

STATE OF COLORADO

John W. Hickenlooper, Governor
Christopher E. Urbina, MD, MPH
Executive Director and Chief Medical Officer

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S. Laboratory Services Division
Denver, Colorado 80246-1530 8100 Lowry Blvd.
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Located in Glendale, Colorado (303) 692-3090

<http://www.cdphe.state.co.us>



Colorado Department
of Public Health
and Environment

Covenant Information:

Covenant ID HMCOV00090

Covenant Date 7/27/2012

Self Reporting

Media of Concern:

Surface Water:

Ground Water:

Air:

Soil:

Other:

Site Contact Information:

Owner Corp: Resurrection Mining Company

Contact Name: Director of Reclamation and Closure

Contact Address: Resurrection Mining Company

Contact City: Greenwood Village

Contact State: CO

Contact Zip: 80111

Contact Phone:

Contaminants of Concern:

lead, arsenic, cadmium, zinc

Property Restrictions:

- 1: No use of untreated groundwater from wells located on the property within 500 ft of California Gulch...
- 2:
- 3:
- 4:
- 5:

Site Information:

ID: CAL OU 0

Name: Resurrection Zone C

Address: ~ 0-4 Miles SE of Leadville, CO

City:

State: CO

Zip:

Legal Description:

See covenant

RESURRECTION ZONE C

106° 16' 30" W

106° 16' 0" W

Featured Institutional Control



Resurrection Mill

39° 14' 0" N

39° 14' 0" N

39° 13' 30" N

39° 13' 30" N

106° 16' 30" W

106° 16' 0" W



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HMCOV00090





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COV RS152.00 D\$0.00

Patricia Berger
Lake County Recorder



Environmental Covenant for Zone C Property

This property is subject to an Environmental Covenant held by the Colorado Department of Public Health and Environment pursuant to section 25-15-321, C.R.S.

ENVIRONMENTAL COVENANT

Resurrection Mining Company ("Resurrection") grants an Environmental Covenant ("Covenant") this 22nd day of July, 2012 to the Hazardous Materials and Waste Management Division of the Colorado Department of Public Health and the Environment ("the Department") pursuant to § 25-15-321 of the Colorado Hazardous Waste Act, § 25-15-101, *et seq.* The Department's address is 4300 Cherry Creek Drive South, Denver, Colorado 80246-1530.

WHEREAS, Resurrection is the owner of certain property situated in Lake County, Colorado, more particularly described in Attachment 1, attached hereto and incorporated herein by reference as though fully set forth (hereinafter referred to as "the Property"); and

WHEREAS, pursuant to that Consent Decree among Resurrection, Newmont USA Limited ("Newmont"), the State of Colorado and the United States, which was entered by the U.S. District Court for the District of Colorado on August 29, 2008 in *State of Colorado v. Asarco Incorporated, et al.* ("Consent Decree"), Resurrection has agreed to grant an Environmental Covenant in accordance with the terms thereof.

NOW, THEREFORE, Resurrection hereby grants this Environmental Covenant to the Department with EPA as a third party beneficiary, and declares that the Property as described in Attachment 1 shall hereinafter be bound by, held, sold, and conveyed subject to the requirements set forth below, which shall run with the Property in perpetuity and be binding on Resurrection, its heirs, successors and assigns, and any persons using the land, as described herein. As used in this Environmental Covenant, the term "Owner" means the record owner of the Property and any other person or entity otherwise legally authorized to make decisions regarding the transfer of the Property or placement of encumbrances on the Property, other than by the exercise of eminent domain.

1) Use Restrictions.

No use of untreated alluvial groundwater from wells located on the property within 500 feet of California Gulch for drinking, domestic, or agricultural purposes shall be allowed. This covenant does not restrict the use of groundwater that is treated to meet then applicable State water quality standards for the beneficial use to which the water is being applied. Treatment must meet any standards that are in place at the time of use.



2) Inspections.

The Department and EPA as the named third party beneficiary shall have the right of entry to the Property at reasonable times with prior notice for the purpose of determining compliance with the terms of this Covenant. Nothing in this Covenant shall impair any other authority the Department may otherwise have to enter and inspect the Property.

3) Termination.

This Covenant runs with the land and is perpetual, unless terminated or modified pursuant to this Section or Section 4. Owner may request that the Department approve a termination or modification of this Covenant. Consistent with C.R.S. 25-15-319(1)(h), the Department shall terminate this Environmental Covenant in whole or in part when, in addition to satisfying the requirements of C.R.S. 25-15-321(3) and (5), Owner provides the following applicable showings to the Department:

- a. Restrictions on using untreated alluvial groundwater from wells located on the property within 500 feet of California Gulch for drinking, domestic, and agricultural purposes shall be terminated if Owner demonstrates to the State that concentrations of the constituents listed in Table 1 of Attachment 2 in the subject groundwater do not exceed State water quality standards for drinking, domestic, and agricultural purposes existing at the time of application. Current water quality standards are set forth in Table 1 of Attachment 2. Any ground water sampling conducted for purposes of terminating this Environmental Covenant shall be conducted in accordance with Attachment 2.
- b. In addition to the grounds for termination set forth in Sections 3.a, the Environmental Covenants shall also be terminated as to all or part of the Property if it is demonstrated to the Department that the proposed termination will otherwise be addressed in a manner that will ensure protection of human health and the environment, in accordance with C.R.S. 25-15-319(1)(h).

Consistent with C.R.S. 25-15-321(6), the Department shall provide to Owner a written determination on all applications to terminate an Environmental Covenant within 60 days after receipt of such application.

4) Modifications.

Consistent with C.R.S. 25-15-319(1)(h), the Department shall modify this Environmental Covenant in whole or in part when, in addition to satisfying the requirements of C.R.S. 25-15-321(3) and (5), Owner provides the following applicable showings to the Department:

- a. Restrictions on using untreated alluvial groundwater from wells located on the property within 500 feet of California Gulch for drinking, domestic, or agricultural purposes shall be modified to eliminate the restriction against one or



more of these uses if Owner demonstrates to the State that concentrations of the constituents listed in Table 1 of Attachment 2 in the subject groundwater do not exceed State water quality standards in existence at the time of the application for the beneficial use that will be allowed as a result of the modification. Current water quality standards are set forth in Table 1 of Attachment 2. Any ground water sampling conducted for purposes of modifying this Environmental Covenant shall be conducted in accordance with Attachment 2.

- b. In addition to the grounds for modification set forth in Section 4.a, the Environmental Covenants shall also be modified as to all or part of the Property if it is demonstrated to the Department that the proposed modification will ensure protection of human health and the environment, in accordance with C.R.S. 25-15-319(1)(h).

Consistent with C.R.S. 25-15-321(6), the Department shall provide Owner a written determination on all applications to modify an Environmental Covenant within 60 days after receipt of such application.

5) Conveyances. Within thirty days (30) after any grant, transfer or conveyance of any interest in any or all of the Property, the transferring Owner shall notify the Department and EPA as the named third party beneficiary of such grant, transfer or conveyance.

6) Notice to Lessees. Owner agrees to incorporate either in full or by reference the restrictions of this Covenant in any leases, licenses, or other instruments granting a right to use the Property.

7) No Liability. The Department does not acquire any liability under State law by virtue of accepting this Covenant.

8) Enforcement. The Department and EPA as the named third party beneficiary may enforce the terms of this Covenant pursuant to §25-15-322. C.R.S., and may file suit in district court to enjoin actual or threatened violations of this Covenant.

9) Notices. Any document or communication required under this Covenant shall be sent or directed to:

Notices to the Department shall be provided to:

[appropriate Program Manager or Unit leader]
Hazardous Materials and Waste Management Division
Colorado Department of Public Health and the Environment
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Notices to EPA shall be provided to:

EPA Remedial Project Manager



California Gulch Superfund Site
United States Environmental Protection Agency, Region 8
(8EPR-SR)
1595 Wynkoop Street
Denver, CO 80202-1129

Notices to Resurrection shall be provided to:

Law Department
Resurrection Mining Company
1700 Lincoln Street, Suite 3600
Denver, CO 80203

And

Director of Reclamation and Closure
Resurrection Mining Company
1700 Lincoln Street, Suite 3600
Denver, CO 80203

Either party may change its designated notice recipient upon 5 days prior to notice to the other party.

10) Property Modification. Pursuant to the Consent Decree, this Environmental Covenant is intended to cover only that portion of the Property on which the Settling Defendants own the entire fee title. If Resurrection and the Department hereafter agree that, as of the date of this Environmental Covenant, the Settling Defendants did not own the entire fee title in any portion of the Property, the Department will modify Attachment 1 hereto to exclude that portion of the Property from coverage under this Environmental Covenant.



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COV R\$152.00 D\$0.00

Patricia Berger
Lake County Recorder

Resurrection has caused this instrument to be executed this 27th day of July, 2012.

Resurrection Mining Company

By: Stephen F. Cottrell

Title: Vice President and Secretary

STATE OF Colorado)

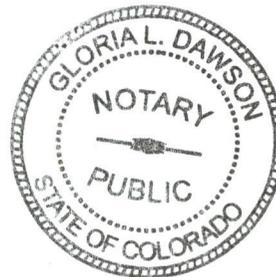
COUNTY OF Arapahoe) ss:

The foregoing instrument was acknowledged before me this 27th day of July, 2012 by Stephen F. Cottrell on behalf of Resurrection Mining Company

Gloria L. Dawson
Notary Public

6363 Sp. Fiddler's Green Circle
Address Greenwood Village, CO 80111

My commission expires: July 15, 2015





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Patricia Berger
Lake County Recorder

**ATTACHMENT 1
TO ENVIRONMENTAL COVENANT
THE PROPERTY**

Mineral Survey Number

1243
1277
2361
4229

Claim Name

Coon Valley
First National
Alhambra Placer Tract 2
Bessie Stewart



ATTACHMENT 2
TO ENVIRONMENTAL COVENANT
GROUNDWATER SAMPLING PROTOCOLS

Groundwater Sampling and Analysis Plan

This attachment specifies the groundwater sampling procedures for purposes of terminating or modifying an Environmental Covenant for groundwater use restrictions, as specified in Appendix F1. For purposes of the protocol, a “property” is defined as a portion of a claim, an individual claim or contiguous claims not exceeding 35 acres in total area for which the groundwater use restrictions of an aquifer are to be terminated. The following sections describe the groundwater sampling requirements, methods, sample analysis, and quality assurance that will support such termination or modification. Alternate groundwater sampling procedures and analysis methods for a property may be proposed in a site-specific sampling plan for the property, subject to approval by the State.

1.1 Groundwater Sampling Requirements

One groundwater sample will be collected from a well completed in the aquifer of the hydrogeologic unit (alluvial, unconsolidated sedimentary deposits, or bedrock) proposed for beneficial use underlying each property. For alluvial or unconsolidated sedimentary deposits, the hydrogeologic unit is defined as the aquifer with the same lithology and within the same surface water hydrologic divide. The bedrock hydrogeologic unit is defined as the aquifer within the same geologic formation and structure. The groundwater use restrictions will be terminated or modified for a property for only that aquifer of the hydrologic unit in which the well is completed.

The groundwater sample from the well will be analyzed for constituents that are relevant to the California Gulch Superfund Site for which numeric groundwater quality standards have been established by the State for the proposed beneficial use at the time of the application for termination or modification of the Environmental Covenant, hereafter referred to as the Numeric Standards. The constituents that are relevant to the California Gulch Superfund Site and the current Numeric Standards are presented in Table 1 for drinking/domestic or agricultural uses. The groundwater in the aquifer will be determined acceptable for the proposed use, and the Environmental Covenant restricting groundwater will be terminated for the property or modified to allow a particular beneficial use, if the constituent concentrations of the sample from the well are less than the Numeric Standards for all beneficial uses (in the event of termination) or the particular beneficial use (in the event of modification).

1.2 Groundwater Sampling Methods

The groundwater sample from the well will be collected according to the methods described in SOP No. 4-Ground Water Well Sampling. Non-dedicated or non-disposable sampling equipment will be decontaminated prior to collection of the sample according to the methods described in SOP No. 1-Decontamination. Sample collection documentation, sample



containment, preservation, identification, labeling and shipping will be performed according to the procedures described in SOP No. 7- Sample Handling, Documentation, and Analysis.

1.3 Laboratory Analytical Methods

Samples will be analyzed for the parameters for which Numeric Standards have been established for the proposed beneficial use. Sample container, preservation, and holding times are provided in SOP No. 7-Sample Handling, Documentation, and Analysis. The laboratory will be required to process all samples submitted according to the specific protocols for sample custody, holding times, analysis, reporting and associated laboratory quality assurance. Laboratory quality assurance checks will include the use of blank, spiked, split, and duplicate samples, calibration checks, and internal standards. Designated laboratory personnel will be required to ensure that QA/QC procedures are achieved. The laboratory or laboratories for constituent analysis must be accredited by the Colorado Certification Program. Laboratory calculations and data review will be performed by the laboratory in accordance with the procedures described by the analytical method. The laboratory will review the results of the laboratory QC analyses, instrument calibration and maintenance records, calculations, and the record of sample custody (including holding times) within the laboratory.

Table 1 Groundwater Standards for Beneficial Use

Parameter	Domestic Water Supply and Drinking Water Standards	Agricultural Standards
Antimony-dissolved	0.006 mg/L	
Aluminum-dissolved		5 mg/L
Arsenic-dissolved	0.01 mg/L	0.1 mg/L
Barium-dissolved	2.0 mg/L	
Beryllium-dissolved	0.004 mg/L	0.1 mg/L
Cadmium-dissolved	0.005 mg/L	0.01 mg/L
Chloride-dissolved	250 mg/L	
Chromium-dissolved	0.1 mg/L	0.1 mg/L
Copper-dissolved	1.0 mg/L	0.2 mg/L
Fluoride-dissolved	4.0 mg/L	2 mg/L
Iron-dissolved	0.3 mg/L	5 mg/L
Lead-dissolved	0.05 mg/L	0.1 mg/L
Manganese-dissolved	0.05 mg/L	0.2 mg/L
Mercury-dissolved	0.002 mg/L	0.01 mg/L
Molybdenum-dissolved	0.035 mg/L	
Nickel-dissolved	0.1 mg/L	0.2 mg/L
Selenium-dissolved	0.05 mg/L	0.02 mg/L
Silver-dissolved	0.05 mg/L	
Sulfate-dissolved	250 mg/L	
Thallium-dissolved	0.002 mg/L	
Zinc-dissolved	5 mg/L	2 mg/L



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Patricia Berger
Lake County Recorder

pH	6.5 – 8.5	6.5-8.5
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SOP-1

SOP Date: February 2008

DECONTAMINATION

1.0 INTRODUCTION AND TYPES OF CONTAMINATION

The purpose of this document is to define the standard procedure for decontamination associated with environmental investigation for the California Gulch Superfund Site. This procedure is intended to be used with other SOPs.

1.1 Site and/or Sample Cross-Contamination

The overall objective of multimedia sampling programs is to obtain samples which accurately depict the chemical, physical, and/or biological conditions at the sampling site. Extraneous contaminant materials can be brought onto the sampling location and/or introduced into the medium of interest during the sampling program (e.g., by contacting water with equipment previously contaminated at another sampling site). Trace quantities of these contaminant materials can thus be captured in a sample and lead to false positive analytical results and, ultimately, to an incorrect assessment of the contaminant conditions associated with the site. Decontamination of non-dedicated or non-disposable sampling equipment (e.g., bailers, pumps, and tubing) and field support equipment (e.g., drill rigs, vehicles) is required. To ensure that sampling cross-contamination is prevented, and that on site contaminants are not carried off site.

2.0 PROCEDURES

2.1 Equipment List

The following is a list of equipment that may be needed to perform decontamination:

- Brushes
- Wash tubs
- Buckets
- Scrapers
- Steam cleaner or high-pressure washer
- Paper towels
- Alconox detergent (or equivalent)
- Potable water
- Deionized or distilled water
- Garden type water sprayers
- Clean plastic sheeting and/or trash bags

2.2 Decontamination



2.2.1 Sampling Equipment

The following steps will be used to decontaminate non-dedicated or non-disposable sampling equipment (including reusable filter apparatus):

Personnel will dress in suitable safety equipment to reduce personal exposure (e.g., latex gloves, safety glasses, etc.).

Gross contamination on equipment will be scraped off at the sampling or construction site. Equipment that will not be damaged by water will be washed with an Alconox solution or low-sudsing detergent and potable water and scrubbed with a bristle brush or similar utensil (if possible). Equipment will be triple rinsed with potable water followed by a triple rinse with deionized or distilled water.

Following decontamination, equipment will be placed in a clean area, on or in clean plastic sheeting to prevent contact with contaminated soil. If the equipment is not used immediately, the equipment will be covered or wrapped in plastic sheeting or heavy duty trash bags to minimize potential airborne contamination.

2.2.2 Submersible Pumps

If non-dedicated submersible pumps are used they will be decontaminated between wells. The outside of the pump and hose will be tripled rinsed with deionized or distilled water. Deionized or distilled water will be pumped through the pump and hose. The volume of deionized or distilled water pumped through will be at a minimum equal to three times the volume of fluid that could be contained by the pump and hose.

2.2.3 Water Level Probes

Electric water level probes will be decontaminated by rinsing with deionized or distilled water or by wiping the probe during removal with paper towels wetted with deionized or distilled water. The water level probe will be placed in a plastic bag after decontamination.

2.2.4 Sensitive Equipment

Sensitive equipment that may be damaged by water will be carefully wiped clean using paper towels and detergent water or spray bottle and towel and rinsed with deionized or distilled water. Care will be taken to prevent any equipment damage.

2.2.5 Drilling and Heavy Equipment

Drilling and heavy equipment will be decontaminated at a designated decontamination area for large equipment. The following steps will be used to decontaminate drilling and heavy equipment:

Personnel will dress in suitable safety equipment to reduce personal exposure (e.g., gloves, safety glasses or splash shields, etc.).



Equipment showing gross contamination or having drill cuttings caked on will be scraped off with a flat-bladed scraper at the sampling or construction site.

Equipment, such as drill rigs, augers, drill bits, and shovels will be sprayed with potable water by a high-pressure washer. Care should be taken to adequately clean the insides of the hollow-stem augers and backhoe buckets.

Following decontamination, drilling equipment will be placed on the clean drill rig and moved to a clean area. If the equipment is not used immediately, it should be stored in a designated clean area.

2.2.6 Equipment Leaving the Site

Vehicles used for non-intrusive activities shall be cleaned on an as needed basis. Construction equipment such as earth moving equipment, trucks, drilling rigs, backhoes, trailers, etc., will be pressure washed at the designated decontamination area before the equipment is removed from the site.

2.2.7 Wastewater

Used wash and rinse solutions may be discharged to the ground at the sampling site

2.2.8 Other Wastes

Solid wastes such as paper towels and used filters will be sealed in plastic garbage bags and disposed of in a sanitary landfill.

2.3 Documentation

Sampling personnel will be responsible for documenting the decontamination of sampling and drilling equipment. The documentation will be recorded with waterproof ink in the sampler's field notebook with consecutively numbered pages. The information entered in the field book concerning decontamination should include the following:

- Decontamination personnel
- Date
- Decontamination observations



SOP-4

SOP Date: February 2008

GROUNDWATER WELL SAMPLING

1.0 PURPOSE AND SCOPE

The purpose of this document is to define the standard procedure for collecting groundwater samples from wells for the California Gulch Superfund Site. This procedure gives descriptions of equipment, field procedures, and QA/QC procedures necessary to collect groundwater samples from wells. The sample locations and frequency of collection are specified in the QAPP.

This procedure is intended to be used together with several other SOPs, as applicable, including:

SOP 1 Decontamination

SOP 7 Sample Handling, Documentation, and Analysis

2.0 WATER SAMPLING PROCEDURES

2.1 Equipment List

Sample bottles, preservatives, sample labels will be obtained from the analytical laboratory. Several extra sample bottles will be obtained in case of breakage or other problems. Sample bottles can be either pre-preserved or preservatives can be added in the field.

Equipment that may be used during well evacuation:

- Well keys
- Electronic water level probe
- Assorted tools (knife, screwdriver, etc.)
- PVC, Teflon, or stainless-steel bailer (bottom filling)
- PVC hand pump
- Nylon or polypropylene rope
- Bailer tripod
- PVC pump discharge hose
- Gas-powered electric generator
- Stainless-steel submersible pump
- pH meter (with automatic temperature compensation)
- Specific conductivity meter
- Plastic squeeze bottle filled with deionized water
- Polyethylene or glass container (for field parameter measurements)
- Chemical-free paper towels or Kimwipes



- Calculator
- Field notebook
- Waterproof pen
- Plastic sheeting (for placing around well)
- Appropriate health and safety equipment

Equipment that may be used during well sampling:

- Electronic water level measurement probe
- PVC, Teflon, or stainless-steel bailers (bottom filling)
- Stainless-steel submersible pump
- PVC pump discharge hose
- Electric generator
- Nylon or polypropylene rope or twine
- Bailer tripod
- pH meter (with automatic temperature compensation)
- Specific conductivity meter
- Plastic squeeze bottle filled with deionized water
- Sample bottles
- Dedicated jug for holding sample for filtering
- Cooler with ice
- Polyethylene or glass jar for field measurement samples
- Sample labels

Equipment used during sample filtration:

- Disposable filterware with 0.45-micron filter
- Hand pump or peristaltic pump
- Tygon or silicon tubing (2- to 4 ft lengths)

Equipment used during decontamination:

- Deionized or distilled water
- Decontamination buckets/pails
- Paper towels
- Plastic brushes
- Sprayers

2.2 Sampling Procedures

This section gives the step-by-step procedures for collecting samples in the field. Observations made during sample collection should be recorded in the field notebook and field data sheet as specified in Section 2.4 of this SOP.

2.2.1 Decontaminate Equipment



Before any evacuation or sampling begins, all well probes, bailers, and other sampling devices shall be decontaminated. If dedicated equipment is used, it should be rinsed with deionized water. Dedicated downhole pumps will not be decontaminated. A discussion of equipment and personnel decontamination is contained in SOP No. 1, Decontamination, and in the site Health and Safety Plan.

2.2.2 Instrument Calibration

Electronic equipment used during sampling includes a pH meter with temperature scale, a conductivity meter and a turbidity meter. Before going into the field, the sampler shall verify that all of these are operating properly. The pH and conductivity meters require calibration and calibration checks every day prior to use. The turbidity meter requires a calibration check by reading measurements cells of a known value. Calibration times and readings will be recorded in a notebook and/or on Calibration Data Sheet, which are to be kept by the field sampler.

2.2.3 Evacuate Well

The purpose of well purging is to remove stagnant water from the well to obtain representative water from the geologic formation being sampled while minimizing disturbance to the collected samples. Before a sample is taken, the well will be purged until a minimum of three well casing volumes have been removed and field parameters have stabilized, or until a maximum of five well volumes have been removed. Purging will be considered completed if the well is pumped or bailed dry. A well should be pumped at a rate no faster than approximately 1 gallon per minute if it has a tendency to dry up prior to evacuating three casing volumes. Evacuated well water may be disposed of at the well site in a manner that does not cause runoff.

Before well purging begins, the following procedures are to be performed at each well:

- Note the condition of the outer well casing, concrete well pad, protective posts (if present), and any other unusual conditions in the area around the well.
- If bailing place clean plastic sheeting around the well.
- Open the well.
- Note the condition of the inner well cap and casing.
- Measure (to nearest 0.01 foot) and record depth of static water level from the measuring point on the well casing and indicate time. Record what the measuring point is (i.e., notch on north side, top of PVC well casing).
- Calculate volume of water in the well casing in gallons based on feet of water and casing diameter. (See Section 2.4.3 for calculation of volumes.)
- From the above calculation, calculate the three casing volumes to be evacuated.
- Obtain an initial sample (which is not retained) from the bailer or purge pump for field measurements (temperature, conductivity, and pH measurements) and observation of water quality.



Evacuate three volumes of water in casing with a bailer or pump. Take temperature, specific conductance, and pH measurements after evacuation of each well volume to confirm that the water chemistry has stabilized. Generally, pH values within ± 0.2 pH unit and conductivity and temperature readings within ± 10 percent between consecutive readings indicate good stability of the water chemistry. If the chemistry is not stable, continue purging up to a maximum of five well volumes, measuring pH and specific conductance after each one half well volume.

When evacuating a well using a pump, the pump intake should be placed:

for low recovery wells (wells that can be pumped dry), place pump intake at bottom of screened interval.

for high recovery wells (little drawdown with pumping), place pump at or slightly above the middle of the screened interval to ensure the removal of stagnant water from the well bore.

If the well is bailed or pumped dry during evacuation, it can be assumed that the purpose of removing 3 well volumes of water has been accomplished, that is, removing all stagnant water that had prolonged contact with the well casing or air. If recovery is very slow, samples may be obtained as soon as sufficient water is available.

2.2.4 Obtain Water Samples

Obtain samples for chemical analysis within 2 hours after purging is completed, if possible. For slow recovering wells, the sample shall be collected immediately after a sufficient volume is available (water has recovered to screened interval). The water quality samples shall be taken from within the well screen interval.

The following sampling procedure is to be used at each well:

1. Assemble decontaminated sampling equipment. If bailers are used, new nylon or polypropylene rope will be used for each well for each sampling event. Assemble the filtering apparatus.
2. Make sure that sample labels have been filled out for each well.
3. Lower the bailer slowly and gently into contact with the water in the well. Lower the bailer to the same depth in the well each time, within the screened interval. Retrieve the bailer smoothly and empty the water in a slow steady stream into the containers. If submersible or bladder pumps are utilized to collect samples, start the pump and fill the sample bottles as described below.
4. Triple rinse the sample containers with sample water and then fill the sample bottles. If not enough sample water is available to perform the triple rinse, then at a minimum a single rinse will be performed and will be recorded in the field logbook and/or data sheet. Cap the sample containers quickly. If sample bottles are pre-preserved, fill the sample bottles without rinsing. Add preservative if the bottle is not pre-preserved. Do not allow the sample containers with preservatives to overflow. See Section 2.2.5 for details on field filtering.



5. Slowly pour an unfiltered portion into the sample container for field parameter (pH, specific conductance, temperature, and turbidity) analyses and perform the in-field analyses and record.
6. Place samples on ice in a cooler.
7. Record time of sampling.
8. Replace and lock well cap.
9. Complete field documentation.

2.2.5 Filtering Samples

Samples for metals analyses will be filtered during the field sampling event by using a disposable filter apparatus and peristaltic or hand vacuum pump.

The following procedure is to be used for filtering:

Assemble filter device according to manufacturer's instructions.

Prior to the collection of aliquots, flush the filter with approximately 100 to 200 milliliters of groundwater. Filter sample either by pouring sample in the top portion of filter unit or pumping through an in line filter using a peristaltic pump. Sample may also be filtered by attaching the in-line filter to the submersible pump discharge.

Triple rinse the sample containers with filtered sample water and then fill the sample bottles. If not enough sample water is available to perform the triple rinse, then at a minimum a single rinse will be performed and will be recorded in the field logbook and/or data sheet. Cap the sample containers quickly. If sample bottles are pre-preserved, fill the sample bottles without rinsing. Add preservative if the bottle is not pre-preserved. Do not allow the sample containers with preservatives to overflow.

Place the used filter membrane or disposable filter equipment in a Ziploc[®] bag for disposal with the personal protective equipment.

Any reusable filtering equipment will be decontaminated in accordance with SOP No. 1.

2.3 Sample Handling

Sample containers and preservatives are specified in SOP No. 7, Sample Handling, Documentation and Analysis. Samples will be labeled and handled as described in SOP No. 7.

2.4 Documentation

2.4.1 Groundwater Data Sheet

A groundwater data sheet for groundwater samples (Appendix A) will be completed at each sampling location. The data sheet will be completely filled in. If items on the sheet do not apply



to a specific location, the item will be labeled as not applicable (NA). The information on the data sheet includes the following:

- Well number
- Date and time of sampling
- Person performing sampling
- Depth to water before sampling
- Volume of water evacuated before sampling
- Conductivity, temperature, and pH during evacuation (note number of well volumes)
- Time samples are obtained
- Number of samples taken
- Sample identification number(s)
- Preservation of samples
- QC samples taken (if any)
- How the samples were collected (i.e., bailer, pump, etc.)

2.4.2 Field Notes

Field notes shall be kept in a bound field book. The following information will be recorded using waterproof ink:

- Names of personnel
- Weather conditions
- Date and time of sampling
- Location and well number
- Condition of the well
- Decontamination information
- Initial static water level and total well depth
- Calculations (e.g., calculation of evacuated volume)
- Calibration information
- Sample methods, or reference to the appropriate SOP

2.4.3 Well Volume Calculations

The following equation shall be used to calculate the volume of water to be removed during well evacuation.

For 2 inch well:

$$\begin{aligned} \text{Evacuation Volume [gal]} &= (\text{Total Depth [ft]} - \text{Water Level} \\ &\quad \text{Depth [ft]}) \times 0.1632 \text{ gal/ft} \\ &= \text{gallons/well casing volume} \end{aligned}$$

For 4-inch well:

$$\text{Evacuation Volume [gal]} = (\text{Total Depth [ft]} - \text{Water Level}$$



Depth [ft]) x 0.6528 gal/ft

For 6-inch well: = gallons/well casing volume

Evacuation Volume [gal] = (Total Depth [ft] - Water Level
Depth [ft]) x 1.4688 gal/ft

= gallons/well casing volume

Multiply the volume of one well casing volume by 3 to obtain the minimum volume of water to be evacuated.



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**APPENDIX A
GROUNDWATER DATA SHEET**



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Was a rinsate sample collected?
)

Yes No (sample control number _____)

Notes: _____



SOP-7

SOP Date: February 2008

SAMPLE HANDLING, DOCUMENTATION, AND ANALYSIS

1.0 PURPOSE AND SCOPE

The purpose of this document is to define the standard protocols for sample handling, documentation, and analysis for the California Gulch Superfund Site. This procedure is intended to be used together with other SOPs and is referenced in all SOPs that apply to sampling.

2.0 PROCEDURES FOR SAMPLE HANDLING, DOCUMENTATION, AND ANALYSIS

2.1 Sample Identification and Labeling

Samples collected during monitoring, investigations, or remediation activities will be assigned unique sample identification numbers. Each sample identification number will identify the organization collecting the sample or the program under which it is collected, sampling location, type of sample, and sampling sequence for each sample. These numbers are required for tracking the handling, analysis, and verification or validation status of all samples collected during monitoring. In addition, the sample identification numbers will be input into the project database to identify analytical results received from the laboratory.

Sample identification numbers that are assigned will be divided into four fields as shown in the following example:

M-CGW1-01-900423

The first field is one character in length and identifies the company conducting the sampling. The second field is an alphanumeric code identifying the location of the sample and the last letter of this field indicates the matrix (e.g., CGM1 indicates California Gulch Well No. 1, the second W indicates a water matrix). The next field identified is the type of sample being collected; this is used to identify whether the sample is a primary or grab sample, a composite sample, field duplicate, field blank, or equipment rinsate. The final field contains the date in a year-month-day format. For example, the sample identified above was collected on April 23, 1990.

Each sample that is collected in the field will be labeled for future identification. Sample labels will be filled out as completely as possible by a member of the sampling team prior to the start of the day's field sampling activities. The date, time, sampler's signature, and the last field of the sample identification number should not be completed until the sample is actually collected. All sample labels will be filled out using waterproof ink. At a minimum, each label will contain the following information:



Sampler's company affiliation;
Site location;
Sample identification;
Date and time of sample collection;
Method of preservation used;
Sample matrix; and
Sampler's initials.

2.2 Sample Containers, Preservatives, and Holding Times

2.2.1 Sample Containers

Proper sample preparation practices will be observed to minimize sample contamination and potential repeat analyses due to anomalous analytical results. Prior to sampling, commercially-cleaned sample containers will be obtained from the analytical laboratory. The bottles will be labeled as described in the previous section to indicate the type of sample and sample matrix to be collected. Sample bottles can be either pre-preserved from the laboratory or preservatives can be added in the field during sample collection.

2.2.2 Sample Preservation

Samples are preserved in order to prevent or minimize chemical changes that could occur during transit and storage. Sample preservation should be performed immediately upon sample collection to ensure that laboratory results are not compromised by improper coordination of preservation requirements and holding times. Samples will be preserved immediately and stored on ice in coolers prior to shipping. Sample preservation requirements are based on the most current publication of 40 CFR, Part 136.3 and are provided in Table 1.

2.2.3 Sample Holding Times and Analyses

Sample holding times are established to minimize chemical changes in a sample prior to analysis and/or extraction. A holding time is defined as the maximum allowable time between sample collection and analysis and/or extraction, based on the nature of the analyte of interest and chemical stability factors. Holding times applicable for analytes are listed in Table 1. Samples should be sent to the laboratory as soon as possible after collection by hand delivery or an overnight courier service to minimize the possibility of exceeding holding times.

For most samples, preservation by cooling to 4°C is required immediately after collection while the samples are held for shipment and during shipment to the laboratory.

2.3 Sample Preparation and Shipping

After collection, samples will be labeled and prepared as described in the previous discussion, and placed on ice in an insulated cooler. The sample containers will be placed in re-closeable plastic storage bags. Samples will then be placed right side up in a cooler with ice for delivery to the laboratory. The ice in the cooler will be double-bagged. The coolers will be taped shut and



chain-of-custody seals will be attached to the outside of the cooler to ensure that the cooler cannot be opened without breaking the seal. Final packaging and shipping will be conducted in compliance with current IATA Resolution 618 and DOT 49 CFR Part 171 Regulations.

All samples will be shipped for laboratory receipt and analysis within the holding times specified in Table 2. This may require daily shipment of samples with short holding times.

2.4 Sample Documentation and Tracking

This section describes the information that should be provided in field notes and sample Chain-of-Custody documentation.

2.4.1 Field Notes

Documentation of observations and data acquired in the field provide information on sample acquisition, field conditions at the time of sampling, and a permanent record of field activities. Field observations and data collected during routine monitoring activities will be recorded with waterproof ink in a permanently bound weatherproof field log book with consecutively numbered pages or on field data sheets as specified in the project SOPs.

Field notebook and/or data sheet entries will, at a minimum, include the information listed below. Relevant SOPs should be consulted to supplement this list.

- Project name;
- Location of sample;
- Date and time of sample collection;
- Sample identification numbers;
- Description of sample (matrix sampled);
- Sample depth (if applicable);
- Sample methods, or reference to the appropriate SOP;
- Field observations;
- Results of any field measurements, such as depth to water, pH, temperature, specific conductance; and
- Personnel present.

Changes or deletions in the field book or on the data sheets should be recorded with a single strike mark, and remain legible. Sufficient information should be recorded to allow the sampling event to be reconstructed without having to rely on the collector's memory.

All field books will be signed on a daily basis by the person who has made the entries. Anyone making entries in another person's field book will sign and date those entries.

2.4.2 Sample Chain-Of-Custody

During field sampling activities, traceability of the sample must be maintained from the time the samples are collected until laboratory data are issued. Establishment of traceability of data is



crucial for resolving future problems if analytical results are called into question and for minimizing the possibility of sample mix-up. Initial information concerning collection of the samples will be recorded in the field log book or on data sheets as described above. Information on the custody, transfer, handling and shipping of samples will be recorded on a Chain-of-Custody (COC) form.

The sampler is responsible for initiating and filling out the COC form. The COC will be signed by the sampler when he or she relinquishes the samples to anyone else. A COC form will be completed for each set of water quality samples collected, and will contain the following information:

- Sampler's signature and affiliation
- Project number
- Date and time of collection
- Sample identification number
- Sample type
- Analyses requested
- Number of containers
- Signature of persons relinquishing custody, dates, and times
- Signature of persons accepting custody, dates, and times
- Method of shipment
- Shipping air bill number (if the samples are shipped)
- Any additional instructions to the laboratory.

The person responsible for delivery of the samples to the laboratory will sign the COC form, retain the third copy of the form, document the method of shipment, and send the original and the second copy of the form with the samples. Upon arrival at the laboratory, the person receiving the samples will sign the COC form and return the second copy to the Project Manager. Copies of all COC documentation will be compiled and maintained in the central files. The original COC forms will remain with the samples until the time of final disposition. After returning samples for disposal, the laboratory will send a copy of the original COC to the Operator. This will then be incorporated into the central files.



Table 1 Sample Containers, Preservation Methods, and Holding Times

Analyte	Container ⁽¹⁾	Filtration ⁽²⁾	Preservation	Holding Time ⁽³⁾
pH	P,G	No	Cool, 4°C	7 days ⁽⁴⁾
Specific conductance	P,G	No	Cool, 4°C	28 days
Total alkalinity (as CaCO ₃)	P,G	Yes	Cool, 4°C	7 days ⁽⁴⁾
Total dissolved solids	P,G	Yes	Cool, 4°C	7 days
Total suspended solids	P,G	No	Cool, 4°C	7 days
Chloride	P,G	Yes	None required	28 days
Mercury	P,G	Yes	HNO ₃ to pH<2	28 days
Nitrate as N	P,G	Yes	Cool, 4°C	2 days
Nitrite	P	No	Cool, 4°C	48 hours
Nitrate-Nitrite	P	No	H ₂ SO ₄ to pH <2	28 days
Total Phosphorus	P,G	Yes	Cool, 4°C, H ₂ SO ₄ to pH <2	28 days
Orthophosphate	P	Yes	Cool, 4°C	48 hours
Radionuclides (total)	P,G	No	HNO ₃ to pH <2	6 months
Radionuclides (dissolved)	P,G	Yes	HNO ₃ to pH <2	6 months
Silica	P	Yes	Cool, 4°C	28 days
Sulfate	P,G	Yes	Cool, 4°C	28 days
Dissolved metals	P,G	Yes	Cool, 4°C, HNO ₃ to pH <2	6 months
Total metals	P,G	No	Cool, 4°C, HNO ₃ to pH <2	6 months
Total recoverable metals	P,G	No	Cool, 4°C, HNO ₃ to pH <2	6 months

⁽¹⁾ Bottle code: P=polyethylene bottle with polyethylene-lined lid. G=glass bottle with Teflon-lined polyethylene lid.
⁽²⁾ Samples requiring filtration must be filtered in the field using a 0.45 µm membrane filter before preservative is added.
⁽³⁾ Holding times start at date of sample collection.
⁽⁴⁾ Sample pH and alkalinity should be analyzed as soon as possible after collection. However, for practical purposes, the holding times have been set at seven days. The 14 day holding time specified in 40 CFR 136.3, Table II, is considered to be inappropriate for the high carbonate waters of the system.

RESURRECTION MINING COMPANY ENVIRONMENTAL COVENANT "C" ZONE PROPERTIES



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