



BIG HOLE WATERSHED COMMITTEE AND U.S. FOREST SERVICE ELKHORN MINE AND MILL (COOLIDGE, MT) SITE-SPECIFIC HEALTH AND SAFETY PLAN

Prepared for:
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RESTORING OUR ENVIRONMENT - DESIGNING OUR FUTURE

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Contents

1	PURPOSE	1
2	SCOPE OF WORK.....	1
3	SITE LOCATION AND CHARACTERIZATION.....	1
3.1	Regulatory Requirements	2
4	SITE ROLES AND RESPONSIBILITIES.....	4
4.1	Principal-in-Charge.....	4
4.2	Project Manager	4
4.3	Field Team Leader.....	4
4.4	Safety and Health Manager	4
4.5	Work Team.....	4
4.6	Site Organization.....	5
5	HAZARD ASSESSMENT AND CONTROL.....	5
5.1	Biological Hazards	5
5.2	Body Mechanics	6
5.3	Chemical Hazards.....	7
5.4	Electrical Hazards.....	7
5.5	Gravitational Hazards	7
5.6	Motion Hazards.....	8
5.7	Radiological Hazards	10
5.8	Thermal Hazards	11
5.9	Pressure Hazards.....	11
5.10	Human Factors.....	11
5.11	Weather	12
5.12	Fire	12
5.13	Chain Saw.....	12
6	SITE-SPECIFIC REQUIREMENTS/PROCEDURES	13
6.1	Daily Toolbox Meeting.....	13
6.2	Pre-Job Meeting.....	13
6.3	Communication.....	13
6.4	Personal Protective Equipment	13
6.5	Personal/Equipment Decontamination	14
6.6	Training	14
7	SITE-SPECIFIC EMERGENCY RESPONSE PLAN.....	14
7.1	Emergency Procedure for Accident/Injury	14
7.2	Emergency Contact Information.....	15
7.3	Emergency Hospital Routes and Evacuation Procedures.....	15

7.4	Other Emergency Information.....	16
8	CORPORATE HEALTH AND SAFETY PLAN LINKAGE	17
9	REFERENCES.....	18

Attachments

Attachment 1 Elkhorn Mine and Mill Site Location
Attachment 2 Job Risk Assessment Form
Attachment 3 Site-Specific Safety Data Sheets
Attachment 4 Daily Toolbox Meeting Forms
Attachment 5 Emergency Hospital Map
Attachment 6 HAZWOPER Certificates

1 PURPOSE

The purpose of this Site-Specific Health and Safety Plan (SSHASP) is to address site-specific hazards and risks associated with investigation work activities performed by Pioneer Technical Services, Inc. (Pioneer) at the Elkhorn Mine and Mill, near Coolidge Montana (referred to as Site or site), administered by the U.S. Forest Service (USFS) in conjunction with the Big Hole Watershed Committee (BHC). This document also identifies the appropriate mitigation and controls to eliminate or reduce identified hazards or risks and addresses site-specific roles and responsibilities, hazards/risks, simultaneous operations (SIMOPS), and security and emergency response procedures for the project.

Also included in this document are site-specific policies and procedures related to the work required at the Site. Section 8 *Corporate Health and Safety Plan Linkage* provides a table that lists applicable corporate safety and health programs, policies, and procedures, which are incorporated by reference.

This SSHASP is a living document and will be updated as necessary to reflect changes to the scope of work, changes to policies/procedures, and/or when new hazards are identified. This SSHASP will be updated to address any changes to the scope of work and additional hazards associated with the scope of work change. This SSHASP will be distributed to the following:

- Principal-in-Charge
- Project Manager
- Field Team Leader

2 SCOPE OF WORK

Pioneer will complete the following Site Investigation work activities covered under this SSHASP:

- Collect surface and sub-surface soil samples to be analyzed with a field X-ray fluorescence (XRF) analyzer with a select group of samples being sent for laboratory analysis.
- Dig shallow test pits using a mini excavator or manually. It is assumed that test pits will be 5 feet or less below ground surface (bgs).
- Use Global Positioning System (GPS) devices to locate and record sample locations.

3 SITE LOCATION AND CHARACTERIZATION

The Site is in the Pioneer Mountain range of the Beaverhead-Deerlodge National Forest in Beaverhead County, Montana. The Site encompasses approximately 35 acres of various open to heavily forested areas, a mill processing area, a mining area, remnant waste rock piles, and an impacted floodplain. The Site is located within the NE ¼ of Section 14, Township 4S, Range 12W. The Site is accessed by traveling National Forest Road #2465 or Mono Creek/Old Polaris

Road, roughly 4 miles southeast of its intersection with Montana State Highway 43 from Wise River, Montana. Attachment 1 shows the location of the Site.

The purpose of the sampling activities at the Site is to collect data in support of the Site Investigation to determine the horizontal and vertical extent of mine waste contamination at the Site and estimate the removal volume. The objectives of the investigation are as follows:

1. Collect sufficient laboratory and XRF data to characterize and determine the nature and extent of mine waste on the Site.
2. Estimate the volume of mine waste and impacted soil at the Site through digging and sampling of test pits.
3. Compare laboratory results to the removal reclamation goals detailed in the 1998 Engineering Evaluation/Cost Analysis by USFS (Pioneer, 1998).
4. Provide recommendations to BHWC and USFS for further removal action at the Site.

3.1 Regulatory Requirements

Pioneer's designated safety and health manager (refer to Section 4.4) will review all jobs/tasks to ensure compliance with applicable regulations. Occupational health and safety regulations require that all project personnel:

1. Eliminate risks to health and safety as far as reasonably practicable.
2. If it is not reasonably practicable to eliminate risks to health and safety, reduce those risks so far as is reasonably practicable.

Relevant regulations that will apply to this project as required by the Occupational Safety and Health Administration (OSHA) include 29 Code of Federal Regulation (CFR) 1904 Recording and Reporting Occupational Injuries and Illnesses and 29 CFR 1910 General Industry (CFR, 2019).

Applicable Subparts for 29 CFR 1904 include, but are not limited to, the following:

Subpart A – Purpose (all sections)

Subpart B – Scope (all sections)

Subpart C – Recordkeeping Forms and Recording Criteria (all sections)

Subpart D – Other OSHA Injury and Illness Recordkeeping Requirements (all sections)

Subpart E – Reporting Fatality, Injury, and Illness Information to the Government (all sections)

Subpart F – Transition from the Former Rule (all sections)

Subpart G – Definitions (all sections)

Applicable Subparts for 29 CFR 1910 include, but are not limited to, the following:

Subpart A – General (all sections)

Subpart D – Walking-Working Surfaces, the following sections:

- 1910.21 Definitions
- 1910.22 General requirements
- 1910.30 Other working surfaces

Subpart E – Exit Routes and Emergency Planning (all sections)

Subpart H – Hazardous Materials, the following sections:

- 1910.106 Flammable liquids
- 1910.120 Hazardous waste operations and emergency response

Subpart I – Personal Protective Equipment (all sections)

Subpart J – General Environmental Controls, the following sections:

- 1910.141 Sanitation
- 1910.144 Safety color code for marking physical hazards
- 1910.145 Specifications for accident prevention signs and tags

Subpart K – Medical and First Aid (all sections)

Subpart L – Fire Protection, the following section:

- 1910.157 Portable fire extinguishers

Subpart N – Material Handling and Storage, the following section:

- 1910.176 Handling materials - general

Subpart P – Hand and Portable Powered Tools and Other Hand-Held Equipment (all sections)

Subpart Z – Toxic and Hazardous Substances, the following sections:

- 1910.1000 Air contaminants
- 1910.1018 Inorganic arsenic
- 1910.1025 Lead
- 1910.1096 Ionizing radiation
- 1910.1200 Hazard communication

Pioneer's designated safety and health manager (refer to Section 4.4) will review this SSHASP on a regular basis to ensure compliance with additional regulations and to incorporate any changes.

4 SITE ROLES AND RESPONSIBILITIES

4.1 Principal-in-Charge

The principal-in-charge will serve in a quality assurance/risk assessor role to assure that the work plans are adequate to collect the data necessary and determine if additional actions are required. The principal-in-charge for this work will be **Shawn Bisch**, or an alternate designated by Pioneer.

Shawn Bisch (406) 497-8057

4.2 Project Manager

The project manager will lead the team and be responsible for contracting, project delivery, quality assurance, and for completing the project. The project manager for this work will be **Marty Bennett**, or an alternate designated by Pioneer.

Marty Bennett (406) 490-1564

4.3 Field Team Leader

The Field Team Leader (FTL) will direct the sampling team for this project. The FTL for this work will be **Kile Denny**, or an alternate designated by Pioneer.

Kile Denny (406) 720-3065

4.4 Safety and Health Manager

The safety and health manager will coordinate and enforce all aspects of the SSHASP for this project and serve as a resource and in-house consultant on job safety and health matters. The safety and health manager for this work will be **Tara Schleeman**, or an alternate designated by Pioneer.

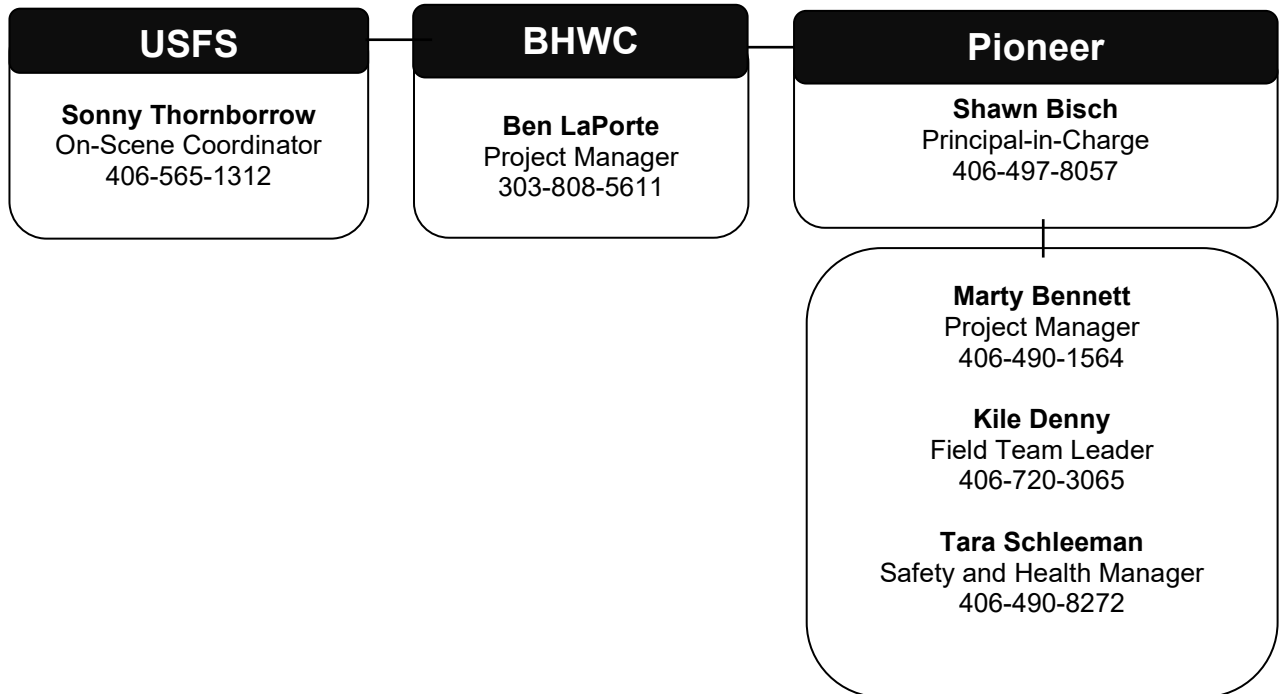
Tara Schleeman (406) 490-8272

4.5 Work Team

The Pioneer work team for this project will carry out the duties assigned by an authority to proper specifications. All personnel on the team will STOP WORK if any duty/task appears potentially unsafe. Those working in the field will inspect the Site area prior to commencing work and actively monitor the Site and its surroundings for changes that might affect the performance of the task. Also, personnel will report all allegations or occurrences of unsafe work, near misses, and any opportunities to improve unsafe work environments to the FTL and the safety and health manager.

4.6 Site Organization

The project team will conduct all project activities described in Section 2 Scope of Work. The diagram below shows the organization for this project:



5 HAZARD ASSESSMENT AND CONTROL

The following paragraphs discuss the site-specific hazards, risks, and mitigation measures associated with the Site and the tasks outlined in Section 2 Scope of Work. Pioneer will complete a Job Risk Assessment (JRA) to identify new tasks and/or hazards that are not addressed in this SSHASP. A blank copy of a JRA form is in Attachment 2. This SSHASP will be updated as the scope/conditions change and/or new hazards are identified.

5.1 Biological Hazards

Biological hazards include animals, plants, insects, and human behavior. All personnel working on the site will be trained and competent on the tasks they will perform in the field and will understand the scope of work and tasks to be performed. If a team member is unclear on the scope of work or new tasks arise, work will stop until the entire team can verify that they understand the task.

Personnel working on the site may come in contact with various species of animals, plants, and insects, such as domestic animals, wildlife, livestock, various insects, snakes, rodents, etc. Some examples are deer, black bears, mountain lions, rattlesnakes, ticks, and bees. All personnel working on the site will be trained on the signs and symptoms of exposure to plants and insect

bites, such as redness and swelling. First aid kits will be available in company vehicles to treat minor bites, stings, scrapes, and cuts. Employees will wash hands after removing gloves when they have been exposed to a biological hazard. All personnel will take these sensible precautions:

- Avoid contact with animals, if possible, by leaving the area and/or getting in vehicles until animals are no longer present.
- Make noise to let animals know they are in the area.
- Report all bites and stings to the FTL and safety and health manager.
- Personnel with allergies will notify their FTL to ensure proper treatment in the event of a bite, sting, or exposure to plants/weeds.
- In the daytime, all food, attractants and refuse that could attract bears or other wildlife will be acceptably stored or attended in accordance with Beaverhead-Deerlodge National Forest Food Storage Requirements.
- Bear spray will be made available to all team members for the duration of the site investigation.

Employees have the potential to be exposed to various infectious diseases while working on the site. Employees will wear proper Level D personal protective equipment (PPE) and nitrile gloves when necessary. Employees will also follow good personal hygiene like frequent hand washing and hand sanitizing, disinfecting of tools and equipment, etc. Employees will follow all requirements issued by Pioneer, the Centers for Disease Control and Prevention (CDC), U.S. Environmental Protection Agency (EPA), or other similar agencies in response to the spread of infectious diseases. Specific infectious diseases hazards and controls will be documented on the JRAs for the project, as necessary.

5.2 Body Mechanics

Personnel working on the site will be required to handle, lift, and move sampling and GPS equipment that could result in muscle and back strains. Workers will use ergonomic techniques such as using the correct tool for the job, work/rest periods, and safe lifting techniques. Safe lifting techniques include 1) warming up the lower back with a standing back bend, 2) standing with feet shoulder width apart, 3) bending with the knees, 4) keeping the load close to the body, and 5) keeping the head up while lifting with the legs.

Workers will take breaks as needed and break tasks into shorter segments to allow the muscles time to rest. Employees will park vehicles as close as reasonably possible to sample locations to minimize the amount and distance of moving sampling equipment. Operators will avoid twisting when lifting items by moving their feet rather than twisting the torso. Workers will also keep heavier items within the power zone height, about mid-thigh to mid-chest. As a rule of thumb, personnel should not lift objects that are more than 50 pounds. If equipment will be used to lift materials and tools. Environmental factors can affect a worker's muscles when performing lifts. Cold temperatures can cause decreased muscle flexibility and hot temperatures can lead to dehydration and fatigue. Adjust work schedules to minimize lifting in extreme temperatures.

5.3 Chemical Hazards

Personnel working on the site can be exposed to heavy metals such as arsenic, antimony, cadmium, copper, iron, lead, manganese, and zinc in soil. Exposure to heavy metals can occur via contaminated soil and/or ponded/standing water, and sample collection from mine wastes (i.e., waste rock dumps, residual tailings, stockpiles, sedimentary wash/gullies, and the floodplain). Potential exposure pathways for these contaminants include inhalation and ingestion, which could result in adverse health effects. All personnel will practice proper personal hygiene techniques (i.e., washing hands before eating/drinking and eating in designated areas) while on the site. In addition to Level D PPE, personnel will wear gloves when there is a potential to contact impacted soil/water. Work will be suspended during high wind conditions that produce large amounts of visible dust. If contact with skin and/or eyes does occur, flush the skin and/or eyes with water. Eye wash bottles are available in the company vehicles.

Exposure to gasoline or diesel can occur while refueling vehicles or equipment. Inadvertent exposure via inhalation and/or skin contact with gasoline can result in adverse health effects and skin irritation. To avoid exposure, fuel vehicles in well-ventilated areas, stand up wind while fueling, and minimize splash hazards so skin contact does not occur. If skin contact does occur, flush the affected area with water.

All personnel will follow the hazard communication procedures as outlined in the Pioneer *Corporate Health and Safety Plan (HASP)* (Pioneer, 2020), referred to herein as Pioneer HASP. A complete inventory of Safety Data Sheets (SDSs) for chemicals is available on Pioneer's employee web page. Specific to this project, site-specific SDSs (i.e., arsenic, antimony, cadmium, copper, iron, lead, manganese, and zinc) are in Attachment 3.

5.4 Electrical Hazards

Contact with underground and overhead utilities could result in personal injury, death, or property damage. Potential contact with underground and overhead utilities while performing work activities discussed in Section 2 is unlikely as the Site is extremely remote.

Overhead utility permits are not expected to be required for the work listed in Section 2 Scope of Work; however, if there is a task change that requires an overhead utilities permit, work will stop and the team will assess the hazards associated with the tasks and acquire the required permits.

5.5 Gravitational Hazards

Personnel will be required to walk/work on uneven, steep, soft, saturated, and slippery surfaces and walk/work around downed trees. As a result, slips, trips, falls, and personal injuries could occur. Personnel will wear boots with good traction that are appropriate for the weather conditions. Personnel will also plan their path and, if possible, avoid downed trees and steep, rugged, and slippery terrain.

Portions of the site are heavily forested with live and beetle-killed trees. Personnel will pay attention to wind when sampling and will move away from treed areas during high winds (greater than 15 miles per hour).

Personnel could be injured if the XRF analyzer drops on their feet. To avoid this, personnel will wear Level D PPE, and the XRF analyzer will be set up on a solid surface and will not be moved until sampling is complete.

During excavation work, personnel could fall in the excavation resulting in serious personal injuries. To prevent falls, ground personnel will stay at least 6 feet back from the edge of the open excavation. When necessary, personnel will install a warning line with ropes or caution tape. This warning line will be placed 6 feet back from the edge of the open excavation.

Spoil piles from the excavation activities will be kept at least 2 feet from the edge of the excavation to minimize the possibility of sloughing. All open excavations will be guarded by installing barricades, using plastic safety fencing, or flagging the excavation with a combination of rope and visible markers. When applicable, personnel will follow the established procedures for trenching, excavation, and ground disturbance as outlined in the Pioneer HASP.

Ground personnel could be exposed to suspended loads resulting in personal injuries if working near the excavator with soil in the bucket. Ground personnel will not walk/work under suspended loads and will maintain a 20-foot buffer zone around operating equipment.

5.6 Motion Hazards

Vehicle incidents could occur while driving to and from the sites due to interaction with public traffic. In addition, personnel will travel on heavily trafficked highways while mobilizing and demobilizing to the general vicinity of each Site. Personnel will be required to drive on unimproved roads that are not maintained and are infrequently traveled. Personnel will consider the weather conditions before traveling to the Site. Other hazards include off-road vehicles, all-terrain vehicles (ATVs), and motorcycles using the area as well. Pioneer personnel driving in the site area will have completed defensive driving training and will follow these sensible driving habits:

- Drive slowly on steep roads and use 4-wheel drive.
- When driving downhill, shift into second (2) or low (L) gear to use the engine and transmission to slow the vehicle down.
- Drive straight up (and down) hills and avoid driving on an angle, which could cause the vehicle to lose traction or slip sideways.
- When possible, stay on designated roads.
- If a vehicle becomes stuck, complete a JRA prior to extracting the vehicle.
- Verify prior to mobilization each day that the field vehicle spare tire and necessary tools to change a flat tire are in good order.

The Site is located beyond the Coolidge trailhead. Vehicle and equipment access to the Site will be through the locked gate along a minimally maintained road to the mill site. The Coolidge / Elkhorn Site is a popular recreation site with hikers. It is to be expected that the public will be at the Site while sampling is occurring, introducing an additional hazard. Special care will be taken during field work to prevent the public from entering the Site work zone. If the public does not adhere to precautionary measures, then a stop work will occur until the Site is re-secured.

Personnel will carry a GPS when driving and have maps of the area depicting small roads that may not be well represented with the GPS.

Working and/or parking vehicles in dry vegetation could result in grass fires. Personnel will not park or idle vehicles in dry vegetation. All company field vehicles will contain fire extinguishers and shovels.

Ground personnel will be required to work around heavy equipment (mini excavator). While working around heavy equipment, ground personnel could be struck by and/or caught between equipment. Ground personnel will practice the following when working around heavy equipment:

- Be aware of surroundings and watch out for moving equipment.
- Maintain a 20-foot buffer zone around moving equipment.
- Before approaching the equipment, communicate with the operator by establishing eye contact and waving.
- Approach equipment only when it is not in motion and it is safe to approach, for example when the bucket of the excavator is on the ground and the operator has signaled that it is safe to approach.
- Do not walk/work under a suspended load.
- Watch for shifting or unstable loads and working surfaces.

Personnel collecting soil samples from test pits and working around test pits could be exposed to cave-ins resulting in serious personal injuries or death. If the test pit is 4 feet deep, the excavator will build a ramp to access the test pit. Personnel will not enter test pits that are deeper than 4 feet; in those cases, personnel will collect soil samples from the equipment bucket once it has been placed on the ground and the equipment is powered down. If personnel need to enter a test pit that is 4 feet or deeper, sloping techniques will be used following the trenching, excavation, and ground disturbance procedures outlined in the Pioneer HASP.

When performing sampling activities, personnel might need to bend, squat, and kneel. These motions could result in personal injuries such as muscle/back strains. To avoid this, personnel should stretch prior to starting work and take breaks when necessary.

During sampling, personnel will be required to lift/carry tools, samples, and carrying cases, which could result in muscle and back strains. To prevent injuries, personnel will use the following proper lifting techniques:

- Warm up the lower back with a standing back bend.
- Stand with feet shoulder width apart.
- Get a good grip.
- Keep load close to the body.
- Lift with legs and not with back.
- Avoid lifting above shoulder height.
- Use two people to lift items, if necessary.

Personnel should also take breaks when experiencing symptoms of muscle fatigue such as sore/burning muscles.

Personnel using an XRF analyzer and collecting soil samples could pinch their fingers in the XRF analyzer case and/or scrape their fingers/hands when collecting/handling soil samples. Personnel could also be exposed to pinch points when opening and closing gates and vehicle doors and when using hand tools and equipment. Getting fingers/hands pinched may result in personal injuries such as scrapes, cuts, and broken fingers. Personnel will watch where they place their fingers/hands; will not place their hands into blind spaces; wear gloves when opening and closing gates and collecting and handling soil samples; and inspect all tools/equipment prior to each use.

5.7 Radiological Hazards

Personnel might be exposed to ultraviolet (UV) radiation from the sun. The hazards associated with UV radiation are burns and eye and skin damage. All personnel should use sunscreen with high sun protection factor (SPF) greater than 15. Personnel working on the site will wear long-sleeved shirts, long pants, and should wear tinted safety glasses. Employees should take breaks in shaded areas or vehicles as needed to relive exposure to UV radiation.

Personnel using the XRF analyzer can be exposed to radiation from the analyzer's x-ray tube. Inadvertent exposure to radiation from the XRF analyzer could result in serious adverse health effects. To prevent exposure to radiation, personnel will acknowledge and comply with the following safety precautions:

- Radiation from the x-ray tube is fully contained within the device when not in use and allowed to escape through the measurement window only while the user is analyzing a sample.
- Radiation emission is controlled by a shutter.
- Keep hands and all body parts away from the front end of the analyzer when the shutter is open to minimize exposure.
- Do not hold the analyzer near the measurement window during testing.
- Never point the analyzer at yourself or anyone else when the shutter is open.
- Never hold samples with your hand during analysis or look into the path of the primary beam.

5.8 Thermal Hazards

Personnel will likely be sampling during the summertime period and could be exposed to hot temperatures when working outdoors, which could result in heat illness. Exposure to hot temperatures when working outdoors could result in heat-related illness. Heat-related illnesses include a spectrum of disorders from environmental heat exposure. Some examples are minor conditions such as heat cramps, heat rash, heat syncope (fainting as a result of heat exposure), heat exhaustion, and the more severe condition known as heat stroke. Heat stroke is defined as a body temperature of greater than 105.1 °F due to environmental heat exposure. The risk of heat-related illness can be reduced by observing precautions to avoid overheating and dehydration: wear light, loose-fitting clothing to allow perspiration to evaporate and cool the body; drink plenty of liquids to replace fluids lost from sweating; and use an air-conditioned vehicle or move indoors to cool down. When applicable, personnel will follow the established procedures for working in hot environments as defined in the Pioneer HASP.

5.9 Pressure Hazards

Exposure to elevated noise levels from heavy equipment may result in hearing damage. All personnel will follow the standard requirements below:

- All personnel (i.e., operator and samplers) will wear single hearing protection: earplugs.
- Non-essential personnel (i.e., not operating the equipment or observing work activities) will maintain a 20-foot buffer zone around heavy equipment and, if necessary, can get inside a field vehicle to reduce noise exposure.

Hearing protection will be administered and used in accordance with the hearing protection policies and procedures outlined in the Pioneer HASP.

Personnel may also be exposed to pressurized hydraulic hoses when working around heavy equipment. Hydraulic hoses could burst/rupture resulting in inadvertent contact with hydraulic fluid or personal injury due to being struck by the hoses. Personnel will inspect heavy equipment and hydraulic hoses each day prior to starting work. Non-essential personnel will maintain a 20-foot buffer zone around heavy equipment.

5.10 Human Factors

Lack of understanding of the scope of work or inadequate training could cause incidents resulting in injury and/or property damage. All personnel will understand the scope of work and tasks to be performed. In addition, all personnel will be trained on the tasks they will perform in the field. If workers are unclear on the scope of work, work will stop until all members of the workforce can verify that they understand the scope of work and task they are performing. A JRA will be completed when necessary.

5.11 Weather

Potential for severe weather conditions such as high winds or lightning storms exists at the Site. Specific hazards and controls are addressed in JRAs. Current and potential weather conditions as well as stop work triggers will be established and discussed during Daily Toolbox Meetings.

Exposure to lightning is possible during the fall months. Personnel will follow the 30-30 rule to minimize risk of shock/electrocution. The 30-30 rule involves the following:

- Once lightning is seen, count the number of seconds until thunder is heard.
- If thunder is heard in 30 seconds or less, stop work and go indoors/take shelter.
- Do not return to outside activity until 30 minutes after hearing the last thunder.

5.12 Fire

The State of Montana could experience drought and above normal day time temperatures during field season. Due to these conditions, the Beaverhead-Deerlodge National Forest and Department of Natural Resources (DNRC) could issue Stage 1 or Stage 2 fire restrictions. The USFS has requirements for completing work on USFS-managed lands. Pioneer personnel will follow USFS requirements and all Stage 1 and Stage 2 restrictions if they become active. To prevent forest fires, personnel will acknowledge and comply with the following safety precautions:

- All vehicles and equipment will be equipped with minimum 10-pound dry chemical fire extinguisher and 1 round-point shovel.
- Fueling of equipment will be completed in areas without available fuels capable of carrying fire.
- Chain saws will have an approved spark arrester.
- Any fueling or refueling of a chain saw will only be performed in an area that has first been cleared or is free of all material capable of carrying fire; the chain saw will be moved at least 10 feet from place of fueling before it is started.
- Smoking will not be permitted within the contract area except on surfaced or dirt roads, at landings, within closed vehicles, or at other posted places and will never be allowed while working or traveling on foot.

5.13 Chain Saw

Site conditions such as downed timber, snags, springs, and bogs will necessitate the need to use a chain saw to cut downed timbers. Based on the lifting limitations of the mini excavator, downed trees must be cut to allow safe access of the mini excavator. Downed trees will be cut in approximately 6-foot-long sections to allow the mini excavator to pick them up and move them away from the access path.

One designated field team member will operate the chain saw, complying to the following safety precautions:

- Only downed timber necessary for access will be cut, no standing or widow makers will be sawn.
- Operator will ensure there are no other people in the area, except the operator of the mini excavator.
- Prior to operation, the operator will check to ensure the chain saw safety controls (i.e., kick-back brake, guide bar, etc.) are functioning properly.
- Operator will check the spark arrestor on the saw.
- Operator will wear proper PPE that includes hearing protection, face shield, and cut-proof chaps.

6 SITE-SPECIFIC REQUIREMENTS/PROCEDURES

The following sections outline the site-specific procedures and requirements field personnel will adhere to during the work activities.

6.1 Daily Toolbox Meeting

A Daily Toolbox Meeting will be held to ensure that all team members understand the scope of work and that the hazards and risks have been identified for that day's activities. Daily Toolbox Meetings will include all members involved in the given activity and documented on a Daily Toolbox Meeting record form (Attachment 4). During the meeting, the team will review applicable JRAs.

6.2 Pre-Job Meeting

Pre-job meetings will occur prior to starting work. The purpose of the pre-job meeting includes the following:

- Discuss the scope of work and hazards/risk associated with the scope of work.
- Discuss communication plan.
- Review the SSHASP.
- Discuss the nearest hospital(s) and best route(s).

6.3 Communication

Cellular phones (cell phone) will be the primary method of communication between personnel performing the work. When there is no cellular reception at the site and immediate vicinity, personnel will carry a cell phone signal booster to increase the service availability. Personnel will not use cell phones while driving and will stop the vehicle prior to using a cell phone.

6.4 Personal Protective Equipment

The PPE for this project will be Level D, unless otherwise noted on other subsequent Site documentation. Protective equipment will include the following:

- Level D PPE (includes hard hats, high-visibility vest/clothing, safety glasses with side shields, work gloves, long pants, work shirts, and steel-toed boots or shoes).
- Nitriles gloves when collecting and handling soil samples.
- Rain gear (coat with hood and pants), including rubber boots.

6.5 Personal/Equipment Decontamination

Personal and equipment decontamination will take place at the site each day. Personnel will follow the decontamination procedures below and ensure they are completed each day:

- Decontaminate all equipment prior to use and prior to leaving the site each day. Decontamination consists of a tap water rinse, soap and tap water wash, a distilled water rinse, and liquid-NOX rinse.
- Dispose of decontamination fluids on the ground surface leaving any hazardous material on the site.
- Wash hands prior to drinking and eating.
- Eat and drink in designated areas. Designated areas will be separated from the project site and determined during Daily Toolbox Meetings.

6.6 Training

This SSHASP will be communicated to all employees prior to commencing work. All members of the workforce have current 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training. Job and or task-specific training will be addressed in risk-assessed standard operating procedures.

7 SITE-SPECIFIC EMERGENCY RESPONSE PLAN

To address emergency response situations (e.g., personal injury or fire) at each site, all Pioneer employees will be aware of Pioneer's Emergency Response Plan and able to carry out support activities outlined therein. The FTL will assure that all personnel and visitors coming to the site are aware of the emergency response procedures for each site during the pre-entry briefing.

7.1 Emergency Procedure for Accident/Injury

In case of a serious accident or an emergency situation involving activities addressed under this SSHASP, personnel will follow the procedures below:

1. **Cease Work in the Vicinity** – Using a cell phone, notify all team members in the immediate area to stop work and if applicable evacuate the area.

2. **Assess the Situation** – Make sure scene is safe to enter before further assessing the accident. If conditions are unsafe to enter, do not put yourself or others in danger. Do not move the injured person(s). This can lead to more severe injuries.
3. **Call 911** – Information to give dispatcher includes the following:
 - a. Explain the nature of the emergency.
 - b. Provide accurate information on the severity and urgency of the situation.
 - c. Give clear information on where the accident occurred and the quickest route to get there.
 - d. If hazardous materials or substances are involved, inform dispatcher of them.
 - e. When necessary, make follow-up contact with emergency services personnel to provide added information and coordinate response to any injuries of care or service providers.
4. **Escort** – Assign someone to escort emergency personnel to the scene of the accident.
5. **Make Additional Emergency Contacts** – Call the individuals in Section 7.2 in the order listed until you obtain direct voice contact.

7.2 Emergency Contact Information

Pioneer Technical Services, Inc.:

Marty Bennett	406-490-1564
Kile Denny	406-720-3065
Tara Schleeman	406-490-8272

Local Emergency Services:

Ambulance	– Butte Silver Bow County Ambulance 911 or (406) 723-3132
Sheriff	– Butte Silver Bow County Sheriff 911 or (406) 497-1120
Fire	– Butte Silver Bow County Fire Department (911) or (406) 497-6481
Highway Patrol	– Montana Highway Patrol (406) 444-3780
Hospital	– Butte Silver Bow County Medical Center (406) 723-2500

7.3 Emergency Hospital Routes and Evacuation Procedures

At the beginning of each workday, during the Daily Toolbox Meeting, the field team will plan the daily schedule, discuss which area of the site will be visited, and review the emergency procedures. Information about the nearest hospital to the Site is as follows:

Hospital name: St. James Healthcare

Hospital address: 400 S Clark Street, Butte MT

Hospital phone number: (406) 723-2500

Attachment 5 contains a map showing the route to the hospital from the Site.

If an evacuation of the work area is necessary, the FTL will be responsible for initiating and communicating the evacuation to the team. The team will evacuate to the designated muster point (see below) and the FTL will be responsible for performing a head count.

The general muster point for the Site will be determined by the FTL at the start of day. The location of the muster point will be documented in the Daily Toolbox Meeting record form.

If emergency response services are needed to the site, the FTL will designate someone to meet emergency response personnel at the designated muster point and escort them to the location where emergency services are needed.

7.4 Other Emergency Information

First aid kit locations: Pioneer field vehicles

Fire extinguisher locations: Pioneer field vehicles

Certified First Aid Personnel: Marty Bennett, Kile Denny, Pat Hunter

8 CORPORATE HEALTH AND SAFETY PLAN LINKAGE

This section identifies which of the health and safety programs, policies, and procedures are directly included in this SSHASP and those that are addressed by reference in the Pioneer HASP.

Topic	HSSE Program Incorporated by Reference	Support Document Included in SSHASP	N/A	What is Included?
Health and Safety Programs, Policies, and Procedures				
Confined Space Program	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Decontamination Procedures	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Driving Safety Program	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Drug, Alcohol, and Weapons Policy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Electrical Hazards Program	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Energy Isolation (LOTO) Program	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Emergency Response Program	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Site specific
Environmental Drilling Program	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Ergonomics Program	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Fitness for Duty Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Hand and Power Tools Program	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Hazard Communication Program	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Site specific
Hazardous Plants and Animals Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Site specific
Hearing Conservation Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Heat/Cold Stress Program	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Heavy Equipment Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Hot Work Program	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Incident Reporting and Investigation Program	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Industrial Hygiene Program	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Job Zone Control and Traffic Management Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Management of Change Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Material Handling and Storage Program	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Medical Case Management Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Overhead Utilities Program	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Personal Protective Equipment Program	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Site specific
Risk Assessment, Hazard identification and Hazard Control	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Site Visitor Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Topic	HSSE Program Incorporated by Reference	Support Document Included in SSHASP	N/A	What is Included?
Stop Work Program	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Subcontractor Management Policy	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Toolbox Meetings Program	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Trenching, Excavation, and Ground Disturbance Program	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Working at Heights Program	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Working Alone Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Training Program	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

HSSE: Health, Safety, Security, and Environment

SSHASP: Site-Specific Health and Safety Plan

9 REFERENCES

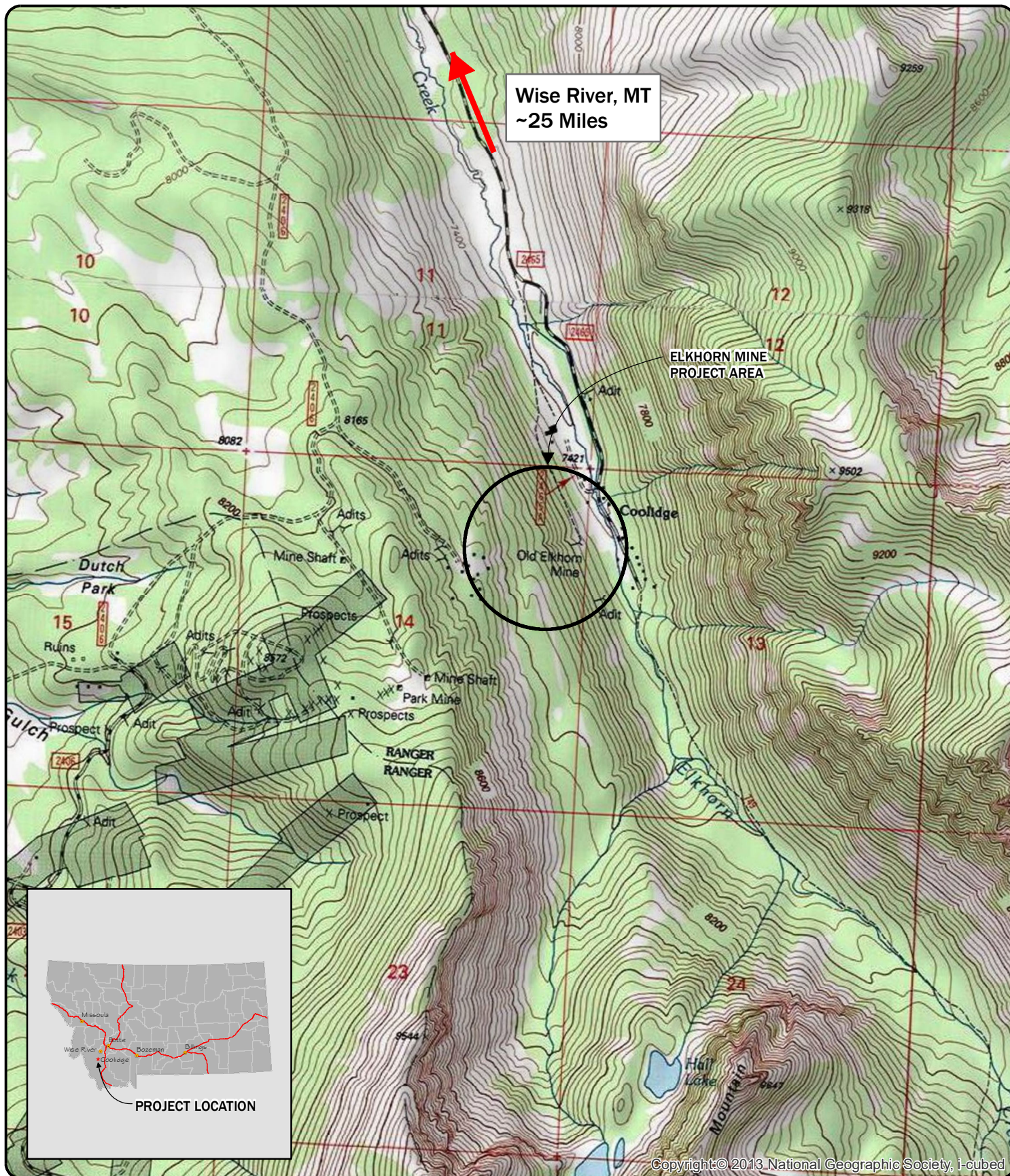
Pioneer, 1998. Amendment to the Final Engineering Evaluation/ Cost Analysis for the Elkhorn Creek Site. Prepared for U.S. Department of Agriculture/ Forest Service. January 1998.

CFR, 2019. 29 CFR 1904 Recording and Reporting Occupational Injuries and Illnesses and 29 CFR 1910 General Industry. Available at <https://www.ecfr.gov/cgi-bin/ECFR?page=browse>.

Pioneer, 2020. Pioneer Technical Services, Inc. Corporate Health and Safety Plan (HASP). June 2020.

ATTACHMENT 1

Elkhorn Mine and Mill Site Location



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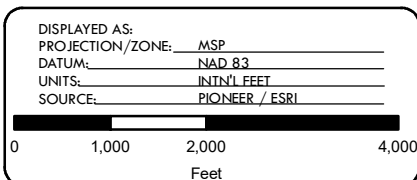
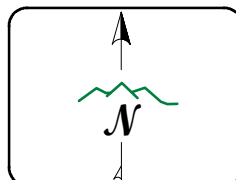


FIGURE 1



SITE LOCATION MAP ELKHORN MINE

DATE: 3/9/2022

ATTACHMENT 2

Job Risk Assessment Form



Job Risk Assessment

Document Control #:

Date:	Location:
Work Team:	
Task Description:	
Required PPE:	
Emergency Response Procedures/Muster Points/Nearest Hospital:	
<u>Working alone</u>	
Worker will establish contact with:	
Phone number:	
Contact intervals: <input type="checkbox"/> Beginning of shift <input type="checkbox"/> Other (specify): <input type="checkbox"/> End of shift	
Are there other work activities in the area that may affect this job?	
1. Does the task require workers to enter a confined space? (A confined space is defined as "any space that is large enough to bodily enter and perform work, has limited means for entry or exit, and is not designed for continuous human occupancy")	
<input type="checkbox"/> YES	<input type="checkbox"/> NO
If yes:	
Is there a potential for engulfment or hazardous atmosphere?	<input type="checkbox"/> YES <input type="checkbox"/> NO
If yes, a Confined Space Permit is required:	
Have workers been properly trained?	<input type="checkbox"/> YES <input type="checkbox"/> NO
Have all permit requirements been met?	<input type="checkbox"/> YES <input type="checkbox"/> NO
2. Does the task require workers to be 6 feet or more off the ground or work within 6 feet of an excavation/edge that is 6 feet or deeper?	
<input type="checkbox"/> YES	<input type="checkbox"/> NO
If yes:	
Have workers been properly trained?	<input type="checkbox"/> YES <input type="checkbox"/> NO
What fall protection systems(s) will be used?	
3. Does the task require drilling or Geoprobe?	
<input type="checkbox"/> YES	<input type="checkbox"/> NO
If yes:	
Have workers been properly trained?	<input type="checkbox"/> YES <input type="checkbox"/> NO
Has driller been pre-qualified?	<input type="checkbox"/> YES <input type="checkbox"/> NO
Has the drill rig/Geoprobe been inspected prior to starting work?	<input type="checkbox"/> YES <input type="checkbox"/> NO
Have utility locates been completed?	<input type="checkbox"/> YES <input type="checkbox"/> NO
Locate ticket number:	



Job Risk Assessment

Document Control #:

4. Does this task require ground disturbance, trenching, and/or excavation? <input type="checkbox"/> YES <input type="checkbox"/> NO	
If yes:	
Will workers enter the excavation?	<input type="checkbox"/> YES <input type="checkbox"/> NO
Have workers been properly trained?	<input type="checkbox"/> YES <input type="checkbox"/> NO
Have utility locates been completed?	<input type="checkbox"/> YES <input type="checkbox"/> NO
Locate ticket number: _____	
Has the <i>Construction Checklist for Trenching</i> been completed? <input type="checkbox"/> YES <input type="checkbox"/> NO	

5. Will the task take place near overhead utilities? <input type="checkbox"/> YES <input type="checkbox"/> NO	
If yes:	
Have workers been properly trained?	<input type="checkbox"/> YES <input type="checkbox"/> NO
Have line voltages been verified?	<input type="checkbox"/> YES <input type="checkbox"/> NO
What minimum radial clearance distance is required? (see attachment)	

6. List the steps needed to complete the job.

7. Which of the following biological or energy root sources could be involved with each step?

Root Source	What hazards are associated with the root source? How, where, or when could an incident/injury occur?	List control measures required to eliminate, control or protect against the hazards.
Biological (e.g., plants, insects, reptiles, animals, human)		
Chemical (e.g., cleaning agents, inks, dust, asbestos, toxins to air, water or ground)		



Job Risk Assessment

Document Control #:

Motion (e.g., rotating equipment, unwanted movement over surfaces, wind energy, traffic)		
Gravity (e.g., falling objects, people falling, lifting)		
Radiation (e.g., ultraviolet, ionizing, or electromagnetic radiation)		
Electrical (e.g., wiring, motors, transformers, electrocution, underground utilities, lightning)		
Thermal (e.g., cold or hot weather, cold pressure lines, hot or cold product lines or equipment)		



Job Risk Assessment

Document Control #:

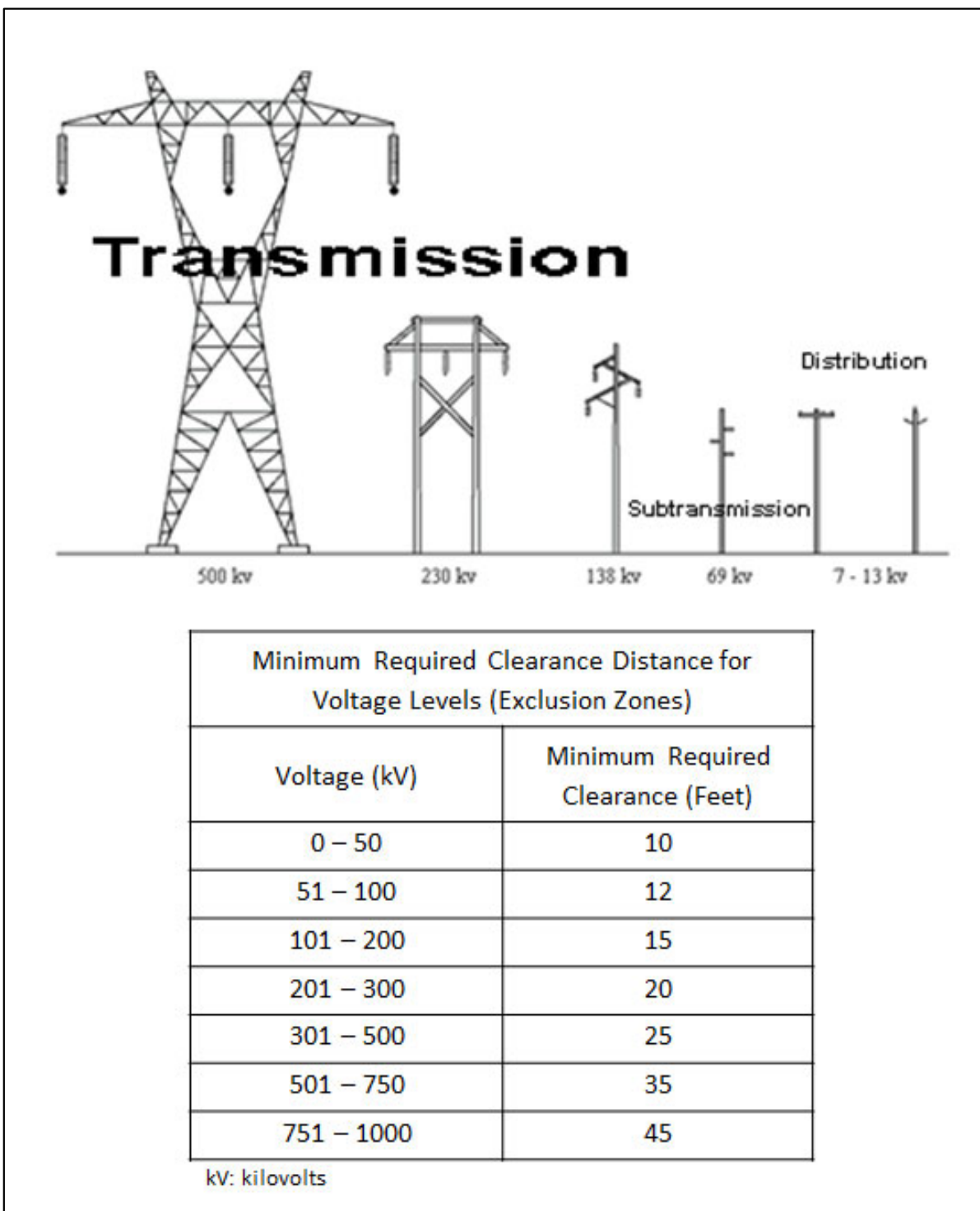
Pressure (e.g., hydraulic pressure, air pressure, gas pressure, oil pressure, sound waves [noise])		
-----------------------------------------------------------------------------------------------------------------------------------	--	--

Please use the HASP's Daily Toolbox Meeting Record Form to sign in/out and to document to post daily review.

I confirm that the conditions under which the JRA was originally completed remain unchanged, that work is allowed to continue and that the revalidated permit has been reviewed with the work team.

Date	Time	Signature

Minimum Required Clearance Distance for Overhead Utilities



ATTACHMENT 3

Site-Specific Safety Data Sheets



SAFETY DATA SHEET

Creation Date 29-Sep-2009

Revision Date 18-May-2015

Revision Number 2

1. Identification

Product Name Antimony, powder

Cat No. : AC192450000; AC192450100

Synonyms Antimony Black; Antimony Regulus

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Entity / Business Name
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01
/ **Europe** call: +32 14 57 52 11
Emergency Number **US**:001-201-796-7100 /
Europe: +32 14 57 52 99
CHEMTREC Tel. No.**US**:001-800-424-9300 /
Europe:001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Carcinogenicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Liver, Kidney, Cardiovascular system.	

Label Elements

Signal Word

Warning

Hazard Statements

May cause respiratory irritation
Suspected of causing cancer
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements**Prevention**

Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area

Response

IF exposed or concerned: Get medical attention/advice

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

Storage

Store locked up
Store in a well-ventilated place. Keep container tightly closed

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

None identified

3. Composition / information on ingredients

Component	CAS-No	Weight %
Antimony, powder	7440-36-0	>95

4. First-aid measures

General Advice	If symptoms persist, call a physician.
Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.
Inhalation	Move to fresh air. If breathing is difficult, give oxygen. Obtain medical attention.
Ingestion	Do not induce vomiting. Obtain medical attention.
Most important symptoms/effects	No information available.
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Dry chemical.
Unsuitable Extinguishing Media	No information available
Flash Point	No information available
Method -	No information available
Autoignition Temperature	330 °C / 626 °F
Explosion Limits	
Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical

Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products

antimony oxide

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPAHealth
2Flammability
1Instability
0Physical hazards
N/A**6. Accidental release measures****Personal Precautions****Environmental Precautions**

Ensure adequate ventilation. Use personal protective equipment. Avoid dust formation. Should not be released into the environment. See Section 12 for additional ecological information.

Methods for Containment and Clean Up

Sweep up or vacuum up spillage and collect in suitable container for disposal. Keep in suitable, closed containers for disposal.

7. Handling and storage**Handling**

Use only under a chemical fume hood. Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Avoid dust formation.

Storage

Keep containers tightly closed in a dry, cool and well-ventilated place. Keep under nitrogen.

8. Exposure controls / personal protection**Exposure Guidelines**

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Antimony, powder	TWA: 0.5 mg/m ³	(Vacated) TWA: 0.5 mg/m ³ TWA: 0.5 mg/m ³	IDLH: 50 mg/m ³ TWA: 0.5 mg/m ³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Antimony, powder	TWA: 0.5 mg/m ³	TWA: 0.5 mg/m ³	TWA: 0.5 mg/m ³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures

Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment**Eye/face Protection**

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection

Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Grey
Odor	No information available
Odor Threshold	No information available
pH	No information available
Melting Point/Range	630 °C / 1166 °F
Boiling Point/Range	1635 °C / 2975 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	1 mmHg @ 886 °C
Vapor Density	Not applicable
Relative Density	No information available
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	330 °C / 626 °F
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Sb
Molecular Weight	121.75

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions. Air sensitive.
Conditions to Avoid	Incompatible products. Excess heat. Avoid dust formation. Exposure to air.
Incompatible Materials	Strong oxidizing agents
Hazardous Decomposition Products	antimony oxide
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Antimony, powder	7 g/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation	No information available
Sensitization	No information available
Carcinogenicity	Limited evidence of a carcinogenic effect. The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Antimony, powder	7440-36-0	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects	No information available
Reproductive Effects	No information available.
Developmental Effects	No information available.
Teratogenicity	No information available.
STOT - single exposure	Respiratory system
STOT - repeated exposure	Liver Kidney Cardiovascular system
Aspiration hazard	No information available
Symptoms / effects, both acute and delayed	No information available
Endocrine Disruptor Information	No information available
Other Adverse Effects	See actual entry in RTECS for complete information. The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Antimony, powder	Not listed	Cyprinodon variegatus: LC50 = 6.2-8.3 mg/L/96h	Not listed	Not listed

Persistence and Degradability Insoluble in water
Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN2871
Proper Shipping Name ANTIMONY POWDER
Hazard Class 6.1
Packing Group III

TDG

UN-No UN2871
Proper Shipping Name ANTIMONY POWDER
Hazard Class 6.1
Packing Group III

IATA

UN-No UN2871
Proper Shipping Name Antimony powder
Hazard Class 6.1
Packing Group III

IMDG/IMO

UN-No UN2871
Proper Shipping Name Antimony powder
Hazard Class 6.1
Packing Group III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Antimony, powder	X	X	-	231-146-5	-		X	-	X	X	X

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b)

Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Antimony, powder	7440-36-0	>95	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Antimony, powder	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Antimony, powder	X		-

OSHA Occupational Safety and Health Administration

Not applicable

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Antimony, powder	5000 lb 10 lb	-

California Proposition 65

This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Antimony, powder	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ):	Y
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security

This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class D2A Very toxic materials

**16. Other information**

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 29-Sep-2009

Revision Date 18-May-2015

Print Date 18-May-2015

Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of SDS

Arsenic



SAFETY DATA SHEET

1 PRODUCT AND SUPPLIER IDENTIFICATION

Product Name: Arsenic - lump or powder

Formula: As

Supplier: ESPI Metals

1050 Benson Way

Ashland, OR 97520

Telephone: 800-638-2581

Fax: 541-488-8313

Email: sales@espimetals.com

Emergency: Infotrac 800-535-5053 (US) or 352-323-3500 (24 hour)

Recommended Uses: Scientific Research

2 HAZARDS IDENTIFICATION

GHS Classification (29 CFR 1910.1200): Acute toxicity - oral, category 4, Acute toxicity - inhalation, category 4.

GHS Label Elements:



Signal Word: Warning

Hazard Statements: H302 Harmful if swallowed, H332 Harmful if inhaled.

Precautionary Statements: P261 Avoid breathing dust or fume, P264 Wash hands thoroughly after handling, P270 Do not eat, drink or smoke when using this product, P271 Use only outdoors or in a well-ventilated area, P281 Use personal protective equipment as required, P301+P304+P312 IF SWALLOWED OR INHALED: Call a POISON CENTER or doctor/physician if you feel unwell, P330 Rinse mouth, P501 Dispose of contents/container in accordance with local, state or federal regulations.

3 COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient: Arsenic
CAS#: 7440-38-2
%: 100
EC#: 231-148-6

4 FIRST AID MEASURES

General Measures: Remove patient from area of exposure.

INHALATION: Remove to fresh air, keep warm and quiet, give oxygen if breathing is difficult. Seek immediate medical attention.

INGESTION: Rinse mouth with water. Do not induce vomiting. Seek immediate medical attention. Never induce vomiting or give anything by mouth to an unconscious person.

SKIN: Remove contaminated clothing, brush material off skin, wash affected area with soap and water. Seek medical attention.

EYES: Flush eyes with lukewarm water, including under upper and lower eyelids, for at least 15 minutes. Seek medical attention.

Most Important Symptoms/Effects, Acute and Delayed: May cause vomiting, abdominal pain, diarrhea. See section 11 for more information.

Indication of Immediate Medical Attention and Special Treatment: No other information available.

5 FIREFIGHTING MEASURES

Extinguishing Media: Use suitable extinguishing agent for surrounding materials and type of fire. Smother small fires involving arsenic powder or dust with Class D or other metal extinguishing agent.

Unsuitable Extinguishing Media: No information available.

Specific Hazards Arising from the Material: Emits toxic fumes under fire conditions.

Special Protective Equipment and Precautions for Firefighters: Full face, self-contained breathing apparatus and full protective clothing when necessary.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures: Wear appropriate respiratory and protective equipment specified in section 8. Isolate spill area and provide ventilation. Avoid breathing dust or fume. Avoid contact with skin and eyes. Eliminate all sources of ignition.

Methods and Materials for Containment and Cleaning Up: Avoid creating dust. Wet sweep or vacuum up spill so as not to create more dust. Place in properly labeled closed containers.

Environmental Precautions: Do not allow to enter drains or to be released to the environment.

7 HANDLING AND STORAGE

Precautions for Safe Handling: Handle in an enclosed, controlled process. Transfer material in closed systems or within a completely hooded containment with local exhaust ventilation. Prevent spillage. Avoid creating dusts. Avoid exposure to high temperature. Avoid breathing dust or fumes. Avoid contact with skin and eyes. Wash thoroughly before eating or smoking. See section 8 for information on personal protection equipment.

Conditions for Safe Storage, Including Any Incompatibilities: Store in a cool, dry area. Store material tightly sealed in properly labeled containers. Do not store together with oxidizers, acids or halogens. See section 10 for more information on incompatible materials.

8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits: Arsenic

OSHA/PEL: 0.01 mg/m³

ACGIH/TLV: 0.01 mg/m³

Appropriate Engineering Controls: Handle in a controlled, enclosed environment. Ensure adequate ventilation to maintain exposures below occupational limits. Whenever possible the use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposure to airborne dust and fume to meet established occupational exposure limits. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air. Clothing worn in areas of exposure to arsenic dust or fume should be restricted to the workplace and laundered regularly.

Individual Protection Measures, Such as Personal Protective Equipment:

Respiratory Protection: Where airborne exposures may exceed OSHA/ACGIH permissible air concentrations, the minimum respiratory protection recommended is negative pressure air purifying respirator with cartridges that are NIOSH/MSHA approved against dusts, fumes and mists having a TWA less than 0.05 mg/m³.

Eye Protection: Safety glasses or goggles.

Skin Protection: Wear impermeable gloves, protective work clothing. Protective overgarments or work clothing must be worn by persons who may become contaminated with particulate during work activities.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:

Form: Lump or powder

Color: Gray

Odor: Odorless

Odor Threshold: Not determined

pH: N/A

Melting Point: 817 °C (28 atm.)

Boiling Point: 613 °C (sublimes)

Flash Point: N/A

Evaporation Rate: N/A

Flammability: N/A

Upper Flammable Limit: N/A

Lower Flammable Limit: N/A

Vapor Pressure: 1 mm Hg @ 372 °C (solid)

Vapor Density: N/A

Relative Density (Specific Gravity): 5.727 g/cc @ 14 °C

Solubility in H₂O: Insoluble

Partition Coefficient (n-octanol/water): Not determined

Autoignition Temperature: No data

Decomposition Temperature: No data

Viscosity: N/A

10 STABILITY AND REACTIVITY

Reactivity: No data

Chemical Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: Hydrogen gas can react with inorganic arsenic to form the highly toxic gas arsine.

Conditions to Avoid: Avoid creating dusts. Avoid high temperatures.

Incompatible Materials: Moist air, strong oxidizing agents, oxidizing acids, halogen and halogen compounds, sulfur, platinum, palladium, zinc, lithium, hydrogen gas.

Hazardous Decomposition Products: Arsenic oxide fume, arsine.

11 TOXICOLOGICAL INFORMATION

Likely Routes of Exposure: Inhalation, skin and eyes

Symptoms of Exposure: May cause irritation and systemic poisoning with symptoms including abdominal pain, nausea, vomiting, diarrhea, and encephalopathy and peripheral neuropathy.

Acute and Chronic Effects: Acute effects of inorganic arsenic compounds include vomiting, abdominal pain and diarrhea, followed by numbness and tingling of the extremities, muscle cramping, and death, in extreme cases. The first signs of long-term exposure to high levels of inorganic arsenic are usually observed in the skin, and include pigmentation changes, skin lesions, and hard patches on the palms and soles of the feet (hyperkeratosis). Other adverse health effects that may be associated with long-term ingestion of inorganic arsenic include developmental effects, neurotoxicity, diabetes and cardiovascular disease.

Acute Toxicity: LD50 oral - rat - 763mg/kg

Carcinogenicity: **NTP:** Known to be human carcinogen **IARC:** Group 1 - Carcinogenic to humans

To the best of our knowledge the chemical, physical and toxicological characteristics of the substance are not fully known.

12 ECOLOGICAL INFORMATION

Ecotoxicity: No data

Persistence and Degradability: No data

Bioaccumulative Potential: No data

Mobility in Soil: No data

Other Adverse Effects: Danger to drinking water and to aquatic organisms. Do not allow material to be released to the environment. No further relevant information available.

13 DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Product: Dispose of in accordance with Federal, State and Local regulations.

Packaging: Dispose of in accordance with Federal, State and Local regulations.

14 TRANSPORT INFORMATION

UN Number: UN1558

UN Proper Shipping Name: Arsenic

Transport Hazard Class: 6.1

Packing Group: II

Marine Pollutant: No

Special Precautions: Warning: Toxic substances

15 REGULATORY INFORMATION

TSCA Listed: All components are listed.

Regulation (EC) No 1272/2008 (CLP): Acute toxicity - oral, category 4, Acute toxicity - inhalation, category 4, Hazardous to the aquatic environment - acute hazard, category 1, Hazardous to the aquatic environment - chronic hazard, category 1.

Canada WHMIS Classification (CPR, SOR/88-66): Acute toxicity.

HMIS Ratings: Health: 2 Flammability: 1 Physical: 0

NFPA Ratings: Health: 2 Flammability: 1 Instability: 0

Chemical Safety Assessment: A chemical safety assessment has not been carried out.

16 OTHER INFORMATION

The information contained in this document is based on the state of our knowledge at the time of publication and is believed to be correct, but does not purport to be all inclusive and shall be used only as a guide. ESPI Metals makes no representation, warranty, or guarantee of any kind with respect to the information contained in this document or any use of the product based on this information. ESPI Metals shall not be held liable for any damages resulting from handling or from contact with the above product. Users should satisfy themselves that they have all current data relevant to their particular use.

Prepared by: ESPI Metals

Revised/Reviewed: July 2015

Cadmium



SAFETY DATA SHEET

1 PRODUCT AND SUPPLIER IDENTIFICATION

Product Name: Cadmium - pieces, shot, sheet, foil, rod, wire, target

Formula: Cd

Supplier: ESPI Metals

1050 Benson Way

Ashland, OR 97520

Telephone: 800-638-2581

Fax: 541-488-8313

Email: sales@espimetals.com

Emergency: Infotrac 800-535-5053 (US) or 352-323-3500 (24 hour)

Recommended Uses: Scientific Research

2 HAZARDS IDENTIFICATION

GHS Classification (29 CFR 1910.1200): Acute toxicity - oral, category 3, Acute toxicity - inhalation, category 1, Carcinogenicity, category 1B, Specific target organ toxicity - repeated exposure, category 2.

GHS Label Elements:



Signal Word: Danger

Hazard Statements: H301 Toxic if swallowed, H330 Fatal if inhaled, H350 May cause cancer, H373 May cause damage to kidneys through prolonged or repeated exposure.

Precautionary Statements: P201 Obtain special instructions before use, P202 Do not handle until all safety precautions have been read and understood, P260 Do not breathe dust or fume, P264 Wash skin thoroughly after handling, P270 Do not eat, drink or smoke when using this product, P271 Use only outdoors or in a well-ventilated area, P281 Use personal protective equipment as required, P284 Wear respiratory protection, P301+P310 IF

SWALLOWED: Immediately call a POISON CENTER or doctor/physician, P330 Rinse mouth, P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing, P310 Immediately call a POISON CENTER or doctor/physician, P308+P313 IF exposed or concerned: Get medical advice/attention, P314 Get medical advice/attention if you feel unwell, P405 Store locked up, P501 Dispose of contents/container in accordance with local, state or federal regulations.

NOTE: In the solid form in which it is provided, and under typical handling and use, this material does not pose a health hazard. Subsequent operations performed by the end user, such as exposure to high temperatures, melting or grinding, may produce highly toxic cadmium oxide dust or fume. ESPI Metals does not warranty this material for any specific application and all precautions must be taken by the end user to prevent and protect against exposure to inhalable particulate. See section 8 for information on exposure controls and personal protection.

3 COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient: Cadmium
CAS#: 7440-43-9
%: 100
EC#: 231-152-8

4 FIRST AID MEASURES

General Measures: Under normal handling and use, exposure to solid forms of this material present few health hazards, however subsequent operations such as grinding, melting or welding may produce hazardous dust or fumes. Emergency responders should take care to avoid secondary exposure to cadmium particulate. Wear appropriate protective equipment.

INHALATION: Remove to fresh air, keep warm and quiet, give oxygen if breathing is difficult. Seek immediate medical attention. Treat pulmonary edema as a priority, even if no symptoms (i.e. wheezing, coughing, shortness of breath, etc.) are apparent. Symptoms of pulmonary edema can be delayed up to 48 hours after exposure. Quickly transport victim to an emergency care facility.

INGESTION: Rinse mouth with water. Do not induce vomiting. Seek immediate medical attention. Never induce vomiting or give anything by mouth to an unconscious person. Ingested cadmium may lead to spontaneous vomiting. If vomiting occurs naturally, have victim rinse mouth with water again.

SKIN: Remove contaminated clothing, wash affected area with soap and water. Seek medical attention. Wash contaminated clothing before reusing.

EYES: Flush eyes with lukewarm water, including under upper and lower eyelids, for at least 15 minutes. Seek medical attention.

Most Important Symptoms/Effects, Acute and Delayed: May cause respiratory irritation, coughing, headache. See section 11 for more information.

Indication of Immediate Medical Attention and Special Treatment: No other information available.

5 FIREFIGHTING MEASURES

Extinguishing Media: Use Class D dry powder extinguishing agent.

Unsuitable Extinguishing Media: Do not use water or foam.

Specific Hazards Arising from the Material: This product does not present fire or explosion hazards as shipped. Fine dust from processing may ignite if allowed to accumulate and subjected to an ignition source. When heated, cadmium emits highly toxic fumes of cadmium oxide.

Special Protective Equipment and Precautions for Firefighters: Full face, self-contained breathing apparatus and full protective clothing.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures: Wear appropriate respiratory and protective equipment specified in section 8. Isolate spill area and provide ventilation. Avoid breathing dust or fume. Avoid contact with skin and eyes. Eliminate all sources of ignition.

Methods and Materials for Containment and Cleaning Up: Avoid creating dusts. For larger pieces - pick up mechanically. For chips or dust - vacuum spill using a system equipped with a HEPA filtration system and place in properly labeled closed containers. Special precautions must be taken when changing filters on HEPA vacuum cleaners used to clean up hazardous materials. Caution should be taken to minimize airborne generation of particulate and avoid contamination of air and water.

Environmental Precautions: Do not allow to enter drains or to be released to the environment.

7 HANDLING AND STORAGE

Precautions for Safe Handling: Handle in a well-ventilated area. Avoid exposure to high temperature. Avoid creating dust. Avoid breathing dust or fumes. Provide local exhaust ventilation if dusts are created. Avoid contact with skin and eyes. Wash thoroughly before eating or smoking. See section 8 for information on personal protection equipment.

Conditions for Safe Storage, Including Any Incompatibilities: Store in a sealed container. Store in a cool, dry area. . Do not store together with oxidizers, acids or halogens. See section 10 for more information on incompatible materials.

8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits: Cadmium

OSHA/PEL: 0.005 mg/m³

ACGIH/TLV: 0.01 mg/m³

Appropriate Engineering Controls: Whenever possible the use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposure to airborne dust and fume to meet established occupational exposure limits. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air. Clothing worn in areas of exposure to cadmium dust or fume should be restricted to the workplace and laundered regularly.

Individual Protection Measures, Such as Personal Protective Equipment:

Respiratory Protection: When potential exposures are above the occupational limits, approved respirators must be used.

Eye Protection: Safety glasses

Skin Protection: Wear impermeable gloves, protective work clothing as necessary.

9 PHYSICAL AND CHEMICAL PROPERTIES**Appearance:**

Form: Solid in various forms

Color: Silvery metallic

Odor: Odorless

Odor Threshold: Not determined

pH: N/A

Melting Point: 320.9 °C

Boiling Point: 765 °C

Flash Point: N/A

Evaporation Rate: N/A

Flammability: No data

Upper Flammable Limit: No data

Lower Flammable Limit: No data

Vapor Pressure: 1 mm Hg @ 394 °C

Vapor Density: N/A

Relative Density (Specific Gravity): 8.642 g/cc

Solubility in H₂O: Insoluble

Partition Coefficient (n-octanol/water): Not determined

Autoignition Temperature: No data

Decomposition Temperature: No data

Viscosity: N/A

10 STABILITY AND REACTIVITY

Reactivity: No data

Chemical Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: High temperatures will generate toxic cadmium oxide fumes.

Conditions to Avoid: Avoid creating or accumulating fines or dusts. Avoid high temperatures.

Incompatible Materials: Peroxides, chlorates, nitrates, halogens, interhalogens, strong acids, strong bases, sulphur, potassium, zinc, selenium and tellurium.

Hazardous Decomposition Products: Cadmium oxide fume.

11 TOXICOLOGICAL INFORMATION

Likely Routes of Exposure: Inhalation, skin, eyes.

Symptoms of Exposure: Inhalation of fumes may cause upper respiratory tract irritation and systemic poisoning with early symptoms including headache, coughing, and a metallic taste.

Acute and Chronic Effects: After a delay of several hours (up to 10) after inhalation of dust or fumes, a person may develop constriction of the chest, persistent cough, and progressive shortness of breath. There may be headache, chills, diarrhea, muscle aches, nausea, vomiting, irritability, and restlessness. Prolonged exposure to cadmium dust and/or fume may cause loss of sense of smell, occasional ulcerations of the nasal passages, rhinolaryngitis, cough, shortness of breath, mild anemia, sleeplessness, irritability, loss of appetite, and cadmium-yellow fringe on teeth. The primary target organ for chronic cadmium effects is the kidney with increased excretion of a specific low molecular weight protein (beta-2-microglobulin). Exposures to high levels of cadmium dust or fume may be immediately dangerous to life or health and can cause delayed pneumonitis with fever and chest pain, and pulmonary edema resulting in death.

Acute Toxicity: LD50 oral - rat - 225mg/kg, LC50 inhalation - rat - 25mg/kg/30 min

Carcinogenicity: **NTP:** K - Known to be carcinogenic **IARC:** 1 - Carcinogenic to humans

To the best of our knowledge the chemical, physical and toxicological characteristics of the substance are not fully known.

12 ECOLOGICAL INFORMATION

Ecotoxicity: No data

Persistence and Degradability: No data

Bioaccumulative Potential: No data

Mobility in Soil: No data

Other Adverse Effects: May be toxic to aquatic organisms. Do not allow material to be released to the environment. No further relevant information available.

13 DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Product: Dispose of in accordance with Federal, State and Local regulations.

Packaging: Dispose of in accordance with Federal, State and Local regulations.

14 TRANSPORT INFORMATION

Shipping Regulations: Not regulated

UN Number: N/A

UN Proper Shipping Name: N/A

Transport Hazard Class: N/A

Packing Group: N/A

Marine Pollutant: No

15 REGULATORY INFORMATION

TSCA Listed: All components are listed.

Regulation (EC) No 1272/2008 (CLP): Acute toxicity - oral, category 3, Acute toxicity - inhalation, category 1, Carcinogenicity, category 1B, Specific target organ toxicity - repeated exposure, category 2, Hazardous to the aquatic environment - acute hazard, category 1, Hazardous to the aquatic environment - chronic hazard, category 1.

Canada WHMIS Classification (CPR, SOR/88-66): Acute toxicity, Carcinogenicity, Specific target organ toxicity - repeated exposure.

HMIS Ratings: Health: 1 Flammability: 0 Physical: 0

NFPA Ratings: Health: 3 Flammability: 0 Instability: 0

Chemical Safety Assessment: A chemical safety assessment has not been carried out.

16 OTHER INFORMATION

The information contained in this document is based on the state of our knowledge at the time of publication and is believed to be correct, but does not purport to be all inclusive and shall be used only as a guide. ESPI Metals makes no representation, warranty, or guarantee of any kind with respect to the information contained in this document or any use of the product based on this information. ESPI Metals shall not be held liable for any damages resulting from handling or from contact with the above product. Users should satisfy themselves that they have all current data relevant to their particular use.

Prepared by: ESPI Metals

Revised/Reviewed: July 2015

Copper



SAFETY DATA SHEET

1 PRODUCT AND SUPPLIER IDENTIFICATION

Product Name: Copper - shot, sheet, foil, rod, wire, pellets, target

Formula: Cu

Supplier: ESPI Metals

1050 Benson Way

Ashland, OR 97520

Telephone: 800-638-2581

Fax: 541-488-8313

Email: sales@espimetals.com

Emergency: Infotrac 800-535-5053 (US) or 352-323-3500 (24 hour)

Recommended Uses: Scientific Research

2 HAZARDS IDENTIFICATION

GHS Classification (29 CFR 1910.1200): Not classified as hazardous

GHS Label Elements:

Signal Word: N/A

Hazard Statements: N/A

Precautionary Statements: N/A

3 COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient: Copper

CAS#: 7440-50-8

%: >99

EC#: 231-159-6

4 FIRST AID MEASURES

General Measures: No special requirements.

INHALATION: Remove to fresh air, keep warm and quiet, give oxygen if breathing is difficult. Seek medical attention.

INGESTION: Rinse mouth with water. Do not induce vomiting. Seek medical attention. Never induce vomiting or give anything by mouth to an unconscious person.

SKIN: Remove contaminated clothing, brush material off skin, wash affected area with soap and water. Seek medical attention if symptoms persist.

EYES: Flush eyes with lukewarm water, including under upper and lower eyelids, for at least 15 minutes. Seek medical attention if symptoms persist.

Most Important Symptoms/Effects, Acute and Delayed: May cause irritation. See section 11 for more information.

Indication of Immediate Medical Attention and Special Treatment: No other relevant information available.

5 FIREFIGHTING MEASURES

Extinguishing Media: Use suitable extinguishing media for surrounding material and type of fire. Use Class D or other metal extinguishing agent for fires involving fines, dusts or molten metals.

Unsuitable Extinguishing Media: Do not use halogenated extinguishers on small chips or fines. Do not use water in fighting fires around molten metal.

Specific Hazards Arising from the Material: May emit copper oxide fumes under fire conditions.

Special Protective Equipment and Precautions for Firefighters: Full face, self-contained breathing apparatus and full protective clothing when necessary.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures: Wear appropriate respiratory and protective equipment specified in section 8.

Methods and Materials for Containment and Cleaning Up: Sweep or scoop up. Place in properly labeled closed containers. Scrap can be collected for recycling.

Environmental Precautions: Do not allow to enter drains or to be released to the environment.

7 HANDLING AND STORAGE

Precautions for Safe Handling: Avoid creating dust. Avoid breathing dust or fumes. Provide adequate ventilation if dusts are created. Avoid contact with skin and eyes. Wash thoroughly before eating or smoking. See section 8 for information on personal protection equipment.

Conditions for Safe Storage: Store in a sealed container. Store in a cool, dry area. Protect from air and moisture. See section 10 for more information on incompatible materials.

8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits: Copper

OSHA/PEL: 0.1 mg/m³

ACGIH/TLV: 0.2 mg/m³

Engineering Controls: Ensure adequate ventilation to maintain exposures below occupational limits. Whenever possible the use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposure to airborne dust and fume to meet established occupational exposure limits. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air.

Respiratory Protection: If permissible levels are exceeded, use NIOSH approved dust respirator.

Eye Protection: Safety glasses

Skin Protection: Wear impermeable gloves, protective work clothing as necessary.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:

Form: Solid in various forms

Color: Reddish metallic

Odor: Odorless

Odor Threshold: Not determined

pH: N/A

Melting Point: 1083.4 °C

Boiling Point: 2567 °C

Flash Point: N/A

Evaporation Rate: N/A

Flammability: N/A

Upper Flammable Limit: N/A

Lower Flammable Limit: N/A

Vapor Pressure: 1 mm Hg @ 1628 °C

Vapor Density: N/A

Relative Density (Specific Gravity): 8.92 g/cc

Solubility in H₂O:	Insoluble
Partition Coefficient (n-octanol/water):	Not determined
Autoignition Temperature:	No data
Decomposition Temperature:	No data
Viscosity:	N/A

10 STABILITY AND REACTIVITY

Reactivity: No data

Chemical Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: None expected.

Conditions to Avoid: Avoid creating or accumulating fines or dusts.

Incompatible Materials: Acids, halogens, alkalis, water/moisture.

Hazardous Decomposition Products: Copper oxide fume.

11 TOXICOLOGICAL INFORMATION

Likely Routes of Exposure: Inhalation, skin and eyes.

Symptoms of Exposure: May cause irritation.

Acute and Chronic Effects: Copper is a trace element that is essential for human health. Chronic exposure to copper dust can irritate the respiratory tract, nose, mouth and eyes, and cause headaches, dizziness, nausea and diarrhea. Ingestion of excessive amounts of copper may cause gastrointestinal distress. Chronic ingestion may damage the liver and kidneys.

Acute Toxicity: No data

Carcinogenicity: **NTP:** Not identified as carcinogenic **IARC:** Not identified as carcinogenic

To the best of our knowledge the chemical, physical and toxicological characteristics of the substance are not fully known.

12 ECOLOGICAL INFORMATION

Ecotoxicity: No data

Persistence and Degradability: No data

Bioaccumulative Potential: No data

Mobility in Soil: No data

Other Adverse Effects: No further relevant information available.

13 DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Product: Dispose of in accordance with Federal, State and Local regulations.

Packaging: Dispose of in accordance with Federal, State and Local regulations.

14 TRANSPORT INFORMATION

Shipping Regulations: Not regulated

UN Number: N/A

UN Proper Shipping Name: N/A

Transport Hazard Class: N/A

Packing Group: N/A

Marine Pollutant: No

15 REGULATORY INFORMATION

TSCA Listed: All components are listed.

Regulation (EC) No 1272/2008 (CLP): N/A

Canada WHMIS Classification (CPR, SOR/88-66): N/A

HMIS Ratings: Health: 0 **Flammability:** 0 **Physical:** 0

NFPA Ratings: Health: 0 **Flammability:** 0 **Instability:** 0

Chemical Safety Assessment: A chemical safety assessment has not been carried out.

16 OTHER INFORMATION

The information contained in this document is based on the state of our knowledge at the time of publication and is believed to be correct, but does not purport to be all inclusive and shall be used only as a guide. ESPI Metals makes no representation, warranty, or guarantee of any kind with respect to the information contained in this document or any use of the product based on this information. ESPI Metals shall not be held liable for any damages resulting from handling or from contact with the above product. Users should satisfy themselves that they have all current data relevant to their particular use.

Prepared by: ESPI Metals

Revised/Reviewed: July 2015

Iron



SAFETY DATA SHEET

1 PRODUCT AND SUPPLIER IDENTIFICATION

Product Name: Iron - foil, sheet, rod, wire, target, shot, pieces, flake

Formula: Fe

Supplier: ESPI Metals
1050 Benson Way
Ashland, OR 97520

Telephone: 800-638-2581

Fax: 541-488-8313

Email: sales@espimetals.com

Emergency: Infotrac 800-535-5053 (US) or 352-323-3500 (24 hour)

Recommended Uses: Scientific Research

2 HAZARDS IDENTIFICATION

GHS Classification (29 CFR 1910.1200): Not classified as hazardous

GHS Label Elements:

Signal Word: N/A

Hazard Statements: N/A

Precautionary Statements: N/A

3 COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient: Iron

CAS#: 7439-89-6

%: >99

EC#: 231-096-4

4 FIRST AID MEASURES

General Measures: No special requirements.

INHALATION: Remove to fresh air, keep warm and quiet, give oxygen if breathing is difficult. Seek medical attention.

INGESTION: Rinse mouth with water. Do not induce vomiting. Seek medical attention. Never induce vomiting or give anything by mouth to an unconscious person.

SKIN: Remove contaminated clothing, brush material off skin, wash affected area with soap and water. Seek medical attention if symptoms persist.

EYES: Flush eyes with lukewarm water, including under upper and lower eyelids, for at least 15 minutes. Seek medical attention if symptoms persist.

Most Important Symptoms/Effects, Acute and Delayed: May cause irritation. See section 11 for more information.

Indication of Immediate Medical Attention and Special Treatment: No other relevant information available.

5 FIREFIGHTING MEASURES

Extinguishing Media: Use suitable extinguishing media for surrounding material and type of fire. Use Class D or other metal extinguishing agent for fires involving fines, dusts or very thin foils.

Unsuitable Extinguishing Media: Do not use water in fighting fires involving iron fines, dusts or very thin foils. Do not use water in fighting fires around molten metal.

Specific Hazards Arising from the Material: This product does not present fire or explosion hazards as shipped. Small chips, fine turnings and dust from processing may be readily ignitable. May emit metal oxide fumes under fire conditions.

Special Protective Equipment and Precautions for Firefighters: Full face, self-contained breathing apparatus and full protective clothing when necessary.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures: Wear appropriate respiratory and protective equipment specified in section 8. Isolate spill area and provide ventilation. Avoid breathing dust or fume. Avoid contact with skin and eyes. Eliminate all sources of ignition.

Methods and Materials for Containment and Cleaning Up: Avoid dust formation. Sweep or scoop up. Place in a closed container for further handling and disposal. Scrap can be collected for recycling.

Environmental Precautions: Do not allow to enter drains or to be released to the environment.

7 HANDLING AND STORAGE

Precautions for Safe Handling: Avoid creating dust. Avoid breathing dust or fumes. Provide adequate ventilation if dusts are created. Avoid contact with skin and eyes. Wash thoroughly before eating or smoking. See section 8 for information on personal protection equipment.

Conditions for Safe Storage: Store in a sealed container. Store in a cool, dry area. Protect from moisture. See section 10 for more information on incompatible materials.

8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits: Iron

OSHA/PEL: No exposure limit established

ACGIH/TLV: No exposure limit established

Engineering Controls: Ensure adequate ventilation to maintain exposures below occupational limits. Whenever possible the use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposure to airborne dust and fume to meet established occupational exposure limits. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air.

Respiratory Protection: If permissible levels are exceeded, use NIOSH approved dust respirator.

Eye Protection: Safety glasses

Skin Protection: Not normally needed. Wear impermeable gloves, protective work clothing as necessary.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:

Form: Solid in various forms

Color: Silver-gray metallic

Odor: Odorless

Odor Threshold: Not determined

pH: N/A

Melting Point: 1535 °C

Boiling Point: 2750 °C

Flash Point: N/A

Evaporation Rate: N/A

Flammability: No data

Upper Flammable Limit: No data

Lower Flammable Limit: No data

Vapor Pressure: 1 mm Hg @ 1787 °C
Vapor Density: N/A
Relative Density (Specific Gravity): 7.86 g/cc
Solubility in H₂O: Insoluble
Partition Coefficient (n-octanol/water): Not determined
Autoignition Temperature: No data
Decomposition Temperature: No data
Viscosity: N/A

10 STABILITY AND REACTIVITY

Reactivity: No data

Chemical Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: No data

Conditions to Avoid: Avoid creating or accumulating fines or dusts.

Incompatible Materials: Acids, water/moisture, halogens, oxygen, oxidizing agents, phosphorus

Hazardous Decomposition Products: Iron oxide fume.

11 TOXICOLOGICAL INFORMATION

Likely Routes of Exposure: Inhalation, skin, eyes.

Symptoms of Exposure: Fines/dusts may irritate skin and eyes.

Acute and Chronic Effects: Chronic inhalation of finely divided iron powder may cause chronic iron poisoning and pathological deposition of iron in the body tissue. Ingestion may cause vomiting, diarrhea, pink urine, black stool, and liver damage.

Acute Toxicity: LD50 Oral - rat - 30,000mg/kg

Carcinogenicity: **NTP:** Not identified as carcinogenic **IARC:** Not identified as carcinogenic

To the best of our knowledge the chemical, physical and toxicological characteristics of the substance are not fully known.

12 ECOLOGICAL INFORMATION

Ecotoxicity: No data

Persistence and Degradability: No data

Bioaccumulative Potential: No data

Mobility in Soil: No data

Other Adverse Effects: No further relevant information available.

13 DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Product: Dispose of in accordance with Federal, State and Local regulations.

Packaging: Dispose of in accordance with Federal, State and Local regulations.

14 TRANSPORT INFORMATION

Shipping Regulations: Not regulated

UN Number: N/A

UN Proper Shipping Name: N/A

Transport Hazard Class: N/A

Packing Group: N/A

Marine Pollutant: No

15 REGULATORY INFORMATION

TSCA Listed: All components are listed.

Regulation (EC) No 1272/2008 (CLP): N/A

Canada WHMIS Classification (CPR, SOR/88-66): N/A

HMIS Ratings: Health: 0 **Flammability:** 0 **Physical:** 0

NFPA Ratings: Health: 0 **Flammability:** 0 **Instability:** 0

Chemical Safety Assessment: A chemical safety assessment has not been carried out.

16 OTHER INFORMATION

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Prepared by: ESPI Metals

Revised/Reviewed: July 2015

Lead



SAFETY DATA SHEET

1 PRODUCT AND SUPPLIER IDENTIFICATION

Product Name: Lead - pellets, shot, sheet, foil, rod, wire, target

Formula: Pb

Supplier: ESPI Metals

1050 Benson Way

Ashland, OR 97520

Telephone: 800-638-2581

Fax: 541-488-8313

Email: sales@espimetals.com

Emergency: Infotrac 800-535-5053 (US) or 352-323-3500 (24 hour)

Recommended Uses: Scientific Research

2 HAZARDS IDENTIFICATION

GHS Classification (29 CFR 1910.1200): Carcinogenicity, category 2, Reproductive toxicity, category 2, Specific target organ toxicity - repeated exposure, category 2.

GHS Label Elements:



Signal Word: Warning

Hazard Statements: H351 Suspected of causing cancer, H361 Suspected of damaging fertility or the unborn child, H373 May cause damage to organs through prolonged or repeated exposure.

Precautionary Statements: P201 Obtain special instructions before use, P202 Do not handle until all safety precautions have been read and understood, P260 Do not breathe dust/fume/gas/mist/vapors/spray, P281 Use personal protective equipment as required, P308+P313 IF exposed or concerned: Get medical advice/attention, P314

Get medical advice/attention if you feel unwell, P405 Store locked up, P501 Dispose of contents/container in accordance with local, state or federal regulations.

3 COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient: Lead
CAS#: 7439-92-1
%: 100
EC#: 231-100-4

4 FIRST AID MEASURES

General Measures: Remove patient from area of exposure.

INHALATION: Remove to fresh air, keep warm and quiet, give oxygen if breathing is difficult. Seek immediate medical attention.

INGESTION: Rinse mouth with water. Do not induce vomiting. Seek immediate medical attention. Never induce vomiting or give anything by mouth to an unconscious person.

SKIN: Remove contaminated clothing, wash affected area with soap and water. Seek medical attention. Wash contaminated clothing before reusing.

EYES: Flush eyes with lukewarm water, including under upper and lower eyelids, for at least 15 minutes. Seek medical attention.

Most Important Symptoms/Effects, Acute and Delayed: May cause irritation. See section 11 for more information.

Indication of Immediate Medical Attention and Special Treatment: No other information available.

5 FIREFIGHTING MEASURES

Extinguishing Media: Use suitable extinguishing agent for surrounding materials and type of fire.

Unsuitable Extinguishing Media: No information available.

Specific Hazards Arising from the Material: This product does not present fire or explosion hazards as shipped. Fine dust from processing is a weak to moderate fire hazard if allowed to accumulate and subjected to an ignition source. Under fire conditions toxic fumes of lead oxide may be released.

Special Protective Equipment and Precautions for Firefighters: Full face, self-contained breathing apparatus and full protective clothing when necessary.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures: Wear appropriate respiratory and protective equipment specified in section 8. Isolate spill area and provide ventilation. Avoid breathing dust or fume. Avoid contact with skin and eyes.

Methods and Materials for Containment and Cleaning Up: For larger pieces - pick up mechanically. For chips or dust - vacuum using a HEPA filter. Place in properly labeled closed containers. Avoid creating dusts. Do not use compressed air.

Environmental Precautions: Do not allow to enter drains or to be released to the environment.

7 HANDLING AND STORAGE

Precautions for Safe Handling: Handle in a well-ventilated area. Avoid creating dust. Avoid exposure to high temperature. Provide adequate ventilation if dusts are created. Avoid breathing dust or fumes. Avoid contact with skin and eyes. Wash thoroughly before eating or smoking. See section 8 for information on personal protection equipment.

Conditions for Safe Storage, Including Any Incompatibilities: Store in a sealed container. Store in a cool, dry area. Protect from moisture. Do not store together with strong oxidizers or acids. See section 10 for more information on incompatible materials.

8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits: Lead

OSHA/PEL: 50 $\mu\text{g}/\text{m}^3$

ACGIH/TLV: 0.05 mg/m^3

Appropriate Engineering Controls: Whenever possible the use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposure to airborne dust and fume to meet established occupational exposure limits. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air. Clothing worn in areas of exposure to lead dust or fume should be restricted to the workplace and laundered regularly.

Individual Protection Measures, Such as Personal Protective Equipment:

Respiratory Protection: When potential exposures are above the occupational limits, approved respirators must be used.

Eye Protection: Safety glasses

Skin Protection: Wear impermeable gloves, protective work clothing as necessary.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:

Form: Solid in various forms

Color: Silvery metallic

Odor: Odorless

Odor Threshold: Not determined

pH: N/A

Melting Point: 327.5 °C

Boiling Point: 1740 °C

Flash Point: N/A

Evaporation Rate: N/A

Flammability: No data

Upper Flammable Limit: No data

Lower Flammable Limit: No data

Vapor Pressure: 1 mm Hg @ 973 °C

Vapor Density: N/A

Relative Density (Specific Gravity): 11.34 g/cc

Solubility in H₂O: Insoluble

Partition Coefficient (n-octanol/water): Not determined

Autoignition Temperature: No data

Decomposition Temperature: No data

Viscosity: N/A

10 STABILITY AND REACTIVITY

Reactivity: No data

Chemical Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: High temperatures will generate toxic lead oxide fumes.

Conditions to Avoid: Avoid creating or accumulating fines or dusts. Avoid high temperatures.

Incompatible Materials: Strong acids, strong oxidizers, halogens and interhalogen compounds.

Hazardous Decomposition Products: Lead oxide fume.

Other: Freshly cut or cast lead surfaces tarnish rapidly due to the formation of an insoluble protective layer of basic lead carbonate.

11 TOXICOLOGICAL INFORMATION

Likely Routes of Exposure: Inhalation, skin, eyes. Product as shipped does not present an inhalation hazard; however subsequent operations may create dusts or fumes which could be inhaled.

Symptoms of Exposure: Skin or eye contact with dust or fume may cause local irritation. Inhalation of dust or fumes may cause headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia,

and pain in legs, arms, and joints. An acute short-term dose of lead could cause acute encephalopathy with seizures, coma, and death. However, short-term exposure of this magnitude is rare. Kidney damage, as well as anemia, can occur from acute exposure. Symptoms due to ingestion of lead dust or fume would be similar to those from inhalation. Other health effects such as metallic taste in the mouth and constipation or bloody diarrhea might also be expected to occur.

Acute and Chronic Effects: Lead accumulates in bone and body organs once it enters the body. Elimination from the body is slow. Initial and periodic medical examinations are advised for persons repeatedly exposed to levels above the exposure limits of lead dust or fumes. Once lead enters the body, it can affect a variety of organ systems, including the nervous system, kidneys, reproductive system, blood formation, and gastrointestinal system.

Acute Toxicity: No data

Carcinogenicity:

Lead and Lead Compounds, Inorganic: **NTP:** R - Reasonably anticipated to be a carcinogen **IARC:** 2B - Possibly carcinogenic to humans

To the best of our knowledge the chemical, physical and toxicological characteristics of the substance are not fully known.

12 ECOLOGICAL INFORMATION

Ecotoxicity: No data

Persistence and Degradability: No data

Bioaccumulative Potential: No data

Mobility in Soil: No data

Other Adverse Effects: Do not allow material to be released to the environment. No further relevant information available.

13 DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Product: Dispose of in accordance with Federal, State and Local regulations.

Packaging: Dispose of in accordance with Federal, State and Local regulations.

14 TRANSPORT INFORMATION

Shipping Regulations: Not regulated

UN Number: N/A

UN Proper Shipping Name: N/A

Transport Hazard Class: N/A

Packing Group: N/A

Marine Pollutant: No

15 REGULATORY INFORMATION

TSCA Listed: All components are listed.

Regulation (EC) No 1272/2008 (CLP): Carcinogenicity, category 2, Reproductive toxicity, category 2, Specific target organ toxicity - repeated exposure, category 2, Hazardous to the aquatic environment - acute hazard, category 1, Hazardous to the aquatic environment - chronic hazard, category 1.

Canada WHMIS Classification (CPR, SOR/88-66): Carcinogenicity, Reproductive toxicity, Specific target organ toxicity - repeated exposure.

HMIS Ratings: Health: 1 Flammability: 0 Physical: 0

NFPA Ratings: Health: 1 Flammability: 0 Instability: 0

Chemical Safety Assessment: A chemical safety assessment has not been carried out.

16 OTHER INFORMATION

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Prepared by: ESPI Metals

Revised/Reviewed: July 2015

Manganese



SAFETY DATA SHEET

1 PRODUCT AND SUPPLIER IDENTIFICATION

Product Name: Manganese - flake, pieces, rod, target

Formula: Mn

Supplier: ESPI Metals

1050 Benson Way

Ashland, OR 97520

Telephone: 800-638-2581

Fax: 541-488-8313

Email: sales@espimetals.com

Emergency: Infotrac 800-535-5053 (US) or 352-323-3500 (24 hour)

Recommended Uses: Scientific Research

2 HAZARDS IDENTIFICATION

GHS Classification (29 CFR 1910.1200): Not classified as hazardous

GHS Label Elements:

Signal Word: N/A

Hazard Statements: N/A

Precautionary Statements: N/A

3 COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient: Manganese

CAS#: 7439-96-5

%: 100

EC#: 231-105-1

4 FIRST AID MEASURES

General Measures: No special requirements.

INHALATION: Remove to fresh air, keep warm and quiet, give oxygen if breathing is difficult. Seek medical attention.

INGESTION: Rinse mouth with water. Do not induce vomiting. Seek medical attention. Never induce vomiting or give anything by mouth to an unconscious person.

SKIN: Remove contaminated clothing, brush material off skin, wash affected area with soap and water. Seek medical attention if symptoms develop or persist.

EYES: Flush eyes with lukewarm water, including under upper and lower eyelids, for at least 15 minutes. Seek medical attention if symptoms develop or persist.

Most Important Symptoms/Effects, Acute and Delayed: May cause irritation. See section 11 for more information.

Indication of Immediate Medical Attention and Special Treatment: No other relevant information available.

5 FIREFIGHTING MEASURES

Extinguishing Media: Use Class D dry powder extinguishing agent.

Unsuitable Extinguishing Media: Do not use water, foam, halogenated gas or carbon dioxide.

Specific Hazards Arising from the Material: This product does not present fire or explosion hazards as shipped. Dust from processing may be flammable when exposed to heat, sparks or flame. May emit toxic metal oxide fumes under fire conditions.

Special Protective Equipment and Precautions for Firefighters: Full face, self-contained breathing apparatus and full protective clothing when necessary.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures: Wear appropriate respiratory and protective equipment specified in section 8. Isolate spill area and provide ventilation. Avoid breathing dust or fume. Avoid contact with skin and eyes. Eliminate all sources of ignition.

Methods and Materials for Containment and Cleaning Up: Avoid dust formation. Sweep or scoop up and place in a closed container for further handling and disposal.

Environmental Precautions: Do not allow to be released to the environment.

7 HANDLING AND STORAGE

Precautions for Safe Handling: Avoid creating dust. Avoid breathing dust or fumes. Provide adequate ventilation if dusts are created. Avoid contact with skin and eyes. Wash thoroughly before eating or smoking. See section 8 for information on personal protection equipment.

Conditions for Safe Storage: Store in a cool, dry area. Store in a closed container. Protect from moisture. Do not store together with oxidizers, acids or halogens. See section 10 for more information on incompatible materials.

8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits: Manganese

OSHA/PEL: 5 mg/m³

ACGIH/TLV: 0.2 mg/m³

Engineering Controls: Ensure adequate ventilation to maintain exposures below occupational limits. Whenever possible the use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposure to airborne dust and fume to meet established occupational exposure limits. Use good housekeeping and sanitation practices. Do not allow dusts to accumulate as they may present a fire hazard. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air.

Respiratory Protection: If permissible levels are exceeded, use NIOSH approved dust respirator.

Eye Protection: Safety glasses

Skin Protection: Wear impermeable gloves, protective work clothing as necessary.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:

Form: Solid in various forms

Color: Gray metallic

Odor: Odorless

Odor Threshold: Not determined

pH: N/A

Melting Point: 1244±3 °C

Boiling Point: 1962 °C

Flash Point: N/A

Evaporation Rate: N/A

Flammability: No data

Upper Flammable Limit: No data

Lower Flammable Limit: N/A

Vapor Pressure: 1 mm Hg @ 1292 °C

Vapor Density: N/A

Relative Density (Specific Gravity): 7.20 g/cc

Solubility in H₂O: Decomposes

Partition Coefficient (n-octanol/water): Not determined

Autoignition Temperature: No data

Decomposition Temperature: No data

Viscosity: N/A

10 STABILITY AND REACTIVITY

Reactivity: No data

Chemical Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: Manganese dusts dispersed in air in sufficient concentrations, and in the presence of an ignition source, may be flammable in open spaces or explosive in confined spaces.

Conditions to Avoid: Avoid creating or accumulating fines or dusts.

Incompatible Materials: Acids, water or steam, halogens, hydrogen peroxide, nitrous oxide, phosphorous vapor, sulfur dioxide, all alkalis.

Hazardous Decomposition Products: Manganese oxide fume, hydrogen gas.

11 TOXICOLOGICAL INFORMATION

Likely Routes of Exposure: Inhalation, skin, eyes.

Symptoms of Exposure: May cause irritation if dusts or fumes are inhaled or swallowed. Fines/dusts may irritate skin and eyes.

Acute and Chronic Effects: Chronic inhalation exposure of humans to high levels of manganese may result in a syndrome called manganism which typically begins with feelings of weakness and lethargy and progresses to other symptoms such as gait disturbances, clumsiness, tremors, speech disturbances, a mask-like facial expression and psychological disturbances. Manganese is an essential micronutrient in humans.

Acute Toxicity: No data

Carcinogenicity: **NTP:** Not identified as carcinogenic **IARC:** Not identified as carcinogenic

To the best of our knowledge the chemical, physical and toxicological characteristics of the substance are not fully known.

12 ECOLOGICAL INFORMATION

Ecotoxicity: No data

Persistence and Degradability: No data

Bioaccumulative Potential: No data

Mobility in Soil: No data

Other Adverse Effects: Possibly harmful to aquatic life. Do not allow material to be released to the environment without proper governmental permits. No further relevant information available.

13 DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Product: Dispose of in accordance with Federal, State and Local regulations.

Packaging: Dispose of in accordance with Federal, State and Local regulations.

14 TRANSPORT INFORMATION

Shipping Regulations: Not regulated

UN Number: N/A

UN Proper Shipping Name: N/A

Transport Hazard Class: N/A

Packing Group: N/A

Marine Pollutant: No

15 REGULATORY INFORMATION

TSCA Listed: All components are listed.

Regulation (EC) No 1272/2008 (CLP): N/A

Canada WHMIS Classification (CPR, SOR/88-66): N/A

HMIS Ratings: Health: 0 **Flammability:** 0 **Physical:** 0

NFPA Ratings: Health: 0 **Flammability:** 0 **Instability:** 0

Chemical Safety Assessment: A chemical safety assessment has not been carried out.

16 OTHER INFORMATION

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Prepared by: ESPI Metals

Revised/Reviewed: July 2015

Zinc



SAFETY DATA SHEET

1 PRODUCT AND SUPPLIER IDENTIFICATION

Product Name: Zinc - shot, sheet, foil, wire, rod, pellets, target

Formula: Zn

Supplier: ESPI Metals

1050 Benson Way

Ashland, OR 97520

Telephone: 800-638-2581

Fax: 541-488-8313

Email: sales@espimetals.com

Emergency: Infotrac 800-535-5053 (US) or 352-323-3500 (24 hour)

Recommended Uses: Scientific Research

2 HAZARDS IDENTIFICATION

GHS Classification (29 CFR 1910.1200): Not classified as hazardous

GHS Label Elements:

Signal Word: N/A

Hazard Statements: N/A

Precautionary Statements: N/A

3 COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient: Zinc

CAS#: 7440-66-6

%: 100

EC#: 231-175-3

4 FIRST AID MEASURES

General Measures: No special requirements.

INHALATION: Remove to fresh air, keep warm and quiet, give oxygen if breathing is difficult. Seek medical attention.

INGESTION: Rinse mouth with water. Do not induce vomiting. Seek medical attention. Never induce vomiting or give anything by mouth to an unconscious person.

SKIN: Remove contaminated clothing, brush material off skin, wash affected area with soap and water. Seek medical attention if symptoms develop or persist.

EYES: Flush eyes with lukewarm water, including under upper and lower eyelids, for at least 15 minutes. Seek medical attention if symptoms develop or persist.

Most Important Symptoms/Effects, Acute and Delayed: May cause irritation. See section 11 for more information.

Indication of Immediate Medical Attention and Special Treatment: No other relevant information available.

5 FIREFIGHTING MEASURES

Extinguishing Media: Use suitable extinguishing media for surrounding material and type of fire.

Unsuitable Extinguishing Media: Do not use water, carbon dioxide or halogenated extinguishers on molten or burning metal.

Specific Hazards Arising from the Material: This product does not present fire or explosion hazards as shipped. Dust from processing, dispersed in air in sufficient concentrations, and in the presence of an ignition source, is a weak dust explosion hazard. May emit toxic metal oxide fumes under fire conditions.

Special Protective Equipment and Precautions for Firefighters: Full face, self-contained breathing apparatus and full protective clothing when necessary.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures: Wear appropriate respiratory and protective equipment specified in section 8. Isolate spill area and provide ventilation. Avoid breathing dust or fume. Avoid contact with skin and eyes. Eliminate all sources of ignition.

Methods and Materials for Containment and Cleaning Up: Avoid dust formation. Sweep or scoop up. Place in properly labeled closed container for further handling and disposal.

Environmental Precautions: Do not allow to be released to the environment.

7 HANDLING AND STORAGE

Precautions for Safe Handling: Avoid creating dust as dusts may present a fire hazard. Avoid breathing dust or fumes. Provide adequate ventilation if dusts are created. Avoid contact with skin and eyes. Wash thoroughly before eating or smoking. See section 8 for information on personal protection equipment.

Conditions for Safe Storage: Store in a cool, dry area. Store away from oxidizers. See section 10 for more information on incompatible materials.

8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits: Zinc

OSHA/PEL: No exposure limit established

ACGIH/TLV: No exposure limit established

Engineering Controls: Ensure adequate ventilation to maintain exposures below occupational limits. Whenever possible the use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposure to airborne dust and fume to meet established occupational exposure limits. Use good housekeeping and sanitation practices. Do not allow dusts to accumulate as they may present a fire hazard. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air.

Respiratory Protection: If permissible levels are exceeded, use NIOSH approved dust respirator.

Eye Protection: Safety glasses

Skin Protection: Wear impermeable gloves, protective work clothing as necessary.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:

Form: Solid in various forms

Color: Silver gray metallic

Odor: Odorless

Odor Threshold: Not determined

pH: N/A

Melting Point: 419.58 °C

Boiling Point: 907 °C

Flash Point: N/A

Evaporation Rate: N/A

Flammability: No data

Upper Flammable Limit: No data

Lower Flammable Limit: No data

Vapor Pressure:	1 mm Hg @ 487 °C
Vapor Density:	N/A
Relative Density (Specific Gravity):	7.14 g/cc
Solubility in H₂O:	Insoluble
Partition Coefficient (n-octanol/water):	Not determined
Autoignition Temperature:	No data
Decomposition Temperature:	No data
Viscosity:	N/A

10 STABILITY AND REACTIVITY

Reactivity: No data

Chemical Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: Zinc metal will react with acids and strong alkalis to generate hydrogen gas.

Conditions to Avoid: Avoid creating or accumulating fines or dusts.

Incompatible Materials: Strong oxidizing agents such as chlorine, fluorine, bromine, sodium potassium or barium peroxide, sodium or potassium chlorate, chromium trioxide and fused ammonium nitrate. Elemental sulfur dust, halogenated hydrocarbons or chlorinated solvents and chlorinated rubber.

Hazardous Decomposition Products: Zinc oxide fume.

11 TOXICOLOGICAL INFORMATION

Likely Routes of Exposure: Inhalation, skin, eyes.

Symptoms of Exposure: May cause irritation if dusts or fumes are inhaled or swallowed. Fines/dusts may irritate skin and eyes.

Acute and Chronic Effects: Zinc is an essential trace element and necessary for human health. It is involved in the synthesis and metabolism of nutrients, cell and organ structure and integrity, cell division, immune function and wound healing. Acute ingestion of high amounts of zinc may cause nausea, vomiting, loss of appetite, abdominal cramps, diarrhea and headaches. Chronic ingestion of high amounts may cause copper deficiency, altered iron function and reduced immune function. Pure zinc powder, dust and fume are relatively nontoxic to humans by inhalation. Inhalation of fumes containing zinc oxide may cause metal fume fever. Symptoms include cough, shortness of breath, sore throat, chest pain, headache and fever.

Acute Toxicity: No data

Carcinogenicity: **NTP:** Not identified as carcinogenic **IARC:** Not identified as carcinogenic

To the best of our knowledge the chemical, physical and toxicological characteristics of the substance are not fully known.

12 ECOLOGICAL INFORMATION

Ecotoxicity: No data

Persistence and Degradability: No data

Bioaccumulative Potential: No data

Mobility in Soil: No data

Other Adverse Effects: Do not allow material to be released to the environment without proper governmental permits. No further relevant information available.

13 DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Product: Dispose of in accordance with Federal, State and Local regulations.

Packaging: Dispose of in accordance with Federal, State and Local regulations.

14 TRANSPORT INFORMATION

Shipping Regulations: Not regulated

UN Number: N/A

UN Proper Shipping Name: N/A

Transport Hazard Class: N/A

Packing Group: N/A

Marine Pollutant: No

15 REGULATORY INFORMATION

TSCA Listed: All components are listed.

Regulation (EC) No 1272/2008 (CLP): Hazardous to the aquatic environment - acute hazard, category 1, Hazardous to the aquatic environment - chronic hazard, category 1.

Canada WHMIS Classification (CPR, SOR/88-66): N/A

HMIS Ratings: Health: 0 **Flammability:** 0 **Physical:** 0

NFPA Ratings: Health: 0 **Flammability:** 0 **Instability:** 0

Chemical Safety Assessment: A chemical safety assessment has not been carried out.

16 OTHER INFORMATION

The information contained in this document is based on the state of our knowledge at the time of publication and is believed to be correct, but does not purport to be all inclusive and shall be used only as a guide. ESPI Metals makes no representation, warranty, or guarantee of any kind with respect to the information contained in this document or any use of the product based on this information. ESPI Metals shall not be held liable for any damages resulting from handling or from contact with the above product. Users should satisfy themselves that they have all current data relevant to their particular use.

Prepared by: ESPI Metals

Revised/Reviewed: July 2015

ATTACHMENT 4

Daily Toolbox Meeting Forms

Job(s) Location(s) _____

Date: _____

Name of Project Oversight/Project Manager: _____ Muster Point: _____

Simultaneous Operations (SIMOPs) or Multi-Crew Activity? ☐ Yes ☐ No If yes, describe the SIMOPs: _____Has the SIMOPS work been communicated to all workers? ☐ Yes ☐ No If yes, list topics discussed: _____

Contacts for SIMOPs: _____ Company: _____

List all jobs to be performed today: _____

List safety discussion topics applicable to today's activities: _____

Identify if there are any permitted activities and document the permit number: _____

Have the hazards for each listed job been identified, assessed, and controlled by a competent person and the workforce on site? ☐ Yes ☐ NoHave newly identified risks been documented in the Job Risk Assessment (JRA)? ☐ Yes ☐ NoHave all members of the workforce confirmed understanding of the work scope, hazards, risk controls and mitigation? ☐ Yes ☐ NoHas everyone reviewed the current JRA? ☐ Yes ☐ NoHave equipment checks been completed, documented, and reviewed? ☐ Yes ☐ No ☐ N/A

(Do not proceed unless the answer to all the above questions is Yes or N/A)

Will any conditions change the muster points for today? ☐ Yes ☐ No If yes, describe and discuss with crew: _____Post Daily Review:Best practice/activity(s) observed: ☐ Yes ☐ No If Yes, describe them: _____Were there any Incidents or First-Aid Reports for the day? ☐ Yes ☐ No If Yes, name them: _____Were there any 'Stop Work' interventions? ☐ Yes ☐ No If Yes, describe them: _____Area for improvement: Practice/Activity(s) Observed: ☐ Yes ☐ No If Yes, name them: _____

Signature Page**I know the hazards:**

By signing here, you are stating the following:

1. You have been involved in the JRA and understand the hazards and risk control actions associated with each task you are about to perform.
2. You understand the permit to work requirements applicable to the work you are about to perform (if it includes permitted activities).
3. You are aware that no tasks or work (that is not risk-assessed) is to be performed.
4. You also are aware of your obligation to 'Stop Work' (See Stop Work Section).

I arrived and departed fit for duty:

5. You are physically and mentally fit for duty.
6. You are not under the influence of any type of medication, drugs or alcohol that could affect your ability to work safely.
7. You are aware of your responsibility to bring any illness, injury, (regardless of where or when it occurred) or fatigue issue you may have to the attention of the Field Team Leader.
8. You signed out uninjured unless you have otherwise informed the Field Team Leader.

SIMOPs NOTE: SIGNATURES ARE REQUIRED BY ALL PERSONS INVOLVED IN A WORK TASK OR WHO MAY BECOME AFFECTED BY A SIMOP SITUATION.

Individual Name/Company Name/Signature**Initials & Sign in time****Initials & Sign out Time**

In & Fit

Out & Fit

In & Fit

Out & Fit

In & Fit

Out & Fit

In & Fit

Out & Fit

In & Fit

Out & Fit

In & Fit

Out & Fit

In & Fit

Out & Fit

In & Fit

Out & Fit

In & Fit

Out & Fit

At the conclusion of the day, I certify that the job site is being left in a safe condition and there were no reports of injury or first aid.

☐ Yes☐ No

Signature of Field Team Leader:

(if no, inform the Project Manager, when applicable)

I will STOP the job any time anyone is concerned or uncertain about safety.

I will STOP the job if anyone identifies a hazard or additional mitigation not recorded in the JRA.

I will be alert to any changes in personnel, conditions at the work site or hazards not covered by the original JRA.

If it is necessary to **STOP THE JOB**, I will reassess the task, hazards and mitigations; and then amend the JRA as needed.



Names of site visitors not involved in the work activities:

In _____ / Out _____

In _____ / Out _____

In _____ / Out _____

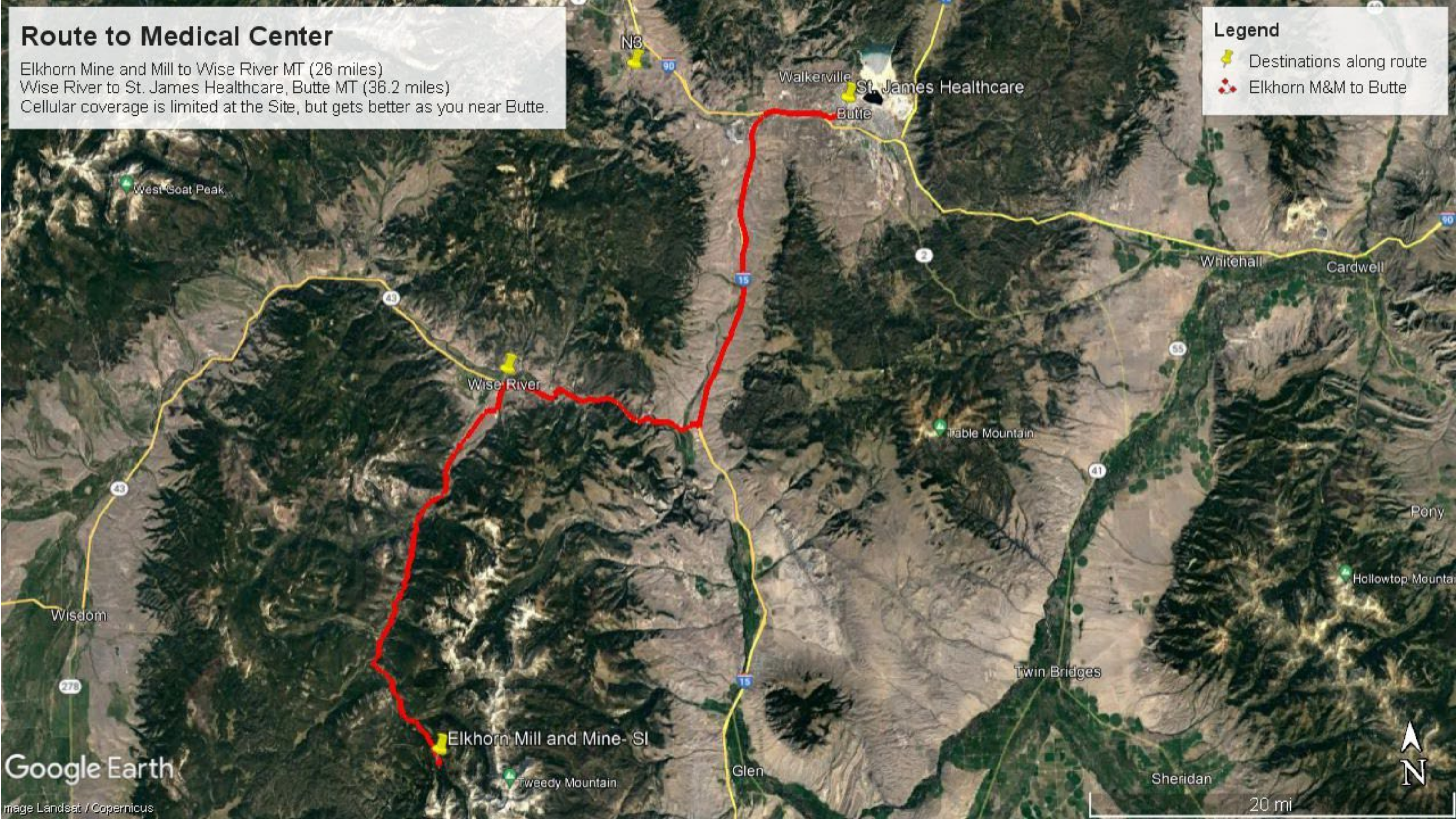
In _____ / Out _____

In _____ / Out _____

Definitions: **Project** – A planned set of interrelated jobs to be executed over a period of time. **Job** – A general activity, including several different tasks that occur when working on a project. **Task** – One of several potential specific actions that occur as part of the process to complete a job. **Hazard** - The potential for an uncontrolled release of, or unwanted contact with, a biological or energy source.

ATTACHMENT 5

Emergency Hospital Map



ATTACHMENT 6

HAZWOPER CERTIFICATES

SAFETY TRAINING

CERTIFICATE OF COMPLETION

This is to certify that

Marty Bennett

Has successfully completed
8-Hr. OSHA 1910.120 Hazardous Waste Operations &
Emergency Response Refresher Course

Course Date: February 11, 2022



Hailey M. Thompson, Instructor

02/11/2022

Date



**SAFETY
TRAINING**

CERTIFICATE OF COMPLETION

This is to certify that

Mason Bowditch

Has successfully completed
8-Hr. OSHA 1910.120 Hazardous Waste Operations &
Emergency Response Refresher Course

Course Date: February 25, 2022

Tara N. Schleeman

Tara N. Schleeman, Instructor

02/25/2022

Date



SAFETY TRAINING

CERTIFICATE OF COMPLETION

This is to certify that

Kile Denny

Has successfully completed
8-Hr. OSHA 1910.120 Hazardous Waste Operations &
Emergency Response Refresher Course

Course Date: February 25, 2022

Tara N. Schleeman

Tara N. Schleeman, Instructor

02/25/2022

Date



SAFETY TRAINING

CERTIFICATE OF COMPLETION

This is to certify that

Justin Harcharik

Has successfully completed
8-Hr. OSHA 1910.120 Hazardous Waste Operations &
Emergency Response Refresher Course

Course Date: February 18, 2022

Tara N. Schleeman

Tara N. Schleeman, Instructor

02/18/2022

Date

