Work Plan
Easy Junior Mine Site
Restoration Characterization

Prepared for:
U.S. Army Corps of Engineers
Contract DACW05-00-D-006
Delivery Order No. 005

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Contents

Appendices

Acronyms

BLM	U.S. Department of Interior, Bureau of Land Management
BMRR	Bureau of Mining Regulation and Reclamation
CDM	CDM Federal
FSP	field sampling plan
HDPE	high density polyethylene
HSP	health and safety plan
NDEP	Nevada Department of Environmental Protection
QAPP	quality assurance project plan
RAMS	Restoration of Abandoned Mine Sites
SAR	sodium adsorption ratio
SOPs	standard operating procedures
TOC	total organic carbon
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WAD	weak acid dissociable
WRDA	Water Resources Development Act

1.0 INTRODUCTION

1.1 OVERVIEW

This work plan has been developed by CDM Federal (CDM) in support of ongoing site characterization and reclamation activities at the Easy Junior Mine, located in White Pine County, Nevada. The work will be completed under U.S. Army Corps of Engineers ("the Corps") contract DACW05-00-D-006, delivery order no. 005. This work plan has been developed under the authority of Public Law 106-53, Section 560 of the Water Resources Development Act (WRDA) of 1999. Under the WRDA, Congress has provided direction to the Corps to establish the Restoration of Abandoned Mine Sites (RAMS) program. RAMS allows the Corps to provide assistance to other federal agencies and the states in addressing abandoned mine lands issues.

This work plan includes the following elements: Section 1.2 presents a description of the Easy Junior Mine site, Sections 1.3 to 1.5 present environmental issues related to conditions at the mine site, Section 2.0 presents a summary of the scope of work being governed by this work plan; Section 3.0 presents the project organization, contacts, and schedule; and Section 4.0 presents the references reviewed in developing the site description. Appendix A includes the field sampling plan (FSP), Appendix B contains the quality assurance project plan (QAPP), and Appendix C includes CDM standard operating procedures (SOPs) that govern collection and recording of field data. Appendix D presents the health and safety plan (HSP) governing field work at the Easy Junior Mine site and Appendix E contains the site security plan.

1.2 EASY JUNIOR MINE SITE DESCRIPTION

1.2.1 <u>Site Location</u>

The Easy Junior Mine site ("the site") is located on public lands administered by the U.S. Department of Interior, Bureau of Land Management (BLM) Ely Field Office, Ely, Nevada. The site is located approximately 45 miles west of Ely, Nevada and 15 miles south of U.S. Highway 50 in the foothills of what is considered to be a portion of the Pancake Range. The site is located in Township 15 North, Range 56 East, Sections 4, 5, 8, and 9, White Pine County, Nevada.

The site is located in an area with a climate typical of the eastern portion of Nevada. Average elevation of the site is 6,500 feet above sea level. Mean annual precipitation at the site is slightly over 9 inches, while annual free water surface evaporation is 48 inches (Alta Gold Company, 1989).

No perennial surface waters exist on or near the project site. The nearest surface water is Bull Creek, 8.8 miles southeast of the site and on the opposite side of the Pancake Range. The site is outside of the 100-year flood plain. The mine's water supply well was drilled approximately 5 miles southeast of the mine area. Water in this aquifer is of potable quality. Water beneath the mine site occurs at approximately 1,430 feet below ground surface (NDEP, 1995a).

Permitted site facilities included an open pit, two heap leach pads of approximately 45 acres, a barren solution pond, a settling pond, an overflow pond, a pregnant solution sump, and carbon adsorption columns (NDEP, 1995b). A single pit was mined with waste being hauled to the waste dumps. Ore was transported to the leach pad area and either stacked as run-of-mine ore or crushed and conveyed to the pad.

1.2.2 Site Geology

Geologic units at the site include sedimentary units including the Devonian Guilmette Formation (Devil's Gate Limestone), the Pilot Shale, Joana Limestone, Chainman Shale and Diamond Peak Formation of Mississippian age. Tertiary volcanics and jasperoid (Alta Gold Company, 1989b) are also found at the site.

1.2.3 Site Mining History

Modern day exploration of the Easy Junior site began in the early 1980's. The joint venture of Alta Gold Company and Echo Bay Mines explored unpatented mining claims at the site. Mineral lease agreements for some of the unpatented claims were negotiated with Lyle F. Campbell and BP Mineral (Alta Gold, 1986a). Approximately 37,000 feet of roads were permitted under an exploration permit at the site. Exploration roads and holes are bonded separately from mining operations.

Alta Gold and Echo Bay Minerals jointly owned all of the operations and facilities covered under the Plan of Operations, however Alta Gold was the operator of the project. Mining began late in 1989 and continued through 1990. The project was inactive during 1991 and 1992; during which Alta Gold acquired Echo Bay's interest in the property. Mining operations began again in 1993 and continued through 1994. Gold was extracted from ore at the Easy Junior Mine by conventional cyanide leach techniques. Leachate gravity flowed to the pregnant solution sump and was pumped through carbon adsorption columns. Barren solution was pumped back to the pad for spraying of ore. Loaded carbon was transported to Alta Gold Company's (Alta Gold) Robinson Project for gold recovery. Leaching of ore continued through late 1996 and addition of cyanide to the barren solution was discontinued in October 1996. Approximately 64,000 ounces of gold were recovered during the mine life (Wilson, 2001).

Following completion of active mining at the site, Alta Gold filed bankruptcy. During the initiation of the bankruptcy proceeding, Alta Gold discontinued site reclamation; however, a surety bond was obligated in the amount of $365,517 for reclamation of the site (Nevada Department of Environmental Protection [NDEP], 1996a). Some concurrent reclamation was initiated at the site but a significant amount of reclamation work remains. Alta Gold submitted a reclamation plan on February 19, 1993 and addressed agency comments in a January 5, 1996 letter. A reclamation permit (number 0094) was subsequently approved by NDEP on April 24, 1996.

The NDEP Bureau of Mining Regulation and Reclamation (BMRR) issued a water pollution control permit for the site during 1990 and renewed the permit in December 1995. A Final Permanent Closure Plan for the site, as required by BMRR, was not on record during review of BLM files. The BMRR ensures that mining operations do not degrade water of the state and that post-mining land use goals are achieved. They also require that land impacted by mining operations be returned to safe and stable conditions (NDEP, 2001). Post-mining land use is defined as livestock grazing and wildlife grazing in Alta Gold's reclamation plan (Alta Gold, 1993a).

1.3 EASY JUNIOR MINE SITE ISSUES

There are several issues of concern at the Easy Junior Mine site. These issues are summarized below (CDM, 2001).

- A significant amount of work remains before satisfying the reclamation requirements at the Easy Junior Mine site. Alta Gold discontinued reclamation activities after filing bankruptcy. Completed reclamation work includes contouring and seeding of the waste dump and the exploration road, and removal of the shop building, dry house, and administrative buildings. NDEP approved a bond release of $24,646 for work completed (NDEP, 1995c).

- Prior to filing bankruptcy, the heap leach pad was sufficiently rinsed to achieve an acceptable pH and cyanide concentration in the leach pad effluent. All neutralized process waters were land applied; therefore, water balance is not a significant issue at this site.

- Long-term water quality discharging from the heap leach pad is an issue of concern at the site. The pad has not been contoured and capped. In August 2001, the effluent discharge rate was approximately 1 gallon per minute (gpm) into an adjacent leach field (CDM, 2001). Discharge rates during winter and spring months are expected to be greater. Information addressing the acid/base potential of heap leach pad materials was not discovered during review of BLM documents on file.

- The occurrence of sulfide oxidation within the waste rock dumps is also of concern. Fumaroles exist as a result of the sulfide oxidation in some dump locations during winter months. Vegetative reclamation has been unsuccessful in areas of the dump where the vapor discharges to the atmosphere. BLM staff indicated that previous testing of cover soils proved acidic soil conditions (CDM, 2001).

- The processing area has been partially reclaimed; however, a barren solution pond, a settling pond, an overflow pond, and a pregnant solution sump remain unreclaimed. Sludge remaining in the pond and sump bottom has not been characterized. The sludge likely contains various metals attenuated to the fine particulate matter. The steep angle (1.5-2.0:1.0) of the high density polyethylene (HDPE)-lined pond sides could hinder the escape of wildlife that enter the pond to drink.

Identification of acceptable growth media for use in site reclamation is another site issue. Based on observation, approximately 10,000 cubic yards of stockpiled "soil" remains at the site. Reclamation of the heap leach pad and other facilities will require augmenting existing growth media.

1.3.1 Heap Leach Pad

One polyvinyl chloride-lined leach pad was constructed in the southeast section of the property. Alta Gold anticipated a total pad volume of approximately 1.7 million tons of ore (Alta Gold, 1993a) within the 49.5 acre footprint (NDEP, 1996a). Approximately 1 gallon per minute of flow was observed in the leach pad's return flow pipeline during an August 2001 site visit (CDM, 2001). Pad effluent is being discharged to a drainfield immediately west of the pad. No reclamation of the pad material was observed; however, fresh water rinsing and land application of neutralized solution was completed prior to discharge to the drainfield.

Fresh water rinsing of the heap leach pad began in October 1996 and continued through June 1997 (Alta Gold, 1998a). Rinsing was discontinued when weak acid dissociable (WAD) cyanide concentrations reached 0.1 milligrams per liter and the pH had stabilized at 8.1. Additional samples of pad effluent were collected during pad draindown during the third and fourth quarters of 1997. Samples of process solution were analyzed each quarter of 1997 for water in storage ponds (barren solution) and for leach pad effluent (pregnant solution).

Approximately 7 million gallons of neutralized process solution was land applied in an area immediately south of the heap leach pad. The depth to groundwater in the vicinity is over 1,300 feet below ground surface. Alta concluded that waters of the state would not be degraded, although several constituents exceeded Nevada Drinking Water Standards.

Alta Gold's reclamation plan indicates that the heap leach pad was constructed so that the side slopes maintain an angle no greater than 37 degrees from horizontal. Four lifts of 20 feet were planned with a 15 foot recessed step between lifts. The overall side slope is 2:1. Following solution detoxification, the slopes were to be reduced to 3:1, resulting in a stable configuration. The ore would be pushed over the edge of the pad liner to achieve a 3:1 slope, as the toe of the ore is currently at the liner edge.

None of the documents reviewed indicated the presence of sulfide minerals in the ore or waste material. However, sulfide reduction is likely occurring in the waste rock dump as evidenced by fumaroles at the surface during winter months. There is no evidence of sulfide reduction in the ore from operational water quality data.

1.3.2 Waste Rock Dump

The primary waste rock dumps are located downgradient and west of the pit area in the northwest portion of the project area. Minor areas of waste rock exist peripheral to the pit and appear to be associated with construction of the haulage road from the pit to the processing facilities. The main waste rock dump has been sloped from an angle of repose (1.5:1) to approximately 3:1. Topsoil has been spread on the majority of the dump and reseeded. Approximately 10 to 20 acres on the back of the dump have little or no topsoil. Reseeding in this area has been unsuccessful.

The grass vegetative cover is established, with some bare spots. The bare spots on the dump face and front edge of the top of the dump appear to be a caused by low pH soils resulting from sulfide reduction within the dump. Lime has been selectively placed in areas over and near the fumaroles observed at these locations. No seepage has been observed from the waste rock dump.

The Alta Gold reclamation plan indicates that the final dump slope is 3:1, with relatively flat tops. No acid-base accounting data for waste rock was found in review of BLM documents.

Based on discussions with BLM personnel, sulfide reduction is occurring within the dump as meteoric waters seep downward. Lime has been spread on the dump top and upper side slope in areas where the growth media exhibits low pH.

Based on the August 2001 site tour, revegetation of the dump surface has been successful in areas with adequate growth media cover. Minimal rills and gullies were observed in the revegetated areas of the dump. Revegetation has been unsuccessful on areas of the dump where little or no growth media was placed.

1.3.3 Processing Facilities

The main processing plant has been disassembled and removed from the site, although the foundation, miscellaneous outbuildings, and piping remain. HDPE-lined pregnant, barren, and stormwater ponds are located immediately downgradient of the processing plant. The liner integrity appears to be good. All ponds are empty, with some residual dry sludge (approximately 2-3 inches) in the pond bottoms. A pregnant solution sump (approximately 10,000 gallons) with concrete foundation exists in-line between the leach pad and processing plant location. No reclamation of the processing ponds has occurred and the sludge remaining in the bottom of ponds and the pregnant solution sump has not been characterized.

The total storage capacity of the ponds is 7.81 million gallons (Alta Gold Company, 1989a). The settling pond volume is 0.31 million gallons, the barren pond volume is 3.5 million gallons, and the overflow pond volume is 4.0 million gallons.

The reclamation plan indicates the pond liners will be cut and folded into the bottom of the ponds. Berms will be pushed into the ponds to fill the pond volume. Based on observations made during the site visit, adequate berm material is not available to fill the ponds.

Scrap and inert demolition debris will either be hauled off site or buried in the previously permitted Class III landfill.

Insert Figure 1

Insert Figure 2: Site Map

2.0 SCOPE OF WORK

The following text presents a summary of the work to be completed under this Work Plan.

2.1 TASK 1 - ADMINISTRATIVE ITEMS

2.1.1 Subtask 1.1 – Program Level Meetings

The CDM project manager and lead technical representative will attend two program meetings in either Reno or Carson City. The purpose of the meetings will be to discuss the proposed work to be accomplished and the findings of the investigations, as described for Task 2. CDM will provide meeting minutes within three workdays following each meeting.

2.1.2 Subtask 1.2 – Agency Teleconferences

CDM will set up and hold teleconferences in which the Corps, BLM, and other agencies will participate. CDM will provide a proposed agenda at least two workdays prior to the teleconference and minutes within two workdays after each teleconference. The purpose of the teleconferences will be to discuss and achieve consensus with project goals, status, and findings. The weekly teleconferences will occur only during the active period of work. This schedule may be relaxed to biweekly or monthly upon the agreement of the participants. For the life of the project it is assumed that there will be 12 teleconferences each two hours in duration.

2.1.3 Subtask 1.3 – Weekly Project Status Reports

CDM will prepare and provide to the Corps and BLM, weekly project status reports. These reports will summarize the activities that occurred during the previous week. Included with the reports will be the preliminary results of analytical or geotechnical testing received during the prior week. In the event that no work was performed during the prior week, the weekly report will be a simple fax stating that no work occurred. The period during which active field work will be performed is estimated to be 12 weeks.

2.1.4 Subtask 1.4 – Field Log Submittal

During the period of active field work, CDM will provide copies of field logs and forms with the weekly status reports to the USACE and the BLM point of contact. These logs will include but not be limited to:

- Standby time
- Date and time work commenced and ended
- Weather and temperature
- Type(s) of equipment used
- Names of all personnel working at the site
- Names of all visitors to the site
- Conditions encountered.

2.1.5 Subtask 1.5 – Correspondence Log

CDM will maintain a correspondence log of all telephone communications pertinent to the project, including but not limited to telephone calls, meetings, and summaries of discussions on both the project and program levels. CDM will provide this documentation with the weekly status reports.

2.2 TASK 2 – HEAP LEACH PAD RECLAMATION

2.2.1 Need for Heap Leach Pad Reclamation

A 49.5-acre heap leach pad, containing approximately 1.7 million tons of cyanide-leached ore, requires closure at the mine site. Pad effluent is discharged to a drain field immediately west of the pad. Alta Gold completed fresh water rinsing and land application of the neutralized solution. Post-closure solution discharge activities must not degrade waters of the State of Nevada and remain in compliance with state regulations relevant to stabilization (chemical and physical) as defined by the Nevada Administrative Code 4451.430. Alta Gold's reclamation plan indicates that the heap leach pad was constructed so that the side slopes maintained an angle no greater than 37 degrees from horizontal. Four lifts of 20 feet were planned with a 15-foot recess step between lifts. The overall side slope is 2:1. Following solution detoxification, the slopes were to be reduced to a slope of 3:1, resulting in a stable slope configuration. This was to be accomplished through the pushing of ore over the edge to achieve the final slope. Geotechnical analysis performed by Alta Gold to support their final pad configuration was not located during the records search/review.

2.2.2 Subtask 2.1 - Water Quality and Leach Pad Characterization

CDM will collect one water quality sample of the leach pad liquid. This sample will be analyzed for Profile II constituents (including WAD cyanide) and total cyanide and will correspond with completion of a meteoric water mobility procedure given that the unreclaimed pad has been exposed to meteoric water for the past several years.

CDM will collect one composite soil sample from the upper horizon (0 to 24 inches) of leach pad material to characterize potential impacts to flora and fauna if a minimum or no soil cover option is selected to close the facility. The sample will be composited from at least four locations on the leach pad. The sample will be subject to geotechnical testing of grain-size distribution and water holding capacity and will be analyzed for the metals antimony, arsenic, cadmium, copper, lead, manganese, mercury, nickel, selenium, silver, and zinc. The sample will also be tested for nitrate, sulfate, sulfide, and soil pH.

CDM will use results of both the water quality and soil samples to support the development of the cover design. The results for the testing will be discussed in the investigation report detailing the design approach for the heap leach pad.

2.2.3 Subtask 2.2 - Soils Identification Evaluation

CDM will determine the volume and physical and chemical properties of the stockpiled soil to demonstrate the utility of using the soil as final cover. Published soil maps will be used to determine areas where adequate soil will be found. CDM will then select up to four potential source areas for growth media. One soil sample will be composited from each of the four areas and analyzed for total organic carbon (TOC), coarse fragment analysis (>2 mm), standard grain size distribution (including hydrometer [textural] analysis for fines passing through a No. 200 sieve), phosphorous, potassium, soil pH, sodium adsorption ratio (SAR), electrical conductivity, water holding capacity, and total metals (antimony, arsenic, cadmium, copper, lead, manganese, mercury, nickel, selenium, silver, and zinc) content.

2.2.4 Subtask 2.3 - Effluent Drainfield Assessment

The effluent from the leach pad is currently draining through four lines to a leach field. The structure distributing the water is currently not functioning as designed. CDM will review the design of the effluent drain system and make recommendations for design modifications to improve proper discharge of the water. Recommendations will be presented in the investigation report.

2.2.5 Subtask 2.4 - Heap Leach Pad Reclamation Proposal

CDM will develop a heap leach pad reclamation proposal following completion of studies described above. A recommended regrading plan and engineered soil cover will be designed using HELP, Soil Cover, or other applicable models. Data supporting the action and the approval of NDEP, if granted, for pushing material off of the pad will be included in the proposal. The reclamation proposal will be a component of the Investigation Report and will contain adequate detail for development of a construction cost estimate and associated bid documents.

2.2.6 Subtask 2.5 - Total Mine Reclamation Cost Estimate

CDM will develop a reclamation proposal and government-level cost estimate for restoration of the mine site. The proposal and cost estimate will be on a project component basis so that BLM can make decisions on site restoration priorities based on the amount of existing bond monies for the mine site. The existing reclamation plan will be used as a guideline. The cost estimate for the following tasks will be included:

- TCLP characterization of pond sludge
- Burial of pond drain lines
- Recontouring of ponds
- Breaking of concrete foundations with burial on site
- Removal of site debris
- Cleanup of hydrocarbon spill (no previous mention of this??), including site testing and placement on leach pad
- Recontouring of haul roads
- Placement of growth medium on reclaimed sites

- Placement of additional growth medium on waste dump areas with no vegetation
- Seeding of all reclaimed sites
- Determination of surface pH in problem areas of waste dump
- Cost of environmental assessment for long-term closure of effluent discharge.

2.3 TASK 3 – INVESTIGATION REPORT

CDM will prepare an investigation report that will include the results of the field characterization work and support the development of a complete final permanent closure plan for the heap leach pad facility. The investigation report will be developed to address the requirements of submittal to the Nevada BMRR closure branch. The cost estimate for completing site reclamation will be provided in a separate document.

3.0 PROJECT ORGANIZATION AND SCHEDULE

3.1 Project Organization and Contacts

This project is being managed by CDM under the direction of the Corps. Key project personnel and contacts are listed below.

Individual	Role	Organization
B.J. Bailey	Project Manger	Army Corps of Engineers
Lynn Bjorklund	Project Manager	Bureau of Land Management
Kevin Ryan	Project Manager	CDM
Kerri Dierberger	Field Team Manager	CDM
John Wondolleck	Contract Manager	CDM

3.2 Schedule

The project schedule is presented on the following pages.

Proposed Schedule, page 1 of 2

Proposed Schedule, page 2 of 2

4.0 REFERENCES

Alta Gold Company, 1989a. *Plan of Operations Amendment*.

Alta Gold Company, 1989b. *Plan of Operations*.

Alta Gold Company, 1993a. *Reclamation Plan.*

Alta Gold Company, 1989a. *Water Pollution Control Permit Application*.

Alta Gold Company, 1998a. *Request for Approval of Land Application of Heap Rinsate/Drain-down Solution.*

Bjorklund, Lynn (BLM Ely Field Office), 2001. Personal communication.

Camp Dresser and McKee Inc, 2001. RAMS Site Visit Summary Report

Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation, 1995a. *Draft Water Pollution Control Permit*

Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation, 1995b. *Water Pollution Control Permit Fact Sheet*

Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation, 1995c. *Partial Surety Release for Alta Gold – Easy Junior Project*

Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation, 1995d. *Reclamation Permit Application – Stability Requirements for Mine Components in Post-Mining Configurations.*

Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation, 1996a. *Reclamation Permit No. 0094*

Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation, 2001. Accessed on: September 12, 2001. Available at: http://ndep.state.nv.us/bmrr/bmrr01.htm

Wilson, Bill (BLM Ely Field Office), 2001. Personal communication.

Contents

Acronyms

BLM	U.S. Department of Interior, Bureau of Land Management
CDM	CDM Federal
FSP	field sampling plan
QAPP	quality assurance project plan
SAR	sodium adsorption ratio
SOPs	standard operating procedures
TOC	total organic carbon
USEPA	United States Environmental Protection Agency
WAD	weak acid dissociable

1.0 INTRODUCTION

This field sampling plan (FSP) presents the field sample and data collection procedures to be employed to address the objectives of the additional site characterization and sample collection and analysis described in the Work Plan. The FSP includes references to standard operating procedures (SOPs) that will be followed in order to assure that all samples collected will be representative of the physical and chemical characteristics of site media.

The field sampling activities addressed under this FSP include:

- Sampling of leach pad liquid and soil
- Determination of the volume and physical and chemical properties of the stockpiled soil.

The intended use of the data collected under the guidance of this FSP is to provide the Bureau of Land Management (BLM) with information and recommendations for development of a cover design for the heap leach pad and demonstrate the utility of using the on-site stockpiled soil for growth medium on the final cover.

2.0 OBJECTIVES OF FIELD SAMPLING

2.1 WATER QUALITY AND LEACH PAD CHARACTERIZATION

Issues related to sampling of the leach pad liquid and soils are described in Sections 2.2.1 and 2.2.2 of the Work Plan. The objective of this sampling is to support the development of the cover design for the heap leach pad. The results of the sampling effort will be presented in the investigation report for the Easy Junior mine site.

2.2 STOCKPILED SOILS IDENTIFICATION EVALUATION

The objectives of the stockpiled soils evaluation are discussed in detail in Section 2.2.3 of the Work Plan. Four potential source areas for growth media will be determined in the field. One composite sample will be prepared comprising soil from each of the four areas and analyzed for physical and chemical properties.

3.0 FIELD SAMPLING PROCEDURES

3.1 INTRODUCTION

Presented in this section are summaries of the field sampling procedures to be employed by CDM Federal (CDM) while performing the work scope described in Section 2.0. All sample collection, recording, handling, and shipment will be in accordance with CDM SOPs included as Appendix C of the work plan. There will be no investigation-derived waste produced during any sampling activities at the Easy Junior Mine site.

3.2 WATER QUALITY AND LEACH PAD CHARACTERIZATION

One sample of the liquid will be collected from the leach pad and analyzed for Profile II constituents (including weak dissociable acid [WAD] cyanide) and total cyanide. One sample from the upper 2 feet of the leach pad material will be collected using a decontaminated stainless-steel trowel and placed into the proper pre-cleaned laboratory containers. The sample will be subject to geotechnical testing of grain-size distribution and water holding capacity and analyzed for the metals antimony, arsenic, cadmium, copper, lead, manganese, mercury, nickel, selenium, silver, and zinc. The sample will also be tested for nitrate, sulfate, sulfide, and soil pH. All chemical analyses will be performed in accordance with the analytical methods presented in the quality assurance project plan (QAPP, Appendix B).

3.3 SAMPLING OF STOCKPILED SOILS

The physical and chemical properties of the on-site stockpiled soil will be utilized to assess potential for use of the soil as final cover. Additionally, 4 potential source areas for growth media proximal to the mine site will be identified through a review of available soil maps, sampled, and analyzed. One soil sample composited from soil collected from each of the four potential source areas will be tested for total organic carbon (TOC), coarse fragment analysis (>2 mm), standard grain size distribution (including hydrometer [textural] analysis for fines passing through a No. 200 sieve), phosphorous, potassium, soil pH, sodium adsorption ratio (SAR), electrical conductivity, water holding capacity and total metals (antimony, arsenic, cadmium, copper, lead, manganese, mercury, nickel, selenium, silver, and zinc) content.

The SOPs that govern the collection of these samples are presented in Appendix C and are listed below:

- SOP 1-1 Surface Water and Sediment/Sludge Sampling (pages: 1-7 and 14)
- SOP 1-2 Sample Custody (pages: all)
- SOP 1-3 Surface Soil Sampling (pages: 1-3; 11-12)
- SOP 2-1 Packaging and Shipping of Environmental Samples (pages: 1-4)
- SOP 4-1 Field Logbook Content and Control (pages: all)
- SOP 4-2 Photographic Documentation of Field Activities (pages: all)
- SOP 4-5 Field Equipment Decontamination at Non-radioactive Sites (pages: all)

The SOPs provide general procedures that will be followed for sample collection. The following text provides specifics regarding the sampling of wastes at the Easy Junior Mine site.

- Sampling equipment will be decontaminated and wrapped in plastic prior to entry of the Easy Junior Mine site
- Samples will be placed in sample containers pre-cleaned by the analytical laboratory
- Field information will be recorded in a field logbook. Samples will be logged on a chain-of custody form and the samples will be kept secure on ice until prepared for shipment to the analytical laboratory.
- There will be no field duplicate or field equipment blank sample collected as part of this sampling effort.

Table A-1 summarizes the sample bottle type and preservative for each chemical analysis being performed on the samples.

Table A-1

Sample Analytes, Analytical Methods, Matrices, Containers and Preservatives

Analyte	**Analytical Method[1]**	**Matrix**	**Sample Container**	**Preservative**
Profile II Constituents: Alkalinity/Bicarbonate Alkalinity/Carbonate Alkalinity/Hydroxide Alkalinity/Total	ASTM Standard Method 2320B	Liquid	1-1 liter polyethylene	unpreserved except for ice to 4°C±2°C
Chloride Fluoride Sulfate	USEPA 300.0			
pH	ASTM Standard Method 4500			
Total Dissolved Solids	ASTM Standard Method 2540C			
Aluminum Bismuth Boron Calcium Gallium Iron Lanthanum Lithium Magnesium Potassium Scandium Sodium Strontium Tin Titanium	USEPA 200.7		1-500 ml polyethylene	HNO_3 to pH <2 and ice to 4°C±2°C
Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Lead Manganese Molybdenum Nickel Selenium Silver Thallium Vanadium Zinc	USEPA 200.8			
Mercury	USEPA 245.1			
Nitrate – N	USEPA 300.0		1-250 ml polyethylene	H_2SO_4 to pH <2 and ice to 4°C±2°C
Phosphorus	USEPA 365.3			
WAD Cyanide	USEPA 1677		1 liter polyethylene	NaOH to pH > 12 and Ice to < 4ºC
Total Cyanide	USEPA 335.3	Liquid	1 liter polyethylene	NaOH to pH > 12 and Ice to < 4ºC

Nitrate may be included with other analytes to be analyzed for using Method 300.0 **IF** received by laboratory within 48 hours of sampling.

Table A-1

Sample Analytes, Analytical Methods, Matrices, Containers and Preservatives (continued)

Analyte	**Analytical Method[1]**	**Matrix**	**Sample Container**	**Preservative**
Total Metals: Antimony Arsenic Cadmium Copper Lead Manganese Nickel Selenium Silver Zinc Mercury	USEPA 6010B	Soil	8-oz glass jar	Ice to < 4ºC
Nitrate	USEPA 300.0		All analyses from one 8-oz. glass jar	Ice to < 4ºC
pH	USEPA 9045C			
Phosphorus	USEPA 365.3			
Potassium	USEPA 258.1			
Sulfate	USEPA 300.0			
Sulfide	USEPA 376.2			
Sodium adsorption ratio	USDA No. 60		8-oz. glass jar	Ice to < 4ºC

[1]Or equivalent method achieving required detection limits. See Appendix B for analytical procedures.

Contents

List of Tables

Acronyms

BLM	Bureau of Land Management
CCV	continuing calibration verification
CDM	CDM Federal
FSP	field sampling plan
HSP	health and safety plan
LCS	laboratory control sample
MDL	method detection limit
MS/MSD	matrix spike/matrix spike duplicate
PARCC	precision, accuracy, representativeness, completeness, and comparability
QAPP	quality assurance project plan
QC	quality control
RPD	relative percent difference
RSD	relative standard deviation
SAR	sodium adsorption ratio
SOPs	standard operating procedures
TOC	total organic carbon
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
WAD	weak acid dissociable

1.0 PROJECT MANAGEMENT

This quality assurance project plan (QAPP) documents the project organization; presents the analytical procedures being used to produce data for the samples collected under the field sampling plan (FSP); and, identifies the analytical and data review procedures to ensure the accuracy, precision, and representativeness of the samples so that project objectives presented in the FSP are met. This QAPP is one component of the Work Plan being developed to produce chemical data of known quality at the Easy Junior Mine Site, White Pine County, Nevada.

This QAPP has been reviewed by the CDM Federal (CDM) project QA coordinator, who will also maintain QA oversight for the duration of the project. All work performed on this project will be in accordance with the CDM QA Program described in CDM's *Quality Assurance Manual* (CDM, 2001). All deliverables produced during the fieldwork and investigation will be subject to technical review by CDM technical specialists. Deliverables presenting measurement data will also be reviewed by an approved CDM QA reviewer. All documents developed during this project will be under the control of the CDM project manager who will maintain the project files. Audits or field surveillances will be performed in accordance with CDM requirements.

1.1 PROJECT ORGANIZATION

Key positions and associated responsibilities for all individuals responsible for project management, data collection, data reporting, and review are provided below. Included are the functions of each individual and their lines of authority.

Bureau of Land Management (BLM) Project Manager - Neal Brecheisen

- Review and approval of the project work plan and deliverables
- Review of field reports
- Provide project direction and oversight

United States Army Corps of Engineers (USACE) Project Manager – B.J. Bailey

- Communicate project objectives and content with BLM project manager
- Issue and oversee contractual items
- Assure delivery of data and project deliverables to BLM
- Review project technical and data reports
- Provide project oversight

CDM Project Manager – Kevin Ryan

- Provide technical direction for all field activities
- Review and approve CDM deliverables
- Ensure compliance with project schedule

- Implement corrective or other actions necessary to complete the project scope

CDM Project Quality Assurance Manager – George Delullo

- Review QAPP and FSP for compliance with CDM's QA program
- Provide technical direction to the CDM project manager and field team leader on quality assurance issues
- Conduct audits/surveillances of project reports for verification of adherence to the quality control procedures identified in this QAPP and the FSP

CDM Field Team Leader – Kerri Dierberger

- Assure that all sampling is conducted in accordance with the FSP and supporting standard operating procedures (SOPs)
- Verify that all quality control (QC) procedures are followed and QA samples are collected and managed in accordance with the QAPP
- Report any sampling problems to the CDM project manager
- Assure proper completion of the field log book, field record sheets, and chain-of-custody forms

Analytical Laboratory – Sierra Analytical

- Provide pre-cleaned sample containers of the size and type listed in the FSP
- Conduct chemical analyses in accordance with the analytical procedures identified in this QAPP
- Calibrate and maintain equipment in accordance with manufacturers recommendations and the laboratory's QA plan
- Conduct internal QA/QC checks and procedures and provide CDM with verification records upon request
- Notify CDM's QA manager of any laboratory problems that jeopardize the quality of sample data or fail to address analytical method QC limits
- Deliver analytical reports in accordance with the subcontract agreement including results, QA/QC documentation, problems and corrections, and custody records.

1.2 PROJECT DESCRIPTION

1.2.1 Site Background

Background information regarding the Easy Junior Mine site and environmental issues that need to be addressed are provided in Section 1.0 of the Work Plan.

1.2.2 Data Acquisition Activities Governed by this QAPP

Two distinct sampling activities will occur as described in Sections 2.2.2 and 2.2.3 of the Work Plan. These activities include:

- Sampling of the heap leach pad liquid and soils to support the development of the cover design for the pad.
- Sampling of stockpiled soil to demonstrate the utility of using the soil for the final cover.

Sampling procedures are described in the FSP. Section 3.0 of this QAPP provides the analytical procedures. Table B-1 provides a summary of the analytical schedule for sampling activities at the Easy Junior Mine site.

1.2.3 Special Training Requirements/Certifications

The Easy Junior mine site will be treated as a hazardous waste site for purposes of identifying safety practices during field sampling and data collection. Appendix D presents the Health and Safety Plan. All personnel who enter an abandoned mine site must recognize and understand the potential hazards to health and safety associated with the site. All employees involved in sampling and site inspection activities will have training that meets the OSHA hazardous waste site worker 40-hour training requirement. Personnel responsible for the use of field instruments, sampling equipment, and operation of mechanical and/or power equipment will receive necessary training for the safe and proper use of the equipment. Field activities will be directed by a qualified geologist or engineer.

2.0 ANALYTICAL AND QUALITY CONTROL PROCEDURES

2.1 ANALYTICAL PROCEDURES

Table A-1 of the FSP presents a summary of the analytical method, sample matrix, sample container, and sample preservative requirements for the chemical analyses being performed under this program. Table B-1 provides a summary of the samples to be collected by sampling locations with reference to the respective FSP Section. Table B-2 presents the analytes with their respective detection limits for each matrix (water and soil).

2.2 MEASUREMENT/DATA ACQUISITION

2.2.1 Sample Handling and Custody Requirements

Procedures for sample handling and chain-of-custody control are provided in SOP 1-2 (Appendix C). The procedures outlined in this SOP will be strictly adhered to during sample collection, transportation, and laboratory handling to ensure that the identity of the sample is maintained and that the sample is received intact and preserved in accordance with the procedure. Sample labeling and chain-of-custody development will also be in accordance with the SOP.

Table B-1
Summary of Chemical Analytical Schedule
Easy Junior Mine, Nevada

Sample Location(s)	Matrix	Parameters	Estimated Number of Samples	Field Duplicates	MS/MSD	Reference
Leach Pad	Liquid	Profile II constituents (includes WAD cyanide) and Total Cyanide,	1	0	1	FSP Sect. 3.2
Leach Pad	Soil	Total metals, nitrate, sulfate, sulfide, soil pH	1	0	1	FSP Sect. 3.2
Stockpiled Soil	Soil	Phosphorus, potassium, soil pH, sodium adsorption ratio, total metals	1	0	1	FSP Sect. 3.3

2.2.2 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

The analytical laboratory will maintain and calibrate its equipment and instruments in accordance with its internal quality assurance program requirements. Criteria used for calibration will be derived from the manufacturers specifications and the requirements of the analytical procedure being followed. All calibration materials used by the laboratory will be traceable to a known source.

2.2.3 Inspection Requirements for Supplies and Consumables

All purchased supplies and consumables that support field monitoring and sampling activities or that have a direct relationship to sample quality (e.g., calibration standards, sample containers, decontamination fluids) will be inspected on receipt and noted in the field log book as origin of material and identification number(s) before the materials are used. At a minimum the inspection will include part, serial, or lot number; whether the material meets the requirements of the FSP and QAPP; whether the material is intact and has not been compromised (as to introduce foreign matter), and whether necessary documentation has been provided by the vendor.

Any non-conforming items will be marked as not usable, set aside, and eventually returned to the vendor for replacement or other action as necessary.

2.2.4 Field Parameter Measurements

No field parameters will be measured during sample collection activities at the Easy junior mine site.

Table B-2
Sample Analytes and Detection Limits
Easy Junior Mine Site

Analyte	Matrix	Analytical Method[1]	Detection Limit (mg/L unless otherwise identified
Alkalinity/Bicarbonate	Liquid	ASTM Standard Method 2320B	10 mg/L $CaCO_3$
Alkalinity/Carbonate		ASTM Standard Method 2320B	10 mg/L $CaCO_3$
Alkalinity/Hydroxide		ASTM Standard Method 2320B	10 mg/L $CaCO_3$
Alkalinity/Total		ASTM Standard Method 2320B	10 mg/L $CaCO_3$
Aluminum	Liquid	USEPA 200.7	0.03
Bismuth			0.1
Boron			0.001
Calcium			0.2
Gallium			0.1
Iron			0.01
Lanthanum			0.1
Lithium			0.02
Magnesium			0.2
Potassium			0.3
Scandium			0.05
Sodium			0.3
Strontium			0.01
Tin			0.1
Titanium			0.005
Antimony	Liquid	USEPA 200.8	0.002
Arsenic			0.04
Barium			0.003
Beryllium			0.002
Cadmium			0.003
Chromium			0.01
Cobalt			0.01
Copper			0.01
Lead			0.04
Manganese			0.005
Molybdenum			0.01
Nickel			0.01
Selenium			0.04
Silver			0.005
Thallium			0.2
Vanadium			0.005
Zinc			0.01
Mercury	Liquid	USEPA 245.1	0.0002
Chloride	Liquid	USEPA 300.0	0.5
Fluoride			0.01
Nitrate – N			0.01
Sulfate			0.5
pH	Liquid	ASTM Standard Method 4500	0.1 pH units
Phosphorus	Liquid	USEPA 365.3	0.01
Total dissolved solids	Liquid	ASTM Standard Method 2540C	10
WAD Cyanide	Liquid	USEPA 1677	0.005
Total Cyanide	Liquid	USEPA 335.3	0.01

Table B-2
Sample Analytes and Detection Limits
Easy Junior Mine Site

Analyte	Matrix	Analytical Method	Detection Limit (mg/L unless otherwise identified)
Antimony	Soil	USEPA 6010B	0.2
Arsenic			4
Cadmium			0.3
Copper			1
Lead			4
Manganese			1
Nickel			1
Selenium			4
Silver			0.5
Zinc			1
Mercury	Soil	USEPA 7471A	0.02
Nitrate	Soil	USEPA 300.0	0.1
Sulfate			5
pH	Soil	USEPA 9045C	0.1 pH unit
Phosphorus	Soil	USEPA 365.3	0.02
Potassium	Soil	USEPA 258.1	0.5
Sulfide	Soil	USEPA 376.2	10
Sodium adsorption ratio	Soil	USDA No. 60	meq/L ratio

3.0 DATA QUALITY CRITERIA

3.1 DATA REVIEW AND VERIFICATION REQUIREMENTS

The analytical laboratory performing the chemical tests listed in Table B-3 will responsible for reviewing all analytical data generated under the guidance of this QAPP to ensure that it meets all requirements. Each analyst will be responsible for reviewing the quality of their work based on the established protocols of the specific laboratory's SOPs, analytical method protocols, and project-specific requirements as stated in the laboratory's subcontract. The laboratory will provide results in electronic and paper formats. At a minimum, the laboratory's data reviewer will check the sampling documentation (chain-of-custody), holding time, instrument calibration and tuning, lab blank sample analyses, method QC sample results, and the presence of any elevated detection limits.

A CDM data reviewer will check the documentation provided by the analytical laboratory to ensure that the information is complete and supports the analytical results. The CDM data reviewer will also review laboratory duplicate analyses and any field blanks for compliance with the precision goals established for the project.

Table B-3
Data Quality Objectives

Task	DQO Step	Investigation Statement	Work Plan Reference
Leach Pad Liquid Characterization	State the Problem	The liquid is likely a source of contamination. Data are required to determine proper treatment/disposal options.	Section 2.2
	Identify the Decision	One representative sample will be analyzed for profile II constituents (including WAD cyanide) and total cyanide.	
	Identify Inputs to the Decision	The analytical data will be used to define chemical characteristics and environmental threats of the liquid, and to identify treatment options.	
	Define the Study Boundaries	The study boundaries reflect the maximum area of the leach pad that is covered with the liquid.	
	Develop a Decision Rule	If it is determined that leachable quantities of wastes are generated, the waste will require treatment before disposal.	
	Specify the Limits on Decision Error	Limits on analytical error are the internal laboratory DQOs including control limits for MS/MSD and LCS percent recovery, surrogate percent recovery, and detection limits.	
	Optimize the Design	By sampling the locations only once, sufficient data are expected to be generated to satisfy the DQOs.	
Leach Pad Soil Characterization	State the Problem	The leach pad soil cover needs to be characterized prior to supporting the development of the cover design.	Section 2.3.5
	Identify the Decision	One sample of the leach pad soil material will be analyzed for metals, nitrate, sulfate, sulfide, and soil pH to characterize potential impacts to flora and fauna. The same material will also be subjected to grain-size analysis and water holding capacity.	
	Identify Inputs to the Decision	The analytical data will be used to define chemical characteristics and environmental threats of the leach pad soils and to determine if it can be used as a suitable site cover.	
	Define the Study Boundaries	The study boundaries reflect the maximum area covered by the leach pad soils.	
	Develop a Decision Rule	If analytical results are in excess of established criteria, (i.e., PRGs) or if physical analyses indicate that the material will not be a suitable cover material, then another source for the cover will need to be identified.	
	Specify the Limits on Decision Error	Limits on analytical error are the internal laboratory DQOs including control limits for MS/MSD and LCS percent recovery, surrogate percent recovery, and detection limits.	
	Optimize the Design	By sampling the location once, sufficient data are expected to be generated to satisfy the DQOs.	

Task	DQO Step	Investigation Statement	Work Plan Reference
Stockpiled Soils Evaluation	State the Problem	The physical and chemical properties of the stockpiled soil need to be determined in order to demonstrate the utility of using the soil as final cover.	Section 2.3.5
	Identify the Decision	The stockpiled soil is either suitable for use as a cover material or it is not.	
	Identify Inputs to the Decision	The analytical and physical data will be used to define characteristics of the soil to determine if it can be used as a suitable site cover.	
	Define the Study Boundaries	The entire area of the stockpiled soil.	
	Develop a Decision Rule	The stockpiled soil will be determined to either be a suitable or unsuitable source for the final cover.	
	Specify the Limits on Decision Error	Limits on analytical error are the internal laboratory DQOs including control limits for MS/MSD and LCS percent recovery, surrogate percent recovery and detection limits.	
	Optimize the Design	By sampling the stockpiled soil only once, sufficient data are expected to be generated to satisfy the DQOs.	

3.2 LABORATORY QUALITY CONTROL

The laboratory's overall method performance will be monitored by the inclusion of various QC checks that allow an evaluation of method control (batch QC), and the effect of the matrix on the data being generated (matrix-specific QC). Batch QC is based on the analysis of a laboratory control sample (LCS) to general accuracy (precision and bias) data and method blank data to assess the potential for cross-contamination. Matrix-specific QC will be based on the use of an actual environmental sample for precision and bias determination from the analysis of matrix spike (MS), matrix-spike duplicate (MSD), and surrogate procedures. Laboratory QC will also be based on the labs internal QA/QC plan and SOPs.

3.2.1 <u>Method Blank Samples</u>

Method blanks are analyzed by the laboratory to assess background interference or contamination that exists in the analytical system that might lead to reporting of elevated concentration levels or false positive data. The method blank is defined as an interference-free blank matrix similar to the sample matrix to which all reagents are added in the same volumes or proportions as used in sample preparation and carried through the complete sample preparation, cleanup, and determination procedures. For aqueous analyses, analyte-free reagent water would typically be used. The results of the method blank analysis are evaluated, in conjunction with other QC information, to determine the acceptability of the data generated for that batch of samples. Sample results will not be corrected for blank contamination.

In general, one method blank sample shall be analyzed for each analytical batch (one every 12 hours for gas chromatograph/mass spectrometer analyses). Contamination in method blanks (as well as reagent blanks, instrument blanks, extraction blanks for elutriations, initial calibration blanks, and continuing calibration blanks) above the method detection limit (MDL) is not allowed. Data found to be associated with blanks containing target analytes at or above the MDL may be rejected with resampling and/or re-extraction and reanalysis at the expense of the laboratory. A CDM data reviewer will evaluate the data based on the level detected in the associated samples.

3.2.2 <u>Laboratory Control Samples</u>

The LCS is analyzed to assess general method performance by the ability of the laboratory to successfully recover the target analytes from a control matrix. The LCS is similar in composition to the method blank. Analyte free water is used for aqueous analyses and a purified solid matrix is used for soil samples. Due to the difficulty of obtaining a solid matrix free from metals, analyte-free reagent water is taken through the appropriate digestion procedures for metals analysis. The LCS is spiked with all single-component target analytes before it is subjected to the preparation, cleanup, and determinative procedures. The laboratory will perform corrective action based on failure of any analyte in the spiking list. When samples are not subject to a separate preparatory procedure, the continuing calibration verification (CCV) may be used as the LCS, provided that the CCV acceptance limits are used for evaluation. The spiking levels for the LCS would normally be set at the project-specific action limits assuming that the low standard used for the initial calibration was below this limit. If the low standard used was at this limit or if the site action levels were unknown, then the spiking levels would be set between the low and mid-level standards. The results of the LCS are evaluated in conjunction with other QC information, to determine the acceptability of the data generated for the batch of samples. The laboratory shall also maintain control charts, or tables for these samples to monitor the precision. The precision may be evaluated by comparing the results for the LCS batch-to-batch or duplicate LCSs.

3.3 DATA QUALITY OBJECTIVES

Data quality criteria address precision, accuracy, representativeness, completeness, and comparability (i.e., PARCC indices) of the data. A brief description of each parameter is provided below. The data quality objectives for the sampling and analytical program governed by this QAPP are provided in Table B-3.

3.3.1 Precision

Precision refers to the level of agreement among repeated measurements of the same characteristics, usually under a given set of conditions, and is expressed quantitatively as a measure of variability of a group of measurements compared to their average value. Precision can be expressed as the relative percent difference (RPD) between measurements of the same parameter. Relative standard deviation (RSD) may also be calculated. For this project, laboratory duplicate analyses will be used to assess analytical precision.

3.3.2 Accuracy

Accuracy refers to the degree to which a measurement agrees with an accepted reference or true value. Accuracy is a measure of bias in a measurement system. Sources of error that introduce bias are the sampling process, field contamination, preservatives, sample handling, matrix, sample preparation, analysis techniques, and data reduction. Analytical accuracy will be assessed using laboratory standard reference materials.

3.3.3 Representativeness

Representativeness is a qualitative parameter that expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Subjective factors to be taken into account are the degree of homogeneity of a site, the degree of homogeneity of a sample taken from one point at a site, and the available information on which a sampling plan is based.

For this project, field duplicates will be collected and analyzed to assess representativeness. Two samples collected from the same location and at the same time are considered to be equally representative of the condition at a given point in space and time.

The laboratory's objective for representativeness is to ensure that sample data accurately represent the distinguishing characteristic of a sample source. Laboratory analytical procedures, such as the homogenization of a sample prior to aliquot removal, will ensure that each aliquot represents the whole sample from which it was extracted. Thus, laboratory procedures will not interfere with the concentration or composition of the analytes in the sample.

3.3.4 Completeness

Completeness is a quantitative measurement of the amount of valid, usable data obtained from a measurement system compared to the amount expected under normal conditions. A certain amount and type of data must be collected in order for conclusions based on that data to be deemed valid. Due to the limited number of samples proposed for collection under this work plan, a completeness goal of 100% is required in order to meet the overall project objectives.

3.3.5 Comparability

Comparability represents the confidence with which one data set can be compared to another data set measuring the same property. Comparability is ensured through the use of established and approved sample collection techniques and analytical methods, consistency in the basis of analysis (weight, volume etc.), consistency in reporting units, and analysis of standard reference materials. USEPA-approved sampling and analytical methods will be used and a State of Nevada-certified analytical laboratory will use standard operating procedures as described in their QA plan.

4.0 QUALITY CONTROL RESPONSIBILITIES

All of the selected staff for this project have the qualifications and experience required for conducting their specific assignments. If staff changes are necessary during the execution of this work, resumes shall be submitted for new personnel together with a description of their responsibilities, in a technical memorandum to the USACE project manager. All CDM project personnel are responsible for identifying, reporting, and documenting any activities that could adversely affect the quality requirements set forth by the contract.

The laboratory has a designated project manager for this project who will communicate directly with CDM personnel. The laboratory project manager will be responsible for ensuring that all analytical data generated under this contract are reviewed prior to their release to CDM and the USACE project manager. The laboratory project manager also has sufficient authority to assure that samples submitted from the project site are received and processed in accordance with this QAPP.

5.0 RECONCILIATION WITH DATA QUALITY OBJECTIVES

An assessment of data quality will be performed to determine whether data generated are consistent with the investigation objectives. If data are found to deviate significantly (several orders of magnitude) from previous analyses or surrounding conditions upon which the sampling program was based, the data may be qualified based on the validator's assessment of the usability of the data for the intended end uses.

6.0 CORRECTIVE ACTION

Corrective action is required when potential or existing conditions are identified that may have an adverse impact on data quality. Corrective action applies to both the field and laboratory procedures. In general, any member of the project team who identifies a condition adversely affecting quality can initiate corrective action. Written evidence (e.g. field or laboratory logbook) will document and identify the condition and explain the way it may affect data quality.

A well-defined and effective policy for correcting quality problems is critical to the success of a quality assurance program. While this QA program is designed to minimize problems, it must also identify and correct any problems that do exist. The corrective action system for this project will include:

- Identify the problem
- Identify cause of the problem
- Identify corrective actions to correct the problem
- Implement corrective actions
- Verify effectiveness of corrective actions in correcting the problem
- Document corrective action including:
  - Problem identified and cause
  - Corrective actions implemented
  - Effectiveness of corrective actions
  - Samples impacted by problem

Documentation of corrective actions will be included in the project file.

APPENDIX C

CDM STANDARD OPERATING PROCEDURES
FOR
FIELD DATA COLLECTION

SOP Identifier	**SOP Title**
SOP 1-1	Surface Water and Sediment/Sludge Sampling
SOP 1-2	Sample Custody
SOP 1-3	Surface Soil Sampling
SOP 2-1	Packaging and Shipping of Environmental Samples
SOP 4-1	Field Logbook Content and Control
SOP 4-2	Photographic Documentation of Field Activities
SOP 4-5	Field Equipment Decontamination at Non-radioactive Sites

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1.0 STANDARD ABANDONED MINE SITE HEALTH AND SAFETY PROCEDURES

Abandoned mine sites pose three types of potentially serious risks to the casual visitor: physical, chemical, and explosive (combined physical and chemical). The following procedures and precautions will be followed by the CDM sampling team performing sampling activities at the Easy Junior mine site.

Abandoned mine sites involve a number of physical hazards ranging from steep, unstable slopes that could result in a serious fall; tripping hazards due to uneven terrain, debris, and abandoned equipment; unsafe and collapsed structures; unsafe (potential for collapse) adits; unsafe cribbing walls and tailing dam impoundments (risk of failure), and unprotected, vertical shafts of unknown depth. The sampling team must wear steel-toed, steel-shank work boots as a measure of protection against ground hazards (e.g., sharp metal, protruding nails). The sampling team must also wear full-length work pants (denim or similar material) to provide protection from protruding objects, rusted metal, and chemical materials (heavy metals, cyanide, low pH) that may be present at the mine site.

Under no circumstance should any member of the sampling team enter buildings or adits, or climb on any structures including crib walls. Steep slopes should be avoided. The location of any head frames (intact or collapsed) should be noted. These locations should be avoided. There may be a hidden or unstable opening to a vertical shaft near the head frame.

Chemical hazards posed by abandoned mine sites include high concentrations of heavy metals with arsenic, cadmium, and lead being of greatest concern. Soil, waste rock, and/or water may contain extremely low (<2 pH) or high (>12 pH) acidic or basic conditions that can cause skin burns, eye irritation, and/or eye damage. Various chemicals used in ore processing, including cyanide and mercury, can be present in high concentrations; therefore, caution must be used when handling and processing samples of waste rock, stained soil, or mine site runoff. The sampling team will use disposable gloves when handling samples. Hands must be thoroughly washed following sampling, and samplers should not drink or eat food during sample collection and processing.

Liquid containers (e.g., 20 to 55 gallon drums, 5 to 10 gallon cans) are commonly found at mine sites. These containers typically are used to store fuels (diesel, gasoline, kerosene) and lubricating oils. The presence and condition of liquid containers should be noted in relation to the primary sample locations, but no further investigation of such items will be performed under this study.

2.0 EASY JUNIOR MINE SITE HEALTH AND SAFETY ISSUES

Cyanide was used at the Easy Junior mine site to separate gold from the ore and waste materials containing cyanide are probably present at the site. Cyanide is extremely toxic via inhalation and ingestion routes of exposure. Before sampling of any material suspected or known to contain cyanide, the area of and around the material to be sampled must be surveyed using cyanide detecting equipment. The sampler using the cyanide detecting equipment must be trained in its usage and verify its proper function through calibration tests prior to its use in the field. Field samplers must use protective gloves when sampling and handling material suspected of containing cyanide. Hands must be washed thoroughly following sampling. Field clothing should be separated from other clothing when laundered.

Explosives and dangerous chemicals may still be present at the mine site. Crates, boxes, bottles, and bags should not be opened, but their presence noted in the field logbook. Items such as blasting caps, primer cord, or dynamite sticks should be noted but never touched. If observed, the BLM and USACE project managers must be contacted immediately. The presence of these materials can be ascertained by observing the contents of sheds and structures from the outside. The scope of this study does not involve explosives or stored chemicals and no further investigation should be performed until otherwise directed by the USACE project manager.

3.0 SITE – SPECIFIC WORK ACTIVITIES GOVERNED BY THIS SAFETY PLAN

The Easy Junior Mine site work plan addresses several sampling and site characterization activities involving contact with soil and liquid that could potentially containing cyanide. The sampling work will occur at two locations on the mine site.

Site activities will include the following:

- Sampling of liquid present in the leach pad
- Sampling of soil from the leach pad
- Sampling of stockpiled soils

Section 2.2 of the work plan provides additional details regarding these activities.

4.0 CHEMICAL HAZARD

It is assumed that site wastes contain cyanide and should therefore be handled only using protective clothing and proper containment.

5.0 PERSONAL PROTECTIVE EQUIPMENT

The cyanide in site wastes does not pose an inhalation risk. This will be confirmed by using a cyanide gas detector. Level D personnel protective equipment will consist of standard field clothes, steel-toed boots, and work gloves.

6.0 EASY JUNIOR MINE SITE SAFETY CONCERNS CHECKLISTS

Cyanide	- A cyanide gas detector will be used for all activities involving contact with waste. Any detection of cyanide by the instrument will be cause for cessation of work. - Gloves will be worn during sampling to prevent direct skin contact with site waste. - Work clothes worn during sampling will be laundered separately from other personal items - Hands will be washed following sampling and prior to eating or smoking.

Metals	-	The mine wastes may also contain elevated concentrations of metals. Gloves will be worn to prevent direct contact with the waste.
	-	Work clothes worn during sampling will be laundered separately from other personal items.
	-	Hands will be washed following sampling and prior to eating or smoking.

7.0 EASY JUNIOR MINE SITE CONTACTS:

Kevin Ryan	CDM project manager	775-853-0333
B.J. Bailey	USACE project manager	916-557-6642
Lynn Bjorklund	BLM project manager	775-885-6121
Robert Saiz	CDM E&C H&S Officer	303-298-1311
Chuck Meyers	CDM Federal H&S Officer	703-968-0900

William Bee Ririe Hospital	775-289-3001
White Pine County Ambulance Service	911 or 775-289-4833
County/State Police	911 or 775-289-4833

8.0 ROUTE TO NEAREST MEDICAL FACILITY:

From the Easy Junior mine site, proceed north 5 miles on secondary road 1176, east 3 miles on secondary county road 1179, north 15 miles along county road 5, then 45 miles east along Highway 50 to Ely, Nevada. The William Bee Ririe hospital is located at 1500 Avenue H.

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1.0 SITE SECURITY PLAN

The Easy Junior Mine site is located on land controlled by the BLM. Other than those activities described below, CDM will not be responsible for site security.

Site Access

CDM will contact BLM before entering the site. CDM will obtain the key from the BLM to access the site gate and will close and lock the gate after all entries and after leaving the site.

Work Site Control

CDM will maintain control of the immediate area of all work sites. This primarily will involve controlling public access to work sites. The CDM field team leader will greet all individuals approaching the work site, explain the objectives of the activity, and keep the individual(s) away from any area of physical or chemical hazard.

Limitations on Site Security

CDM has not been tasked to conduct the following site security activities; therefore, these activities will not be CDM's responsibility: maintenance or repair of fencing or gates, maintenance of signage, control of trespassers or unauthorized individuals (except in the immediate vicinity of CDM work activities), control of materials or structures on the site, nor providing a guard or a guard service.