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Brunel Energy, Inc.

Ammonia Awareness

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1. Purpose

- 1.1. Brunel Energy, Inc., hereinafter referred to as; “the Company,” has established a program compliant with OSHA 29 CFR 1910.119 to address and minimize possible ways employees may be exposed to Anhydrous Ammonia.

2. Applicability

- 2.1. This policy applies to employees, subcontractors and/or visitor(s) of the Company. For the purposes of this policy, an employee shall be considered on the job whenever he/she is:
 - 2.1.1. On or in, any Company or client property, including parking areas; or
 - 2.1.2. On company time even if off Company premises (including paid lunch, rest periods and periods of being on call).
- 2.2. As a condition of employment, Company employees are required to abide by additional governmental or customer policies and requirements that may be imposed at a worksite in addition to the requirements of these policies and procedures. Nothing set forth in this policy constitutes, construes or interprets in any way as a contract of employment.

3. Definitions

- 3.1. **Ammonia (NH₃) Anhydrous** is ammonia used in manufacturing, refrigeration and agriculture is a pungent, colorless and toxic gas or liquid that, when concentrated, is corrosive to human tissue upon contact.

4. Responsibilities

- 4.1. Manager(s) and HSE Supervisor(s) shall:
 - 4.1.1. Ensure locations where ammonia exposure may exist is identified, a hazard assessment is conducted and proper personal protective (PPE) is provided and properly worn by employees.
- 4.2. Employee(s) shall:
 - 4.2.1. Not commence work in an area where ammonia exposure may exist unless a site-specific contingency plans and emergency provision has been reviewed.
 - 4.2.2. Alert supervisors if they notice any type of ammonia danger or possible ammonia hazard.
- 4.3. Subcontractor(s) shall:
 - 4.3.1. Ensure proper personal protective equipment is worn when performing work in an area where ammonia exposure may exist.

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5. Requirements

5.1. General

- 5.1.1. Prior to commencing work in an area with recognized exposure to ammonia, a hazard assessment shall be performed, proper personal equipment (PPE) identified, and provisions of site-specific contingency/emergency plans shall be reviewed with employees prior to commencing work.

5.2. Health Hazards

- 5.2.1. The severity of health effects associated with Anhydrous Ammonia vary on the exposure, the route of exposure and the duration of exposure. Harmful if inhaled and/or if encounters contact with eyes or skin. Exposure to high concentrations of ammonia in air causes immediate burning of the eyes, temporary blindness, coughing, chest pain, lung damage or death. The exposure limits and health effects can be found on Table 1 Exposure Limits and Health Effects.

Table 1 Exposure Limits and Health Effects

Exposure Limits and Health Effects (Updated September 6, 2012)		
Standard Set By	Exposure Limit	Health Effect Codes -- Health Effects and Target Organs
OSHA PEL - General Industry See 29 CFR 1910.1000 Table Z-1	50 ppm (35 mg/m ³) TWA	HE4 -- temporary blindness
		HE11 -- pulmonary edema
		HE14 -- marked eye, skin, and respiratory irritation
OSHA PEL - Construction Industry See 29 CFR 1926.55 Appendix A	50 ppm (35 mg/m ³) TWA	HE4 -- temporary blindness
		HE11 -- pulmonary edema
		HE14 -- marked eye, skin, and respiratory irritation
OSHA PEL - Shipyard Employment See 29 CFR 1915.1000 Table Z-Shipyards	50 ppm (35 mg/m ³) TWA	HE4 -- temporary blindness
		HE11 -- pulmonary edema
		HE14 -- marked eye, skin, and respiratory irritation
NIOSH REL	25 ppm (18 mg/m ³) TWA 35 ppm (27 mg/m ³) STEL	HE14 -- marked eye, skin, and respiratory irritation
ACGIH TLV [®] (1970)	25 ppm (17 mg/m ³) TWA 35 ppm (27 mg/m ³) STEL	HE14 -- marked eye, skin, and respiratory irritation
CAL/OSHA PELs	25 ppm (17 mg/m ³) TWA 35 ppm (27 mg/m ³) STEL	HE14 -- marked eye, skin, and respiratory irritation

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5.3. Eye Exposure

- 5.3.1. Mild or Moderate exposure to the eyes can result in irritation and a burning feeling, whereas severe exposure can lead to inflammation of the eye's membranes, swelling and sloughing of the eye's surface cells, and temporary or even permanent blindness.

5.4. Ingestion

- 5.4.1. Although uncommon, ingesting ammonia is hazardous. Symptoms can range from mild to moderate – such as vomiting, abdominal pain and burns to the mouth, esophagus and stomach – to severe, including corrosive damage to the mouth, throat and stomach.

5.5. Inhalation

- 5.5.1. Inhaling ammonia gas can cause breathing problems, wheezing or chest pain. Asphyxiation may occur in poorly ventilated or enclosed areas, according to the Agency for Toxic Substances and Disease Registry.

5.6. Skin Exposure

- 5.6.1. Employees should be provided with appropriate personal protective equipment (PPE) such as impervious clothing, gloves and/or face shields and other appropriate protective clothing necessary to prevent any possibility of skin contact with liquid anhydrous ammonia aqueous solutions of ammonia containing more than 10% by weight of ammonia.
- 5.6.2. Similar precautions should be taken to prevent the skin from becoming frozen from contact with vessels containing liquid anhydrous ammonia.

6. Safe Work Practices

- 6.1. Wear personal protective equipment to work with liquid ammonia, protect eye, face and skin. To work with liquid or gaseous ammonia, you may require respiratory protection.
- 6.2. Take hot work permitting precautions whenever hot work will be performed in areas where ammonia is present. If piping, vessels, or containers that have held ammonia will be welded, soldered, drilled, or cut, purge all ammonia first.
- 6.3. Use proper ventilation, never work with ammonia in an unventilated area. Always ensure that you have adequate ventilation, and make sure that ventilation is non sparking or explosion-proof.
- 6.4. When you work with ammonia, know where the emergency escape respirators are located. If ammonia leaks or is spilled, put on a respirator and leave the area immediately. Report the spill or leak so it can be appropriately controlled.
- 6.5. Liquid ammonia can burn your eyes. Know where the emergency wash is located.

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- 6.6. Employees shall wash their eyes and skin, as quickly as possible to reduce the effects from exposure to ammonia.
- 6.7. There is no antidote for ammonia poisoning, but ammonia's effect can be treated, and most victims recover. People who experience serious signs and symptoms (such as severe or constant coughing or burns in the throat) may need hospital care.
- 6.8. Remove from the exposure, if inhaled. Flush skin or eyes with water for 15 minutes. Do not induce vomiting if ingested, give 1-2 glasses of milk or water. In all cases, medical aid should be sought.
- 6.9. Skin Contact, flush with lukewarm, gently flowing water for 5 minutes. If irritation or pain persists, seek medical attention.

7. Training

- 7.1. Training should be able to understand the hazards of the process, properties of ammonia and system/process, become competent in safe operating practices, and to take appropriate actions during an incident.
- 7.2. All employees must be trained upon initial assignment and annually thereafter.
- 7.3. All training shall be documented.

8. Reference

- 8.1. 29 CFR 1910.111, Storage and Handling of Anhydrous Ammonia
- 8.2. 1910.132 Personal Protective Equipment