DRI Hazardous Waste Generation Safe Handling Practices

1.0 INTRODUCTION

1.1 The DRI Hazard Communication Program was designed to assure that consistent and uniform information is available for chemicals and other hazardous materials. These safe handling practices further support the hazard communication program by providing general hazard information and safe handling procedures for chemical wastes.

2.0 PURPOSE AND SCOPE

2.1 The primary objective of this procedure is to provide employees with the basic hazard communication information necessary to make them aware of the hazards of various classes of chemical wastes and to guide them on safe handling practices when working with these wastes.

2.2 These safe handling practices also discuss basic emergency response procedures for hazardous waste spills.

2.3 These safe handling practices pertain to all operations generating hazardous waste at the DRI.

3.0 RESPONSIBILITY

3.1 DRI Division and Center Directors are responsible for:

3.1.1 Being aware of the requirements outlined in these safe-handling procedures.

3.1.2 Requiring compliance with the applicable elements of these practices from departments/projects under their management

3.2 DRI Supervision (e.g., Principal Investigators, Supervisors, Project Managers, etc) is responsible for:

3.2.1 Providing support and verifying compliance with these safe handling practices.

3.2.2 Verifying that all employees under their supervision who generate or work around hazardous waste are properly trained and aware of the requirements of these safe handling practices within six (6) months of employment and have reviewed these procedures annually or when changes are made to them, whichever occurs first.

3.2.3 Ensuring that until their affected employees have been properly trained, they remain under the direct supervision of trained personnel.

3.3 The EH&S Department is responsible for:

3.3.1 Providing the necessary support to management and staff for compliance with the requirements of these practices.

3.3.2 Reviewing and updating these practices as required by changing regulations.

3.3.3 Verifying that affected principal investigators, supervision and project management understand the hazards, emergency procedures, and safety equipment relevant for employees under their supervision.

3.4 DRI employees are responsible for:

3.4.1 Following these safe-handling practices for hazardous wastes.

3.4.2 Consulting with their supervisor or EH&S if unsure of the procedure to follow.

4.0 DEFINITIONS OF HAZARDS

4.1 Hazardous wastes are defined by Nevada Revised Statute 459.430 as any waste or combination of wastes, including solids, semisolids, liquids or contained gases, which:

4.1.1 Because of its quantity or concentration or its physical, chemical or infectious characteristics may:

4.1.1.1 Cause or significantly contribute to an increase in mortality or serious irreversible or incapacitating illness; or

4.1.1.2 Pose a substantial hazard or potential hazard to human health, public safety or the environment when it is given improper treatment, storage, transportation, disposal or other management.

4.1.2 Is identified as hazardous by the department as a result of studies undertaken for the purpose of identifying hazardous wastes.

The term includes, among other wastes, toxins, corrosives, flammable materials, irritants, strong sensitizers and materials which generate pressure by decomposition, heat or otherwise.

4.2 U.S. EPA identifies hazardous waste as those materials that are no longer of use that are either specifically listed as a hazardous waste in 40 CFR 261.30 through 261.33 or have one of more of the following characteristics: ignitable, corrosive, toxic or reactive. Note: These definitions differ slightly from the DOT and other classification schemes. (For example, the DOT considers a liquid with a flash point of < 100°F to be flammable, while EPA classifies liquids with flash point < 140°F as ignitable.)

4.2.1 **IGNITABLE WASTES**

4.2.1.1 The flash point is the lowest temperature at which a liquid will produce enough vapors to form an ignitable mixture with air. Ignitable materials have a flash point of less than 140°F.

4.2.1.2 Vapors from flammable or combustible materials are hazardous because they can readily burn or explode. Improper storage and handling can cause injuries, death, and loss of property through fires. There is a flammable range of the vapor/air mixture for each type of ignitable material. This range varies and some substances are much more hazardous than others are. Complete knowledge of the material and its characteristics is required. Consult the MSDS for additional information.

4.2.1.3 Some examples of ignitable hazardous wastes generated at the DRI are solutions of acetone, methanol, ethyl acetate, acetonitrile and hexane/ether.

4.2.2 **CORROSIVE WASTES**

4.2.2.1 Corrosive materials present a physical hazard to individuals and they also present a hazard to property and equipment. Strong acids and bases will cause skin burns and are an inhalation and eye hazard. Repeated exposure to corrosives can cause severe dermatitis.

4.2.2.2 Corrosives are defined by the EPA as having a pH less than or equal to 2 (acidic), or having a pH greater than or equal to 12.5 (caustic), or having the ability to corrode steel at a rate greater than .250 inches per year at a test temperature of 55°C (130°F).

4.2.2.3 Per the City of Reno Environmental Control Department, corrosives with a pH < 5.5 or > 9.0 are non-sewerable and must be handled as hazardous wastes. If their pH ranges between >2 and < 5.5 or > 9 and < 12.5, they are non-RCRA regulated hazardous wastes.

4.2.2.4 Some common examples of corrosive hazardous wastes generated by DRI are solutions of hydrochloric, nitric and hydrofluoric acids and solid and solutions of sodium and potassium hydroxide.

4.2.3 **TOXIC WASTES**

4.2.3.1 Toxic materials cause harmful effects to the human biological system and the environment. Toxic materials can affect people in many different ways. Some effects include nausea, dizziness, vomiting, muscle spasms, and blurry vision. Toxins can affect the blood, liver, kidneys, heart and lungs, central nervous system, and many other organs and biological systems.

4.2.3.2 Toxics have an acute oral LD_{50} less than 5000 mg. per kg. (LD_{50} = the quantity of a toxin which is required to cause death in 50% of an animal test population.)

4.2.3.3 Toxics have an acute dermal LD_{50} less than 4300 mg. per kg.

4.2.3.4 Toxics have an acute inhalation LC_{50} less than 10,000 ppm of a gas or vapor.

4.2.3.5 Toxics have been shown through experience or testing to pose a hazard to human health or environment because of carcinogenicity, acute or chronic toxicity, bioaccumulative properties, or persistence in the environment.

4.2.3.6 Some common examples of toxic hazardous wastes generated at the DRI are mercury, cyanide and arsenic containing wastes.

4.2.4 **REACTIVE WASTES**

4.2.4.1 Reactive materials may release energy by themselves or in combination with other materials. Many reactive materials undergo violent chemical changes and are capable of explosive reactions, including oxidizers which initiate or promote combustion by spontaneously evolving oxygen either at room temperature or under slight heating. These materials can react with organic material or combustible liquids to cause or intensify fires. Reactive materials include, but are not limited to, peroxide formers (e.g., isopropyl ether), oxidizers (e.g. strong oxidizing chemicals include nitric acid, liquid oxygen, and hydrogen peroxide), water reactives (e.g. metallic sodium lithium aluminum hydride), flammable solids (e.g. magnesium and picric acid).

4.2.4.2 Reactives are normally unstable and readily undergo violent changes.

4.2.4.3 Reactives can react violently or form potentially explosive mixtures with water.

4.2.4.4 Reactives may generate toxic gases, mists or vapors in a quantity sufficient to present a danger to human health or the environment when mixed with water.

4.2.4.5 Some examples of reactive hazardous wastes are hydrogen peroxide $\geq$ 30%, concentrated perchloric acid, fuming nitric acid, and sodium borohydride.

5.0 PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

5.1 Proper Personal Protective Equipment for Handling Ignitables

5.1.1 Wear proper gloves to prevent contact with skin.

5.1.2 Wear goggles or safety glasses to protect eyes. If a splash hazard to the face is possible, add a face shield.

5.1.3 If adequate ventilation is not available, wear half face or full-face cartridge respirator[1] equipped with organic vapor filters to prevent inhalation.

5.1.4 Consult MSDSs for additional personal protective equipment requirements for the particular ignitables in the waste stream.

5.2 Proper Personal Protective Equipment for Handling Corrosive Materials

5.2.1 Wear proper gloves to prevent contact with skin.

5.2.2 Wear goggles or safety glasses to protect eyes. If a splash hazard to the face is possible, add a face shield.

5.2.3 Wear half face or full-face respirator[1] equipped with acid gas/HEPA filters to prevent inhalation if required and/or utilize local exhaust ventilation (hoods) to remove containment at its source and prevent dispersion.

5.2.4 Consult MSDS for additional personal protective equipment requirements.

5.3 Proper Personal Protective Equipment for Handling Toxics

5.3.1 Wear proper gloves to prevent contact with skin.

5.3.2 Wear goggles or safety glasses to protect eyes. If a splash hazard to the face is possible, add a face shield.

5.3.3 If adequate ventilation equipment is not available, wear half face or full-face cartridge respirator[1] equipped with organic vapor/HEPA filters to prevent inhalation.

5.3.4 Consult MSDS for additional personal protective equipment requirements.

5.4 Proper Personal Protective Equipment for Handling Reactive Materials

5.4.1 Wear proper gloves to prevent contact with skin.

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[1] In order to comply with OSHA's respirator standard, before wearing a respirator, one must have a current medical clearance and must attend respiratory protection training and respirator fit testing annually.

5.4.2 Wear goggles or safety glasses to protect eyes. If a splash hazard to the face is possible, add a face shield.

5.4.3 If adequate ventilation equipment is not available, wear half face or full-face cartridge respirator[1] equipped with organic vapor/acid gas/HEPA filters to prevent inhalation.

5.4.4 Consult MSDS for additional personal protective equipment requirements.

5.5 Other required safety equipment for working with hazardous wastes may include lab coats, aprons, sleeve protectors, safety shoes, a safety shower, and eyewash.

6.0 SPECIAL CONSIDERATIONS

6.1 Special Considerations for Handling Hazardous Waste.

6.1.1 Ensure adequate ventilation is available. Use a hood or other localized exhaust system to remove vapors and gases as necessary to prevent inhalation contact.

6.1.2 Ground and bond containers during transfer of flammable liquids to prevent static sparking.

6.1.3 NO SMOKING is allowed.

6.1.4 NO storing of food or drink and No eating or drinking is allowed in hazardous waste storage or accumulation areas.

6.1.5 After working with hazardous wastes remove all PPE and wash thoroughly before undertaking other activities.

6.2 Do not mix incompatibles chemicals.

6.3 Do not store incompatibles together unless separate secondary containment is provided.

6.3 It is important to remember that many chemicals are hazardous in more than one manner. For example, concentrated hydrogen peroxide is toxic, corrosive, flammable, reactive, and a strong oxidizer. Read the MSDSs for hazard information.

7.0 EMERGENCY PROCEDURES

7.1 Employees should be aware of evacuation, isolation, and notification procedures for chemical spills, exposures or other emergencies involving chemicals/chemical releases. If an immediate fire hazard exists or medical assistance is required call 911.[2] Evacuate the area. While awaiting emergency response, notify EH&S via the Emergency ONLY number (775) 742-6330. For spills involving radioactive materials or radiation hazards, immediately contact Myung Chul Jo, UNR Radiation Safety Officer, at (775) 784-4540, then call the DRI EH&S using the Emergency ONLY number (775) 742-6330.Be prepared to provide with the following information: type of emergency and chemical(s) involved, the exact location of the emergency, and number of people involved.

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[2] Call 4411 immediately after completing call with the 911 dispatcher to alert key DRI personnel to the emergency.

7.2 Hazardous Material Spills

7.2.1 Toxic or hazardous materials are any substance which endanger the health and safety of employees (or the public and/or environment should they escape our buildings). Release of such material is defined as liquid spills, venting and/or re-entry into the air intake of gases, fumes, vapors or mists, or hazardous solids outside of their normal containers. Also included is the release of pathogens or radioactive material. Depending on the quantity, as well as the inherent hazard of the released materials, hazardous materials spills can be broadly classified as **"Incidental"** or **"Non-Incidental"** spills as follows:

7.2.1.1 An **incidental spill** is one that does not cause a health or safety hazard to employees and does not need to be cleaned up immediately to prevent death or serious injury to employees, the public or the environment. Incidental spills can be handled by employees in the immediate release area via absorption, neutralization, or other control methods at the time of the release and do not require assistance from others. Responses to releases of hazardous substances where there is no immediate safety or health hazard (i.e., fire, explosion, or chemical exposure) or hazard to the environment <u>are not</u> considered to be emergency responses.

7.2.1.2 A **non-incidental spill** is a spill that requires a response effort from outside the immediate release area by other designated responders (i.e., trained emergency responders such as mutual aid groups, local fire departments, etc.) because the incident will result, or is likely to result, in an uncontrolled release which may cause high levels of exposure to toxic substances, or which poses danger to employees, the public, or the environment requiring immediate attention. Responding to non-incidental spills is called an **"Emergency Response"** and requires persons who have had the 40 hr. initial hazardous waste operations (HAZWOPER) training (and subsequent 8-hr. annual training) to conduct the response.

7.3 **If the spill does not involving immediate danger to life and property** (Incidental Spill Response.):

7.3.1 Verbally notify everyone within hearing distance that a spill has occurred.

7.3.2 Refer to the Material Safety Data Sheet for hazard information.

7.3.3 Don the appropriate personal protective equipment.

7.3.4 Confine the spill. If liquid, dike the spill by encircling it with the appropriate absorbent spill material or use spill pillows or pigs. The place absorbent over the spilled material.[3] If dry, carefully scoop, sweep or otherwise pick up the spilled material in a manner that prevents it from becoming airborne.

7.3.5 If the spill is on skin or in the eyes, flush thoroughly with running water for a minimum of 15 minutes, then seek medical assistance/evaluation. If the spill is on clothing, you must discard all outer clothing and shower off for a minimum of 15 minutes. Enlist the help of other persons to conduct the spill clean up.

[3] If a universal spill absorbent is used, the resulting waste will be the same hazard class as the material spilled. If neutralizing absorbent is used, the resultant waste may be non-RCRA because the acid or caustic has been neutralized. However, use of a flammable spill absorbent (generally activated charcoal) results in a flammable waste. The liquid has been absorbed and the vapors captured, but the solid will still be flammable.

7.4 **For spills classified as requiring an emergency response** (i.e., non-incidental spills), **employees will evacuate the danger area. Only HAZWOPER trained employees** shall assist in performing spill clean up activities to address the emergency. Other employees may provide assistance to trained responders as long as they are working outside of the danger area (i.e., in the cold zone).

7.4.1 If it is safe to do so before evacuating, employees should secure the spill area by performing emergency measures such as diking the spill, turning on hoods, extinguishing ignition sources, and closing doors, as they evacuate the spill area.

7.5 **Spills to the outside environment** require immediate notification to EH&S via the emergency ONLY phone, 775-742-6330. Attempt to contain the spill with spill pigs or other methods of diking, if safe to do so, to prevent the spread in the environment or down storm drains.

7.6 **Contaminated or Injured Personnel**

7.6.1 In the case of release of radioactive or biologically active material, do not allow possibly contaminated individuals to leave the spill area if there is a threat of spreading the contamination. Contaminated individuals should wrapped in blankets or transported in such a way to prevent spread of contamination to coworkers, responding emergency personnel, and the environment.

7.6.2 If injured personnel are sent via ambulance to the hospital, ensure copies of the Material Safety Data Sheets for the materials involved in the spill incident accompany them. Likewise, if an employee seeks medical assistance at a later date, have him/her take copies of the applicable MSDS(s) with them to the clinic.

8.0 REFERENCES

8.1 Nevada Revised Statute, NRS 459.430.

8.2 Title 40 Code of Federal Regulations, Sections 260 - 268.

8.3 Title 29 Code of Federal Regulations 1910.1200.