NORTHERN ARIZONA CONSULTING

COPPER AGE MINE PA/SI WORK PLAN

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Table of Contents

List of Abbreviations

ADEQ: Arizona Department of Environmental Quality
ADMMR: Arizona Department of Mines and Mineral Resources
BLM: Bureau of Land Management
CAM: Copper Age Mine
CoC: Chain-of-Custody
EAL: Environmental Analysis Laboratory
EPA: Environmental Protection Agency
FAAS: Flame Absorption Atomic Spectrophotometry
GI: Grading Instructor
HASP: Health and Safety Plan
HAZWOPER: Hazardous Waste Operations and Emergency Response
HRS: Hazard Ranking System
IDLH: Immediately dangerous to life and health
IDW: investigation derived waste
KRMC: Kingman Regional Medical Center
NAU: Northern Arizona University
OSHA: Occupational Safety and Health Administration
SSHO: Site Safety and Health Officer
PA/SI: Preliminary Assessment and Site Investigation
PEL: Permissible Exposure Limits
PM: Project Manager
QA/QC: Quality Assurance and Quality Control
RSLs: Regional Screening Levels
SAP: Sampling Analysis Plan
SRL: Soil Remediation Level
SOPs: Standard Operating Procedures
TA: Technical Advisor
XRF: X-ray Fluorescence

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

This Work Plan is an outline and description of necessary steps for initial project tasks; it includes the Health and Safety Plan (HASP) and the Sampling Analysis Plan (SAP). Its development provides logistical framework for successful completion of the Copper Age Mine (CAM) site project.

1.1 PROJECT OBJECTIVES

According to the client, the main objective of this project is to characterize the site for use as public recreation land. The Bureau of Land Management (BLM) is concerned with potential contaminants and concentrations that pose health risk, both to human activity and ecological presence.

1.2 PROJECT SCOPE

The overall project scope includes preparation for field work, field work, analysis of samples obtained in the field leading to a PA/SI report on human health and ecological risks at the site.

1.3 WORK PLAN SCHEDULE

The schedule will be submitted and approved by the client prior to commencement of any other tasks. Field work is projected to occur Jan 19-20, 2018.

2.0 PROJECT MANAGEMENT

Well defined project management will provide the framework for the proper development of the project.

2.1 PROJECT MANAGEMENT APPROACH

The management of project operations will occur through the implementation of team management and foresight of potential challenges. Team management will be accomplished through regular team meetings and effective communication strategies such as meeting minutes and agendas. Team meetings will occur on a weekly basis. This provides a structure for group feedback, internal deliverable accounting, and schedule management. Meeting minutes will be documented for reference and accountability. Project management involves being prepared for potential challenges, which, in this case, include outside contamination and bad weather.

2.2 PROJECT PROCEDURES

Project management procedures include regular team and advisement meetings. Group meetings with the Grading Instructor (GI) will occur tri-weekly and allow for feedback on all deliverables. All members of the team are expected to attend and any questions about past and future deliverables will be addressed. An agenda will be developed and emailed to the GI 48 hours prior to the meeting date. This agenda will include topics expected to be discussed and an approximate duration for discussion. A student leader will be assigned to lead the discussion and a student secretary will document it. These team management techniques are required to keep the project on-schedule and focused.

The team will be in contact with the Technical Advisor (TA) and the client as necessary. Email will be the primary route of contact for both parties. The TA will be contacted regarding technical considerations of the project. Any questions will be well developed and thoroughly researched prior to addressing the TA. The client will be contacted for deliverables' review, and questions concerning project specifications or requirements.

2.3 Quality Management

To ensure quality management, all documents will undergo constant revision as new developments arise within the project. These documents will be continually reviewed by the GI and TA. This helps improve the documents and makes sure they best meet project objectives and remain within the scope. Revisions will be sent to the client per request.

Regarding laboratory analysis, statistical analysis will be performed on the lab data to validate and determine the overall quality of the results. The data will also undergo verification through a third-party lab, which will analyze approximately 20% of the samples. The coordination of all QA related project activities will be managed by the QA officer, Laura Garcia. For more specific quality management techniques please refer to Section 8.0 of Appendix A.

2.4 Subcontract Management

Subcontracting will occur in the form of transferring the samples to a third-party facility for verification by Flame Absorption Atomic Spectrophotometry (FAAS) testing. Presently, the lab facility will be the Environmental Analysis Laboratory (EAL) operated by Jeff Propster at NAU. The Subcontract Management representative, Carl Haskie, will serve as the primary contact for EAL.

3.0 Site Background Information

This section includes a brief description of CAM site's relevant background history.

3.1 Site Location

The CAM site, also known as El Oro Mine, is located in the Mohave County, approximately two miles southeast of Chloride, Arizona and 15 miles northwest of Kingman, Arizona on BLM land. Its cadastral description is Township 23 North, Range 18 West, Section 11, Northwest Quarter [1]. The CAM site is not a populated area; however, Chloride is the closest populated area and most recently reported a population of 271 people [2]. The location is depicted below in Figure 3.1.

Figure 3.1 - Relative location of the CAM site to major surrounding cities and physical features [3].

3.2 Site Description

Currently, the CAM site has remnants of prior mining operations, including concrete footings, tailings piles, a tailings dam, and one known mine opening. Its overall area is 15.1 acres or 0.0236 square miles. The surrounding area is native desert.

Lead and zinc were the primary commodities reportedly produced by the site [3]. The CAM site likely processed ore from the surrounding region and, as a result, the mine tailings may be contaminated with other heavy metals. Other contaminants potentially associated with the mine tailings include cadmium, chromium, iron, nickel, arsenic, and mercury [4]. A site inspection is necessary to determine the full extent of the contamination and the chemical composition of the mine tailings. These contaminants have adverse health effects on both humans and the environment [4]. The BLM has no data on the site [5].

3.3 Previous Operations and Investigations

The current status of CAM site is "past producer," its operational status was "shipping" [2]. The former means that the mine is no longer operational; the latter indicates during its operation the site was primarily used to ship mined materials from surrounding mines [5].

According to Arizona Department of Mines and Mineral Resources (ADMMR) records, CAM was in operation from early- to mid-1900s [1]. At the time of operation, its commodities were lead and zinc, its co-product was silver, and its by-products were gold, antimony, and copper. The CAM site processed 5,000 tons of ores from on-site operations, as well as ores from nearby mills and mines [2, 5]. The records indicated operation ended around 1946 [2]. The owner during operation was Arizona Ore Reduction Company and from 1976 forward Samuel Williams was the listed owner [6, 7].

4.0 Investigative Approach

There currently has been no investigations conducted at the CAM site. This PA/SI will be the initial investigation and will provide information on the most current data on the site in terms of risk assessment.

4.1 Site Investigation Objective

The site investigation objective is to obtain samples from the site to identify COCs and thereby providing the necessary data to characterize any spatial contamination and to perform human health and ecological risk assessments.

4.2 Site Investigation General Approach

The general approach will follow the EPA PA/SI protocol. It will explore the pollution source (mine site), state the extent and amount of pollution spreading, identify the human and environmental risks, and will be a basis of the selection of the remediation technique required.

5.0 Field Investigation Methods and Procedures

Field investigation methods and procedures will focus on accuracy and consistency. SOPs and guidelines will be followed, as set by the SAP in Appendix A.

6.0 Investigative Derived Waste Management

Special considerations are required when managing investigation derived waste (IDW). IDW is waste generated during the course of hazardous waste site investigations. For this project, it is expected that solid and liquid wastes will be generated. See Section 5.0 of Appendix A for specific management practices.

7.0 Sample Collection Procedures and Analysis

When the sampling event occurs, the adequate process, documentation, and QA/QC will be followed. These are addressed in the following subsections.

7.1 Sample Containers, Preservation, and Storage

Immediately after collection, samples will be placed in Ziplock bags then in a cool, dry storage area, such as a cooler. This will ensure proper storage in the event of breakage. Assurance that paperwork and sample labels will not be damaged by water will also be made. For further details, please refer to Section 6.0 of Appendix A.

7.2 Sample Documentation and Shipment

Sample control will be documented using a chain-of-custody (CoC) form. Shipment will consist of the transport of selected samples to the EAL. See Section 7.0 of Appendix A for further details.

7.3 Field QA/QC

The field QA/QC will be maintained by following sampling protocols, equipment preparation requirements, using the required sample containers and documenting throughout the duration of the sampling. Laboratory QA/QC methods will also be observed. See Section 8.0 of Appendix A for further details of QA/QC methods.

8.0 Deviations from the Work Plan

Deviations from the Work Plan will be approved by the TA on site during the sampling event. These deviations, if any, will be documented and explained within the final PA/SI report. Best attempts will be made to follow the Work Plan as presented; however, potential challenges may prevent its exact execution.

Special care has been taken in identifying the most likely potential challenges and possible solutions. Additionally, to combat the potential weather challenge, the team has reserved their availability. Currently, the site visit is planned for January 19-20, 2018; the team will maintain an open schedule before, during, and after this time to accommodate the sampling trip and a possible rescheduling.

While these potential challenges have been addressed, there is always the possibility of unforeseen circumstances affecting the Work Plan when working in the field. These will be handled as they arise and approved by the TA on site. Subsequent deviations will be approved by the client and documented accordingly.

9.0 PA/SI REPORTING

Project tasks will be summarized and documented within the final PA/SI report. The report will detail activities and research relating to existing information, site reconnaissance, field and lab work, data analysis and risk assessment. Its purpose is to characterize the site, with the aim of identifying the COCs and extent of contamination within the CAM site.

10.0 PROJECT SCHEDULE

The project will follow a defined schedule, which is made up of tasks, deliverables, and milestones. This ensures final objectives are met and the project is successfully completed on time. The project will start on September, 2017 and be completed by May 2018.

Tentative dates have been assigned to tasks, deliverables, and milestones. These are subject to change as deadlines are revised, potential challenges are encountered, and/or new developments occur. If the schedule is altered, documentation will be completed and relevant parties alerted. The current schedule is presented in Figure 10.1, below.

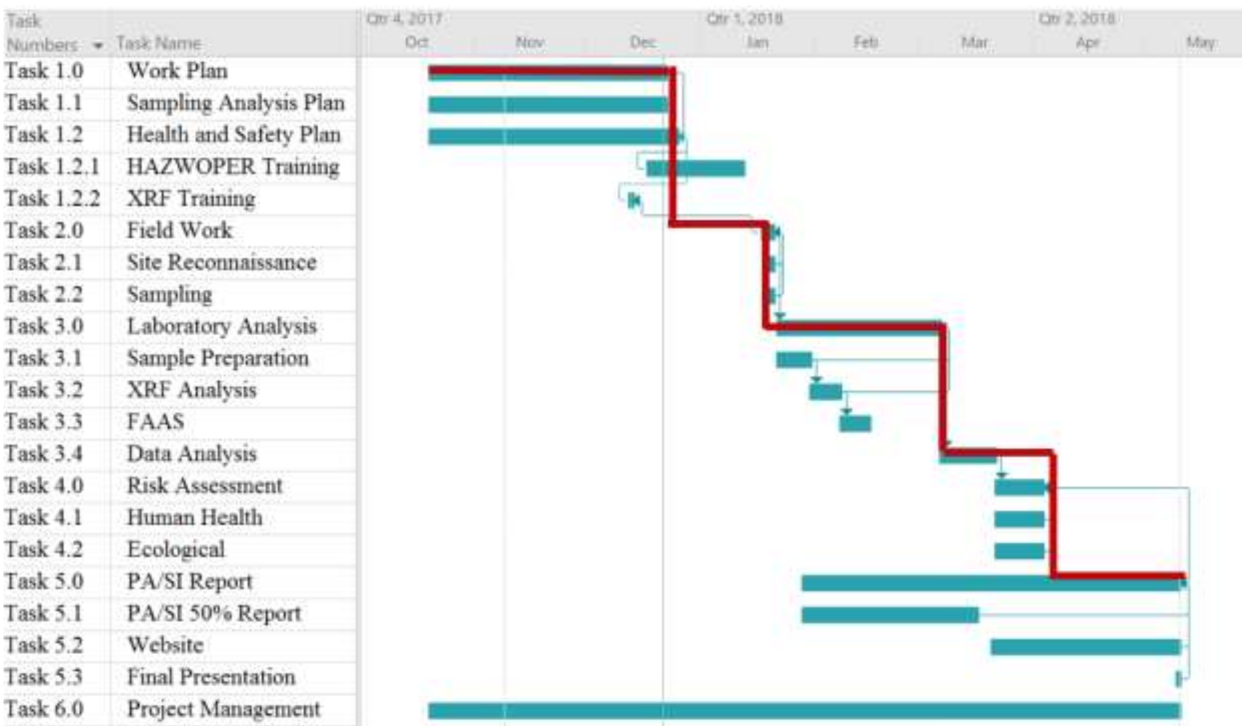

Figure 10.1: Gantt Chart of tentative schedule and task assignments.

11.0 References

[1] E. Zielske, *Copper Age Files*.

[2] "American FactFinder - Community Facts", Factfinder.census.gov, 2017. [Online]. Available: https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml?src=bkmk#. [Accessed: 19- Sep- 2017].

[3] *Google Earth Pro*. Google, 2017.

[4] "El Oro", Arizona Department of Mines and Mineral Resources File Data.

[5] E. Zielske, "BLM Client Meeting", NAU, 2017.

[6] *World Mines Register: Volume 15*. Miller Freeman Publications, 1922, pp. 254-256.

[7] "El Oro Mine (MRDS #10186259) AU", *Mrdata.usgs.gov*. [Online]. Available: https://mrdata.usgs.gov/mrds/show-mrds.php?dep_id=10186259. [Accessed: 22- Oct-2017].

APPENDIX A: SAMPLING AND ANALYSIS PLAN

1.0 INTRODUCTION

The SAP outlines sampling rationale and details, methods, preservation, and documentation of field work. Field method procedures will be outlined in detail and will include field equipment, soil preparation, location identification and decontamination. Sampling documentation will be the same for the collection and shipment. The team will set a procedure for labeling, note taking, and preparation of the CoC. In addition, quality assurance and quality control (QA/QC) will provide the framework for data analysis and validation of samples.

1.1 PROJECT OBJECTIVES

The objective of the SAP is to obtain representative samples to identify the COCs and their geospatial extents. These samples will serve to fully characterize the site and provide quality data for the RA.

2.0 SAMPLING RATIONALE

2.1 SELECTION OF SAMPLING LOCATIONS

The CAM site is approximately 15.1 acres or 657,756 square feet. Sample selection will utilize systematic grid, hot spot, and background sampling. Approximately 98 samples will be taken with 84 grid, 10 hot spot, and four background. Figure A-1 below shows the grid sampling layout, consisting of 84 grids with each grid being 95 square feet. The gridded locations include milled and unmilled waste rock, excavation sites, tailings, and mill foundations. Possible migration routes have also been included in the grid and consist of roadways and drainage areas, such as arroyos and creek beds.

Figure A-1 demonstrates the largest tailings pile to the north which includes unmilled waste rock. The area south of this consists of the excavation site and waste rock resulting from excavation. An old water well is located east of the excavation site. Mill foundations are located west of the excavation site. Two tailings piles are found on site. One is located next to the excavated waste rock, east of the mill and the second is north of the mill across the dirt road. The different roadways in and out of the site will also be sampled. The migration pathways for contaminants away from the site appear to follow the south and southwestern direction. These can be observed as three different creek beds beginning in grids 53, 61, and 74.

Sampling locations may change after the site is visually assessed. Therefore, the collection of a few in-situ XRF readings (directly off the ground) at some locations is recommended by the client. These readings would be used only for screening purposes.

Figure A-1: Aerial view of the CAM site. There are 84 grids in total with each consisting of 95 square ft.

2.2 Selection of Samples for Laboratory Analysis

Approximately 20% of the collected samples will be transferred to EAL for FAAS testing. The amount sent over will be based on XRF data and will be selected so that the full range of concentrations for each COC will be analyzed. This selection will ensure that accurate correlations are made between AA and XRF data. The overall sample size will be determined via the analytical method discussed in Section 3.3.

2.3 Selection of Target Metals

All constituents found at or above AZ Residential/Non-residential soil remediation levels (SRLs) will be considered COCs. Metals such as lead, zinc, copper, gold, and silver are possible to be found at the CAM site. Of these lead is the most likely to be found.

3.0 Request for Analysis

3.1 Analyses Narrative

Samples will be analyzed by XRF to determine the COCs. XRF data will be confirmed by AA.

3.2 Analytical Laboratory

Sample preparation and XRF analysis will be performed at NAU's environmental engineering lab. Additionally, acid digestion of soil samples prior to AA analysis will be performed at NAU's environmental engineering lab. Third-party verification using FAAS will be performed at EAL, which specializes in environmental analytical chemistry.

3.3 Analytical Methods

Sample preparation will consist of drying and sieving the samples. Per *ASTM D421-85 (2007) Standard Practice and Preparation of Soil Samples for Determination of Soil Constants*, drying of the samples will last 24 hours at approximately 105 degrees Celsius. Each soil sample will be dried and placed on a separate tray to maintain the quality of each sample and minimize the chance of cross contamination. Once samples are dried, they will be sieved using the 200 μm sieve per ASTM D421-85. After each sample have been dried and sieved, they will be placed in new plastic bags with their respective labels, including sample identification.

With the samples dried and sieved, they will be ready for XRF analysis. XRF Analysis will be performed following EPA Method 6200, *Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment.* The XRF instrument will undergo energy calibration checks. Additionally, two blanks will undergo analysis: one method and one instrument blank. Both blanks will be analyzed on each working day. The method blank monitors potential laboratory influences; the instrument blank monitors potential XRF instrument contamination. XRF analysis will be performed through the XRF testing of a 9-grid pattern per sample, as shown below in Figure A-2.

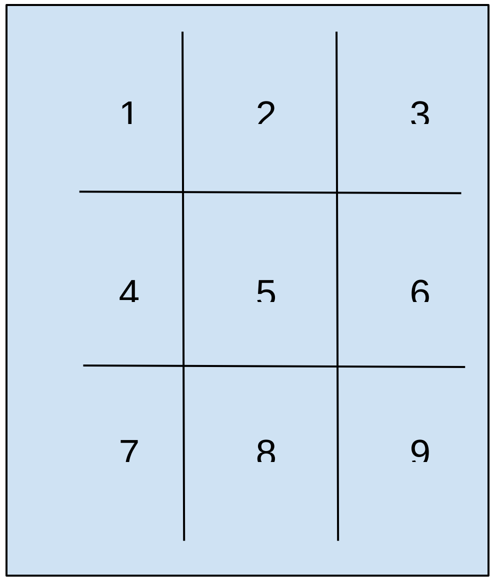

Figure A-2: Grid pattern used for XRF testing.

Using the grid pattern shown in Figure A-2, XRF analysis will provide nine readings. The high and low of each will be eliminated, and the remaining readings averaged for the true value. This will be repeated for the readings of each analyte.

Once XRF analysis is completed, acid digestion will occur. Based on XRF results, 20% of samples representing the concentration ranges observed will undergo acid digestion. Acid digestion will be performed using ASTM E2941-14, *Standard Practices for Extraction of Elements from Ores and Related Metallurgical Materials by Acid Digestion*. The digestion process will consist of nitric acid being combined with the samples in an appropriate digestion container. Each of the digestion containers will be labeled similarly to the grid labeling scheme, but with a letter A presiding before each label name to indicate that the sample has undergone acid digestion (ex: A-H-A2-01). The lab standards of ASTM E2941-14 will be observed.

4.0 Field Methods

4.1 Team Briefing

Prior to the sample collection, the team is expected to read and review the HASP. At the briefing, the importance of the HASP and SAP will be reiterated. The team briefing will cover the detailed HASP procedures, which are outlined in Appendix B.

4.2 Field Equipment

The equipment that will be used in the field sampling and sample storage will include the following:

- Stake flags
- Zip-lock plastic bags

- Trowels
- Shovel
- Latex or Nitrile gloves
- Tape measure
- Sample labels
- Ice chests
- Field notebook
- GPS unit
- Camera
-

The following items will be required for the decontamination of equipment and materials:

- 5-Gallon buckets (3)
- Deionized water (minimum 20-30 gallons)
- Non-phosphate soap
- Brushes
- Paper towels

The following is a list of required Level D personal protective equipment (PPE):

- Latex and Nitrile gloves
- Tyvek Suit and boot covers
- Safety glasses
- Work boots

4.3 Soil Sample Preparation and Collection

The soil sample preparation includes removal of all surface litter and large pebbles from the sampling site. Collection will consist of using a trowel to collect ~1" of surface soil and transferring the sample to a labeled Ziploc bag. The labeling procedure will consist of sample identification, sampler, date, and time. See Sections 7.1 and 7.3 for further details regarding the labeling scheme and CoC, respectively.

4.4 Soil Sample Location Identification

Prior to sampling, the location of where samples need to be taken will be clearly marked with stake flags according to the sampling plan in section 2.1, above. These sampling locations will be photographed and marked using a GPS.

4.5 Decontamination

Between sample collection, the equipment will be decontaminated to prevent cross-contamination. This includes washing the trowels with non-phosphate soap by scrubbing with brushes and dried with paper towels. New pairs of latex/nitrile gloves will be used for each new sample taken.

5.0 Investigation Derived Waste Management

To mitigate potential contamination of the generated and disposed waste or IDW, certain procedures will be followed.

5.1 Water

Water that is used for decontamination will be left at the site. This will insure that no further contamination is transmitted elsewhere.

5.2 Solid Waste

Solid waste such as contaminated supplies will be double bagged and deposited at a municipal landfill. Once back at the NAU lab, the irrelevant sieved materials will be treated as non-hazardous waste and placed in the large mixed waste trash receptacle. After testing, the suspect material will be double bagged for disposal at the municipal landfill.

6.0 Sampling Containers, Preservation, and Storage

Sample preservation is important for accurate results. To preserve the samples, storage containers will be used. Per 40 CFR 264, these containers must be in good condition, wastes must be compatible with container, container must be closed during storage, container storage areas must have a containment system that can contain 10% of the volume of containers or of the largest container, and spilled or leaked waste must be removed from the collection area as necessary to prevent overflow [5]. The containers to be used for storage and preservation will be an ice chest and Ziploc bags.

7.0 Sample Documentation and Shipment

7.1 Sample Labeling

The sample identification will be in accordance with the project title, sample type and sample number. The first identifier will represent the project title, Copper Age, CA. The second identifier will be the sample type: G for Grid, B for background, and H for hot spot. The last identifier will be the sample number which will correspond to the grid square the sample is taken from (Table A-1).

The sample labeling will remain the same as all samples are dried and sieved. For each XRF sample, the labeling will be CA-G-1-X1 through X9 for the 9 spots on each sample. When the data are averaged, the sample will be CA-G-1-X. Similarly, digestates will be labeled CA-G-1-X-A and these are liquid samples. Duplicates will be labeled with a D for duplicated, such as CA-G-1D.

Sample labels will be completed using waterproof ink and its corresponding flag will be attached to the sample as a contingency [1]. When sending the samples out to be analyzed by the NAU lab, a CoC will be attached.

7.2 Field Notes and Photographs

The location of each sample will be recorded through the use of a GPS data collector. Field notes and photographs will be taken to further document the locations of sample.

7.3 Sample Chain-of-Custody Procedures

The samples taken from the CAM site will have relevant labeling and documentation, which includes a CoC. The CoC presented in Figure A-3 will be used.

SOIL SAMPLE CHAIN OF CUSTODY FORM			
Company:		**Telephone:**	
Project Name:			
Client:		**Written Report To:**	
Date:		**Time:**	
Sample Number	**Location**	**Sample Description**	**Sampled By**
Relinquished By (Print):		**Date:**	
Relinquished By (Signature):		**Time:**	
Received By (Print):		**Date:**	
Received By (Signature):		**Time:**	

Figure A-3: Chain-of-Custody

8.0 Quality Assurance/Quality Control

Quality Assurance/Quality Control (QA/QC) is imperative to ensure the validity of analytical results and site conclusions.

8.1 Laboratory QA/QC

QA/QC will focus on sample care and safety. All samples will be stored in a locked cupboard, where the QA/QC manager, Laura Garcia, and the lab manager, Adam Bringhurst, will have access. This will be locked at the end of each working session. The cupboard will contain sample trays. The trays will categorized per completed lab procedure: unprocessed, dried, sieved, XRF, and to be acid digested. Separate trays will be kept for finished materials to be properly disposed of. CoC forms will remain with all samples at all times.

The third-party lab QA/QC methods will be determined by EAL. Laboratory QC samples usually consist of an initial matrix spike and a second matrix spike of duplicate samples [6]. Field duplicate samples will be taken in the field and undergo the same process, thus providing an estimate of sampling variance.

8.2 Background Samples

Background samples will be collected to determine normal analyte levels in the surrounding region. These samples will be collected from undisturbed soils within approximately 0.25 miles from the site.

8.3 Data Analysis

The XRF and FAAS results will be statistically vetted to remove outliers. The distribution pattern data will be normalized, likely with log transformation, and graphically plotted. Outliers will be visually identified and eliminated. The mean and 90% exposure concentration of COCs will then be identified. A regression coefficient of the XRF data will be computed and used to verify that it meets BLM and EPA Method 6200 standards (>0.7).

8.4 Data Validation

The team will provide an overview of data legitimacy. The assessment will state which, if any, data quality objectives were not met. A correlation curve will be constructed to compare the results of the XRF and FAAS analysis to determine data validity. The team will also list any actions relating to rejected data, and suggest the relevant reanalysis or resampling required [6].

9.0 References

[1] QA/G-5s Guidance on Choosing a Sampling Design for Environmental Data Collection. (2002). Washington, DC: EPA, pp 12-15.

[2] Arizona Department of Mines and Mineral Resources File Data. El Oro Mohave. Pdf.

[3] "Budget Justifications and Performance Information Fiscal Year 2017 - Bureau of Land Management", US Department of Interior.

[4] Innis, Pamela S. 2004. Hazardous Waste Site Sampling Basics, Technical Note 414. Bureau of Land Management, Denver, Colorado. BLM/ST/ST-04/001+1703. 35 pages.

[5] United States Environmental Protection Agency, Guide to Management of Investigation -Derived Wastes. Washington, D.C. 1992.

[6] "Sampling and Analysis Plan - Guidance and Template v.4 - General Projects - 04/2014," *EPA*, 18-Jul-2016. [Online]. Available: https://www.epa.gov/quality/sampling-and-analysis-plan-guidance-and-template-v4-general-projects-042014.

Appendix B: Health And Safety Plan (HASP)

1.0 Introduction

The HASP details the necessary components for effective safety monitoring of employees working with and around hazardous substances. It also details how to proceed when accidents occur. Safety is achieved by assigning a structural organization, identifying physical and health hazardous, completing training, and knowing the job requirements.

2.0 Key Personnel

To complete, the project, various positions will be employed to meet the objective identified in previous sections. Task will be accomplished per roles and responsibilities.

2.1 Project Manager

The Project Managers (PM) are Bridget Bero and Alarick Reiboldt. The PMs coordinates safety and health functions alongside the Site Safety and Health Officer (SSHO). They hold the ultimate responsibility for the proper implementation of the HASP. They will oversee the production and review of all deliverables while providing technical oversight.

2.2 Field Coordinators

The Field Coordinators for this project are Laura Garcia and Sarah Reddinger. They are responsible for overseeing field operations and functions as the quality assurance leader. They will ensure implementation of HASP requirements in the field. The Field Coordinators will also manage the QA/QC and coordinate this with the sampling procedures.

Laura Garcia will also act as the Site Safety and Health Officers (SSHO) of this project and is responsible for the implementation of the HASP. She will verify compliance of the HASP while managing safety and health functions on the site. This includes, but is not limited to, ensuring site monitoring, worker training, medical surveillance, and effective implementation of personal PPE.

The Decontamination Manager of this site is Sarah Reddinger, who will manage the decontamination processes on site. She is responsible for the development and implementation of decontamination Standard Operating Procedures (SOPs).

2.3 Site Worker

All site workers will be HAZWOPER certified. They will comply with the HASP and use the required PPE while staying alert for the potential of unsafe working conditions.

2.4 Federal Agency Representatives

The BLM representative for this site is Eric Zielske. He will serve as the Remedial Project Manager and is responsible for the overall project administration.

3.0 JOB HAZARD ANALYSIS

There are potential chemical and non-chemical hazards for this project. Due to the potential hazards and unknown status of the site, Level D PPE will be required. Level D PPE is comprised Tyvek suits, latex or nitrile gloves, safety glasses, and work boots. Training in the use of PPE will be done through the HAZWOPER, which is discussed in section 4.0. The hazards are outlined in the following sections.

3.1 CHEMICAL HAZARDS

Table 2 presents the possible chemical hazards that could be encountered on the CAM site.

Table B-1: Chemical Hazard Substance Information

Hazardous Substance Name	Characteristics of Substance	Route(s) of Entry	Potential Exposure	Prevention
Lead	Toxic	Inhalation – Dust Ingestion	Walking and sampling activities near and around the mine tailing and mine-related materials or equipment. Windy conditions are also expected to generate dust.	Level D PPE will be worn.
Aluminum	Irritant	Inhalation – Dust Ingestion	Walking and sampling activities near and around the mine tailing and mine-related materials or equipment. Windy conditions are also expected to generate dust.	Level D PPE will be worn.

Arsenic	Toxic	Inhalation – Dust Ingestion	Walking and sampling activities near and around the mine tailing and mine-related materials or equipment. Windy conditions are also expected to generate dust.	Level D PPE will be worn.
Cadmium	Toxic	Inhalation – Dust Ingestion	Walking and sampling activities near and around the mine tailing and mine-related materials or equipment. Windy conditions are also expected to generate dust.	Level D PPE will be worn.
Mercury	Toxic	Inhalation – Dust Ingestion	Walking and sampling activities near and around the mine tailing and mine-related materials or equipment. Windy conditions are also expected to generate dust.	Level D PPE will be worn.

3.2 Non-Chemical Hazards

Table B-3 presents the possible non-chemical hazards that could be encountered on the CAM site.

Table B-2: Non-Chemical Hazards		
Task/Hazard	**Non-Chemical Hazards**	**Prevention**
Walking Sampling	Tripping or falling due to uneven and roughly vegetated, rocky terrain.	Work boots will be used on site, care will be taken when walking on site while performing tasks or carrying equipment.
Working in hot, dry conditions	Possible heat exposure, heat stress, dehydration, or sunstroke. Symptoms include heat rash, dizziness, nausea, and elevated body temperature.	Regular, scheduled breaks will be mandated. Sufficient water and food will be provided.
Inclement Weather	Potential rain and high winds	Personnel will be prepared with proper clothing and equipment to deal with changing and/or adverse weather.
Plants	Potential reaction to poisonous or irritating plant exposure. Will vary depending on the individual and exposure severity.	Level D PPE will be worn. After each work day, personnel will check for possible irritations.
Biting/Stinging Insects	Wasps, bees, spiders, and scorpions may be found on site. Bites/stings are generally not dangerous unless the individual is allergic. Bites/stings by some spiders such as the Black Widow and Brown Recluse need critical attention and should be evaluated by a medical professional.	Level D PPE will be worn. Antihistamines and an EpiPen will be kept on site in case of reaction to bee stings. After each work day, personnel will check for possible irritations.

Ticks	Ticks are small blood-eating parasites and can transmit diseases such as Lyme Disease and other blood borne diseases.	Level D PPE will be worn. After each work day, personnel will check for possible irritations.
Small Animals	Rabies can be transferred from small animals such as rabbits, squirrels, and bats.	Personnel will not approach wild animals.
Snakes	All snakes are considered to be poisonous and any snake bite is to be immediately evaluated by a medical professional.	Personnel will not approach snakes or other reptiles. Long pants and work boots will minimize chances for direct contact with skin. Level D PPE will be worn.

4.0 Required Training

Per OSHA requirements each employee who might work at a potentially hazardous site must receive training prior to being on the site. This is to ensure safety for all workers at the site. All individuals working on site are required to take or refresh the OSHA 40 Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) per 29 CFR 1910.120 & 29 CFR 1926.65.

Upon completion workers will be able to mitigate the risk of handling hazardous material. This will be accomplished through an understanding of the safety and health hazards present on site. Proper use of PPE will be addressed. A knowledge of proper work practices will be developed to help manage risk prevention. The importance of site control and decontamination procedures will also be included. Additionally, XRF training administered by the BLM will be completed. This will ensure proper use and therefore valid results.

5.0 Decontamination Procedures/Solutions

Decontamination ensures that personnel and equipment are not contaminated prior to leaving the site. Water will be available for hand and face washing as needed. Waste created through the process of decontamination has to be disposed of properly as outlined in Appendix A, Section 5.0.

Regarding personnel decontamination, all of the PPE, except work boots, are disposable. Work boots will be removed and bagged at the end of each work day and stored in the vehicle until the next day’s use. PPE will be collected, double-bagged, and stored until disposal at a proper receptacle. Furthermore, best attempts will be made to keep the vehicle free of contaminated materials, unless they are properly contained.

6.0 Emergency Information

In the event of injury, first aid should be administered immediately. A first aid kit, including an EpiPen, will be kept on site. All injuries, accidents, or near miss events should be reported to the PM and SSHO.

In case of a serious, life threatening injury or emergency medical condition 911 should be called immediately to route an ambulance or helicopter for medical transport. A serious, life threatening injury consists of any medical condition, if not treated, that would result in the loss of life or limb. Examples include uncontrollable bleeding, loss of consciousness, seizure, poisoning, severe chest pain, serious burns or cuts, or broken bones.

In the event of non-life threatening injuries, personnel can be transported to the nearest hospital, The Kingman Regional Medical Center (KRMC). It is located at 3269 Stockton Hill Rd, Kingman, Arizona. Directions to reach the KRMC from the CAM site are as follows:

1. Head west from the CAM site approximately 1 mile until you reach Co Hwy 125 *17 min* (6.9 mi)
2. Follow Co Hwy 125 South and take the Southwest turn to Co Hwy 225 *2 min* (0.4 mi)
3. Take exit 51 to I-40 E/US-93 S *17 min* (15.3 mi)
4. Continue on Stockton Hill Rd to reach the KRMC *2 min* (0.3 mi)

The route is depicted below in Figure B.1.

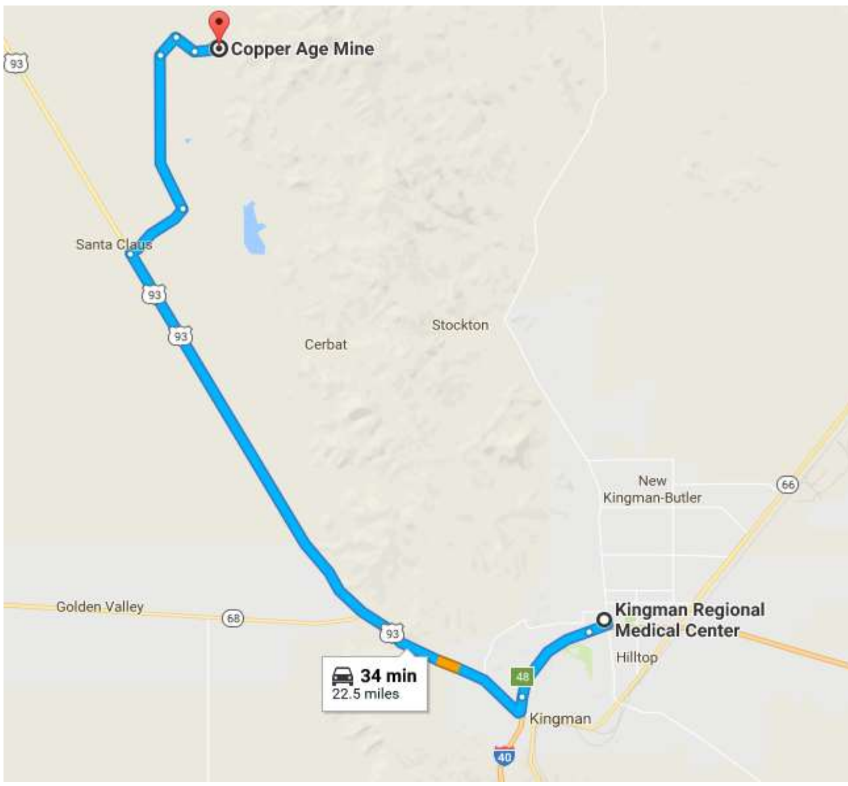

Figure B.1: Map depicting quickest route from CAM site to KRMC

To contact the relevant medical services, the following numbers can be used.

- Fire/Rescue: 911
- Ambulance: 911
- Police: 911
- Nearest Hospital: 928-757-2101
- National Poison Control Center: 800-222-1222

Team Members:

- Laura Garcia: (928) 231-9853
- Spencer Harvey: (928) 221-9484
- Carl Haskie: (505) 860-9247
- Sarah Reddinger: (505) 480-3212
- Bridget Bero: (928) 607-2516
- Alarick Reiboldt: (928) 380-4568
- Eric Zielske: (602) 653-6283