %	50 %
Magnesium, Mg	0.005 %	5 %
Sodium, Na	0.005 %	50 %
Phosphorous, P	0.005 %	50 %
Titanium, Ti	0.005 %	25 %
Silver, Ag	2 μg/g	10,000 μg/g
Arsenic, As	10 μg/g	50,000 μg/g
Gold, Au	8 μg/g	50,000 μg/g
Barium, Ba	1 μg/g	35,000 μg/g
Beryllium, Be	1 μg/g	5,000 μg/g
Bismuth, Bi	50 μg/g	50,000 μg/g
Cadmium, Cd	2 μg/g	25,000 μg/g
Cerium, Ce	5 μg/g	50,000 μg/g
Cobalt, Co	2 μg/g	25,000 μg/g
Chromium, Cr	2 μg/g	25,000 μg/g
Copper, Cu	2 μg/g	15,000 μg/g
Europium, Eu	2 μg/g	5,000 μg/g
Gallium, Ga	4 μg/g	50,000 μg/g
Holmium, Ho	4 μg/g	5,000 μg/g
Lanthanum, La	2 μg/g	50,000 μg/g
Lithium, Li	2 μg/g	50,000 μg/g
Manganese, Mn	4 μg/g	50,000 μg/g
Molybdenum, Mo	2 μg/g	50,000 μg/g
Niobium, Nb	4 μg/g	50,000 μg/g
Neodymium, Nd	9 μg/g	50,000 μg/g
Nickel, Ni	3 μg/g	50,000 μg/g
Lead, Pb	4 μg/g	100,000 μg/g
Scandium, Sc	2 μg/g	50,000 μg/g
Tin, Sn	50 μg/g	50,000 μg/g
Strontium, Sr	2 μg/g	15,000 μg/g
Tantalum, Ta	40 μg/g	50,000 μg/g
Thorium, Th	6 μg/g	50,000 μg/g
Uranium, U	100 μg/g	100,000 μg/g
Vanadium, V	2 μg/g	30,000 μg/g
Yttrium, Y	2 μg/g	25,000 μg/g
Ytterbium, Yb	1 μg/g	5,000 μg/g
Zinc, Zn	2 μg/g	75,000 μg/g

Reporting limits for the 10 element ICP-AES method:

Element	Lower limit (μg/g)	Upper limit (μg/g)
Silver, Ag	0.08	400
Arsenic, As	1.0	6,000
Gold, Au	0.10	1,500
Bismuth, Bi	1.0	6,000
Cadmium, Cd	0.05	500
Copper, Cu	0.05	500
Molybdenum, Mo	0.10	900
Lead, Pb	1.0	6,000
Antimony, Sb	1.0	6,000
Zinc, Zn	0.05	500

Reporting limits for the AAS methods:

Element	Lower limit	Upper limit
Gold, Au	0.005 μg/g	10 μg/g
Mercury, Hg	0.020 μg/g	10 %

Table 3. Lower limits of determination for water samples analyzed by inductively coupled plasma-mass spectrometry (ICP-MS), atomic fluorescence (AF), and ion chromatography (IC).

Reporting limits for the ICP-MS method:

Element	Lower limit
Silver, Ag	0.01 µg/L
Aluminum, Al	0.2 µg/L
Arsenic, As	3 µg/L
Barium, Ba	0.1 µg/L
Beryllium , Be	0.05 µg/L
Calcium, Ca	0.05 mg/L
Cadmium, Cd	0.02 µg/L
Cobalt, Co	0.02 µg/L
Chromium, Cr	1 µg/L
Copper, Cu	0.5 µg/L
Iron, Fe	30 µg/L
Potassium, K	0.03 mg/L
Magnesium, Mg	0.01 mg/L
Manganese, Mn	0.01 µg/L
Sodium, Na	0.01 mg/L
Nickel, Ni	0.1 µg/L
Lead, Pb	0.05 µg/L
Antimony, Sb	0.1 µg/L
Thallium, Tl	0.05 µg/L
Vanadium, V	0.1 µg/L
Zinc, Zn	0.5 µg/L

Reporting limits for the AF method:

Element	Lower limit
Mercury, Hg	0.005 µg/L

Reporting limits for the IC method:

Element	Lower limit (mg/L)
Chloride, Cl^-	0.1
Fluoride, F^-	0.1
Nitrate, NO_3^-	0.1
Sulfate, SO_4^{2-}	2.0

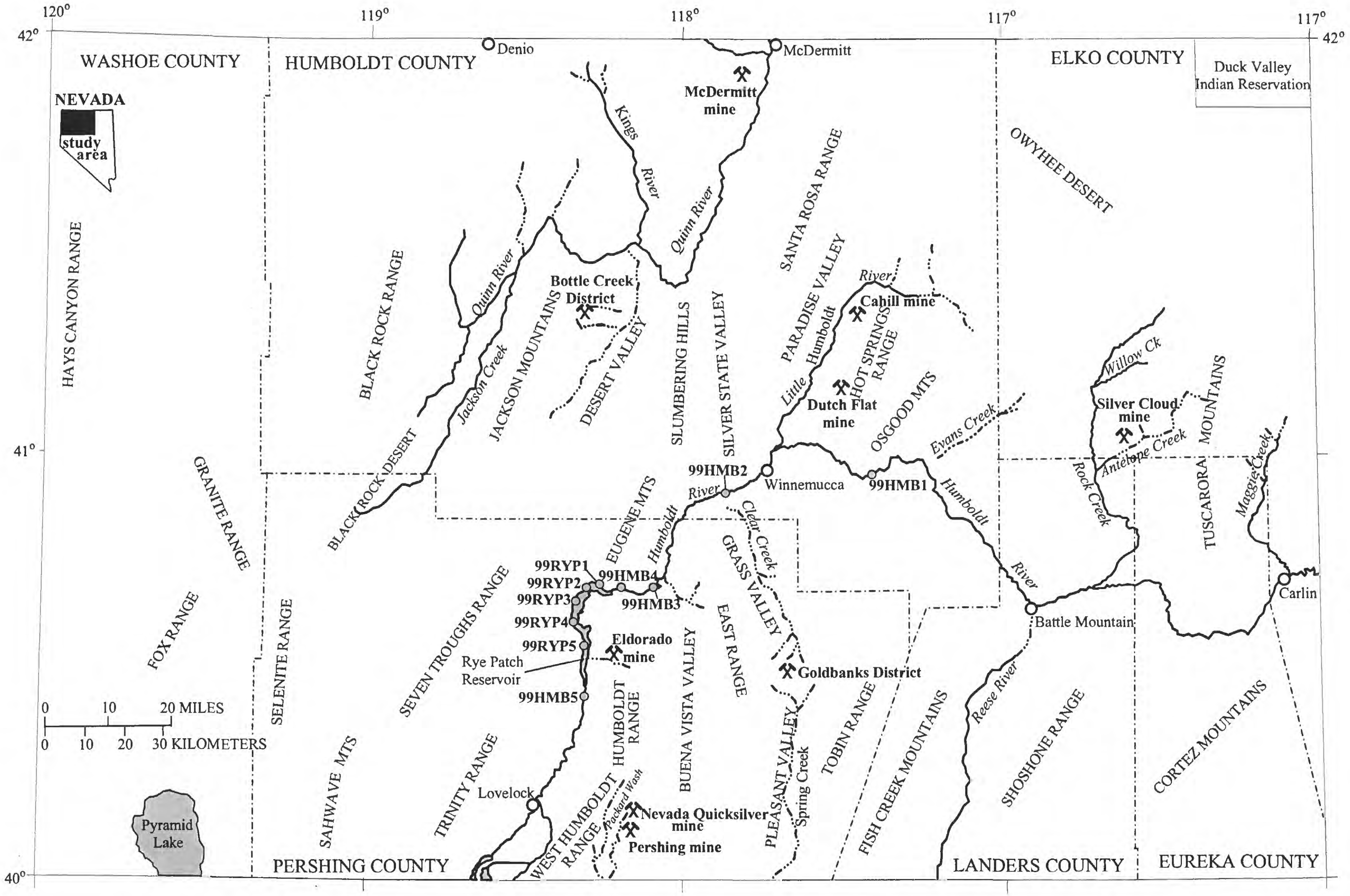

Figure 1. Location of the mercury districts studied and samples collected from the Humboldt River and Rye Patch Reservoir.

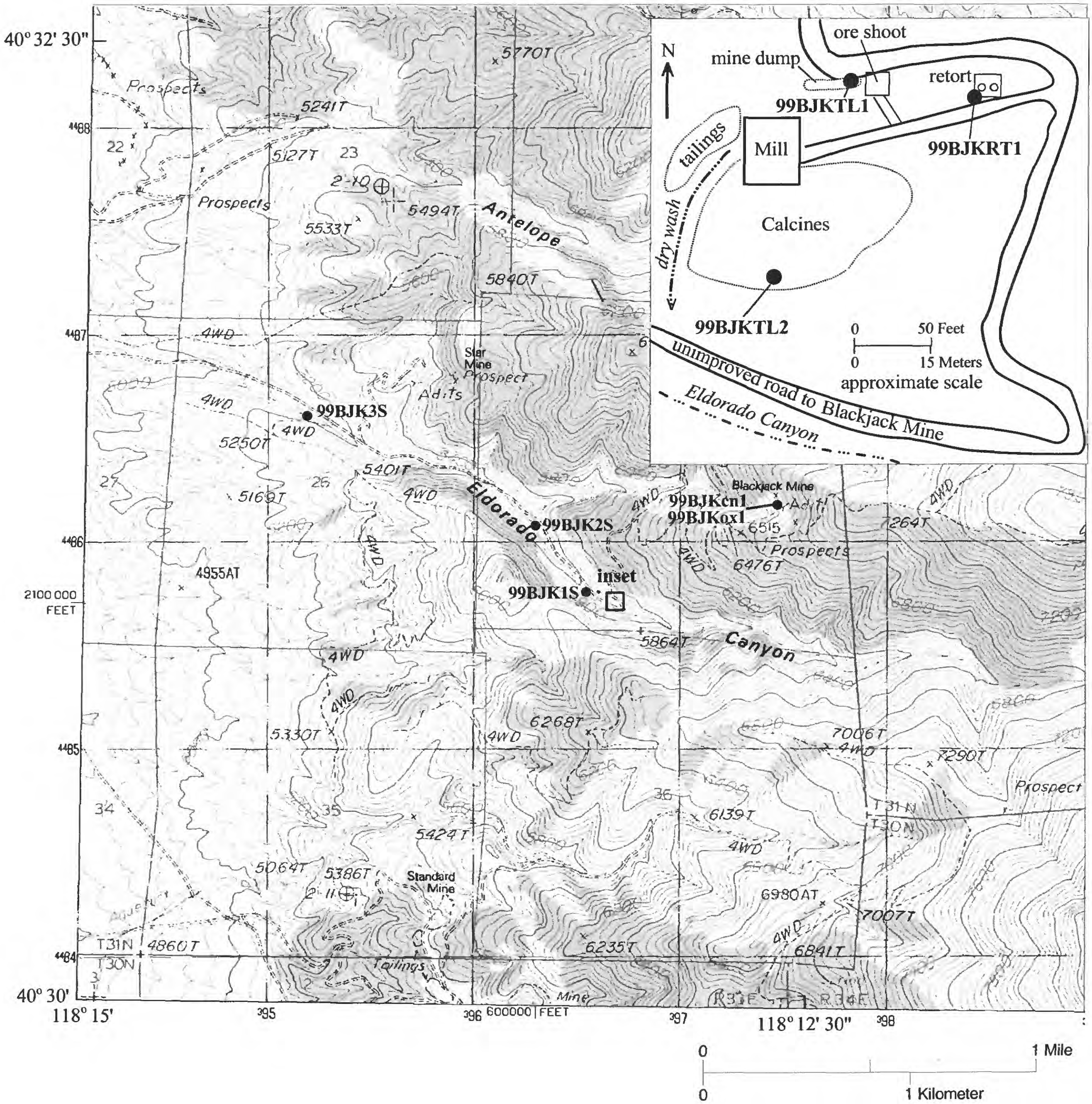

Figure 2. Location of samples collected from the Eldorado mine (also known as the Blackjack mine) in the Imlay District. Inset figure is a sketch map showing the location of samples collected around the mill and retort areas

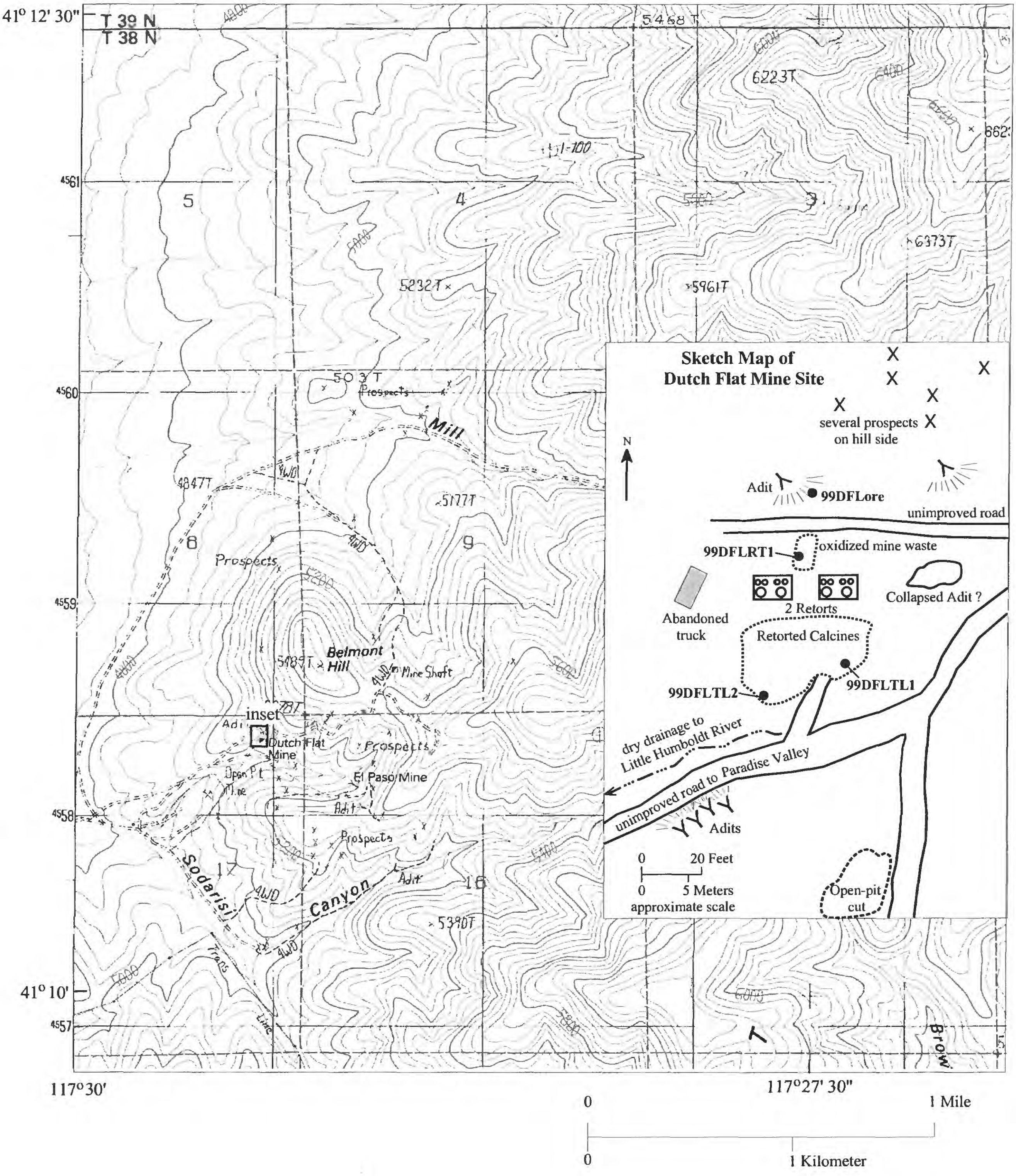

Figure 3. Location of samples collected from the Dutch Flat mine in the Dutch Flat District. Inset figure is a sketch map showing the location of samples collected around the retort site.

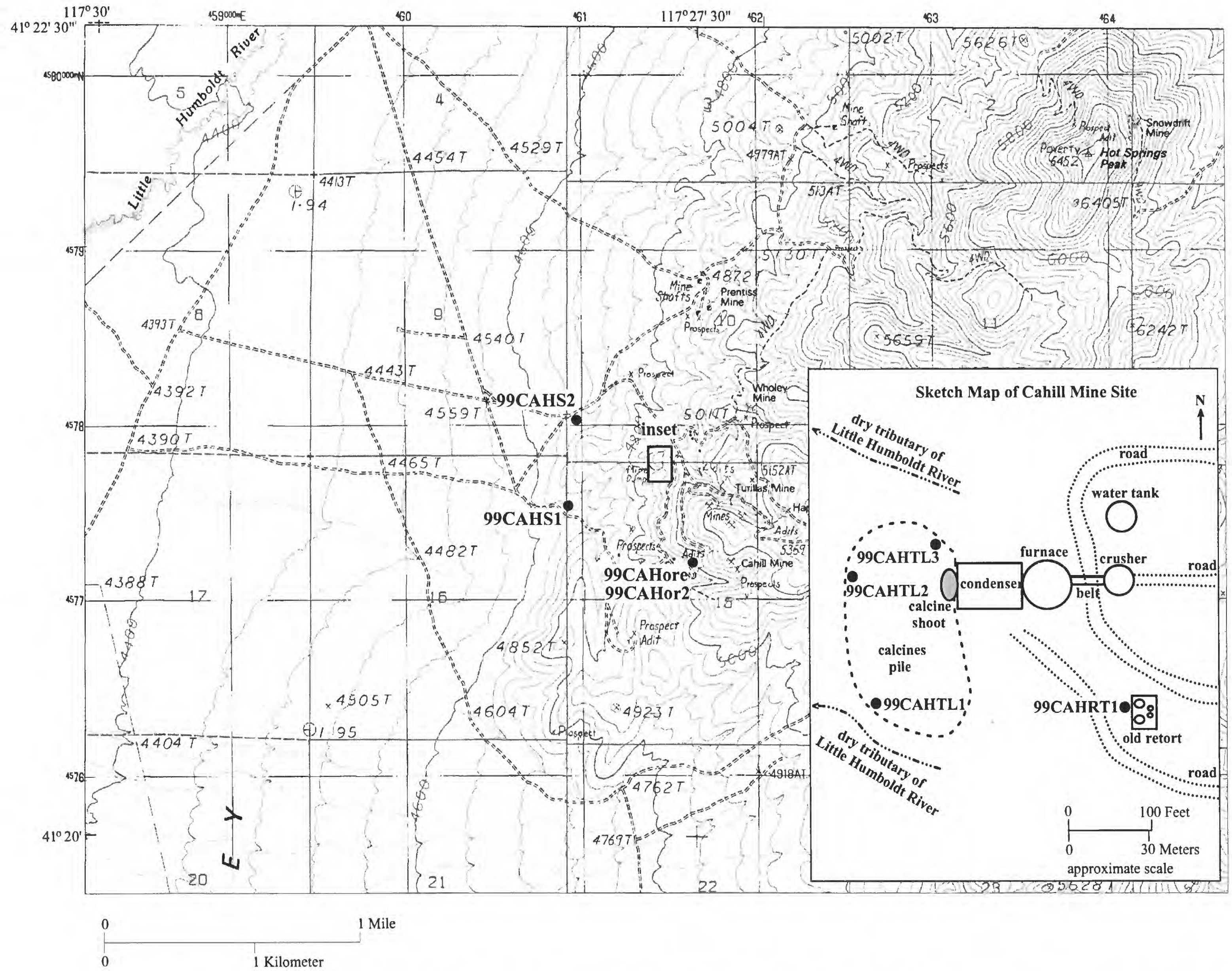

Figure 4. Location of samples collected from the Cahill mine in the Poverty Peaks District. Inset figure is a sketch map showing the location of samples collected around the retort site.

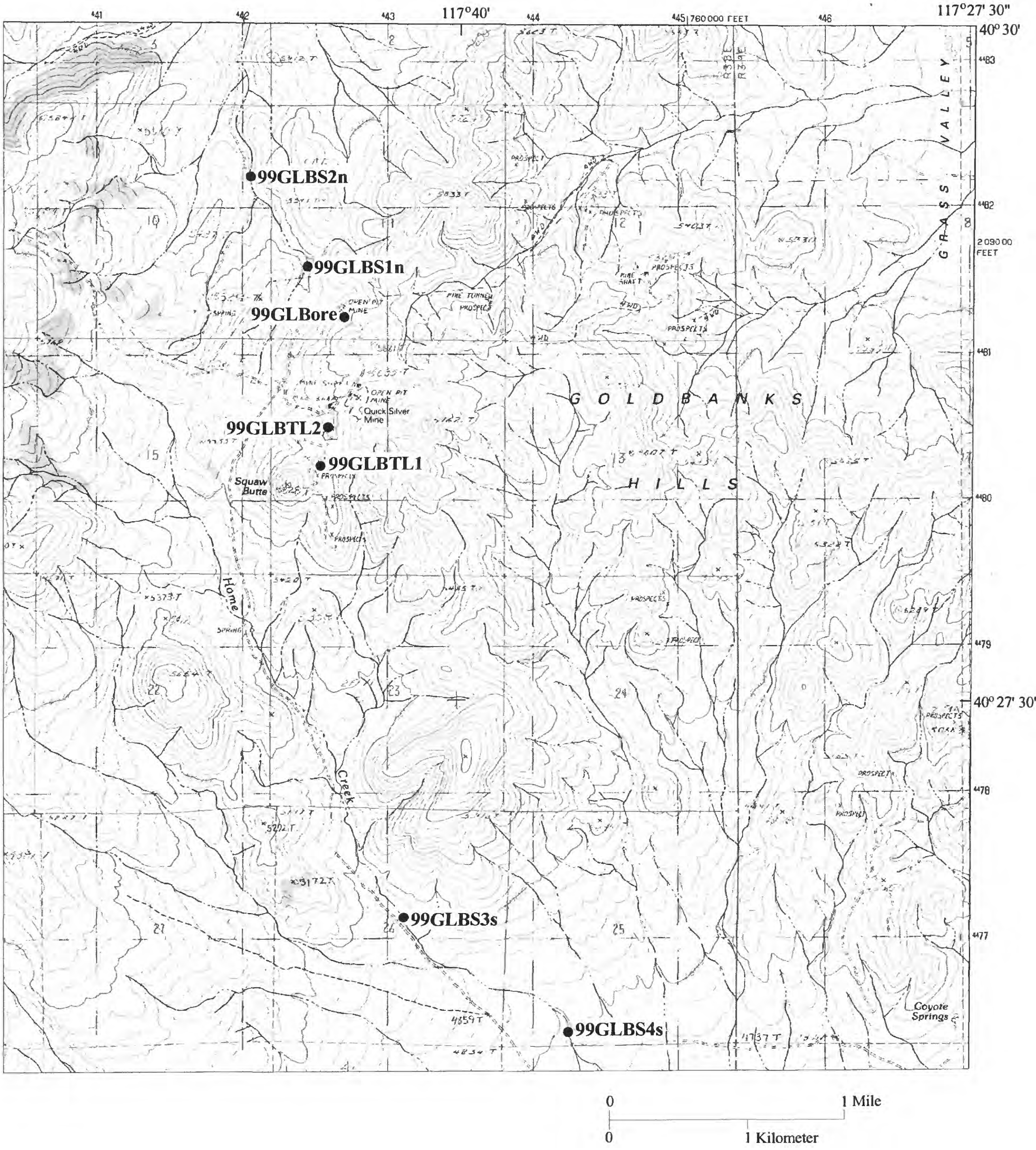

Figure 5. Location of samples collected from the Goldbanks mine in the Goldbanks District.

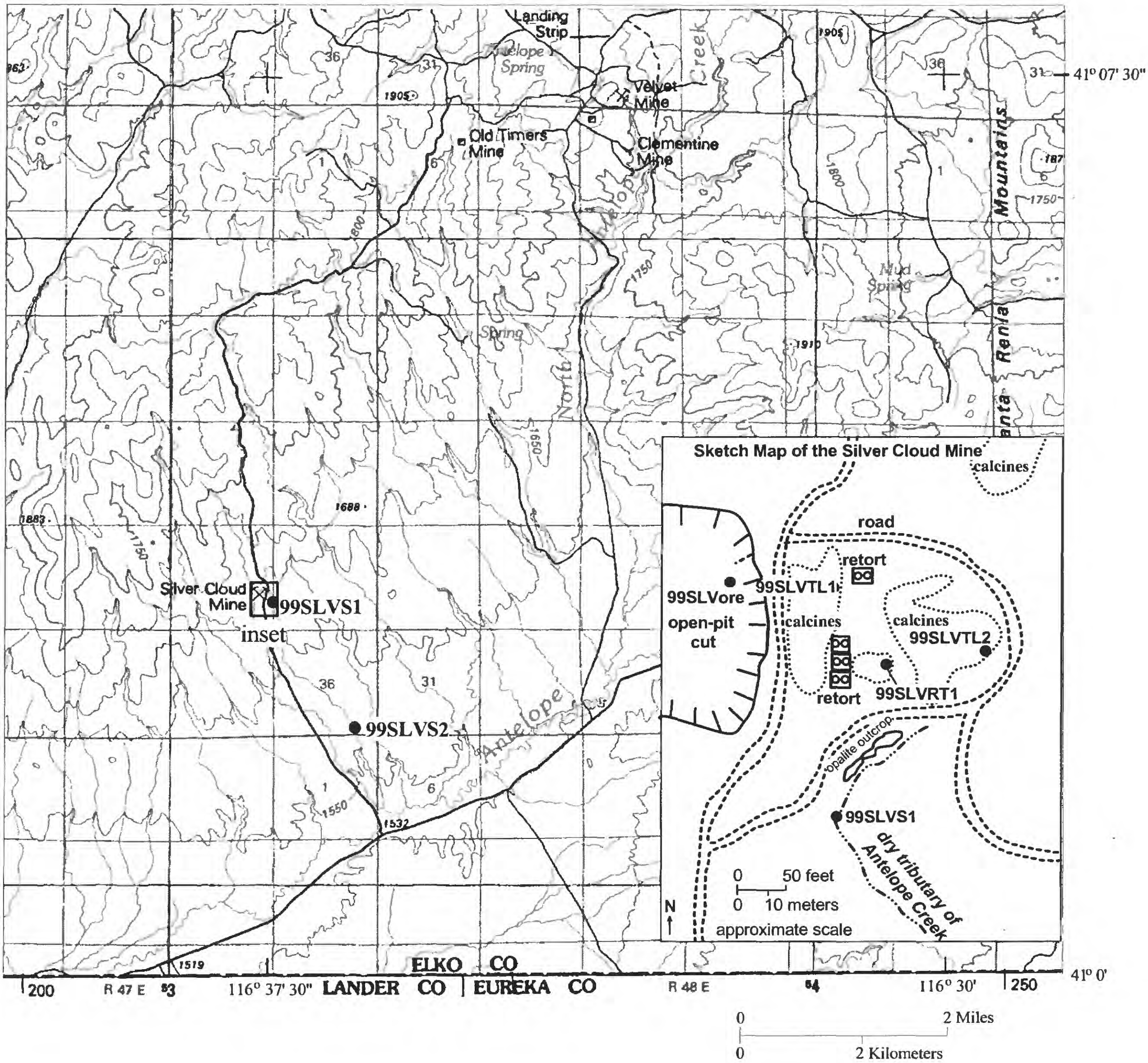

Figure 6. Location of samples collected from the Silver Cloud mine in the Ivanhoe District. Inset figure is a sketch map showing the location of samples collected around the mine site.

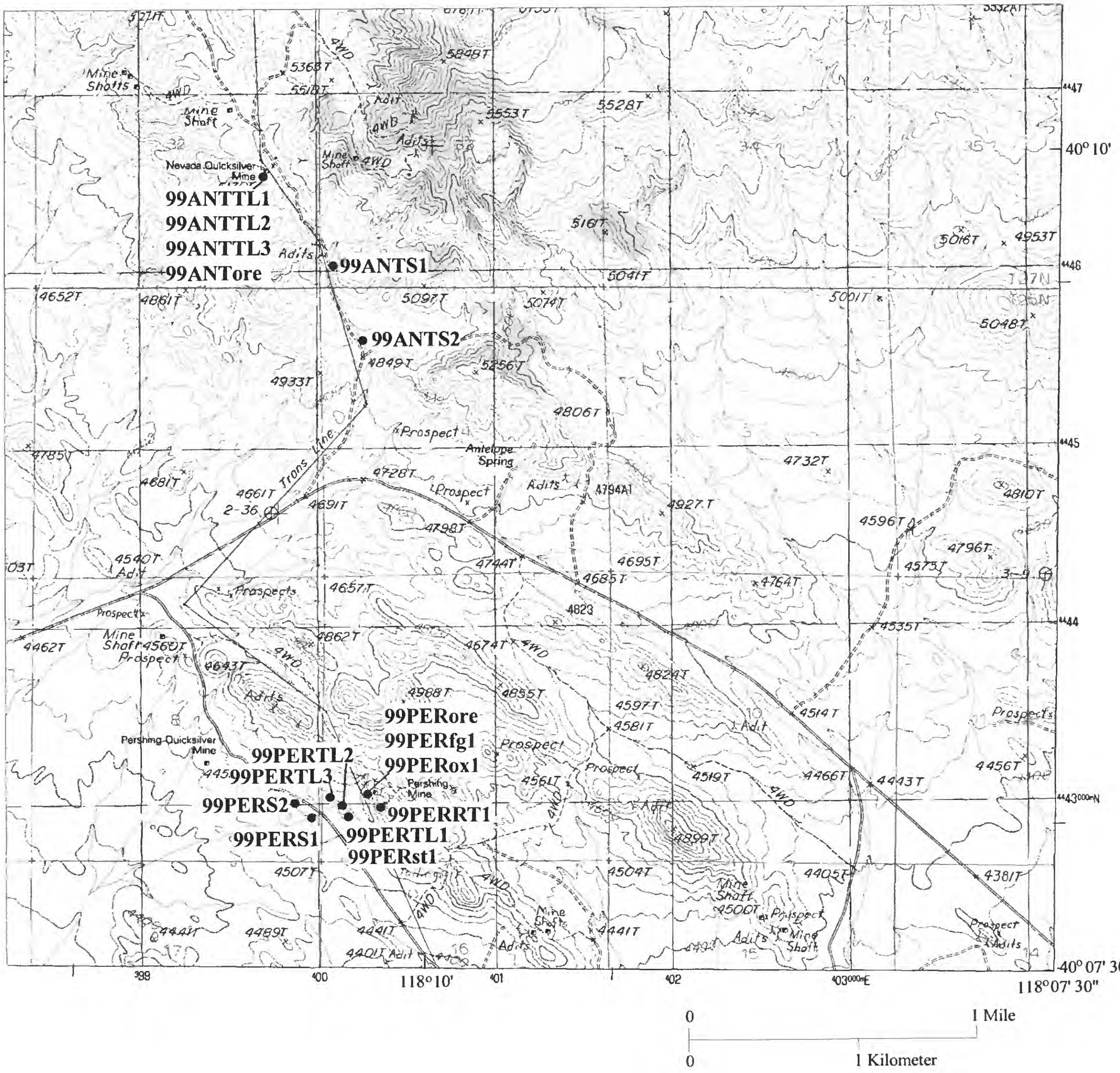

Figure 7. Location of samples collected from the Pershing mine and the Juniper (Nevada Quicksilver) mine in the Antelope Springs District.

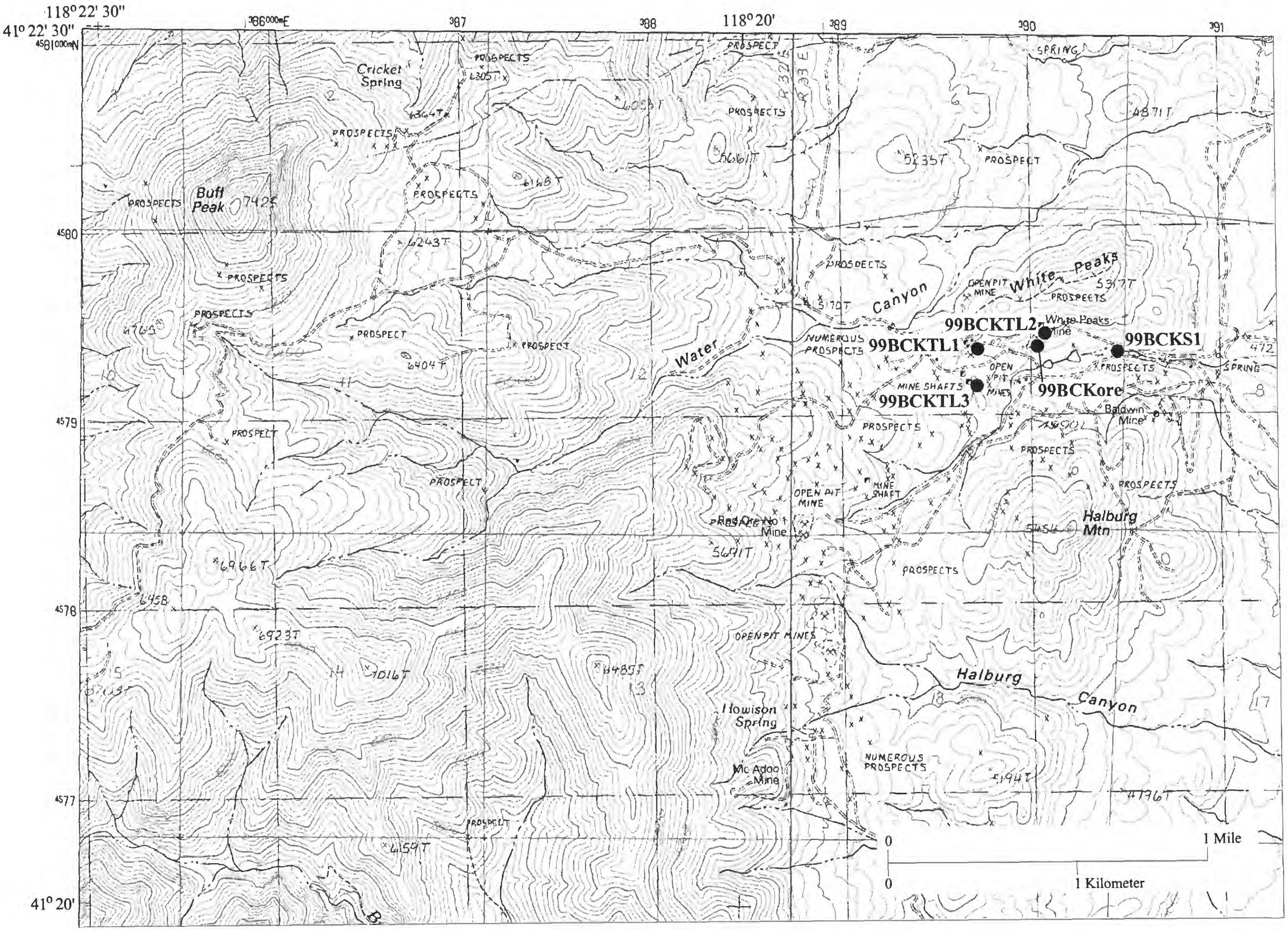

Figure 8. Location of samples collected from the White Peaks mine in the Bottle Creek District.

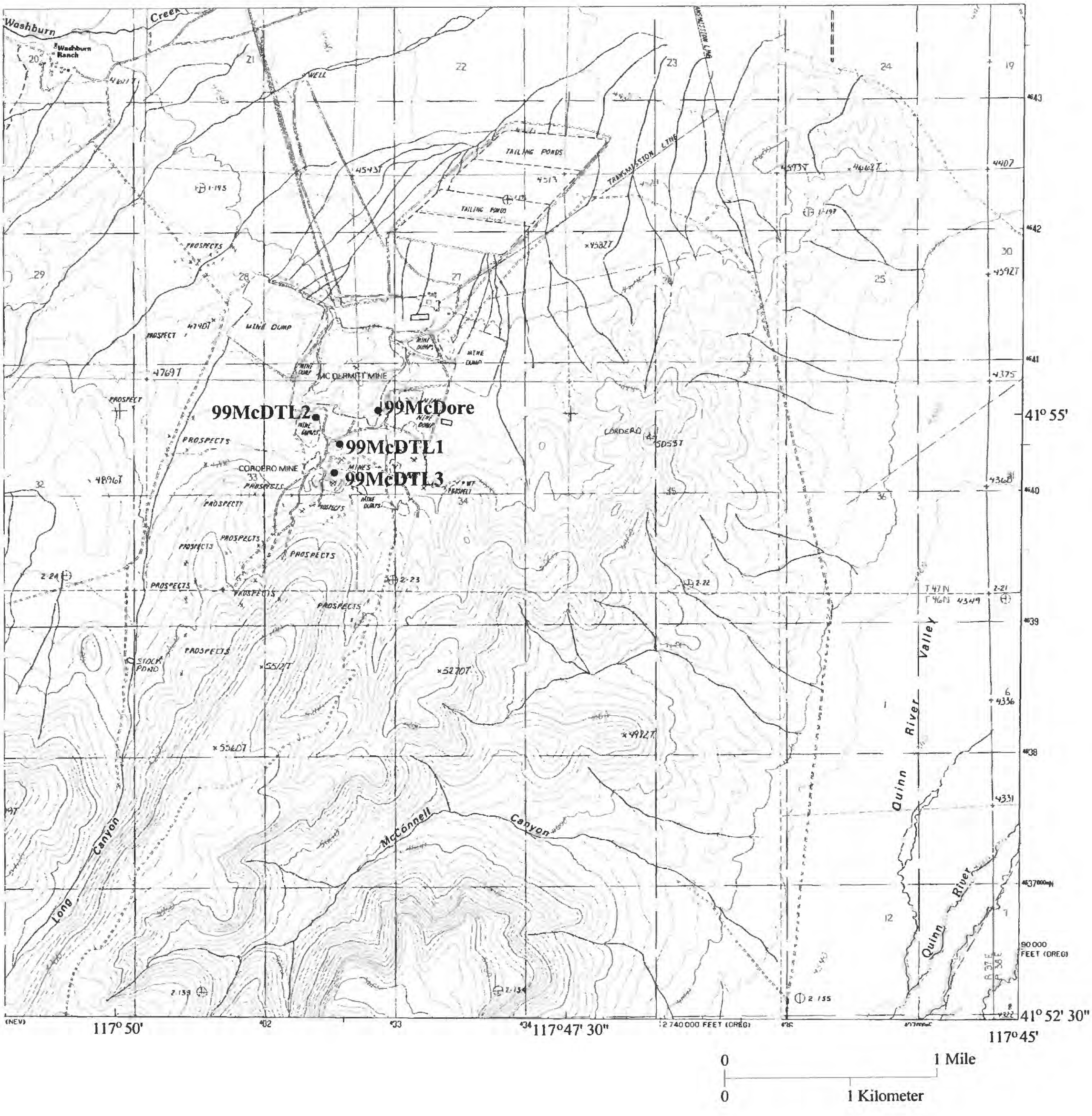

Figure 9. Location of samples collected from the McDermitt mine in the Opalite District.

Table 4. Geochemical data for sediment and rock samples collected in the Humboldt River study.

Lab No.	Field No.	Latitude deg.	min.	sec.		Longitude deg.	min.	sec.		Latitude dec. deg.	Longitude dec. deg.
C-132069	99HMB3S	40	41	45	N	118	5	21	W	40.69583	-118.08917
C-132070	99HMB5S	40	26	49	N	118	18	36	W	40.44694	-118.31000
C-132071	99RYP1S	40	41	12	N	118	15	2	W	40.68667	-118.25056
C-132072	99RYP2S	40	42	21	N	118	17	53	W	40.70583	-118.29806
C-132073	D9RYP2S	40	42	21	N	118	17	53	W	40.70583	-118.29806
C-132074	99RYP3S	40	39	0	N	118	21	3	W	40.65000	-118.35083
C-132075	99RYP4S	40	37	27	N	118	21	4	W	40.62417	-118.35111
C-132076	99RYP5S	40	34	35	N	118	19	7	W	40.57639	-118.31861
C-132077	99BJK1S	40	31	5	N	118	13	16	W	40.51806	-118.22111
C-132078	99BJK2S	40	31	15	N	118	13	27	W	40.52083	-118.22417
C-132079	99BJK3S	40	31	32	N	118	14	14	W	40.52556	-118.23722
C-132080	99PERS1	40	7	58	N	118	10	32	W	40.13278	-118.17556
C-132081	99PERS2	40	7	59	N	118	10	27	W	40.13306	-118.17417
C-132082	99ANTS1	40	9	38	N	118	10	24	W	40.16056	-118.17333
C-132083	99ANTS2	40	9	25	N	118	10	16	W	40.15694	-118.17111
C-132084	99CAHS1	41	21	0	N	117	28	7	W	41.35000	-117.46861
C-132085	99CAHS2	41	21	18	N	117	28	4	W	41.35500	-117.46778
C-132086	99BCKS1	41	21	35	N	118	18	40	W	41.35972	-118.31111
C-132087	99GLBS1n	40	29	5	N	117	40	47	W	40.48472	-117.67972
C-132088	99GLBS2n	40	29	26	N	117	41	4	W	40.49056	-117.68444
C-132089	D9GLBS2n	40	29	26	N	117	41	4	W	40.49056	-117.68444
C-132090	99GLBS3s	40	26	42	N	117	40	20	W	40.44500	-117.67222
C-132091	99GLBS4s	40	26	12	N	117	39	29	W	40.43667	-117.65806
C-132092	99SLVS1	41	3	4	N	116	37	27	W	41.05111	-116.62417
C-132093	99SLVS2	41	1	51	N	116	36	33	W	41.03083	-116.60917
C-132094	99PERore	40	8	1	N	118	10	13	W	40.13361	-118.17028
C-132095	99PERox1	40	8	1	N	118	10	13	W	40.13361	-118.17028
C-132096	99PERfg1	40	8	1	N	118	10	13	W	40.13361	-118.17028
C-132097	99PERst1	40	7	58	N	118	10	21	W	40.13278	-118.17250
C-132098	99ANTore	40	9	55	N	118	10	40	W	40.16528	-118.17778
C-132099	99BJKcn1	40	31	19	N	118	12	38	W	40.52194	-118.21056
C-132100	99BJKox1	40	31	19	N	118	12	38	W	40.52194	-118.21056
C-132101	99DFLore	41	10	38	N	117	29	22	W	41.17722	-117.48944
C-132102	99CAHore	41	20	53	N	117	27	43	W	41.34806	-117.46194
C-132103	99CAHor2	41	20	53	N	117	27	43	W	41.34806	-117.46194
C-132104	99BCKore	41	21	38	N	118	18	55	W	41.36056	-118.31528
C-132105	99GLBore	40	28	57	N	117	40	40	W	40.48250	-117.67778
C-132106	99McDore	41	54	58	N	117	48	36	W	41.91611	-117.81000
C-132107	99SLVore	41	3	12	N	116	37	30	W	41.05333	-116.62500

Table 4. Geochemical data for sediment and rock samples collected in the Humboldt River study.

Lab No.	Field No.	Au-AAS µg/g	Hg-CVAAS µg/g	Ag-ICP10 µg/g	As-ICP10 µg/g	Au-ICP10 µg/g	Bi-ICP10 µg/g	Cd-ICP10 µg/g
C-132069	99HMB3S	<0.005	0.05	<0.08	4.0	<0.1	<1	0.25
C-132070	99HMB5S	<0.005	0.5	<0.08	9.0	0.2	<1	0.28
C-132071	99RYP1S	<0.005	0.15	<0.08	10	<0.1	<1	0.21
C-132072	99RYP2S	<0.005	0.05	<0.08	4.0	0.1	<1	0.18
C-132073	D9RYP2S	<0.005	0.06	<0.08	6.0	<0.1	<1	0.22
C-132074	99RYP3S	<0.005	0.07	<0.08	11	<0.1	<1	0.23
C-132075	99RYP4S	0.006	0.09	<0.08	10	<0.1	<1	0.39
C-132076	99RYP5S	<0.005	0.09	<0.08	8.0	<0.1	<1	0.26
C-132077	99BJK1S	0.135	1.7	0.30	52	0.1	<1	3.4
C-132078	99BJK2S	0.046	1.4	0.20	47	<0.1	<1	3.0
C-132079	99BJK3S	0.024	0.87	0.30	63	<0.1	<1	4.6
C-132080	99PERS1	0.065	26	0.10	85	<0.1	<1	1.7
C-132081	99PERS2	0.030	12	<0.08	53	<0.1	<1	1.2
C-132082	99ANTS1	0.026	30	0.90	99	<0.1	<1	2.1
C-132083	99ANTS2	0.023	26	0.70	120	<0.1	<1	1.8
C-132084	99CAHS1	0.007	170	<0.08	51	<0.1	<1	0.39
C-132085	99CAHS2	0.008	2.0	<0.08	17	<0.1	<1	0.28
C-132086	99BCKS1	<0.005	1.6	<0.08	12	<0.1	<1	0.21
C-132087	99GLBS1n	0.009	2.6	<0.08	31	<0.1	<1	0.30
C-132088	99GLBS2n	<0.005	2.2	<0.08	33	<0.1	<1	0.27
C-132089	D9GLBS2n	0.008	3.6	<0.08	31	<0.1	<1	0.27
C-132090	99GLBS3s	<0.005	0.24	<0.08	17	<0.1	<1	0.21
C-132091	99GLBS4s	0.006	0.6	<0.08	14	0.1	<1	0.27
C-132092	99SLVS1	0.013	18	0.10	9.0	<0.1	<1	0.38
C-132093	99SLVS2	0.005	8.8	<0.08	5.0	<0.1	<1	0.26
C-132094	99PERore	0.076	15000	0.3	62	<0.1	<1	25
C-132095	99PERox1	0.046	330	0.2	4400	<0.1	<1	<0.05
C-132096	99PERfg1	0.766	7.2	<0.08	710	0.7	<1	0.05
C-132097	99PERst1	0.834	6.6	0.1	120	1.1	<1	4.3
C-132098	99ANTore	0.604	37	27	4500	0.8	<1	240
C-132099	99BJKcn1	0.026	89	0.3	400	<0.1	2	15
C-132100	99BJKox1	0.020	250	0.1	2200	0.2	8	2.0
C-132101	99DFLore	0.152	20	1	800	0.2	<1	0.70
C-132102	99CAHore	0.049	28000	0.3	26	<0.1	<1	0.29
C-132103	99CAHor2	0.008	380	0.1	11	<0.1	<1	<0.05
C-132104	99BCKore	0.015	780	<0.08	18	<0.1	<1	0.15
C-132105	99GLBore	0.012	740	0.1	7.0	<0.1	<1	<0.05
C-132106	99McDore	0.012	69000	<0.08	83	<0.1	<1	0.22
C-132107	99SLVore	0.016	82	<0.08	6.0	<0.1	<1	<0.05

Table 4. Geochemical data for sediment and rock samples collected in the Humboldt River study.

Lab No.	Field No.	Cu-ICP10 µg/g	Mo-ICP10 µg/g	Pb-ICP10 µg/g	Sb-ICP10 µg/g	Zn-ICP10 µg/g	Al-ICP40 %	Ca-ICP40 %
C-132069	99HMB3S	10	0.2	8.0	<1	45	6.8	2.6
C-132070	99HMB5S	9.2	0.7	13	3	100	5.8	3.5
C-132071	99RYP1S	22	1.3	7.0	<1	37	6.9	4.0
C-132072	99RYP2S	11	0.6	7.0	<1	58	6.7	2.5
C-132073	D9RYP2S	13	0.5	8.0	<1	60	6.7	2.9
C-132074	99RYP3S	18	0.4	8.0	3	59	6.8	4.7
C-132075	99RYP4S	30	0.9	14	3	92	6.3	4.5
C-132076	99RYP5S	15	1.0	14	1	140	6.2	3.1
C-132077	99BJK1S	16	8.5	32	11	140	4.3	13
C-132078	99BJK2S	15	8.8	35	10	140	4.0	13
C-132079	99BJK3S	23	11	33	17	180	4.7	13
C-132080	99PERS1	21	1.1	100	120	210	6.6	5.5
C-132081	99PERS2	24	1.1	72	67	160	6.5	4.3
C-132082	99ANTS1	39	1.8	1600	190	210	6.2	6.9
C-132083	99ANTS2	42	1.5	920	220	200	6.4	8.2
C-132084	99CAHS1	37	1.3	18	76	73	42	15
C-132085	99CAHS2	26	0.8	14	17	73	6.6	1.9
C-132086	99BCKS1	31	0.6	9.0	4	52	7.9	2.1
C-132087	99GLBS1n	27	1.1	15	4	88	7.7	2.2
C-132088	99GLBS2n	24	1.1	15	4	84	7.3	2.9
C-132089	D9GLBS2n	25	1.1	14	4	86	7.9	3.1
C-132090	99GLBS3s	25	1.0	9.0	2	99	8.2	5.3
C-132091	99GLBS4s	27	0.9	10	2	90	8.2	4.2
C-132092	99SLVS1	17	0.8	13	<1	53	7.0	1.5
C-132093	99SLVS2	13	1.2	12	<1	84	7.5	1.8
C-132094	99PERore	28	0.4	230	450	430	0.2	20
C-132095	99PERox1	2.9	16	13	630	180	4.0	0.3
C-132096	99PERfg1	21	0.7	15	22	57	9.5	2.9
C-132097	99PERst1	15	0.8	110	150	>500	0.5	19
C-132098	99ANTore	<0.05	4.3	<1.0	>6000	<0.05	1.6	9.0
C-132099	99BJKcn1	47	39	120	63	>500	2.7	13
C-132100	99BJKox1	150	140	35	65	340	1.3	1.4
C-132101	99DFLore	27	2.9	30	8	73	6.6	0.1
C-132102	99CAHore	7.2	0.6	16	14	38	0.8	11
C-132103	99CAHor2	1.5	0.3	10	4	7.0	0.1	0.07
C-132104	99BCKore	100	0.7	8.0	2	100	7.2	4.7
C-132105	99GLBore	3.6	0.2	6.0	<1	2.3	0.2	0.07
C-132106	99McDore	3.2	2.0	6.0	490	3.2	0.2	0.03
C-132107	99SLVore	1.4	0.4	4.0	1	3.3	0.5	0.1

Table 4. Geochemical data for sediment and rock samples collected in the Humboldt River study.

Lab No.	Field No.	Fe-ICP40 %	K-ICP40 %	Mg-ICP40 %	Na-ICP40 %	P-ICP40 %	Ti-ICP40 %	Ag-ICP40 µg/g
C-132069	99HMB3S	1.8	2.5	0.8	1.6	0.07	0.33	<2
C-132070	99HMB5S	11	1.7	1.0	1.5	0.11	1.2	<2
C-132071	99RYP1S	1.7	2.4	0.8	1.9	0.11	0.26	<2
C-132072	99RYP2S	3.1	2.4	0.8	1.7	0.10	0.74	<2
C-132073	D9RYP2S	2.8	2.4	1.0	1.6	0.08	0.59	<2
C-132074	99RYP3S	2.5	2.1	1.5	1.4	0.07	0.32	<2
C-132075	99RYP4S	3.4	1.8	1.2	1.2	0.06	0.34	<2
C-132076	99RYP5S	12	1.6	1.3	1.5	0.06	1.19	<2
C-132077	99BJK1S	2.1	1.3	0.8	0.8	0.17	0.26	<2
C-132078	99BJK2S	2.0	1.3	0.8	0.7	0.17	0.24	<2
C-132079	99BJK3S	2.3	1.5	0.8	0.8	0.22	0.26	<2
C-132080	99PERS1	2.8	2.0	2.0	1.0	0.07	0.34	<2
C-132081	99PERS2	2.9	1.7	1.9	0.7	0.07	0.32	<2
C-132082	99ANTS1	3.3	1.8	1.4	0.5	0.07	0.27	<2
C-132083	99ANTS2	3.8	1.9	1.6	0.6	0.07	0.29	<2
C-132084	99CAHS1	20	14	8.3	7.9	0.44	2.9	<2
C-132085	99CAHS2	2.5	2.1	1.0	1.4	0.06	0.39	<2
C-132086	99BCKS1	2.8	2.3	0.7	1.9	0.06	0.46	<2
C-132087	99GLBS1n	3.5	2.1	1.2	1.5	0.08	0.53	<2
C-132088	99GLBS2n	4.0	2.0	1.3	1.6	0.08	0.73	<2
C-132089	D9GLBS2n	4.4	2.1	1.5	1.7	0.10	0.81	<2
C-132090	99GLBS3s	7.0	1.4	2.3	1.8	0.15	1.7	<2
C-132091	99GLBS4s	5.0	2.0	1.9	2.2	0.13	0.87	<2
C-132092	99SLVS1	2.4	2.1	0.7	1.5	0.07	0.44	<2
C-132093	99SLVS2	3.7	2.7	0.8	1.6	0.06	0.77	<2
C-132094	99PERore	0.4	0.2	12	0.05	0.04	0.006	<2
C-132095	99PERox1	8.6	0.4	0.3	0.26	0.13	0.10	<2
C-132096	99PERfg1	3.7	3.2	1.4	0.21	0.08	0.41	<2
C-132097	99PERst1	0.7	0.2	12	0.13	0.03	0.03	<2
C-132098	99ANTore	12	0.3	0.6	0.05	0.04	0.04	28
C-132099	99BJKcn1	2.5	1.1	0.3	0.06	0.08	0.09	<2
C-132100	99BJKox1	20	1.4	0.1	0.11	0.82	0.04	<2
C-132101	99DFLore	4.7	2.9	0.2	0.10	0.03	0.26	<2
C-132102	99CAHore	0.5	0.38	6.3	0.009	0.02	0.02	<2
C-132103	99CAHor2	0.06	0.03	0.01	<0.005	<0.005	0.29	<2
C-132104	99BCKore	7.3	1.5	2.1	2.3	0.12	1.1	<2
C-132105	99GLBore	0.03	0.04	0.02	0.01	0.005	0.54	<2
C-132106	99McDore	0.5	0.04	0.01	0.02	0.005	0.25	<2
C-132107	99SLVore	0.09	0.1	0.04	0.08	0.005	0.17	<2

Table 4. Geochemical data for sediment and rock samples collected in the Humboldt River study.

Lab No.	Field No.	As-ICP40 µg/g	Au-ICP40 µg/g	Ba-ICP40 µg/g	Be-ICP40 µg/g	Bi-ICP40 µg/g	Cd-ICP40 µg/g	Ce-ICP40 µg/g
C-132069	99HMB3S	15	<8	1100	2	<50	<2	70
C-132070	99HMB5S	16	<8	740	<1	<50	<2	210
C-132071	99RYP1S	18	<8	1300	2	<50	<2	87
C-132072	99RYP2S	14	<8	1000	2	<50	<2	160
C-132073	D9RYP2S	16	<8	1000	3	<50	<2	130
C-132074	99RYP3S	21	<8	870	2	<50	<2	73
C-132075	99RYP4S	21	<8	600	2	<50	<2	60
C-132076	99RYP5S	21	<8	640	1	<50	<2	250
C-132077	99BJK1S	70	<8	440	<1	<50	3	52
C-132078	99BJK2S	70	<8	400	<1	<50	3	33
C-132079	99BJK3S	71	<8	450	<1	<50	4	45
C-132080	99PERS1	85	<8	1700	2	<50	<2	58
C-132081	99PERS2	58	<8	1300	2	<50	<2	60
C-132082	99ANTS1	79	<8	910	2	<50	<2	51
C-132083	99ANTS2	110	<8	1600	2	<50	2	55
C-132084	99CAHS1	280	<8	6800	10	<50	<2	500
C-132085	99CAHS2	22	<8	990	2	<50	<2	80
C-132086	99BCKS1	25	<8	950	2	<50	<2	59
C-132087	99GLBS1n	36	<8	1000	3	<50	<2	59
C-132088	99GLBS2n	43	<8	960	2	<50	<2	75
C-132089	D9GLBS2n	42	<8	1000	2	<50	<2	89
C-132090	99GLBS3s	41	<8	790	<1	<50	2	72
C-132091	99GLBS4s	32	<8	2000	2	<50	<2	340
C-132092	99SLVS1	15	<8	980	2	<50	<2	82
C-132093	99SLVS2	18	<8	1000	3	<50	<2	130
C-132094	99PERore	59	<8	110	<1	<50	29	<5
C-132095	99PERox1	4100	<8	71	<1	<50	6	31
C-132096	99PERfg1	690	<8	560	3	<50	<2	91
C-132097	99PERst1	110	<8	250	<1	<50	4	<5
C-132098	99ANTore	4200	<8	190	1	<50	250	27
C-132099	99BJKcn1	270	<8	270	<1	<50	15	14
C-132100	99BJKox1	1800	<8	270	<1	<50	7	28
C-132101	99DFLore	660	<8	740	2	<50	<2	110
C-132102	99CAHore	31	<8	120	<1	<50	<2	6
C-132103	99CAHor2	<10	<8	570	<1	<50	<2	<5
C-132104	99BCKore	28	<8	650	<1	<50	<2	53
C-132105	99GLBore	<10	<8	380	<1	<50	<2	11
C-132106	99McDore	160	<8	100	2	<50	<2	16
C-132107	99SLVore	<10	<8	550	<1	<50	<2	38

Table 4. Geochemical data for sediment and rock samples collected in the Humboldt River study.

Lab No.	Field No.	Co-ICP40 µg/g	Cr-ICP40 µg/g	Cu-ICP40 µg/g	Eu-ICP40 µg/g	Ga-ICP40 µg/g	Ho-ICP40 µg/g	La-ICP40 µg/g
C-132069	99HMB3S	5	25	11	<2	19	<4	40
C-132070	99HMB5S	20	52	10	2	18	4	110
C-132071	99RYP1S	6	51	25	<2	27	5	41
C-132072	99RYP2S	9	45	12	<2	20	<4	80
C-132073	D9RYP2S	9	48	13	<2	21	6	67
C-132074	99RYP3S	10	51	20	<2	27	<4	37
C-132075	99RYP4S	15	53	27	<2	22	<4	32
C-132076	99RYP5S	25	86	15	<2	15	<4	110
C-132077	99BJK1S	8	48	23	<2	21	<4	28
C-132078	99BJK2S	7	59	22	<2	18	5	25
C-132079	99BJK3S	10	62	23	<2	24	5	28
C-132080	99PERS1	13	59	23	<2	42	<4	26
C-132081	99PERS2	12	56	22	<2	24	<4	27
C-132082	99ANTS1	17	50	31	<2	23	<4	24
C-132083	99ANTS2	24	59	38	<2	19	<4	26
C-132084	99CAHS1	93	480	260	5	170	8	220
C-132085	99CAHS2	12	59	25	<2	22	<4	35
C-132086	99BCKS1	13	54	32	<2	27	<4	29
C-132087	99GLBS1n	13	58	26	<2	28	5	31
C-132088	99GLBS2n	17	37	30	<2	25	<4	30
C-132089	D9GLBS2n	18	43	29	<2	38	8	35
C-132090	99GLBS3s	30	78	28	<2	29	5	24
C-132091	99GLBS4s	23	84	31	<2	22	<4	60
C-132092	99SLVS1	9	48	19	<2	21	6	38
C-132093	99SLVS2	12	44	19	<2	26	<4	61
C-132094	99PERore	4	26	33	<2	27	<4	<2
C-132095	99PERox1	9	40	<2	<2	<4	5	12
C-132096	99PERfg1	18	41	24	<2	24	<4	43
C-132097	99PERst1	5	9	21	<2	33	<4	<2
C-132098	99ANTore	13	36	880	<2	<4	<4	7
C-132099	99BJKcn1	4	64	45	<2	11	<4	16
C-132100	99BJKox1	7	69	130	<2	<4	<4	26
C-132101	99DFLore	6	30	23	<2	18	<4	58
C-132102	99CAHore	2	32	11	<2	30	<4	4
C-132103	99CAHor2	<2	<2	<2	<2	<4	<4	<2
C-132104	99BCKore	36	36	110	2	24	<4	17
C-132105	99GLBore	<2	13	8	<2	<4	<4	<2
C-132106	99McDore	<2	<2	2	<2	6	<4	<2
C-132107	99SLVore	<2	6	2	<2	4	<4	7

Table 4. Geochemical data for sediment and rock samples collected in the Humboldt River study.

Lab No.	Field No.	Li-ICP40 µg/g	Mn-ICP40 µg/g	Mo-ICP40 µg/g	Nb-ICP40 µg/g	Nd-ICP40 µg/g	Ni-ICP40 µg/g	Pb-ICP40 µg/g
C-132069	99HMB3S	33	370	3	7	28	14	12
C-132070	99HMB5S	22	920	7	20	80	17	27
C-132071	99RYP1S	35	370	4	9	33	15	11
C-132072	99RYP2S	33	480	3	25	52	16	15
C-132073	D9RYP2S	41	550	3	14	41	17	11
C-132074	99RYP3S	66	470	4	<4	29	22	6
C-132075	99RYP4S	61	480	3	7	23	31	9
C-132076	99RYP5S	34	1300	9	17	91	22	20
C-132077	99BJK1S	24	300	10	<4	22	34	60
C-132078	99BJK2S	24	290	9	<4	18	34	39
C-132079	99BJK3S	28	350	11	<4	16	42	19
C-132080	99PERS1	75	530	4	<4	20	24	110
C-132081	99PERS2	59	550	4	8	19	25	61
C-132082	99ANTS1	76	590	4	9	<9	33	1300
C-132083	99ANTS2	75	760	4	<4	18	39	1100
C-132084	99CAHS1	210	5000	46	23	320	250	58
C-132085	99CAHS2	37	610	3	9	25	24	7
C-132086	99BCKS1	30	660	4	7	21	21	7
C-132087	99GLBS1n	49	710	5	11	24	26	10
C-132088	99GLBS2n	42	860	4	8	21	26	10
C-132089	D9GLBS2n	46	910	5	12	35	29	15
C-132090	99GLBS3s	32	1200	4	17	24	41	9
C-132091	99GLBS4s	52	1000	4	4	43	32	5
C-132092	99SLVS1	33	620	4	18	26	15	17
C-132093	99SLVS2	41	770	5	31	43	15	20
C-132094	99PERore	8	560	<2	<4	<9	<3	230
C-132095	99PERox1	53	15	16	9	<9	24	7
C-132096	99PERfg1	220	350	4	13	32	50	16
C-132097	99PERst1	140	740	3	<4	<9	<3	110
C-132098	99ANTore	270	2300	16	7	<9	16	68000
C-132099	99BJKcn1	29	82	30	<4	11	82	24
C-132100	99BJKox1	22	12	110	14	<9	56	5
C-132101	99DFLore	39	180	5	14	39	13	9
C-132102	99CAHore	16	430	<2	<4	<9	8	<4
C-132103	99CAHor2	3	21	<2	<4	<9	<3	7
C-132104	99BCKore	15	1200	6	6	24	23	<4
C-132105	99GLBore	4	13	<2	7	<9	<3	14
C-132106	99McDore	61	28	4	8	<9	<3	5
C-132107	99SLVore	2	29	3	32	<9	<3	12

Table 4. Geochemical data for sediment and rock samples collected in the Humboldt River study.

Lab No.	Field No.	Sc-ICP40 µg/g	Sn-ICP40 µg/g	Sr-ICP40 µg/g	Ta-ICP40 µg/g	Th-ICP40 µg/g	U-ICP40 µg/g	V-ICP40 µg/g
C-132069	99HMB3S	8	<50	320	<40	10	<100	72
C-132070	99HMB5S	13	<50	290	<40	120	<100	390
C-132071	99RYP1S	8	<50	450	<40	11	<100	70
C-132072	99RYP2S	9	<50	310	<40	26	<100	120
C-132073	D9RYP2S	10	<50	310	<40	16	<100	110
C-132074	99RYP3S	10	<50	390	<40	<6	<100	89
C-132075	99RYP4S	11	<50	300	<40	<6	<100	110
C-132076	99RYP5S	18	<50	290	<40	65	<100	350
C-132077	99BJK1S	7	<50	270	<40	<6	<100	230
C-132078	99BJK2S	7	<50	250	<40	<6	<100	230
C-132079	99BJK3S	8	<50	280	<40	<6	<100	280
C-132080	99PERS1	11	<50	490	<40	<6	<100	93
C-132081	99PERS2	11	<50	380	<40	<6	<100	82
C-132082	99ANTS1	11	<50	400	<40	<6	<100	100
C-132083	99ANTS2	12	<50	430	<40	<6	<100	100
C-132084	99CAHS1	75	<50	1400	<40	78	<100	730
C-132085	99CAHS2	10	<50	240	<40	9	<100	89
C-132086	99BCKS1	11	<50	330	<40	<6	<100	100
C-132087	99GLBS1n	13	<50	340	<40	<6	<100	120
C-132088	99GLBS2n	14	<50	350	<40	7	<100	170
C-132089	D9GLBS2n	15	<50	380	<40	7	<100	190
C-132090	99GLBS3s	26	<50	440	<40	<6	<100	390
C-132091	99GLBS4s	19	<50	420	<40	21	<100	210
C-132092	99SLVS1	8	<50	280	<40	9	<100	70
C-132093	99SLVS2	11	<50	260	<40	21	<100	110
C-132094	99PERore	<2	<50	130	<40	<6	<100	20
C-132095	99PERox1	<2	<50	2100	<40	<6	<100	31
C-132096	99PERfg1	15	<50	940	<40	8	<100	110
C-132097	99PERst1	<2	<50	400	<40	<6	<100	25
C-132098	99ANTore	<2	<50	900	<40	<6	<100	140
C-132099	99BJKcn1	5	<50	120	<40	<6	<100	880
C-132100	99BJKox1	<2	<50	350	<40	<6	<100	2300
C-132101	99DFLore	10	<50	90	<40	21	<100	79
C-132102	99CAHore	<2	<50	86	<40	<6	<100	19
C-132103	99CAHor2	<2	<50	15	<40	<6	<100	7
C-132104	99BCKore	35	<50	390	<40	<6	<100	360
C-132105	99GLBore	3	<50	20	<40	<6	<100	10
C-132106	99McDore	<2	<50	15	<40	<6	<100	9
C-132107	99SLVore	2	<50	58	<40	<6	<100	13

Table 4. Geochemical data for sediment and rock samples collected in the Humboldt River study.

Lab No.	Field No.	Y-ICP40 µg/g	Yb-ICP40 µg/g	Zn-ICP40 µg/g	Sample Description
C-132069	99HMB3S	19	2	60	Minus-80-mesh stream sediment
C-132070	99HMB5S	31	4	140	Minus-80-mesh stream sediment
C-132071	99RYP1S	18	2	60	Minus-80-mesh stream sediment
C-132072	99RYP2S	22	3	80	Minus-80-mesh stream sediment
C-132073	D9RYP2S	22	3	70	Minus-80-mesh stream sediment
C-132074	99RYP3S	16	2	70	Minus-80-mesh stream sediment
C-132075	99RYP4S	14	2	100	Minus-80-mesh stream sediment
C-132076	99RYP5S	45	5	180	Minus-80-mesh stream sediment
C-132077	99BJK1S	16	2	160	Minus-80-mesh stream sediment
C-132078	99BJK2S	15	2	160	Minus-80-mesh stream sediment
C-132079	99BJK3S	17	2	190	Minus-80-mesh stream sediment
C-132080	99PERS1	14	2	240	Minus-80-mesh stream sediment
C-132081	99PERS2	14	2	180	Minus-80-mesh stream sediment
C-132082	99ANTS1	13	2	250	Minus-80-mesh stream sediment
C-132083	99ANTS2	14	2	220	Minus-80-mesh stream sediment
C-132084	99CAHS1	120	11	500	Minus-80-mesh stream sediment
C-132085	99CAHS2	18	2	70	Minus-80-mesh stream sediment
C-132086	99BCKS1	18	2	67	Minus-80-mesh stream sediment
C-132087	99GLBS1n	17	2	97	Minus-80-mesh stream sediment
C-132088	99GLBS2n	18	3	99	Minus-80-mesh stream sediment
C-132089	D9GLBS2n	20	3	110	Minus-80-mesh stream sediment
C-132090	99GLBS3s	23	3	130	Minus-80-mesh stream sediment
C-132091	99GLBS4s	22	3	110	Minus-80-mesh stream sediment
C-132092	99SLVS1	21	3	76	Minus-80-mesh stream sediment
C-132093	99SLVS2	31	4	120	Minus-80-mesh stream sediment
C-132094	99PERore	2	<1	480	Ore with cinnabar
C-132095	99PERox1	9	<1	250	Oxidized rock with minor cinnabar
C-132096	99PERfg1	11	2	85	Oxidized rock
C-132097	99PERst1	3	<1	570	Salt precipitate on tailings
C-132098	99ANTore	6	<1	71000	Ore with cinnabar
C-132099	99BJKcn1	15	2	600	Ore with cinnabar
C-132100	99BJKox1	5	1	350	Oxidized rock with sphalerite (?)
C-132101	99DFLore	8	1	67	Ore with cinnabar
C-132102	99CAHore	10	<1	16	Ore with cinnabar
C-132103	99CAHor2	<2	<1	<2	Ore with cinnabar
C-132104	99BCKore	29	4	120	Ore with cinnabar
C-132105	99GLBore	3	<1	8	Ore with cinnabar
C-132106	99McDore	6	<1	4	Ore with cinnabar
C-132107	99SLVore	5	<1	2	Ore with cinnabar

Table 5. Geochemical data for calcines samples collected in the Humboldt River study.

Lab No.	Field No.	Latitude				Longitude				Latitude	Longitude
		deg.	min.	sec.		deg.	min.	sec.		dec. deg.	dec. deg.
C-133254	99PERTL1	40	7	59	N	118	10	19	W	40.36750	-118.17194
C-133255	99PERTL2	40	8	1	N	118	10	20	W	40.36694	-118.17222
C-133256	99PERTL3	40	8	3	N	118	10	22	W	40.36639	-118.17278
C-133257	99PERRT1	40	8	1	N	118	10	13	W	40.13361	-118.17028
C-133258	99ANTTL1	40	9	55	N	118	10	40	W	40.16528	-118.17778
C-133259	99ANTTL2	40	9	55	N	118	10	40	W	40.16528	-118.17778
C-133260	99ANTTL3	40	9	55	N	118	10	40	W	40.16528	-118.17778
C-133261	99BJKTL1	40	31	4	N	118	13	13	W	40.51778	-118.22028
C-133262	99BJKTL2	40	31	4	N	118	13	13	W	40.51778	-118.22028
C-133263	99BJKRT1	40	31	4	N	118	13	13	W	40.51778	-118.22028
C-133264	99DFLTL1	41	10	38	N	117	29	22	W	41.17722	-117.48944
C-133265	99DFLTL2	41	10	38	N	117	29	22	W	41.17722	-117.48944
C-133266	99DFLRT1	41	10	38	N	117	29	22	W	41.17722	-117.48944
C-133267	99CAHTL1	41	21	7	N	117	27	37	W	41.35194	-117.46028
C-133268	99CAHTL2	41	21	7	N	117	27	37	W	41.35194	-117.46028
C-133269	99CAHTL3	41	21	7	N	117	27	37	W	41.35194	-117.46028
C-133270	99CAHRT1	41	21	7	N	117	27	37	W	41.35194	-117.46028
C-133271	99BCKTL1	41	21	37	N	118	19	12	W	41.36028	-118.32000
C-133272	99BCKTL2	41	21	38	N	118	18	55	W	41.36056	-118.31528
C-133273	99BCKTL3	41	21	30	N	118	19	6	W	41.35833	-118.31833
C-133274	99GLBTL1	40	28	20	N	117	40	43	W	40.47222	-117.67861
C-133275	99GLBTL2	40	28	33	N	117	40	42	W	40.47583	-117.67833
C-133276	99McDTL1	41	54	52	N	117	48	51	W	41.91444	-117.81417
C-133277	99McDTL2	41	54	49	N	117	48	57	W	41.91361	-117.81583
C-133278	99McDTL3	41	54	41	N	117	48	56	W	41.91139	-117.81556
C-133279	99SLVTL1	41	3	9	N	116	37	32	W	41.05250	-116.62556
C-133280	99SLVTL2	41	3	12	N	116	37	30	W	41.05333	-116.62500
C-133281	99SLVRT1	41	3	10	N	116	37	30	W	41.05278	-116.62500
C-133282	D9SLVTL1	41	3	9	N	116	37	32	W	41.05250	-116.62556
C-133283	D9SLVTL2	41	3	12	N	116	37	30	W	41.05333	-116.62500
C-133284	D9PERRT1	40	8	1	N	118	10	13	W	40.13361	-118.17028
C-133285	D9BJKTL1	40	31	4	N	118	13	13	W	40.51778	-118.22028
C-133286	D9BJKRT1	40	31	4	N	118	13	13	W	40.51778	-118.22028
C-133287	D9BCKTL3	41	21	30	N	118	19	6	W	41.35833	-118.31833
C-133288	D9McDTL3	41	54	41	N	117	48	56	W	41.91139	-117.81556
C-133289	D9DFLTL1	41	10	38	N	117	29	22	W	41.17722	-117.48944

Table 5. Geochemical data for calcines samples collected in the Humboldt River study.

Lab No.	Field No.	Au-AAS µg/g	Hg-CVAAS µg/g	Ag-ICP10 µg/g	As-ICP10 µg/g	Au-ICP10 µg/g	Bi-ICP10 µg/g	Cd-ICP10 µg/g
C-133254	99PERTL1	0.252	11	0.2	200	0.1	<1	9.2
C-133255	99PERTL2	0.280	9.3	0.2	240	0.3	<1	17
C-133256	99PERTL3	0.318	13	0.3	220	0.3	<1	11
C-133257	99PERRT1	0.072	80	<0.08	72	<0.1	<1	2.6
C-133258	99ANTTL1	0.200	3.6	0.4	250	0.2	<1	3.4
C-133259	99ANTTL2	0.952	43	30	2500	1.0	<1	46
C-133260	99ANTTL3	1.16	100	120	>6000	1.3	<1	25
C-133261	99BJKTL1	0.043	1000	2.8	660	<0.1	3	14
C-133262	99BJKTL2	0.018	25	1.2	480	<0.1	3	19
C-133263	99BJKRT1	0.234	320	0.7	280	<0.1	2	13
C-133264	99DFLTL1	0.029	320	0.8	640	<0.1	<1	0.9
C-133265	99DFLTL2	0.034	110	0.8	790	0.1	1	0.46
C-133266	99DFLRT1	0.045	680	1.8	490	<0.1	1	0.58
C-133267	99CAHTL1	0.017	1.9	0.2	94	<0.1	<1	0.11
C-133268	99CAHTL2	0.013	4.2	0.2	47	<0.1	<1	0.17
C-133269	99CAHTL3	0.028	8.6	0.2	100	<0.1	<1	0.19
C-133270	99CAHRT1	0.017	23	0.1	60	<0.1	<1	0.31
C-133271	99BCKTL1	0.020	7.8	<0.08	30	<0.1	<1	0.27
C-133272	99BCKTL2	0.012	5.4	<0.08	50	<0.1	<1	0.15
C-133273	99BCKTL3	0.010	207	<0.08	20	<0.1	<1	0.17
C-133274	99GLBTL1	0.014	2.5	<0.08	140	<0.1	<1	0.39
C-133275	99GLBTL2	0.015	10	<0.08	220	<0.1	<1	0.1
C-133276	99McDTL1	0.009	1200	0.1	270	<0.1	2	0.05
C-133277	99McDTL2	0.012	43	<0.08	47	<0.1	<1	<0.05
C-133278	99McDTL3	0.014	1400	<0.08	15	<0.1	<1	0.09
C-133279	99SLVTL1	0.012	3.0	<0.08	8	<0.1	<1	<0.05
C-133280	99SLVTL2	0.023	17	<0.08	<1	<0.1	<1	<0.05
C-133281	99SLVRT1	0.073	180	0.2	7	<0.1	<1	0.14
C-133282	D9SLVTL1	0.006	1.9	<0.08	5	<0.1	<1	<0.05
C-133283	D9SLVTL2	0.021	16	<0.08	<1	<0.1	<1	<0.05
C-133284	D9PERRT1	0.106	310	0.1	120	<0.1	<1	6.3
C-133285	D9BJKTL1	0.020	740	0.4	340	<0.1	3	15
C-133286	D9BJKRT1	0.017	2000	0.3	180	<0.1	2	10
C-133287	D9BCKTL3	0.010	210	<0.08	24	<0.1	<1	0.27
C-133288	D9McDTL3	0.009	1600	<0.08	16	<0.1	<1	0.17
C-133289	D9DFLTL1	0.029	360	1.1	780	<0.1	1	0.88

Table 5. Geochemical data for calcines samples collected in the Humboldt River study.

Lab No.	Field No.	Cu-ICP10 µg/g	Mo-ICP10 µg/g	Pb-ICP10 µg/g	Sb-ICP10 µg/g	Zn-ICP10 µg/g	Al-ICP40 %	Ca-ICP40 %
C-133254	99PERTL1	10	0.7	370	360	>500	1.2	16
C-133255	99PERTL2	9.8	1.1	430	380	>500	1.3	15
C-133256	99PERTL3	11	0.6	460	770	>500	1.3	16
C-133257	99PERRT1	26	1.3	87	130	300	5.2	9.6
C-133258	99ANTTL1	8.3	0.8	980	660	220	1.2	21
C-133259	99ANTTL2	450	3.8	>6000	>6000	>500	3.5	13
C-133260	99ANTTL3	>500	3.4	>6000	>6000	>500	2.3	2.8
C-133261	99BJKTL1	71	42	1800	270	430	4.6	7.0
C-133262	99BJKTL2	42	44	690	150	380	3.9	11
C-133263	99BJKRT1	39	22	220	63	380	3.9	14
C-133264	99DFLTL1	36	8.6	140	36	150	8.3	0.7
C-133265	99DFLTL2	44	18	99	41	140	8.2	0.6
C-133266	99DFLRT1	48	8.8	65	20	63	8.5	0.4
C-133267	99CAHTL1	6.9	1.0	37	71	21	2.0	5.4
C-133268	99CAHTL2	12	1.2	25	55	23	2.0	6.7
C-133269	99CAHTL3	18	1.7	24	92	30	2.5	6.2
C-133270	99CAHRT1	45	2.7	28	49	150	4.8	5.0
C-133271	99BCKTL1	100	4.1	10	6	110	8.3	2.8
C-133272	99BCKTL2	93	2.0	7	56	130	8.5	1.8
C-133273	99BCKTL3	100	7.4	9	11	110	7.5	3.7
C-133274	99GLBTL1	28	1.9	23	30	90	7.2	2.4
C-133275	99GLBTL2	22	2.7	6	41	16	8.4	0.3
C-133276	99McDTL1	36	15	16	41	48	2.7	0.6
C-133277	99McDTL2	5.3	11	15	8	54	6.4	0.2
C-133278	99McDTL3	51	4.5	11	3	110	7.0	0.7
C-133279	99SLVTL1	2.6	0.3	9	1	5	4.5	0.4
C-133280	99SLVTL2	0.9	0.1	3	<1	2	0.9	0.3
C-133281	99SLVRT1	42	6.1	27	3	27	2.1	7.1
C-133282	D9SLVTL1	2.6	0.3	9	<1	4	4.3	0.4
C-133283	D9SLVTL2	1.0	0.2	4	<1	2	1.0	0.3
C-133284	D9PERRT1	34	1.9	190	290	>500	5.1	9.9
C-133285	D9BJKTL1	48	42	15	74	410	4.5	7.5
C-133286	D9BJKRT1	41	22	17	34	310	3.5	16
C-133287	D9BCKTL3	90	7.1	9	14	100	7.7	3.8
C-133288	D9McDTL3	67	5.1	12	3	110	6.9	1.0
C-133289	D9DFLTL1	47	12	29	31	170	8.1	0.8

Table 5. Geochemical data for calcines samples collected in the Humboldt River study.

Lab No.	Field No.	Fe-ICP40 %	K-ICP40 %	Mg-ICP40 %	Na-ICP40 %	P-ICP40 %	Ti-ICP40 %	Ag-ICP40 µg/g
C-133254	99PERTL1	0.9	0.4	9.4	0.04	0.03	0.05	<2
C-133255	99PERTL2	1.0	0.6	8.9	0.05	0.04	0.04	<2
C-133256	99PERTL3	1.0	0.7	9.5	0.06	0.04	0.05	<2
C-133257	99PERRT1	3.7	2.1	5.1	0.95	0.05	0.21	<2
C-133258	99ANTTL1	0.8	0.7	5.8	0.21	0.04	0.04	<2
C-133259	99ANTTL2	6.5	0.8	1.3	0.12	0.06	0.08	37
C-133260	99ANTTL3	9.7	0.8	0.3	0.10	0.04	0.05	160
C-133261	99BJKTL1	2.7	1.9	0.4	0.23	0.18	0.19	<2
C-133262	99BJKTL2	2.5	1.6	0.3	0.13	0.21	0.10	<2
C-133263	99BJKRT1	3.3	1.4	0.6	0.41	0.23	0.13	<2
C-133264	99DFLTL1	3.5	2.9	0.3	0.17	0.09	0.34	<2
C-133265	99DFLTL2	4.7	2.6	0.3	0.17	0.06	0.37	<2
C-133266	99DFLRT1	3.5	3.2	0.2	0.08	0.06	0.42	<2
C-133267	99CAHTL1	0.8	1.1	2.7	0.01	0.04	0.07	<2
C-133268	99CAHTL2	0.9	1.0	3.2	0.04	0.07	0.08	<2
C-133269	99CAHTL3	1.3	1.2	3.5	0.05	0.05	0.09	<2
C-133270	99CAHRT1	5.5	1.7	1.3	0.75	0.05	0.26	<2
C-133271	99BCKTL1	8.3	1.2	1.1	1.1	0.11	1.0	<2
C-133272	99BCKTL2	9.0	1.6	0.9	0.94	0.15	1.4	<2
C-133273	99BCKTL3	7.6	1.2	0.9	1.4	0.13	1.2	<2
C-133274	99GLBTL1	3.5	2.1	1.1	0.11	0.11	0.46	<2
C-133275	99GLBTL2	4.7	0.8	0.1	0.39	0.13	0.65	<2
C-133276	99McDTL1	6.4	0.5	0.2	0.16	0.05	0.43	<2
C-133277	99McDTL2	4.1	2.5	0.2	0.94	0.03	0.39	<2
C-133278	99McDTL3	5.4	1.6	0.7	0.63	0.04	0.81	<2
C-133279	99SLVTL1	0.5	0.5	0.8	0.15	0.02	0.31	<2
C-133280	99SLVTL2	0.2	0.1	0.1	0.10	0.01	0.41	<2
C-133281	99SLVRT1	3.1	0.3	0.5	0.30	0.02	0.49	<2
C-133282	D9SLVTL1	0.5	0.5	0.7	0.14	0.02	0.32	<2
C-133283	D9SLVTL2	0.2	0.2	0.1	0.10	0.01	0.43	<2
C-133284	D9PERRT1	3.9	1.8	5.1	0.90	0.06	0.22	<2
C-133285	D9BJKTL1	2.6	1.6	0.4	0.20	0.19	0.17	<2
C-133286	D9BJKRT1	2.8	1.3	0.5	0.34	0.23	0.14	<2
C-133287	D9BCKTL3	7.3	1.1	1.0	1.3	0.12	1.1	<2
C-133288	D9McDTL3	6.5	1.2	0.8	0.52	0.05	0.86	<2
C-133289	D9DFLTL1	4.6	2.6	0.3	0.21	0.08	0.36	<2

Table 5. Geochemical data for calcines samples collected in the Humboldt River study.

Lab No.	Field No.	As-ICP40 µg/g	Au-ICP40 µg/g	Ba-ICP40 µg/g	Be-ICP40 µg/g	Bi-ICP40 µg/g	Cd-ICP40 µg/g	Ce-ICP40 µg/g
C-133254	99PERTL1	200	<8	2100	<1	<50	11	17
C-133255	99PERTL2	250	<8	4000	<1	<50	22	<5
C-133256	99PERTL3	240	<8	4600	<1	<50	13	31
C-133257	99PERRT1	80	<8	510	2	<50	2	25
C-133258	99ANTTL1	250	<8	2700	<1	<50	3	<5
C-133259	99ANTTL2	3500	<8	540	<1	<50	22	33
C-133260	99ANTTL3	11000	<8	200	<1	<50	<2	13
C-133261	99BJKTL1	350	<8	610	<1	<50	11	30
C-133262	99BJKTL2	380	<8	530	<1	<50	14	22
C-133263	99BJKRT1	230	<8	480	<1	<50	11	41
C-133264	99DFLTL1	680	<8	490	3	<50	<2	75
C-133265	99DFLTL2	800	<8	540	3	<50	<2	92
C-133266	99DFLRT1	440	<8	690	2	<50	<2	110
C-133267	99CAHTL1	69	<8	210	<1	<50	<2	16
C-133268	99CAHTL2	26	<8	230	<1	<50	2	6
C-133269	99CAHTL3	84	<8	630	<1	<50	<2	22
C-133270	99CAHRT1	55	<8	880	2	<50	<2	37
C-133271	99BCKTL1	29	<8	490	<1	<50	3	46
C-133272	99BCKTL2	63	<8	690	<1	<50	<2	65
C-133273	99BCKTL3	33	<8	1200	<1	<50	4	53
C-133274	99GLBTL1	150	<8	970	3	<50	<2	61
C-133275	99GLBTL2	250	<8	150	<1	<50	<2	65
C-133276	99McDTL1	260	<8	510	<1	<50	<2	55
C-133277	99McDTL2	34	<8	480	2	<50	2	90
C-133278	99McDTL3	15	<8	250	2	<50	<2	76
C-133279	99SLVTL1	<10	<8	270	<1	<50	<2	110
C-133280	99SLVTL2	<10	<8	380	2	<50	<2	43
C-133281	99SLVRT1	<10	<8	370	<1	<50	<2	89
C-133282	D9SLVTL1	<10	<8	290	<1	<50	<2	100
C-133283	D9SLVTL2	<10	<8	480	2	<50	<2	53
C-133284	D9PERRT1	130	<8	920	2	<50	5	34
C-133285	D9BJKTL1	340	<8	610	<1	<50	11	29
C-133286	D9BJKRT1	160	<8	420	<1	<50	9	26
C-133287	D9BCKTL3	32	<8	870	<1	<50	4	53
C-133288	D9McDTL3	15	<8	210	2	<50	3	84
C-133289	D9DFLTL1	800	<8	530	3	<50	<2	69

Table 5. Geochemical data for calcines samples collected in the Humboldt River study.

Lab No.	Field No.	Co-ICP40 µg/g	Cr-ICP40 µg/g	Cu-ICP40 µg/g	Eu-ICP40 µg/g	Ga-ICP40 µg/g	Ho-ICP40 µg/g	La-ICP40 µg/g
C-133254	99PERTL1	4	14	20	<2	8	<4	2
C-133255	99PERTL2	3	15	21	<2	17	<4	6
C-133256	99PERTL3	3	16	23	<2	23	<4	<2
C-133257	99PERRT1	11	54	41	<2	6	<4	18
C-133258	99ANTTL1	3	14	23	<2	14	<4	3
C-133259	99ANTTL2	5	47	550	<2	<4	<4	13
C-133260	99ANTTL3	<2	58	1400	3	<4	<4	12
C-133261	99BJKTL1	9	120	52	<2	17	<4	34
C-133262	99BJKTL2	8	77	41	2	<4	<4	2[illegible]
C-133263	99BJKRT1	9	81	43	<2	<4	<4	23
C-133264	99DFLTL1	15	40	40	3	8	<4	43
C-133265	99DFLTL2	12	59	52	2	7	<4	57
C-133266	99DFLRT1	3	47	41	2	9	<4	64
C-133267	99CAHTL1	3	16	11	<2	14	<4	14
C-133268	99CAHTL2	3	19	17	<2	16	<4	15
C-133269	99CAHTL3	6	37	25	<2	20	<4	20
C-133270	99CAHRT1	12	63	59	2	<4	<4	25
C-133271	99BCKTL1	42	49	150	4	<4	4	15
C-133272	99BCKTL2	42	53	120	3	14	<4	20
C-133273	99BCKTL3	39	61	130	3	9	4	21
C-133274	99GLBTL1	12	62	31	<2	9	<4	30
C-133275	99GLBTL2	4	89	38	3	13	<4	27
C-133276	99McDTL1	11	35	38	<2	9	<4	30
C-133277	99McDTL2	2	25	8	<2	<4	<4	37
C-133278	99McDTL3	8	61	47	<2	20	5	31
C-133279	99SLVTL1	<2	11	9	<2	27	<4	46
C-133280	99SLVTL2	<2	13	7	<2	<4	<4	13
C-133281	99SLVRT1	8	37	54	<2	<4	<4	21
C-133282	D9SLVTL1	<2	8	7	<2	18	<4	43
C-133283	D9SLVTL2	<2	12	8	<2	6	<4	13
C-133284	D9PERRT1	11	33	45	2	23	<4	22
C-133285	D9BJKTL1	7	120	48	2	6	<4	27
C-133286	D9BJKRT1	8	59	40	<2	8	<4	25
C-133287	D9BCKTL3	39	44	130	2	<4	<4	19
C-133288	D9McDTL3	8	71	61	2	4	<4	28
C-133289	D9DFLTL1	18	30	50	3	<4	<4	43

Table 5. Geochemical data for calcines samples collected in the Humboldt River study.

Lab No.	Field No.	Li-ICP40 µg/g	Mn-ICP40 µg/g	Mo-ICP40 µg/g	Nb-ICP40 µg/g	Nd-ICP40 µg/g	Ni-ICP40 µg/g	Pb-ICP40 µg/g
C-133254	99PERTL1	46	610	<2	<4	<9	4	500
C-133255	99PERTL2	77	570	<2	<4	<9	5	590
C-133256	99PERTL3	47	630	<2	<4	<9	5	630
C-133257	99PERRT1	90	600	<2	<4	<9	25	100
C-133258	99ANTTL1	540	520	<2	<4	<9	4	1200
C-133259	99ANTTL2	390	580	<2	<4	<9	12	55000
C-133260	99ANTTL3	280	160	<2	<4	<9	<3	57000
C-133261	99BJKTL1	43	110	60	<4	31	81	65
C-133262	99BJKTL2	38	120	53	<4	<9	72	45
C-133263	99BJKRT1	33	290	24	<4	16	67	18
C-133264	99DFLTL1	270	1100	2	<4	33	28	25
C-133265	99DFLTL2	190	710	16	<4	39	31	25
C-133266	99DFLRT1	130	38	3	7	41	10	65
C-133267	99CAHTL1	15	230	<2	<4	<9	9	21
C-133268	99CAHTL2	19	250	<2	<4	<9	18	13
C-133269	99CAHTL3	21	390	<2	<4	15	24	12
C-133270	99CAHRT1	43	670	<2	<4	<9	34	34
C-133271	99BCKTL1	25	1400	<2	<4	<9	25	<4
C-133272	99BCKTL2	25	1400	<2	6	14	24	<4
C-133273	99BCKTL3	15	1900	5	6	15	25	10
C-133274	99GLBTL1	52	600	<2	7	18	25	20
C-133275	99GLBTL2	40	69	<2	7	25	7	15
C-133276	99McDTL1	68	100	17	<4	<9	<3	35
C-133277	99McDTL2	11	18	10	14	29	<3	21
C-133278	99McDTL3	13	370	<2	8	22	18	8
C-133279	99SLVTL1	56	27	<2	37	22	<3	33
C-133280	99SLVTL2	6	41	4	48	<9	<3	18
C-133281	99SLVRT1	25	120	15	72	<9	17	49
C-133282	D9SLVTL1	50	20	<2	36	22	<3	34
C-133283	D9SLVTL2	8	48	4	54	<9	<3	23
C-133284	D9PERRT1	91	640	<2	<4	14	26	240
C-133285	D9BJKTL1	40	120	58	<4	19	79	14
C-133286	D9BJKRT1	26	250	25	<4	<9	50	24
C-133287	D9BCKTL3	19	1800	<2	4	12	26	<4
C-133288	D9McDTL3	13	460	<2	6	17	21	6
C-133289	D9DFLTL1	220	1200	8	<4	28	35	28

Table 5. Geochemical data for calcines samples collected in the Humboldt River study.

Lab No.	Field No.	Sc-ICP40 µg/g	Sn-ICP40 µg/g	Sr-ICP40 µg/g	Ta-ICP40 µg/g	Th-ICP40 µg/g	U-ICP40 µg/g	V-ICP40 µg/g
C-133254	99PERTL1	<2	<50	540	<40	<6	<100	24
C-133255	99PERTL2	<2	<50	650	<40	<6	<100	23
C-133256	99PERTL3	<2	<50	610	<40	<6	<100	24
C-133257	99PERRT1	8	<50	590	<40	<6	<100	70
C-133258	99ANTTL1	<2	<50	950	<40	<6	<100	20
C-133259	99ANTTL2	4	<50	1100	<40	<6	<100	160
C-133260	99ANTTL3	2	<50	850	<40	<6	<100	55
C-133261	99BJKTL1	6	<50	200	<40	7	<100	1200
C-133262	99BJKTL2	5	<50	230	<40	<6	<100	1000
C-133263	99BJKRT1	5	<50	250	<40	<6	<100	630
C-133264	99DFLTL1	13	<50	200	<40	<6	<100	100
C-133265	99DFLTL2	13	<50	350	<40	28	<100	83
C-133266	99DFLRT1	8	<50	500	<40	28	<100	80
C-133267	99CAHTL1	2	<50	47	<40	<6	<100	25
C-133268	99CAHTL2	2	<50	82	<40	<6	<100	37
C-133269	99CAHTL3	3	<50	79	<40	<6	<100	49
C-133270	99CAHRT1	7	<50	200	<40	<6	<100	83
C-133271	99BCKTL1	36	<50	300	<40	<6	<100	370
C-133272	99BCKTL2	34	<50	200	<40	6	<100	390
C-133273	99BCKTL3	28	<50	300	<40	<6	<100	320
C-133274	99GLBTL1	12	<50	400	<40	<6	<100	140
C-133275	99GLBTL2	18	<50	480	<40	12	<100	190
C-133276	99McDTL1	12	<50	300	<40	16	<100	200
C-133277	99McDTL2	6	<50	67	<40	16	<100	39
C-133278	99McDTL3	13	<50	68	<40	10	<100	120
C-133279	99SLVTL1	3	<50	150	<40	22	<100	25
C-133280	99SLVTL2	<2	<50	88	<40	<6	<100	17
C-133281	99SLVRT1	<2	<50	220	<40	<6	<100	29
C-133282	D9SLVTL1	3	<50	140	<40	15	<100	25
C-133283	D9SLVTL2	<2	<50	110	<40	<6	<100	19
C-133284	D9PERRT1	8	<50	650	<40	<6	<100	80
C-133285	D9BJKTL1	7	<50	190	<40	<6	<100	1200
C-133286	D9BJKRT1	4	<50	240	<40	<6	<100	520
C-133287	D9BCKTL3	28	<50	290	<40	<6	<100	310
C-133288	D9McDTL3	15	<50	68	<40	<6	<100	140
C-133289	D9DFLTL1	13	<50	230	<40	13	<100	100

Table 5. Geochemical data for calcines samples collected in the Humboldt River study.

Lab No.	Field No.	Y-ICP40 µg/g	Yb-ICP40 µg/g	Zn-ICP40 µg/g	Sample Description
C-133254	99PERTL1	4	<1	850	Mercury mine calcines
C-133255	99PERTL2	4	<1	2100	Mercury mine calcines
C-133256	99PERTL3	4	<1	1200	Mercury mine calcines
C-133257	99PERRT1	9	1	320	Mercury mine calcines
C-133258	99ANTTL1	5	<1	240	Mercury mine calcines
C-133259	99ANTTL2	8	1	21000	Mercury mine calcines
C-133260	99ANTTL3	3	<1	4800	Mercury mine calcines
C-133261	99BJKTL1	14	1	510	Mercury mine calcines
C-133262	99BJKTL2	12	1	440	Mercury mine calcines
C-133263	99BJKRT1	16	1	420	Mercury mine calcines
C-133264	99DFLTL1	16	2	160	Mercury mine calcines
C-133265	99DFLTL2	15	2	150	Mercury mine calcines
C-133266	99DFLRT1	13	2	69	Mercury mine calcines
C-133267	99CAHTL1	8	<1	19	Mercury mine calcines
C-133268	99CAHTL2	10	<1	21	Mercury mine calcines
C-133269	99CAHTL3	10	<1	26	Mercury mine calcines
C-133270	99CAHRT1	13	2	190	Mercury mine calcines
C-133271	99BCKTL1	26	3	120	Mercury mine calcines
C-133272	99BCKTL2	29	3	130	Mercury mine calcines
C-133273	99BCKTL3	30	3	120	Mercury mine calcines
C-133274	99GLBTL1	25	3	95	Mercury mine calcines
C-133275	99GLBTL2	9	2	30	Mercury mine calcines
C-133276	99McDTL1	32	5	63	Mercury mine calcines
C-133277	99McDTL2	26	3	69	Mercury mine calcines
C-133278	99McDTL3	28	4	110	Mercury mine calcines
C-133279	99SLVTL1	14	2	15	Mercury mine calcines
C-133280	99SLVTL2	5	<1	12	Mercury mine calcines
C-133281	99SLVRT1	13	2	36	Mercury mine calcines
C-133282	D9SLVTL1	14	2	14	Mercury mine calcines
C-133283	D9SLVTL2	6	<1	14	Mercury mine calcines
C-133284	D9PERRT1	10	1	730	Mercury mine calcines
C-133285	D9BJKTL1	13	1	450	Mercury mine calcines
C-133286	D9BJKRT1	16	1	310	Mercury mine calcines
C-133287	D9BCKTL3	29	3	120	Mercury mine calcines
C-133288	D9McDTL3	28	4	130	Mercury mine calcines
C-133289	D9DFLTL1	19	2	180	Mercury mine calcines

Table 6. Geochemical data for water samples collected in the Humboldt River study.

Lab No.	Field No.	Latitude				Longitude				Latitude	Longitude
		deg.	min.	sec.		deg.	min.	sec.		dec. deg.	dec. deg.
C-132039	99HMB1WU	40	57	39	N	117	25	15	W	40.96083	-117.42083
C-132040	99HMB1WF	40	57	39	N	117	25	15	W	40.96083	-117.42083
C-132041	99HMB2WU	40	55	1	N	117	52	28	W	40.91694	-117.87444
C-132042	99HMB2WF	40	55	1	N	117	52	28	W	40.91694	-117.87444
C-132043	99HMB3WU	40	41	45	N	118	5	21	W	40.69583	-118.08917
C-132044	99HMB3WF	40	41	45	N	118	5	21	W	40.69583	-118.08917
C-132045	99HMB4WU	40	41	39	N	118	13	2	W	40.69417	-118.21722
C-132046	99HMB4WF	40	41	39	N	118	13	2	W	40.69417	-118.21722
C-132047	99HMB5WU	40	26	49	N	118	18	36	W	40.44694	-118.31000
C-132048	99HMB5WF	40	26	49	N	118	18	36	W	40.44694	-118.31000
C-132049	99RYP1WU	40	41	12	N	118	15	2	W	40.68667	-118.25056
C-132050	99RYP1WF	40	41	12	N	118	15	2	W	40.68667	-118.25056
C-132051	99RYP2WU	40	42	21	N	118	17	53	W	40.70583	-118.29806
C-132052	99RYP2WF	40	42	21	N	118	17	53	W	40.70583	-118.29806
C-132053	99RYP3WU	40	39	0	N	118	21	3	W	40.65000	-118.35083
C-132054	99RYP3WF	40	39	0	N	118	21	3	W	40.65000	-118.35083
C-132055	99RYP4WU	40	37	27	N	118	21	4	W	40.62417	-118.35111
C-132056	99RYP4WF	40	37	27	N	118	21	4	W	40.62417	-118.35111
C-132057	99RYP5WU	40	34	35	N	118	19	7	W	40.57639	-118.31861
C-132058	99RYP5WF	40	34	35	N	118	19	7	W	40.57639	-118.31861
C-132059	99BJKW1U	40	31	5	N	118	13	16	W	40.51806	-118.22111
C-132060	99BJKW1F	40	31	5	N	118	13	16	W	40.51806	-118.22111
C-132061	99BJKW2U	40	31	14	N	118	13	27	W	40.52056	-118.22417
C-132062	99BJKW2F	40	31	14	N	118	13	27	W	40.52056	-118.22417

Table 6. Geochemical data for water samples collected in the Humboldt River study.

Lab No.	Field No.	Conductivity µS/cm	pH	Turbidity NTU	Fe2+ mg/L	Temperature °C
C-132039	99HMB1WU	530	8.1	40	<0.1	23
C-132040	99HMB1WF					
C-132041	99HMB2WU	600	8.2	91	<0.1	24
C-132042	99HMB2WF					
C-132043	99HMB3WU	630	8.4	150	<0.1	23
C-132044	99HMB3WF					
C-132045	99HMB4WU	660	8.3	150	<0.1	24
C-132046	99HMB4WF					
C-132047	99HMB5WU	840	8.6	48	<0.1	23
C-132048	99HMB5WF					
C-132049	99RYP1WU	730	8.5	140	<0.1	23
C-132050	99RYP1WF					
C-132051	99RYP2WU	730	8.5	140	0.1	24
C-132052	99RYP2WF					
C-132053	99RYP3WU	740	8.6	78	0.1	25
C-132054	99RYP3WF					
C-132055	99RYP4WU	780	8.6	40	0.1	21
C-132056	99RYP4WF					
C-132057	99RYP5WU	820	8.6	48	0.1	23
C-132058	99RYP5WF					
C-132059	99BJKW1U	350	8.6	5	<0.1	13
C-132060	99BJKW1F					
C-132061	99BJKW2U	330	8.7	8	<0.1	14
C-132062	99BJKW2F					

Table 6. Geochemical data for water samples collected in the Humboldt River study.

Lab No.	Field No.	Alkalinity mg/L CaCO3	Hg-AF µg/L	Cl-IC mg/L	F-IC mg/L	NO3-IC mg/L	SO4-IC mg/L
C-132039	99HMB1WU	210	0.006				
C-132040	99HMB1WF		<0.005	22	0.7	<0.1	30
C-132041	99HMB2WU	230	<0.005				
C-132042	99HMB2WF		<0.005	28	0.9	<0.1	40
C-132043	99HMB3WU	250	0.008				
C-132044	99HMB3WF		<0.005	31	0.9	<0.1	44
C-132045	99HMB4WU	260	0.009				
C-132046	99HMB4WF		<0.005	33	0.8	<0.1	49
C-132047	99HMB5WU	230	<0.005				
C-132048	99HMB5WF		<0.005	76	0.9	0.1	85
C-132049	99RYP1WU	280	0.008				
C-132050	99RYP1WF		0.005	40	0.9	<0.1	58
C-132051	99RYP2WU	270	0.005				
C-132052	99RYP2WF		<0.005	39	0.8	0.1	61
C-132053	99RYP3WU	250	0.005				
C-132054	99RYP3WF		<0.005	52	0.9	0.2	78
C-132055	99RYP4WU	240	<0.005				
C-132056	99RYP4WF		<0.005	60	0.9	0.1	82
C-132057	99RYP5WU	230	0.005				
C-132058	99RYP5WF		<0.005	72	0.9	<0.1	82
C-132059	99BJKW1U	160	0.008				
C-132060	99BJKW1F		<0.005	5.7	0.7	0.3	20
C-132061	99BJKW2U	150	0.006				
C-132062	99BJKW2F		<0.005	6.1	0.7	0.2	20

Table 6. Geochemical data for water samples collected in the Humboldt River study.

Lab No.	Field No.	Ag-ICP-MS µg/L	Al-ICP-MS µg/L	As-ICP-MS µg/L	Ba-ICP-MS µg/L	Be-ICP-MS µg/L
C-132039	99HMB1WU	0.09	700	16	93	<0.05
C-132040	99HMB1WF	0.07	1.3	16	72	<0.05
C-132041	99HMB2WU	0.06	1700	19	150	0.07
C-132042	99HMB2WF	0.04	0.87	18	79	<0.05
C-132043	99HMB3WU	0.04	3700	22	240	0.20
C-132044	99HMB3WF	0.03	0.7	20	75	<0.05
C-132045	99HMB4WU	0.02	3800	23	220	0.20
C-132046	99HMB4WF	0.02	1.8	22	73	<0.05
C-132047	99HMB5WU	0.03	580	26	52	<0.05
C-132048	99HMB5WF	0.03	46	25	38	<0.05
C-132049	99RYP1WU	0.02	2300	28	170	0.30
C-132050	99RYP1WF	0.01	26	29	89	<0.05
C-132051	99RYP2WU	0.01	2200	29	150	0.09
C-132052	99RYP2WF	<0.01	23	26	78	<0.05
C-132053	99RYP3WU	<0.01	940	28	88	0.10
C-132054	99RYP3WF	<0.01	49	27	53	<0.05
C-132055	99RYP4WU	<0.01	730	26	71	<0.05
C-132056	99RYP4WF	<0.01	69	27	51	<0.05
C-132057	99RYP5WU	0.01	910	28	73	<0.05
C-132058	99RYP5WF	<0.01	54	26	39	<0.05
C-132059	99BJKW1U	<0.01	69	8.8	17	<0.05
C-132060	99BJKW1F	<0.01	<0.2	8.5	16	<0.05
C-132061	99BJKW2U	<0.01	87	8.4	17	<0.05
C-132062	99BJKW2F	<0.01	<0.2	8.5	15	<0.05

Table 6. Geochemical data for water samples collected in the Humboldt River study.

Lab No.	Field No.	Ca-ICP-MS µg/L	Cd-ICP-MS µg/L	Co-ICP-MS µg/L	Cr-ICP-MS µg/L	Cu-ICP-MS µg/L
C-132039	99HMB1WU	33	0.04	0.4	<1	2
C-132040	99HMB1WF	31	<0.02	0.03	<1	1
C-132041	99HMB2WU	38	0.09	0.92	1	4
C-132042	99HMB2WF	34	<0.02	0.04	<1	2
C-132043	99HMB3WU	45	0.20	2.2	3	8
C-132044	99HMB3WF	35	<0.02	<0.02	<1	2
C-132045	99HMB4WU	43	0.20	2	3	8
C-132046	99HMB4WF	36	<0.02	0.03	<1	3
C-132047	99HMB5WU	34	<0.02	0.2	<1	2
C-132048	99HMB5WF	34	<0.02	<0.02	<1	2
C-132049	99RYP1WU	44	0.10	1.2	2	6
C-132050	99RYP1WF	40	<0.02	0.02	<1	3
C-132051	99RYP2WU	44	0.08	1.2	2	6
C-132052	99RYP2WF	38	<0.02	0.07	<1	3
C-132053	99RYP3WU	40	0.04	0.59	<1	4
C-132054	99RYP3WF	35	<0.02	0.07	<1	3
C-132055	99RYP4WU	36	0.02	0.4	<1	3
C-132056	99RYP4WF	36	<0.02	0.04	<1	2
C-132057	99RYP5WU	36	0.03	0.5	<1	3
C-132058	99RYP5WF	32	<0.02	0.02	<1	2
C-132059	99BJKW1U	41	0.06	<0.02	<1	0.5
C-132060	99BJKW1F	42	<0.02	<0.02	<1	<0.5
C-132061	99BJKW2U	40	0.06	<0.02	<1	0.5
C-132062	99BJKW2F	41	<0.02	<0.02	<1	<0.5

Table 6. Geochemical data for water samples collected in the Humboldt River study.

Lab No.	Field No.	Fe-ICP-MS µg/L	K-ICP-MS µg/L	Mg-ICP-MS µg/L	Mn-ICP-MS µg/L	Na-ICP-MS µg/L
C-132039	99HMB1WU	520	6700	9.5	42	49
C-132040	99HMB1WF	<30	6200	9.6	3.5	50
C-132041	99HMB2WU	1400	8300	12	110	58
C-132042	99HMB2WF	<30	7800	11	11	59
C-132043	99HMB3WU	3000	9700	14	230	66
C-132044	99HMB3WF	<30	8300	11	3.6	65
C-132045	99HMB4WU	3100	9300	14	200	67
C-132046	99HMB4WF	29	9100	11	3.4	66
C-132047	99HMB5WU	530	12000	13	15	99
C-132048	99HMB5WF	68	12000	13	1.6	100
C-132049	99RYP1WU	2100	11000	15	150	82
C-132050	99RYP1WF	51	11000	13	3	78
C-132051	99RYP2WU	2200	12000	15	120	82
C-132052	99RYP2WF	46	9800	12	4.4	76
C-132053	99RYP3WU	990	10000	14	44	82
C-132054	99RYP3WF	67	10000	13	3.2	79
C-132055	99RYP4WU	740	10000	13	25	87
C-132056	99RYP4WF	98	10000	13	1.8	90
C-132057	99RYP5WU	880	12000	14	32	100
C-132058	99RYP5WF	79	11000	13	1.7	99
C-132059	99BJKW1U	110	710	7.8	4	8.7
C-132060	99BJKW1F	34	710	7.8	0.36	8.6
C-132061	99BJKW2U	100	730	8	4.3	8.8
C-132062	99BJKW2F	36	760	8	0.5	8.8

Table 6. Geochemical data for water samples collected in the Humboldt River study.

Lab No.	Field No.	Ni-ICP-MS µg/L	Pb-ICP-MS µg/L	Sb-ICP-MS µg/L	Tl-ICP-MS µg/L	V-ICP-MS µg/L
C-132039	99HMB1WU	1.2	0.63	0.9	<0.05	5.5
C-132040	99HMB1WF	0.4	<0.05	0.92	<0.05	4.3
C-132041	99HMB2WU	2.6	1.9	0.88	<0.05	9.1
C-132042	99HMB2WF	0.7	<0.05	1	<0.05	6.1
C-132043	99HMB3WU	5.5	4.3	0.78	0.05	14
C-132044	99HMB3WF	0.9	<0.05	1.2	<0.05	7.0
C-132045	99HMB4WU	5.1	4.1	0.87	0.06	14
C-132046	99HMB4WF	0.9	<0.05	1.2	<0.05	7.7
C-132047	99HMB5WU	0.9	0.40	3	<0.05	10
C-132048	99HMB5WF	0.3	<0.05	3.4	<0.05	8.9
C-132049	99RYP1WU	3.6	2.3	1.2	<0.05	15
C-132050	99RYP1WF	1.3	0.08	2.5	<0.05	10
C-132051	99RYP2WU	4	1.9	1.4	<0.05	14
C-132052	99RYP2WF	1.5	0.05	2.2	<0.05	8.7
C-132053	99RYP3WU	1.6	0.83	2.4	<0.05	12
C-132054	99RYP3WF	0.8	0.09	3.2	<0.05	9.7
C-132055	99RYP4WU	1.2	0.57	2.7	<0.05	11
C-132056	99RYP4WF	0.6	0.05	3.3	<0.05	9.0
C-132057	99RYP5WU	1.4	0.63	3	<0.05	12
C-132058	99RYP5WF	0.5	<0.05	3.6	<0.05	8.9
C-132059	99BJKW1U	<0.1	0.20	0.53	<0.05	0.9
C-132060	99BJKW1F	<0.1	<0.05	0.49	<0.05	0.8
C-132061	99BJKW2U	<0.1	0.20	0.49	<0.05	0.8
C-132062	99BJKW2F	<0.1	<0.05	0.48	<0.05	0.7

Table 6. Geochemical data for water samples collected in the Humboldt River study.

Lab No.	Field No.	Zn-ICP-MS μg/L	Sample Description
C-132039	99HMB1WU	6.0	UNFILTERED STREAM WATER
C-132040	99HMB1WF	<0.5	FILTERED STREAM WATER 0.45 MICRON
C-132041	99HMB2WU	9.0	UNFILTERED STREAM WATER
C-132042	99HMB2WF	<0.5	FILTERED STREAM WATER 0.45 MICRON
C-132043	99HMB3WU	24	UNFILTERED STREAM WATER
C-132044	99HMB3WF	<0.5	FILTERED STREAM WATER 0.45 MICRON
C-132045	99HMB4WU	20	UNFILTERED STREAM WATER
C-132046	99HMB4WF	<0.5	FILTERED STREAM WATER 0.45 MICRON
C-132047	99HMB5WU	2.0	UNFILTERED STREAM WATER
C-132048	99HMB5WF	0.5	FILTERED STREAM WATER 0.45 MICRON
C-132049	99RYP1WU	10	UNFILTERED RESERVOIR WATER
C-132050	99RYP1WF	1.0	FILTERED RESERVOIR WATER 0.45 MICRON
C-132051	99RYP2WU	10	UNFILTERED RESERVOIR WATER
C-132052	99RYP2WF	1.0	FILTERED RESERVOIR WATER 0.45 MICRON
C-132053	99RYP3WU	4.0	UNFILTERED RESERVOIR WATER
C-132054	99RYP3WF	2.0	FILTERED RESERVOIR WATER 0.45 MICRON
C-132055	99RYP4WU	3.0	UNFILTERED RESERVOIR WATER
C-132056	99RYP4WF	0.8	FILTERED RESERVOIR WATER 0.45 MICRON
C-132057	99RYP5WU	4.0	UNFILTERED RESERVOIR WATER
C-132058	99RYP5WF	2.0	FILTERED RESERVOIR WATER 0.45 MICRON
C-132059	99BJKW1U	1.0	UNFILTERED STREAM WATER
C-132060	99BJKW1F	<0.5	FILTERED STREAM WATER 0.45 MICRON
C-132061	99BJKW2U	0.9	UNFILTERED STREAM WATER
C-132062	99BJKW2F	<0.5	FILTERED STREAM WATER 0.45 MICRON