

## Procedure

**Date:** 26 July 2009

**Section:** Underground

**Subject:** **Arsenic 1<sup>st</sup> Level Hygiene Procedures**

**Purpose:** The following procedure has been assembled in order to define responsibilities and duties for personnel working around Arsenic on the first level UG.

**Objective:** To ensure all necessary steps are taken to protect employees from exposure to **arsenic trioxide**.

### Procedure:

- Employees entering the C-Dry shall remove all outside clothing in the clean side of the dry. Clothing will be placed in any available locker.
- Workers will dress in the UG equipment and make their way to the Underground Dry situated on the 1<sup>st</sup> Level beside the cage.
- Workers entering the UG Dry shall remove all overclothing and UG equipment (i.e. H Hats, lamps, belts, etc) on the clean side of the dry. Clothing will be gathered in suitable containers.
- To prevent contamination of the Underground-Dry, only the wearing of underwear is permitted past the clean side and into the dirty side of the UG dry.**
- Socks and sockets are provided on the clean side of the UG dry. They are to be worn from the clean to the dirty side.
- Complete UG equipment are to be provided by the company and will be put on the dirty side of the underground dry. Gloves, Hard Hats, Lamps, Belts and boots will also be stored in this area.
- Clothing and equipment worn in the contaminated or suspected contaminated area **must remain** on the dirty side of the dry at all times. All equipment and clothing worn in the contaminated area will not be brought back to surface.
- Half mask respirators are provided to employees on the dirty side of the UG dry and **must** be worn in the contaminated containment's.
- Half masks when required to be cleaned and dried, will be clean prior to bringing them over to the dirty side of the UG dry,
- Boots worn in the contaminated containment must not pass into the clean side of the UG dry.
- Upon returning to the dry from the contaminated containment area boots must be washed prior to entry into the dirty side of the UG dry.
- Before leaving the dirty side of the UG dry, coveralls and gloves must be removed and placed in the dirty side.

- All employees are required to shower when leaving the dirty side of the underground dry and before entering the clean side of the dry. Showers are required each time the contaminated area is left.
- Only underclothing is allowed to come over to the clean side from the dirty side of the dry.
- Urine sampling is mandatory for every employee working in the plant. Samples are required as follows:
  - i) The start of the first scheduled shift of the week ,and at the end of the last scheduled shift of the week..
  - ii) Any employee required being in the containment areas for four hours or longer during a regular or overtime shift.
  - iii) Anytime an employee feels additional sampling is required to determine exposure.

## **MSDS**

- MSDS for 6465 Arsenic and 3338 Arsine attached

## **Reviewed:**

Original Signed – Held in Safety – Site Specific Safety Plan Copy  
Ted Bienias – Site Manager

## **Approval:**

Original Signed – Held in Safety – Site Specific Safety Plan Copy  
Bob Gilroy – VP Ops Nuna



# RESPONSE ACTION PLAN FOR AN ARSENIC SLUDGE SPILL

(Includes Arsenic in dust or powder form)  
Class 6.1 Material (TDG)

## INITIAL RESPONSE

- **Immediately** initiate the spill response flow plan outlined in the main body of the Emergency Spill Response Plan.
- **Block any entry to waterways.** Construct an interceptor trench or direct flow using spill containment equipment towards a low area away from water. If the spill has reached natural waters, try to prevent additional material from entering the water.
- Secure the site and prevent non-authorized entry.
- Attempt to **contain** the arsenic sludge by dyking with earth, sand bags, snow or other type of barrier. Construct a berm if required. Use earth-moving equipment as necessary to complete containment measures. As necessary, use materials found in the spill containment kits located onsite.

## RECOVERY

- Recover / excavate all arsenic sludge, dust or powder, and contaminated soil or snow.
- Place contaminated materials into appropriate drums, containers or specially designed spill containment waste bags (when in dust or powder form – do not place sludge in bags unless bags are immediately placed into another container suitable for containing the sludge). All contaminated material should be disposed of as directed by the Mine Manager or their designate.
- Ensure that all equipment utilized is decontaminated at the conclusion of the recovery operation. Decontamination may include washing equipment down with hot water and/or steam. Any waste water produced during such an effort will be collected and disposed of in an appropriate manner as directed by the Mine Manager or their designate.
- Thoroughly clean any surfaces affected (such as steel, concrete or wood).
- Resurface the affected area with waste rock, gravel or other appropriate material.

## FIRE RESPONSE

- Material is not flammable and will not support combustion.
- In a fire involving Arsenic sludge, Arsine gas may be produced as a result of the heat from the fire. **Do not attempt to extinguish the fire unless you are equipped with Self Contained Breathing Apparatus (SCBA) and protective clothing.**
- Use extinguishers compatible with storage site construction materials. If water must be used, limit quantities and treat any runoff in the same manner as you would a spill of minewater (see action plan below).

## **PROPERTIES**

- Arsenic sludge is a mixture of arsenic trioxide and water, and is dark grey in colour.
- The chemical formula for arsenic is As. Arsenic in the sludge form is Arsenic Trioxide ( $\text{As}_2\text{O}_3$ ). This form of arsenic is water-soluble.
- Arsenic trioxide ( $\text{As}_2\text{O}_3$ ) is a known carcinogen, poisonous by ingestion and dust inhalation, and possibly by skin absorption. It is corrosive to eyes, skin, and mucous membranes.
- Refer to the MSDS for Arsenic Trioxide (CAS # 1327-53-3) for more information.

## **ENVIRONMENTAL CONCERNS**

- Arsenic is toxic to human health and to aquatic life even in very low concentrations. Every effort must be made to prevent Arsenic Trioxide from migrating into waterways.

## **CONTAINERS**

- Use metal or plastic drums (overpacks) for the transportation of Arsenic Sludge.

## **PERSONAL PROTECTION**

- When working with arsenic, personnel are required to wear rubber boots, full slicker suit, rubber gloves and a full-face shield.
- Airstream respirators are required if dusty conditions are present.
- Avoid skin contact with arsenic sludge, dust or powder.
- Avoid inhalation of arsenic sludge, dust or powder.
- Avoid arsenic sludge, dust or powder from contacting clothing.
- Prevent arsenic sludge, dust or powder from contacting the eyes.
- Wash thoroughly after handling arsenic sludge or dust.
- Shower after the completion of your work.
- Do not eat or smoke until after completing wash up. Properly decontaminate work clothing or dispose of it in containers suitable for containing arsenic (see Recovery section above).
- Spill response personnel aiding in the cleanup of an arsenic spill are to provide urine samples to Environmental Services on a regular basis as deemed necessary by the Environmental Coordinator.

## Material Safety Data Sheet

Arsenic Trioxide

ACC# 02070

### Section 1 - Chemical Product and Company Identification

**MSDS Name:** Arsenic Trioxide

**Catalog Numbers:** A59I-100, A889-60

**Synonyms:** Arsenic Oxide; Arsenic Sesquioxide; Arsenous Oxide; Arsenous Acid Anhydride; Arsenous Acid

**Company Identification:**

Fisher Scientific

1 Reagent Lane

Fair Lawn, NJ 07410

**For information, call:** 201-796-7100

**Emergency Number:** 201-796-7100

**For CHEMTREC assistance, call:** 800-424-9300

**For International CHEMTREC assistance, call:** 703-527-3887

### Section 2 - Composition, Information on Ingredients

| CAS#      | Chemical Name    | Percent | EINECS/ELINCS |
|-----------|------------------|---------|---------------|
| 1327-53-3 | Arsenic trioxide | 100.0   | 215-481-4     |

### Section 3 - Hazards Identification

#### EMERGENCY OVERVIEW

Appearance: white solid.

**Danger!** May be fatal if swallowed. Poison! Contains inorganic arsenic. Harmful if inhaled. Cancer hazard. Causes eye and skin irritation. May cause severe respiratory and digestive tract irritation with possible burns. May cause blood abnormalities. May cause lung damage. May cause central nervous system effects. May cause cardiac disturbances. May cause liver and kidney damage. This substance has caused adverse reproductive and fetal effects in animals.

**Target Organs:** Kidneys, central nervous system, liver, lungs, cardiovascular system, red blood cells, skin.

### Potential Health Effects

**Eye:** Contact produces irritation, tearing, and burning pain. May cause conjunctivitis.

**Skin:** Causes irritation with burning pain, itching, and redness. May cause dermatitis. Exposure to arsenic compounds may produce hyperpigmentation of the skin and hyperkeratoses of plantar and palmar surfaces as well as both primary irritation and sensitization types.

**Ingestion:** May be fatal if swallowed. Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. May cause hemorrhaging of the digestive tract. Ingestion of arsenical compounds may cause burning of the lips, throat constriction, swallowing difficulties, severe abdominal pain, severe nausea, projectile vomiting, and profuse diarrhea. Ingestion of arsenic compounds can produce convulsions, coma, and possibly death within 24 hours.

**Inhalation:** May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. Inhalation of arsenic compounds may lead to irritation of the respiratory tract and to possible nasal perforation. Long-term exposure to arsenic compounds may produce impairment of peripheral circulation.

**Chronic:** May cause liver and kidney damage. Chronic inhalation may cause nasal septum ulceration and perforation. May cause anemia and other blood cell abnormalities. Chronic skin effects include: cracking, thickening, pigmentation, and drying of the skin. Arsenic trioxide can cause cancer in humans. Other long term effects include: anemia, liver and kidney damage. Chronic exposure to arsenical dust may cause shortness of breath, nausea, chest pains, and garlic odor.

### Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

**Ingestion:** Call a poison control center. If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.

**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. Do NOT use mouth-to-mouth resuscitation.

**Notes to Physician:** Treat symptomatically and supportively.

### Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand,

MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use extinguishing media appropriate to the surrounding fire. Substance is noncombustible.

**Extinguishing Media:** Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Do NOT get water inside containers.

**Flash Point:** Not applicable.

**Autoignition Temperature:** Not applicable.

**Explosion Limits, Lower:**Not available.

**Upper:** Not available.

**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 0

#### Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation. Do not get water inside containers.

#### Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation. Do not allow contact with water. Use only with adequate ventilation or respiratory protection.

**Storage:** Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store in metal containers.

#### Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. See 29CFR 1910.1018 for regulatory requirements pertaining to all occupational exposures to inorganic arsenic.

#### Exposure Limits



| Chemical Name    | ACGIH  | NIOSH  | OSHA - Final PELs   |
|------------------|--|--|---|
| Arsenic trioxide | 0.01 mg/m <sup>3</sup> TWA (as As)<br>(listed under Arsenic, inorganic compounds). | 5 mg/m <sup>3</sup> IDLH (as As)<br>(listed under Arsenic, inorganic compounds). | 10 æg/m <sup>3</sup> TWA (as As)<br>(listed under Arsenic, inorganic compounds).5 æg/m <sup>3</sup> Action Level (as As); 10 æg/m <sup>3</sup> TWA (as As, Cancer hazard - see 29 CFR 19 10.1018, except Arsine) (listed under Arsenic, inorganic compounds). |

**OSHA Vacated PELs:** Arsenic trioxide: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** 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:** Wear appropriate gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** 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.

Section 9 - Physical and Chemical Properties

**Physical State:** Solid

**Appearance:** white

**Odor:** odorless

**pH:** Not available.

**Vapor Pressure:** 66 mm Hg @ 312C

**Vapor Density:** Not available.

**Evaporation Rate:**Negligible.

**Viscosity:** Not available.

**Boiling Point:** 465 deg C

**Freezing/Melting Point:**312 deg C

**Decomposition Temperature:**Not available.

**Solubility:** 3.7% in water.

**Specific Gravity/Density:** 3.738

**Molecular Formula:**As2O3

**Molecular Weight:**197.8414

#### Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.

**Conditions to Avoid:** Dust generation, moisture, metals, excess heat.

**Incompatibilities with Other Materials:** Incompatible with chlorine trifluoride, fluorine, hydrogen fluoride, oxygen difluoride, and sodium chlorate. Can generate arsine, which is an extremely poisonous gas, when arsenic compounds contact acid, alkalies, or water in the presence of an active metal (zinc, aluminum, magnesium, manganese, sodium, iron, etc).

**Hazardous Decomposition Products:** Excess heat, oxides of arsenic, arsine.

**Hazardous Polymerization:** Has not been reported.

#### Section 11 - Toxicological Information

**RTECS#:**

**CAS#** 1327-53-3: CG3325000

**LD50/LC50:**

CAS# 1327-53-3:

Oral, mouse: LD50 = 20 mg/kg;

Oral, rabbit: LD50 = 20190 ug/kg;

Oral, rat: LD50 = 10 mg/kg;

.

**Carcinogenicity:**

CAS# 1327-53-3:

- **ACGIH:** A1 - Confirmed Human Carcinogen (listed as 'Arsenic, inorganic compounds').
- **California:** carcinogen, initial date 2/27/87 (listed as Arsenic, inorganic compounds).
- **NTP:** Known carcinogen (listed as Arsenic, inorganic compounds).
- **IARC:** Group 1 carcinogen

**Epidemiology:** In a large number of studies, exposure to inorganic arsenic compounds in drugs, food, and water as well as in an occupational setting have been causally associated with the developmental of cancer, primarily of the skin and lungs.

**Teratogenicity:** Teratogenic effects, including exencephaly, skeletal defects, and genitourinary system defects, of arsenic compounds administered intravenously or intraperitoneally at high doses have been demonstrated in hamsters, rats and mice.

**Reproductive Effects:** May cause reproductive effects.

**Mutagenicity:** No information available.

**Neurotoxicity:** No information available.

**Other Studies:**

## Section 12 - Ecological Information

**Ecotoxicity:** Water flea Daphnia: LC50 = 0.038 mg/L; 24 Hr.; Unspecified Bacteria: Phytobacterium phosphoreum: EC50 = 31.43-73.73 mg/L; 5,15,30 minutes; Microtox test No data available.

**Environmental:** Terrestrial: Half-life in soil 6.5 years. Aquatic: Tends to bioaccumulate. Will biodegrade to arsine and will bioconcentrate.

**Physical:** No information available.

**Other:** No information available.

## Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3.

Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

**RCRA P-Series:** CAS# 1327-53-3: waste number P012.

**RCRA U-Series:** None listed.

## Section 14 - Transport Information

|                       | US DOT           | Canada TDG                |
|-----------------------|------------------|---------------------------|
| <b>Shipping Name:</b> | ARSENIC TRIOXIDE | No information available. |
| <b>Hazard Class:</b>  | 6.1              |                           |
| <b>UN Number:</b>     | UN1561           |                           |
| <b>Packing Group:</b> | II               |                           |

## Section 15 - Regulatory Information

### US FEDERAL

#### TSCA

CAS# 1327-53-3 is listed on the TSCA inventory.

#### Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

#### Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

#### Section 12b

None of the chemicals are listed under TSCA Section 12b.

#### TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

#### CERCLA Hazardous Substances and corresponding RQs

CAS# 1327-53-3: 1 lb final RQ; 0.454 kg final RQ

#### SARA Section 302 Extremely Hazardous Substances

CAS# 1327-53-3: 100 lb lower threshold TPQ; 10000 lb upper threshold T PQ

#### SARA Codes

CAS # 1327-53-3: immediate, delayed.

#### Section 313

This material contains Arsenic trioxide (listed as Arsenic, inorganic compounds), 100.0%, (CAS# 1327-53-3) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

#### Clean Air Act:

CAS# 1327-53-3 (listed as Arsenic, inorganic compounds) is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depleters.

This material does not contain any Class 2 Ozone depleters.

#### Clean Water Act:

CAS# 1327-53-3 is listed as a Hazardous Substance under the CWA.

None of the chemicals in this product are listed as Priority Pollutants under the CWA. CAS# 1327-53-3 is listed as a Toxic Pollutant under the Clean Water Act.

#### OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

### STATE

CAS# 1327-53-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Arsenic, inorganic compounds), Massachusetts.

#### California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water

**Act:**

WARNING: This product contains Arsenic trioxide, listed as 'Arsenic, inorganic compounds', a chemical known to the state of California to cause cancer. WARNING: This product contains Arsenic trioxide, listed as 'Arsenic (inorganic oxides)', a chemical known to the state of California to cause developmental reproductive toxicity.

California No Significant Risk Level: None of the chemicals in this product are listed.

**European/International Regulations****European Labeling in Accordance with EC Directives****Hazard Symbols:**

T+ N

**Risk Phrases:**

R 28 Very toxic if swallowed.

R 34 Causes burns.

R 45 May cause cancer.

R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**Safety Phrases:**

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 53 Avoid exposure - obtain special instructions before use.

S 60 This material and its container must be disposed of as hazardous waste.

S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

**WGK (Water Danger/Protection)**

CAS# 1327-53-3: 3

**Canada - DSL/NDSL**

CAS# 1327-53-3 is listed on Canada's DSL List.

**Canada - WHMIS**

This product has a WHMIS classification of D1A, D2A.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

**Canadian Ingredient Disclosure List**

CAS# 1327-53-3 is listed on the Canadian Ingredient Disclosure List.

**Section 16 - Additional Information**

**MSDS Creation Date:** 6/21/1999

**Revision #7 Date:** 11/20/2008

*The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.*

## Arsenic Hygiene Procedures

**Purpose:** The following procedure has been assembled in order to define responsibilities and duties for personnel working highly contaminated arsenic areas.

**Objective:** To ensure all necessary steps are taken to protect employees from exposure to **arsenic trioxide**.

### Procedure:

- Employees entering the C-dry shall remove all outside clothing in the clean side of the dry. Clothing will be placed in any available locker.

**To prevent contamination of street clothes, only the wearing of underwear is permitted past the clean side and into the dirty side of the dry. Work cloths then will be donned for movement from the C-Dry to the Site-Dry where outer layer clothing will be donned.**

- Coveralls are provided by the company and will be put on once in the dirty side of the site-dry. Gloves and boots will also be stored in this area. Outer layer coveralls worn in the containment area **must remain** on the dirty side of the site-dry at all times and never be brought to the C-Dry.
- Airstream respirators (if required due to threat) are to be provided to employees on the dirty side of the dry and **must** be worn in the containment's. Batteries should be checked at the start of the shift to ensure they are providing enough power for adequate airflow.
- If the threat is deemed to be low then half mask respirators will be worn, these must be cleaned at the end of every shift and the canisters replaced.
- Boots worn in the containment area must not pass beyond the site-dry, separate footwear shall be donned for movement to the C- dry.
- Upon returning to the C-dry, boots must be washed prior to entry into the hanging area.
- All employees are required to shower when leaving the property and before entering the clean side of the dry. **Showers are required each time the containment area is left.**
- Towels may be provided on the clean side of the dry These items are to be laundered on the clean side of the dry.
- Urine sampling is mandatory for every employee working in containment areas.

**Controlled Document**

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Samples are required as follows:

- i) The start of the first scheduled shift of the week, either 4x4 or 5x2 rotation and at the end of the last scheduled shift of the week, 4x4 or 5x2.
- ii) Any employee required being in the plant or pond containment areas for four hours or longer during a regular or overtime shift.
- iii) Anytime an employee feels additional sampling is required to determine exposure.

**Controlled Document**

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## NUNA SAFE WORKING PROCEDURES

|                  |   |                        |  |
|------------------|---|------------------------|--|
| <b>Division:</b> |   |                        |  |
| <b>Section:</b>  |   |                        |  |
| <b>Subject:</b>  | GM-SOP – 004 – PPE and Decontamination for High Risk Arsenic Exposure Tasks |                        |  |
| <b>Owner:</b>    | Corporate EHS Manager   | <b>Effective Date:</b> |  |
| <b>Revision:</b> |   | <b>Replaces:</b>       |  |

### 1 OBJECTIVE

1.01 To provide guidelines to Supervisors so they can ensure that all personnel are protected from Arsenic Trioxide and other contaminants.

### 2 SCOPE

2.01 The Project Supervisor shall be responsible for ensuring that all personnel are trained and understand the procedure.

The Site Safety Supervisor shall be responsible for ensuring the Health and Safety Plan is presented to the project personnel, Baseline Urine Sampling is conducted, and Quantitative Respirator Fit Testing is completed prior to work.

All personnel, when trained shall be responsible to follow this procedure as directed by the Project Supervisor.

### 3 INTRODUCTION

3.01 NWT Mine Health and Safety and Safety Act and Regulations: require all personnel be adequately trained to do their jobs safely, inspect their work site and understand the procedures contained in this SOP.

### 4 RESPONSIBILITY

4.01

### 5 DEFINITIONS

5.01 **Arsenic Trioxide** is the hazard we are concerned about primarily. An MSDS is available.

**Baseline Urine Sampling** is conducted prior to personnel going to work. Subsequent to that ongoing urine sampling will continue based on the result of sampling and according to the schedule set out in the Site Specific Safety Plan. This is at the beginning, middle and end of a workweek.

**North Series 7700 Half Mask Respirators with P100 Cartridges will only be worn for very short term exposures.**

**Racal Helmet or Airstream High Efficiency Headgear System.** This is a PAPR with a flip up full-face visor. It is battery operated positive pressure air filtering or purifying device. This is the preferred device for exposures to hazards for longer periods of work.

**Respirator Fit Testing** is accomplished using a computer operated instrument known as a Portacount Respirator Fit Tester that eliminates the human error factor. The tester is a qualitative tester. Upon completion of a fit test a written and electronic record can be saved.



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### 6 REFERENCES AND RELATED DOCUMENTS

6.01 NWT Mine Health and Safety Act and Regulations:

### 7 PREPARATION

#### 1. TOOLS:

1. Racal Helmet or Airstream High Efficiency Headgear System.
2. Cotton Coveralls or a Tyvek suit (1<sup>st</sup> layer)
3. Oiler jacket and pants or a chemical resistant coverall impervious to water (2<sup>nd</sup> layer).
4. Latex or other suitable disposable glove.
5. Rubber or Neoprene gloves
6. Rubber steel-toe work boots
7. Other tools and equipment as required

2. **HAZARDS:** Personal injury from inhalation of air borne contaminants.

3. **REQUIREMENTS:** Clean Shaven and medically able to wear an air filtering device.



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### 8 PROCEDURE

### ALL PERSONNEL

1. Employees entering the C-Dry shall remove all street clothing in the clean side of the dry. Clothing will be placed in any available locker. If a scheduled urine sample is required, this should be taken before changing into work clothing.
2. At the start of the shift, all employees will dress for work at the C-Dry, on arrival at the work place they will don the outer layer of Tyvek coveralls with hood and Oilers adhering to the hygiene procedures for this area.
3. Airstream respirators (if required due to threat) are to be provided to employees at the C-Dry and **must** be worn in the work place. Batteries should be checked at the start of the shift to ensure they are providing enough power for adequate airflow.
4. While working, the visors of the Airstream respirators must be down at all times for effective protection from contaminants.
5. **Decontamination** after the completion of the task is important. While standing in a decontamination pan for collecting the decontamination water, Oilers should be washed off with the pressure washer prior to removal. Care should be taken at this time to wipe down the Racal Helmet or Airstream with supplied wiping materials.
6. Boots worn in the work area must not pass beyond the work area without being decontaminated by scrubbing and pressure washing. Particular attention should be paid to the bottom of the boots.
7. The Tyvek coveralls can now be removed by removing the coverall so that it is rolled up inside out and deposited into the Over pack provided for this purpose.
8. At this point Racal Helmet or Airstream can be removed and taken to the C-dry for recharging and maintenance.
9. Upon returning to the C-Dry, boots must be washed in the boot wash inside the front entrance prior to entry into the washrooms and the dirty side of the dry area.
10. Good hygiene is required for ensuring that exposure to Arsenic is kept below standard. All employees are required to shower before entering the clean side of the dry prior to leaving the property.
11. Arsenic contaminated equipment should not be permitted to leave the work area until it is decontaminated. If required a swipe test can be conducted to determine if acceptable standards have been achieved.



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### 9 ATTACHMENTS

#### Documents and Records

NWT Mine, Health and Safety Regulations and Act: 6:01, 9.02, 9.03, 9.04, 9.05, 9.06(2), 9.09, 9.10, 9.12, 9.13, 9.22, 9.28, 9.29, 9.30, 9.31, 9.32 – 9.42

CSA Standards Z94.4-93 Selection, Use and Care of Respirators

| First Name<br>(Print) | Last Name<br>(Print) | Company | Position | Date | Signature |
|-----------------------|----------------------|---------|----------|------|-----------|
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## NUNA SAFE WORKING PROCEDURES

|                  |   |                        |  |
|------------------|---|------------------------|--|
| <b>Division:</b> |   |                        |  |
| <b>Section:</b>  |   |                        |  |
| <b>Subject:</b>  | GM-SOP – 004 – PPE and Decontamination for High Risk Arsenic Exposure Tasks |                        |  |
| <b>Owner:</b>    | Corporate EHS Manager   | <b>Effective Date:</b> |  |
| <b>Revision:</b> |   | <b>Replaces:</b>       |  |

### 10 APPROVED RECORD

| NAME | POSITION | DATE | REV # | NOTES |
|------|----------|------|-------|-------|
|      |          |      |       |       |
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## Procedure

**Date:** 26 February 2008

**Section:** Safety / First Aid Contaminated Area Underground

**Subject:** 1<sup>st</sup> Level Underground Injury Response Procedure

**Purpose:** The following procedure has been assembled in order to define responsibilities and duties of the First Aider / Ambulance attendant who must respond to an employee who may be injured on the First Level site.

**Objective:** To ensure all necessary steps are taken to protect the First aid attendant from exposure to **arsenic trioxide** during extrication of an injured employee.

### Procedure:

- Upon receiving the call from the UG, the UG Supervisor / First Aider will quickly assess nature and severity of injury.
- The First Aider will need to know the easiest access to retrieve the injured worker.
- If required to enter the Underground, the First Aider will don the Tyvek coveralls, disposable gloves, rubber boots, safety hat, safety glasses and Air Purifying Half Mask Face piece with Green Hepa Filter. (PPE). The attendant will also bring with them, a second set of coveralls to leave on the clean side of the plant.
- If the injured employee is ambulatory, and circumstances permit, the First aid attendant will escort the said employee to the shower where the 1<sup>st</sup> Level Hygiene Procedures will be followed.
- If an ambulance is required, it is imperative the dispatcher is notified of the area they are responding to and that necessary precautions are taken prior to receiving the injured worker. A copy of this procedure will be reviewed with and given to the YKFD.
- In cases where the First Aider will require the need of the ambulance crew within the UG, the ambulance crew will be given all appropriate PPE prior to entry. A back up ambulance crew will be called and a hand-over will be conducted between the crews at the exterior edge of the plant confines. The first ambulance crew will then follow the 1<sup>st</sup> Level Hygiene Procedures
- Where possible, all clothing of the injured worker shall be removed and left in the plant for proper cleaning.
- The hospital shall also be contacted and notified that the injured employee is coming from the 1<sup>st</sup> Level Arsenic Area.
- Two (2) **Decontamination Information Cards** shall be given to the ambulance crew transporting the injured worker to the hospital. The ambulance crew will keep one for their information and the second card will be given to the Stanton Emergency personnel.

- First aid attendant **will** use the medical supply kit from the First aid room as this is made of plastic and will be easier to clean post injury.

## **MSDS**

- MSDS for 6465 Arsenic and 3338 Arsine attached

## **Reviewed**

*Original Signed – Held in Safety – Site Specific Safety Plan Copy*

Ted Bienias – Site Manager

## **Approval**

*Original Signed – Held in Safety – Site Specific Safety Plan Copy*

Bob Gilroy – VP Ops Nuna

**Subject:                    Arsenic Safety Procedure**

**Purpose:**     The following procedure has been assembled in order to define responsibilities and duties for personnel working arsenic contaminated areas of the property.

**Objective:**   To ensure all necessary steps are taken to protect employees from exposure to arsenic trioxide, and any other hazards.

**Procedure:**

Contaminated Area Access

For the purpose of this procedure, all areas designated within an established perimeter will be referred to as the “**CONTAINMENT AREA**” and will be considered a hazardous work location. Only those employees who are **AUTHORIZED** and have received training on the hazards, safe work practices and have been provided with the proper Personal Protective Equipment will be permitted to enter these areas.

All entrances to the pond containment area must be secured at all times other than when moving equipment and materials. At each entrance, a sign indicating “Authorized Personal only” must be placed in a conspicuous location.

Protective Clothing & Entry Procedure

In consideration of the special conditions when working in this area, particular attention must be applied to clothing. Due to the high concentrations of arsenic trioxide found in the wet sludge material, two layers of work clothes will be required. **NO STREET CLOTHES SHALL BE PERMITTED IN THE POND CONTAINMENT AREAS.**

At the start of a shift, all employees will dress for work at the C-Dry, on arrival to the ‘Containment Area’ they will then don the outer layer of clothing adhering to the hygiene procedures for this area. **Refer to Hygiene Procedures.**

Their protective clothing will consist of the following:

1. Cotton Coveralls or a Tyvek suit (1<sup>st</sup> layer)
2. Oiler jacket and pants or a chemical resistant coverall impervious to water (2<sup>nd</sup> layer).
3. Latex or other suitable disposable glove
4. Rubber or Neoprene gloves
5. Rubber steel-toe work boots

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Outer protective clothing must be fully zipped or buttoned up to prevent possible exposure. During periods of heavy spraying or splashing, it may be necessary to tape the opening at the neck, sleeves, and top of boots with duct tape or other suitable material.

If movement of personnel is required while in the 'Containment Area' a vehicle solely designated for transporting **ALL** employees must remain with the employees at the work location, and is not permitted to travel to any other location on the property unless in the event of an emergency.

#### Airstream & Racal High Efficiency Headgear Systems

Depending on the level of threat the choice of respiratory protection required when working in the containment areas may be the Airstream or Racal helmet, providing positive pressure to the user, and protecting against particulates. **HALF MASK RESPIRATORS and PAPER DUST MASKS WILL ONLY BE PERMITTED IF THREAT LEVELS ARE DETERMINED TO BE LOW PRIOR TO COMMENCEMENT OF JOB.** Before using any respirator, all employees must be trained in the proper use and maintenance according to the Manufacture User Instructions.

Airstream & Racal respirators are available to employees on the dirty side of the Blend Plant dry and **MUST** be operating properly with the visor in the **DOWN POSITION** when in the pond containment areas. **FAILURE TO MAINTAIN A PROPER SEAL OR HAVING THE VISOR UP COULD RESULT IN AN EXPOSURE TO ARSENIC.**

Before donning an Airstream or Racal respirator, the user will inspect it closely to ensure the unit has a fully charged battery and tested to ensure acceptable airflows are being achieved.

All Airstream & Racal respirators shall be thoroughly washed at the end of each shift and components requiring replacement shall be made at this time. The unit shall be stored in their designated storage area at the Blend Plant.

#### Exit Procedure

When leaving the containment area, protective outerwear must be removed, and stored at their designated storage area. All disposable clothing must be bagged and placed into the appropriate trash receptacle. Rubber gloves must be washed every day or replaced with clean ones.

**EMPLOYEES WORKING IN THE CONTAINMENT AREAS ARE NOT PERMITTED TO TRAVEL TO ANY OTHER AREA OF THE PROPERTY OTHER THAN TO THE DESIGNATED 'DRY' FACILITY.** This will prevent any chance of contaminating other work areas.

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All employees are required to shower at the C-dry facilities when leaving the containment areas. This will include when taking breaks. **Refer to Hygiene Procedures.**

**ALL PERSONNEL MUST SHOWER AFTER LEAVING THE CONTAINMENT AREAS, REGARDLESS OF THE AMOUNT OF TIME SPENT IN THE LOCATION.**

### Hygiene

**SMOKING AND EATING IS PROHIBITED** in all containment areas, and will be limited to break times only.

Barrier cream is available from the supervisor and offers some protection against rashes caused from chemical exposure. Apply to clean dry skin, making sure to work the product well into the skin. Pay particular attention to wrists, hands, and neck and face area.

**Strict adherence to proper hygiene procedures is important for the health and safety of personnel working in these areas. Good housekeeping practices must be followed at all times with particular attention given to keeping the Blend Plant dry facilities clean at all times.**

### **Urine sampling**

**URINE SAMPLING IS MANDATORY FOR EVERY EMPLOYEE WORKING IN THE POND CONTAINMENT AREAS.** Samples are required as follows:

- The start of the first shift schedule shift of the week, either 4x4 or 5x2 rotation and at the end of the last scheduled shift of the week, 4x4 or 5x2.
- Any employee required being in the plant for four hours or longer during a regular or overtime shift.
- Anytime an employee feels additional sampling is required to determine exposure.

*Refer to Annex B of the Decontamination procedure for more information regarding exposure levels.*

### Equipment decontamination

All equipment used in the containment areas must be thoroughly cleaned before leaving these areas. This includes but not limited to the following:

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- Mobile equipment
- Pumps and hoses
- Motors
- Hand Tools

Arsenic contaminated equipment shall not be permitted to leave the containment areas under any circumstance until it is properly cleaned. If required, a swipe test will be conducted to determine if acceptable standards have been achieved.

### Environmental Monitoring

Swipe tests will be taken of the dry facility once every two weeks or more frequently if required to determine if cleaning procedures are effective in maintaining acceptable standards. Periodic sampling of the interior cab of any mobile equipment used in the containment areas will be taken to determine if acceptable levels are being achieved. The results of these samples will be made available to the Occupational Health and Safety Committee.

### Communication

The employees working in this area will be in continuous contact via two way radio with their supervisor at all times. Employees working alone must be checked on once every two hours or more frequently as dictated by the work they are performing.

### Specialized work

Where an employee is required to work over or be near water, which presents a risk of drowning, the employee shall be constantly supervised and will be required to wear an approved life jacket. A lifebuoy that is equipped with a line not less than 15m in length and having strength not less than of a 10 mm manila rope will be made available in the event a rescue is required. In addition, a rescue boat of sufficient size that is capable of being operated under all prevailing circumstances will be located in the pond containment areas.

Where an employee is required to work around mobile equipment special consideration must be made for the safety of the individual. The employee must always be in sight of the equipment operator and should the operator lose visual contact with the employee, he will stop work immediately. Two-way radio communication or hand signals between the equipment operator and employee will be essential to ensure the safety of the worker. An employee will never place himself in danger by standing under a load or in the articulating part of any mobile equipment.

### Emergency Procedures

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To guard against heat stress injuries employees may be required to take more frequent rest breaks to freshen up. A well balanced diet spread over the workday, and plenty of fluids (water & juices) will help to eliminate this problem.

All serious injuries requiring immediate transport to the hospital via ambulance or other emergency vehicle will be done under the guidance of the First Aid Attendant who will ensure emergency personnel are provided with the proper protective clothing.

**ALL RASHES** must be reported to the supervisor and first aid for early intervention and proper treatment.

**All spills** of arsenic sludge material outside of the containment area will be handled immediately as per the General Contingency Environmental Emergency and Spill Response Plan.

**IMPORTANT:**

**THIS PROCEDURE APPLIES TO ALL GMRP PERSONNEL, CONTRACTORS, AND ANY OTHER PERSON ENTERING INTO THESE AREAS. THERE ARE NO EXCEPTIONS ALLOWED UNLESS IN THE EVENT OF AN EMERGENCY AFFECTING THE SAFETY OF ANY PERSON.**

Attached: MSDS Arsenic Trioxide