



## Goddard Procedural Requirements (GPR)

**DIRECTIVE NO.** GPR 1700.2C

**APPROVED BY Signature:** Original signed by  
Arthur F. Obenschain for

**EFFECTIVE DATE:** June 9, 2011

**NAME:** Robert Strain

**EXPIRATION DATE:** June 9, 2016

**TITLE:** Director

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### COMPLIANCE IS MANDATORY

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**Responsible Office:** 350/Occupational Safety and Health (OS&H) Division

**Title:** Chemical Hygiene Plan

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## PREFACE

### P.1 PURPOSE

This directive establishes the Goddard Space Flight Center (GSFC) Chemical Hygiene Program as required by NPR 1800.1, NASA Occupational Health Program.

The Program defines work practices and procedures to ensure that laboratory users and employees at GSFC are protected from health hazards associated with hazardous chemicals with which they work. It also defines organizational responsibilities and procedures required for the procurement, use, handling, storage, and disposal of hazardous chemicals on Center.

### P.2 APPLICABILITY

This directive applies to personnel working in, visiting, or responsible for chemical laboratories in which chemical research and development are performed. In this application only, it applies to all GSFC employees, to all work conducted under the authority of GSFC, and to all equipment and property managed by GSFC. For GSFC contractors, it is applicable when directed through contract clauses in conformance with NASA Procurement Regulations. All other personnel will follow the provisions of this program while at GSFC facilities.

### P.3 AUTHORITIES

NPR 1800.1, NASA Occupational Health Program

### P.4 APPLICABLE DOCUMENTS

- a. 29 CFR 1910.1000, Air Contaminants
- b. 29 CFR 1910.1020, Access to Employee Exposure and Medical Records
- c. 29 CFR 1910.1200, Hazard Communication
- d. ANSI/ISEA Z358.1-2009, American National Standards Institute, Emergency Eye Wash and Shower Equipment
- e. 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories
- f. GPR 1410.1, Directives Management

CHECK THE GSFC DIRECTIVES MANAGEMENT SYSTEM AT  
<http://gdms.gsfc.nasa.gov> TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE.

- g. GPR 1410.2, Configuration Management
- h. GPR1700.8 GSFC Hazard Communication Program
- i. GPR 1840.2, Industrial Hygiene Program
- j. GPR 3410.2, Employee Competence and Quality Management System Training
- k. GPR 8730.7, Laboratory Management
- l. GSFC Form 23-56, Low Hazard Review Checklist (Chemical Process Hazard Analysis)
- m. GSFC Form 23-57, Moderate Hazard Review Checklist (Chemical Process Hazard Analysis)
- n. GSFC Form 23-58, High Hazard Review Checklist (Chemical Process Hazard Analysis)
- o. GSFC Form 23-64, Hazard Analysis Selection Matrix

**P.5 CANCELLATION**

GPR 1700.2B, Chemical Hygiene Plan

**P.6 SAFETY**

Safety of operations associated with these processes is established by performing one or more Process Hazard Analyses. See Section 2.1.2.

**P.7 TRAINING**

Employees working in a chemical laboratory shall be trained on the requirements of this program. Training requirements are explained in Section 2.4. Training records are maintained as described in P.8.

**P.8 RECORDS**

<b>Record Title</b>	<b>Record Custodian</b>	<b>Retention</b>
Chemical exposure monitoring, assessment, and employee notification records	Industrial Hygiene Office	Handle as permanent pending retention approval.
Records of training	Office of Human Capital Management (OHCM)	* <u>NRRS 3/33G1</u> - Destroy 5 years after employee discontinues or completes training.
Physician Report that evaluates the employee's health status and potential exposure to a hazardous chemical	Medical and Environmental Management Division	* <u>NPR 1441.1</u> - Retain until employee is transferred or separated. Upon transfer, ship medical record to medical office of new assignment. Within 90 days after separation, transfer to National Personnel Records Center.
Records of safety equipment inspections and testing	Inspecting office	* <u>NRRS 1/117A</u> - Retire to Federal Records Center when related property is disposed of by NASA. Destroy 5 years after retirement.

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Process Hazard Analysis (GSFC Forms 23-56, 23-57, 23-58) and Hazard Analysis Selection Matrix (GSFC Form 23-64)	Owning organization	Destroy upon discontinuance of the process or the facility.
Records of chemical safety audits	Applicable safety office	Handle as permanent pending retention approval.
OSHA Log of Work Related Injury and Illness or equivalent form.	Safety and Occupational Health Division	29 CFR 1904.33b(1), Cut off 5 years after end of calendar year. Retain 1 year. Then destroy.

\*NRRS – NASA Records Retention Schedules ([NPR 1441.1](#))

## P.9 MEASUREMENT/VERIFICATION

The overall success of the Chemical Hygiene Program shall be determined by Code 350 Safety and Occupational Health Division through assessment of the degree of compliance with this policy and legal and regulatory requirements, and performance in the following areas:

- a. The number of formal audit findings not identified on self-evaluations;
- b. Percent of trained laboratory workers;
- c. Effectiveness of hazard control measures by number of health incidents;
- d. Number of Process Hazard Analyses (PHAs) completed for the laboratory and percentage of required PHAs completed; and
- e. Trends and reduction in numbers of recordable Injuries and Illnesses reported on the OSHA Log of Work Related Injuries and Illness (or equivalent form) among employees who work or worked in GSFC laboratories.

## PROCEDURES

In this document, a requirement is identified by “shall,” a good practice by “should,” permission by “may” or “can,” expectation by “will,” and descriptive material by “is.”

### 1. Responsibilities

**1.1 The Center Director** will ensure the workplace is safe and healthful for all GSFC workers.

**1.2 Directors of** shall ensure that laboratory-specific chemical hygiene procedures are developed, documented, and implemented.

### 1.3 Occupational Safety and Health (OS&H) Division at Greenbelt shall:

- a. Oversee development and implementation of the Chemical Hygiene Program and applicable procedures at Greenbelt;
- b. Appoint a Chemical Hygiene Officer for Greenbelt;

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- c. Provide direction and oversight of GSFC chemical monitoring programs at Greenbelt and Wallops, ensuring that exposure assessments are conducted as needed and that exposure monitoring records are maintained;
- d. Maintain chemical safety audit records;
- e. Ensure that the General Chemical Hygiene Training Information and Guidelines for Chemical Storage are maintained current with OSHA and other regulatory and statutory requirements, and are available on the Safety 1st Web site <http://safety1st.gsfc.nasa.gov/chem.cfm>; and
- f. Ensure the following Industrial Hygiene (IH) functions are performed:
  - (1) Baseline and periodic (e.g., annually for high-hazard areas) IH surveys, in accordance with 29 CFR 1910.1450(d)(2), for all areas at GSFC/Greenbelt (at Wallops, this includes only the baseline assessment);
  - (2) Communication of monitoring results in writing to employees' supervisors; and
  - (3) Annual (or as requested) evaluation of exhaust hoods, and other ventilation engineering controls.

#### **1.4 Safety Office at Wallops shall:**

- a. Oversee development and implementation of the Chemical Hygiene Program and applicable procedures at Wallops;
- b. Appoint a Chemical Hygiene Officer for Wallops; and
- c. Conduct periodic (e.g., annually for high-hazard areas) surveys in accordance with GPR 1840.2 Industrial Hygiene Program for all areas at Wallops.

#### **1.5 Medical and Environmental Management Division (Greenbelt and Wallops) shall:**

- a. Periodically conduct medical surveillance based on potential exposure and/or need for personal protective equipment, such as a laboratory emergency responder;
- b. Conduct medical evaluation and follow-up to civil service employees suspected of exposure to hazardous substances above established action levels;
- c. Conduct medical assessments based on health issues or symptoms among those potentially exposed; and
- d. Perform other health functions described herein.

**1.6 Chemical Hygiene Officer** has primary responsibility for the GSFC Chemical Hygiene Program. The Chemical Hygiene Officer (CHO) is appointed by the Chief, OS&H, for the Greenbelt campus, and by the Head, Wallops Safety Office, for the Wallops Flight Facility. The CHO shall:

- a. Provide guidance in the implementation of the Chemical Hygiene Program;
- b. Administer and enforce the requirements of the Program. Responsibilities include but are not limited to the following:
  - (1) Oversee implementation of the Chemical Hygiene Program and applicable procedures;

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- (2) Provide advice, oversight, and consultation to GSFC line management to ensure compliance with 29 CFR 1910.1450 and other relevant regulations and policies for procurement, use, storage, and disposal of chemicals used in laboratories;
- (3) As requested, review proposed laboratory use of chemicals and the proposed precautions used to protect employees, including specific designated areas and personal protective equipment;
- (4) Review laboratory use of chemicals and the precautions used to protect employees, including specifically designated controls and PPE;
- (5) Provide technical assistance to comply with the Chemical Hygiene Program;
- (6) Review annually and update, if necessary, the Chemical Hygiene requirements documentation (See Section 2.1);
- (7) Advise the Chemical Safety Committee on standards, regulations, and codes; and
- (8) Review High-Hazard Reviews (PHAs) and provide concurrence signature.

**1.7 Supervisors** are responsible for operations within the organization, and for compliance with all relevant regulations, policies, and procedures. Supervisors shall:

- a. Ensure that chemical hygiene procedures as defined herein are implemented to the extent necessary to maximize general laboratory safety;
- b. Ensure employees working in a laboratory are informed/trained on the requirements of this Program;
- c. Ensure that employees using PPE are trained in its use, and for respiratory PPE, have the required medical evaluations;
- d. Maintain training records for Task-Specific Training as defined in GPR 3410.2;
- e. Ensure that sufficient coordination is employed so that regulatory requirements relating to procurement, use, collection, transportation, storage, and disposal of laboratory chemicals are followed;
- f. Ensure, in coordination with OS&H, that exposure assessments are conducted if there is a reason to believe that exposure levels of a chemical substance could routinely exceed the action level (or OEL in the absence of an action level), and ensure that exposure monitoring records are maintained; and
- g. Designate an individual to be responsible for the laboratory requirements listed in section 1.8.

**1.8 Supervisor's Designee** holds primary responsibility for implementation of the Chemical Hygiene Program and for safe operation of their laboratories. Prudent and thorough planning for experiments and contingencies are paramount. Supervisor's Designee shall:

- a. Acquire the knowledge and information needed to control chemical hazards in the laboratory, including knowledge of the current OSHA requirements and Material Safety Data Sheet (MSDS) recommendations for hazardous materials used in the laboratory;
- b. Ensure that workers and visitors to the laboratory know and follow the applicable safety procedures;
- c. Ensure that protective and emergency equipment is available and in working order, and that appropriate training for its use has been provided;

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- d. Identify, with the assistance of IH personnel, the appropriate PPE for each operation, and ensure that each worker has access to PPE that is in good condition, has the necessary training and medical certifications, and uses it correctly;
- e. Develop and maintain all current required documentation (see Section 2), and provide unrestricted access to this documentation for all laboratory users;
- f. Ensure that Hazardous Materials Management System (HMMS) is used to maintain a current inventory of all chemicals used in the laboratory, along with their MSDSs, and ensure that the inventory is updated at least annually;
- g. Complete PHAs using GSFC Forms 23-56, 23-57, or 23-58, as appropriate, and update the analyses when needed (see 2.2);
- h. Ensure that laboratory users are aware of the hazards associated with the chemicals to which they may be exposed, and that they are provided appropriate task-specific training;
- i. Ensure that the potential for employee exposure is considered prior to the use of a hazardous chemical(s);
- j. Ensure that exposure monitoring is performed as necessary (see section 3);
- k. Ensure performance of laboratory safety inspections as described in Section 6, and support OS&H in performing the annual safety audit of the laboratory. Provide for corrective actions when needed;
- l. Ensure that laboratory facility equipment (e.g., exhaust hoods, eye washes, safety equipment, etc.) is properly maintained, and the repairs are scheduled with Facilities Management Division (FMD) through FMD Work Requests, provide funds for the repairs, and provide assistance to FMD personnel in preventing exposure to chemical hazards while accessing the equipment;
- m. Comply with all applicable Federal, state, and local regulations, and facility procedures for chemical disposal (see Section 2.6); and
- n. Ensure that eyewash/showers that meet the requirements of ANSI/ISEA Z358.1-2009 are readily available in laboratories with chemicals whose MSDSs recommend flushing the eyes after eye exposure.

**1.9 Laboratory Users** are responsible for personal safety while conducting assigned tasks with hazardous materials. Laboratory Users shall:

- a. Follow safe, established work practices of the Chemical Hygiene Program and laboratory safety programs;
- b. Report any concerns or observations of unsafe or unhealthy working conditions to the supervisor, or to OS&H at Greenbelt or the Wallops Safety Office as appropriate;
- c. Develop good personal chemical hygiene habits;
- d. Attend initial and refresher safety classes and supervisor's task-specific training;
- e. Read, understand, and maintain familiarity with the Laboratory Safety Documentation Set (see section 2) for each laboratory in which they work;
- f. Use PPE only when properly trained and, if applicable, when properly evaluated medically; and
- g. Have the authority to effect changes in their work areas to mitigate the risks and thereby increase their safety.

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## 2. Elements of a Chemical Hygiene Plan

### 2.1 Documentation Requirements

Supervisor's Designee shall develop specific safety procedures for each laboratory under their control. Procedures may cover multiple laboratories controlled by the organization so long as each laboratory is clearly identified and the documents accurately describe the activities performed in the laboratory.

These procedures and other documentation described below will be included in a Laboratory Safety Documentation Set (LSDS). LSDS shall be displayed in a prominent location in the laboratory when in hard copy format. LSDS maintained in readily assessable electronic format shall have the location posted. The form of the Document Set for maintenance is at the discretion of the Supervisor's Designee. The preferred form for display and for use in the laboratory is a notebook divided into sections for the information described below. The contents and whereabouts of this information should be clearly understood by laboratory users. It includes all information described in sections 2.1. The LSDS is updated or verified by the Supervisor's Designee annually or when a laboratory process changes. The LSDS shall clearly identify the name and contact information of the Supervisor's Designee.

**2.1.1 Chemical Hygiene Procedure.** This is a laboratory-unique document that addresses the chemical hygiene requirements for each chemical laboratory. Every laboratory at GSFC is different, and presents its own unique situations that need to be addressed in safety procedures. A Chemical Hygiene Procedure shall be generated for any laboratory that uses hazardous chemicals for research purposes.

The Chemical Hygiene Procedure in accordance with 29 CFR 1910.1450 shall address the following eight elements:

- a. Standard Operating Procedures (SOPs) for performing processes that involve hazardous chemicals. These are operating procedures for specialized operations that need to be performed in a specific sequence, or with specific conditions or other control factors, in order to maintain a safe and proper operation. A chemical laboratory may have one standard procedure or many, based on the type of operation(s) performed. Generally, each specialized process should have its own SOP;
- b. A brief list of control measures such as engineering controls, PPE, and hygiene practices, in particular, for extremely hazardous chemicals;
- c. Use of fume hoods and other protective equipment, including maintenance and verification of a proper operation;
- d. Provisions for additional employee protection for particularly hazardous substances;
- e. Employee information and training requirements (see section 2.4);
- f. Identification of circumstances where an activity requires prior approval, with procedures for gaining approval;
- g. Provisions for medical consultation and examinations (see section 2.3); and
- h. Designation of responsible personnel and points of contact (with contact information) for the Greenbelt or Wallops Chemical Hygiene Officer, the organization's representative on the Chemical Safety Committee, responsible managers, environmental services, other key points of contact, and emergency contacts.

The above items should be relatively simple, usually in the form of a listing with brief explanatory information where needed. The Chemical Hygiene Procedure shall be reviewed and its effectiveness revalidated at least annually by the Supervisor's Designee. It should be updated as necessary. A template for developing the Chemical Hygiene Procedure is available on the [Safety 1st](http://safety1st.gsfc.nasa.gov/chem.cfm) Web site at <http://safety1st.gsfc.nasa.gov/chem.cfm>.

### 2.1.2 Process Hazard Analyses (PHA)

The Supervisor's Designee shall identify and control hazards in the laboratory. The PHA is designed to aid management in meeting this responsibility.

#### a. Requirements

The PHA is mandatory for laboratories and other areas that use chemicals for research purposes in accordance with 29 CFR 1910.1450. These analyses are used to assess the hazards associated with new or modified processes or operations in a laboratory environment.

The Supervisor's Designee shall perform a PHA for each chemical process, and update it whenever new, modified, or relocated experiments or tests present a change in the potential hazard to employees, equipment, facilities, or the environment. The Supervisor's Designee reviews and revalidates the PHAs every 2 years. The form and format of PHAs are the responsibility of OS&H and are defined on the [Safety 1st](http://safety1st.gsfc.nasa.gov/chem.cfm) Web site at <http://safety1st.gsfc.nasa.gov/chem.cfm>.

#### b. Levels of PHA

There are three levels of reviews for three anticipated levels of hazards: Low, Moderate, and High. The Hazard Analysis Selection Matrix (GSFC Form 23-64) is used to determine which level of analysis is appropriate. Then the PHAs are prepared using GSFC Forms 23-56 (low hazard), 23-57 (moderate hazard), or 23-58 (high hazard), as appropriate.

The following are the required participants for the respective PHA:

<b>Position</b>	<b>LHR*</b>	<b>MHR*</b>	<b>HHR*</b>
Supervisor's Designee and users	X	X	X
Branch Head	X	X	X
Safety Representative			X
Additional Technical Sources			X

\* See a, b, and c below

These guidelines are the minimum suggested methods, and are not meant to be a substitute for good judgment. Combinations of lower-level hazards may indicate a need for a higher level of review. Conversely, if a lower level of hazard review than that indicated by these guidelines is judged acceptable, it may be used with the approval of the Supervisor's Designee and Division Chief.

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(1) **Low Hazard Review (LHR):** Low Hazard Review (LHR) is conducted when the hazard is deemed “low.” Low hazard is defined as having little potential to create injury or property damage, and no potential for environmental release. An LHR requires completion of a brief description of the process, the potential hazards, and what steps will be taken to mitigate those hazards. Include a set of operating procedures, the personal protective equipment required, special training required, and the signature of those involved with the review. The Supervisor’s Designee and users conduct this level of review. The review is performed using GSFC Form 23-56.

(2) **Moderate Hazard Review (MHR):** Moderate Hazard Review (MHR) is conducted when the hazards involved are deemed “moderate.” Moderate hazard is defined as having the potential to cause injury, equipment damage, or environmental release. Supervisor’s Designee and users conduct an MHR. The involvement of a safety representative can be requested and is encouraged. An MHR requires the completion of a comprehensive checklist, accompanied by a complete set of standard operating procedures. Among the information evaluated are process technology, potential hazards and mitigation, environmental issues, and adherence to specific engineering/design standards. The review is performed using GSFC Form 23-57.

(3) **High Hazard Review (HHR):** High Hazard Review (HHR) is conducted for experiments, equipment installations, or processes that are deemed “high hazard.” High Hazard is defined as having the potential to cause serious injury, severe equipment or facility damage, or negative environmental impact.

An HHR Committee shall be established for each laboratory operation that meets the criteria for High Hazard Review. HHR Committee minutes shall be taken during the review and distributed to the members. The HHR Committee should consist of a chairperson, a representative from OS&H, a researcher, a technician, a member of the Chemical Safety Committee (CSC), and any other resources deemed necessary. A comprehensive review by the HHR Committee of all potential hazards involved in processes and equipment is required. A member of the CSC or the OS&H representative can help determine what type of HHR method will be used based on the nature of the hazard(s) presented. The HHR requires that a number of documents be assembled and made available to the review committee. Applicable piping and instrument diagrams, chemical reaction characteristics, relevant incident reports, process chemistry, and operation procedures are required. The review is performed using a completely documented GSFC Form 23-58, approved by the Branch Head and CHO.

The HHR Committee shall approve significant changes. The HHR Committee is commissioned by the Branch Head upon recommendations of the Supervisor’s Designee. In cases where the Branch Head, Supervisor and Supervisor’s Designee are the same person, the Branch Head will commission the HHR Committee.

### c. **Records**

The Lab Manager shall make part of the Laboratory Safety Documentation Set the completed Hazard Analysis Selection Matrix, PHA, and associated attachments. The record copy is kept by the laboratory’s owning organization. The Lab Manager will provide a copy to OS&H or the Wallops Safety Office, as appropriate.

d. **Other Required Documentation.** In addition to the above, the Laboratory Safety Documentation Set includes the following:

- (1) General housekeeping and security requirements;
- (2) Inventory List of chemicals used, available by emailing request to [GSFC-HMMS-Support@mail.nasa.gov](mailto:GSFC-HMMS-Support@mail.nasa.gov) or by calling 6-HMMS (4667);
- (3) MSDSs, available from the HMMS database and properly assigned to the laboratory location. Organizations should check HMMS for the chemicals they use, and if MSDSs are not present for all chemicals in use, they can obtain the MSDS from the manufacturer. They shall then update HMMS with the information by emailing the information to [GSFC-HMMS-Support@mail.nasa.gov](mailto:GSFC-HMMS-Support@mail.nasa.gov) or by calling 6-HMMS (4667), add all MSDSs to the Laboratory Safety Documentation Set, make them available electronically, in hard copy, or both;
- (4) Description of chemical storage locations and storage containment;
- (5) Exposure monitoring equipment and devices;
- (6) Laboratory Specific Emergency Plan (this can be a part of the building emergency plan), which includes procedures for spill control, ventilation failure, reporting, medical care, other emergencies, and drills. Describes location and operation of emergency equipment. Identifies primary and alternative evacuation routes and an outside assembly area. Lists emergency procedures and contacts, including location(s) of emergency equipment such as eye wash stations, wash-down showers, fire extinguishers, etc;
- (7) Chemical waste disposal procedures in accordance with GPR 8500.3 (see section 2.6);
- (8) Schedules of laboratory inspections and periodic checks of control devices. Attach the schedule for inspection/evaluation of hood performance, as coordinated with the OS&H industrial hygiene function, and eye washes and showers. Also include the organization's plan on monitoring/preventive maintenance of hood performance; and
- (9) Procedures to prevent restarting out-of-service equipment.

## 2.2 Exposure Determination

OS&H IH function shall perform baseline and periodic IH surveys in accordance with GPR 1840.2 and 29 CFR 1910.1450. If monitoring results show levels above recognized OELs, the IH function shall inform the employees' supervisor or Supervisor's Designee of the results and conduct follow up IH surveys after applicable engineering controls, administrative controls and/or PPE are implemented. If conditions change, the Supervisor's Designee contacts industrial hygiene personnel to assess the new conditions.

It may be appropriate to conduct an Exposure Evaluation when there is a report of a possible hazardous exposure. The IH function performs this evaluation. Possible hazardous exposures are reported as a close call or mishap in accordance with GPR 8621.1

The IH function shall keep a record of the exposure evaluation in accordance with section P.8 of this directive.

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**2.3 Medical Consultation and Examinations.** The IHO shall investigate promptly all complaints of possible employee overexposure to toxic substances in the workplace. The Chemical Hygiene Program provides the opportunity for civil service employees who work with hazardous chemicals to receive medical attention, including follow-up examinations that the examining doctor feels are necessary. Contractors are responsible for notifying the GSFC Medical Director if their employees feel they have been exposed to a hazardous chemical in the workplace.

There should be a medical consultation whenever there is reason to believe an employee has been overexposed to a hazardous chemical in the workplace. Examples of circumstances that indicate possible overexposure are:

- a. The employee had direct skin or eye contact with a chemical substance;
- b. Odor was noticed, especially if the employee was working with one or more chemicals with an OEL below the odor threshold;
- c. The employee is experiencing adverse health symptoms that may be related to the exposure, e.g., headache, rash, nausea, coughing, tearing, irritation or redness of eyes, irritation of nose or throat, dizziness, loss of motor dexterity, or judgment which resembles drunkenness, etc. Some or all symptoms disappear when the employee is taken away from the chemical area into fresh air. Symptoms previously complained about reappear soon after the employee starts working with chemicals again;
- d. Similar complaints are received from more than one person in the same work area;
- e. Exposure monitoring reveals an exposure level routinely above the action level;
- f. A spill, leak, or other release resulted in the likelihood of hazardous exposure; and
- g. Damage or failure of PPE.

Resulting medical examinations and consultations shall be performed by or under the direction of the GSFC Medical Director, at no cost to the employee, without loss of pay, at a reasonable time and place. GSFC obtains a written report from the physician who evaluates the employee's exposure to a hazardous chemical in the workplace. The report will include:

- a. The results of the medical examination and any associated tests;
- b. Any recommendations for further medical follow-up;
- c. Any known medical condition that may place the employee at increased risk as a result of a hazardous chemical in the workplace; and
- d. A statement that the employee has been informed by the physician of the results of the examination and any medical condition that may require further examination or treatment.

The physician's statement should not include findings unrelated to occupational exposure. Submit the report to the Health Unit as a permanent medical record.

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## 2.4 Information and Training

Information and training are key parts of the Chemical Hygiene Program. Supervisors are responsible for ensuring that personnel receive the necessary training and retraining (contact the CHO for information on training sources). Supervisor's Designee is responsible for ensuring that untrained personnel do not work in the laboratory.

Information should be updated continuously and refresher training in all areas should be conducted regularly. The training and education program is a regular, ongoing activity.

### a. Information Requirements

Laboratory users shall have the information to ensure that they know and understand the hazards of the chemicals in their work area. This information will be provided at the time of an employee's initial assignment to a work area where hazardous chemicals are present and before assignments involving new exposure situations, in accordance with OSHA standards.

Laboratory users should be familiar with the location, availability, and contents of:

1. This directive;
2. The Laboratory Safety Documentation Set (see section 2);
3. OSHA Standard 29 CFR 1910.1450, "Occupational Exposures to Hazardous Chemicals in Laboratories." This is available by going to [www.OSHA.gov](http://www.OSHA.gov), selecting "Laws and Regulations," and then "OSHA Regulations (Standards – 29CFR)";
4. Standard reference material on the hazards, safe handling, storage, and disposal of the hazardous chemicals in the laboratory. This material includes, but is not limited to, MSDSs (GSFC's MSDSs can be obtained from HMMS at <https://hmms/pls/msds>); and
5. Symptoms associated with exposures to hazardous chemicals used in the laboratory.

### b. Training Requirements

Training requirements include:

1. Methods and observations that may be used to detect the presence or release of a hazardous chemical, such as:
  - a) Exposure monitoring results conducted in the laboratory;
  - b) Continuous monitoring devices; and
  - c) Appearance or odor of hazardous chemicals when released.
2. Information on physical and health hazards of chemicals in the work area and methods of protection from those hazards;
3. Proper use of emergency equipment and procedures;
4. Contents of the General Chemical Hygiene Training Information and the General Hazardous Chemical Storage Guidelines posted on the Safety 1st Web site <http://safety1st.gsfc.nasa.gov/chem.cfm>; and

5. Hazard communications.

Each laboratory user whose job requires the use of PPE shall undergo training in the proper use of that equipment. Employees who are expected to wear any type of respirator (dust mask, cartridge respirator, Self-Contained Breathing Apparatus, etc.) shall have specific training in the use, maintenance, and disposal of respirators before using a respirator. Employees should also have a current medical certification.

Employees using any OSHA-regulated substances (see substances identified in 29 CFR Part 1910, Subpart Z) shall undergo specific training in the use of those materials. The organizational line manager of the individual laboratories shall certify to the IHO that the training elements listed above have been completed for each laboratory user.

**2.5 Laboratory Inspection Requirements**

OSHA requires several inspections to be performed at specified intervals. Minimum inspection requirements are described below:

Inspection Type	Interval / Details
Portable eye washes	Maintained periodically by users in accordance with manufacturer's instructions in accordance with Z358.1-2009.
Eye washes and showers	Annually by FMD (requires FMD Work Request). Operated by users weekly in accordance with ANSI/ISEA Z358.1-2009 and NPR 8715.3.3
Fume hoods	Annually by IH. Users should verify proper operation before every use.
Inspections resulting from incidents involving abnormal exposure levels	As specified by IH or the Health Unit.
Inspections of emergency equipment	As specified in 29 CFR 1910.1450, or per the manufacturer's recommendations if not so specified.
Safety audits	Annually by OS&H or Wallops Safety Office. Will include verification of compliance with this GPR.
Self-inspections, as defined by the Supervisor's Designee	As defined by the Supervisor's Designee in accordance with 29 CFR 1960.25C.

Records of inspections, including date, location, participants, and findings, will be kept for all inspections, and retained as specified in Section P.8.

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## 2.6 Waste Disposal

Owning organizations shall manage all waste in accordance with applicable GSFC requirements for waste management, and applicable regulations. Refer to GPR 8500.3, Waste Management, for waste management procedures. For hazardous wastes determinations and disposal, laboratory personnel should email [gsfc-hazwaste@lists.nasa.gov](mailto:gsfc-hazwaste@lists.nasa.gov) or call the Hazardous Waste Pickup line on extension 6-9233 at Greenbelt, and extension 7-1718 at Wallops.

In accordance with GPR 8500.3, owning organizations shall consider all chemicals, hazardous materials, or materials that are in any way dangerous hazardous waste until evaluated by Code 250 Medical and Environmental Management Division. (MEMD) Also, if a process creates new disposal considerations, owning organizations consult MEMD.

All hazardous waste shall be managed in accordance with the requirements of GPR 8500.3, Waste Management.

Owning organizations shall not pour waste chemicals down a drain or add them to mixed refuse or landfill burial. This is unacceptable and is against the law. Moreover, owning organizations shall not use fume hoods as a means of disposal for volatile chemicals.

### Appendix A – Definitions

- A.1 Action level** – an exposure level equivalent to ½ of the defined exposure limit, unless otherwise specified in Occupational Safety and Health Administration (OSHA) regulations.
- A.2 Administrative controls** – controls that limit or eliminate employee exposure by scheduling reduced work times in contaminant areas, and/or good work practices and employee training that include hazard recognition and work practices specific to the employee’s job that can help reduce exposures.
- A.3 Chemical Hygiene Officer** – an employee designated to provide technical guidance in the development of the chemical hygiene program and regulatory enforcement authority for the implementation of the provisions of the Chemical Hygiene Program.
- A.4 Chemical Hygiene Program** – a written program that sets forth procedures, laboratory and control equipment, personal protective equipment, and work practices capable of protecting employees from the hazards presented by hazardous chemicals used in a particular laboratory workplace and meets requirements of 29 CFR 1910.1450(e).
- A.5 Chemical Management System** – a system for managing data related to the acquisition, use, and disposal of all hazardous chemicals that cross the boundaries of GSFC. The basis of this system is the GSFC Hazardous Material Management System (HMMS) database used for maintaining Material Safety Data Sheets (MSDS) and chemical inventories.
- A.6 Chemical process** – for the purpose of this directive, a sequence of activities, involving defined procedural steps, materials, and equipment, by which change takes place in a chemical system.
- A.7 Engineering controls** – control methods that reduce or eliminate the hazard either by initial design specifications or by applying methods of substitution, isolation, or ventilation.
- A.8 Hazardous chemical** – 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 that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin, eyes, or mucous membranes. Appendices A and B of the Hazard Communication Standard (29 CFR 1910.1200) provide further guidance in defining the scope of health hazards and determining whether or not a chemical is to be considered hazardous for GSFC purposes.
- A.9 Hazard communication** – a process whereby hazards of chemicals are identified, evaluated, and transmitted to employees. This transmittal of information is accomplished by means of comprehensive hazard communication programs, including container labeling and other forms of warning, material safety data sheets, and employee training.
- A.10 Labels** – markings on chemical containers that identify the material in the container and the risks and control associated with its use.
- A.11 Laboratory** – a facility where the “laboratory use of hazardous chemicals” occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.
- A.12 Laboratory Manager/(LM)** (as described in GPR 8730.7) – a person that has the designated responsibility to manage the operation of a laboratory. The person so designated may be a government or contractor employee. If the LM is a contractor the Laboratory Owner will be responsible for performing inherently governmental functions.

- A.13 Laboratory-type hood** – a device located in a laboratory, enclosed on five sides with a movable sash or fixed partial enclosure on the remaining side; constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory, and allows chemical manipulations to be conducted in the enclosure without insertion of any portion of the employee’s body other than hands and arms. Walk-in hoods with adjustable sashes meet the above definition provided that the sashes are adjusted during use so that the airflow and the exhaust of air contaminants are not compromised and employees do not work inside the enclosure during the release of airborne hazardous chemicals.
- A.14 Laboratory scale** – work with substances in which the containers used for reactions, transfers, and other handlings of substances are designed to be easily and safely manipulated by one person. Laboratory scale excludes those workplaces whose function is to produce commercial quantities of materials.
- A.15 Laboratory use of hazardous chemicals** – handling or use of such chemicals in which all of the following four conditions are met:
- (1) Chemical manipulations are carried out on a laboratory scale, i.e., containers for reactions, transfers, and other handling can be easily and safely manipulated by one person;
  - (2) Multiple chemical procedures or chemicals are used;
  - (3) Procedures involved are not part of a production process, nor do they in any way simulate a production process; and
  - (4) Protective laboratory practices and equipment are available and in common use to minimize the potential for employee exposure to hazardous chemicals.
- A.16 Laboratory user** – any individual assigned work in a laboratory.
- A.17 Occupational Exposure Limit (OEL)** – Any exposure limit established by OSHA, including time-weighted average, ceiling, short-term exposure limit, skin contact prohibition, or Threshold Limit Value published by the American Conference of Governmental Industrial Hygienists. Where conflict exists between OSHA PELs, and ACGIH TLV’s, the more stringent requirement shall apply.
- A.18 OSHA-regulated substances** – those substances identified in 29 CFR part 1910, subpart Z.
- A.19 Overexposure** – exposure to levels of hazardous materials over or above the OEL.
- A.20 Personal protective equipment (PPE)** – protective garments and devices that employees wear to protect them from their environment. PPE should always be used in conjunction with engineering controls and other methods.
- A.21 Process Hazard Analysis (PHA)** – a safety analysis tool that determines the hazards and control measures for a chemical process. See section 2.2.
- A.22 Supervisor’s Designee** – within this procedural requirements document, refers to the individual that has been designated by the responsible supervisor to implement the requirements for a given laboratory. The individual may hold other responsibilities such as Laboratory Manager.
- A.23 Toxicity** – degree to which a substance is poisonous. Three levels are referred to in 29 CFR 1910.1450 App A, E.3 and E.4:
- (1) Moderate Chronic Toxicity – medium toxicity marked by long duration or frequent recurrence;
  - (2) High Chronic Toxicity – high toxicity marked by long duration or frequent recurrence; and
  - (3) High Acute Toxicity – a critical or severe level of toxicity, which usually has an immediate effect on an exposed person.

## Appendix B – Acronyms

<b>CHO</b>	Chemical Hygiene Officer
<b>FMD</b>	Facilities Management Division
<b>GSFC</b>	Goddard Space Flight Center
<b>HHR</b>	High Hazard Review
<b>HMMS</b>	Hazardous Material Management System
<b>IH</b>	Industrial Hygiene
<b>LHR</b>	Low Hazard Review
<b>LM</b>	Laboratory Manager
<b>LSDS</b>	Laboratory Safety Documentation Set
<b>MHR</b>	Moderate Hazard Review
<b>MEMD</b>	Medical & Environmental Management Division
<b>MSDS</b>	Material Safety Data Sheets
<b>OEL</b>	Occupational Exposure Limit
<b>OS&amp;H</b>	Occupational Safety and Health
<b>OSHA</b>	Occupational Safety and Health Administration
<b>PHA</b>	Process Hazard Analyses
<b>PPE</b>	Personal Protective Equipment
<b>SOPs</b>	Standard Operating Procedures

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**CHANGE HISTORY LOG**

<b>Revision</b>	<b>Effective Date</b>	<b>Description of Changes</b>
Baseline		Initial Release
A	02/15/05	Document revised to clarify all requirements in accordance with NASA Rules Review Committee recommendations.
B	04/02/2010	Administratively Revised to update the Responsible Office Code, Organization Title and organization name within the document.  Administratively extended for 1 year from original expiration date.
C	06/09/2011	Document revised to update responsibilities and requirements.