

1.0 INTRODUCTION

- 1.1 The Desert Research Institute (DRI) Hazard Communication Program was established to assure that consistent and uniform information is available for chemical materials and other hazardous substances present at our site, that employees (including graduate students) and temporary workers are aware of hazardous materials with which they work, and that training is provided in procedures and practices necessary to control exposures to these materials. The program applies to materials known to be present in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency. The program is not restricted to chemicals in a limited sense but applies to a broad range of hazardous materials including, for example, pure chemicals, mixtures and biologically active compounds. The Program will comply with the State of Nevada Hazard Communication Standard (29 CFR 1910.1200) as enforced by the Division of Industrial Relations Occupational Safety and Health Enforcement.

2.0 PURPOSE AND SCOPE

- 2.1 These practices and procedures describe the DRI Hazard Communication (employee right-to-know) Program. The DRI written Hazard Communication Plan consists of the following sections:
- 2.1.1 Section 1.0, Introduction
 - 2.1.2 Section 2.0, Purpose and Scope
 - 2.1.3 Section 3.0, Responsibility
 - 2.1.4 Section 4.0, Hazard Determination of chemicals or chemical products that are manufactured or imported. 29 CFR 1910.1200(d)
 - 2.1.5 Section 5.0, Chemical Inventory - Preparation and Maintenance. 29 CFR 1910.1200(e)(1)(i)
 - 2.1.6 Section 6.0, Handling Non-Routine Tasks. 29 CFR 1910.1200(1)(ii)
 - 2.1.7 Section 7.0, Informing Contractors of Hazards or Potential Hazards. 29 CFR 1910.1200(e)(2)
 - 2.1.8 Section 8.0, Labeling of Hazardous Chemicals in Inventory or leaving the workplace. 29 CFR 1910.1200(f)
 - 2.1.9 Section 9.0, Material Safety Data Sheets (MSDSs) for hazardous chemicals in the workplace shall be readily accessible to employees. A Material Safety Data Sheet for each hazardous chemical or hazardous chemical product manufactured or distributed by DRI shall be developed and distributed to customers ordering these materials. 29 CFR 1910.1200(g)
 - 2.1.10 Section 10.0, Employee Information and Training on the hazards of the chemicals in the workplace. 29 CFR 1910.1200(h). For those individuals whose employment potentially includes working with or around OSHA regulated carcinogens (29 CFR 1910.1001-1018, 1027-1029, 1044-1048, 1050-1052) the additional information as required by the OSHA citations will be included in as part of their annual hazard communication training.
 - 2.1.11 Section 11.0, Definitions. 29 CFR 1910.1200(c)
 - 2.1.12 Section 12.0, References

A copy of this program shall be available upon request to employees, their designated representatives, the Assistant Secretary of the Department of Labor and the Director of NIOSH. 29 CFR 1910.1200(e)(4)

- 2.2 This program applies to all employees/temporary workers who work with or around hazardous substances in the workplace and who may be exposed under normal conditions of use or in a reasonably foreseeable emergency resulting from workplace operations. In addition employees who may enter areas where hazardous substances are used or who may be exposed due to a workplace emergency are covered under this program.
- 2.3 This section applies to laboratories only as follows:
 - 2.3.1 Labels on incoming containers of hazardous chemicals are not removed or defaced;
 - 2.3.2 Any material safety data sheets that are received with incoming shipments of hazardous chemicals must be maintained and be readily accessible during each workshift to laboratory employees when they are in their work areas;
 - 2.3.3 Laboratory employees will be provided information and training in accordance with Section 10 of this section, except for the location and availability of the written hazard communication program; and,
 - 2.3.4 Laboratory employers that ship hazardous chemicals are considered to be either a chemical manufacturer or a distributor under this rule, and thus must ensure that any containers of hazardous chemicals leaving the laboratory are labeled in accordance with Section 8.0, and that a material safety data sheet is provided to distributors and other employers in accordance with Section 9.0.

Employees working in research, development, and other non-manufacturing labs using small quantities of many chemicals fall under the OSHA Laboratory (Chemical Hygiene) Standard and should refer to the DRI Chemical Hygiene Plan for additional OSHA required laboratory safety requirements.

- 2.4 In work operations where employees only handle substances in sealed containers which are not opened under normal conditions of use (such as are found in warehousing, retail sales or transportation); the hazard communication program applies as follows:
 - 2.4.1 Labels on incoming containers of hazardous substances are not to be removed or defaced;
 - 2.4.2 Copies of any Material Safety Data Sheets (MSDSs) that are received with incoming shipments of the sealed containers of hazardous substances will be maintained or obtained, and MSDSs will be readily accessible during each work shift to employees when they are in their work area(s); and,
 - 2.4.3 Employees will be provided with information and training in accordance with Section 10 to the extent necessary to protect them in the event of a spill or leak of a hazardous substance from a sealed container.
- 2.5 Other exceptions to the hazard communication regulation
 - 2.5.1 Labeling specified in the hazard communication act is not required for the following chemicals:
 - 2.5.1.1 Any pesticide as such term is defined in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;

- 2.5.1.2 Any chemical substance or mixture as such terms are defined in the Toxic Substances Control Act (15 U.S.C. 2601 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;
 - 2.5.1.3 Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device or product, including materials intended for use as ingredients in such products (e.g. flavors and fragrances), as such terms are defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.) or the Virus-Serum-Toxin Act of 1913 (21 U.S.C. 151 et seq.), and regulations issued under those Acts, when they are subject to the labeling requirements under those Acts by either the Food and Drug Administration or the Department of Agriculture;
 - 2.5.1.4 Any distilled spirits (beverage alcohols), wine, or malt beverage intended for nonindustrial use, as such terms are defined in the Federal Alcohol Administration Act (27 U.S.C. 201 et seq.) and regulations issued under that Act, when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Bureau of Alcohol, Tobacco, and Firearms;
 - 2.5.1.5 Any consumer product or hazardous substance as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, when subject to a consumer product safety standard or labeling requirement of those Acts, or regulations issued under those Acts by the Consumer Product Safety Commission; and,
 - 2.5.1.6 Agricultural or vegetable seed treated with pesticides and labeled in accordance with the Federal Seed Act (7 U.S.C. 1551 et seq.) and the labeling regulations issued under that Act by the Department of Agriculture.
- 2.5.2 A hazardous chemical is defined as any chemical which is a physical hazard (29 CFR 1910.1200(c)). The Hazard Communication Program applies to all hazardous substances with the exception of the following (29 CFR 1910.1200(b)(5)):
- 2.5.2.1 Any hazardous waste as such term is defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42U.S.C.6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency;
 - 2.5.2.2 Any hazardous substance as such term is defined by the Comprehensive Environmental Response, Compensation and Liability ACT (CERCLA) (42 U.S.C. 9601 et seq.) when the hazardous substance is the focus of remedial or removal action being conducted under CERCLA in accordance with Environmental Protection Agency regulations;
 - 2.5.2.3 Tobacco or tobacco products;
 - 2.5.2.4 Wood or wood products (non-excluded hazardous substances which are used in conjunction with wood or wood products, or are known to be present as impurities in those materials, are covered by this section);
 - 2.5.2.5 Articles (hazardous substances used in the manufacture of use of an article are covered by this section unless otherwise excluded);
 - 2.5.2.6 Foods, drugs, or cosmetics intended for personal consumption by employees while in the workplace;

- 2.5.2.7 Any drug, as that term is defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.), when it is in solid, final form for direct administration to the patient (e.g., tablets or pills); drugs which are packaged by the chemical manufacturer for sale to consumers in a retail establishment (e.g., over-the-counter drugs); and drugs intended for personal consumption by employees while in the workplace (e.g., first aid supplies);
- 2.5.2.8 Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace;
- 2.5.2.9 Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended;
- 2.5.2.10 Nuisance particulates where the chemical manufacturer or importer can establish that they do not pose any physical or health hazard covered under this section
- 2.5.2.11 Ionizing and nonionizing radiation; and,
- 2.5.2.12 Biological hazards.

3.0 RESPONSIBILITY

- 3.1 The following responsibilities are in addition to those outlined in various sections of the written program:
 - 3.1.1 Division and Program Directors and Administrative Vice Presidents are responsible for:
 - 3.1.1.1 Verifying that a process safety analysis (PSA) or job hazard analysis (JHA) is conducted in work areas under their management any time a new chemical substance or process is introduced, or an existing process is changed.
 - 3.1.1.2 Delegating the following tasks to the appropriate supervision under their direction and verifying that those delegates have preformed the duties assigned:
 - 3.1.1.2.1 Providing each employee/temporary worker whom will work with hazardous materials specific information and training on hazardous chemicals in the work area in compliance with Section 10.0.
 - 3.1.1.2.2 Verifying the labeling of chemical substances in their work areas for compliance with Section 8.0.
 - 3.1.1.2.3 Auditing the work practices of their employees to verify engineering and administrative controls and personal protective equipment designed to prevent employee exposures to hazardous substances are being properly employed.
 - 3.1.1.2.4 Maintaining a current chemical inventory (and an MSDS binder, if appropriate) for hazardous substances used and stored in areas under their supervision.

- 3.1.1.2.5 Assuring the development and evaluation of standard operation procedures (SOPs) for chemical processes under their supervision to document that chemical safety issues have been addressed.
 - 3.1.1.2.6 Conducting required Hazard Communication review training for all department employees and temporary workers and verifying that these individuals fully understand their rights to hazard information and how to use it to protect their health and safety.
 - 3.1.1.2.7 Conducting periodic reviews for work place hazards and developing corrective actions for hazards identified.
- 3.1.2 The Environmental, Health and Safety Department is responsible for:
- 3.1.2.1 Communicating any changes in the regulations to managers and supervisors for distribution to their affected employees/temporary workers.
 - 3.1.2.2 Reviewing (and revising if necessary) the written program at least annually.
 - 3.1.2.3 Obtaining new training programs and/or updating existing programs so employees receive current information in their annual training sessions.
 - 3.1.2.4 Conducting an annual program evaluation which includes:
 - 3.1.2.4.1 Observation of/or the discussion with employees to determine that employees are aware of the hazards of the materials with which they work.
 - 3.1.2.4.2 Periodic discussions with supervisors to verify their knowledge of the program and consistent program implementation.
 - 3.1.2.4.3 A review of training records to verify the ability to document program implementation.
 - 3.1.2.4.4 A spot check of secondary containers to verify labeling is consistent with Section 8.0.
- 3.1.3 Employees/temporary workers are responsible for:
- 3.1.3.1 Understanding the safety requirements for their job assignment and reviewing and understanding written standard operating procedures (SOPs) and including safety requirements prior to commencing a project.
 - 3.1.3.2 Reviewing the Material Safety Data Sheets (MSDS) prior to beginning work with a new chemical substance.
 - 3.1.3.3 Requesting MSDSs for new chemical orders as well as requesting MSDSs for existing chemicals for which there is no MSDS on file (see Section 9.3).
 - 3.1.3.4 Obtaining answers from their supervisor for any questions they may have about chemical substance(s) or process(es) prior to working with the substance or process.

4.0 HAZARD DETERMINATION

- 4.1 Currently, DRI is not in the business of manufacturing hazardous materials. Should business direction change DRI will conduct a hazard determination (refer to Attachment A) for chemicals and chemical products manufactured by DRI and create product specific material safety data sheets based on the hazard characteristics of the material.
- 4.2 For chemicals used which are manufactured by other vendors, DRI will rely on the hazard evaluations done by the manufacturers or suppliers of the chemicals as provided on the Material Safety Data Sheets and product labels received from these manufacturers or suppliers.

5.0 CHEMICAL INVENTORY (also a requirement of the OSHA Lab Standard, thus the DRI Chemical Hygiene Plan)

- 5.1 The initial chemical inventory for hazardous chemicals at DRI was prepared from lists provided by supervisors of specific areas and locations.
- 5.2 Supervisors are required to maintain a current inventory of all chemicals in use or storage in areas under their responsibility. At a minimum the inventory will list the information required by the Nevada State Fire Marshal. This includes chemical name, chemical abstract services (CAS) number, the common or trade name(if any), the hazard classes, physical state, type of container, largest container, maximum amount on site (in gallons, pounds or cubic feet) on any given day and whether the material when stored is at, above or below ambient for temperature and pressure.
- 5.3 Supervisors are required to review their individual inventories at least annually and to submit a copy of the inventory to the EH&S Department. As the regulatory agency requirements may change from year to year, EH&S will communicate the requirements to the departments approximately 2 months prior to the report deadline.

6.0 NON-ROUTINE TASKS

- 6.1 If employees are assigned non-routine tasks which could potentially expose them to hazardous chemicals (confined space entry, cleaning reactor vessels, etc.) they shall first be trained in the hazard(s) or potential hazard(s) involved with the task and in the proper manner in which to conduct the task.
- 6.2 This training shall be provided by the supervisor or other technically qualified individuals and shall be documented. The training, at a minimum shall include:
 - 6.1.1 potential physical hazards
 - 6.1.2 potential chemical (health) hazards
 - 6.1.3 pertinent instruction regarding the operation
 - 6.1.4 protective measures required
 - 6.1.5 emergency procedures

7.0 CONTRACTORS

- 7.1 A representative of the Facilities Department and/or the area supervisor will inform contractors of any hazardous chemicals contractor employees may be exposed to while performing work at DRI and will

also advise them of appropriate work procedures and personal protective equipment required for them to use while working in the area. (Note: Any training required for contractor personnel to safely perform work at DRI is the responsibility of the contractor. DRI does not provide training or personal protective equipment (PPE) to contractors.)

- 7.2 The Facilities Department will request a list of hazardous chemicals and the corresponding MSDSs from contractors who will be using hazardous chemicals at DRI before the contractors begin work. This information, along with any precautions or measures DRI employees should take to lessen the possibility of exposure to the contractor's chemical will be communicated to the supervisor(s) of the area(s) where the work is to be conducted. They in turn will inform their affected employees and temporary workers.

8.0 LABELING

- 8.1 This section does not require hazard communication labeling of chemicals falling into the categories exempted in Section 2.5.1
- 8.2 All other hazardous chemicals shall follow the hazard communication labeling system is as follows:
- 8.2.1 Manufacturers, importers and distributors of hazardous substances are required to label, tag or mark their containers with the identity of the hazardous substances, appropriate hazard warnings (including any substances specific health standard information required by regulation) and name and address of the manufacturer, importer or other responsible party in a manner which does not conflict with D.O.T. regulations.
- 8.2.2 Materials transferred by DRI from original containers shall be labeled with the identity of the hazardous substances as appears on the MSDS and the appropriate hazard warnings, including but not limited to physical hazards, health hazards, target organ effects (See Attachment A for more detail), and use or storage precautions.
- 8.2.3 Existing labels shall not be removed or defaced unless the container is immediately marked with the required information.
- 8.2.4 The labels and other forms of warnings (placards, process sheets, batch tickets, etc.) shall be legible, in English and prominently displayed on container or readily available in the work area throughout each work shift.
- 8.2.5 New labels need not be affixed if existing labels already convey the required information.
- 8.3 Verifying each container of hazardous chemicals at all DRI locations is adequately labeled to identify the chemical and its hazards is the responsibility of each area supervisor.
- 8.4 In addition to containers, piping systems carrying hazardous materials must be labeled with the identify of the chemical, its hazard, and the direction of flow. Supervisors are responsible to verify this labeling is in place and is appropriate.
- 8.5 The departmental inspection checklist includes a check of chemical labeling. These inspections are to be conducted at least monthly by the supervisor or his/her designated area representative. Copies of the inspection report and documentation of corrective actions taken are to be maintained in the work area for a period of three years (NAC 618.542.2(a)).

9.0 MATERIAL SAFETY DATA SHEETS (MSDSs)

9.1 DRI MSDSs

- 9.1.1 The EH&S Department is responsible for the development of MSDSs for hazardous materials (such as research compounds) manufactured for distribution by DRI. The hazard determination and format will follow information located in Attachments A and B.
- 9.1.2 A vendor supplied material safety data sheet must accompany any hazardous chemicals distributed by DRI (refer to Section 2.3.4) for additional detail).
- 9.1.3 To obtain an MSDS for a new DRI research compound or to revise an existing DRI MSDS, an MSDS Request Data form (Attachment C) must be completed and routed to the EH&S Department. Once the MSDS is completed the original is filed in the EH&S Office and a copy sent to the to the requesting departments.
- 9.1.4 The shipper is responsible for including a copy of the current product MSDS with the shipment.

9.2 Vendor MSDSs

- 9.2.1 Each individual who orders hazardous substances (for example: chemicals, chemical products, raw materials, cleaning supplies, etc.) is responsible for requesting an MSDS if an MSDS for the hazardous substance is not already on file in the department's MSDS binder.
 - 9.2.2 The EH&S Department will review all incoming MSDSs they receive for obvious omissions and inadequacies, and will contact the manufacturer or supplier to address any problems found. Employees should contact EH&S if they have any questions about the quality or content of MSDSs in their work area(s).
- 9.3 MSDS files (binders) are to be maintained by each laboratory or department that uses hazardous substances. If an MSDS is missing , complete the MSDS Request Letter (Attachment D) and send or fax it to the manufacturer or distributor. If the manufacturer or supplier does not respond within 15 working days, contact the EH&S Department for assistance.
- 9.4 Employees and temporary workers shall have access on all shifts to Material Safety Data Sheets for hazardous chemicals used in their respective work areas.

10.0 EMPLOYEE INFORMATION AND TRAINING

- 10.1 New employees and temporary workers receive generic information regarding hazardous materials, materials safety data sheets, and laboratory safety in the "Quick Guide to Safety" (provided to them on their first day at DRI). Supervisors are responsible for providing each employee/temporary worker who will work with hazardous materials specific information and training on hazardous chemicals in his/her work area. This shall be provided at the time of initial job assignment and whenever a new hazard is introduced into the work area. The initial training includes:
 - 10.1.1 identification of operations in the work area where chemicals are present
 - 10.1.2 where the written program and chemical inventory are kept, how employees access these and where the employee can find the MSDSs for the chemicals used in his/her work area
 - 10.1.3 information on how chemicals can be detected in the work area (for example: odor or sensation and whether these are indicative of a hazard being present.)

- 10.1.4 information on air sampling, including any continuous monitoring being done
 - 10.1.5 information on the physical and health hazards of the chemicals used in the particular work area
 - 10.1.6 information on appropriate control methods, such as use of local exhaust ventilation, necessary work practices, and personal protective equipment
 - 10.1.7 an explanation of the hazard communication labeling system and how employees can obtain and use the appropriate hazard information
 - 10.1.8 information on hazards associated with non-routine tasks and emergency situations.
- 10.2 Yearly retraining will be provided each employee working with hazardous materials.
- 10.3 Copies of the DRI written Hazard Communication program and training documentation shall be made available to temporary worker placement agencies at their written request. The agency representative may also review the MSDS files maintained in the individual's work area.

11.0 DEFINITIONS

- 11.1 "**Article**" means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.
- 11.2 "**Assistant Secretary**" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.
- 11.3 "**Chemical**" means any element, chemical compound or mixture of elements and/or compounds.
- 11.4 "**Chemical manufacturer**" means an employer with a workplace where chemical(s) are produced for use or distribution.
- 11.5 "**Chemical name**" means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name which will clearly identify the chemical for the purpose of conducting a hazard evaluation.
- 11.6 "**Combustible liquid**" means any liquid having a flashpoint at or above 100 deg. F (37.8 deg. C), but below 200 deg. F (93.3 deg. C), except any mixture having components with flashpoints of 200 deg. F (93.3 deg. C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.
- 11.7 "**Commercial account**" means an arrangement whereby a retail distributor sells hazardous chemicals to an employer, generally in large quantities over time and/or at costs that are below the regular retail price.
- 11.8 "**Common name**" means any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.
- 11.9 "**Compressed gas**" means:

- 11.9.1 A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70 deg. F (21.1 deg. C); or
- 11.9.2 A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 deg. F (54.4 deg. C) regardless of the pressure at 70 deg. F (21.1 deg. C); or
- 11.9.3 A liquid having a vapor pressure exceeding 40 psi at 100 deg. F (37.8 deg. C) as determined by ASTM D-323-72.
- 11.10 **"Container"** means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.
- 11.11 **"Designated representative"** means any individual or organization to whom an employee gives written authorization to exercise such employee's rights under this section. A recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.
- 11.12 **"Director"** means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.
- 11.13 **"Distributor"** means a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.
- 11.14 **"Employee"** means a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.
- 11.15 **"Employer"** means a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or subcontractor.
- 11.16 **"Explosive"** means a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.
- 11.17 **"Exposure or exposed"** means that an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g. accidental or possible) exposure. "Subjected" in terms of health hazards includes any route of entry (e.g. inhalation, ingestion, skin contact or absorption.)
- 11.18 **"Flammable"** means a chemical that falls into one of the following categories:
- 11.18.1 **"Aerosol, flammable"** means an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;
- 11.18.2 **"Gas, flammable"** means:
- 11.18.2.1 A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of thirteen (13) percent by volume or less; or
- 11.18.2.2 A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than twelve (12) percent by volume, regardless of the lower limit;

- 11.18.3 "**Liquid, flammable**" means any liquid having a flashpoint below 100 deg. F(37.8 deg. C), except any mixture having components with flashpoints of 100 deg. F (37.8 deg. C) or higher, the total of which make up 99 percent or more of the total volume of the mixture.
- 11.18.4 "**Solid, flammable**" means a solid, other than a blasting agent or explosive as defined in 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.
- 11.19 "**Flashpoint**" means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested as follows:
- 11.19.1 Tagliabue Closed Tester (See American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24-1979 (ASTM D 56-79)) for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100 deg. F (37.8 deg. C), that do not contain suspended solids and do not have a tendency to form a surface film under test; or
- 11.19.2 Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7-1979 (ASTM D 93-79)) for liquids with a viscosity equal to or greater than 45 SUS at 100 deg. F (37.8 deg. C), or that contain suspended solids, or that have a tendency to form a surface film under test; or
- 11.19.3 Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester (ASTM D 3278-78)).
- Organic peroxides, which undergo autoaccelerating thermal decomposition, are excluded from any of the flashpoint determination methods specified above.
- 11.20 "**Foreseeable emergency**" means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.
- 11.21 "**Hazardous chemical**" means any chemical which is a physical hazard or a health hazard.
- 11.22 "**Hazard warning**" means any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the specific physical and health hazard(s), including target organ effects, of the chemical(s) in the container(s). (See the definitions for "physical hazard" and "health hazard" to determine the hazards which must be covered.)
- 11.23 "**Health hazard**" means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes. Appendix A provides further definitions and explanations of the scope of health hazards covered by this section, and Appendix B describes the criteria to be used to determine whether or not a chemical is to be considered hazardous for purposes of this standard.
- 11.24 "**Identity**" means any chemical or common name which is indicated on the material safety data sheet (MSDS) for the chemical. The identity used shall permit cross-references to be made among the required list of hazardous chemicals, the label and the MSDS.

- 11.25 "**Immediate use**" means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.
- 11.26 "**Importer**" means the first business with employees within the Customs Territory of the United States which receives hazardous chemicals produced in other countries for the purpose of supplying them to distributors or employers within the United States.
- 11.27 "**Label**" means any written, printed, or graphic material displayed on or affixed to containers of hazardous chemicals.
- 11.28 "**Material safety data sheet (MSDS)**" means written or printed material concerning a hazardous chemical which is prepared in accordance with paragraph (g) of this section.
- 11.29 "**Mixture**" means any combination of two or more chemicals if the combination is not, in whole or in part, the result of a chemical reaction.
- 11.30 "**Organic peroxide**" means an organic compound that contains the bivalent -O-O-structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.
- 11.31 "**Oxidizer**" means a chemical other than a blasting agent or explosive as defined in 1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.
- 11.32 "**Physical hazard**" means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.
- 11.33 "**Produce**" means to manufacture, process, formulate, blend, extract, generate, emit, or repackage.
- 11.34 "**Pyrophoric**" means a chemical that will ignite spontaneously in air at a temperature of 130 deg. F (54.4 deg. C) or below.
- 11.35 "**Responsible party**" means someone who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.
- 11.36 "**Specific chemical identity**" means the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.
- 11.37 "**Trade secret**" means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix D sets out the criteria to be used in evaluating trade secrets.
- 11.38 "**Unstable (reactive)**" means a chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperature.
- 11.39 "**Use**" means to package, handle, react, emit, extract, generate as a byproduct, or transfer.
- 11.40 "**Water-reactive**" means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.
- 11.41 "**Work area**" means a room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.

- 11.42 **"Workplace"** means an establishment, job site, or project, at one geographical location containing one or more work areas.

12.0 REFERENCES

- 12.1 Title 29 Code of Federal Regulations 1910.1200.
- 12.2 Nevada Administrative Code 618.542(2)(a)
- 12.3 Other sources of information - The following references (latest editions) are used to evaluate chemical hazards (any or all may be consulted on a case-by-case basis).
- 12.3.1 Material Safety Data Sheets provided by suppliers of hazardous materials.
- 12.3.2 *ACGIH's - Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment and Biological Exposure Indices*
- 12.3.3 *Sax's - Dangerous Properties of Industrial Materials*
- 12.3.4 *Toxicology*
- 12.3.5 *IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man and Supplements*
- 12.3.6 *The Merck Index: An Encyclopedia of Chemicals and Drugs*
- 12.3.7 *Casarett and Doull's Toxicology*
- 12.3.8 National Toxicology Program (NTP) *Annual Report on Carcinogens*
- 12.3.9 Bibliographic Data Bases - (may be required when more information is needed) such as
- 12.3.9.1 MEDLINE
- 12.3.9.2 TOXLINE
- 12.3.9.3 RTECS - *Registry of Toxic Effects of Chemical Substances*
- 12.3.10 Toxic & Hazardous Substances, OSHA - Title 29 Code of Federal Regulations 1910.1000.
- 12.4 American National Standards Institute, ANSI Z400.1-1993, "Hazardous Industrial Chemicals-Material Safety Data Sheet Preparation".

ATTACHMENT A

HAZARD DETERMINATION

The following chemical hazard evaluation procedure was established in order to provide information used in the development of Material Safety Data Sheets and chemical labels. This procedure complies the Nevada Hazard Communication Standard requirements for hazard determination (29 CFR 1910.1200 Appendix A).

I. EH&S is responsible for evaluating the information provided by Product Development and identifying the hazards of chemicals produced at or distributed by DRI.

II. HEALTH HAZARD EVALUATION

Any chemicals which meet any of the following definitions, as determined by the criteria set forth in Section III, are health hazards.

A. Carcinogen: A chemical is considered a carcinogen if:

1. It has been evaluated by the International Agency for Research on Cancer (IARC), and found to be a carcinogen or potential carcinogen; or
2. It is listed as a carcinogen or potential carcinogen in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or
3. It is regulated by OSHA as a carcinogen.

B. Corrosive: A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact. This term shall not refer to action on inanimate surfaces. (See 49 CFR 173 Appendix A).

C. Highly toxic: A chemical falling within any of the following categories:

1. A chemical that has a median lethal dose (LD₅₀) of 50 milligrams (mg) or less per kilogram (kg) of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
2. A chemical that has an LD₅₀ of 200 mg or less per kg of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kg each.
3. A chemical that has a median lethal concentration (LC₅₀) in air of 200 parts per million (ppm) by volume or less of gas or vapor, or 2 mg per liter or less of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

D. Irritant: A chemical, which is not corrosive, but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact. (See 16 CFR 1500.41 and 1500.42).

E. Sensitizer: A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.

- F. Toxic: A chemical falling within any of the following categories:
1. A chemical that has an LD₅₀ of more than 200 mg/kg but not more than 1000 mg/kg of body weight when administered by continuous contact as in section C-2.
 2. A chemical that has an LD₅₀ of more than 50 mg/kg but not more than 500 mg/kg of body weight when administered orally as in section C-1.
 3. A chemical that has an LC₅₀ in air of more than 200 ppm but not more than 2000ppm by volume of gas or vapor, or more than two mg per liter but not more than 20 mg per liter of mist, fume, or dust when administered by continuous inhalation as in section C-3.
- G. Target organ effects: The following is a target organ categorization of effects which may occur due to chemical exposure. This categorization of effects is not intended to be all-inclusive.
1. Hepatotoxins: chemicals which produce liver damage
 2. Nephrotoxins: chemicals which produce kidney damage
 3. Neurotoxins: chemicals which produce their primary toxic effects on the nervous system
 4. Agents which act on the blood or hematopoietic system: chemicals that decrease hemoglobin function or deprive the body tissues of oxygen
 5. Agents which damage the lung: chemicals which irritate or damage the pulmonary tissue
 6. Reproductive toxins: chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis)
 7. Cutaneous hazards: chemicals which affect the dermal layer (skin) of the body
 8. Eye hazards: chemicals which affect the eye or visual capacity
- H. Biological Hazard*: A human, animal, or plant product which is infectious, toxic, parasitic or allergenic. Acute or chronic infectious disease may be caused by bacteria, viruses, Rickettsia fungi; certain protozoa, helminth, and arthropods are parasitic. (* Biological hazards, while not required by U.S. regulation, are a requirement of some foreign hazard communication standards.

III. HAZARD DETERMINATION

The following criteria are used to determine if a chemical was hazardous. (29 CFR 1910.1200 Appendix B)

- A. Carcinogenicity: As described in section II-A, a determination by the NTP, the IARC or OSHA that a chemical is a carcinogen or a potential carcinogen is considered conclusive evidence.
- B. Human data: Where available, epidemiological studies and case reports of adverse health effects were considered in the evaluation.
- C. Animal data: Human evidence of health effects in exposed populations is generally not available for the majority of chemicals produced or used in the workplace. Therefore, the available results of toxicological testing in animal populations were used to predict the health effects that may be experienced by exposed workers. In particular, the definitions of certain acute hazards refer to specific animal testing results (see Section II-C and F).

- D. Adequacy and reporting of data: The results of any studies which are designed and conducted according to established scientific principles, and which report statistically significant conclusions regarding the health effects of a chemical, is a sufficient basis for a hazard determination and will be reported on a MSDS. This includes valid studies which tend to refute the findings of hazard.
- E. Physical hazards: Materials which display any of the following characteristics or conditions should be considered hazardous:
1. Combustible liquid - Any liquid having a flashpoint at or above 100°F (37.8°C), but below 200°F (93.3°C), except any mixture having components with flashpoints of 200°F or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.
 2. Compressed gas - Any gas or mixture of gases having, in a container, either an absolute pressure exceeding 40 pounds per square inch at 70°F (21.2°C), or an absolute pressure exceeding 104 pounds per square inch at 130°F (54.4°C), or both.
 3. Explosive - A chemical that causes a sudden, almost instantaneous release of pressure, gas and heat when subjected to sudden shock, pressure of high temperature.
 4. Flammable liquid - Any liquid having a flash point below 100°F (37.8°C), except any mixture having components with flashpoints of 100°F or higher, the total of which make up 99 percent or more of the total volume of the mixture.
 5. Organic peroxide - An organic compound that contains the bivalent -O-O- or -O-O- structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.
 6. Oxidizer - Substance that readily yields oxygen to stimulate combustion.
 7. Pyrophoric - A chemical that will ignite spontaneously in air at a temperature of 130°F (54.5°C) or below.
 8. Unstable (reactive) - A chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense or will become self-reactive under conditions of shocks, pressure or temperature.
 9. Water-reactive - A chemical that reacts with water to release a gas that is either flammable or presents a health hazard.
- F. Mixture: Any combination of two or more chemicals if the combination is not, in whole or in part, the result of a chemical reaction. Mixtures were evaluated as follows:
1. If a mixture was tested as a whole to determine its hazards, the results of such testing were used to determine whether the mixture is hazardous.
 2. If a mixture was not tested as a whole to determine whether the mixture is a health hazard, the mixture was assumed to present the same health hazards as do the components which comprise one percent (by weight or volume) or greater of the mixture, except that the mixture was assumed to present a carcinogenic hazard if it contains a component in concentrations of 0.1 percent or greater which is considered to be a carcinogen (see Section II-A).
 3. If the mixture was not tested as a whole to determine whether the mixture is a physical hazard, whatever scientifically valid data was available was used to evaluate the physical hazard potential of the mixture.

4. If there was evidence that indicates that a component present in the mixture in concentrations less than one percent (or in the case of carcinogens 0.1 percent) could be released in concentrations which would exceed an established permissible exposure limit or ACGIH Threshold Limit Value, or could present a health hazard to employees in those concentrations, the mixture was assumed to present the same hazard.

IV. REVIEW PLAN

Information used on Material Safety Data Sheets, chemical labels or other documents used to communicate chemical hazard information will be updated by EH&S as new and significant health information is found.

ATTACHMENT B

MATERIAL SAFETY DATA SHEETS (MSDS)

- I. Material Safety Data Sheets are written in English and contain the following information as a minimum as required by 29 CFR 1910.1200 (g)(2):
- (A) The identify used on the label, and, except as provided for in paragraph (I) of this section of trade secrets:
 - (1) If the hazardous chemical is a single substance, its chemical and common name(s);
 - (2) If the hazardous chemical is a mixture which has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients which contribute to these known hazards, and the common name(s) of the mixture itself; or,
 - (3) If the hazardous chemical is a mixture which has not been tested as a whole:
 - (a) The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise 1% or greater of the composition, except that chemicals identified as carcinogens under paragraph (d) (4) of this section shall be listed if the concentrations are 0.1% or greater and,
 - (b) The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise less than 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health hazard to employees and,
 - (c) The chemical and common name(s) of all ingredients which have been determined to present a physical hazard when present in the mixture;
 - (B) Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);
 - (C) The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;
 - (D) The acute and chronic health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions which are generally recognized as being aggravated by exposure to the chemical;
 - (E) The primary route(s) of entry;
 - (F) The OSHA permissible exposure limit, ACGIH Threshold Limit Value, and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the material safety data sheet, where available;
 - (G) Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Annual Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IAR) Monographs (latest editions), or by OSHA;

- (H) Any generally applicable precautions for safe handling and use which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;
 - (I) Any generally applicable control measures which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, such as appropriate engineering controls, work practices, or personal protective equipment;
 - (J) Emergency and first aid procedures;
 - (K) The date of preparation of the material safety data sheet or the last change to it; and ,
 - (L) The name, address and telephone number of the chemical manufacturer, importer, employer or other responsible party preparing or distributing the material safety data sheet, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.
- II. Data sheets are formatted following ANSI Z400.1, "Hazardous Industrial Chemicals-Materials Safety Data Sheet Preparation".

ATTACHMENT C MSDS REQUEST DATA FORM

Requester's Name: _____ **Ext.** _____ **Date:** _____

SECTION 1. COMPANY AND MATERIAL IDENTIFICATION

Supplier of Data: Desert Research Institute
2215 Raggio Parkway or 755 E. Flamingo Road
Reno, NV 89512-1095 or Las Vegas, NV 89119 USA

In case of emergency, call: Environmental, Health & Safety Department
775-742-6330

Generic name:

Trade name:

Other Trade names:

Note: This MSDS is written to provide health and safety information for personnel that will be handling the research compound (i.e. transportation, distribution, receiving laboratory). For health and safety information during manufacturing, refer to the appropriate MSDS of each component.

SECTION 2. COMPOSITION AND INGREDIENT INFORMATION

Component	CAS#	Formula	Percent
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SECTION 3. HEALTH HAZARDS

WARNING STATEMENT

CAUTION:

Precautionary statement

Potential routes of exposure

Systemic

Acute:

Chronic:

Reproductive and Developmental Toxicity

Carcinogenicity and Mutagenicity

Permissible Exposure Limit

OSHA exposure limits set at PEL

SECTION 4. FIRST AID MEASURES

Eye contact

Skin contact

Inhalation

Ingestion

Accidental Injection

SECTION 5. FIRE PROTECTION

Extinguishing media

Special fire fighting procedures

SECTION 6. ACCIDENTAL RELEASE MEASURES

SECTION 7. HANDLING AND STORAGE

[EXAMPLE: Avoid contact with skin, eyes and mucosa. Wash thoroughly after handling. Refrigerate at between 2°C and 8°C (36°F and 46°F). Do not freeze.]

SECTION 8. EXPOSURE CONTROL - PERSONAL PROTECTION

[EXAMPLE: Wear appropriate personal protective equipment to prevent eye, face and skin exposure. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid inhalation of dust, mists and vapors associated with the use of this material through the use of engineering controls. If adequate local exhaust is not available, respiratory protection may be required. Use the appropriate NIOSH-approved respirator when necessary to control inhalation hazard.]

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point:
Solubility in water:
Spec. Gravity:
% Volatile:
Evaporation:

Melting Point:
Vapor Pressure:
pH:
Vapor Density:
Odor:

Appearance, color:

SECTION 10. STABILITY AND REACTIVITY

Stability:

Hazardous combustion or decomposition products:

Hazardous Polymerization:

Will (will not) occur.

SECTION 11. TOXICOLOGICAL INFORMATION

Acute effects:

Chronic effects:

RTECS data supplied is for _____, RTECS # _____. Only selected RTECS data is presented here. See actual entry in RTECS for complete information.

Toxicity data:

TD_{Lo}:

LD₅₀:

etc.

Mutagenicity Data:

Carcinogenicity Data :

Reproductive Effects Data:

Target organs:

SECTION 12. ECOLOGICAL INFORMATION

(Include here any environmental fate data)

SECTION 13. DISPOSAL CONSIDERATIONS

Dispose in a manner consistent with all local, state and federal Environmental, Health and Safety regulations.

SECTION 14. TRANSPORTATION INFORMATION

(Include here transportation and shipping information)

SECTION 15. REGULATORY INFORMATION

The regulatory data listed is for _____:

UN number:

RID/ADR:

EINECS:

TSCA:

RCRA:

SARA (302):

SARA (313):

OSHA: PEL

STATE REGULATORY INFORMATION: _____ is covered under the following specific State regulations:

SECTION 16. OTHER INFORMATION

The above information is based on data available to us and is believed to be correct. Since the information may be applied under conditions beyond our control and with which we may be unfamiliar, we do not assume any responsibility for the results of its use and all persons receiving it shall make their own determination of the effects, properties and protections which pertain to their particular conditions.

No representation, warranty, or guarantee, express or implied (including a warranty of fitness or merchantability for a particular purpose), is made with respect to the material, the accuracy of this information, the results obtained from the use thereof, or the hazards connected with the use of the material. Caution should be used in the handling and use of the material.

Complete form a thoroughly as possible and submit it with Material Safety Data Sheets for all ingredients to the EH&S Dept., M/S 016

ATTACHMENT D

Sample MSDS Request Letter

_____ (date)

_____ (Supplier Name)
_____ (Address)
_____ (City, State, Zip)

RE: MSDS for _____ (exact product name, catalogue number, etc.)

To Whom it may concern:

Please send a copy of your Material Safety Data Sheet (MSDS) for your product _____ listed above. The MSDS is required for compliance with the State of Nevada Hazard Communication Regulation, Title 29 Code of Federal Regulations, Section 1200.

Please send MSDS to:

Environmental, Health and Safety
Desert Research Institute
2215 Raggio Parkway, MS-016
Reno, NV 89512-1095

If this product does not require an MSDS, please notify us in writing at the same address.

If you have any questions regarding this request, please contact _____ (your name and phone number).

Sincerely,

_____ your name
_____ your title

cc. EH&S Department