Chemical Hygiene Plan
For
Bldg. F160 Analytical Laboratory

National Aeronautics and Space Administration
Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, Virginia

Revision 9
March 2018

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Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, Virginia

Prepared by

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THIS REVISION SUPERSEDES ALL PREVIOUS EDITIONS OF THE WALLOPS FLIGHT FACILITY Chemical Hygiene Plan

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Acronyms List

ANSI	American National Standards Institute
CFR	Code of Federal Regulations
GDMS	Goddard Document Management System
GPR	Goddard Program Requirement
GSFC	Goddard Space Flight Center
HAZCOM	Hazard Communication
HAZWOPER	Hazardous Waste Operator
ICP	Integrated Contingency Plan
JHA	Job Hazard Analysis
N/A	Not Applicable
NPR	NASA Program Requirement
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
SOP	Standard Operating Procedures
SDS	Safety Data Sheet
WFF	Wallops Flight Facility
WI	Work Instruction
WICC	Wallops Island Consolidated Contract

Forward

Safety, in the context of this document, represents the effort to identify and minimize the hazards associated with operations in Code 250, building F160 analytical laboratories and storage facilities. This document specifies the procedures established for use to protect personnel, facilities, and the environment with a minimum impact to operations. Work in these areas involves the use of hazardous chemicals. This document provides guidelines that must be followed in order to provide adequate protection.

1.0 Personnel with Chemical Hygiene Responsibilities

1.1 Management Staff

Title	Name, numbers and location
Associate Chief, Medical & Environmental Management Division National Aeronautics and Space Administration	Mr. T.J. Meyer Code 250 Building F160, Room W159, 757.824.1987 (office) 443.614.7840 (cell)
Deputy Chief Ground Safety National Aeronautics and Space Administration	Ms. Carolyn Turner Code 803 Building E107, Room 215, 757.824.1720 (office)
Code 250 Safety Representative National Aeronautics and Space Administration	Mr. R. Owen Hooks Code 250 Building F-16, Room W157, 757.824.1941(office)
WICC Quality and Safety Manager LJT & Associates, Inc	Mr. Jason Rabon Code 840, Building F16, Room 115 757.824.2290 (office)
Environmental Programs LJT & Associates, Inc. Hazardous Waste Manager	Ms. Marianne Simko Code 200 Building F160, Room C135, 757.824.2127 (office)
Analytical Chemistry Laboratory LJT & Associates, Inc. Laboratory Technical Director, Chemical Hygiene Representative	Mr. Jason Freischlag Code 200, Building F160, Room E112 757.824.2352(office)

1.2 Other Key Personnel Institutional Services

Title	Name, numbers and location
EMERGENCIES	**911 OR Ext.1333**
Chemical Hygiene Representative/Safety Officer National Aeronautics and Space Administration	Mr. Marvin Bunting Code 803, Building E106, Room 209 757.824.2030 (office) 410.957.1702 (home)
Building F160 Facilities Operations Manager National Aeronautics and Space Administration	Mr. Joel Mitchell Code 250, Building F160, Room W159 757.824.1127 (office) 443.880.4670 (cell)

Title	Name, numbers and location
EMERGENCIES	**911 OR Ext.1333**
Building F160 Assistant Facilities Operations Manager ASRC FEDERAL SPACE & DEFENSE, INC.	Mr. Ralph Hickman Code 500, Building F160, Room C127 757.824.2451(office)
Environmental Office	757.824.1987
Fire Department	911 or 757.824.1333
Hazardous Waste Disposal	757.824.1718
Health Unit	757.824.1266
Service/Trouble Desk	757.824.2466
Security Office	757.824.1111

1.3 Employee Information Requirements

All laboratory employees and users must be familiar with the location, availability and contents of:

a) GPR 1700.2 (Binder D) The Chemical Hygiene Plan, as included in the Goddard Document Management System (GDMS), hard copy (binders) located in Building F160, across from Room E112 on a shelf.

b) The laboratory's Safety Data Sheets (SDS) are located in hard copy (binders) located in Building F160, across from Room E112 on a shelf.

c) OSHA Standard 29 CFR 1910.1450 "Occupational Exposures to Hazardous Chemicals in Laboratories" available on www.OSHA.gov, "Laws and Regulations (Standards – 29 CFR) Appendices A."

2.0 Personal Protective Equipment and Dress Requirements

2.1 General Dress Requirements for all Code 250 Working Areas

a. No abbreviated blouses or shirt tops.

b. No shorts.

c. Loose clothing, loose jewelry, or long hair must be neatly tucked away to prevent injury.

d. No open- toed shoes or sandals are allowed. Heels must not exceed two inches in height.

e. Visitors are required to follow the same dress requirements, except as approved by the Associate Chief, Medical & Environmental Management Division.

2.2 General PPE Requirements

a. Specific PPE requirements are listed by process in each laboratory standard operating procedure or work instruction.

b. Safety glasses meeting ANSI Z87.1 shall be worn at all times when near any chemical area.

c. When the possibility of chemical contamination exists, protective clothing that resists physical and chemical hazards should be worn over street clothes. Lab coats are appropriate for minor chemical splashes and solids contamination, while plastic or rubber aprons are best for protection from corrosive or irritating liquids. Disposable outer garments (i.e., Tyvek suits) may be useful when cleaning and decontamination of reusable clothing is difficult.

d. Steel-toed safety shoes are to be worn at all times when moving heavy equipment and gas cylinders.

e. Prior to wearing any PPE, check it to make sure it is clean and in good condition. Glasses/face shield/goggles must not have scratches or nicks in the lenses. Gloves, aprons and arm guards must be checked for holes or tears. Replace all damaged PPE prior to use. Glove inspection – roll over the end of the glove creating an air pocket. Look, listen, and feel for any air leaks. Make sure the glove is clean and free of any chemical residue before putting near your face. If gloves feel tacky to the touch, they are starting to break down and should not be used.

f. Contact lenses may be worn in the laboratory when goggles are used as the primary eye protection.

g. Store PPE to be reused in personal office area once it is clean and dry to avoid cross-contamination.

2.3 Detailed Laboratory PPE Requirements

a. Lab coats, safety glasses, and disposable nitrile gloves are to be worn in all laboratory working spaces when working with chemicals or performing analyses. Additional PPE requirements may be listed in the applicable standard operating procedure or work instruction.

2.4 PPE Cleaning Requirements

a. After each use, wipe apron and face shield with a wet wipe and then wipe dry.

b. Clean glasses/goggles with mild soap and water. Dry prior to storing.

c. Tyvek coveralls and gloves when used are to be disposed like wipes, as non-controlled waste.

d. If PPE is subjected to greater exposure than routine or had indications of break-through, replace immediately.

3.0 Hazardous Waste Disposal Procedures

a. Never dispose of any hazardous material or Chem-wipe that contains hazardous material in the trash or down the drain. The Hazardous Waste Generator training categorizes all waste process streams generated in the F160 lab. If a waste stream has not been identified, contact the Environmental Program Manager for guidance. Used chemicals must be packaged and properly labeled with a Hazardous Waste label that clearly states contents before being transported to a hazardous waste satellite accumulation area. Once in the hazardous waste satellite accumulation site, the containers are sorted according to type.

b. Chemical wipes that have come into contact with a chemical will be treated as hazardous waste and placed in hazardous waste containers. Chemical wipes are segregated into one of four categories. Package per the following waste designations:

1. Chlorinated Solvent Waste
2. Non-Chlorinated Solvent Waste
3. Acid Wipe Waste
4. Base Wipe Waste

b. Wipes should be placed in the appropriate container. Containers are for lab-wipe disposal only, and not for bulk hazardous waste.

c. All personnel generating hazardous waste, including wipes containing chemicals or other hazardous materials, shall attend annual Hazardous Waste Generator Training provided by the WFF Safety and Environmental Division, Code 250.

d. All hazardous waste shall be separated and labeled per the requirements of the training. Solvent wipes may be combined in one container for disposal. Label as non-regulated waste.

e. Hazardous waste pickup shall be called monthly, or whenever a hazardous waste container is nearing capacity, to request removal of all containers containing hazardous waste. Call Ext. 1718 or Ext. 2127 for immediate pickup.

4.0 Hazardous Materials/Equipment Procurement

4.1 Existing Materials

To reorder materials already in use in the lab, contact the Laboratory Technical Director. When the materials arrive, the Laboratory Technical Director shall notify the requestor, supplying him/her with a copy of the SDS and verify a current SDS is on file in the laboratory SDS binders.

4.2 New Materials

For procurement of any hazardous material:

a. Once the need for a new hazardous material has been established, the requestor shall contact the Laboratory Technical Director.

b. The Laboratory Technical Director shall verify the material is compatible with the proposed operation and existing storage facilities.

c. The requestor shall provide the Laboratory Technical Director the following information.

    1. Quantity to be stored

    2. Description of the process in which the material will be used

d. Upon receiving the material, the requestor shall notify the Laboratory Technical Director of the location of the material and provide a copy of the SDS. The Laboratory Technical Director shall update the quantity and storage location in the chemical inventory and place the new SDS copy in the SDS binders.

e. All personnel shall receive the SDS of the new material (hazards, safe use, and how to protect themselves). The new material SDS will be the topic of the next daily Safety Tailgate meeting.

4.3 Equipment

For procurement of any equipment that generates hazards (i.e., radiation- producing equipment, high voltage, high pressures, unprotected moving parts, produces hazardous material, high noise levels, high temperatures, etc.)

a. When any equipment is needed that may produce hazards, such as radiation, hydrogen, etc., a written request shall be submitted to the Laboratory Technical Director describing the equipment, its standards, and the process of its use.

b. The Laboratory Technical Director will review the request and will forward the request to the WICC Quality and Safety Manager with his/her comments (approval or rejection and why).

c. The procurement request must state the requirements the tool or equipment must meet.

d. The Chemical Hygiene Representative/Safety Officer shall review the documents prior to making a final decision.

e. Branch Head/Associate Branch Head shall review and approve the equipment prior to use, verifying that the process hazard analysis and operating procedures are complete.

5.0 Housekeeping Requirements

a. The work area shall be cleaned after each process.

b. All hazardous materials shall be placed in their designated storage locations at the end of each process.

c. All hazardous wastes shall be emptied into their proper hazardous waste collection container at the end of each process.

d. Any spilled material will be cleaned up immediately, and disposed of accordingly, by trained lab personnel.

e. Personnel shall clean glassware immediately after use. Clean glassware shall then be placed in the appropriate storage location. Broken glassware shall be removed from service an disposed in a broken glass container.

f. Fume hoods shall be cleaned after each process. Chemicals left in the fume hoods shall be properly secured and stored when not in use.

g. All electrical appliances not in use, including hot-plates, and other devices shall be turned off at the end of each shift.

h. Always complete all processes by the end of the work shift, unless approved by the Laboratory Technical Director.

i. The last two people out of the laboratory area shall verify all electrical equipment not in use is turned off prior to leaving.

j. All personnel performing general housecleaning in the laboratory will either be escorted or trained to the requirements in Section 11.2.

6.0 Spills and Accidents

A written emergency plan shall be established and communicated to all concerned personnel. This plan shall include procedures for ventilation failure, medical care, reporting, and drills. Frequent drills and simulated emergencies are conducted by the on-site Fire Department. Refer to section 9.1 and Appendix B.

There shall be an alarm system to alert people in all parts of the facility. Personnel should be familiar with the location and operation of all emergency equipment.

Evacuation routes and alternates shall be identified, and an outside assembly area shall be designated. All personnel shall be trained in proper procedures. Brief guidelines for shutting down operations during an emergency or evacuation procedures shall be developed and communicated to all personnel.

Return- to- work procedures and start-up procedures for some operations should be established and reviewed often.

The WFF Integrated Contingency Plan (http://sites.wff.nasa.gov/code250/documents.html) and the Emergency Preparedness Plan (Appendix B) describe the elements of prevention, containment, cleanup, and reporting.

Prevention:	Storage, operating procedures, monitoring, inspection, and personnel training.
Containment:	Engineering controls on storage facilities and equipment.
Cleanup:	Countermeasures and training of designated personnel to help reduce the impact of a chemical spill.
Reporting:	Provisions for reporting spills both internally to identify controllable hazards and externally to Federal and State regularly agencies. Reporting to other agencies must coordinate with the Environmental Office.

Any accident and close call shall be investigated and analyzed based on the NASA Mishap or Close call Reporting and Investigating system (NPR8621).

If an employee detects the release of any hazardous material, the employee shall:

1. Stop work
2. Inform co-workers of the release
3. Vacate the laboratory
4. Pull the fire alarm
5. Assemble outside at designated area
5. Inform supervisor

If an employee experiences unusual symptoms subsequent to his or her exposure, the supervisor shall direct the employee to the Health Unit for a medical evaluation.

If the release is due to an accidental chemical release, refer to the Spill Emergency plan in Binder B, ICP, located in Building F160, across from Room E112 on a shelf.

7.0 Buddy System and Access/Work Requirements

7.1 Buddy System

The buddy system (two or more persons working together), established for work in hazardous situations, is designed to summon immediate help and provide assistance in case of an emergency. The most important guideline of the buddy system is that the buddy must summon help before providing assistance. Prior to beginning hazardous work, laboratory personnel must notify their buddy that hazardous work is about to begin. The buddy must frequently check on the worker performing the hazardous operation through a pre-arranged method. No hazardous work shall be performed without making prior arrangements with a buddy.

7.2 Who Can Work/Tour/Visit the Laboratory

a. No persons below 18 years of age are allowed inside the lab or other locations containing hazardous materials or operations. All exceptions must have prior approval in writing on a case-by-case basis by the Associate Chief, Medical & Environmental Management Division.

b. All visitors shall follow the dress requirements stated in Section 2.

c. All personnel desiring unescorted access must complete Hazard Communication Training and be authorized by the Associate Chief, Medical & Environmental Management Division or a designee.

d. Personnel having handicaps such as being unable to walk without aid or being hard of hearing, etc. must have permission from the Branch Head to access the area. If access is permitted, an escort may be required.

e. All personnel performing maintenance or general housecleaning in the laboratory will either be escorted or trained to the requirements in Section 11.2 or the Signature Review section tab.

7.3 Extended Work Hours

It is laboratory policy to establish a limit on the maximum number of consecutive work hours per person to minimize the probability of mishaps due to personnel fatigue, especially when working with hazardous materials. Any personnel working with hazardous materials or hazardous operations shall not work in excess of 12 consecutive hours. A maximum of four additional hours (16 consecutive hours) shall be authorized when a one-time job circumstance exists, provide that the Environmental Program Manager has approved. A minimum of eight hours time-off shall be allotted between

workdays for personnel working 12 hours. Personnel shall never work in excess of 60 hours per week or more than seven consecutive days without one day off.

7.4 Subcontractor Requirements

Subcontractors shall not perform work within the laboratory unless escorted or provided with training on the hazards.

7.5 Emergency Locations

Refer to Appendix B. Drawings not to scale.

8.0 Medical Program

All medical examinations shall comply with OSHA 1910.120(f) or OSHA 1910.1450 and GPR 1700.2C, whichever is more stringent. All laboratory personnel shall be HAZWOPER trained, and will continue to have medical surveillance/consultation physical exams on an annual or more frequent basis pursuant to 29 CFR OSHA 1910.120(f) or OSHA 1910.1450 and GPR 1700.2C, whichever is more stringent. A letter stating they have successfully passed the required medical examination shall be provided to the Environmental Program Manager prior to working unsupervised in the Laboratory. Personnel with out-of-date medical exams shall not be allowed to work unsupervised in the Laboratory. The Environmental Program Manager maintains and tracks records and documentation of each employee's training and medical surveillance.

8.1 Respiratory Protection

Personnel required to wear respiratory protection (during routine operations) shall receive a baseline medical examination and an annual evaluation. Personnel not passing the medical examination shall not be allowed to work in an area where respiratory protection is required. Refer to Appendix C.

8.2 Maintenance Personnel

Only authorized personnel familiar with the hazards shall perform maintenance on equipment containing hazardous materials. Personnel performing maintenance operations on systems containing hazardous materials where they may be exposed, at or above the permissible exposure limits, shall receive a medical examination prior to assignment and at least annually. All personnel performing maintenance or general housecleaning in the laboratory will either be escorted or trained to the requirements in Section 11.2

8.3 Possible Exposure

If an exposure occurs, call 911. If an exposure goes without notice, but later an employee develops any signs or symptoms indicating a possible exposure, or if periodic exposure monitoring indicates possible exposure to hazardous materials, the employee shall receive a medical examination. If the symptoms develop during normal business hours,

employees are to report to the WFF Health Unit. If the incident occurs during off-duty hours, the employee shall report to the nearest hospital or medical facility. The WFF Health Unit must receive a written report from the outside facility as soon as possible. The WFF Health Unit shall perform follow-up examinations, when possible.

9.0 Standard Operating Procedures

9.1 General Operating Procedures

When there are changes to any operation that may cause possible exposures to hazardous materials, the GSFC WFF Industrial Hygiene Office shall be notified that exposure monitoring is required. Steps to be followed in the event of a spill are covered in the ICP (Binder B).

Schedules for Laboratory Inspections and Periodic Tests of Control Devices

Hood Inspection by Safety Office	Annual
Eye Wash and Safety Shower Inspection by lab staff	Weekly
Satellite Accumulation Area Inspection by lab staff	Monthly
Eye Wash and Safety Shower Operation Check by Facilities	Annual

9.1.1 Treatment Post Exposure

a. In the event of chemical contact on skin, rinse the affected area with water for at least 15 minutes, removing clothing while rinsing, if necessary. Seek medical attention if symptoms persist.

b. Eyes that have been in contact with chemicals should be rinsed immediately with water continuously for at least 15 minutes. Contact lenses should be removed while rinsing—do not delay rinsing to remove the lenses. Medical attention is necessary if symptoms persist.

9.1.2 Precautions to Prevent Inhalation

a. When opening a chemical jar or bottle, always tip the mouth of the container away from your face. Do not open a chemical jar or bottle near your face.

b. Never inhale a chemical to identify it.

c. All chemicals must be properly identified and stored.

d. Use a ventilated hood whenever possible when dealing with chemicals.

e. Do not handle chemicals in closed areas that do not have good ventilation.

f. In the event of exposure, close containers or otherwise increase ventilation, and move to fresh air. If symptoms persist, seek medical attention.

g. If a chemical spill occurs, evacuate the area and notify the Laboratory Director or call 911.

9.1.3 Precautions to Prevent Chemical Ingestion

a. Isolate chemical use areas from other work areas.

b. Food and drink are not permitted in any lab or chemical storage area. This includes gum chewing, tobacco products, the application of make-up, use of eye drops, or taking medication. The following locations are off-limits to food and drink: Building F160, rooms E107, E108, E109, E110, E113, E114, and E115.

c. Wear gloves when handling chemicals.

d. Wash your hands after removing your gloves. Wash your hands before eating, drinking, or smoking.

e. Clean pens, glasses, etc. prior to use if there is a possibility any of these came into contact with chemicals or other contaminants.

f. In the event of accidental ingestion, immediately go to WFF Health Unit or contact the Poison Control Center at 800-962-1253 for instructions. Do not induce vomiting unless directed to do so by a health care provider.

9.1.4 Precautions to Prevent Chemical Absorption

a. Wear protective equipment when handling solid, liquid, or gaseous chemicals as specified in Section 2, Personal Protective Equipment and Dress Requirements.

b. Ensure protective equipment has no tears or holes. If tears or holes occur during use, change immediately.

9.1.5 Fume Hoods

a. Fume hoods shall be used when working with any of the following materials/processes:

   Acids/bases

   Biological agents

   Fuels

   Solvents

   Each hood is identified as to the type of material used on that bench. Do not use a material other than what the bench label indicates is allowed.

b. Prior to use of the fume hood, verify Chemical Hygiene Representative has certified the hood within the past year. If out of date, notify the Chemical Hygiene Representative.

c. Insure the hood is working properly by checking prior to beginning the task. If there are indications the hood is not working properly, notify the Chemical Hygiene Representative prior to use or shut down operations in progress.

d. Prior to performing maintenance on any hood, all operations shall be discontinued and chemical containers sealed/removed from the bench inside.

e. **Fume Hood Failure:** Remove yourself from the room, close the door, pull the fire alarm, and evacuate the building. Also, alert co-workers and others in the laboratory.

9.1.6 Fire

Alert others in the laboratory, activate the alarm, and evacuate the building. Call, or designate someone **to call 911.**

9.2 Work Instructions

Work Instructions (formerly Standard Operating Procedures) for each type of analysis are found in Binder A.

9.3 Chemical Transportation

a. Glass containers shall always be placed in a rubber or plastic bottle carrier.

b. Carry bottles by placing one hand under the bottle and the other around the neck with the index finger through the ring.

c. Always carry multiple containers on a cart.

d. Always carry acids and bases on separate levels of carts. Never interchange chemical classes on the same shelf. Chemicals may only be on the cart when being used to transport chemicals.

e. Empty chemical storage boxes shall be placed in the center hallway for trash pickup and/or recycling.

9.4 Bulk Chemical Storage

a. Acids, bases, flammables, nitric acid, and sulfuric acid must be stored only in their designated cabinets, separate from incompatible chemicals. Nitric and sulfuric acids require secondary containers (individually labeled red plastic containers).

b. Water-reactive chemicals must be stored in a separate small storage locker.

9.5 Signs and Labels

Each container of any hazardous material must be clearly and correctly labeled. Laboratory areas that have special or unusual hazards shall be posted with warning signs. These hazards include ultraviolet light, flammable materials, compressed gases, biological hazards, etc.

Prominent signs and labels shall be posted, including:

a. Emergency telephone numbers for fire, flood, or hazardous chemical spill.

b. Telephone numbers for supervisors and laboratory workers to be contacted in the event of an accident or emergency.

c. Identification labels showing contents of containers (including waste containers) and associated hazards.

d. Location signs for safety showers, eyewash stations, other safety and first aid equipment, and exits.

e. Areas where food and beverages may be consumed and stored.

10.0 Procedures for Non-Standard Operations

Prior to changing any established operation/equipment use or prior to introduction of any new operation/equipment not described in this document, written approval must be obtained from the Laboratory Technical Director and WICC Quality and Safety Manager. A written description of the operations/equipment and all identified hazards with method of mitigation (a job hazard analysis [JHA]) shall be presented to the Code 250 Safety Representative and the Chemical Hygiene Representative prior to the start of operations. The Associate Chief, Medical & Environmental Management Division, shall sign all High Hazard JHAs. After the start of operations, the JHA shall be updated as required.

Job Hazard Analyses are found in Appendix D

11.0 Training and Communication Requirements

11.1 Training

a. The Laboratory Technical Director, under the direction of the Environmental Program Manager, shall train new employees on the specific procedures, operations, chemicals, and protocols used in the laboratory and this Chemical Hygiene Plan. The laboratory shall have sufficient personnel with the necessary education, training, technical knowledge and experience for their assigned functions.

b. Each member of the laboratory technical staff shall be responsible for complying with quality assurance and quality control requirements that pertain to their organizational or technical function.

c. Each laboratory technical staff member shall have a combination of experience and education to adequately demonstrate a specific knowledge of the member's particular function and a general knowledge of laboratory operations, test methods, quality assurance and quality control procedures, and records management.

d. Additionally, the Laboratory Technical Director, under the direction of the Environmental Program Manager, shall inform each new employee of the Standard Laboratory Safety Procedures. Prior to acceptance and use of any method, satisfactory initial demonstration of capability (IDC) of method performance is required. The intent of the IDC is to have a formal documented

program that defines exactly what the laboratory has decided must be accomplished in order for an analyst to be considered qualified to perform testing. An IDC is used to demonstrate that the laboratory and analyst are capable of performing analyses with acceptable precision, accuracy, sensitivity, and specificity pertaining to that particular method.

e. The Laboratory Technical Director, under the direction of the Environmental Program Manager, shall train each new employee in the use and care of the personal protective equipment (PPE) required in the laboratory and by this Chemical Hygiene Plan. The proper PPE pertaining to a particular method and signed off by new employee on the IDC form when performing any method is stated. The PPE training shall include the following:

   When PPE is necessary.

   What PPE to use.

   The limitations of the PPE.

   The proper care, maintenance, useful life, and disposal of the PPE.

   Additionally, each employee shall demonstrate an understanding of this PPE training prior to performing work requiring PPE.

   Upon successful completion of the initial training and PPE training, the Laboratory Technical Director shall document to the Environmental Program Manager that initial safety training and the PPE training have been successfully completed by the new employee. The Laboratory Technical Director shall include in this documentation the name of the newly-trained employee, the date(s) of the training, and the type of training received. The Environmental Program Manager maintains and tracks records and documentation of each employee's training. The Laboratory Technical Director shall retain a personnel folder of IDC and training for each new employee.

f. The following table lists the training requirements, frequency, and who must be trained. The Environmental Program Manager shall maintain all training records. A senior employee familiar with the hazards involved with a piece of equipment shall provide training to new personnel. Personnel may not use Laboratory equipment until familiar with the operating procedure and authorized to do so.

Training	Who is required to take and when	Frequency of retraining	Require passing score for written exam
Hazardous Waste Management	All person generating any hazardous waste	Annually	N/A
Personal Protective Equipment (PPE)	All person assigned a task requiring PPE	Annually	N/A
Material procurement	Any person purchasing materials	Once	N/A
Respirator	Prior to any person using a respirator	Annually	Must pass a fit test
Hazard Communication	All personnel using hazardous materials or entering the lab unescorted	Annually	N/A
Integrated Contingency Plan	All personnel trained in handling of hazardous materials	Annually	N/A
HAZWOPER	All personnel exposed to hazardous substances, health hazards, or safety hazards	Annually	N/A
Hearing Conservation	Personnel working in noisy areas	Annually	N/A

11.2 Awareness Training

All personnel performing maintenance or general housecleaning in the laboratory will either be escorted or trained to the following table lists of training requirements and sign off on the Signature Review sheet. Upon entry into the Laboratory, contact Laboratory Technical Director or other laboratory member to learn of hazards for the day.

Chemical Hygiene Plan
• Section 2.1 General Dress Requirements
• Section 5.0 Housekeeping Requirements
• Section 6.1 Buddy System
• Section 6.2 Who Can Work/Tour/Visit the Laboratory
• Section 7.3 Possible Exposure
• Section 8.1 General Operating Procedures
Safety Data Sheets (SDS)
• Location
• How to read a SDS
Tour of Laboratory and Identification of Hazards
Emergency Procedures

• Call 911
• Emergency Exits
• Exit Laboratory in the Event of an Alarm

11.3 Communication

All personnel shall attend safety meetings. Attendance is mandatory and shall be taken at the meetings. Any changes in operations, equipment, procedures, safety policies, and any safety concerns/problems shall be discussed.

Prior to scheduled meetings, if personnel must be notified of important information, an email will be sent to all personnel and a notice shall be posted on all entry doors.

12.0 Continuous Improvement

12.1 Area Inspection Follow-up

In order to maintain work areas in a safe and healthful condition, area inspections shall be performed quarterly. The Laboratory Technical Director shall appoint one person per area to conduct safety inspections. The area shall be broken down into a small enough section so that the inspections shall take no more than one hour to complete. The inspectors shall be rotated each quarterly period to give each person, from upper management to employees, a chance to participate in the inspection. Results of these inspections shall be documented and distributed to the parties responsible for correction. Correction shall be tracked with completion expected within 30 days. If it is noted that corrections have not taken place within 30 days, the Laboratory Technical Director shall contact the responsible personnel to determine why. The Code 250 Safety Representative shall be notified of all corrections open greater than 45 days. Records are maintained and filed by the Laboratory Technical Director.

Routine inspections such as eyewashes and safety showers shall be inspected weekly by laboratory users. A log with the inspector's initials shall be kept. Other safety equipment shall be inspected regularly, e.g., every 3-6 months.

12.2 Review/Update of Documents and Procedures

When any equipment or operation is new or has been modified, analysis and procedures shall be written and updated to reflect the changes. All other laboratory operations, procedures, analyses, and documents, including training records and courses, shall be reviewed every year to determine if they are still current. Updates shall be made, when necessary. Job Hazard Analysis shall use GSFC forms 23-56, 57, and 58.

12.3 Safety Concerns

In order to ensure employee safety concerns are properly addressed, any employee with a concern is encouraged to state it in writing to the Laboratory Technical Director,

Environmental Program Manager, or the WICC Quality and Safety Manager. If correction is not a simple matter, the WICC Quality and Safety Manager shall appoint a small committee of personnel (two to five) to investigate and make recommendations for correction. The employee with the concern shall be informed of the committee's recommendations and shall approve the corrective action.

12.4 Action Items

As mentioned above, all discrepancies noted in area inspections shall be tracked through closure. When analyses or annual inspections are done for facilities or processes, open items shall be recorded in a database and tracked through closure. Periodically, the Laboratory Technical Director shall provide the Code 250 Safety Representative with a status of all open items.

13.0 Owner Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Laboratory Technical Director *Signature/Code* *Date* 4-26-18

Marianne Sinha *Environmental Program Manager* *Signature/Code* *Date* 4/11/18

Concurrence by Code 803, if they participated in the review:

803 Concurrence Signatuare 803 *Signature/Code* *Date* 5/7/18

Change History Log

Revision	Effective Date	Description of Changes
Baseline	05/19/2004	Initial Release
Revision 1	02/15/05	Document revised to clarify all requirements in accordance with NASA Rules Review committee recommendations.
Revision 2	04/02/2010	Administratively Revised to update the Responsible Office Code, Organization Title and Organization name within the document.
Revision 3	03/03/2011	Administratively extended for 1 year from expiration date
Revision 4	12/05/2011	Administratively Revised to update the Responsible Office Code, Organization Title and Organization name with the document. Chemical Process Hazard Analyses update addressing the hazards associated with the laboratory's procedures to meet the requirement of 19CRFR1910.1450 Process Hazard Analysis signed by the Branch head and supervisor's designee and users as required. Medical consultation and exam requirements in GPR 1700.2C. All requirements of Part 1910 and Part 1926 of Title 29 of the code of Federal Regulation apply pursuant to their terms to hazardous waste and emergency response operation whether covered by this section or not. If there is a conflict or overlap, the provision more protective of employees safety and health shall apply without regard to 29 CFR 1910.2(c)(1). Reference: ww.osha.gov/
Revision 5	01/07/2013	Document revised to update responsibilities and requirements.

Revision 6	03/22/2013	Safety Audit Review was conducted. Document revised to clarify all requirements in accordance with review committee recommendations.
Revision 7	02/06/2017	Administratively Revised to update the Responsible Office Code, Organization Title and Organization name with the document.
Revision 8	06/21/2017	Added Appendix D Process Hazard Analyses to Plan instead of a separate binder.
Revision 9	03/01/2018	Grammatical and formatting changes. Updated appendices and binder references. Administratively Revised to update the Responsible Office Code phone numbers within the document

APPENDIX A

THE

CHEMICAL HYGIENE

PLAN

APPENDIX A

THE LABORATORY STANDARD

29 CFR 1910.1450

CHEMICAL HYGIENE STANDARD

INTRODUCTION

The "Occupational Exposures to Hazardous Chemicals in Laboratories" Standard establishes a wide range of requirements for laboratories to ensure that occupational exposure to hazardous chemicals in the laboratory environment is reduced or eliminated as far as possible.

In the preamble, OSHA summarizes the benefits of the standard:

> "The new standard differs from many OSHA health standards in that it does not establish new exposure limits, but sets other performance provisions designed to protect laboratory workers from potential hazards in their work environment. By permitting a greater degree of flexibility to laboratories in developing and implementing employee safety and health programs, OSHA expects benefits to result from increased worker awareness of potential risks, improved work practices, appropriate use of existing personal protective equipment and greater use of engineering controls. Given the flexibility to design and implement innovative measures to reduce employee exposure to hazardous substances, employers also will reap rewards in terms of lower insurance premiums, lower property damage costs, lower turnover costs, less absenteeism and, in general, increased productivity. Finally, the potential decrease in acute and chronic health problems will result in overall benefits to society through the associated reduction in medical and productivity costs."
>
> "A substantial amount of evidence in this record indicates that laboratory workers are at risk to serious and even life threatening occupational hazards. Several companies with good work practice programs, however, indicated that these hazards can be overcome through sound safety practices, and submitted evidence of the magnitude of the benefits to be attained from this standard."

This brief quote from the preamble of the standard summarizes the basic goals and approach of this standard. It is primarily a
performance standard, giving wide latitude to individual laboratories in how to attain the desired results.

The text of the standard, including the appendices, is incorporated into this chemical Hygiene Plan.

1910.1450 Occupational Exposure to Hazardous Chemicals in Laboratories.

(a) Scope and application. (1) This section shall apply to all employers engaged in the laboratory use of hazardous chemicals as defined below.

(2) Where this section applies, it shall supersede, for laboratories, the requirements of all other OSHA health standards in 29 CFR part 1910, subpart Z, except as follows:

(I) For any OSHA health standard, only the requirement to limit employee exposure to the specific permissible exposure limit shall apply for laboratories, unless that particular standard states otherwise or unless the conditions of paragraph (a)(2)(iii) of this section apply.

(ii) Prohibition of eye and skin contact where specified by any OSHA health standard shall be observed.

(iii) Where the action level (or in the absence of an action level, the permissible exposure limit) is routinely exceeded for an OSHA regulated substance with exposure monitoring and medical surveillance requirements paragraphs (d) and (g)(1)(ii) of this section shall apply.

(3) This section shall not apply to:

(I) Uses of hazardous chemicals which do not meet the definition of laboratory use, and in such cases, the employer shall comply with the relevant standard in 29 CFR part 1910, subpart 2, even if such use occurs in a laboratory.

1910.1450(a)(3)(ii)
(ii) Laboratory uses of hazardous chemicals which provide no potential for employee exposure. Examples of such conditions might include:

(A) Procedures using chemically-impregnated test media such as
Dip-and-Read tests where a reagent strip is dipped into the specimen to be tested and the results are interpreted by comparing the color reaction to a color chart supplied by the manufacturer of the test strip; and

(B) Commercially prepared kits such as those used in performing
pregnancy tests in which all of the reagents needed to conduct the test are contained in the kit.
(b) Definitions -

"Action level" means a concentration designated in 29 CFR part 1910 for a specific substance, calculated as an eight (8)-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

"Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

"Carcinogen" (see "select carcinogen").

"Chemical Hygiene Officer" means an employee who is designated by the employer, and who is

qualified by training or experience, to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan. This definition is not intended to place limitations on the position description or job classification that the designated individual shall hold within the employer's organizational
structure.

"Chemical Hygiene Plan" means a written program developed and
implemented by the employer which sets forth procedures, equipment, personal protective equipment and work practices that (I) are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace and (ii) meets the requirements of paragraph (e) of this section.

"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.

"Compressed gas" means:

(I) 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

(ii) 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

(iii) A liquid having a vapor pressure exceeding 40 psi at 100 deg. F (37.8 C) as determined by ASTM D-323-72.

"Designated area" means an area which may be used for work with "select carcinogens," reproductive toxins or substances which have a high degree of acute toxicity. A designated area may be the entire laboratory, such as a laboratory hood.

"Emergency" means any occurrence such as, but not limited to, equipment failure, rupture of containers or failure of control equipment which results in an uncontrolled release of a hazardous chemical into the workplace.

"Employee" means an individual employed in a laboratory workplace who may be exposed to hazardous chemicals in the course of his or her assignments.

"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.

"Flammable" means a chemical that falls into one of the following categories:

(I) "Aerosol, flammable" means an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame protection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;

(ii) "Gas, flammable" means:

(A) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13 percent by volume or less; or

(B) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12 percent by volume, regardless of the lower limit.

(iii) "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. C) or higher, the total of which make up 99 percent or more of the total volume of the mixture.

(iv) "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.

"Flashpoint" means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested as follows:

(I) 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

(ii) Pensky-Martens Closed Tester (See American National Standard Method of Test for Flashpoint 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 forma a surface film under test; or

(iii) 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.

"Hazardous chemical" 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 systems, and agents which damage the lungs, skin, eyes, or mucous membranes. Appendices A and B of the Hazard Communication Standard (29 CFR1910.1200) provide further guidance in defining the scope of health hazards and determining whether or not a chemical is to be considered hazardous for purposes of this

standard.

"Laboratory" means 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.

"Laboratory scale" means work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safety manipulated by one person. "Laboratory scale" excludes those workplaces whose function is to produce commercial quantities of materials.

"Laboratory-type hood" means a device located in a laboratory, enclosure on five sides with a movable sash or fixed partial enclosed 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.

"Laboratory use of hazardous chemicals" means handling or use of such chemicals in which all of the following conditions are met:

(I) Chemical manipulations are carried out on a "laboratory scale;"

(ii) Multiple chemical procedures or chemicals are used;

(iii) The procedures involved are not part of a production process, nor in any way simulate a production process; and

(iv) "Protective laboratory practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

"Medical consultation" means a consultation which takes place between an employee and a licensed physician for the purpose of determining what medical examinations or procedures, if any, are appropriate in cases where a significant exposure to a hazardous chemical may have taken place.

"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.

"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.

"Physical hazard" means a chemical for which there is scientifically valid evidence tat it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer pyrophoric, unstable (reactive) or water-reactive.

"Protective laboratory practices and equipment" means those laboratory procedures, practices and equipment accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

"Reproductive toxins" means chemicals which affect the reproductive chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).

"Select carcinogen" means any substance which meets one of the following criteria:

(I) It is regulated by OSHA as a carcinogen; or

(ii) It is listed under the category, "known to be carcinogens," in the Annual Report on Carcinogens published by the National Toxicology Program (NTP)(latest edition); or

(iii) It is listed under Group 1 ("carcinogenic to humans") by the International Agency for research on Cancer Monographs (IARC)(latest editions); or

(iv) It is listed in either Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:

(A) After inhalation exposure of 6 - 7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m(3);

(B) After repeated skin application of less than 300 (mg/kg of body weight) per week; or

© After oral dosages of less than 50 mg/kg of body weight per day.

"Unstable (reactive)" means a chemical which is 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.

"Water-reactive" means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.
1910.1450©
© Permissible exposure limits. For laboratory uses of OSHA regulated substances, the employer shall assure that laboratory employees' exposures to such substances do not exceed the permissible exposure limits specified in 29 CFR part 1910, subpart Z.

(d) Employee exposure determination - (1) Initial monitoring. The employer shall measure the employee's exposure to any substance regulated by a standard which requires monitoring if there is reason to believe that exposure levels for that substance routinely exceed the action level (or in the absence of an action level, the PEL).

(2) Periodic monitoring. If the initial monitoring prescribed by paragraph (d)(1) of this section discloses

employee exposure over the action level (or in the absence of an action level, the PEL), the employer shall immediately comply with the exposure monitoring provisions of the relevant standard.

(3) Termination of monitoring. Monitoring may be terminated in accordance with the relevant standard.

(4) Employee notification of monitoring results. The employer shall, within 15 working days after the receipt of any monitoring results, notify the employee of these results in writing either individually or by posting results in an appropriate location that is accessible to employees.

1910.1450(e)
(e) Chemical hygiene plan - General. (Appendix A of this section is non-mandatory but provides guidance to assist employers in the development of the Chemical Hygiene Plan). (1) Where hazardous chemicals as defined by this standard are used in the workplace, the employer shall develop and carry out the provisions of a written Chemical Hygiene Plan which is:

(I) Capable of protecting employees from health hazards associated with hazardous chemicals in that laboratory and

(ii) Capable of keeping exposures below the limits specified in paragraph © of this section.

(2) The Chemical Hygiene Plan shall be readily available to employees, employee representatives and, upon request, to the Assistant Secretary.

(3) The Chemical Hygiene Plan shall include each of the following elements and shall indicate specific measures that the employer will take to ensure laboratory employee protection;

(I) Standard operating procedures relevant to safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals;

(ii) Criteria that the employer will use to determine and implement control measures to reduce employee exposure to hazardous chemicals including engineering controls, the use of personal protective equipment and hygiene practices; particular attention shall be given to the selection of control measures for chemicals that are known to be extremely hazardous;

1910.1450(e)(3)(iii)
(iii) A requirement that fume hoods and other protective equipment are functioning properly and specific measures that shall be taken to ensure proper and adequate performance of such equipment;

(iv) Provisions for employee information and training as prescribed in paragraph (f) of this section;

(v) The circumstances under which a particular laboratory operation, procedure or activity shall require prior approval from the employer or the employer's designee before implementation;

(vi) Provisions for medical consultation and medical examinations in accordance with paragraph (g) of this section;

(vii) Designation of personnel responsible for implementation of the Chemical Hygiene Plan including the assignment of a Chemical Hygiene Officer, and, if appropriate, establishment of a Chemical Hygiene Committee; and

(viii) Provisions for additional employee protection for work with particularly hazardous substances. These include "select carcinogens," reproductive toxins and substances which have a high degree of acute toxicity. Specific consideration shall be given to the following provisions which shall be included where appropriate:

1910.1450(e)(3)(viii)(A)
(A) Establishment of a designated area;

(B) Use of containment devices such as fume hoods or glove boxes;

© Procedures for safe removal of contaminated waste; and

(D) Decontamination procedures.
(4) The employer shall review and evaluate the effectiveness of the Chemical Hygiene Plan at least annually and update it as necessary.

(f) Employee information and training. (1) The employer shall provide employees with information and training to ensure that they are apprised of the hazards of chemicals present in their work area.

(2) Such information shall be provided at the time of an employee's initial assignment to a work area where hazardous chemicals are present and prior to assignments involving new exposure situations. The frequency of refresher information and training shall be determined by the employer.

(3) Information. Employees shall be informed of:

(I) The contents of this standard and its appendices which shall be made available to employees;

(ii) the location and availability of the employer's Chemical Hygiene Plan;

(iii) The permissible exposure limits for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard;

1910.1450(f)(3)(iv)
(iv) Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory; and

(v) The location and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, Material Safety Data Sheets received from the chemical supplier.

(4) Training. (I) Employee training shall include:

(A) Methods and observations that may be used to detect the presence or release of a hazardous

chemical (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

(B) The physical and health hazards of chemicals in the work area; and

© The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used.

(ii) The employee shall be trained on the applicable details of the employer's written Chemical Hygiene Plan.

1910.1450(g)
(g) Medical consultation and medical examinations. (1) The employer shall provide all employees who work with hazardous chemicals an opportunity to receive medical attention, including any follow-up examinations which the examining physician determines to be necessary, under the following circumstances:

(I) Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory, the employee shall be provided an opportunity to receive an appropriate medical examination.

(ii) Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance shall be established for the affected employee as prescribed by the particular standard.

(iii) Whenever an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the affected employee shall be provided an opportunity for a medical consultation. Such consultation shall be for the purpose of determining the need for a medical examination.

1910.1450(g)(2)
(2) All medical examinations and consultations shall be performed by or under the direct supervision of a licensed physician and shall be provided without cost to the employee, without loss of pay and at a reasonable time and place.

(3) Information provided to the physician. The employer shall provide the following information to the physician:

(I) The identity of the hazardous chemical(s) to which the employee may have been exposed;

(ii) A description of the conditions under which the exposure occurred including quantitative exposure data, if available; and

(iii) A description of the signs and symptoms of exposure that the employee is experiencing, if any.

(4) Physician's written opinion. (I) For examination or consultation required under this standard, the employer shall obtain a written opinion from the examining physician which shall include the following:

(A) Any recommendation for further medical follow-up;

(B) The results of the medical examination and any associated tests;

© Any medical condition which may be revealed in the course of the examination which may place the employee at increased risk as a result of exposure to a hazardous workplace; and

1910.1450(g)(4)(I)(D)
(D) A statement that the employee has been informed by the physician of the results of the consultation or medical examination and any medical condition that may require further examination or treatment.

(ii) The written opinion shall not reveal specific findings of diagnoses unrelated to occupational exposure.

(h) Hazard identification. (1) With respect to labels and material safety data sheets:

(I) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced.

(ii) Employers shall maintain any material safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible to laboratory employees.

(2) The following provisions shall apply to chemical substances developed in the laboratory:

(I) If the composition of the chemical substance which is produced exclusively for the laboratory's use is known, the employer shall determine if it is a hazardous chemical as defined in paragraph (b) of this section. If the chemical is determined to be hazardous, the employer shall provide appropriate training as required under paragraph (f) of this section.

1910.1450(h)(2)(ii)
(ii) If the chemical produced is a byproduct whose composition is not known, the employer shall assume that the substance is hazardous and shall implement paragraph (e) of this section.
(iii) If the chemical substance is produced for another user outside of the laboratory, the employer shall comply with the Hazard Communication Standard (29 CFR 1910.120) including the requirements for preparation of material safety data sheets and labeling.

(I) Use of respirators. Where the use of respirators is necessary to maintain exposure below permissible exposure limits, the employer shall provide, at no cost to the employee, the proper respiratory equipment. Respirators shall be selected and used in accordance with the requirements of 29 CFR 1910.134.

(j) Recordkeeping. (1) The employer shall establish and maintain for each employee an accurate record of any measurements taken to monitor employee exposures and any medical consultation and examinations including tests or written opinions required by this standard.

(2) The employer shall assure that such records are kept, transferred, and made available in accordance with 29 CFR 1910.20.

(k) Dates - (1) Effective date. This section shall become effective May 1, 1990.

1910.1450(k)(2)
(2) Start-up dates. (I) Employers shall have developed and implemented a written Chemical Hygiene Plan no later than January 31, 1991.

(ii) Paragraph (a)(2) of this section shall not take effect until the employer has developed and implemented a written Chemical Hygiene Plan.

(l) Appendices. The information contained in the appendices is not intended, by itself, to create any additional obligations not otherwise imposed or to detract from any existing obligation.

Appendix A to 1910.1450 - National Research Council Recommendations Concerning Chemical Hygiene in Laboratories (Non-Mandatory)

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Foreword

As guidance for each employer's development of an appropriate laboratory Chemical Hygiene Plan, the following non-mandatory recommendations are provided. They were extracted form "Prudent Practices" for Handling Hazardous Chemicals in Laboratories" (referred to below as "Prudent Practices"), which was published in 1981 by the National Research Council and is available from the National Academy Press, 2101 Constitution Ave., NW,. Washington DC 20418.

"Prudent Practices" is cited because of its wide distribution and acceptance and because of its preparation by members of the laboratory community through the sponsorship of the National Research Council. However, none of the recommendations given here will modify any requirements of the laboratory standard. This Appendix merely presents pertinent recommendations from "Prudent Practices", organized into a form convenient for quick reference during operation of a laboratory facility and during development and application of a Chemical Hygiene Plan. Users of this appendix should consult "Prudent Practices" for a more extended presentation and justification for each recommendation.

"Prudent Practices" deal with both safety and chemical hazards while the laboratory standard is concerned primarily with chemical hazards. Therefore, only those recommendations directed primarily toward control of toxic exposures are cited in this appendix, with the term "chemical Hygiene" being substituted for the word "safety". However, since conditions producing or threatening physical injury often pose toxic risks as well, page references concerning major categories of safety hazards in the laboratory are given in section F.

The recommendations from "Prudent Practices" have been paraphrased, combined, or otherwise reorganized, and headings have been added. However, their sense has not been changed.
Corresponding Sections of the Standard and this Appendix

The following table is given for the convenience of those who are developing a Chemical Hygiene Plan which will satisfy the requirements of paragraph (e) of the standard. It indicates those sections of this appendix which are most pertinent to each of the sections of paragraph (e) and related paragraphs.

Paragraph and topic in laboratory standard	Relevant appendix section

(e)(3)(I) Standard operating procedures for handling toxic chemicals.	C, D, E	
(e)(3)(ii) Criteria to be used for implementation of measures to reduce exposures.		D
(e)(3)(iii) Fume hood performance	C4b	
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(e)(3)(vii) Chemical hygiene responsibilities.		B
(e)(3)(viii) Special precautions for work with particularly hazardous substances.		E2, E3, E4

In this appendix, those recommendations directed primarily at administrators and supervisors are given in sections A - D. Those recommendations of primary concern to employees who are actually handling laboratory chemicals are given in section E. (Reference to page numbers in "Prudent Practices" are given in parentheses.)

A. General Principles for Work with Laboratory Chemicals

In addition to the more detailed recommendations listed below in sections B-E, "Prudent Practices" expresses certain general principles, including the following:

1. It is prudent to minimize all chemical exposures. Because few laboratory chemicals are without hazards, general precautions for handling all laboratory chemicals should be adopted, rather than specific guidelines for particular chemicals (2,10). Skin contact with chemicals should be avoided as a cardinal rule (198).

2. Avoid underestimation of risk. Even for substances of no known significant hazard, exposure should be minimized; for work with substances which present special hazards, special precautions should be taken (10, 37, 38). One should assume that any mixture will be more toxic than its most toxic component (30, 103) and that all substances of unknown toxicity are toxic (3, 34).

3. Provide adequate ventilation. The best way to prevent exposure to airborne substances is to prevent their escape into the working atmosphere by use of hoods and other ventilation devices (32, 198).

4. Institute a chemical hygiene program. A mandatory chemical hygiene program designed to minimize exposures is needed; it should be a regular, continuing effort, not merely a standby or short-term activity (6,11). Its recommendations should be followed in academic teaching laboratories as well as by full-time laboratory workers (13).

5. Observe the PEL'S, TLV'S. The Permissible Exposure Limits of OSHA and the Threshold Limit Values of the American Conference of Governmental Industrial Hygienists should not be exceeded (13).

B. Chemical Hygiene Responsibilities

Responsibility for chemical hygiene rests at all levels (6, 11, 21)including the:

1. Chief executive officer, who has ultimate responsibility for chemical hygiene within the institution and must, with other administrators, provide continuing support for institutional chemical hygiene (7, 11).

2. Supervisor of the department or other administrative unit, who is responsible for chemical hygiene in that unit (7).

3. chemical hygiene officer(s), whose appointment is essential (7) and who must:

(a) Work with administrators and other employees to develop and implement appropriate chemical hygiene policies and practices(7);

(b) Monitor procurement, use, and disposal of chemicals used in the lab (8);

© See that appropriate audits are maintained (8);

(d) Help project directors develop precautions and adequate facilities (10);

(e) Know the current legal requirements concerning regulated substances (50); and

(f) Seek ways to improve the chemical hygiene program (8, 11).

4. Laboratory supervisor, who has overall responsibility for chemical hygiene in the laboratory (21) including responsibility to:

(a) Ensure that workers know and follow the chemical hygiene rules, that protective equipment is available and in working order, and that appropriate training has been provided (21, 22);

(b) Provide regular, formal chemical hygiene and housekeeping inspections including routine inspections of emergency equipment (21,171);

© Know the current legal requirements concerning regulated substances (50, 231);

(d) Determine the required levels of protective apparel and equipment (156, 160, 162); and

(e) Ensure that facilities and training for use of any material being ordered are adequate (215).

5. Project director or director of other specific operation, who has primary responsibility for chemical hygiene procedures for that operation(7).

6. Laboratory worker, who is responsible for:

(a) Planning and conducting each operation in accordance with the institutional chemical hygiene procedures (7, 21, 22, 230); and

(b) Developing good personal chemical hygiene habits (22).

C. The Laboratory Facility

1. Design. The laboratory facility should have:

(a) An appropriate general ventilation system (see C4 below) with air intakes and exhausts located so as to avoid intake of contaminated air (194);

(b) Adequate, well-ventilated stockrooms/storerooms (218, 219).

© Laboratory hoods and sinks (12, 162);
(d) Other safety equipment including eyewash fountains and drench showers (162, 169); and

(e) Arrangements for waste disposal (12, 240).

2. Maintenance. Chemical-hygiene-related equipment (hoods, incinerator, etc.) should undergo continual appraisal and be modified if inadequate (11, 12).

3. Usage. The work conducted (10) and its scale (12) must be appropriate to the physical facilities available and, especially, to the quality of ventilation (13).

4. Ventilation -

(a) General laboratory ventilation. This system should: Provide a source of air for breathing and for input to local ventilation devices (199); it should not be relied on for protection from toxic substances released into the laboratory (198); ensure that laboratory air is continually replaced, preventing increase of air concentrations of toxic substances during the working day (194); direct air flow into the laboratory from non-laboratory areas and out to the exterior of the building (194).

(b) Hoods. A laboratory hood with 2.5 linear feet of hood space per person should be provided for every 2 workers if they spend most of their time working with chemicals (199); each hood should have a continuous monitoring device to allow convenient confirmation of adequate hood performance before use (200, 209). If this is not possible, work with substances of unknown toxicity should be avoided (13) or other types of local ventilation devices should be provided (199). See pp. 201-206 for a discussion of hood design, construction, and evaluation.

© Other local ventilation devices. Ventilated storage cabinets, canopy hoods, snorkels, etc. should be provided as needed (199). Each canopy hood and snorkel should have a separate exhaust duct (207).

(d) Special ventilation areas. Exhaust air from glove boxes and isolation rooms should be passed through scrubbers or other treatment before release into the regular exhaust system (208). Cold rooms and warm rooms should have provisions for rapid escape and for escape in the event of electrical failure (209).

(e) Modifications. Any alteration of the ventilation system should be made only if thorough testing indicates that worker protection from airborne toxic substances will continue to be adequate (12, 193, 204).

(f) Performance. Rate: 4-12 room air changes/hour is normally adequate general ventilation if local exhaust systems such as hoods are used as the primary method of control (194).

(g) Quality. General air flow should not be turbulent and should be relatively uniform throughout the laboratory, with no high velocity or static areas (194, 195); airflow into and within the hood should not be excessively turbulent (200); hood face velocity should be adequate (typically 60-100 lfm) (200, 204).

(h) Evaluation. Quality and quantity of ventilation should be evaluated on installation (202), regularly monitored (at least every 3 months) (6, 12, 14, 195), and reevaluated whenever a change in local ventilation devices is made (12, 195, 207). See pp 195-198 for methods of evaluation and for calculation of estimated airborne contaminant concentrations.

D. Components of the Chemical Hygiene Plan

1. Basic Rules and Procedures
(Recommendations for these are given in section E, below)

2. Chemical Procurement, Distribution, and Storage

(a) Procurement. Before a substance is received, information on proper handling, storage, and disposal should be known to those who will be involved (215, 216). No container should be accepted without an adequate identifying label (216). Preferably, all substances should be received in a central location (216).

(b) Stockrooms/storerooms. Toxic substances should be segregated in a well-identified area with local exhaust ventilation (221). Chemicals which are highly toxic (227) or other chemicals whose containers have been opened should be in unbreakable secondary containers (219). Stored chemicals should be examined periodically (at least annually) for replacement, deterioration, and container integrity (218-19).

Stockrooms/storerooms should not be used as preparation or repackaging areas, should be open during normal working hours, and should be controlled by one person (219).

© Distribution. When chemicals are hand carried, the container should be placed in an outside container or bucket. Freight-only elevators should be used if possible (223).

(d) Laboratory storage. Amounts permitted should be as small as practical. Storage on bench tops and in hoods is inadvisable. Exposure to heat or direct sunlight should be avoided. Periodic inventories should be conducted, with unneeded items being discarded or returned to the storeroom/stockroom (225-6, 229).

3. Environmental Monitoring

Regular instrumental monitoring of airborne concentrations is not usually justified or practical in laboratories but may be appropriate when testing or redesigning hoods or other ventilation devices (12) or

when a highly toxic substance is stored or used regularly (e.g., 3 times/week)(13).

4. Housekeeping, Maintenance, and Inspections

(a) Cleaning. Floors should be cleaned regularly (24).

(b) Inspections. Formal housekeeping and chemical hygiene inspections should be held at least quarterly (6, 21) for units which have frequent personnel changes and semiannually for others; informal inspections should be continual (21).

© Maintenance. Eye wash fountains should be inspected at intervals of not less than 3 months (6). Respirators for routine use should be inspected periodically by the laboratory supervisor (169). Other safety equipment should be inspected regularly. (e.g., every 3-6 months) (6, 24, 171). Procedures to prevent restarting of out-of-service equipment should be established (25).

(d) Passageways. Stairways and hallways should not be used as storage areas (24). Access to exits, emergency equipment, and utility controls should never be blocked (24).

5. Medical Program

(a) Compliance with regulations. Regular medical surveillance should be established to the extent required by regulations (12).

(b) Routine surveillance. Anyone whose work involves regular and frequent handling of toxicologically significant quantities of a chemical should consult a qualified physician to determine on an individual basis whether a regular schedule of medical surveillance is desirable (11, 50).

© First aid. Personnel trained in first aid should be available during working hours and an emergency room with medical personnel should be nearby (173). See pp. 176-178 for description of some emergency first aid procedures.

6. Protective Apparel and Equipment

These should include for each laboratory:

(a) Protective apparel compatible with the required degree of protection for substances being handled (158-161);

(b) An easily accessible drench-type safety shower (162, 169);

© An eyewash fountain (162)

(d) A fire extinguisher (162-164);

(e) Respiratory protection (164-9), fire alarm and telephone for emergency use (162) should be available nearby; and

(f) Other items designated by the laboratory supervisor (156, 160).

7. Records

(a) Accident records should be written and retained (174).

(b) Chemical Hygiene Plan records should document that the facilities and precautions were compatible with current knowledge and regulations (7).

© Inventory and usage records for high-risk substances should be kept as specified in sections E3e below.

(d) Medical records should be retained by the institution in accordance with the requirements of state and federal regulations (12).

8. Signs and Labels

Prominent signs and labels of the following types should be posted:

(a) Emergency telephone numbers of emergency personnel/facilities, supervisors, and laboratory workers (28);

(b) Identity labels, showing contents of containers (including waste receptacles) and associated hazards (27, 48);

© Location signs for safety showers, eyewash stations, other safety and first aid equipment, exits (27) and areas where food and beverage consumption and storage are permitted (24); and

(d) Warnings at areas or equipment where special or unusual hazards exist (27).

9. Spills and Accidents

(a) A written emergency plan should be established and communicated to all personnel; it should include procedures for ventilation failure (200), evacuation, medical care, reporting, and drills (172).

(b) There should be an alarm system to alert people in all parts of the facility including isolation areas such as cold rooms (172).

© A spill control policy should be developed and should include consideration of prevention, containment, cleanup, and reporting (175).

(d) All accidents or near accidents should be carefully analyzed with the results distributed to all who might benefit (8, 28).

10. Information and Training Program

(a) Aim: To assure that all individuals at risk are adequately informed about the work in the laboratory, its risks, and what to do if an accident occurs (5, 15).

(b) Emergency and Personal Protection Training: Every laboratory worker should know the location and proper use of available protective apparel and equipment (154, 169).

Some of the full-time personnel of the laboratory should be trained in the proper use of emergency equipment and procedures (6).

Such training as well as first aid instruction should be available to (154) and encouraged for (176) everyone who might need it.
© Receiving and stockroom/storeroom personnel should know about hazards, handling equipment, protective apparel, and relevant regulations (217).

(d) Frequency of Training: The training and education program should be a regular, continuing activity - not simply an annual presentation (15).

(e) Literature/Consultation: Literature and consulting advice concerning chemical hygiene should be readily available to laboratory personnel, who should be encouraged to use these information resources (14).

11. Waste Disposal Program.

(a) Aim: To assure that minimal harm to people, other organisms, and the environment will result from the disposal of waste laboratory chemicals (5).

(b) Content (14, 232, 233, 240): The waste disposal program should specify how waste is to be collected, segregated, stored, and transported and include consideration of what materials can be incinerated. Transport from the institution must be in accordance with DOT regulations (244).

© Discarding Chemical Stocks: Unlabeled containers of chemicals and solutions should undergo prompt disposal; if partially used, they should not be opened (24, 27).

Before a worker's employment in the laboratory ends, chemicals for which that person was responsible should be discarded or returned to storage (226).

(d) Frequency of Disposal: Waste should be removed from laboratories to a central waste storage area at least once per week and from the central waste storage area at regular intervals (14).

(e) Method of Disposal: Incineration in an environmentally acceptable manner is the most practical disposal method for combustible laboratory waste (14, 238, 241).

Indiscriminate disposal by pouring waste chemicals down the drain (14, 231, 242) or adding them to mixed refuse for landfill burial is unacceptable (14).

Hoods should not be used as a means of disposal for volatile chemicals (40, 200).

Disposal by recycling (233, 243) or chemical decontamination (40, 230)should be used when possible.

E. Basic Rules and Procedures for Working with Chemicals

The Chemical Hygiene Plan should require that laboratory workers know and follow its rules and procedures. In addition to the procedures of the sub programs mentioned above, these should include the rules listed below.

1. General Rules

The following should be used for essentially all laboratory work with chemicals:

(a) Accidents and spills - Eye Contact: Promptly flush eyes with water for a prolonged period (15 minutes) and seek medical attention (33, 172).

Ingestion: Encourage the victim to drink large amounts of water (178).

Skin Contact: Promptly flush the affected area with water (33, 172, 178) and remove any contaminated clothing (172, 178). If symptoms persist after washing, seek medical attention (33).

Clean-up. Promptly clean up spills, using appropriate protective apparel and equipment and proper disposal (24, 33). See pp. 233-237 for specific clean-up recommendations.

(b) Avoidance of "routine" exposure: Develop and encourage safe habits (23); avoid unnecessary exposure to chemicals by any route (23); Do not smell or taste chemicals (32). Vent apparatus which may discharge toxic chemicals (vacuum pumps, distillation columns, etc.) into local exhaust devices (199).

Inspect gloves (157) and test glove boxes (208) before use.

Do not allow release of toxic substances in cold rooms and warm rooms, since these have contained recirculated atmospheres (209).

© Choice of chemicals: Use only those chemicals for which the quality of the available ventilation system is appropriate (13).

(d) Eating, smoking, etc.: Avoid eating, drinking, smoking, gum chewing, or application of cosmetics in areas where laboratory chemicals are present (22, 24, 32, 40); wash hands before conducting these activities (23, 24).

Avoid storage, handling, or consumption of food or beverages in storage areas, refrigerators, glassware or utensils which are also used for laboratory operations (23, 24, 226).

(e) Equipment and glassware: Handle and store laboratory glassware with care to avoid damage; do not use damaged glassware (25). Use extra care with Dewar flasks and other evacuated glass apparatus; shield or wrap them to contain chemicals and fragments should implosion occur (25). Use equipment only for its designed purpose (23, 26).

(f) Exiting: Wash areas of exposed skin well before leaving the laboratory (23).

(g) Horseplay: Avoid practical jokes or other behavior which might confuse, startle or distract another worker (23).

(h) Mouth suction: Do not use mouth suction for pipetting or starting a siphon (23, 32).

(I) Personal apparel: Confine long hair and loose clothing (23, 158).

Wear shoes at all times in the laboratory but do not wear sandals, perforated shoes, or sneakers (158).

(j) Personal housekeeping: Keep the work area clean and uncluttered, with chemicals and equipment being properly labeled and stored; clean up the work area on completion of an operation or at the end of each day (24).

(k) Personal protection: Assure that appropriate eye protection (154-156) is worn by all persons, including visitors, where chemicals are stored or handled (22, 23, 33, 154).

Wear appropriate gloves when the potential for contact with toxic materials exists (157); inspect the gloves before each use, wash them before removal, and replace them periodically (157). (A table of resistance to chemicals of common glove materials is given p. 159).

Use appropriate (164-168) respiratory equipment when air contaminant concentrations are not sufficiently restricted by engineering controls (164-5), inspecting the respirator before use (169).

Use any other protective and emergency apparel and equipment as appropriate (22, 157-162).

Avoid use of contact lenses in the laboratory unless necessary; if they are used, inform supervisor so special precautions can be taken (155).

Remove laboratory coats immediately on significant contamination (161).

(l) Planning: Seek information and advice about hazards (7), plan appropriate protective procedures, and plan positioning of equipment before beginning any new operation (22, 23).

(m) Unattended operations: Leave lights on, place an appropriate sign on the door, and provide for containment of toxic substances in the event of failure of a utility service (such as cooling water) to an unattended operation (27, 128).

(n) Use of hood: Use the hood for operations which might result in release of toxic chemical vapors or dust (198-9).

As a rule of thumb, use a hood or other local ventilation device when working with any appreciably

volatile substance with a TLV of less than 50 ppm (13).

Confirm adequate hood performance before use; keep hood closed at all times except when adjustments within the hood are being made (200); keep materials stored in hoods to a minimum and do not allow them to block vents or air flow (200).

Leave the hood "on" when it is not in active use if toxic substances are stored in it or if it is uncertain whether adequate general laboratory ventilation will be maintained when it is "off" (200).

(o) Vigilance: Be alert to unsafe conditions and see that they are corrected when detected (22).

(p) Waste disposal: Assure that the plan for each laboratory operation includes plans and training for waste disposal (230).

Deposit chemical waste in appropriately labeled receptacles and follow all other waste disposal procedures of the Chemical Hygiene Plan (22, 24).

Do not discharge to the sewer concentrated acids or bases (231); highly toxic, malodorous, or lachrymatory substances (231); or any substances which might interfere with the biological activity of waste water treatment plants, create fire or explosion hazards, cause structural damage or obstruct flow (242).

(q) Working alone: Avoid working alone in a building; do not work alone in a laboratory if the procedures being conducted are hazardous (28).

2. Working with Allergens and Embryo toxins

(a) Allergens (examples: diazomethane, isocyanates, bichromates): Wear suitable gloves to prevent hand contact with allergens or substances of unknown allergenic activity (35).

(b) Embryo toxins (34-5) (examples: organomercurials, lead compounds, formamide): If you are a woman of childbearing age, handle these substances only in a hood whose satisfactory performance has been confirmed, using appropriate protective apparel (especially gloves) to prevent skin contact.

Review each use of these materials with the research supervisor and review continuing uses annually or whenever a procedural change is made.

Store these substances, properly labeled, in an adequately ventilated area in an unbreakable secondary container.

Notify supervisors of all incidents of exposure or spills; consult a qualified physician when appropriate.

3. Work with Chemicals of Moderate Chronic or High Acute Toxicity

Examples: diisopropylfluorophosphate (41), hydrofluoric acid (43), hydrogen cyanide (45).

Supplemental rules to be followed in addition to those mentioned above (Procedure B of "Prudent

Practices", pp. 39-41):

(a) Aim: To minimize exposure to these toxic substances by any route using all reasonable precautions (39).

(b) Applicability: These precautions are appropriate for substances with moderate chronic or high acute toxicity used in significant quantities (39).

© Location: Use and store these substances only in areas of restricted access with special warning signs (40, 229).

Always use a hood (previously evaluated to confirm adequate performance with a face velocity of at least 60 linear feet per minute) (40) or other containment device for procedures which may result in the generation of aerosols or vapors containing the substance (39); trap released vapors to prevent their discharge with the hood exhaust (40).

(d) Personal protection: Always avoid skin contact by use of gloves and long sleeves (and other protective apparel as appropriate) (39). Always wash hands and arms immediately after working with these materials (40).

(e) Records: Maintain records of the amounts of these materials on hand, amounts used, and the names of the workers involved (40, 229).

(f) Prevention of spills and accidents: Be prepared for accidents and spills (41).

Assure that at least 2 people are present at all times if a compound in use is highly toxic or of unknown toxicity (39).

Store breakable containers of these substances in chemically resistant trays; also work and mount apparatus above such trays or cover work and storage surfaces with removable, absorbent, plastic backed paper (40).

If a major spill occurs outside the hood, evacuate the area; assure that cleanup personnel wear suitable protective apparel and equipment (41).

(g) Waste: Thoroughly decontaminate or incinerate contaminated clothing or shoes (41). If possible, chemically decontaminate by chemical conversion (40).

Store contaminated waste in closed, suitably labeled, impervious containers (for liquids, in glass or plastic bottles half-filled with vermiculite) (40).

4. Work with Chemicals of High Chronic Toxicity

(Examples: dimethylmercury and nickel carbonyl (48), benzo-a-pyrene (51), N-nitrosodiethylamine (54), other human carcinogens or substances with high carcinogenic potency in animals (38).)

Further supplemental rules to be followed, in addition to all these mentioned above, for work with substances of known high chronic toxicity (in quantities above a few milligrams to a few grams,

depending on the substance) (47). (Procedure A of "Prudent Practices" pp. 47-50).

(a) Access: Conduct all transfers and work with these substances in a "controlled area": a restricted access hood, glove box, or portion of a lab, designated for use of highly toxic substances, for which all people with access are aware of the substances being used and necessary precautions (48).

(b) Approvals: Prepare a plan for use and disposal of these materials and obtain the approval of the laboratory supervisor (48).

© Non-contamination/Decontamination: Protect vacuum pumps against contamination by scrubbers or HEPA filters and vent them into the hood (49). Decontaminate vacuum pumps or other contaminated equipment, including glassware, in the hood before removing them from the controlled area (49, 50).

Decontaminate the controlled area before normal work is resumed there (50).

(d) Exiting: On leaving a controlled area, remove any protective apparel (placing it in an appropriate, labeled container) and thoroughly wash hands, forearms, face, and neck (49).

(e) Housekeeping: Use a wet mop or a vacuum cleaner equipped with a HEPA filter instead of dry sweeping if the toxic substance was a dry powder (50).

(f) Medical surveillance: If using toxicologically significant quantities of such a substance on a regular basis (e.g., 3 times per week), consult a qualified physician concerning desirability of regular medical surveillance (50).

(g) Records: Keep accurate records of the amounts of these substances stored (229) and used, the dates of use, and names of users (48).

(h) Signs and labels: Assure that the controlled area is conspicuously marked with warning and restricted access signs (49) and that all containers of these substances are appropriately labeled with identity and warning labels (48).

(I) Spills: Assure that contingency plans, equipment, and materials to minimize exposures of people and property in case of accident are available (233-4).

(j) Storage: Store containers of these chemicals only in a ventilated, limited access (48, 227, 229) area in appropriately labeled, unbreakable, chemically resistant, secondary containers (48, 229).

(k) Glove boxes: For a negative pressure glove box, ventilation rate must be at least 2 volume changes/hour and pressure at least 0.5 inches of water (48). For a positive pressure glove box, thoroughly check for leaks before each use (49). In either case, trap the exit gases or filter them through a HEPA filter and then release them into the hood (49).

(l) Waste: Use chemical decontamination whenever possible; ensure that containers of contaminated waste (including washings from contaminated flasks) are transferred from the controlled area in a secondary container under the supervision of authorized personnel (49, 50, 233).

5. Animal Work with Chemicals of High Chronic Toxicity

(a) Access: For large scale studies, special facilities with restricted access are preferable (56).

(b) Administration of the toxic substance: When possible, administer the substance by injection or gavage instead of in the diet. If administration is in the diet, use a caging system under negative pressure or under laminar air flow directed toward HEPA filters (56).

© Aerosol suppression: Devise procedures which minimize formation and dispersal of contaminated aerosols, including those from food, urine, and feces (e.g., use HEPA filtered vacuum equipment for cleaning, moisten contaminated bedding before removal from the cage, mix diets in closed containers in a hood) (55, 56).

(d) Personal protection: When working in the animal room, wear plastic or rubber gloves, fully buttoned laboratory coat or jumpsuit and, if needed because of incomplete suppression of aerosols, other apparel and equipment (shoe and head coverings, respirator) (56).

(e) Waste disposal: Dispose of contaminated animal tissues and excreta by incineration if the available incinerator can convert the contaminant to non-toxic products (238); otherwise, package the waste appropriately for burial in an EPA-approved site (239).

F. Safety Recommendations

The above recommendations from "Prudent Practices" do not include those which are directed primarily toward prevention of physical injury rather than toxic exposure. However, failure of precautions against injury will often have the secondary effect of causing toxic exposures. Therefore, we list below page references for recommendations concerning some of the major categories of safety hazards which also have implications for
chemical hygiene:
1. Corrosive agents: (35-6)
2. Electrically powered laboratory apparatus: (179-92)
3. Fires, explosions: (26, 57-74, 162-64, 174-5, 219-20, 226-7)
4. Low temperature procedures: (26, 88)
5. Pressurized and vacuum operations (including use of compressed gas cylinders): (27, 75-101)

G. Material Safety Data Sheets

Material safety data sheets are presented in "Prudent Practices" for the chemicals listed below. (Asterisks denote that comprehensive material safety data sheets are provided).

o Acetyl peroxide (105)
o Acrolein (106)
o Acrylonitrile
Ammonia (anhydrous)(91)
o Aniline (109)
o Benzene (110)
o Benzopyrene (112)

o Bis(chloromethyl) ether (113)
Boron trichloride (91)
Boron trifluoride (92)
Bromine (114)
o Tert-butyl hydroperoxide (148)
o Carbon disulfide (116)
Carbon monoxide (92)
o Carbon tetrachloride (118)
*Chlorine (119)
Chlorine trifluoride (94)
o Chloroform (121)
Chloromethane (93)
o Diethyl ether (122)
Diisopropyl fluorophosphate (41)
o Dimethylformamide (123)
o Dimethyl sulfate (125)
o Dioxane (126)
o Ethylene dibromide (128)
o Fluorine (95)
o Formaldehyde (130)
o Hydrazine and salts (132)
Hydrofluoric acid (43)
Hydrogen bromide (98)
Hydrogen chloride (98)
o Hydrogen cyanide (133)
o Hydrogen sulfide (135)
Mercury and compounds (52)
o Methanol (137)
o Morpholine (138)
o Nickel carbonyl (99)
o Nitrobenzene (139)
Nitrogen dioxide (100)
N-nitrosodiethylamine (54)
o Peracetic acid (141)
o Phenol (142)
o Phosgene (143)
o Pyridine (144)
o Sodium azide (145)
o Sodium cyanide (147)
Sulfur dioxide (101)
o Trichloroethylene (149)
o Vinyl chloride (150)

Appendix B to 1910.1450 - References (Non-Mandatory)

The following references are provided to assist the employer in the development of a Chemical Hygiene Plan. The materials listed below are offered as non-mandatory guidance. References listed here do not imply specific endorsement of a book, opinion, technique, policy or a specific solution for a safety or health problem. Other references not listed here may better meet the needs of a specific laboratory. (a) Materials for the
development of the Chemical Hygiene Plan:

1. American Chemical Society, Safety in Academic Chemistry Laboratories, 4th edition, 1985.

2. Fawcett, H.H. and W.S. Wood, Safety and Accident Prevention in Chemical Operations, 2nd edition, Wiley-Interscience, New York, 1982.

3. Flury, Patricia A., Environmental Health and Safety in the Hospital Laboratory, Charles C. Thomas Publisher, Springfield IL, 1978.

4. Green, Michael E. and Turk, Amos, Safety in Working with Chemicals, Macmillan Publishing Co., NY, 1978.

5. Kaufman, James A., Laboratory Safety Guidelines, Dow Chemical Co., Box 1713, Midland, MI 48640, 1977.

6. National Institutes of Health, NIH Guidelines for the Laboratory use of Chemical Carcinogens, NIH Pub. No. 81-2385, GPO, Washington, DC 20402, 1981.

7. National Research Council, Prudent Practices for Disposal of
Chemicals from Laboratories, National Academy Press, Washington, DC, 1983.

8. National Research Council, Prudent Practices for Handling Hazardous Chemicals in Laboratories, National Academy Press, Washington, DC, 1981.

9. Renfrew, Malcolm, Ed., Safety in the Chemical Laboratory, Vol. IV, J. Chem. Ed., American Chemical Society, Easlon, PA, 1981.

10. Steere, Norman V., Ed., Safety in the Chemical Laboratory, J. Chem. Ed. American Chemical Society, Easlon, PA, 18042, Vol. I, 1967, Vol. II, 1971, Vol. III, 1974.

11. Steere, Norman V., Handbook of Laboratory Safety, the Chemical Rubber Company Cleveland, OH, 1971.

12. Young, Jay A., Ed., Improving Safety in the Chemical Laboratory, John Wiley & Sons, Inc. New York, 1987.

(b) Hazardous Substances Information:

1. American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom * Environment with Intended Changes, 6500 Glenway

Avenue, Bldg. D-7, Cincinnati, OH 45211-4438.

2. Annual Report on Carcinogens, National Toxicology Program U.S. Department of Health and Human Services, Public Health Service, U.S. Government Printing Office, Washington, DC, (latest edition).

3. Best Company, Best Safety Directory, Vols. I and II, Oldwick, N.J., 1981.

4. Bretherick, L., Handbook of Reactive Chemical Hazards, 2nd edition, Butterworths, London, 1979.

5. Bretherick, L., Hazards in the Chemical Laboratory, 3rd edition, Royal Society of Chemistry, London, 1986.

6. Code of Federal Regulations, 29 CFR part 1910 subpart Z. U.S. Govt. Printing Office, Washington, DC 20402 (latest edition).

7. IARC Monographs on the Evaluation of the Carcinogenic Risk of chemicals to Man, World Health Organization Publications Center, 49 Sheridan Avenue, Albany, New York 12210 (latest editions).

8. NIOSH/OSHA Pocket Guide to Chemical Hazards. NIOSH Pub. No. 85-114, U.S. Government Printing Office, Washington, DC, 1985 (or latest edition).

9. Occupational Health Guidelines, NIOSH/OSHA. NIOSH Pub. No. 81-123 U.S. Government Printing Office, Washington, DC, 1981.

10. Patty, F.A., Industrial Hygiene and Toxicology, John Wiley & Sons, Inc., New York, NY (Five Volumes).

11. Registry of Toxic Effects of Chemical Substances, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, Revised Annually, for sale from Superintendent of documents US. Govt. Printing Office, Washington, DC 20402.

12. The Merck Index: An Encyclopedia of Chemicals and Drugs. Merck and Company Inc. Rahway, N.J., 1976 (or latest edition).

13. Sax, N.I. Dangerous Properties of Industrial Materials, 5th edition, Van Nostrand Reinhold, NY., 1979.

14. Sittig, Marshall, Handbook of Toxic and Hazardous Chemicals, Noyes Publications. Park Ridge, NJ, 1981.

© Information on Ventilation:

1. American Conference of Governmental Industrial Hygienists Industrial * Ventilation (latest edition), 6500 Glenway Avenue, Bldg. D-7, Cincinnati, Ohio 45211-4438.

2. American National Standards Institute, Inc. American National Standards Fundamentals Governing the Design and Operation of Local Exhaust Systems ANSI Z 9.2-1979 American National Standards

Institute, N.Y. 1979.

3. Imad, A.P. and Watson, C.L. Ventilation Index: An Easy Way to Decide about Hazardous Liquids, Professional Safety pp 15-18, April 1980.

4. National Fire Protection Association, Fire Protection for Laboratories Using Chemicals NFPA-45, 1982.

Safety Standard for Laboratories in Health Related Institutions, NFPA, 56c, 1980.

Fire Protection Guide on Hazardous Materials, 7th edition, 1978.

National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

5. Scientific Apparatus Makers Association (SAMA), Standard for Laboratory Fume Hoods, SAMA LF7-1980, 1101 16th Street, NW., Washington, DC 20036.

(d) Information on Availability of Referenced Material:

1. American National Standards Institute (ANSI), 1430 Broadway, New York, NY 10018.

2. American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103.

(Approved by the Office of Management and Budget under control number 1218-0131)

[55 FR 3327, Jan. 31, 1990]

* [57 FR 29204, July 1, 1992]

Goddard Procedural Requirements (GPR)

DIRECTIVE NO.	GPR 1700.2D	**APPROVED BY Signature:**	*Original Signed By*
EFFECTIVE DATE:	November 9, 2016	**NAME:**	Judith N. Bruner
EXPIRATION DATE:	November 9, 2021	**TITLE:**	Director, Safety and Mission Assurance

COMPLIANCE IS MANDATORY

Responsible Office: 360/Safety Division

Title: Chemical Hygiene Plan

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 Procedure.

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

a. This directive applies to personnel working in, visiting, or responsible for chemical laboratories involved in the "laboratory uses" of hazardous chemicals. (See Appendix A, A.15).

b. 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.

c. In this directive, all document citations are assumed to be the latest version unless otherwise noted.

d. In this directive, all mandatory actions (i.e., requirements) are denoted by statements containing the term "shall." The terms "may" or "can" denote discretionary privilege or permission; "should" denotes a good practice and is recommended but not required; "will" denotes expected outcome; and "are/is" denotes descriptive material.

P.3 AUTHORITIES

NPR 1800.1, NASA Occupational Health Program Procedure

P.4 APPLICABLE DOCUMENTS AND FORMS

a. 29 CFR 1910.132, Personal Protective Equipment
b. 29 CFR 1910.143, Nonwater Carriage Disposal Systems [Reserved]
c. 29 CFR 1910.1000, Air Contaminants
d. 29 CFR 1910.1020, Access to Employee Exposure and Medical Records
e. 29 CFR 1910.1200, Hazard Communication
f. 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories
g. American National Standards Institute (ANSI)/ISEA Z358.1-2014, , Emergency Eye Wash and Shower Equipment
h. GPR 1700.8, GSFC Hazard Communication Program
i. GPR 1840.2, Industrial Hygiene Program
j. GPR 4100.2, Hazardous Material Data Management
k. GPR 8500.3, Waste Management
l. GPR 8710.7, Cryogenic Safety
m. GPR 8730.7, Laboratory Management Program
n. GSFC Form 23-56, Low Hazard Review Checklist (Chemical Process Hazard Analysis)
o. GSFC Form 23-57, Moderate Hazard Review Checklist (Chemical Process Hazard Analysis)
p. GSFC Form 23-58, High Hazard Review Checklist (Chemical Process Hazard Analysis)
q. GSFC Form 23-64, Hazard Analysis Selection Matrix
r. Compressed Gas Association (CGA) Pamphlet-1 (P-1) 2015

P.5 CANCELLATION

GPR 1700.2C, 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

Record Title	Record Custodian	Retention
Chemical exposure monitoring, assessment, and employee notification records	Industrial Hygiene Office (IHO)	***NRRS 1/129.5** - Cut off upon employment termination. Destroy 30 years after cutoff

Records of training	Office of Human Capital Management (OHCM)	***NRRS 3/33C** - Destroy or delete 5 years after separation of employee or when no longer needed, whichever comes first
Physician Report that evaluates the employee's health status and potential exposure to a hazardous chemical	Medical and Environmental Management Division (MEMD)	***NRRS 1/127A** - Upon transfer, ship entire medical record, including x-rays, to medical office of new assignment. 30 days after separation transfer to National Personnel Records Center (NPRC), St. Louis, MO. NPRC Will destroy 75 years after birth date, 60 years after date of the earliest document in the folder if the date of birth cannot be ascertained, or 30 years after latest separation, whichever is later.
Records of safety equipment inspections and testing	Inspecting office	***NRRS 1/117A** - Retire to Federal Records Center when related property is disposed of by NASA. Destroy 5 years after retirement.
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	***NRRS 8/23.5A8** - Cut off annually. Destroy with concurrence of center or NASA counsel's office 75 years after cutoff or when no longer needed, whichever is later.
Occupational Safety and Health Administration (OSHA) Log of Work Related Injury and Illness or equivalent form.	Safety 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 (NRRS 1441.1)*

P.9 MEASUREMENT/VERIFICATION

The overall success of the Chemical Hygiene Program shall be determined by Code 360 Safety Division through assessment of the degree of compliance with this policy and legal and regulatory requirements, and the number of annual chemical hygiene related inspection findings.

PROCEDURES

1. Responsibilities

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

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

1.3 Safety 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;
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/index.php/industrial-hygiene/chemical-safety; 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 (CHO) has primary responsibility for the GSFC Chemical Hygiene Program. The CHO is appointed by the Chief, Safety Division, 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;
(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 of chemicals used in laboratories (for disposal guidance see section 2.6);
(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 (HHRs) 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 IHO, 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 Occupational Exposure Limit (OEL) in the absence of an action level), and ensure that exposure monitoring records are maintained;

g. Provide funds for procurement and repairs of laboratory facility equipment (e.g., exhaust hoods, eye washes, safety equipment, etc.) as necessary; and
h. 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 Safety Data Sheets (SDS) 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;
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 material acquisition and data management complies with the requirements of GPR 4100.2 by reviewing, verifying, and responding to periodic *Materials Data Validation Date Pending and Passed Report* request;
g. Complete Process Hazard Analysis (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 Safety Division 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, 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 Z358.1-2014 are readily available in laboratories with chemicals whose SDS 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 Safety Division 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.

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). Display LSDS in a prominent location in the laboratory when in hard copy format. Post the location of LSDS maintained in readily assessable electronic format. 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. Clearly identify the name and contact information of the Supervisor's Designee on the LSDS.

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. Generate a Chemical Hygiene Procedure for any laboratory that uses hazardous chemicals for research purposes.

Address the following eight elements of the Chemical Hygiene Procedure in accordance with 29 CFR 1910.1450:

a. Standard Operating Procedures (SOP) 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. (Chemical Safety information and assistance can be obtained by contacting the Industrial Hygiene Office, 6-6669.)

The above items should be relatively simple, usually in the form of a listing with brief explanatory information where needed. The Supervisor's /designee reviews The Chemical Hygiene Procedure and revalidate its effectiveness at least annually. Update as necessary. A template for developing the Chemical Hygiene Procedure is available on the Safety 1st Web site at http://safety1st.gsfc.nasa.gov/index.php/industrial-hygiene/chemical-safety.

2.1.2 Process Hazard Analyses (PHA)

The Supervisor's Designee identifies 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 analysis are used to assess the hazards associated with new or modified processes or operations in a laboratory environment.

The Supervisor's Designee performs 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 Safety Division and are defined on the Safety 1st Web site at http://safety1st.gsfc.nasa.gov/index.php/industrial-hygiene/chemical-safety.

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:

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

* See 1, 2, and 3 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.

(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.

Establish an HHR Committee for each laboratory operation that meets the criteria for High Hazard Review. Take HHR Committee minutes during the review and distributed to the members. The HHR Committee should consist of a chairperson, a representative from Safety Division, 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 Safety Division 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 approves 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 Supervisor's Designee includes as 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 Supervisor's Designee will provide a copy to Safety Division 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 or by calling 6-HMMS (4667);
(3) SDS available from the Hazardous Material Management System (HMMS) database and properly assigned to the laboratory location. Organizations should check HMMS for the chemicals they use, and if SDSs are not present for all chemicals in use, they can obtain the SDS from the manufacturer. Update HMMS with the information by emailing the information to GSFC-HMMS-Support@mail.nasa.gov or by calling 6-HMMS (4667), add all SDS 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 Safety Division 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

Safety Division IH function performs 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 informs 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 keep a record of the exposure evaluation in accordance with section P.8 of this directive.

2.3 Medical Consultation and Examinations.

The IHO investigated 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 are 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. The report must be submitted to the Health Unit as a permanent medical record.

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, 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, SDSs (GSFC's SDSs can be obtained from HMMS at http://hmms.gsfc.nasa.gov/findamsds.html); 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/index.php/industrial-hygiene/chemical-safety;
(5) Hazard communications (recommended annually); and
(6) Hazardous Waste Management Training (required annually in accordance with GPR 8500.3).
(7) Cryogenic systems (triennially in accordance with GPR 8710.7)
(8) Compressed gas safety (before use in accordance with CGA P-1 – 2015)
(9) Oxygen Deficiency Hazards (triennially in accordance with GPR 8710.7)

Each laboratory user whose job requires the use of PPE is required to undergo training in the proper use of that equipment before use and when previous training become obsolete because of changes in the workplace, PPE or employee demonstrates lack of knowledge of PPE. Employees who are expected to wear any type of respirator (dust mask, cartridge respirator, Self-Contained Breathing Apparatus, etc.) is required to have specific training in the use, maintenance, and disposal of respirators before using a respirator (required annually in accordance with 29 CFR 1910.134(k)(5)). Employees should also have a current medical certification (required annually in accordance with 29 CFR 1910.134(e)(1)).

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 laboratory supervisor documents 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 Z358.1-2014.

Eye washes and showers	Annually by FMD (requires FMD Work Request). Operated by users weekly in accordance with ANSI/ISEA Z358.1-2014 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 Safety Division 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.

2.6 Waste Disposal

Owning organizations manages 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 submit a request using the Electronics Management Operations Directorate (eMOD) system at https://emod.wff.nasa.gov/emod/ or email gsfc-hazwaste@lists.nasa.gov at Greenbelt; at Wallops Flight Facility (WFF) complete Hazardous Waste Disposal Inventory (HWDI), GSFC Form 23-54.

In accordance with GPR 8500.3, owning organizations considers 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 must consult MEMD.

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

Owning organizations are prohibited from pouring 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 are prohibited from using 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 Safety Data Sheets (SDS) 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, 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 <u>all</u> 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 Permissible Exposure Limits (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

CHO	Chemical Hygiene Officer
CSC	Chemical Safety Committee
eMOD	Electronics Management Operations Directorate
FMD	Facilities Management Division
GPR	Goddard Procedural Requirements
GSFC	Goddard Space Flight Center
HHR	High Hazard Review
HMMS	Hazardous Material Management System
HWDI	Hazardous Waste Disposal Inventory
IH	Industrial Hygiene
IHO	Industrial Hygiene Office
LHR	Low Hazard Review
LM	Laboratory Manager
LSDS	Laboratory Safety Documentation Set
MHR	Moderate Hazard Review
MEMD	Medical & Environmental Management Division
NPRC	National Personnel Records Center
NRRS	NASA Records Retention Schedules
SDS	Safety Data Sheets
OEL	Occupational Exposure Limit
OHCM	Office of Human Capital Management
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PHA	Process Hazard Analyses
PPE	Personal Protective Equipment
SOPs	Standard Operating Procedures
TLV	Threshold Limit Value
WFF	Wallops Flight Facility

CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
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.
D	11/09/2016	Administratively revised to comply with new requirements of 29 CFR 1910.1200.

APPENDIX B

National Aeronautics and Space Administration

Goddard Space Flight Center
Wallops Flight Facility

Current Year BEPs can be found at: https://ssopd.wff.nasa.gov/
Within the Safety Office tab, then to Emergency Management – Emergency Plans

2017 BUILDING EMERGENCY PLAN (BEP)

BUILDING F-160

Facility Operations Manager (FOM):
Name: T.J. Meyer (757) 824-1987

Alternate Facility Operations Manager (AFOM):
Name: Ralph Hickman (757) 824-2451

IMPORTANT TELEPHONE NUMBERS

Fire/Medical/Security Emergency

All emergencies……...**911 from a Wallops office phone**
757-824-1333 from a mobile phone

Non-Emergency Numbers

Fire Department/Dispatch
(Non-Emergency)…….....1300
Emergency Management Office……..1498
Employee Assistance Program (EAP) ……757-398-2374
24/7 number……800-327-3257
Environmental……..1718
Facilities (HELP Desk)……..……4357 (HELP)
Health Unit……1266
Occupational Health & Safety……1625
Protective Services……..1300

Employee Emergency Information Line

Employee Emergency Information Line……...757-824-1000
…….. 800-521-3415

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SECTION 1: INTRODUCTION

Overview

Goddard Space Flight Center (GSFC) – Wallops Flight Facility developed the Building Emergency Plan (BEP) for the protection of its employees (civil servants and contractors), tenants and visitors at this site in the event of an emergency. GSFC recognizes that reasonable precautions against incidents may not prevent their occurrence. For this reason, GSFC/WFF developed the BEP to communicate policy in regards to employee actions necessary to mitigate the effect of incidents, such as fire and medical emergencies, on building occupants.

The contents and procedures contained in this BEP meet the requirements outlined in Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.38, Employee (Building) Emergency Plans Fire Prevention Plans. Additionally, this BEP follows the guidelines established by the United States Department of Homeland Security's National Incident Management System (NIMS), and the National Fire Protection Association's Standard on Disaster/Emergency Management and Business Continuity Programs (NFPA 1600, 2007 Edition).

BEPs shall be made available to all building occupants and on the Wallops Flight Facility/ Safety Office/Emergency Management portion of https://ssopd.wff.nasa.gov/. Copies of the BEPs shall be made available to members of the WFF Fire Department.

Statement of Policy

The BEP is designed to provide an organized and managed response to natural and man-made incidents that are not a part of everyday work activities. This plan identifies actions taken by employees to ensure personal safety and the safety of others during emergencies.

The policy of GSFC/WFF is that the information contained within this plan be distributed to all employees for their use and employees are trained and exercised annually on its contents. All GSFC/WFF personnel are required to understand the contents of this document and to abide by the responsibilities delegated herein.

Roles and Responsibilities

Building Emergency and Evacuation Planning

WFF Executive Management is responsible for the development of policies regarding the BEP. WFF delegates the responsibility of planning for emergencies and evacuations to the WFF Safety Office/Emergency Management (EM) section.

WFF EM will coordinate with Code 228, Code 250 and the WFF Fire Department to schedule, plan, evaluate, and document the required drills and plan reviews. WFF EM

will act in an advisory capacity and communicate changes in GSFC's policy regarding emergency and evacuation planning to applicable personnel. EM will maintain a comprehensive listing of personnel with self-identified specific needs (building listing only – see Forms and Handouts).

Effectively implementing these policies are the responsibility of the following:

Facilities Operations Manager (FOM):

- Update BEPs under their purview at least annually and whenever points of contacts are changed using the template provided by the Emergency Management office.

Supervisors:

- Notify employees to complete annual employee BEP training.
- Identify Mobility Assistants and their alternates to assist self-identified individuals with specific need(s) during evacuations.
- Coordinate a meeting between each specific needs person and their designated Mobility Assistants to review emergency evacuation procedures and develop a personal evacuation plan.

Wardens (Floor/Area):

- Know who their FOM and his/her alternate(s) are, and serve as the FOM if he/she and the alternate are unavailable during an emergency.
- Carry out the activities as described within this document within their area of responsibility.

Mobility Assistants (as appropriate):

- Review emergency evacuation procedures and the personal evacuation plan with their self-identified person with a specific need during evacuations.
- Provide assistance to their self-identified person with specific needs during drills and evacuations.

All Employees:

- Know who their FOM and Warden, and their alternates are. This information is listed in Appendix B: FOM/Warden Roster.
- Carry out the activities as outlined in Section 5: Employee Emergency Action Plan and, if applicable, the Critical Operations Evacuation Procedures (Attachment C), before, during and after emergencies.
- Complete the initial and annual BEP training to familiarize themselves with the contents of their BEP.
- Participate in the annual building evacuation drill.

SECTION 2: EMERGENCY COMMUNICATIONS

Phoning in an emergency at Wallops:

Call **911** from a Wallops office phone or **757-824-1333** from a mobile phone to report an emergency.

- Be prepared to answer the following questions:
  1. Nature of the emergency (e.g. fire, smell of smoke, medical emergency);
  2. Building name or number, floor/room or area;
  3. Your name and call back number; and
  4. Describe the situation.
  5. For medical emergencies, the dispatcher will request additional information:
  6. Nature of the medical emergency (e.g. conscious/unconscious, breathing/not breathing);
  7. Victim's age (approximate if uncertain) and gender; and
  8. What help, if any, is being given.

  DO NOT HANG UP UNTIL THE DISPATCHER DOES!

- Send someone to meet and escort emergency response personnel to the incident location.
- If you are the person who called 911: Identify yourself to emergency response personnel upon their arrival and be prepared to provide additional details regarding the incident. If the area, floor or building has been evacuated, notify your FOM or Warden. He/she will direct you to the Incident Command Post. Be prepared to provide additional details to emergency response personnel.

Emergency Notification Systems utilized by WFF:

The following systems or devices are used by emergency response personnel, FOMs and Wardens to communicate emergency information and warnings to building occupants during an emergency or disaster.

- WFF Emergency Public Alert System (EPAS): Notifications from the building's emergency alerting system will be made via building alarm systems, email, texts, and Wallops office phones.
- WFF Emergency Warning System (EWS): Outside speakers will notify personnel of weather type alerts or other emergencies through a series of 7 outside speaker systems located on the Main Base, Mainland and Island facilities.
- WFF ECHO Notification System: Severe weather notifications and other possible emergency events information are issued via emails and text messaging to the WFF community.

- WFF Intercom System: Notifications from the Wallops Intercom system may be used to provide verbal emergency communications to building occupants during emergencies.
- NASA Emergency Notification System (ENS): Notifications may be made to the entire WFF community during facility-wide emergencies. These notifications will be made primarily via e-mail and text. The telephone system (work, mobile and/or home) will be used when applicable.

There may be personnel who are unable to hear, see and/or receive these emergency notifications; we ask all employees to ensure everyone in their area is aware of the notification.

Alarm Systems utilized by WFF:

- Evacuation/Fire Alarm System: Manual pull stations are located throughout the buildings for use by building occupants during an emergency where building evacuation is required. Alarms are also activated when a flow is detected in the sprinkler system. These alarms will sound as a rhythmic 'gonging' alert, a pulsing horn, or loud "clanging" bells; each system is augmented by a bright strobe light for the hearing impaired. Electronic message boards may scroll emergency information in hallways of occupied buildings. The building fire alarm system is continuously monitored for alarm by WFF Dispatch.

- Local Hazard Alarm: Many areas at Wallops are equipped with local hazard alarms. These alarms will typically sound as a continuous loud buzzer. A local hazard alarm indicates that an unsafe condition is developing and needs to be investigated by persons familiar with the area and operations. Local hazard alarms are usually activated by smoke detectors but may also be associated with chemical detection systems and special processing equipment. Employees should familiarize themselves with local alarms in their work areas, if applicable, as alarm styles vary throughout the facility.

Office of Communications:

Code 130, the Office of Communications, will provide information on the Center's operating status to the Wallops community via a number of avenues. Wallops personnel should always call **757-824-1000** or toll free at **1-800-521-3415** for current operating status updates.

Secondary notification methods that may be utilized:

- Wallops-All emails;
- NASA Wallops website http://www.nasa.gov/centers/wallops/home/index.html
- NASA Wallops Facebook http://www.facebook.com/NASAWFF

Notification Backup Systems:

In the event any of the above listed notification systems fail during an emergency, or if a redundant method of communication and warning is necessary, any one of the following methods will be used to alert and/or inform employees:

- Portable Loudspeakers: Emergency response personnel and FOMs may use handheld portable loudspeakers to provide direction and information to employees.
- Vehicular Public Address (PA) Systems: Emergency response personnel may use vehicle PA systems to provide direction and information to employees.
- Verbal Notification: Notification may be issued verbally through FOMs, Wardens and emergency response personnel. Verbal notification is typically used when very specific actions are required in a limited area (a single floor or part of a building) or as a backup method for all other systems.

SECTION 3: ANNUAL EMPLOYEE TRAINING

Emergency and evacuation training required for all employees is provided on an annual basis. Training and drills allow employees to develop and maintain the personal safety skills necessary during an emergency.

Employee BEP Training

All new permanent employees must complete the training within six months of starting employment.

Supervisors may have employees complete the GSFC BEP Training in one of two ways: (1) having employees complete the online training in SATERN; or (2) have employees review the BEP via email.

Annual Evacuation Drill

All employees should participate in an annual Evacuation Drill. The WFF Fire Department, in coordination with the FOMs, will schedule and conduct the drill. These drills are important components of emergency planning and should be taken seriously.

Immediately following the drill, Wardens are to evaluate the drill with those who participated to identify strengths, lessons learned, and best practices. FOMs and Wardens are required to complete a Drill Evaluation Form. FOMs will review and submit completed forms to the Incident Commander upon completion of the drill.

WFF may also participate in the annual statewide Tornado Drill. Details of this drill will be sent ahead of time to all WFF employees via email.

WFF may also participate in the annual Southeastern US Regional Earthquake Drill. Details of this drill will be sent ahead of time to all WFF employees via email.

SECTION 4: EVACUATING PERSONS WITH SPECIFIC NEEDS

Identifying Occupants Requiring Assistance

Any person with a disability, temporary or permanent, or other condition that would require them to need assistance during an evacuation is considered to have “specific needs”. Specific needs is further defined as anyone who, without the assistance of another person, would have difficulty evacuating or relocating to a safe location, or would slow down evacuation of other occupants within the building. This may include, but not limited to:

- Persons with a mobility impairment who use a wheelchair, cane, crutches, or other mobility device
- Persons recovering from surgery or medical procedure
- Persons with a hearing or sight impairment
- Women who are pregnant

Program Guidelines

The privacy and confidentiality of persons with specific needs during an evacuation must be respected. As such, individuals **cannot** be required to disclose they have specific needs. Therefore, planning emergency evacuation of persons with specific needs must be predicated on **self-disclosure**. Occupants who have specific needs during an evacuation must request assistance from the Emergency Management section of the WFF Safety Office/ Emergency Management, Code 803, in writing, using the **Self Certification of Specific Needs Form** so that advance arrangements can be made to meet their needs. This information will only be used to assist emergency response personnel in locating and assisting persons with specific needs during an emergency.

Mobility Assistants, or “buddies”, shall be recruited in advance from within the same building as the self-identified person with a specific need to assist them during an evacuation.

There may be instances where no assistance is requested in advance, such as visitors with specific needs, or persons may develop specific needs during an emergency/disaster. We ask all employees to always help others who may need assistance during any emergency or notify emergency responders that assistance is

needed. **In all cases Mobility Assistants, or "buddies", must be recruited with a ratio of at least two Assistants for every individual who requires evacuation assistance.** In assisting persons with specific needs during an evacuation, always consult with the person regarding how best to be of assistance.

Building Evacuation Plans will identify the location of Rescue Assistance Area(s) in the building where people, unable to exit because of stairs, may await evacuation assistance from assigned Mobility Assistants or emergency response personnel.

A list of self-identified individuals requiring evacuation assistance and their specific needs is located in the files of the Emergency Management section of the WFF Safety Office. This list is NOT made available to the general public. This information is for emergency use only and will only be used to prepare for safe and quick evacuation in emergency situations and will be secured according to NASA Procedural Requirements (NPR) 1382.1: NASA Privacy Procedural Requirements, and NASA Rules and Consequences Policy Relative to Safeguarding PII.

SECTION 5: EMPLOYEE EMERGENCY ACTION PLAN

This Section discusses the actions to be taken by Wallops employees in preparation for and in response to specific types of emergencies. For emergencies not specifically addressed here, building occupants should follow the direction of their FOM, Warden and emergency response personnel.

Additional information on family and personal preparedness may be found on the Safety Office/Emergency Management/Emergency Preparedness portion of the SSOPD portal https://ssopd.wff.nasa.gov/.

Before the Emergency:

Preparing for Emergency Evacuations

- Locate your primary and secondary exits detailed in Attachment A - Emergency Evacuation Plan.
- Locate your Assembly and Rescue Assistance Areas detailed in Attachment A - Emergency Evacuation Plan.
- Know who your FOM and Wardens are.
- Identify people who may require assistance in an evacuation.
- Know your emergency phone numbers.
- Keep halls and emergency exits clear of boxes/other items.
- Report hazardous conditions as you become aware of them.

Preparing to Shelter-In-Place

- Determine the locations of your Shelter-in-Place (SIP) areas.
- Be prepared to perform SIP tasks if pre-designated to do so by your supervisor/Warden.
- Determine the safest place to SIP from tornadoes.
- Determine the safest place to SIP from earthquakes.

Specific Threat Actions

The threat or actuality of an emergency requires different actions that are dependent upon the type and immediacy of the threat. Listed here are various types of threats that may impact Wallops. Remember that no matter the type of threat, the **first** priority is to contact emergency responders at **911** from a Wallops office phone or **757-824-1333** from a mobile phone

❖ **Bomb Threat**

Employee response to a bomb threat is primarily data collection to provide to law enforcement agencies. Once a bomb threat is reported, law enforcement officers will take command of the situation. Following the advice of law enforcement agencies, WFF Executive Management will determine if an evacuation is necessary.

Employee Actions:

- Remain calm and keep the caller on the line as long as possible; be courteous and do not interrupt the caller.
- Repeat questions if necessary.
- If possible, signal a co-worker to indicate that you have received a bomb threat.
- Complete a Bomb Threat Form or write down as much information as possible to provide to Protective Services.
- Contact **911** from another Wallops office phone or **757-824-1333** from a mobile phone immediately once the call has been completed.
- Don't allow the phone line to be used again so that law enforcement has an opportunity to trace the call.
- Follow Emergency Evacuation procedures as directed by emergency response personnel.
- Notify your supervisor and/or the FOM as soon as possible.

A Bomb Threat Checklist is provided on the next page for you to copy and place beneath your office phone.

PROTECTIVE SERVICES DIVISION

Bomb Threat

Communications Data Form

FBI Bomb Data Form — *Place this card under your telephone*

Questions to Ask:

1. When is the bomb going to explode?
2. Where is it right now?
3. What does it look like?
4. What kind of bomb is it?
5. What will cause it to explode?
6. Did you place the bomb?
7. Why?
8. What is your address?
9. What is your name?

Exact wording of the threat:

_____

_____

_____

_____

Sex of the caller: _____

Race: _____ Age: _____

Length of call:

Number at which call was received:

_____

Time: Date:

Caller's Voice

- ☐ Calm
- ☐ Angry
- ☐ Excited
- ☐ Slow
- ☐ Rapid
- ☐ Soft
- ☐ Loud
- ☐ Laughter
- ☐ Crying
- ☐ Normal
- ☐ Slurred
- ☐ Familiar
- ☐ Nasal
- ☐ Stutter
- ☐ Lisp
- ☐ Raspy
- ☐ Deep
- ☐ Ragged
- ☐ Clearing throat
- ☐ Deep breathing
- ☐ Voice disguised
- ☐ Distinct
- ☐ Accent

If the voice is familiar, who does it sound like? _____

Background Sounds

- ☐ Street Noises
- ☐ Crockery
- ☐ Voices
- ☐ Static
- ☐ Local
- ☐ House noises
- ☐ Booth
- ☐ Factory Machinery
- ☐ Animal noises
- ☐ PA System
- ☐ Music
- ☐ Long distance
- ☐ Motor
- ☐ Office machinery
- ☐ Other: _____

_____

Threat Language

- ☐ Well spoken (educated)
- ☐ Incoherent
- ☐ Foul
- ☐ Taped
- ☐ Irrational
- ☐ Message read by threat maker

Remarks:

Report call immediately to 911 from a Wallops office phone or 757-824-1333 from your mobile phone

Your Name: _____ **Position:** _____

Call Back Phone #: _____ **Building/Room #:** _____

❖ Earthquake

Employee Actions:

- IF INSIDE, STAY INSIDE. IF OUTSIDE, STAY OUTSIDE.
  Do not run indoors/outdoors! You will be in danger from falling glass and other debris as you leave/enter the building.

- <u>If you are indoors:</u> Drop to the floor; Take Cover under a sturdy object, such as a desk or table; if no such cover is available, get down next to an interior wall and cover your head and neck with your arms; stay away from glass, masonry walls and other potential falling objects; Hold onto a sturdy desk/table – be ready to move with it until the shaking stop

- <u>If you are outdoors:</u> Move to a clear area if you can safely do so; avoid power lines, trees, overhead signs, buildings, vehicles, and other hazards.

  <u>If you are driving:</u> Pull over to the side of the road, stop, and set the parking brake. Avoid bridges, power lines, overhead signs and other hazards. Stay inside the vehicle until the shaking is over. If a power line falls on your vehicle, stay inside the vehicle until a trained person removes the wire.

- <u>If you are on the Island:</u> Follow the procedures outlined above. If you are on the beach, go immediately to higher ground once the shaking stops. Pay particular attention to your surroundings due to the potentially large number of hazards that now may be present. Do not attempt to leave the Island until safety personnel deem the bridge safe to cross.

  After the Shaking Stops:

- When the shaking stops, look around to make sure it is safe to move. Evacuate the building only if there is immediate danger from fire, signs of structural damage, it is unsafe to remain indoors, and/or instructed to do so by the FOM, Warden or emergency response personnel; follow Emergency Evacuation procedures.
- DO NOT use the elevators.
- Check for injured, missing or trapped persons.
- Call **911** from a Wallops office phone or **757-824-1333** from your mobile phone for life-threatening or medical emergencies.
- Safely check for building damage and any hazards (utility disruption, broken pipes, chemical spills, broken glass, etc.). If you are evacuating a building, check for damage as you exit if you can safely do so.
- Report to your FOM, Warden or emergency response personnel if there are any injured, missing or trapped persons; report if there is any building damage and/or hazards. If the building is evacuated, Warden(s) will be at the Assembly Area(s).
- Refrain from using landline and mobile phones, except to report life-threatening emergencies; hang-up phones that have shaken off the hook.

- Give aid to those in need. If personnel in your building or Assembly area need assistance, notify your Warden.
- Be aware that aftershocks may occur. Aftershocks are a common occurrence following an earthquake. If the stability of the building is in doubt, leave the area.
- Never use an open flame for light following an earthquake.
- Shutdown systems which may be damaged from the surge of power if power has been lost or is unstable.
- Do not touch any damaged or downed electrical power lines.
- Look around the work area following an earthquake; return the work area to a normal condition by returning phones to their cradles, pushing in open drawers, etc.
- Be patient - if an earthquake has occurred, there may be a delayed response by emergency responders as they may be attending to more critical situations. Emergency response personnel will make every effort to respond to emergency situations as rapidly as possible and to keep personnel informed on the status of the emergency.

❖ Emergency Evacuations

Employee Actions:

- If a condition is identified which requires evacuation, immediately alert others in the area, sound an alarm (if not already present), and begin to exit; begin evacuation any time you:
  - Hear an alarm;
  - See smoke;
  - See flames;
  - Witness an explosion; or
  - Witness sprinkler activation.
- Follow instructions to evacuate.
- Proceed to the nearest safe exit.
- If smoke is present, stay low to the floor.
- **Do not use the elevator!**
- Provide help to those who need assistance; non-ambulatory people may require special attention.
- The Warden will check areas to ensure that all personnel have been notified and have evacuated.
- Exit the building and go to the identified Assembly Area listed on the posted building Emergency Evacuation Plan and STAY with your group. DO NOT leave the area unless instructed to do so by your Warden or emergency response personnel.
- Check-in with your Warden.
- Wait for instructions at the Assembly Area from your Warden – DO NOT go back into the building until instructed to do so by your Warden or emergency response personnel.

Precautions and guidance

- Evacuations should always be performed in as calm a manner as possible; running, pushing, shouting, and other aggressive behavior should be avoided.
- Personnel are responsible for the safe evacuation of visitors under their charge and common sense should dictate the level of effort required to accommodate orderly evacuation of visitors.
- Evacuations should be accomplished without stopping to retrieve briefcases, coats, lunches, etc. Take only the necessary steps to:
  1. Secure critical operations, hazardous materials or classified information; and/or
  2. De-energize or move equipment left in an unsafe position - this also applies to any conditions within the building such as cooking, stacking of materials, etc.
- On stairs, ascend/descend in a single file line on the right hand side of the stairwell, grasping the hand rail.
- If injuries occur in the stairwell during evacuation and must be treated immediately, treat any injured on the nearest stairwell landing, not on the stairs, if possible; otherwise, assist the injured to the Assembly Area for treatment.

❖ Fire, Visible Smoke, Sprinkler Activation, Explosion

Employee Actions:

- If an alarm or other notification is heard, alert others in your area to evacuate using the nearest safe stairwell or exit – sound an alarm if not already present (use the manual pull station, or if not functioning, shout).
- **Do not use the elevator!**
- Confine the fire if possible (i.e., close as many doors as possible as you leave the area; do not prop doors open).
- Instruct others to stay low if smoke is present.
- Check doors for heat before opening (use back of your hand, start at bottom of door); if the door is hot, do not open.
- Call **911** from a Wallops office phone or **757-824-1333** from your mobile phone immediately.
- If people refuse to evacuate, move on and report them to your Warden.
- Exit the building and go to the identified Assembly Area listed on the posted building Emergency Evacuation Plan and STAY with your group – DO NOT leave the area unless instructed to do so by your Warden or emergency response personnel.
- Check-in with your Warden.
- Wait for instructions at the Assembly Area from your Warden – DO NOT go back into the building until instructed to do so by your Warden or emergency response personnel.

Precautions and Guidance

- Actions taken on an employee's part to use a portable fire extinguisher should be done so only after local notification has been given, evacuation has begun, and WFF Dispatch has been notified. Extinguishers should be used ONLY by:
    1. Those who have been trained WITHIN THE LAST 12 MONTHS on fire extinguisher use;
    2. And who feel it is safe to do so;
    3. And who feel comfortable to do so.

    If a fire extinguisher is used (per your training), remember to always leave a 'safe exit' - never exit through a fire.
- Be prepared to provide information to emergency response personnel as to the location of the fire and possible location of occupants.
- Heat and toxic products of combustion (smoke) are the primary dangers of a fire.
- Smoke and hot gases will accumulate near the ceiling. If an evacuation must take place through a smoke-filled area, stay low to the floor.
- Check doors for heat before opening:
    1. Use the back of your hand and start checking at the top of the door - if hot, do not open.
    2. Close all doors, but DO NOT LOCK.
- If you are trapped inside a room or area:
    1. Confine the fire or smoke by closing as many doors as possible between you and the fire – stay or move to a safe location.

2. Wedge a wet towel or cloth material along the bottom of the door to keep smoke from entering the area.
3. If windows are operable and you must have air, open the window; break the window as a last resort, as it will become impossible to close it if necessary.
4. Leave a signal, such as a towel out the window, to get the fire department's attention - if there is a phone and it is still working, dial **911** from a Wallops office phone or **757-824-1333** from your mobile phone immediately.

❖ Hazardous Material Spill/Release

Personnel using hazardous materials in the workplace must know storage, handling, and emergency procedures of all materials they use (refer to SDS or HMMS for this information). If a spill/release should occur, all personnel aware of the situation must take the necessary steps to prevent injuries and damage to property or the environment.

Hazardous material spills/releases may require the evacuation of an area and/or building(s).
For non-emergency hazardous material safety concerns contact Environmental at 757-824-1718.

Employee Actions:

- Dial **911** from a Wallops office phone or **757-824-1333** from your mobile phone to notify Dispatch immediately for all spills/releases that may threaten personnel, property or the environment.
- Alert others in the area and begin to evacuate the area where the release has occurred.
- Activate the building alarm and follow EMERGENCY EVACUATION procedures if the spill/release:
  1. Contaminates more than one room;
  2. Has very toxic or flammable vapors; and/or
  3. May cause immediate threat to human life.
- Take appropriate steps to ensure no one evacuates through the contaminated area – secure the area by closing doors and posting danger signs.
- Assist injured or contaminated individuals - Avoid contact as much as possible.
  1. Start any required first aid immediately – Follow SDS protocols.
  2. Avoid contact as much as possible.
  3. If you perceive a life-threatening or medical emergency, dial **911** from a Wallops office phone or **757-824-1333** from your mobile phone **immediately.**
  4. If possible, obtain hazardous material safety information from SDS, HMMS or other hazardous material information for emergency response personnel (product name, manufacturer, phone number, etc.).

Precautions and Guidance

- DO NOT attempt to contain or clean up the spill/release - ONLY personnel trained to respond to hazardous material spills/releases are allowed to do so.
- Turn off heat or ignition sources if appropriate.
- Be prepared to provide information to responding agencies as to the location of the spill/release and the material(s) involved.

❖ Medical Emergencies

Injuries may be defined as minor and serious. Minor injuries are those such as routine bumps, bruises, cuts, and scrapes that are reportable to a supervisor and possibly the Health Unit. These require only basic first aid to prevent further injuries or infections. Serious injuries are defined as illness or other medical emergencies that may be life-threatening and/or require immediate transport of a person to an emergency medical facility.

Employee Actions:

- Survey the scene to determine if it is safe for you to help.
- Confirm if airway is open and victim is breathing.
- For serious injuries, call **911** from a Wallops office phone or **757-824-1333** from a mobile phone or direct someone to dial immediately.
- If trained to do so and the condition is life-threatening, provide immediate care until responders arrive. Always use appropriate barriers (gloves, pocket mask/shield, etc.
- Stay with victim until emergency response personnel arrive.
- Be prepared to provide information regarding the situation upon arrival of the emergency responders.
- Direct someone to meet the responding emergency personnel and assist them by leading them to the victim - hold an elevator in the lobby for use by emergency response personnel, if appropriate.
- Notify the employee's supervisor as soon as possible.

Precautions and Guidance

- Never give anything to eat or drink to personnel who are injured or ill.
- Make the injured as comfortable as possible but NEVER move anyone who is suspected of having a head, neck or back injury.
- Take the necessary steps to protect yourself and the patient against the transmission of communicable diseases.
- If a situation occurs that necessitates an evacuation to save a life, immediately remove the injured victim regardless of their injury.
- Provide assistance to responding emergency personnel; do not get in their way
- If you call for medical assistance, stay on the phone line to respond to any and all questions. Do not hang up. Allow the dispatcher on the other end to hang up first.

❖ Power Outage

Employee Actions:

- Do not panic - use emergency lighting.
- Turn off all light switches, except one (so you know when power is restored).
- Unplug computers and other equipment sensitive to power spikes and surges.
- Turn off coffee pots and other appliances.
- Stay near your area and await further instructions from your Warden or FOM; do not leave the facility unless instructed to do so by your supervisor.

Precautions and Guidance

- Follow the instructions of a Warden or FOM (i.e. Evacuate, Shelter in Place…)
- Never use an open flame to produce light.
- If in an unlit area or as darkness approaches, evacuate to an Assembly Area before it gets too dark to safely find the way.

❖ Shelter-In-Place (SIP)

When Wallops is affected by certain weather conditions, a hazardous material spill/release, active shooter, or other like emergencies, sheltering in place actions can provide short term protection to personnel.
Sheltering-in-place actions are most effective when planned in advance. In emergency situations, you may be directed to:

1. Evacuate;
2. SIP in your office/current location;
3. Or SIP in a pre-designated SIP location. Pre-designated SIP locations are identified in your Building Evacuation Plan.

For certain situations, such as a hazardous chemical spill, occupants may be notified to SIP in their pre-designated SIP location and “Seal the Room”. Wardens will direct pre-designated trained personnel to lock window/doors, seal windows/vents/doors, and turn off air conditioning/fans.

Employee Actions

- Close your office windows.
- Close your office door.
- Go to your pre-designated ‘shelter-in-place area’ as directed.
- Wait for further instructions at the ‘shelter-in-place area’
- When an “all clear” announcement is made, follow FOM or Warden’s instructions.

❖ Suspicious Package/Suspicious Mail

Employee Actions:

- Do not touch, move or cover the object.
- Alert others in the area and evacuate the immediate area.
- Report the incident to **911** from a Wallops office phone or **757-824-1333** from a mobile phone immediately.
- Get a good description (size, color, markings, noises made, e.g. ticking); provide exact location (floor, room number, location in room).
- Do not use a radio, cell phone, or battery operated bullhorn in the area (this may detonate the device).
- Evacuate the floor or entire building only if instructed to do so by emergency response personnel and follow EMERGENCY EVACUATION procedures.
- If directions are not given to evacuate the building, control entry to the area until relieved of responsibility or given further instructions from emergency response personnel.

❖ Tornado

Employee Actions:

- In the event of a Tornado Warning, seek shelter immediately. Basements provide the best protection;
- If underground shelter is not available, go into a windowless interior room or hallway on the lowest floor possible; and
- Stay away from windows, doors and outside walls. Go to the center of the room.
- If you are in a mobile work trailer, abandon this trailer and go to the nearest permanent, sturdy building immediately.
- If you are caught outdoors, seek shelter in the nearest permanent, sturdy building.
- If you cannot quickly walk to a sturdy building:

1. Immediately get into a vehicle, buckle your seat belt and try to drive to the closest permanent, sturdy building.
2. If flying debris occurs while you are driving, pull over and park. Now you have the following options as a last resort:
    A. *Stay in your vehicle with the seat belt on. Put your head down below the windows, covering with your hands along with a blanket or coat if possible.*

    B. *If you can safely get noticeably lower than the level of the roadway, exit your car, and lie in that area, covering your head with your hands.*

Your choices should be driven by your specific circumstances. Stay in the Shelter-In-Place location until the danger has passed awaiting further instructions from emergency response personnel. If your building has been damaged during the tornado, you will be directed by emergency response personnel to follow EMERGENCY EVACUATION procedures. Evacuate with extreme caution and be aware of safety hazards caused by the tornado.

❖ Workplace Violence

Employee Actions:
If you witness a workplace violence incident or if you encounter a person behaving in a manner that causes you to fear your own or another's safety, you should:

- Immediately contact **911** from a Wallops office phone or **757-824-1333** from a mobile phone or have someone call for you. This includes:
  1. Crimes in progress, violent incidents or specific threats of imminent violence;
  2. If an individual:
     Makes threats of physical harm toward you, others, or him/herself;
     Has a weapon; and/or
     Behaves in a manner that causes you to fear for your own or another's safety.
- Use a phone out of sight/hearing of the individual; Protective Services will respond and take appropriate action.
- Do not attempt to intervene physically or deal with the situation yourself. It is critical that Protective Services take charge of any incident that can or does involve physical harm.
- If it is an ongoing situation (hostage: person with a weapon), employees should immediately evacuate the area of the incident; Supervisors are responsible for accounting for their employees.
- The area of the incident should be secured and left undisturbed; employees who witnessed the incident should be available to be interviewed by Protective Services.

❖ Workplace Violence: Active Shooter

The Department of Homeland Security recommends the following guidelines: **RUN. HIDE. FIGHT.**

Employee Actions:

- Whenever possible, **RUN**. Get away from the gunshots first then contact **911** from a Wallops office phone or **757-824-1333** from a mobile phone immediately. DO NOT LINGER IN THE AREA; DO NOT GO TO THE ASSEMBLY AREA.
- If unable to RUN, then **HIDE OUT**. Lock or barricade yourselves to shelter-in-place in your office/current location if possible to prevent entry from the shooter.
- If you cannot barricade yourself inside and the suspect comes in, then, using your best judgment, work as a team with others, and make a plan to **FIGHT** the shooter(s). Use whatever you can to prevent the shooter from achieving the goal of shooting people.

Attachment A: Emergency Evacuation Plan

Emergency Evacuation Plan for Personnel in Building F-160

1. All personnel in F-160 should familiarize themselves with the evacuation routes and assembly areas posted at all exits throughout the building.
2. Personnel should become familiar with the location of the nearest fire alarm and telephone in their area. In the event of an emergency, you should activate the nearest fire alarm and/or dial 911 on a telephone. Upon arrival of emergency response personnel, direct them to the location of the emergency.
3. Spread the alarm – pass the word. Notify fellow personnel, the appropriate area warden, and the FOM of the emergency as soon as possible.
4. If time permits, close all doors and windows to confine the emergency and to prevent drafts. Do not endanger yourself or others in this effort.
5. If you are qualified and if time permits use the proper equipment (e.g. fire extinguisher, spill kit) to contain the emergency pending the arrival of emergency responders. Do not endanger yourself or others in this effort.
6. Wardens should familiarize themselves with personnel located within their responsibility area. After searching their respective areas and accounting for all persons, wardens should report to the FOM at the command post.

F-160 Emergency Wardens and Areas of Responsibility

Building F-160

T.J. Meyer, FOM/Head Warden

Ralph Hickman, Alternate FOM

Center Hallway, North

David Liu, Warden

Teena Haugh, Alternate

Center Hallway, South

Marianne Simko, Warden

Shari Miller, Alternate

Center Wing/Calibration Laboratory

Ralph Hickman, Warden

William Lankford, Alternate

West Wing, North/Environmental

T.J. Meyer, Warden

Susan Dunn, Alternate

West Wing, South/NASA Health Unit

Dr. Marc Gaines, Warden

Michelle Bradford, Alternate

West Wing, South/Security

Tom Northam, Warden

Jean Lopez, Alternate

East Wing/Chemistry Laboratory

Monica Borowicz, Warden

Brian Cornwell, Alternate

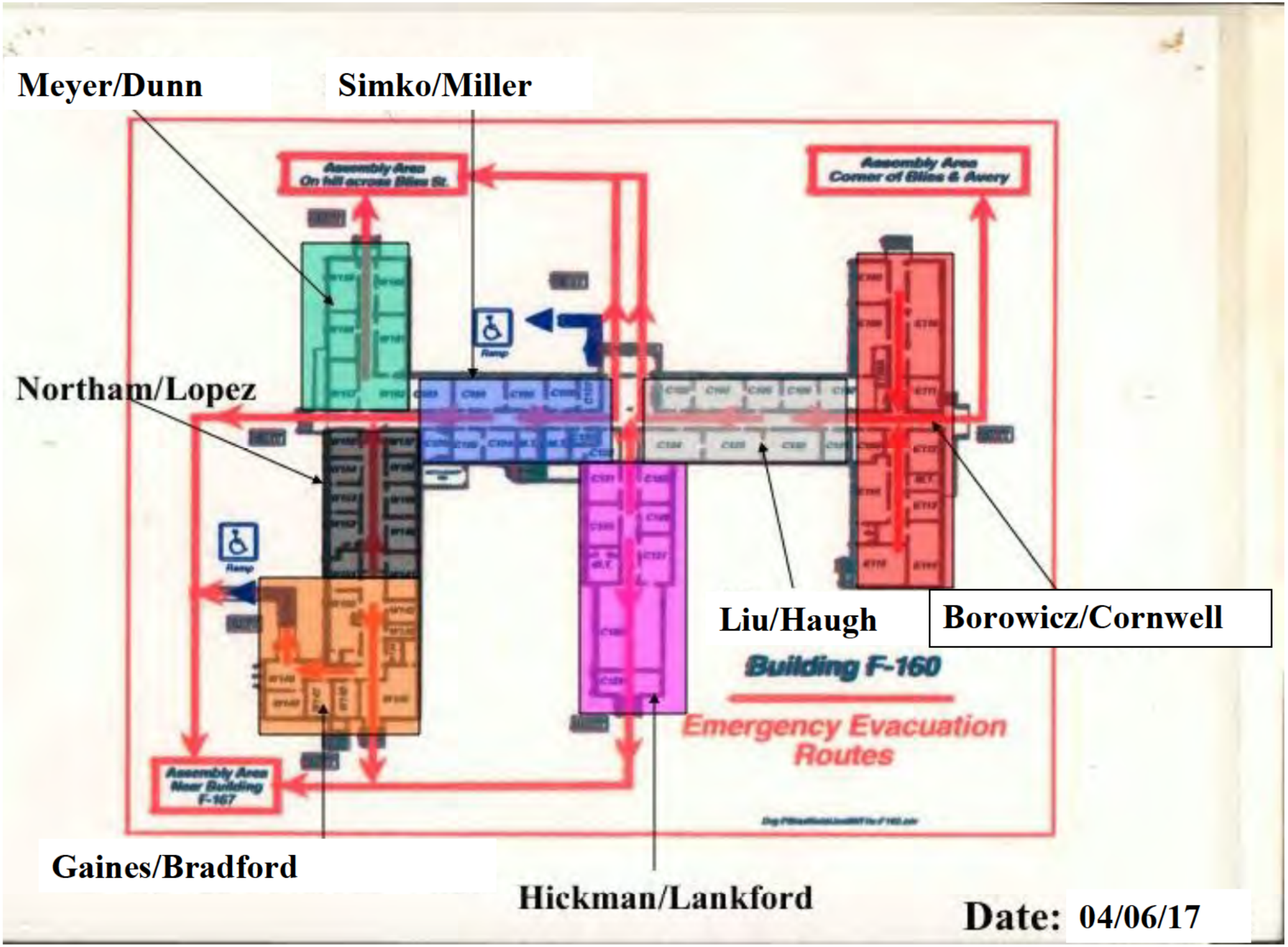
An image depicting warden areas of responsibility and evacuation routes shall always accompany this plan and be posted conspicuously.

If you have any questions concerning this emergency evacuation plan, call TJ Meyer at extension 1987.

T.J. Meyer

F-160 FOM

April 2017


Meyer/Dunn
Simko/Miller
Northam/Lopez
Liu/Haugh
Borowicz/Cornwell
Gaines/Bradford
Hickman/Lankford
Assembly Area On hill across Bliss St.
Assembly Area Corner of Bliss & Avery
Assembly Area Near Building F-167
Ramp
Ramp
Building F-160
Emergency Evacuation Routes
Date: 04/06/17

Attachment B: FOM/Warden Roster

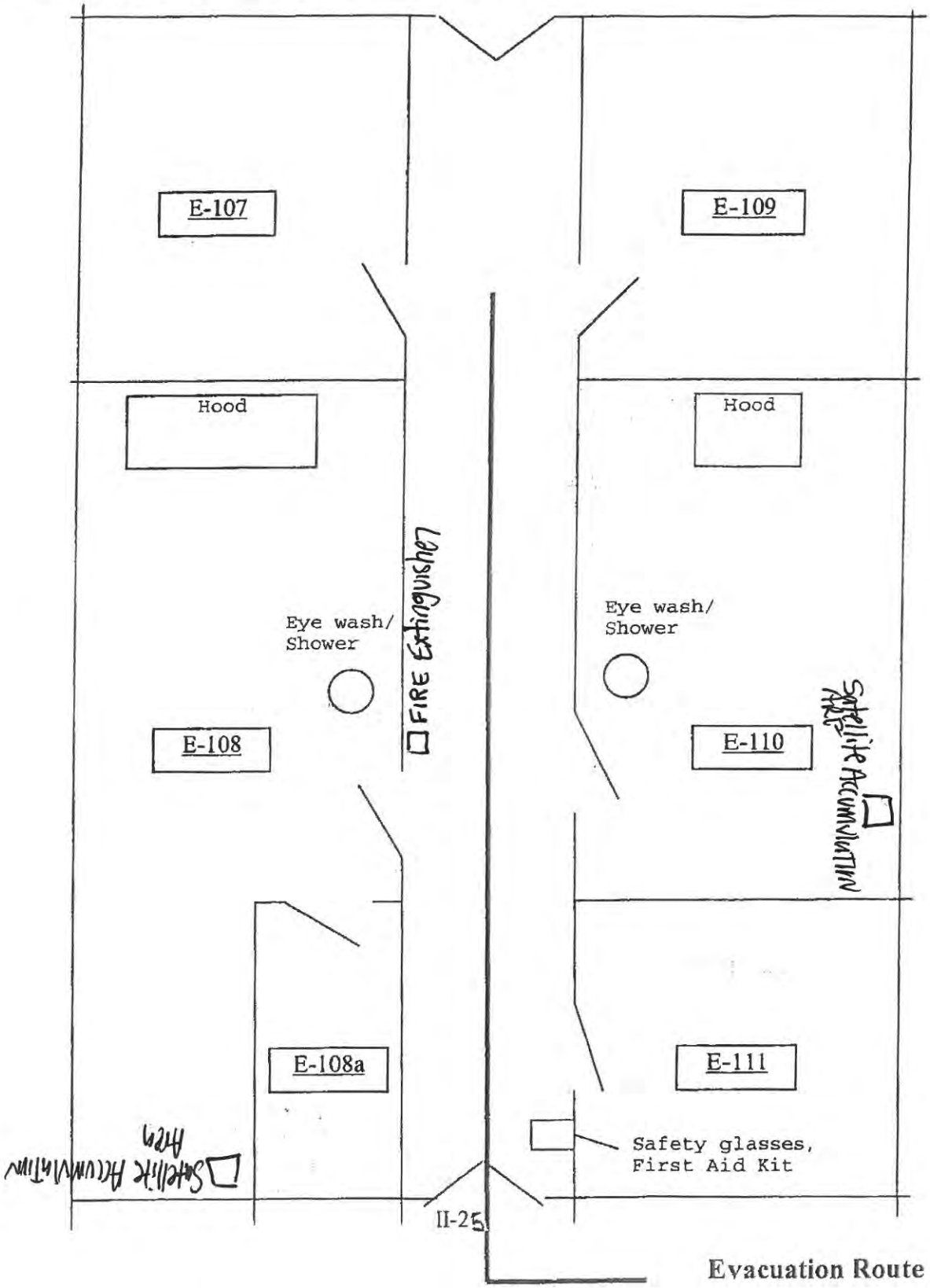
Building:				
Position	**Name**	**Room**	**Ext.**	**E-Mail**
Building Manager	N/A			
Facility Operations Manager (FOM)	T.J. Meyer	W159	X1987	theodore.j.meyer@nasa.gov
Alternate FOM	Ralph Hickman	C127	X2451	ralph.e.hickman@nasa.gov

Floor or Area	Name	Ext.	Room	Vest-Helmet Color	Radio ?	Mobile Phone #	Email
Central Hallway, North	David Liu, Warden	2141	C102			917-892-2952	david.liu-1@nasa.gov
Central Hallway, North	Teena Haugh, Alternate	1476	C105			757-894-2594	teena.p.haugh@nasa.gov
Central Hallway, South	Marianne Simko, Warden	2127	C135			757-710-5904	marianne.f.simko@nasa.gov
Central Hallway, South	Shari Miller, Alternate	2327	C165			443-859-7242	shari.a.miller@nasa.gov
Center Wing, Calibration Lab	Ralph Hickman, Warden	2451	C127			443-397-5708	ralph.e.hickman@nasa.gov
Center Wing, Calibration Lab	William Lankford, Alternate	2368	C131			443-880-3575	william.e.lankford@nasa.gov

West Wing, North Environmental	T.J. Meyer, Warden	1987	W159			443-366-2283	theodore.j.meyer@nasa.gov
West Wing, North Environmental	Susan Dunn, Alternate	1832	W158			410-430-3060	susan.k.dunn@nasa.gov
West Wing, South NASA Health Unit	Dr. Marc Gaines, Warden	2065	W151			757-287-1444	marc.i.gaines@nasa.gov
West Wing, South NASA Health Unit	Michelle Bradford, Alternate	1336	W147			757-894-0281	michelle.i.bradford@nasa.gov
West Wing South Security	Tom Northam, Warden	1885	W141			757-894-5782	edward.t.northam@nasa.gov
West Wing South Security	Jean Lopez, Alternate	2536	W139			757-894-1525	jean.s.lopez@nasa.gov
East Wing, Chemistry Lab	Monica Borowicz, Warden	1023	E111			757-894-0449	monica.k.borowicz@nasa.gov
East Wing, Chemistry Lab	Brian Cornwell, Alternate	1155	E110			757-710-7218	brian.e.cornwell@nasa.gov

ATTACHMENT C: CRITICAL OPERATION EVACUATION PROCEDURES

Building F-160 Chemistry Lab (North Wing)



Evacuation Route

Building: F-160	**Room:** E108	**Phone:** 757-824-1023

The following personnel are designated and trained to assist Emergency Responders with information about this lab, including providing a hazardous materials inventory[i], during an emergency:

Name	**Title**	**24-Hour Contact Phone**
Monica Borowicz	Laboratory Technical Director	757-894-0449
Jason Freischlag	Project Manager	540-353-3658
Brian Cornwell	Chemical Technician I	757-710-7218
Mark Culver	Chemical Technician I	443-235-1911

When the fire alarm sounds, lab workers must EXIT the building.

Before exiting complete the following:

1. Turn off all flames and other ignition sources
2. Close all hazardous material containers
3. Close sash on all fume hoods
4. Turn off all electrical equipment
5. Other:

The following emergency equipment is located in this room:

☐ Emergency Eyewash ☐ Spill Kit/Control Equipment ☐ Emergency Shower ☐ Phone

The following emergency equipment is not located in this room, but can be found at:

Equipment	***Location***
Extinguisher	Hallway immediately outside door
Blanket	Outside room E112

Hood Failure:

1. Evacuate room immediately and close the door behind you.
2. Evacuate all nearby personnel as well.
3. Pull FIRE alarm and exit building to the meeting location across Stubbs Blvd.

If your clothing catches fire:

1. STOP, DROP, and ROLL (If someone else is on fire, knock them to the ground and instruct them to roll back and forth)
2. Cover your face with your hands
3. Use a fire blanket or coat to smother the flames.

If there is a hazardous materials spill:

1. Determine if there is a MAJOR or MINOR spill.
2. **Call 911 for MAJOR spills.** Evacuate the area, and do not allow anyone to enter until Emergency Responders have cleared the area for return.
3. Assist anyone who may have been contaminated or injured during the spill until help arrives.
4. Cleanup MINOR spills if there is no risk of injury.

If you need to use the Emergency Eyewash or Shower:

1. Pull the handle to start the water flowing.
2. Hold your eyes open to get the water under your eyelids.
3. Remove contaminated clothing and shoes.
4. Stay under the water for at least 15 minutes to remove all of the chemicals.

The quickest and safest way out of this room during an evacuation is :

Turn left out of room and exit the exterior door at the end of the hall.

If the primary escape route is not safe, the other way out is:

Turn right out of room and go through the double doors, turn left and exit the exterior door.

All evacuated lab personnel are to meet at this location outside of the building. Take attendance to ensure that everyone has safely exited:

Across Stubbs Blvd. near water tower.

DO NOT reenter the building or laboratory until Emergency Responders have notified that it is safe to return!

[i] An inventory that includes the quantities and locations of all flammable, pyrophoric, oxidizing, toxic, corrosive, reactive, radioactive materials, nonionizing radiation, biological materials, and compressed and liquefied gases.

Building: F-160	**Room:** E110	**Phone:** 757-824-1023

The following personnel are designated and trained to assist Emergency Responders with information about this lab, including providing a hazardous materials inventory[i], during an emergency:

Name	**Title**	**24-Hour Contact Phone**
Monica Borowicz	Laboratory Technical Director	757-894-0449
Jason Freischlag	Project Manager	540-353-3658
Brian Cornwell	Chemical Technician I	757-710-7218
Mark Culver	Chemical Technician I	443-235-1911

When the fire alarm sounds, lab workers must EXIT the building.

Before exiting complete the following:

1. Turn off all flames and other ignition sources
2. Close all hazardous material containers
3. Close sash on all fume hoods
4. Turn off all electrical equipment
5. Other:

The following emergency equipment is located in this room:

☐ Emergency Eyewash ☐ Spill Kit/Control Equipment ☐ Emergency Shower ☐ Phone

The following emergency equipment is not located in this room, but can be found at:

Equipment	***Location***
Extinguisher	Hallway immediately outside door
Blanket	Outside room E112

Hood Failure:

1. Evacuate room immediately and close the door behind you.
2. Evacuate all nearby personnel as well.
3. Pull FIRE alarm and exit building to the meeting location across Stubbs Blvd.

If your clothing catches fire:

1. STOP, DROP, and ROLL (If someone else is on fire, knock them to the ground and instruct them to roll back and forth)
2. Cover your face with your hands
3. Use a fire blanket or coat to smother the flames.

If there is a hazardous materials spill:

1. Determine if there is a MAJOR or MINOR spill.
2. **Call 911 for MAJOR spills.** Evacuate the area, and do not allow anyone to enter until Emergency Responders have cleared the area for return.
3. Assist anyone who may have been contaminated or injured during the spill until help arrives.
4. Cleanup MINOR spills if there is no risk of injury.

If you need to use the Emergency Eyewash or Shower:

1. Pull the handle to start the water flowing.
2. Hold your eyes open to get the water under your eyelids.
3. Remove contaminated clothing and shoes.
4. Stay under the water for at least 15 minutes to remove all of the chemicals.

The quickest and safest way out of this room during an evacuation is :

Turn right out of room and exit the exterior door at the end of the hall.

If the primary escape route is not safe, the other way out is:

Turn left out of room and go through the double doors, turn left and exit the exterior door.

All evacuated lab personnel are to meet at this location outside of the building. Take attendance to ensure that everyone has safely exited:

Across Stubbs Blvd. near water tower.

DO NOT reenter the building or laboratory until Emergency Responders have notified that it is safe to return!

[i] An inventory that includes the quantities and locations of all flammable, pyrophoric, oxidizing, toxic, corrosive, reactive, radioactive materials, nonionizing radiation, biological materials, and compressed and liquefied gases.

Building: F-160	**Room:** E113 MASS SPEC	**Phone:** 757-824-1023

The following personnel are designated and trained to assist Emergency Responders with information about this lab, including providing a hazardous materials inventory[1], during an emergency:

Name	**Title**	**24-Hour Contact Phone**
Monica Borowicz	Laboratory Technical Director	757-894-0449
Jason Freischlag	Project Manager	540-353-3658
Brian Cornwell	Chemical Technician I	757-710-7218
Mark Culver	Chemical Technician I	443-235-1911

When the fire alarm sounds, lab workers must EXIT the building.

Before exiting complete the following:

1. Turn off all flames and other ignition sources
2. Close all hazardous material containers
3. Close sash on all fume hoods
4. Turn off all electrical equipment
5. Other:

The following emergency equipment is located in this room:

☐ Phone

The following emergency equipment is not located in this room, but can be found at:

Equipment	***Location***
Extinguisher	Hallway immediately outside E115 door
Blanket	Outside room E112

Hood Failure:

1. Evacuate room immediately and close the door behind you.
2. Evacuate all nearby personnel as well.
3. Pull FIRE alarm and exit building to the meeting location across Stubbs Blvd.

If your clothing catches fire:

1. STOP, DROP, and ROLL (If someone else is on fire, knock them to the ground and instruct them to roll back and forth)
2. Cover your face with your hands
3. Use a fire blanket or coat to smother the flames.

If there is a hazardous materials spill:

1. Determine if there is a MAJOR or MINOR spill.
2. **Call 911 for MAJOR spills.** Evacuate the area, and do not allow anyone to enter until Emergency Responders have cleared the area for return.
3. Assist anyone who may have been contaminated or injured during the spill until help arrives.
4. Cleanup MINOR spills if there is no risk of injury.

If you need to use the Emergency Eyewash or Shower:

1. Pull the handle to start the water flowing.
2. Hold your eyes open to get the water under your eyelids.
3. Remove contaminated clothing and shoes.
4. Stay under the water for at least 15 minutes to remove all of the chemicals.

The quickest and safest way out of this room during an evacuation is :

Turn right out of room and exit the double door at the end of the hall.

If the primary escape route is not safe, the other way out is:

Turn right out of room and go through the double doors, turn right and exit the exterior door.

All evacuated lab personnel are to meet at this location outside of the building. Take attendance to ensure that everyone has safely exited:

Across Stubbs Blvd. near water tower.

DO NOT reenter the building or laboratory until Emergency Responders have notified that it is safe to return!

[1] An inventory that includes the quantities and locations of all flammable, pyrophoric, oxidizing, toxic, corrosive, reactive, radioactive materials, nonionizing radiation, biological materials, and compressed and liquefied gases.

Building: F-160	**Room:** E114	**Phone:** 757-824-1023

The following personnel are designated and trained to assist Emergency Responders with information about this lab, including providing a hazardous materials inventory[1], during an emergency:

e	**Title**	**24-Hour Contact Phone**
ıca Borowicz	Laboratory Technical Director	757-894-0449
Jason Freischlag	Project Manager	540-353-3658
Brian Cornwell	Chemical Technician I	757-710-7218
Mark Culver	Chemical Technician I	443-235-1911

When the fire alarm sounds, lab workers must EXIT the building.

Before exiting complete the following:

1. Turn off all flames and other ignition sources
2. Close all hazardous material containers
3. Close sash on all fume hoods
4. Turn off all electrical equipment
5. Other:

The following emergency equipment is located in this room: ☐ Phone

The following emergency equipment is not located in this room, but can be found at:

Equipment	***Location***
Eyewash	Room 114
Extinguisher	Hallway immediately outside E115 door
Blanket	Outside room E112

Hood Failure:

1. Evacuate room immediately and close the door behind you.
2. Evacuate all nearby personnel as well.
3. Pull FIRE alarm and exit building to the meeting location across Stubbs Blvd.

If your clothing catches fire:

1. STOP, DROP, and ROLL (If someone else is on fire, knock them to the ground and instruct them to roll back and forth)
2. Cover your face with your hands
3. Use a fire blanket or coat to smother the flames.

If there is a hazardous materials spill:

1. Determine if there is a MAJOR or MINOR spill.
2. **Call 911 for MAJOR spills.** Evacuate the area, and do not allow anyone to enter until Emergency Responders have cleared the area for return.
3. Assist anyone who may have been contaminated or injured during the spill until help arrives.
4. Cleanup MINOR spills if there is no risk of injury.

If you need to use the Emergency Eyewash or Shower:

1. Pull the handle to start the water flowing.
2. Hold your eyes open to get the water under your eyelids.
3. Remove contaminated clothing and shoes.
4. Stay under the water for at least 15 minutes to remove all of the chemicals.

The quickest and safest way out of this room during an evacuation is :

Turn left out of room and exit the exterior door at the end of the hall.

If the primary escape route is not safe, the other way out is:

Turn right out of room and go through the double doors, turn right and exit the exterior door.

All evacuated lab personnel are to meet at this location outside of the building. Take attendance to ensure that everyone has safely exited:

Across Stubbs Blvd. near water tower.

DO NOT reenter the building or laboratory until Emergency Responders have notified that it is safe to return!

Building: F-160	**Room:** E115	**Phone:** 757-824-1023

The following personnel are designated and trained to assist Emergency Responders with information about this lab, including providing a hazardous materials inventory[i], during an emergency:

Name	**Title**	**24-Hour Contact Phone**
Monica Borowicz	Laboratory Technical Director	757-894-0449
Jason Freischlag	Project Manager	540-353-3658
Brian Cornwell	Chemical Technician I	757-710-7218
Mark Culver	Chemical Technician I	443-235-1911

When the fire alarm sounds, lab workers must EXIT the building.

Before exiting complete the following:

1. Turn off all flames and other ignition sources
2. Close all hazardous material containers
3. Close sash on all fume hoods
4. Turn off all electrical equipment
5. Other:

The following emergency equipment is located in this room:

☐ Emergency Eyewash ☐ Spill Kit/Control Equipment ☐ Phone

The following emergency equipment is not located in this room, but can be found at:

Equipment	***Location***
Extinguisher	Hallway immediately outside E115 door
Blanket	Outside room E112

Hood Failure:

1. Evacuate room immediately and close the door behind you.
2. Evacuate all nearby personnel as well.
3. Pull FIRE alarm and exit building to the meeting location across Stubbs Blvd.

If your clothing catches fire:

1. STOP, DROP, and ROLL (If someone else is on fire, knock them to the ground and instruct them to roll back and forth)
2. Cover your face with your hands
3. Use a fire blanket or coat to smother the flames.

If there is a hazardous materials spill:

1. Determine if there is a MAJOR or MINOR spill.
2. **Call 911 for MAJOR spills.** Evacuate the area, and do not allow anyone to enter until Emergency Responders have cleared the area for return.
3. Assist anyone who may have been contaminated or injured during the spill until help arrives.
4. Cleanup MINOR spills if there is no risk of injury.

If you need to use the Emergency Eyewash or Shower:

1. Pull the handle to start the water flowing.
2. Hold your eyes open to get the water under your eyelids.
3. Remove contaminated clothing and shoes.
4. Stay under the water for at least 15 minutes to remove all of the chemicals.

The quickest and safest way out of this room during an evacuation is :

Exit the exterior door in the room.

If the primary escape route is not safe, the other way out is:

Turn right out of room and go through the double doors, turn right and exit the exterior door.

All evacuated lab personnel are to meet at this location outside of the building. Take attendance to ensure that everyone has safely exited:

Across Stubbs Blvd. near water tower.

DO NOT reenter the building or laboratory until Emergency Responders have notified that it is safe to return!

[i] An inventory that includes the quantities and locations of all flammable, pyrophoric, oxidizing, toxic, corrosive, reactive, radioactive materials, nonionizing radiation, biological materials, and compressed and liquefied gases.

Building: F-160	**Room:** E116 **Compressed Gases**	**Phone:** 757-824-1023

The following personnel are designated and trained to assist Emergency Responders with information about this lab, including providing a hazardous materials inventory[i], during an emergency:

Name	**Title**	**24-Hour Contact Phone**
Monica Borowicz	Laboratory Technical Director	757-894-0449
Jason Freischlag	Project Manager	540-353-3658
Brian Cornwell	Chemical Technician I	757-710-7218
Mark Culver	Chemical Technician I	443-235-1911

When the fire alarm sounds, lab workers must EXIT the building.

Before exiting complete the following:

1. Turn off all flames and other ignition sources
2. Close all hazardous material containers
3. Close sash on all fume hoods
4. Turn off all electrical equipment
5. Other:

The following emergency equipment is located in this room: ☐ Phone

The following emergency equipment is not located in this room, but can be found at:

Equipment	***Location***
Eyewash	Room 114
Extinguisher	Hallway immediately outside E115 door
Blanket	Outside room E112

Hood Failure:

1. Evacuate room immediately and close the door behind you.
2. Evacuate all nearby personnel as well.
3. Pull FIRE alarm and exit building to the meeting location across Stubbs Blvd.

If your clothing catches fire:

1. STOP, DROP, and ROLL (If someone else is on fire, knock them to the ground and instruct them to roll)
2. Cover your face with your hands
3. Use a fire blanket or coat to smother the flames.

If there is a hazardous materials spill:

1. Determine if there is a MAJOR or MINOR spill.
2. **Call 911 for MAJOR spills.** Evacuate the area, and do not allow anyone to enter until Emergency Responders have cleared the area for return.
3. Assist anyone who may have been contaminated or injured during the spill until help arrives.
4. Cleanup MINOR spills if there is no risk of injury.

If you need to use the Emergency Eyewash or Shower:

1. Pull the handle to start the water flowing.
2. Hold your eyes open to get the water under your eyelids.
3. Remove contaminated clothing and shoes.
4. Stay under the water for at least 15 minutes to remove all of the chemicals.

The quickest and safest way out of this room during an evacuation is :

Turn right out of room and exit the double door at the end of the hall, turn right and exit the exterior door.

If the primary escape route is not safe, the other way out is:

Turn right out of room and go through the double doors, turn left and exit the exterior doors in the center of bldg.

All evacuated lab personnel are to meet at this location outside of the building. Take attendance to ensure that everyone has safely exited:

Across Stubbs Blvd. near water tower.

DO NOT reenter the building or laboratory until Emergency Responders have notified that it is safe to return!

[i] An inventory that includes the quantities and locations of all flammable, pyrophoric, oxidizing, toxic, corrosive, reactive, radioactive materials, nonionizing radiation, biological materials, and compressed and liquefied gases.

APPENDIX C

WICC Policy/Procedure Directive

DIRECTIVE NO.	WPP-01-05.4C	**APPROVAL SIGNATURE:**	Original Signed By
EFFECTIVE DATE:	November 23, 2009	**NAME:**	James M. West
EXPIRATION DATE:	Term of Contract	**TITLE:**	Program Manager

Technical Responsibility Quality and Safety Manager

Title: RESPIRATORY PROTECTION PROGRAM

1.0 PURPOSE

The purpose of this program is to ensure all WICC employees are protected from exposure to respiratory hazards in the workplace.

2.0 POLICY

It is WICC policy to assure that:

2.1 Engineering controls are applied whenever practicable ahead of any administrative or personal protective equipment (PPE) control measures

2.2 Expenses associated with training, medical evaluations and respiratory protection equipment are borne by the employer and not the employee

2.3 Respirators are provided for voluntary use in situations where respirator use is not required and will not jeopardize the health or safety of workers

2.4 Voluntary use of respirators is evaluated and permitted on a case-by-case basis

3.0 APPLICABILITY

This program applies to all employees who are required to wear respirators during routine work operations, as well as, non-routine, emergency response or hazardous clean-up operations. This includes environmental engineers and chemists, lab technicians, painters, carpenters, utility mechanics, masons, welders and Hazwoper response team members. WFF Fire Department employees receive specialized respiratory training and maintain professional certifications that exempt them from this program.

In addition, any employee who voluntarily wears a respirator when a respirator is not required is subject to the medical evaluation, respirator cleaning, maintenance and storage elements of this program and must be provided information specified in section 10.0 of this directive. Employees who voluntarily wear filter facepieces or dust masks are not subject to the medical evaluation or any other provision of this program.

4.0 CANCELLATION

This directive replaces WICC Policy *WPP-01-05.4A Respirator Protection Program*

5.0 REFERENCES

- 29 CFR 1910.134, *Respiratory Protection Program*, Department of Labor, Occupational Safety and Health Administration
- GPR 1820.2, *Respiratory Protection Program,* GSFC, Goddard Procedural Requirements
- NPR 8715.3 NASA Safety Manual
- WWI-03-17.1, *X-30 Spray Booth Operations*, WICC Work Instruction

6.0 RECORDS

Record	Responsible Manager	Retention
Personnel Training Records	Training Coordinator	Term of Contract
Medical Evaluation	Health Unit Physician	Term of Contract
Annual Program Audit	Safety Program Manager	Term of Contract

7.0 DEFINITIONS

Air-Purifying Respirator (APR) means a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Assigned Protection Factor (APF) means the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program as specified by this section.

Atmosphere-Supplying Respirator means a respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

Canister or Cartridge means a container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.

Employee Exposure means exposure to a concentration of airborne contaminant that would occur if employee were not using respiratory protection.

End-of-Service-Life Indicator (ESLI) means a system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.

Escape-Only Respirator means a respirator intended to be used only for emergency exit.

Fit Factor means a quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

Fit Test means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also Qualitative fit test QLFT and Quantitative fit test QNFT)

High Efficiency Particulate Air (HEPA) Filter means a filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.

Immediately Dangerous to Life or Health (IDLH) means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Maximum Use Concentration (MUC) means the maximum atmospheric concentration of a hazardous substance from which an employee can be expected to be protected when wearing a respirator.

Negative Pressure Respirator (tight fitting) means a respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

Oxygen Deficient Atmosphere means an atmosphere with oxygen content below 19.5% by volume.

Permissible Exposure Limit (PEL) means an 8-hour Time Weighted Average regulatory limit on concentration of a substance in the air.

Positive Pressure Respirator means a respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

Pressure Demand Respirator means a positive pressure atmosphere-supplying respirator that admits breathing air to the face piece when the positive pressure is reduced inside the face piece by inhalation.

Qualitative Fit Test (QLFT) means a pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

Quantitative Fit Test (QNFT) means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Self-Contained Breathing Apparatus (SCBA) means an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

Supplied-Air Respirator (SAR) or airline respirator means an atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

Short-Term Exposure Limit (STEL) means a 15 minute Time Weighted Average that should not be exceeded at any time during a workday.

User Seal Check means an action conducted by the respirator user to determine if the respirator is properly seated to the face.

8.0 RESPONSIBILITIES

8.1 Safety Department

The Safety Department is responsible to administrate and assure compliance with all aspects of the WICC Respiratory Protection Program. The Safety Manager serves as the Program Administrator. Duties of the Program Administrator include:

8.1.1 Identifying work areas, processes or tasks that require workers to wear respirators and evaluating hazards

8.1.2 Selection of respiratory protection options

8.1.3 Monitoring respirator use to ensure that respirators are used in accordance with their certifications

8.1.4 Arranging for and conducting training

8.1.5 Ensuring proper storage and maintenance of respiratory protection equipment

8.1.6 Conducting qualitative fit testing

8.1.7 Assuring administration of medical surveillance program

8.1.8 Maintaining records required by program

8.1.9 Evaluating and updating program

8.2 Superintendents and Supervisors

Superintendents and supervisors are responsible to ensure respiratory protection program is implemented in their areas. In addition to being knowledgeable about program requirements for their own protection, they must also ensure the program is understood and followed by employees under their charge. Duties of the superintendent/supervisor include:

8.2.1 Ensuring employees under their supervision have received appropriate training, fit testing and medical evaluation

8.2.2 Ensuring availability of appropriate types of respirators and accessories

8.2.3 Being aware of tasks requiring use of respiratory protection

8.2.4 Enforcing proper use of respiratory protection

8.2.5 Ensuring respirators are properly cleaned, maintained and stored by performing periodic documented inspections

8.2.6 Monitoring work areas to identify respiratory hazards

8.2.7 Coordinating with safety department on how to address respiratory hazards or other concerns regarding program

8.3 Employees

Each employee must wear appropriate respirator when and where required and in the manner in which they were trained. They must also:

8.3.1 Care for and maintain respirators as instructed and store them in clean, sanitary location.

8.3.2 Inform supervisor if respirator no longer fits for any reason.

8.3.3 Inform supervisor or safety department of respiratory hazards they feel are not adequately addressed in the workplace.

9.0 PROGRAM ELEMENTS

9.1 Hazard Assessment

Program Administrator will conduct a hazard evaluation for each operation, process or work area where airborne contaminants may be present in routine operations or during emergencies. Hazard evaluation will include:

9.1.1 Identification and development of a list of hazardous substances used in the workplace by department or work process (see Appendix A). List must be revised and updated as needed.

9.1.2 Review of work processes to determine where potential exposures to these hazards may occur. This review will be conducted by surveying the workplace, reviewing process records, and talking with employees and supervisors

9.1.3 Estimating or monitoring air conditions to quantify potential hazardous exposures. Monitoring will be performed by WFF personnel or NASA Industrial Hygienist when needed.

9.1.4 If an employee feels that respiratory protection is needed during a particular activity, they may contact their supervisor or WICC safety department manager or technician. If it is determined by supervisor or WICC safety that respiratory protection is appropriate, all elements of this program will be in effect for those tasks.

9.2 Medical Evaluation

Employees who are required to wear respirators, or who choose to wear an APR voluntarily, must pass a medical exam prior to wearing a respirator on the job. Any employee refusing the medical evaluation will not be allowed to work in an area requiring respirator use.

The staff physician at WFF HU will provide medical evaluations for all respiratory program participants. Medical evaluation procedures are as follows:

9.2.1 Medical evaluations will be conducting using questionnaire provided in Appendix C of OSHA Respiratory Protection Standard.

9.2.2 All questionnaires are to be completed and given directly by employees to HU physician or medical personnel. Examination results also are to remain confidential between employee and HU physician.

9.2.3 WICC Safety will provide HU physician with copy of WICC respiratory protection program directive and list of employees enrolled in respiratory program including employees work organization, job title, respirator type, make, model and size

9.2.4 A list of WICC employees currently included in medical surveillance will be maintained on file in WICC Safety Office

9.2.5 After an employee has received clearance and begun to wear their respirator, additional medical evaluations will be provided under the following circumstances:

9.2.5.1 Employee reports signs and/or symptoms related to their ability to use a respirator (e.g. shortness of breath, dizziness, chest pains or wheezing)

9.2.5.2 HU physician or employee supervisor informs WICC Safety of employee need to be re-evaluated

9.2.5.3 Observations during fit testing and program evaluation indicates a need for re-evaluation

9.2.5.4 A change occurs in workplace conditions that may result in an increased physiological burden on the employee

9.3 Fit Testing

Fit testing is required for employees wearing a full-face SAR or half-face APR.

9.3.1 Quantitative fit test must be performed annually for employees whose job requires full face supplied air respiratory protection.

9.3.2 Qualitative fit test must be performed annually for employees whose job requires APR respiratory protection.

9.3.3 Employees must be fit-tested with the make, model and size of respirator that they will actually wear.

9.3.4 Fit testing must be conducted by employees (or outside specialists) trained to follow OSHA approved Bitrex Solution Aerosol QLFT Protocol in Appendix B (B4) of the OSHA Respiratory Protection Standard.

9.4 Respirator and Filter Selection

All respirators must be certified by the National Institute for Occupational Safety and Health (NIOSH) and shall be used in accordance with the terms of that certification. All filters, cartridges, and canisters must be labeled with the appropriate NIOSH approved label. The label must not be removed or defaced while in use. The Program Administrator will select respirators to be used on-site based on hazards to which workers are exposed and in accordance with all OSHA standards.

9.5 Respirator Use

9.5.1 Employees will use their respirators under conditions specified by this program and in accordance with training they receive on the use of each particular model. In addition, the respirator shall not be used in a manner for which it is not certified by NIOSH or by its manufacturer.

9.5.2 All Employees shall conduct use seal checks each time they wear their respirator. Employees shall use either the positive or negative pressure check (depending on which test works best for them) specified in training (Appendix B-1 of OSHA Respiratory Protection Standard.

9.5.3 All employees may leave the work area to clean their respirator, change filters or cartridges, replace parts, or inspect respirator that has stopped functioning as intended. Employees shall notify their supervisor before leaving the area.

9.5.4 Employees are not permitted to wear tight-fitting respirators if they have any condition that prevents them from achieving a good seal (e.g. facial scars, facial hair or missing dentures. Employees are not permitted to wear headphones, jewelry or other articles that may interfere with the face piece-to-face seal.

9.5.5 All employees wearing atmosphere-supplying respirators shall work with a buddy.

9.5.6 Escape-Only Respirators and Powered-Air-Purifying-Respirators (PAPR) will not be available or maintained for use by WICC employees. Emergencies will be handled exclusively by on-site, trained Emergency Response personnel.

9.6 Voluntary Respirator Use

9.6.1 The Program Administrator, on a case-by-case basis, may authorize voluntary use of respiratory protective equipment when requested by employees depending on work conditions and medical evaluations.

9.6.2 Employees choosing to wear an APR must comply with the procedures for medical evaluation, respirator use, cleaning, maintenance and storage of respirators.

9.6.3 All employees who voluntarily choose to wear a half-face APR must review Appendix D of the OSHA respiratory standard provided by WICC Safety Office.

9.7 Supplied Air Quality

Only Grade D breathing air will be used with supplied-air respirators.

9.7.1 Compressed air samples shall be taken and sent to outside testing lab every 6 months for certification that air meets specifications for Grade D breathing air.

9.7.2 A Pre-job air quality test must be performed and documented in accordance with test protocol located in X-30 paint shop prior to use of any supplied air respirator (see *WWI-03-17.1*).

9.8 Respirator Cleaning, Maintenance and Storage

9.8.1. Community use APRs and SARs issued for the exclusive use of an employee shall be cleaned and disinfected after each use.

9.8.2 Employees shall clean and disinfect respirators as specified in training.

9.8.3 Respirators are to be properly maintained at all times to ensure fit and function adequately protects employees. Worn or deteriorated parts are to be replaced prior to use. Repairs to ASRs must be conducted by the manufacturer.

9.8.4 Community use APRs must be stored (in accordance with manufacturer's recommendations) in clean, dry area (e.g. lockers or inside F-19 storeroom).

9.8.5 SARs issued for the exclusive use of an employee must be stored in a personally identified plastic bag and stored in personal locker.

9.9 Filter Change Schedules

9.9.1 Employees wearing APRs with P100 filters for protection against wood dust and other particulates shall change the cartridges when they first begin to detect a change in air flow through respirator.

9.9.2 Employees wearing half or full-face respirators for protection against gas or organic vapors shall change cartridges according to either End of Service Life Indicator (ESLI) located on cartridge or a specified length-of-time determined prior to start of task based upon exposure conditions and usage time for task.

9.9.3 Employees voluntarily wearing APRs with organic vapor cartridges shall change cartridges based upon pre-determined exposure conditions and usage time for task.

10.0 TRAINING

10.1 Requirements

10.1.1 Safety Department will provide training to respirator users and their supervisors.

10.1.2 Employees must be trained prior to using respirators in the workplace.

10.1.3 Supervisors must be trained prior to supervising employees that wear respirators.

10.1.4 Respirator users and supervisors must be retrained annually or more frequently as needed.

10.2 Course Topics

10.2.1 WICC Respiratory Protection Program and OSHA Respiratory Standard

10.2.2 Respiratory hazards at WFF and their health effects

10.2.3 Proper selection and use of respirators and filters

10.2.4 Limitations of respiratory protection

10.2.5 Respirator donning and user seal (fit) checks

10.2.6 Fit-Testing

10.2.7 Emergency use procedures

10.2.8 Respirator care, maintenance and storage

10.2.9 Medical signs and symptoms limiting effective use of respirators

10.3 Testing

10.3.1 Employees must demonstrate their understanding of course topics through hands-on exercises and a written test.

10.3.2 Respirator training is documented by WICC Safety Office and includes type, model and size of respirator for which each employee has been trained and fit tested.

11.0 DOCUMENTATION

11.1 Written copy of this directive and OSHA Respiratory Standard is available in the Program Administrator's office and available to all employees who wish to review it.

11.2 Training and fit test records are kept on file by the Program Administrator.

11.3 The WFF Health Unit physician keeps all medical records for employees covered under the respiratory program. Program Administrator will maintain copies of physician's written recommendation regarding each employee's ability to wear a respirator.

11.4 A respirator inspection and usage log will be kept in storage bag for all full-face supplied air respirators

12.0 PROGRAM EVALUATION

12.1 Program Administrator will conduct periodic evaluations of the workplace to ensure provisions of this program are being implemented.

12.2 Evaluations will include regular consultations with respirator users, supervisors, site inspections and review of records.

13.0 APPENDIXES

Appendix A: WICC Respiratory Hazard Evaluation

Appendix B: WICC Respiratory Program Participant List

Appendix C: Medical Evaluation Questionnaire

Appendix D: Medical Surveillance Clearance Form

Appendix E: WICC Respirator Fit Test Form

Appendix F: Information for Voluntary Use of Respirators

Appendix A: WICC Respiratory Hazard Evaluation

[MS Excel Spreadsheet]

Location: C:\Documents and Settings\dmbradfo\Desktop\Respiratory Protection Program

Appendix B: WICC Respiratory Program Participant List

[MS Excel Spreadsheet]

C:\Documents and Settings\dmbradfo\Desktop\Respiratory Protection Program

Appendix C: Medical Evaluation Questionnaire

[Appendix C to Sec. 1910.134: OSHA Respirator Medical Evaluation Questionnaire (Mandatory)]

To the employer: Answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination.

To the employee: Can you read? (circle one): Yes/No

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

Part A. Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

1. Today's date:_____
2. Your name:_____
3. Your age (to nearest year):_____
4. Sex (circle one): Male / Female
5. Your height: _____ft. _____ in.
6. Your weight: _____ lbs.
7. Your job title:_____
8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code): _____
9. The best time to phone you at this number: _____

10. Has your employer told you how to contact the health care professional who will review this questionnaire?

(circle one): .....Yes / No

11. Check the type of respirator you will use (you can check more than one category):
a. _____ N, R, or P disposable respirator (filter-mask, non- cartridge type only).
b. _____ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

12. Have you worn a respirator (circle one)?: ..... Yes / No

If "yes," what type(s):_____

_____

Part A. Section 2. (Mandatory) Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator (please circle "yes" or "no").

1. Do you currently smoke tobacco, or have you smoked tobacco in the last month?: ..... Yes / No

2. Have you ever had any of the following conditions?

Seizures (fits):	Yes / No
Diabetes (sugar disease):	Yes / No
Allergic reactions that interfere with your breathing:	Yes / No
Claustrophobia (fear of closed-in places):	Yes / No
Trouble smelling odors:	Yes / No

3. Have you ever had any of the following pulmonary or lung problems?

Asbestosis:	Yes / No
Asthma:	Yes / No
Chronic bronchitis:	Yes / No
Emphysema:	Yes / No
Pneumonia:	Yes / No
Tuberculosis:	Yes / No
Silicosis:	Yes / No
Pneumothorax (collapsed lung):	Yes / No
Lung cancer:	Yes / No
Broken ribs:	Yes / No
Any chest injuries or surgeries:	Yes / No
Any other lung problem that you've been told about:	Yes / No

4. Do you currently have any of the following symptoms of pulmonary or lung illness?

Shortness of breath:	Yes / No
Shortness of breath when walking fast on level ground or walking up a slight hill or incline:	Yes / No
Shortness of breath when walking with other people at an ordinary pace on level ground:	Yes / No
Have to stop for breath when walking at your own pace on level ground:	Yes / No
Shortness of breath when washing or dressing yourself:	Yes / No
Shortness of breath that interferes with your job:	Yes / No
Coughing that produces phlegm (thick sputum):	Yes / No
Coughing that wakes you early in the morning:	Yes / No
Coughing that occurs mostly when you are lying down:	Yes / No
Coughing up blood in the last month:	Yes / No
Wheezing:	Yes / No
Wheezing that interferes with your job:	Yes / No
Chest pain when you breathe deeply:	Yes / No
Any other symptoms that you think may be related to lung problems:	Yes / No

5. Have you ever had any of the following cardiovascular or heart problems?

Heart attack:	Yes / No
Stroke:	Yes / No
Angina:	Yes / No
Heart failure:	Yes / No
Swelling in your legs or feet (not caused by walking):	Yes / No
Heart arrhythmia (heart beating irregularly):	Yes / No
High blood pressure:	Yes / No
Any other heart problem that you've been told about:	Yes / No

6. Have you ever had any of the following cardiovascular or heart symptoms?

Frequent pain or tightness in your chest:	Yes / No
Pain or tightness in your chest during physical activity:	Yes / No
Pain or tightness in your chest that interferes with your job:	Yes / No
In the past two years, have you noticed your heart skipping or missing a beat:	Yes / No
Heartburn or indigestion that is not related to eating:	Yes / No
Any other symptoms that you think may be related to heart or circulation problems:	Yes / No

7. Do you currently take medication for any of the following problems?

Breathing or lung problems:	Yes / No
Heart trouble:	Yes / No
Blood pressure:	Yes / No
Seizures (fits):	Yes / No

8. If you've used a respirator, have you ever had any of the following problems?
(If you've never used a respirator, check the following space _____ and go to question 9:)

Eye irritation:	Yes / No
Skin allergies or rashes:	Yes / No
Anxiety:	Yes / No
General weakness or fatigue:	Yes / No
Any other problem that interferes with your use of a respirator:	Yes / No

9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire?: ..... Yes / No

Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-facepiece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.

10. Have you ever lost vision in either eye (temporarily or permanently)?:..... Yes / No

11. Do you currently have any of the following vision problems?

Wear contact lenses:	Yes / No
Wear glasses:	Yes / No
Color blind:	Yes / No
Any other eye or vision problem:	Yes / No

12. Have you ever had an injury to your ears, including a broken eardrum?: .....Yes / No

13. Do you currently have any of the following hearing problems?

Difficulty hearing:	Yes / No
Wear a hearing aid:	Yes / No
Any other hearing or ear problem:	Yes / No

14. Have you ever had a back injury?: .....Yes / No

15. Do you currently have any of the following musculoskeletal problems?

Weakness in any of your arms, hands, legs, or feet:	Yes / No
Back pain:	Yes / No
Difficulty fully moving your arms and legs:	Yes / No
Pain or stiffness when you lean forward or backward at the waist:	Yes / No
Difficulty fully moving your head up or down:	Yes / No
Difficulty fully moving your head side to side:	Yes / No
Difficulty bending at your knees:	Yes / No
Difficulty squatting to the ground:	Yes / No
Climbing a flight of stairs or a ladder carrying more than 25 lbs:	Yes / No
Any other muscle or skeletal problem that interferes with using a respirator:	Yes / No

Part B

Any of the following questions, and other questions not listed, may be added to the questionnaire at the discretion of the health care professional who will review the questionnaire.

1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower than normal amounts of oxygen?: ..... Yes / No

If "yes," do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you're working under these conditions?: .....Yes / No

2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals?: .....Yes / No

If "yes," name the chemicals if you know them:_____

_____

_____

3. Have you ever worked with any of the materials, or under any of the conditions, listed below:

Asbestos:	Yes / No
Silica (e.g., in sandblasting):	Yes / No
Tungsten/cobalt (e.g., grinding or welding this material):	Yes / No
Beryllium down:	Yes / No
Aluminum:	Yes / No
Coal (for example, mining):	Yes / No
Iron:	Yes / No
Tin:	Yes / No
Dusty environments:	Yes / No

Any other hazardous exposures?: .....Yes / No

If "yes," describe these exposures:_____

_____

_____

4. List any second jobs or side businesses you have:_____

_____

5. List your previous occupations:_____

_____

6. List your current and previous hobbies:_____

_____

7. Have you been in the military services? .....Yes / No

   If "yes," were you exposed to biological or chemical agents (either in training or combat)?: .....Yes / No

8. Have you ever worked on a HAZMAT team? .....Yes / No

9. Other than medications for breathing and lung problems, heart trouble, blood pressure, and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications)?: .....Yes / No

If "yes," name the medications if you know them:_____

_____

10. Will you be using any of the following items with your respirator(s)?

HEPA Filters:	Yes / No
Canisters (for example, gas masks):	Yes / No
Cartridges:	Yes / No

11. How often are you expected to use the respirator(s) (circle "yes" or "no" for all answers that apply to you)?:

Escape only (no rescue):	Yes / No
Emergency rescue only:	Yes / No
Less than 5 hours per week:	Yes / No
Less than 2 hours per day:	Yes / No
2 to 4 hours per day:	Yes / No
Over 4 hours per day:	Yes / No

12. During the period you are using the respirator(s), is your work effort:

- Light (less than 200 kcal per hour)?.....Yes / No

  If "yes," how long does this period last during the average shift:_____hrs._____mins.
  Examples of a light work effort are sitting while writing, typing, drafting, or performing light assembly work; or standing while operating a drill press (1-3 lbs.) or controlling machines.

- Moderate (200 to 350 kcal per hour)?: .....Yes / No

If "yes," how long does this period last during the average shift:_____hrs._____mins. Examples of moderate work effort are sitting while nailing or filing; driving a truck or bus in urban traffic; standing while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 lbs.) at trunk level; walking on a level surface about 2 mph or down a 5-degree grade about 3 mph; or pushing a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.

- Heavy (above 350 kcal per hour)?: .....Yes / No

  If "yes," how long does this period last during the average shift:_____hrs._____mins. Examples of heavy work are lifting a heavy load (about 50 lbs.) from the floor to your waist or shoulder; working on a loading dock; shoveling; standing while bricklaying or chipping castings; walking up an 8-degree grade about 2 mph; climbing stairs with a heavy load (about 50 lbs.).

13. Will you be wearing protective clothing and/or equipment (other than the respirator) when you're using your respirator?: .....Yes / No

If "yes," describe this protective clothing and/or equipment:_____ _____

_____

14. Will you be working under hot conditions (temperature exceeding 77 deg. F)?: .....Yes / No

15. Will you be working under humid conditions?: .....Yes / No

16. Describe the work you'll be doing while you're using your respirator(s):

_____

_____

_____

17. Describe any special or hazardous conditions you might encounter when you're using your respirator(s) (for example, confined spaces, life-threatening gases):

_____

_____

18. Provide the following information, if you know it, for each toxic substance that you'll be exposed to when you're using your respirator(s):

Name of the first toxic substance:_____ _____

Estimated maximum exposure level per shift:_____

Duration of exposure per shift:_____ _____

Name of the second toxic substance:_____ _____

Estimated maximum exposure level per shift:_____ _____

Duration of exposure per shift:_____

Name of the third toxic substance:_____ _____

Estimated maximum exposure level per shift:_____ _____

Duration of exposure per shift:_____ _____

The name of any other toxic substances that you'll be exposed to while using your respirator:

_____

_____

_____

19. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of others (for example, rescue, security):

Appendix D: Medical Surveillance Clearance Form

MEDICAL SURVEILLANCE CLEARANCE
NASA – Wallops Flight Facility
Health Unit, Bldg F-160
Wallops Island, VA 23337
Phone (757)824-1266 Fax (757)824-1497

Date of Exam: _____

Employee Name: _____
Last First Middle

On this date you had a medical evaluation at the WFF Health Unit for the occupation(s) and/or exposure(s) as checked below. For the applicable categories, notation follows indicating whether or not you meet the medical standards for that category.

	Category	Medically Qualified?		Date qualification expires:
	Asbestos exposure	Yes	No	1 year
	Climbing	Yes	No	1 year
	L.D.E - Crane (Critical/Non-Critical)	Yes	No	3 years
	L.D.E - Forklift/Aerial Lift	Yes	No	
	Electrician	Yes	No	1 year
	Environmental	Yes	No	1 year
	Firefighter/EMT	Yes	No	1 year
	Food Service Worker	Yes	No	1 year
	Hearing Conservation	Yes	No	1 year
	Laser	Yes	No	1 year
	Lead Exposure	Yes	No	1 year
	Painter	Yes	No	1 year
	Radiation exposure (Ionizing/nonionizing)	Yes	No	1 year
	Respiratory	Yes	No	1 year
	Security Officer	Yes	No	1 year
	Other (1): CDL	Yes	No	2 years
	Other (2):	Yes	No	

( ) **Pre-employment**

A copy of this letter will be sent to your supervisor.

_____, M.D.

_____
Date

I acknowledge the above.

_____
Employee Signature

_____
Date

Appendix E: WICC Respirator Fit Test Form

Respirator Qualitative Fit Test

Employee Name	Company	Department	Position	Medical Eval Date

RESPIRATOR Mfg	Model	Type ¼ ½ **Full**	Size **XL L M S**	Number

LIMITATIONS

____ Facial Hair ____ Denture ____ Glasses ____ Facial Scar ____ Other ____ None

Explain

_____

_____

OSHA PROTOCAL

STEP		**PASS**	**FAIL**	**NOT DONE**
1	Head Stationary – Normal Breathing (60 sec)			
2	Head Stationary – Deep Breathing (60 sec)			
3	Head Turning Side-to-Side (60 sec)			
4	Head Moving Up and Down (60 sec)			
5	Talking or Count Backwards			
6	Bending Over (60 sec)			
7	Head Stationary – Normal Breathing (60 sec)			
TEST RESULT		**PASS**	**FAIL**	

Based on test results and information provided above, I certify that the employee named on this form is fit to wear the respiratory protective equipment specified above.

Test Administrator Signature	**Date**
Employee Signature	**Date**

Appendix F: Information for Voluntary Use of Respirator

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designated for and how much it will protect you.
3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.
4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline	October 1, 2002	Initial Release (SA-003)
A	May 19, 2004	1. Directive header changed to new format. Effective date unchanged. Technical Responsibility assigned to Safety and Health Program Manager.
		2. Directive number changed from SA-003 to WPP-01-05.4ACancellation Paragraph added stating SA-001 has been superseded by WPP-01-5.2A
B	August 24, 2009	Comprehensive Rewrite of Respiratory Protection Program
C	November 23, 2009	Clarified filter change schedule requirements for gas and organic vapor cartridges (Section 9.9.2)

NASA Wallops - WICC

RESPIRATORY PROTECTION PLAN

Effective: January 1, 2012

Prepared by:

URS

Wallops Island VA 23337

Approved:

Gerald Dunn
URS Project Manager

1/1/12
January 1, 2012
Date

Revision 1
January 9, 2013

THIS PLAN IS TO BE USED FOR THE SPECIFIC PROJECT DESCRIBED HEREIN. IT IS NOT TO BE USED FOR ANY OTHER PROJECT. THIS PLAN MUST BE REVISED AS APPROPRIATE TO ADDRESS CHANGING SITE CONDITIONS OR MODIFIED SCOPE OF WORK.

Disclaimer:

This Plan, and each of its provisions, is applicable only to, and for use only by, URS Corporation, its affiliates, and its subcontractors. Any use of this Plan by other parties, including, without limitation, third party contractors on projects where URS is providing engineering, construction management or similar services, without the express written permission of URS, will be at that party's sole risk, and URS Corporation shall have no responsibility. The existence and use of this Plan by URS shall not be deemed an admission or evidence of any acceptance of any safety responsibility by URS for other parties unless such responsibility is expressly assumed in writing by URS in a specific project contract

RESPIRATORY PROTECTION PLAN Revisions

The Plan should be reviewed and/or revised on an annual basis by the Health, Safety, and Environment Representative. The following table shows the list of revisions for tracking purposes.

Revision Number	Revision Date	Revised By/Preparer
0	Jan 2012	Gerald Dunn
1	Jun 2012	Gerald Dunn
2		

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I. Introduction

Respirators are used to protect URS employees from inhaling hazardous chemicals in the air. These chemicals can be in the form of gases, vapors, mists, or dust. Because we provide respirators to our employees to protect them from airborne chemical hazards, we must have a written respiratory protection program. This program will spell out how to do the following at your workplace:

1. How the proper respirators for the particular hazards are selected and issued (include a list of respirators used),
2. When and how respirators will be used in routine work activities, infrequent activities, and foreseeable emergencies such as spill response, rescue or escape situations,
3. How medical evaluations of respirator wearers is provided,
4. How respirator fit-testing is done,
5. How respirators in use are cleaned, stored, inspected and repaired or discarded,
6. How sufficient high purity air is provided for air-supplied respirators (if you use them),
7. How employees are trained about respiratory hazards at your workplace,
8. How employees are trained on the proper use of the respirators used at your workplace,
9. How you evaluate the effectiveness of your respiratory program.

Respirators are prone to leakage, depend on the correct behavior of individual employees and require maintenance and management oversight. This is why they are considered a last resort to protect employees from airborne chemical hazards. It is often more protective, less trouble, and often cheaper to eliminate or reduce the respiratory hazard through various ways like exhaust ventilation, changes in process, or enclosure of the process. Sometimes the use of the hazardous chemical itself can be eliminated. Whenever possible, administrative and engineering controls that do away with need to use respirators should be developed and implemented.

To provide proper protection, respirators must be the right type, must be worn correctly at all times, and must be maintained properly When there is no alternative, a respirator program must be implemented to protect our employees from adverse health effects of exposure to chemicals in the air above their permissible exposure limits. Respirators are typically used in three different situations

1. Routine or regular exposure to processes or activities involving chemicals,
2. Infrequent, but predictable occasions where there is chemical exposure,
3. Emergencies where there is a chemical leak or spill.

The Federal Occupational Safety and Health Administration (OSHA) requirements for respiratory protection are presented in **29 CFR 1910.134** and have been adopted by the

Commonwealth of Virginia to assure the protection of all employees from respiratory hazards. The purpose of this plan is to ensure that all URS personnel and visitors at the Wallops Flight Facility are afforded protection from respiratory hazards. The primary objective is to prevent harmful exposures that might result in occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors. This is accomplished as far as possible by accepted administrative and engineering control measures (for example, general and local ventilation, enclosure or isolation, and substitution of less hazardous processes or materials). When effective engineering controls are not feasible, or while they are being instituted, respirators may be required.

The National Institute for Occupational Safety and Health (NIOSH) guide to respiratory protection, publication No.87-116, as revised or updated, shall be used as an adjunct reference for the implementation of this program. All respirators used by URS personnel and visitors must meet criteria of NIOSH

All URS personnel are expected to be aware of this program. All URS personnel who perform or who may be called upon to perform any work or research activity which will expose them to airborne hazardous or toxic material, or significant amounts of dusts or mists, shall be thoroughly familiar with the contents of this plan.

Copies of the Respiratory Protection Plan are available for review in the following locations:

- **URS Program Manager's office**
- **URS HSE Representative's office**
- **Each URS manager's offices**

The following respirator program meets the OSHA and URS requirements for a written program and it reflects actual practices at your worksite.

II. Responsibility and Authority

Program Manager

The Program Manager **shall be** responsible for the safety and health of all personnel assigned to URS.

HSE Representative (Safety Officer)

The HSE Representative (Safety Officer) is directly responsible to the manager of the URS Respiratory Protection Program and has full authority to make necessary decisions to ensure the success of this program. This authority includes approving equipment purchases necessary to implement and operate the program. The Safety Officer will develop and maintain written detailed instructions covering each of the required elements of this plan, and is the sole person authorized to amend this plan.

The Program Manager has expressly authorized the Safety Officer or URS employee to halt any operation or activity where there is danger of serious personal injury or illness. This authority includes activities with respiratory hazards. The Safety Officer will provide technical assistance

as required and requested to assist individual department and work centers in determining the need for respirators, selection of approved/certified respirators, and scheduling of training and qualitative fit testing. At the time of writing of this Respiratory Protection Program, the HSE Representative is specifically named as the manager as required under **29CFR1910.134(c)(3).**

Supervisory Personnel

Supervisory personnel are responsible for ensuring that respirators are available as needed, that personnel assigned to or visiting their areas of responsibility wear respirators as required, for scheduling the inspection of respirators on a regular basis, and for providing the Program Manager or HSE Representative with a list of personnel who require initial, semi-annual, and annual training or fitting.

Additionally, Supervisory Personnel are responsible for assuring that employees who desire to use respirators for their individual comfort or convenience at times when and in places where respirators are not required contact the Program Manager/HSE Representative and comply with Appendix D to **29 CFR 1910.134**, (Non-Mandatory) Information for Employees Using Respirators When Not Required Under the Standard.

Individual Employee

Every employee is responsible for using the respirator provided to them in accordance with instructions and training for cleaning, disinfecting, inspecting, and storing his or her respirator, and for reporting any respirator malfunction to their supervisor. Each individual choosing to use a respirator for personal comfort or convenience at times when and in places where respirators are not required must so inform their immediate supervisor and must contact the HSE Representative or Program Manager and comply with Appendix D to **29 CFR 1910.134**, (Non-Mandatory) Information for Employees Using Respirators When Not Required Under the Standard.

iii. How the proper respirators for the particular hazards are selected and issued

Respirators are required when employees are exposed (can inhale) chemicals or dust in the air that are at harmful levels. These can include vapors from handling solvents, spray-painting, dust from grinding or sanding, or welding fumes.

How do you decide which type of respirator to select? First, it must be the correct type for the air contaminant. Second, it must fit properly. Third, it must provide adequate protection for the amount of chemical in the air. The more toxic or more concentrated the chemical is in the air, the higher the level of protection the respirator must provide.

Different respirators provide different protection. Depending on the amount of chemical in the air, you may need to use a respirator that provides more protection. Respirators are rated by their "assigned protection factor" (APF) which is a number between 10 and 10,000. *The higher the number - the greater the protection.* A respirator with a protection factor of 10 will provide adequate protection to levels of the chemical in the air 10 times the safe limit of that chemical.

Without some knowledge of the amount of chemical or dust in the air in the workplace, you cannot know whether your employees are exposed to harmful amounts of chemicals they use.

Just about every chemical has its toxic amount or level that will make a person sick On the other hand, highly toxic chemicals can be used without harm to employees if handled properly. Most commonly used chemicals have safe limits or "permissible exposure limits" in the air that if exceeded will cause harm. If these limits are exceeded, we are required to take steps to protect your employees from that air exposure. If the levels cannot be reduced below the permissible exposure limits by ventilation, changes in the process or reduction in the length of time of exposure, than we must provide respirators to exposed employees.

The best way to accurately determine the levels of chemicals or dust in the air is to do some type of air sampling. Air sampling can be done by Marvin Bunting NASA industrial hygiene x2030 at your request.

The material safety data sheets for products used also provide information about the hazards of the chemicals, permissible exposure limits, methods of controls and recommended respirators.

The type and brands of respirators vary widely ranging from simple dust masks to supplied air respirators like the kind firemen wear. Following is description of the main types of respirators used by URS employees at Wallops:

- Firefighters – Self Contained Breathing Apparatus, Supplied Air Respirators
- Environmental Hazardous Waste Management – Half- and Full-faced respirators for Hazwaste use only. **These respirators are not for lab use for hood failures, etc. Procedures for hood failure or chemical release are immediate evacuation and pull the fire alarm on the way out the door.**

WFF URS Environmental Office Respiratory Protection – FY 2013			
Employee	**Mask type (full or half)**	**Make/Model**	**Filter cartridge part number**
Bonsteel, Michael	Full Face	North/5400 series	North Part No. 7583 P100
Borowicz, Monica	Full Face	North/5400 Series	North Part No. 7583 P100
Dunn, Susan K.	Full Face	North/7600-8A S	North Part No. 7583 P100
Eni, Sheryl	Full Face	North/7600-8A S	North Part No. 7583 P100
Hart, Will	Full Face	North/54001	North Part No. 7583 P100
Hooks, Michael	Half Face	North/7700-30 M	North Part No. 7583 P100
Silbert, Shari	Half face	North/7700-30S	North Part No. 7583 P100
Simko, Marianne	Full Face	North/76008A M/L	North Part No. 7583 P100
Whealton, Shane	Full Face	North/76008A M/L	North Part No. 7583 P100
All respirators are for Hazwaste use **ONLY. Do not use respirators for evacuation purposes			

Half-Face Air-Purifying Respirator

Figure 1: NORTH 5400

These respirators are sometimes called "half-face" or "half-mask" respirators since they cover just the nose and mouth. They have removable cartridges that filter out either dust, chemicals or both.

Selecting the correct cartridges is essential since they are designed for particular types of chemicals or dust. The cartridges must be changed out or replaced periodically, especially for chemicals, since they can absorb only so much contaminant before breakthrough occurs. Some cartridges are equipped with end-of-service indicators that show when a cartridge should be replaced. Most cartridges don't have this indicator and we have developed a change-out schedule to prevent breakthrough. The change-out schedule is based on the chemical concentration, physical work effort, temperature and humidity.

Full-Face Air-Purifying Respirator

Figure 2: NORTH 7600

This type of respirator is used when the air contaminant irritates the eyes. They also provide somewhat higher protection to the lungs since they fit tighter and are less prone to leaking. These respirators also have replaceable cartridges that must be changed on a regular basis as described above for half-face respirators.

Self-Contained Breathing Apparatus (SCBA)

Firefighters are required to use SCBA in a variety of situations. Supplied air respirators are required when a respiratory hazard is considered "immediately dangerous to life or health" (IDLH). Respiratory hazards are classified as IDLH as follows:

Figure 3: SCOTT Air Pack

- There is a lack of oxygen (less than 19.5% oxygen)
- There is too much oxygen (more than 23.5% - a fire hazard)
- You know there are toxic chemicals in the air, but you don't know how much
- The amount of chemical in the air is known or expected to be above the IDLH level for that chemical. See the NIOSH Pocket Guide to Chemical Hazards for chemical IDLH levels.
- Levels of chemicals above IDLH can occur in confined spaces, or enclosed spaces where there is little or no ventilation.

Supplied Air Respirator (SAR)

This respirator is an air-supplying respirator for which the source of breathing air is not designed to be carried by the user. Usually air is provided through an air hose (no longer than 300ft). This type of respirator will be only used during confined space training and rescue by the Fire Department.

IV. WHEN AND HOW RESPIRATORS WILL BE USED IN ROUTINE WORK ACTIVITIES, INFREQUENT ACTIVITIES, AND FORESEEABLE EMERGENCIES SUCH AS SPILL RESPONSE, RESCUE OR ESCAPE SITUATIONS

The Program Manager/HSE Representative will monitor the work area in order to be aware of changing conditions where employees are using respirators.

Employees will not be allowed to wear respirators with tight-fitting facepieces if they have facial hair (e.g., stubble, bangs), absence of normally worn dentures, facial deformities (e.g., scars, deep skin creases, prominent cheekbones), or other facial features that interfere with the facepiece seal or valve function. Jewelry or headgear that projects under the facepiece seal is also not allowed. If corrective glasses or other personal protective equipment is worn, ensure that it will not interfere with the seal of the facepiece to the face.

A seal check will be performed every time a tight-fitting respirator is put on. The program administrator will make sure that the NIOSH labels and color-coding on respirator filters and cartridges remain readable and intact during use. Full-facepiece respirators can be provided with corrective glasses since corrective lenses can be mounted inside a full-facepiece respirator. Contact lenses can also be used with full facepiece respirators if they do not cause any problems for the employee.

Employees must leave the area where respirators are required for any of the following reasons:

- to replace filters or cartridges
- smell or taste a chemical inside the respirator
- change in breathing resistance
- to adjust their respirator,
- to wash their faces or respirator,
- illness (dizziness, nausea, weakness, breathing difficulty, coughing, sneezing, etc)

The Program Manager/HSE Representative has identified the following areas or job duties as presenting the potential for IDLH (immediately dangerous to life or health) conditions:

- Fire Department response to fire, HAZMAT, Confined Space Rescue, and any other IDLH condition encountered.
- Environmental employees working in or near hazardous waste materials.

Where any area or confined space is designated as IDLH, we will provide <u>two</u> standby employees outside the area. These standby employees are trained in effective emergency rescue, are equipped with pressure-demand self-contained breathing apparatus (SCBAs), and will be in constant visual, voice or signal line communication with the employees in the IDLH area. The standby employees will notify the administrator before entering the IDLH area, and we will provide the necessary assistance when notified.

V. HOW MEDICAL EVALUATIONS OF RESPIRATOR WEARERS IS PROVIDED

Every employee of this company who must wear a respirator will be provided with a medical evaluation before they are allowed to use the respirator. Our first step is to give the attached medical questionnaire to those employees. Employees are required to fill out the questionnaire in private and send or give them to Wallops Flight Facility Medical Unit. Completed questionnaires are confidential and will be sent directly to medical provider without review by management.

If the medical questionnaire indicates to our medical provider that a further medical exam is required, we will discuss what is required. We will get a recommendation from this medical provider on whether or not the employee is medically able to wear a respirator.

Additional medical evaluations will be done in the following situations:

- Our medical provider recommends it,
- Our respirator program administrator decides it is needed,
- An employee shows signs of breathing difficulty,
- Changes in work conditions that increase employee physical stress (such as high temperatures or greater physical exertion).

VI. HOW RESPIRATOR FIT-TESTING IS DONE

A quantitative fit-test provides the most accurate information; qualitative fit testing depends on the respirator wearer's sense of smell and taste (subjective response). OSHA's standard requires fit-testing for any face mask (full or half) designed to have a tight seal along the face, whether it is used in a positive or negative pressure mode, and whether it is disposable or not. If the required fit factor is greater than 100, then a quantitative fit-test must be performed.

A. Each person will have a qualitative or quantitative fit test when first required to wear a respirator, every 12 months when respirators will be worn thereafter, or as hazards or respiratory needs change.

B. Each person will have a qualitative or quantitative fit test for each specific make(s) and model(s) of respirator(s) for which the worker may wear.

C. Under no circumstances shall a worker be allowed to use any respirator if the results of the qualitative fit test indicate that the worker is unable to obtain a satisfactory seal. The eight exercises required by OSHA under the respiratory protection standard, 29 CFR 1910.134, Appendix A, are as follows (note that these are not required controlled negative pressure (CNP) quantitative fit testing):

   1. normal breathing
   2. deep breathing
   3. head side to side
   4. head up and down
   5. talking out loud

6. grimacing (quantitative only)
7. bending
8. normal breathing

Qualitative and quantitative fit testing must be performed in negative pressure mode for all tight fitting respirators, whether the respirator is positive or negative pressure demand.

Qualitative and quantitative fit testing must be conducted according to one of the protocols found in 29 CFR 1910.134, Appendix A.

Employees using respirators when not required under the standard (i.e., dust masks or comfort masks for nuisance type dust without a specified exposure level) must be aware of the potential hazards of using a respirator. See Attachment 042-2 of this standard or Appendix D of 29 CRF 1910.134 for information program requirement.

All employees who wear respirators will be fit-tested before being allowed to use their respirator. Fit-testing is required annually. Fit-testing will also be done when a different respirator facepiece is chosen, when there is a physical change in an employee's face that would affect fit, or when our employees or medical provider notify us that the fit is unacceptable. No beards are allowed on wearers of tight-fitting respirators. We do fit-testing using one or more of the following fit-testing protocols; Qualitative (using Bitrex) for Environmental personnel and Quantitative fit-testing instrument provided by vendor for fire

Quantitative Fit Testing done by the WICC Safety Office consists of using the Portacount® to test for proper fit for respiratory PPE.
Portacount® Setup consists of:

1 Portacount® to connect to laptop or desktop
1 Adapter **(Adapters are specific to respirator brand)**

The quantitative fit test is given to each employee after he/she has completed respiratory training and passed the general knowledge exam.
STEP 1: Candidate dons respirator and adjusts for proper fit.
STEP 2: The tester sets the computer to begin the test.
STEP 3: The employee performs a series of 60 second tasks.
These tasks include:

- Normal breathing with head stationary,
- Deep breathing with head stationary,
- Turning head side to side,
- Moving head up and down,
- talking,
- grimacing,
- Bending over.

The employee passes the fit test providing the fit factor remains at an acceptable level for each task.

Qualitative Fit Testing done by the WICC Safety Office consists of using the Allegro Bitrex® Test Kit to test for proper fit for respiratory PPE.
Kit consists of:

1 Poly-coated test hood
1 Sensitivity Nebulizer
1 Test Nebulizer
1 Box of Sensitivity Solution
1 Box of Test Solution

The qualitative fit test is given to each employee after he/she has completed respiratory training and passed the general knowledge exam.
STEP 1: Sensitivity test - Employee's sensitivity is measured by the tester administering sensitivity solution into the test hood. ***(ONLY THE TEST HOOD IS WORN FOR THE SENSITIVITY TEST)***
STEP 2: Once sensitivity is established, employee dons PPE and performs seal checks to ensure proper fit before testing begins.
STEP 3: The employee then dons the test hood and the tester begins administering test solution into the hood while the employee performs a series of 60 second tasks. These tasks include: Normal breathing with head stationary, Deep breathing with head stationary, Turning head side to side, Moving head up and down, and bending over.
The employee passes the fit test providing he/she does not detect the Bitrex® solution at any time during the test.

department testing:

The quantitative fit-testing instrument we use is:

- Bitrex Protocol .

Documentation of our fit-testing results is attached (or is kept at the following location)

- WICC Safety Office F-16

VII. HOW RESPIRATORS IN USE ARE CLEANED, STORED, INSPECTED, REPAIRED, DISCARDED

Inspection

Routinely used air-purifying and airline respirators should be checked as follows before and after each use:

a. Examine the facepiece for:

- Excessive dirt.
- Cracks, tears, holes or physical distortions of shape from improper storage.
- Inflexibility of rubber facepiece (stretch and knead to restore flexibility).
- Cracked or badly scratched lenses in full facepieces.
- Incorrectly mounted full facepiece lenses, or broken or missing mounting clips.
- Cracked or broken air-purifying element holder(s), badly worn threads or missing gasket(s) if required.

b. Examine the head straps or head harness for:

- Breaks.
- Loss of elasticity.
- Broken or malfunctioning buckles and attachments.
- Excessively worn serrations on head harness, which might permit slippage (full facepieces only).

c. Examine the exhalation valve for the following after removing its cover:

- Foreign material, such as detergent residue, dust particles or human hair under the valve seat.
- Cracks, tears or distortion in the valve material.
- Improper insertion of the valve body in the facepieces.
- Cracks, breaks or chips in the valve body, particularly in the sealing surface.
- Missing or defective valve cover.
- Improper installation of the valve in the valve body.

d. Examine the air-purifying element for:

- Incorrect cartridge, canister, or filter for the hazard.
- Incorrect installation, loose connections, missing or worn gasket or cross threading in the holder.
- Expired shelf-life date on the cartridge or canister.

- Cracks or dents in the outside case of the filter, cartridge or canister, indicated by the absence of sealing material, tape, foil, etc., over the inlet.

e. If the device has a corrugated breathing tube, examine it for:

- Broken or missing and connectors.
- Missing or loose hose clamps.
- Deterioration, determined by stretching the tube and looking for cracks.

f. Examine the harness of a front-or back-mounted gas mask for:

- Damage or wear to the canister holder, which may prevent its being held in place.
- Broken harness straps for fastening.

g. Self-Contained Breathing Apparatus (SCBA)

- Follow manufacturer specifications for storage, maintenance and cleaning of SCBA systems.

Manual Cleaning

A generalized cleaning procedure is typically found in the manufacturer's manual. Read the respirator manual and follow the manufacturer's recommendations.

- Remove canisters, filters, valves, straps and speaking diaphragms from the facepiece.
- Wash facepiece and accessories in warm soapy water or a commercially available cleaner, following the manufacturer's instructions. Gently scrub the respirator.
- Rinse parts thoroughly in clean water.
- Air dry in a clean place or wipe dry with a lint less cloth.

Machine Cleaning

Machines may be used to expedite the cleaning, sanitizing, rinsing, and drying of large numbers of respirators. Read the machine-cleaning manual and follow manufacturer's recommendations.

- Extreme care must be taken to ensure against excessive tumbling and agitation, or exposure to temperatures above those recommended by the manufacturer (normally 120°F maximum), as these conditions are likely to result in damage to the respirators.
- Ultrasonic cleaners, clothes-washing machines, dishwashers, and clothes dryers have been specially adapted and successfully used for cleaning and drying respirators.

Disinfection

- Disinfection is required when more than one person uses the respirator. Recommended NIOSH disinfection procedures include immersion of the respirator body for two minutes in a 50 ppm chlorine solution (about 2 ml bleach to 1 liter of water). Rinse thoroughly in clean water and dry.
- Immersion times have to be limited to minimize damage to respirators. The solutions can age rubber and rust metal parts. Caution must be taken to thoroughly rinse the respirator after cleaning and disinfection to prevent dermatitis.

- An alternate method is to purchase a commercially prepared solution for disinfection/decontamination and follow the directions recommended by the manufacturer.
- Each person wearing a respirator shall examine the respirator before use in accordance with the training and instruction provided during fit testing.
- After cleaning and sanitizing, each respirator shall be examined to determine if it is in proper working condition, if it needs replacement of parts or repairs, or if it should be discarded. Respirator inspection shall include, when applicable, a check for tightness of connections; for the condition of the respiratory inlet covering, head harness, valves, connecting tubes, harness assemblies, filters, cartridges, canisters, end-of-service life indicator, and shelf life date(s), and for the proper function of regulators, alarms, and other warning systems.
- Each rubber or other elastomeric part shall be inspected for pliability and signs of deterioration. Each air and oxygen cylinder shall be inspected to ensure that it is fully charged according to the manufacturer's instructions.

Repair

- Only persons trained in proper respirator assembly and correction of possible respirator malfunctions and defects shall do replacement of parts or repairs.
- Replacement parts shall be only those designed for the specific respirator being repaired.
- Reducing or admission valves, regulators, and alarms shall be returned to the manufacturer for repair or adjustment.
- The valve, regulator, or alarm manufacturer must approve instrumentation for valve, regulator, and alarm adjustments and tests.

Storage

Respirators shall be stored in a convenient, clean and sanitary location. The purpose of good respirator storage is to ensure that the respirators will function properly when used. Respirators shall be stored in a manner that will protect them against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Respirators shall be stored to prevent distortion of rubber or other elastomeric parts. This can be done by storing the respirators in hermetically sealed plastic bags, or plastic bags capable of being sealed. Emergency and rescue use respirators that are placed in work areas shall be quickly accessible at all times, and the storage cabinet or container in which they are stored shall be clearly marked.

A cartridge change schedule must be developed for cartridges or canisters used with air purifying respirators that do not have an End of Service Life Indicator (ESLI). The purpose of this is to prevent contaminants from breaking through the respirator's sorbent cartridge(s), and thereby over-exposing employees. NIOSH has approved ESLIs for only four cartridges or canisters (mercury vapor, carbon monoxide, ethylene oxide, and hydrogen sulfide). Historically we have relied on the warning properties (odor, irritation) of a contaminant to

dictate cartridge change. OSHA no longer allows this as the sole basis for changing respirator cartridges. In developing a change schedule the following factors should be considered:

- Contaminants
- Concentration
- Frequency of use (continuously or intermittently throughout the shift)
- Temperature and humidity
- Work rate
- The presence of potentially interfering chemicals.

The worst-case conditions should be assumed to avoid early breakthrough. This must be documented in the project health and safety plan or, in the cases of office or labs, in the site specific Respiratory Protection Program.

Sources of Help

OSHA provides assistance in developing respirator cartridge change schedules on its website at http://www.osha.gov/SLTC/etools/respiratory/change_schedule.html.

Most cartridge manufacturers maintain on-line interactive cartridge service life programs that can be used to evaluate the service life against many contaminants. Typically, these do not evaluate the service life against mixtures (multiple contaminants).

Because of the complexity in evaluating mixtures, OSHA offers the following guidance:

- When the individual compounds in the mixture have similar breakthrough times (i.e., within one order of magnitude), service life of the cartridge should be established assuming the mixture stream behaves as a pure system of the most rapidly migrating component with the shortest breakthrough time (i.e., sum up the concentration of the components).
- Where the individual compounds in the mixture vary by 2 odors of magnitude or greater, the service life may be based on the contaminant with the shortest breakthrough time.

Rule of Thumb ("The Occupational Environment" - Its Evaluation and Control)

- If the chemical's boiling point is >70 °C and the concentration is less than 200 ppm, you can expect a service life of 8 hours at a normal work rate.
- Service life is inversely proportional to work rate.
- Reducing concentration by a factor of 10 will increase service life by a factor of 5.
- Humidity above 85% will reduce service life by 50%.

OSHA Interpretation

The OSHA inspection procedures for the respiratory protection standard specifies that where contaminant migration is possible, respirator cartridges/canisters should be changed after each work shift where exposure occurs unless there is objective data to the contrary (description

studies) showing the performance in the conditions and schedule of use/non-use found in the workplace.

VIII. How sufficient high purity air is provided for air-supplied respirators

Only Grade D breathing air will be supplied to compressed air tanks for respirators using provided air compressors located at both fire stations (Buildings B-129 and X-15).

Our compressors used for breathing air supply are non-oil lubricated and the air intake is located in an uncontaminated area. The brand name of our air compressor(s) and the location is as follows:

- Fire Station 1 (B-129) Eagle
- Fire Station 2 (X-15) Mako

Our compressors are equipped with filters, water traps and sorbents to provide clean, safe air. They are maintained by Philip "Bryan" Daffin, Firefighter. Maintenance records are located at Fire Station 1 (B-129. Periodic carbon monoxide monitoring is done by Trace Analytics on a quarterly schedule.

When used, our airline respirators are equipped with air couplings that are not compatible with couplings to non-breathable air (plant air for example) or other gas systems.

If used, our air cylinders for supplied air respirators are inspected and tested according to federal DOT regulations.

IX. How employees are trained about respiratory hazards at your workplace

We evaluate our respiratory program for effectiveness by doing the following steps:

1. Checking results of fit-test results and health provider evaluations.
2. Talking with employees who wear respirators about their respirators – how they fit, do they feel they are adequately protecting them, do they notice any difficulties in breathing while wearing them, do they notice any odors while wearing them, etc.
3. Periodically checking employee job duties for changes in chemical exposure.
4. Periodically checking maintenance and storage of respirators.
5. Periodically checking how employees use their respirators.
6. Other _____

X. How employees are trained on the proper use of the respirators used

Training is done by WICC Health and Safety before employees wear their respirators and annually thereafter as long as they wear respirators. Our supervisors or crew bosses who wear respirators or supervise employees who do will also be trained on the same schedule.

Additional training will also be done when an employee uses a different type of respirator or workplace conditions affecting respiratory hazards or respirator use have changed.

Training will cover the following topics:

1. Why the respirator is necessary,
2. The respirator's capabilities and limitations,
3. How improper fit, use or maintenance can make the respirator ineffective,
4. How to properly inspect, put on, seal check, use, and remove the respirator,
5. How to clean, repair and store the respirator or get it done by someone else,
6. How to use a respirator in an emergency situation or when it fails,
7. Medical symptoms that may limit or prevent respirator use,
8. Our obligations under the Respirators Rule.

Employees will have access to these records.

XI How you evaluate the effectiveness of your respiratory program

As necessary, EHS shall conduct workplace evaluations to ensure that provisions of the current written program are being effectively implemented. To assist in program evaluation, both voluntary and required respirator users must fill out a questionnaire (Appendix F- Respirator Use Annual Questionnaire) on an annual basis to communicate any problems or concerns regarding respirator use. Any problem that EH&S identifies from this questionnaire shall be corrected.

Respiratory Protection Course Summary: Three hours of instruction to train employees on the proper use of respiratory protection equipment. Respiratory training and fit testing is required annually. All program participants are required to have a respiratory physical each year before testing can be performed.

XII Recordkeeping

The following records will be kept:

- A copy of this completed respirator program
- Employees' latest fit-testing results
- Employee training records
- Written recommendations from our medical provider

The records will be kept at the following location: **URS Program Manager/HSE Representative office – Building F-1 Room 100**

Wallops Institutional Consolidated Contract II (WICC II)

Safety, Health, and Environmental Plan

Rev _A

April 1, 2014

Exceeding Expectations through Innovation and Quality

Prepared by:
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Change Information Page

This document is under the configuration control of LJT & Associates, Inc. (LJT). Proposed changes to this document must be submitted to the signatories along with supportive material justifying the proposed change. Changes to this document will be made by Documentation Change Notice (DCN) or by complete revision. Comments or questions concerning this document and proposed changes shall be addressed to:

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ACRONYMS

Acronym	Definition
ANSI	American National Standards Institute
ARFF	Aircraft Rescue and Fire Fighting
CFR	Code Of Federal Regulations
COR	Contracting Officer Representative
CPR	Cardiopulmonary Resuscitation
CSP	Confined Space Program
DCN	Document Change Notice
ECR	Environmental Compliance and Restoration
EEAP	Emergency Evacuation Assembly Point
EMT	Emergency Medical Technician
EPA	Environmental Protection Agency
EPDRP	Emergency Preparedness Disaster Recovery Program
ESHSE	Environmental, Safety and Health Self-Evaluation
ESO	Environmental Safety Office
FOM	Facility Operations Managers
GPD	Goddard Policy Directive
GPR	Goddard Policy Requirement
GSE	Ground Support Equipment
GSFC	Goddard Space Flight Center
HAZMAT	Hazardous Materials
HR	Human Resources
HSE	Health Self Evaluation
ICS	Incident Command System
IF	Injury Frequency
IRIS	Incident Reporting Information System
IS	Injury Severity
ISO	International Standards Organization
JHA	Job Hazards Analysis
JPG	Joint Planning Group
LJT	LJT & Associates, Inc.
MARS	Mid-Atlantic Regional Spaceport
MSC	Marine Science Consortium
MSDS	Material Safety Data Sheet
NASA	National Aeronautics And Space Administration
NFPA	National Fire Protection Agency
NFS	National Fire Standard

Acronym	Definition
NIMS	National Incident Management System
NIST	National Institute Of Standards And Technology
NOAA	National Oceanographic and Atmospheric Agency
NPD	NASA Policy Directive
NPR	NASA Procedural Requirement
NSRS	NASA Safety Reporting System
NSTC	NASA Safety Training Center
O&M	Operation And Maintenance
OHF	Occupational Health Facility
OM&E	Operations, Maintenance and Engineering
ORI	Operational Readiness Inspection
OSHA	Occupational Safety And Health Administration
OSS	Operations Safety Supervisor
PEP	Protective Equipment Program
PM	Program Manager
PMO	Program Management Office
POC	Point Of Contact
PPE	Personal Protective Equipment
PSM	Process Safety Management
QA	Quality Assurance
RAC	Risk Assessment Code
REV	Revision
ROC	Range Operations Contract
S&MA	Safety and Mission Assurance
SDS	Safety Data Sheet
SHA	Safety and Health Audits
SHE	Safety, Health and Environmental
SHMS	Safety and Health Management System
SM&A	Safety and Mission Assurance
SPP	Safety Performance Program
TRR	Test Readiness Review
TT&E	Technical Test & Evaluation
USCG	United States Coast Guard
USN	United States Navy
VPP	Voluntary Protection Program
WFF	Wallops Flight Facility
WICC	Wallops Institutional Consolidated Contract

1 Introduction

The NASA, United States Navy (USN), United States Coast Guard (USCG), National Oceanic and Atmospheric Administration (NOAA), Mid-Atlantic Regional Spaceport (MARS) and the Marine Science Consortium (MSC) missions at Wallops Flight Facility (WFF) are prime locations for potential Safety, Health and Environmental concerns. Mitigation of these risks is essential for the successful accomplishment of their missions on a daily basis and requires rigorous adherence to Federal Civilian and Department of Defense guidelines. These guidelines and requirements are integrated into this plan to ensure both the safety of the Wallops Institutional Consolidated Contract II (WICC II) and WFF personnel, as well as the success of the NASA and tenant missions. Team LJT brings with it the distinction of VT Group's certification as a Voluntary Protection Program (VPP) Star recipient which is designed to recognize exemplary worksites with comprehensive, successful safety and health management systems.

Team LJT's Safety, Health, and Environmental (SHE) Plan is used to assist us in safeguarding our employees by providing a systematic methodology for embedding risk management by using integrated management systems. LJT employs an integrated Safety & Health Management System (SHMS) at leadership, strategic, and operational levels. We consider this a fundamental good business practice that is consistent with our company's values. LJT provides extensive safety and health support to all of our employees and subcontractors working on-site at the NASA WFF. Our approach to providing world-class safety management involves consolidating the various individual contract safety leaders as well as the entire WICC II staff into one overall LJT Safety team. By utilizing this approach LJT provides a strong, fluid, safety organization that can prioritize the multiple projects and activities at WFF under the scope of WICC II and provide quick and effective safety support. The LJT Safety Team Approach also creates an environment where all employees under the scope of the LJT Safety Team receive standardized safety training and processes which in turn simplifies the overall safety processes at WFF.

We ensure safe and reliable Operations, Maintenance, and Engineering (OM&E) of Facilities, Systems, Equipment, Construction Management, and Utilities along with all supporting functions to ensure NASA mission success. The LJT Safety Health Management System is an OSHA VPP; International Organization for Standardization (ISO); and American National Standards Institute (ANSI) Z10 standard compliant system.

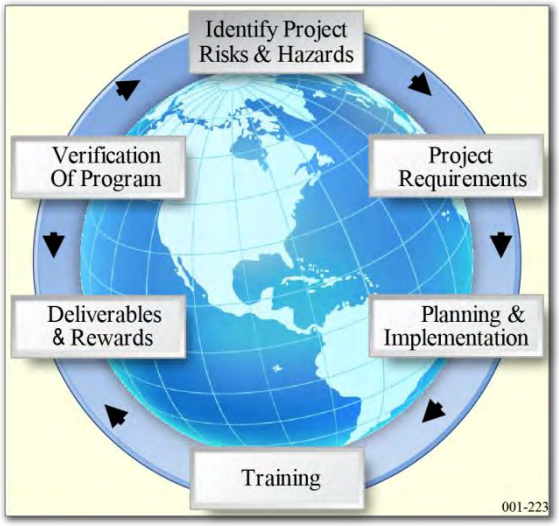

Figure 1. SHE Life Cycle.
Team LJT's standardized SHE approach is a repeating cycle for continuous improvement.

Using our SHE Life Cycle (as seen in Figure 1), we conduct a risk assessment to identify project risks and hazards. Because of the assessment, we mitigate operational risks by implementing plans, programs, and training. To strengthen employee involvement and management commitment, we emphasize internal communications through employee involvement with safety committee meetings, newsletters, outreach programs, and other forms of communication. We continuously

verify performance through audits and inspections. LJT has a standardized SHE approach, and a repeating cycle for continuous improvement. We have developed a rigorous and consistent SHE Management System that gives us the direction and tools we need to go "beyond compliance" and achieve excellent standards everywhere our program locations and requirements lead us as a team.

LJT also employs a safety engineering approach to all projects and construction activities. Similar to the SHE Life Cycle the LJT safety team takes an active role in project evaluation and actively reviews the projects as they progress. This safety engineering approach allows for real time assessment of projects and identification of potential safety concerns that may not have been addressed in the design phase of the project or result as a modification to the project plans. LJT ensures that safety is actively engaged in the planning process of all projects to ensure an effective, cost-efficient end product that meets or exceeds all applicable guidelines and regulations.

LJT performs self-inspections, retains proper documentation, writes and updates programs and plans, and participates in all customer's, federal, and state audits, as well as internal SHE audits performed by external corporate LJT SHE and Quality auditors. Every LJT employee is accountable for SHE, which leads to reductions in injuries, environmental incidents, and loss of Government property ensuring mission capability and reducing impacts to cost, schedule, and/or risk.

LJT tailors our SHE Plan to meet the policies, goals, and requirements in conducting business at WFF, and other properties where we conduct WFF business, in accordance with the WICC II responsibilities and with NASA WFF policies, processes, and procedures. All policies, procedures, and requirements contained within the LJT SHE Plan are disseminated to all WICC II employees, including subcontractors, vendors, visitors, and guests. We leverage our existing successful practices already in place on other contracts and consistently use employee best practices from across all of our contracts to drive continuous improvement in safety, health, and environmental performance.

2 Management, Leadership and Employee Participation

LJT is committed to a leadership role in protecting and promoting the environment of the communities, as well as the safety and health of NASA employees, the local population, and LJT employees. SHE at WFF is a priority and each LJT employee and subcontractor is aware of their roles and responsibilities relative to the WICC II SHE program. We are committed to our standardized approach to improve WFF's overall SHE program. LJT ensures that professional SHE personnel are on staff (with proper training and credentials to implement all regulatory requirements). LJT staff members assist customers with safety and health issues, and offer proper programs, procedures, and techniques to protect human health.

2.1 Policy

The fundamental objective of Team LJT's SHE policy is to be a responsible corporate citizen, who provides the highest degree of safety, health, and environmental stewardship, focusing on strategic themes deemed essential to achieving our mission of achieving a "world class" safety, health, and environmental culture.

Team LJT's Safety, Health, and Environmental policy is:

"LJT's core policy and highest priority is to protect the health and well-being of all employees through the prevention of injury and illness at work. This commitment is based on caring for our employees, partners, and contractors.

LJT and our employees are also committed to operating in an environmentally responsible and sound manner. LJT focuses on being a steward of the environment at all of our locations across the globe and strive to be leaders in environmental protection."

Expectations

Business activities will be conducted to:

- ***Focus on preventing incidents to achieve a workplace that is free from work-related injury and illness and to enable employees to complete each workday and their work life in good health.***
- ***Focus on preventing environmental incidents and impacts through implementing best practices and focusing on continual improvement.***
- ***Achieve full compliance with all applicable legal requirements, customer requirements and company standards.***
- ***Identify and respond to any public safety, health, and environmental impacts of our operations.***
- ***Treat injured employees with dignity and respect and provide the best medical treatment for workplace injury and illness.***
- ***Effectively manage illness and injury and reduce associated costs.***
- ***Maintain a workplace free of the effects of alcohol and other drugs of abuse.***

LJT emphasizes the importance of upfront safety, reliability, maintainability, and Quality Assurance (QA) requirements in all program activities. We also acknowledge the importance of contractor safety management by employing integrated SHE management systems at the

leadership, strategic and operational level. By using integrated management systems with strictly defined disciplines in quality, operations, and safety and health procedures, LJT achieves exemplary safety and health performance results. LJT also holds each of our sub-contractors accountable for compliance with all safety, health, and environmental requirements and policies while working under the WICC II scope.

2.2 Goals and Objectives

The primary SHE goal is to maintain a comprehensive safety and health program that meets the requirements defined in NASA Procedural Requirement (NPR) 8715.3C, WFF Range Safety Practices and Procedural Requirements; and assures the protection of the public, and contractor workforce, equipment, and property. In direct alignment with our customer, it is Team LJT's goal to assist and support WFF in maintaining the current recognition as a nationally recognized center for excellence for safety and health by:

- Abiding by, and where appropriate, assisting with, the implementation and development of Wallops NASA requirements for safety and health policies and processes
- Supporting and assisting WFF's efforts to attain Occupation Safety and Health Administration (OSHA's) Voluntary Protection Program (VPP) worksite compliancy requirements
- Supporting and implementing the annual safety and health goals and objectives established by WFF

Each year, the LJT SHE Manager with support and input from LJT's contract SHE Technicians will establish specific, performance-related safety and health goals and objectives. The established goals and objectives will be approved by the LJT Program Managers (PM's) along with the affected Contract Employee Safety Committees. These goals shall be communicated to all sub-contractors working on projects under the cognizance of LJT. We use various metrics to assess our progress in attaining our goals and objectives. LJT measures results by monitoring the leading indicators (warning signs) and lagging indicators (results). These metrics include: OSHA Injury Frequency (IF) and Injury Severity (IS) rates; Property damage incidents and cost; Hazard/Close Call Reporting; SHE training completion status; Inspection and audit completion and finding closure status; Hazard Analysis/Job Safety Analysis completion status; Safety observations results; and VPP Compliancy Element implementation assessments. These metrics support the assessment and reporting on the overall effectiveness of the SHE program.

LJT utilizes audits and VPP performance assessments to measure the effectiveness of our safety program – and to fulfill the NASA and OSHA VPP compliancy requirements for annual self-assessments. We conduct the annual self-assessments for both LJT managers and employees to obtain an objective program evaluation. The assessments also contain a facility safety survey that evaluates the facilities in which LJT employees reside to perform assigned duties. We compare the results of all assessments to existing documentation, such as close-call reports, audits, accident investigations, and baseline facilities evaluations to assess program effectiveness. We use this information to develop and monitor goals for the upcoming year.

An initial assessment of the WICC II program using criteria based upon current safety and health processes and procedures employed by the WFF project, is located in Appendix A.

2.3 Management Leadership

LJT believes that it is essential for all of our managers to provide the visible leadership to attain our Safety and Health Program goals and objectives during the first six months of the WICC II contract. We assign responsibilities for our management staff and clearly communicate expectations for safety and health performance for all LJT personnel. This SHE Plan has clear, written safety policy, with buy-in from all LJT team members and endorsement by our WFF Contract PM's. We communicate this to all LJT contract employees during safety committee meetings, all hands meetings, and as part of safety orientation training conducted for all contract employees. We developed a safety policy specific for WFF operations, which reflects the beliefs and principles of our team. We continuously measure, review, and correct progress toward our goals at all contract levels. We address newly developed safety issues through management and employee-led safety committees.

Our LJT SHE Manager and site Office Managers have the overall responsibility and accountability for the safety program. LJT directs the safety program through the LJT Safety Team which consists of the LJT SHE Manager and SHE Technicians who are responsible for the management of contract safety reporting along with day-to-day safety administration tasks. Our SHE Manager is a qualified safety professional and assists with hazard identification, evaluation, control, procedure development and review, recordkeeping, and overall monitoring of Team LJT's safety and health program.

The LJT Safety Team incorporates the use of Safety Technicians who report to the LJT SHE Manager and are responsible for providing daily safety and health support to the various projects and activities being managed under the scope of LJT's various contracts at WFF. The WFF contract SHE Technicians provide a proactive element to the LJT SHE Program by ensuring a safety interface is available for all activities in the work environment. This interface provides all LJT contract employees and management direct contact for any SHE support needs as well as provides a more active role of safety representatives in the work environment. By utilizing cross contract safety support, LJT provides a standardized safety approach and practices as well as providing additional staff to allow for professional safety support on critical projects and issues as necessary. The intent of this organization is to provide a more proactive approach to LJT's WFF contract safety programs management by providing dynamic safety responses to match WFF's dynamic operations and projects without restrictions due to safety resources or qualifications. Our intent is not to provide an enforcement element but rather a proactive safety resource available to all projects to ensure that all safety issues, concerns, or questions can be analyzed in real time which reduces the potential for projects to assume unnecessary risks or delays. LJT's SHE Program relies on all employees being proactive, well versed, and personally committed to the safety requirements of their jobs rather than the enforcement or the "safety cop" mentality.

2.3.1 Coordination

LJT understands that WICC II work is in an environment featuring close contact and working relations between a number of contractors, tenants, and the NASA staff. An effective SHE Program requires timely and effective coordination with all organizations involved to accomplish the following:

- Ensure understanding of all safety issues
- Achieve timely resolution of problems

- Provide full support of the WFF Safety and Health Program through the NASA WFF Safety and Mission Assurance (S&MA) Office

These relationships promote mutual support during multi-contractor, joint, or integrated operations. We establish an informal exchange program to provide a means to share safety and health information in an effective and consistent manner among the various involved contractors. The LJT SHE Manager is the primary safety point of contact at WFF, with interfaces established by Contract Safety Technicians on the WICC II and all other LJT contracts at WFF. The Safety Team structure allows for a more defined and standardized safety program with professional safety leadership as well as providing a more robust and active team of safety personnel to monitor and support the numerous activities and projects within the scope of WFF.

Employee involvement starts with clearly defined employee responsibilities (Table 1), which are defined at the time of hire and are discussed in our safety policies and procedures. Another form of employee participation is the employee management interface, as this encourages employee understanding and participation.

Table 1. Employee SHE Responsibilities.
LJT employees fully understand their roles and responsibilities relative to Safety & Health on WICC II.

Position	Safety and Health Responsibilities
All LJT Employees	• Participate as employee Safety Representatives, participate as employee Fire Wardens, and participate in safety and health audits • Perform Job Safety Analysis, hazardous operations assessments, procedure assessments, and operational readiness reviews • Participate as members of LJT Safety committee and subcommittees • Participate in WFF/field site host safety committees, participate in mishap and close call investigations, provide input on hazard corrective action, and provide SHE input to our program and sharing safety information sources • Identify hazards through the Close Call Reporting System or directly to management • Participate in community outreach activities such as electrical safety fair, Cardio-Pulmonary Resuscitation (CPR) training, fire prevention week, WFF SHE Day, and other activities • Participate in Continuous Improvement projects, programs and initiatives • Develop creative themes and methods of communicating the message to employees regarding on and off the job safety • When observing an unsafe condition in an activity, request supervisor to immediately correct the situation or stop work until corrected. If supervisor is not available, then stop the unsafe work and report the situation to the SHE representative • Comply with LJT smoking policy that conforms to NASA and OSHA standards

2.3.2 Employee and Contractor Involvement

All employees, LJT team members, and sub-contractors, must participate in the Safety and Health Program to ensure that individuals are involved in the process of identifying hazards, recommending and monitoring hazard controls, and participating in the development, execution, and success of our program. We train employees and employee representatives to allow them to participate productively in inspections, audits, surveys, and program reviews.

All contractors and vendors shall be evaluated based on previous safety performance as part of the bidding and selection process. Contractors are an integral part of the WICC II safety process and are held to the same accountability as WICC II team members and employees.

We ensure and encourage communication between managers, employees, and sub-contractors regarding safety issues by establishing an environment for open communications between managers, employees, sub-contractors, and LJT safety representatives. We authorize, encourage, and empower our employees and sub-contractors to stop potentially hazardous work activities. We believe that the off-the-job safety of our employees is a factor in their overall health and safety, and in the success of our safety and health program. Employees, who think safety off the job, bring those values with them on-the-job, so components of our employee involvement activities encourage this behavior. Examples include providing SHE information that not only ensures safety in the work environment but also applies to the home environment such as ladder safety, chemical safety, and the use of personal protective equipment.

2.4 Assignment of Responsibility

Managers who occupy positions of leadership and direct control over all WICC II work activities are a key element in complying with our SHE program. Their most important responsibility is to set the example for employees by demonstrating full support and compliance with safety policies and requirements. Managers are also responsible for ensuring employee training in safe work practices. They must communicate the physical and health hazards of assigned tasks, ensuring that employees receive and use proper protective equipment (PPE). Managers monitor their areas continually for factors capable of causing mishaps, intervening to prevent accidents. Managers are responsible for appropriate corrective and disciplinary actions when their employees violate safety rules. Table 2 (next page) shows specific responsibilities of all LJT management positions.

2.4.1 WICC II Contract Program Manager

The WICC II Contract PM provides oversight for the development and implementation of all safety and health programs for WFF Programs. Table 2 shows specific responsibilities of the WICC II PM.

2.4.2 Managers

LJT Managers actively participate in the implementation of the safety policy and conduct activities within their area in the manner that will prevent injury to personnel and damage to property. Table 2 also shows specific responsibilities for all of the WICC II Managers.

2.4.3 Safety Representatives

Our safety representatives are the LJT SHE Manager and Contract Safety and Health Technicians, who are knowledgeable safety leaders, with overall responsibility to implement and support our site-specific Safety and Health programs.

Table 2. LJT Management SHE Responsibilities. *Our management team has clearly defined roles and responsibilities for execution of the WFF Safety Program.*	
Position	**Safety & Health Responsibilities**
WICC II Program Manager	▪ Delineate and documents SHE responsibility and accountability of subordinates ▪ Ensure that adequate resources are provided to meet the needs of Team LJT's SHE program ▪ Enforce SHE policies and procedures and ensure compliance with applicable local, state, and federal safety and health regulations ▪ Ensure that all employees receive SHE training ▪ Provide for all formal contacts with regulatory agencies, and NASA
LJT SHE Manager	▪ Implement site-specific Safety and Health programs and provide day-to-day oversight of SHE programs and provide feedback to the WICC II Contract PM concerning the status of the program ▪ Act as the interface with any regulatory agency ▪ Serve as LJT's Designated Safety Official ▪ Conduct and document employee training ▪ Take necessary action when unsafe conditions are found to exist, including Stop Work ▪ Act as a Contract liaison between LJT, NASA, and other Contract Representatives ▪ Support LJT/WFF sites safety, health, environmental, and fire protection concerns and goals ▪ Support all projects with safety, health, and environmental input as necessary
Contract Safety Techs	▪ Facilitate the LJT safety committee ▪ Support WICC II contract's safety, health, environmental, and fire protection concerns and goals ▪ Take necessary action when unsafe conditions are found to exist, including Stop Work ▪ Provide safety support to the various projects and activities conducted under the scope of the contract ▪ Provide daily safety input to the LJT Safety and Health Manager from various inspections or other activities ▪ Conduct and document employee safety training as needed
Managers	▪ Control design, engineering, condition, and use of equipment, facilities, processes, methods, and procedures to eliminate or control hazards while minimizing work-related losses ▪ Ensure employees are properly trained ▪ Ensure that assigned employees understand safety responsibilities, practice safe work habits, and use protective equipment or apparel as required ▪ Coordinate development of hazardous operation procedures with the Contract Safety Technician or the LJT SHE Manager ▪ Maintain clean and efficient area of operation, correct hazardous conditions and practices, investigate accidents and injuries, and make required reports within specified time limits ▪ Review proposals for new and modified equipment, facilities, processes, methods, and procedures with the SHE Manager prior to completing final plans ▪ Conduct periodic fire, environmental, safety, and health inspections of responsible areas and operations
Building Fire Warden	▪ Receive training in fire warden duties and responsibilities ▪ Identify an alternate to serve in his/her absence ▪ Attend Fire Warden meetings when required ▪ Identify escape routes and rendezvous locations for employees working in his/her section ▪ Lead employees working in his/her area during evacuation drills and real emergencies ▪ Assist managers with reporting of any missing persons during an evacuation ▪ Complete Fire Drill Accountability Checklist during each drill or emergency evacuation ▪ Ensure that all Employees Requiring Evacuation Assistance are assigned buddies and alternates to assist with evacuation procedures during a drill of real emergency

2.4.4 Company Physician

The majority of LJT personnel is located on-site and utilizes the WFF Occupational Health Facility (OHF) for occupational health and emergency medical services. Operations of the WFF Health Unit are within the scope of WICC II, the attending physician serves as the company physician for WICC II. The Health Unit's attending physician and/or SHE Manager serves as primary Point of Contact (POC) for communicating medical data from WFF OHF to Corporate Management. For employees at other locations, the PM and/or SHE Manager is the POC to facilitate communication of medical data to contract management.

2.4.5 Building Fire Wardens

Our SHE Team and the WICC II Management Team will consult the respective building Facility Operations Manager (FOM) and designate Fire Wardens in each of the buildings where our WICC II employees work. Building Fire Wardens assist in building evacuations and ensure that employees are accurately accounted for in his/her area during a drill or emergency. We show their responsibilities in Table 2.

2.4.6 Designated Safety Official

Our LJT SHE Manager serves as our designated company safety official.

2.4.7 Contract Safety Committee

The LJT Safety Committee consists of both management and non-management employees from all major areas. The Safety Committee meets at least monthly and convenes at other times to address urgent issues. We hold the meetings during regular work hours and rotate members periodically. We outline specific responsibilities of the Safety Committee in Table 3.

Table 3. Safety Committee Responsibilities.
Our Safety Committee has clearly defined roles and responsibilities for WICC II.

Position	Safety & Health Responsibilities
WICC II Safety Committee	• Review compliance with the SHE policies and procedures and to recommend changes or improvements • Address other safety and/or environmental problems and procedures to improve safety and health of employees • Conduct inspections of the facility to identify safety problems and to recommend corrective action. ▪ Conducted monthly for various different departments within the facility ▪ Findings discussed at each meeting and the area supervisor advised of the findings ▪ Inspection findings given a completion date and tracked until closed • Assist in enforcement of safety policies and procedures or report where policies, procedures, or rules are not being followed • Act as the representative in their area which includes: ▪ Communicating safety rules to other employees in their areas ▪ Providing a representative in their area that other employees can go to with health or safety problems or concerns • Ensure that SHE problems are brought to the LJT management's attention

2.5 Provision of Authority

Our LJT Policy complies with all applicable safety and health regulatory requirements.

This SHE Plan is fully complimentary to the NASA WFF Safety Program as defined by, NPR 8715.3C, NASA General Safety Program Requirements, Ground and Launch Personnel, Equipment, Systems, and Material Operations Safety Requirements. We ensure compliance with Launch Service Provider field site requirements. We will use NODIS & GDMS to obtain the most current version of NASA & GSFC Policy. Code 803 Policies will be obtained from the Code 803 home page. Our SHE Plan meets or exceeds all WFF, NASA, OSHA, Environmental Protection Agency (EPA), National Fire Protection Agency (NFPA), and federal, state, and local regulations to include, but not be limited to, the following:

NASA-STD-8719.11, Safety Standard for Fire Protection

NPR 8715.3, NASA General Safety Requirements

NPR 8715.5, Range Safety Program

GPR 1860.1, Ionizing Radiation Protection

NPR 2570.1, NASA Radio Frequency Spectrum Management Manual

NFS-1852.223-73, Safety and Health Plan

NPD 1600.3, Prevention of and Response to Workplace Violence

Federal Law as recorded in 29 CFR 1910 and 1926, and 40 CFR 1 through 799, Environmental Protection Rules

GPR 1440.8, Records Management

NPR 1800.1, NASA Occupational Health Program Procedures

NPD 8500.1, NASA Environmental Management

GPD 8500.1, Environmental Policy and Management

GPD 8715.1, Goddard Space Flight Center (GSFC) Safety Policy

GPR1600.1, Goddard Security Requirements

GPR 1820.1, Hearing Conservation Program

GPR 1820.2, Respiratory Protection Program

GPR 6400.1, Logistics Support PR 6000.1, Requirements for Packing, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components

GPR 1700.2, Chemical Hygiene Program

GPR 1700.5, Control of Hazardous Energy (Lock out/Tag Out)

GPR 1700.6, Confined Space Program at GSFC

GPR 1700.7, Electrical Safety

GPR 1700.8, GSFC Hazard Communication Program

GPR 1710.1, Corrective and Preventative Action

GPR 1860.1, Ionizing Radiation Protection

GPR 1860.2, Laser Radiation Protection

GPR 1860.3, Radio Frequency Radiation Safety

GPR 8621.1, Reporting of Mishaps and Close Calls

GPR 8621.3, Mishap and Close Call Investigation

GPR 8715.6, Wallops Flight Facility Safety, Occupational Health, and Emergency Preparedness Programs

803-GS-PLN-INST-EM-02Hurricane/Nor'easter Preparedness Plan for Wallops Flight Facility

803-PG-8715.1.3D Risk Assessment Code Matrix and Guidelines

RSM-2002Range Safety Manual for Goddard Space Flight Center (GSFC) Wallops Flight Facility (WFF)

2.6 Performance and Accountability

The LJT NASA Division Safety Performance Program (SPP) P&SP 2.14 focuses on measuring safety performance in terms of leading indicators and lagging indicators. It is a weighted score with 75% of the score value aligned with the leading indicators and only 25% assigned to the lagging indicators. We base this structure on the concept that if we measure only failures, i.e., number of accidents, we are simply documenting that a problem exists. We dig further into the data and stratify it by type of event, type of injury, etc., to begin to tell us more about our problem. To achieve world-class SHE performance, LJT must also look at positive, proactive measures designed to target accident reduction. Leading Indicators

Examples of proactive activities that include management commitment by participation in activities such as:

- Job safety analyses
- Job safety observations
- Employee safety concern evaluations
- Close call investigations
- Safety communication
- Safety inspections
- Safety meetings
- Risk evaluations
- Safety training

By design, the SPP focuses on leading indicators. The SPP credits a project/program as having met its leadership requirements by documenting that the PM provided a monthly safety message, participated in the monthly project safety meeting, reviewed the current accident data and trend analysis for their project, and assisted with updating the project risk profile as it relates to SHE activities and accident prevention.

Additionally, SPP scores the site on meeting its accident reduction goals for Injury Frequency (IF) and Injury Severity (IS). Should a project not meet their goals for IF or IS we require the development of a corrective action plan, which discusses what action plan is needed to mitigate and address the accident rates. By design, the SPP focuses on leading indicators. The SPP credits a project/program as having met its leadership requirements by documenting that the PM provided a monthly safety message, participated in the monthly project safety meeting, reviewed the current accident data and trend analysis for their project, and assisted with updating the project risk profile as it relates to SHE activities and accident prevention.

Additionally, SPP scores the site on meeting its accident reduction goals for IF and IS. Should a project not meet their goals for IF or IS we require the development of a corrective action plan, which discusses what action plan is needed to mitigate and address the accident rates.

In the end, a combined score results in the project receiving a point-value score on a scale from zero to 100. Acceptable performance begins with a minimal score of 80. Superior performance recognizes any time a project receives a score above 95. LJT recognizes awards for SHE performance at the LJT Corporation, NASA Division level during the Management Conference held in December of each year.

2.6.1 Manager Accountability

We hold Managers accountable for meeting their SHE protection responsibilities, and we clearly define authority, responsibility, and accountability for safety and health protection in their performance plan. We evaluate SHE protection performance as part of annual evaluation. Table 4 shows manager performance standards. We document the results of performance against these standards in the manager's annual performance review.

Table 4. Performance Standards/Accountability.

Position	Performance Standards/Accountability
WICC II Program Manager	• Defines Team LJT's safety and health requirements and liabilities • Ensures compliance with all safety regulations that apply to the WICC II • Provides required safety training for employees and managers • Ensures employees have knowledge of specific hazards in their workplace • Establishes and communicates safety responsibilities to managers and employees • Provides ongoing review of manager performance and provide feedback • Conducts formal performance assessments which include measures of safety performance • Takes action to reduce personal injury or unsafe use of facilities and resources • Conducts periodic safety assessments • Ensures mishaps are promptly and completely investigated • Ensures that corrective action is implemented immediately • Provides adequate budget resources for safety and health
Area Managers (see Appendix B, Managers VPP Implementation Guide)	• Attend required management SHE training • Know safety requirements and liabilities • Ensure employees are aware of the hazards in their workplace, understand needed safeguards, and are properly trained • Provide safety orientation for all new employees • Establish a work environment that meets health and safety regulations • Ensure hazards are promptly corrected • Conduct safety inspections at least monthly • Take action to reduce personal injury or unsafe use of resources • Discuss safety issues and concerns at staff and group meetings • Ensure employee safety representation to the Contract Safety Committee • Assign building/area fire wardens • Provide ongoing review of performance with feedback and coaching to all employees • Initiate disciplinary action for employee violations of safety/health procedures • Report all unsafe findings to the LJT Safety Team
All Employees	• Attend required employee safety and health training • Know safety requirements and adhere to all safety rules and regulations for your work place • Conduct safety inspections at least daily • Take action to reduce personal injury or unsafe use of resources • Report all unsafe findings to their respective manager or to the LJT Safety Team

2.6.2 Employee Accountability

LJT management and employees all share in SHE responsibilities for the first line of safety and the safety and health of their co-workers at WFF. We include measurements of safety performance in the annual performance reviews for employees. Employees conduct themselves in a safe manner, adhering to all policies and procedures, and if required, wear safety articles and use any protective equipment provided at all times. Employees immediately report any injury, accident, or violation to their respective manager.

2.6.3 Disciplinary Policy and Procedures

We expect certain conduct of company employees with respect to normal work rules and accepted social behavior relative to the work environment. Progressive discipline consists of discrete steps of disciplinary action increasing in severity as infraction warrants. LJT's intent is such that the severity of the infraction correlates with the severity/step of discipline. For egregious acts or violations of our SHE policies and practices, the WICC II PM can immediately discharge the employee.

2.6.4 Employee Motivation

To encourage employee participation and accountability in the SHE program, LJT participates in NASA, WFF, and LJT Corporation awards programs. LJT uses a contract awards program whereby employees receive performance awards for superior safety and health performance. In addition, LJT has a continuous improvement program that includes safety as an element of focus.

2.6.5 Program Evaluation

Team LJT, to include all team members, measures the effectiveness of our SHE program and obtains quantitative results. We use these results in several ways, including the following:

- Evaluating SHE program implementation
- Determining whether to conduct a focused audit
- Identifying areas of emphasis for continuous improvement
- Evaluation of SHE management programs and processes to ensure that existing programs and activities are effective and VPP-compliant
- Complete VPP Application

2.6.6 Self-Evaluation

LJT evaluates its SHE compliance program through self-evaluations by:

We conduct the self-evaluation using the four major categories and elements from OSHA VPP guidelines. We conduct the program self-evaluation annually. We discuss and distribute the evaluation through the LJT Safety Committee and electronically to all managers and employees. We develop objectives for the next year by focusing on areas of weakness identified in the annual evaluation and by soliciting input. We record actions assigned to meet these objectives in a tracking log and discuss progress at each monthly safety committee meeting to maintain accountability.

In addition to this self-evaluation, there is an annual LJT Environmental, Safety and Health Self-Evaluation (ESHSE). This includes a survey of equipment, materials, and processes to identify existing and potential safety, health, fire, and environmental hazards. The following outlines the element of the ESHSE:

- The effectiveness of existing hazard controls

- Examination of SHE records maintained over the past year including incident/accident reports, injury and illness statistics, and documentation of compliance with SHE laws and regulations. Our teammates are included in this evaluation.
- Updates of the following: the inventory of water discharges, air emissions, wastes, permits and regulatory reports; the training plan; remediation; the well, tank, pit and pipeline inventory; site location and geologic information; and employee exposure monitoring
- Status of goals, training and action plans

LJT management reviews and approves the completed ESHSE report, including the updated goals and action plans. Upon request we provide the report to the NASA Division, ESH Director.

2.6.7 Performance Assessment (Appendix A)

LJT measures the effectiveness of its program by performance assessments on an annual basis. LJT uses the results in several ways, such as evaluating overall effectiveness of the Safety and Health program, evaluating Safety and Health Program implementation by line managers, determining whether to conduct a focused audit, and identifying areas of emphasis for continuous improvement.

Scoring Criteria: OSHA Guidelines and Voluntary Protection Programs (VPP) define the narrative description for each scoring element of 1, 2, 3, 4, and 5. The numeric scores represent the following:

- There is no safety and health program in place
- Improvement is needed

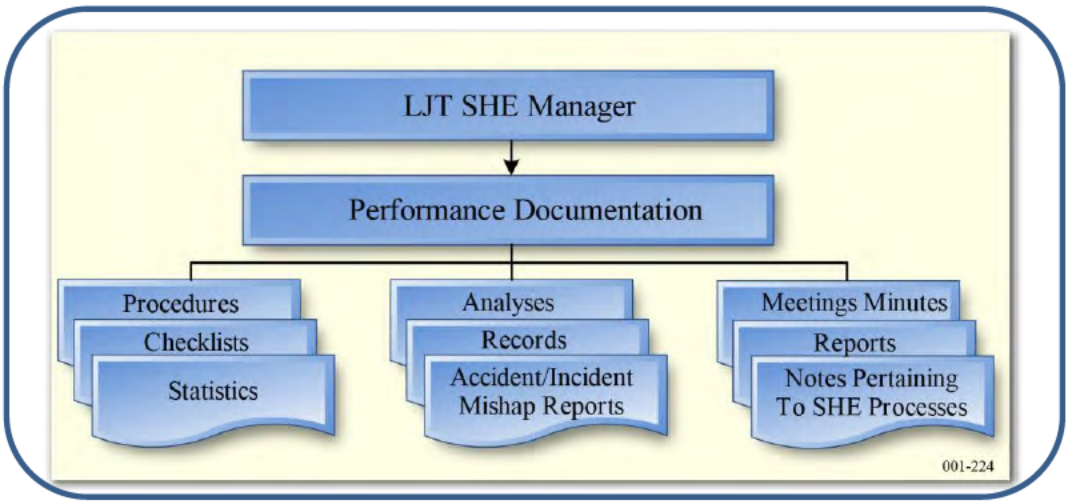

Figure 2. Performance Documentation.
Our LJT SHE Manager is responsible for all pertinent safety and health data

- Compliance with OSHA requirements/ standards
- Performance exceeds OSHA compliance (Star status)
- Performance exceeds requirements for Star status

2.7 Performance Documentation

As shown in Figure 2 (previous page), our SHE Manager identifies, acquires, and maintains all pertinent safety and health data. LJT processes and analyzes this information to produce meaningful data and reports for NASA in compliance with contract requirements, or upon request.

We make objective evidence available to support WICC II and LJT efforts to meet VPP compliancy requirements and achieve safety and health goals. This evidence includes, but is not limited to the following:

The LJT SHE Manager tracks leading indicators; audit findings, near misses, hazard items, mishap/accident report actions, maintaining metric data and other safety-related actions. Tracking these items ensures timely closeout of open items, data collection, metrics, and reporting.

We define the fields of the database to allow for the entry of data collected on current forms with the intent of tracking open items to closure. We provide a tracking number, entry date, point of contact, Risk Assessment Code (RAC), status closure date, remarks, and OSHA 300 log number (if applicable) data fields.

Data Base Maintenance - As the focal point for tracking Close Call Reports, audits, and other safety actions, our LJT SHE Manager manages data collection, data entry, and database administration with assistance from LJT information technology personnel.

Reports - We provide standard report formats for the status of hazard items, mishap action items, Close Call Report closure, metric reporting, and ad hoc queries. This data provides the basis for analysis and reporting of safety metrics. The following items are examples of metric reporting data:

- Total inspection/audit items opened in time period
- Total inspection/audit items closed in time period
- Total open items in data base
- Total closed items in data base
- Number of open items above severity level of 3
- Number of open items by type
- Number of OSHA recordable items in time period
- Number of lost work day cases due to occupational injury/illness for year
- Number of restricted work days cases due to occupational injury/illness for year
- Number of lost work days due to injury for year
- Number of restricted workdays due to injury for year
- Percent scheduled Audits/Inspections complete
- Percent Training Complete by priority and by topic

2.7.1 Roster of Terminated Employees

LJT provides a roster of terminated employees to the WICC II Occupational Health Officer no later than 30 days after the end of each Contract year or at the end of the Contract. Our Human Resources (HR) organization provides this report along with the following information:

- Date of report, Contractor identity, and contract number

- Name, social security number, LJT badge number, and date of termination for each person listed
- Name, address, and telephone number of contractor representative (for questions or other information)

2.7.2 Hazard Communications

To comply with NPR 1800.1B, NASA Occupational Health Program Procedures, and field site requirements and to maintain compliance with 29 CFR 1910.1200, OSHA's Hazard Communication Standard, LJT provides copies of all Safety Data Sheets (SDS's) for hazardous materials brought onto a field or Government site and/or included in products delivered to NASA. We send one copy of each sheet to site central repository, along with any information on new or changed locations and/or quantities normally stored or used.

Our LJT SHE Manager approves all chemical and hazardous material purchases to ensure compliance and to maintain an accurate hazardous material inventory. LJT also initiates and maintains a hazard communication program, and implements the use of WFF's Electronic SDS system to stay current with products and mitigation response.

2.7.3 Hazardous Material Inventory

Annually, upon request by the WFF Environmental Office or Occupational Health Officer, we compile an inventory report of all hazardous materials located on Government property. The inventory for the preceding year will be made available by the end of the second week of January. These materials are within the scope of:

- 29 CFR 1910.1200, Hazard Communication
- Federal Standard 313 (Material Safety Data)
- Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities
- For non-WFF locations, LJT provides the site inventory data to any field site occupational health representative.
- The information provided includes the following:
- The identity of the material
- The location of the material by building and room
- The quantity of each material normally kept at each location.

LJT provides inventory reports to NASA as directed. Having reliable SHE data available is essential for statutory reporting, planning, and permit applications, among other needs. Accordingly, we maintain a database of safety and health performance information available to NASA upon request. LJT also ensures that all hazardous materials brought onsite during construction activities or other projects are inventoried and controlled onsite until they are no longer utilized and have been removed from the site.

2.7.4 Government Access to SHE Program Documentation

LJT makes safety and health documentation, including relevant personnel records, available for inspection or audit at the Government's request. We provide electronic access to NASA so long as there is no violation to the Privacy Act. Our SHE program provides for the rigorous

documentation of safety and health activities on WICC II. Figure 3 illustrates Team LJT-generated SHE documentation.

This SHE documentation provides the foundation and traceability required to comply with Federal, State, and local agency reporting requirements, as well as providing tools for proper management oversight and insight into the plan's performance. We delineate the means for identification, acquisition, and processing of SHE data, development of procedures, record keeping, statistical analysis and metrics, and provisions for Government insight in subsequent sections of this Plan.

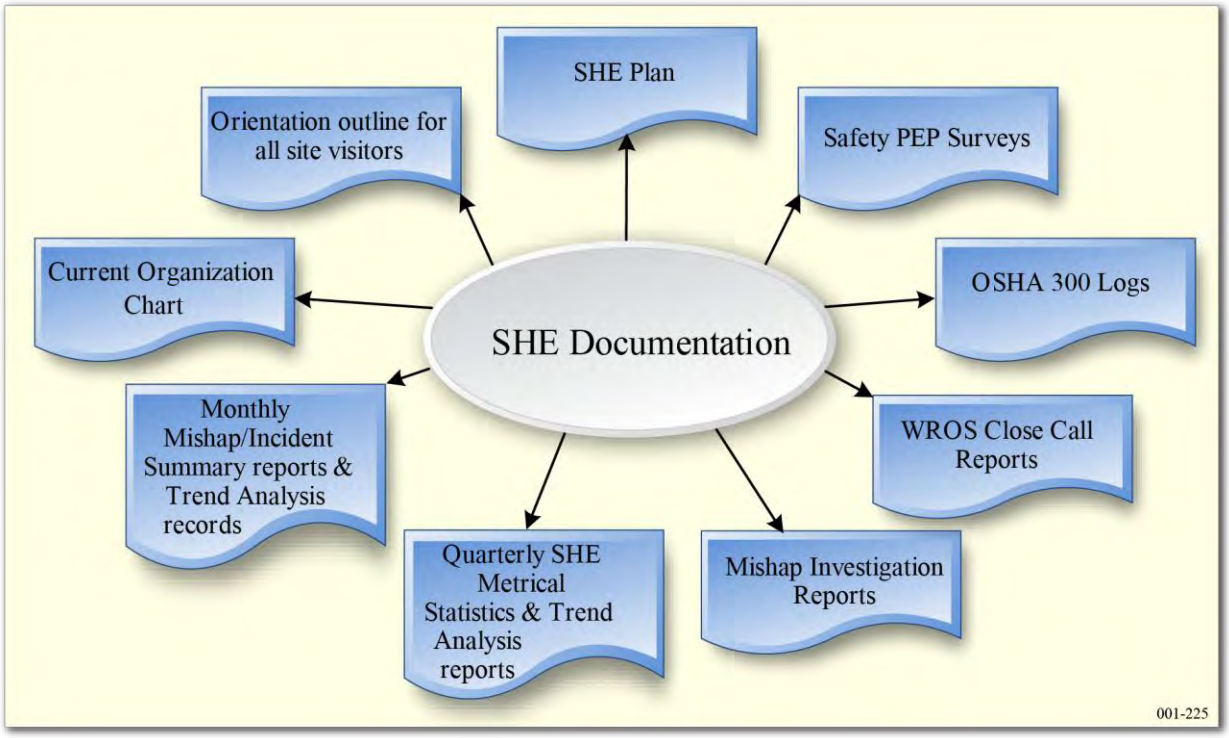

Figure 3. Safety and Health Documentation. *Our SHE documentation provides the foundation and traceability required to comply with federal, state, and local agency reporting requirements*

2.7.5 Safety Requirements Review

Since review standards are constantly changing, it is important to review new and revised standards to ensure continual compliance. In addition to federal, state, and local regulatory agencies, NASA safety requirements impact WICC II operations, and we maintain this plan and procedures as required with NASA applicable requirements. Our SHE Team is responsible for ensuring the review of new or revised standards from federal, state, local, or NASA authorities. We compare the standards under review to current standards for new or revised requirements to incorporate into the WICC II plans, facilities, or operations. LJT revises applicable audit tools and documents where necessary to ensure compliance with the identified new or revised standard.

The NASA Contracting Officer Representative (COR) may also request a review of specific standards by WICC II personnel.

2.7.6 Procurement and Contract Safety

This SHE Plan applies to all LJT personnel, our subcontractors, and all team members. All suppliers of goods and services to this Contract are responsible for compliance with NASA, WFF,

EPA, OSHA, and State/local requirements, including the referenced documents that are the basis for this Safety and Health plan. All subcontractors submit safety performance documentation for evaluation as part of the selection process. In addition, we flow all safety and health requirements to subcontractors. LJT monitors and evaluates subcontractor performance for compliance with safety and health requirements.

3 Workplace Analysis

LJT manages this SHE Plan under the umbrella of our Safety and Health Management System (SHMS) process (Figure 4).

Figure 4. LJT's SHE Management System. *We use a proven, integrated approach to implement SHE on the WICC II program.*

LJT fosters a culture of ownership with a SHMS derived from the elementary project management roots of Plan, Do, Check, and Act. Team LJT's SHMS ensures NASA a continual cycle of planning, implementing, reviewing, and improving the processes and actions that we undertake to meet our SHE obligations.

Our SHMS includes a comprehensive and SHE Plan. We bring to NASA the following:

- Our top management commitment to making safety and health an organizational priority
- A proactive Safety and Health team that remains flexible and adapts to the changing needs of WICC II projects and operations.
- Integration of SHE throughout our organization
- A flexible and simple SHE Plan, which is adaptable and understandable
- Assurance to all stakeholders that a condition of compliance, and employee or environmental mishap avoidance, is an opportunity to continually improve

Our SHE Team participates in open communication with the WFF Safety Office to ensure compliance and maintain operational excellence. The SHE Manager tracks compliance with all recommendations addressed in the quarterly report to the LJT Safety Team, LJT Safety Committee, and WICC II Program Manager with comments on any locations not making satisfactory progress towards compliance. LJT measures our SHE program with established metrics (listed in section 2.7) and frequent inspections, and our documentation is readily available to NASA.

Workplace analysis is reflected in Figure 5, Workplace Analysis involves three elements described in detail in this plan in sections 3.1, 3.4, and 3.6.

3.1 Hazard Identification

We systematically identify hazards through a combination of the following:

- Surveys

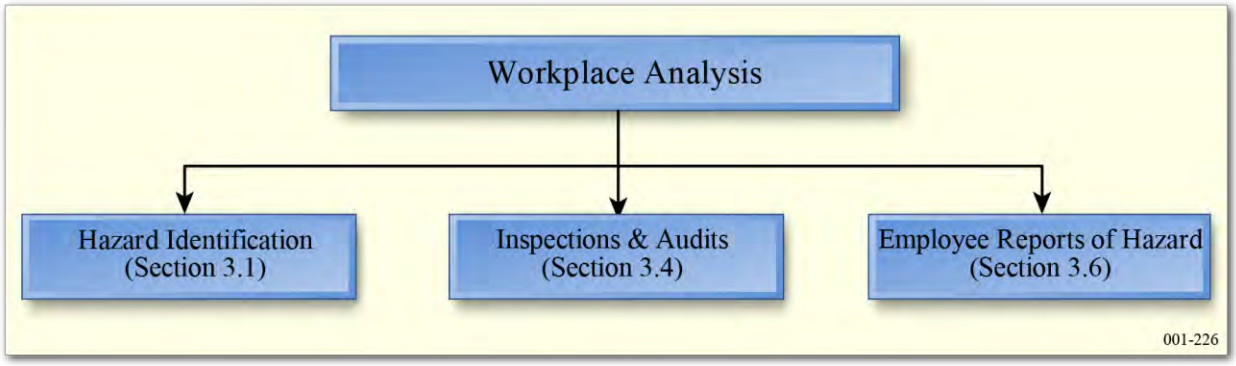

Figure 5. Workplace Analysis. *Team LJT's workplace analysis involves hazard identification, inspections and audits, and employee reporting of hazards*

- Analyses
- Inspections of the workplace
- Investigations of mishaps and close calls
- Collection and trend analysis of safety and health data

SHE data includes records of occupational injuries and illnesses; findings and observations from preventive maintenance activities; reports on hazardous substance spills and inadvertent releases to the environment; facilities related incidents related to partial or full loss of systems functions.

Hazard Identification involves compiling an inventory of hazards associated with work performed on this contract, along with operations and work environments that are in the vicinity or in close proximity to contract operations. To begin the hazard identification process, analysts become familiar with the items to analyze, the environment, including review of planned operations. We document analytical effort and rationale progressively and systematically. LJT documents hazard analysis using the NASA-specified formats when available.

We employ several techniques to identify hazards encountered by our employees working on this contract. LJT reports results of these analyses in accordance with the contract Safety Program Evaluation.

3.1.1 Comprehensive Survey

A team consisting of a qualified safety professional and members of the management team to include supervisors and leads (providing operational expertise) participates in wall-to-wall assessment of contract facilities, process, equipment, and materials. We focus on the identification of hazards, and associated controls. The inspection of startup or new facilities and operations also includes an inspection by a safety and health inspection team comprised of certified and otherwise qualified safety and health professionals from NASA and LJT, along with the management of the facility. We evaluate all facilities where WICC II personnel work based upon compliance with applicable regulations and commonly accepted safe work practices.

The WICC II PM and LJT SHE Manager are responsible for implementing a program of comprehensive surveys for the WICC II contract. These establish a baseline for hazard

identification and encompass regulations that address employee safety and health, as well as environmental protection. The frequency of these varies depending on the nature of the risks present at a location and the results of previous surveys. The overall purpose of these surveys is to assist the WICC II PM and the LJT SHE Manager in implementing a program that meets the requirements set forth in this plan. In addition, these surveys identify other areas of interest to the LJT SHE Manager and WICC II PM, as indicated in Figure 6. LJT uses a Baseline Hazard Analysis to ensure that every project complies with all applicable NASA requirements, LJT protocols, federal, local, and international permits, and to implement project-specific SHE plans. The WICC II team receives the analysis to create, comply with, and ensure that employees are aware of the SHE compliance requirements.

3.2 Change Analysis

LJT evaluates all changes to facilities, systems, equipment, processes, materials, operations, procedures, and maintenance to ensure safety compliance. The analysis of change is conducted by the respective line manager, LJT SHE Manager, WICC II PM, and the Contract Safety Specialist.

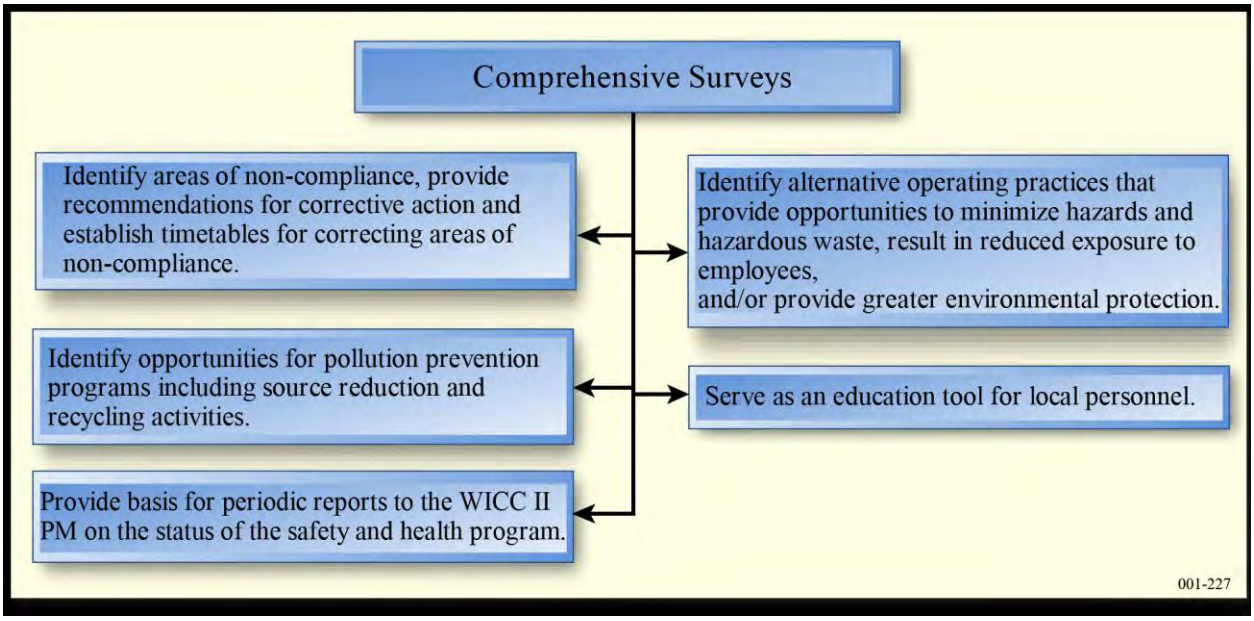

Figure 6. LJT Comprehensive Surveys. *Our purpose of these surveys is to assist the WICC II PM and LJT SHE Manager in implementing a program that fully complies with NASA requirements.*

Our Contract Safety Specialist with support of the LJT SHE Manager assesses the requested use of specialized equipment and/or chemicals to identify potential alternatives that may exist.

Changes may be driven by new or modified regulatory and NASA requirements. In these cases, LJT completes required analyses for the affected process or facility to develop an action plan for achieving compliance with the applicable requirement and for ensuring the health and safety or surrounding personnel.

3.3 Hazard Analysis and Control

Hazard analysis is composed of two distinct areas:

- Hazard identification

- Hazard control

LJT defines a hazard as having potential for doing harm, while "risk" is the evaluation of the hazard. Once we identify hazards, we then rank by assessing the severity and probability of occurrence and identifying the resulting Risk Assessment Code as defined in 803-PG-8715.1.3D. We address the hazards, giving priority to Critical Risk Assessment Code items, and analyze for their cause(s) to develop a hazard control strategy. We immediately report those hazards identified as being immediately dangerous to life or health to the Safety Technician, LJT SHE Manager, and the NASA Safety and Mission Assurance Office. We take immediate steps to prevent occurrence of the hazard or exposure to employees.

Hazard analysis and risk assessment is the responsibility of the line manager of the affected area supported by the SHE Technician as required. All safety engineering products that address operations, equipment, etc., on NASA property are required to be reviewed by the LJT SHE Manager for concurrence prior to implementation or use. The review shall include compliance with the Federal Affirmative Procurement Act and the Buy Quiet, By Design evaluation process to reduce the potential impacts to the environment and WICC II personnel.

Classification and assessment of hazards and risk levels is a cornerstone of any effective safety program. The recognition and control of hazards before mishaps, narrow escapes, or failures occur is a prime objective of safety analysis. Effective hazard recognition and control involves systematic research, observations, inspections, and analysis of the operations and the jobs as they evolve from the design phase to the final operational or disposal phase. Identification of hazards related to operations, equipment, or facilities early in the life cycle facilitates proper design and implementation of effective controls.

A primary element of our system safety process of mishap prevention is the analysis of systems and operations to identify potential hazards. Performance of qualitative hazard analyses to identify hazards and ensure their resolution is a combined effort of the safety and the engineering disciplines. We perform preliminary hazard analyses for all change requests and preliminary design reviews to identify safety-critical areas, evaluate hazards, and to identify the safety design and operations requirements. Corrective actions shall be taken to first to eliminate the hazards, or secondly, if complete elimination is not possible, to control the identified hazards. LJT develops the preliminary hazard analyses into a Systems Hazard Analyses (SHA) later in the design phase to further define and evaluate hazards. The SHA eliminates and controls provisions after the design is more mature. LJT Safety performs further analysis to identify hazardous conditions with a potential for personnel injury or damage to hardware, equipment, or facilities during hazardous operations as a part of the Safety Review process and other evaluations.

LJT updates the hazard analyses when changes occur to interrelated areas of design and system or subsystem integration that affect reported hazards or present new hazards. LJT analyzes all potential hazards (including those resulting from failures) regardless of subsystem or component redundancy. In addition, we analyze hazards from normal or emergency equipment operations, the environment, design characteristics, human factors, and potential credible mishaps. LJT accomplishes this through safety participation in the engineering change request process. This safety review identifies changes that require a revision to existing analyses. The safety review can be documented through a job hazard analysis (JHA), specific meeting minutes, or through a formal memo or report that shall be included in the engineering documentation for the project. LJT

identifies hazards introduced by design modification, and provides adequate controls for WICC II management review of proposed engineering changes.

We also identify failures or malfunctions that could present a hazard to interfacing hardware. LJT recognizes the critical importance of eliminating and controlling all potential hazards to ensure normal operation of equipment including the safety of interfacing hardware and the total system.

LJT analyzes safety data on vehicles/hardware/equipment/facilities provided by developers for compliance with NASA-WFF safety requirements. Where examination of the data indicates an inconsistency or non-compliance with the safety requirements, we notify NASA and propose any potential resolutions.

LJT conducts analysis of hazardous operational procedures using guidance contained in NPR 8715.3C, with analysis worksheets maintained electronically. LJT conducts an analysis of all operational procedures to determine which contain potentially hazardous operations. We conduct JHA's on procedures and processes that involve hazardous operations to ensure thorough hazard identification and effective resolution via operational safety controls. The analyses identify applicable hazard information from several sources including design analyses, WFF safety requirements documents, and applicable hazard reports. Once we identify hazards, LJT makes all reasonable attempts to eliminate the hazard(s) identified. If the hazard(s) cannot be eliminated, we ensure appropriate operational controls are implemented. Controls include:

- Control areas
- Required safety devices and equipment
- Cautions and warnings
- Emergency procedures
- Requirements for working with hazardous materials

Necessary precautions that are reviewed and approved by NASA Ground Safety (Code 803.1) prior to the operations beginning to ensure that hazardous conditions are not induced into flight hardware, GSE, and/or facility systems.

We produce an analysis worksheet for each hazardous procedure reviewed to ensure that required hazard controls from whatever source are consistently included in all hazardous procedures. In addition, a special operational analysis may be produced, when required, for processing facilities and facility systems to support the operational readiness reviews.

3.4 Inspections and Audits

LJT conducts regular inspections of WICC II facilities and operations to identify and correct unsafe conditions and/or work practices. We cooperate with all safety and health program audits to ensure proper implementation and compliance with current requirements, and to identify opportunities for continuous improvement.

The inspection team includes the SHE Technician or Manager and employee volunteers. LJT designs site inspections to catch hazards missed at other stages of workplace analysis. These inspections ensure that we identify and correct unsafe acts or unsafe conditions. In addition, we implement a follow-up system to ensure that corrective action is completed and adequately address the possibility of recurrence.

Inspection team members conduct site inspections with inspection reports, and recommendations for corrective actions forwarded to the WICC II PM, with prioritized recommendations for corrective action. Our SHE Technician reviews priorities and coordinates completion of corrective actions within 30 business days of the initial report. Any corrective actions that require longer than 30 days shall have a remediation plan in place to ensure employees are safe until the issue can be resolved. We maintain inspection reports, recommendations, and records in a database for future reference and trend analysis.

The SHE Technician, WICC II SHE Manager, WICC II PM, Contract Safety Committee, and managers of each respective contract area conduct a variety of inspections and audits to ensure compliance with various local and federal regulations. The WFF Safety and Mission Assurance (SM&A) Branch may also conduct inspections and audits at any time. Team LJT will ensure that reasonable accommodations are made to ensure that all NASA audits or inspections are conducted as requested. If a regulatory entity such as OSHA or EPA wishes to conduct a compliance inspection of Contract facilities, they contact the LJT SHE Manager which will in turn notify the WFF Safety and Mission Assurance Branch of the request as soon as reasonably possible, and follow the procedures outlined in Procedure 25, Regulatory Agency Inspections and Incident Reporting.

3.4.1 Audits

LJT operates an audit program which identifies:

- Potential policy and procedural weaknesses
- Areas for improvement
- The unsatisfactory execution of the Safety and Health programs
- Those activities that constitute either a failure to correct or a repeat finding from an earlier audit
- Electrical Safety Audits shall not exceed 3 years in accordance with NFPA 70E Art 110.3

3.4.2 Inspections

We conduct safety and health inspections of all work areas under the jurisdiction of the WICC II Contract, with each site covered quarterly. These inspections will include various projects and subcontractors that are working under the cognizance of WICC II at the time the audit or inspection is being conducted. These inspections (detailed in Figure 7 on next page) comply with OSHA and WFF directives regarding inspection procedures and abatement plans. We initiate corrective actions to resolve findings identified during all inspections, and track to final closure using the NASA surveillance and the internal tracking system as applicable. Findings that present immediate danger to personnel or equipment result in an immediate stop-work until properly corrected.

The LJT SHE Manager establishes a SHE Program audit schedule, which supports the completion of the annual program evaluation (reference this SHE Plan, section 3.4.3). The WICC II Safety Technician supports the schedule and conducts various audits and inspections as necessary.

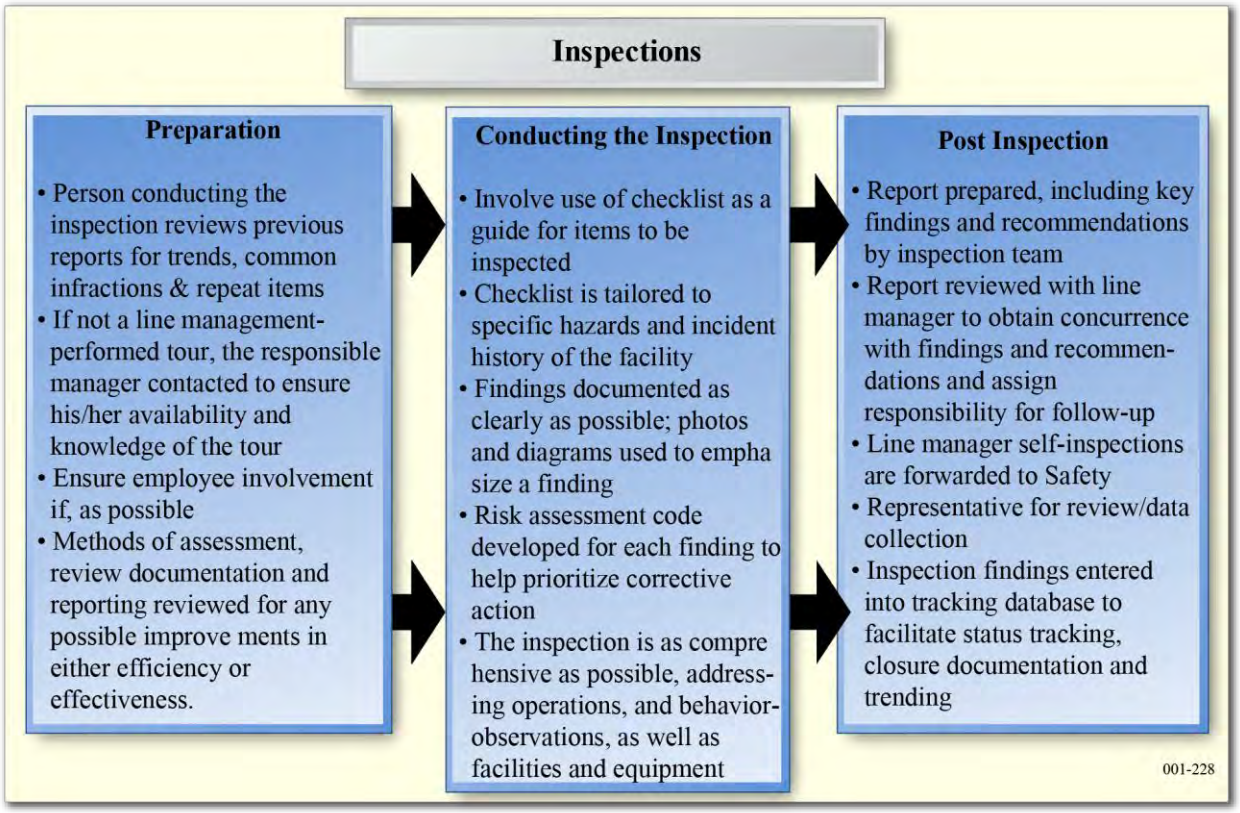

Figure 7. Inspections. *LJT's inspections comply with OSHA and WFF directives regarding inspection procedures and abatement plans*

Initiating an audit for evaluating a safety and health program(s) is a way to test the effectiveness of written or informal programs. The process involves focusing on a specific program or procedure and evaluating its implementation through records review, incident and mishap data review, onsite reviews using compliance checklists, observations, interviews, or questionnaire completion. If incidents occur related to the program audit, LJT tracks these back through the applicable safety and health program and reports. By taking this action, LJT ensures implementation of an effective safety and health program. We document audit findings and associated corrective actions, assigned to the responsible party, and tracked to closure.

3.4.3 Safety and Health Audits and Inspections Examples

3.4.3.1 Line Manager Self-inspection:

Line managers are responsible for formally inspecting their spaces on a semiannual basis. LJT alternates these inspections on a quarterly basis with formal inspections conducted by the SHE Manager. We forward the results of these inspections to our SHE Technician for review and data collection. The SHE Technician reports overall findings and any potential trends to the LJT SHE Manager for review.

3.4.3.2 Formal Inspections

The SHE Technician and the SHE Manager conduct inspections of all WICC II contract facilities and projects. We conduct and document a monthly (at minimum) walk-through of hazardous areas. We develop and use a checklist for general office areas and high hazard areas or operations.

3.4.3.3 Employee Self-Inspections:

Employees are aware of hazards in their workspaces. To assist in the periodic review of workspaces by employees, we develop and use a checklist. LJT uses this checklist when new employees are hired, transferred to a new space, or periodically as necessary. We forward all findings to the line manager and the SHE Technician for corrective action and data collection.

- Solving Discrepancies
- Modified Hazards
- WFF or Site Occupational Safety or Occupational Health Inspections:

WFF Site Safety and Health Representatives (NASA or Contract) may enter any work area and conduct inspections. All employees cooperate fully with the safety and health inspectors during his/her inspection. Employees reserve the right and ability to postpone audits or inspections if it is deemed unsafe for auditors to be in the area of an operation or project. The audit or inspections will be rescheduled at a time that is more suitable for all parties.

3.4.4 Operational Readiness Inspections:

Inspection of startup or new facilities and operations includes an inspection by a safety and health inspection team formed by the SHE Manager, SHE Technician, an appointed site representative, or S&MA.

3.4.5 Annual Lockout/Tagout Audit:

We conduct a comprehensive compliance audit on an annual basis of the Lockout/Tagout program as required by 29 CFR 1910.147, which focuses on compliance to current regulatory, customer, and site requirements and the implementation of a Lock-out/Tag-out procedure.

3.4.6 Annual Hazard Communication Audit:

LJT conducts an evaluation on an annual basis of the hazardous communication program, which focuses on compliance to current regulatory, customer, and site policies, requirements and hazards applicable under 29 CFR 1910.1200.

3.5 Inspection and Audit Responsibilities

LJT management and employees all share in the inspection and audit responsibilities. Table 5 (next page) shows specific roles and responsibilities for inspection and audit procedures.

Table 5. LJT Management Inspection and Audit Responsibilities. *Our management team and employees have clearly defined roles and responsibilities for execution of WICC II.*	
Position	**Inspection and Audit Responsibilities**
SHE Manager	LJT SHE Manager provides guidance and oversees program audits, and ensures SHE inspections addresses all facilities at least once on a quarterly basis for each location. Areas with additional exposures and hazardous operations are inspected on more frequent basis established by the SHE Manager and use checklists tailored specifically for the hazardous operations SHE Manager reports findings and significant trends for all audits and inspections to the WICC II PM, Corporate Officials, and the LJT Safety Committee. LJT provides all audit findings, and additional safety information to all employees. LJT tracks findings of each audit in a database and include the date of the finding, plan for eliminating the hazard, and the closure date. NASA has access to all audit data
SHE Technician	SHE Manager reports findings for all audits and inspections to the LJT SHE Manager.
Managers	The manager of the inspected area initiates and follows through on necessary actions to correct all identified deficiencies. Actions include, but not limited to, preparation of a work request or safety training of employees. The manager makes a note of the corrective actions initiated and completed on his/her copy of the inspection checklist and submits copy of the checklist to the SHE Technician. The Manager contacts the SHE Technician promptly when audit items are closed.
Employees	Participate on inspection & audit teams as required. Complete self-inspections of their assigned workspaces.

3.6 Employee Reports of Hazards

We immediately report all hazards on NASA property, which are immediately dangerous to life or health, to the NASA Safety and Test Operations Division. All WICC II employees are encouraged to report all potential hazards regardless of severity to their supervisor, the SHE Technician, or to the SHE Manager. All safety engineering products that address operations, equipment, etc., on NASA property are subject to WFF S&MA review and concurrence unless otherwise waived.

Our system for reporting hazards in the workplace permits initiation for corrective action and prevention of injury to personnel or damage to facilities, equipment and hardware. Employees have numerous methods to report hazards and narrow escapes to management for corrective action.

3.6.1 Reporting Hazards

LJT defines a hazard as an unsafe or unhealthful condition that could possibly lead to a mishap if not corrected, and follows these reporting procedures:

- Employees shall report hazards directly to their supervisor or designee. The supervisor shall inform the SHE Technician of the hazard and any corrective actions taken. The SHE Technician will report any significant issues or trends to the LJT SHE Manager. The LJT SHE Manager shall document the safety concerns in NASA's Incident Reporting Information System (IRIS).
- If the manager or lead cannot correct the hazard, he/she reports the hazard to the facility manager. He/she then has to respond to the hazard with corrective action or a plan for implementing corrective action. If a line manager or facility manager cannot correct the

hazard within this period, LJT develops a plan to correct the hazard and submits the plan of action to the NASA Safety and Mission Assurance (S&MA) Branch for concurrence.

- If the response from these organizations is not satisfactory or out of the scope of WICC II to facilitate repairs, LJT reports the hazard to the NASA S&MA Branch and/or site field office for review or resolution.
- If the response to the hazard report is still not satisfactory, LJT can report the hazard through NASA's Safety Reporting System. NASA's Safety Reporting System reports hazards to these organizations if necessary
- If any employee feels that local or institutional paths for reporting incidents do not adequately address a significant safety concern, the perceived hazard can also be reported to OSHA by calling 1-800-321-OSHA.

3.6.2 Reporting Close Calls

A "close call" is an occurrence in which there is no injury, or property damage, but which could have resulted in a mishap. We do not classify these occurrences as mishaps, but as potentially significant indicators of undesirable conditions in the work environment.

LJT reports close calls using a WICC II site Close Call form or by notifying the WICC Helpdesk and reporting the issue as a safety concern. Employees can report close calls anonymously and are not subject to reprisal for reporting hazardous conditions in their workspaces.

The completed Close call forms are then faxed or emailed to the SHE Technician or LJT SHE Manager.

The LJT SHE Manager has the formal responsibility for logging all reported close calls into IRIS and tracking to closure. We report the close call to a facility or line manager for investigation and finalization of a corrective action plan. A response including the closure plan is provided to the employee who reported the close call/hazard if it was not reported anonymously.

The LJT SHE Manager maintains an internal tracking system of all close calls and reviews those reported for imminent hazards. We take all appropriate action to ensure the safety and health of employees and facilities. The SHE Technician and the Area Safety Representative tracks and expedites the report to closure.

If the close call possesses a high severity potential, a formal investigation may be required.

3.6.3 Responsibilities

LJT employees and management each have specific responsibilities associated with reporting of hazards, shown in Table 6 (next page).

Table 6. LJT Hazard Reporting Responsibilities. *Our employees and management team all have clearly defined roles and responsibilities in reporting hazards.*	
Position	**Hazard Reporting Responsibilities**
Employees	• Immediately reports all hazardous conditions to their Manager or site lead • Participate in the close call reporting system by submitting reports when applicable
Managers	• Indoctrinates all employees in hazard reporting procedures • Ensures that employees report all close calls and hazardous conditions in accordance with this procedure
SHE Technician	• Reports deficiencies, hazards, and close calls to the SHE Manager for investigation • Follows up on implementation of recommended corrective actions
SHE Manager	• Investigates hazards and close calls to determine actions required to prevent injury or property damage • Follows up on implementation of recommended corrective actions

3.6.4 Encouragement for Reporting Close Calls and Hazards

All WICC II employees willingly participate in the hazard and close call reporting system and promptly report hazardous conditions. All subcontractors selected to perform work on the various projects managed by WICC II will be expected to report any safety concerns as soon as reasonably possible to the site lead. Close call reporting forms are available from the area Safety Representatives. Employees report hazards, Close Calls, mishaps, safety and health issues, or concerns free from any threat of reprisal. LJT management reinforces this by encouraging reporting and openly discussing safety and health issues. In addition, the hazard and Close Call report form facilitates anonymous reporting. For anonymous reports, the Safety Committee provides closure concurrence. To encourage employee reporting, LJT provides incentive awards for hazard and close call reporting.

3.6.5 Industrial Hygiene (NPR 1840.19)

LJT implements a comprehensive Industrial Hygiene Program to fulfill LJT responsibilities to provide employees with a safe and healthful workplace. This program includes identification, evaluation, and control of chemical, biological, radiological, and physical agents through review and selective monitoring of processes, facility components, and systems that involve hazards such as asbestos, lead, and formaldehyde, blood borne pathogens, noise, radiation, mercury, heat stress, hypergolic propellants, high pressure systems, cryogenics, and repetitive physical stressors.

To assist in control of identified hazards, LJT provides recommendations and consultation services for design, exposure reducing engineering controls such as local exhaust ventilation systems and noise reduction devices, product substitution, and the use of Personal Protective Equipment. The SHE Manager documents and administers OSHA required programs in coordination with site service providers for the provision of surveys and assessment. They include Respiratory Protection Program; Confined Space Entry; Chemical Hygiene Plan and Laboratory Safety Program; Hearing Conservation and Noise Control; Blood-Borne Pathogens; and Ergonomics.

4 Mishap Investigation and Record Analysis

Team LJT's process for reporting and investigating mishaps, incidents, and work-related injuries and illnesses that occur on the WICC II contract use the following guidelines:

- NPR 8621.1B, NASA Procedural Requirements for Mishap Reporting, Investigating, and Recordkeeping and Code of Federal Regulations 1904.7
- NPR 8715.3C, NASA General Safety Program Requirements

Incident reporting is the first step in the process of identifying the chain of events leading up to an accident involving personal injury or property loss. Investigation and corrective action are required to prevent recurrence of the same or similar event(s). LJT follows NASA reporting requirements, which cover three distinct types of HSE occurrences:

Type A-D Mishap. A mishap is an unplanned occurrence or event that as a minimum results in injury or illness to personnel, a lost workday, injury to a visitor or member of the public; damage to equipment or property equal to or greater than $1,000, or mission failure.

Incident. A mishap consisting of personal injury or illness that does not result in a lost workday, but is more than first-aid severity, and/or property damage equal to or greater than $1,000, but less than $25,000. Any employee that is involved in an incident that results in a recordable injury or greater shall be tested for the presence of drugs and alcohol by a certified party at the time of reporting or treatment.

Close Call. A situation or occurrence with no injury, no damage or only minor damage (less than $1,000), but that possesses the potential to cause any type mishap, or any injury, damage, or negative mission impact. A close call is not a mishap.

LJT policy states that any employee who observes a SHE concern must promptly report it in writing, using the Incident Report form, to the SHE Manager. If the Incident Report Form is unavailable, other means such as email or text message can be utilized to create the initial report of the concern. The Incident Report Form shall still be completed once a copy is made available and submitted to the Safety Program Office. For work performed on this contract, all mishaps, incidents, and close calls must be immediately so reported, regardless of location.

LJT classifies mishaps as Type A-D, and enters them in the NASA IRIS database. All close calls and safety incidents are also entered into the NASA Incident Reporting Information System (IRIS) database to establish data for tracking and trending by WICC II and NASA.

LJT coordinates with LJT Corporate Headquarters in the event of any of the following:

- Work-related injuries that require treatment beyond first-aid.
- Work-related fatality or serious injury/illness that requires hospitalization for other than observation to an employee
- Work-related fatality or serious injury/illness to a non-LJT employee occurring at a facility owned, leased, or operated by LJT
- Any SHE incident that is likely to generate significant adverse publicity for LJT

4.1 Mishap Investigation and Reporting

The SHE Manager (or other qualified person) is responsible for investigating and implementing appropriate corrective actions for all reported mishaps. The SHE Manager forwards a written

response to the employee reporting the issue (if known) if the employee has not already corrected the issue at the time of the report. The response includes the corrective action taken and an estimated time for action completion. We retain the original document from the reporting employee and the response for a minimum of one year.

The mishap investigation process, as outlined in NPR 8621.1B, includes the following:

- Conduct investigation immediately after an accident occurs. If a full investigation is not complete during the required reporting schedule, LJT conducts a preliminary investigation prior to the final investigation. Forward the results of this investigation to the LJT SHE Manager as soon as practical.
- An initial investigation is required for all mishaps that are Type A, B, C or D. LJT shares the responsibility to perform collateral investigations, should NASA choose to conduct their own investigation. However, investigations conducted by NASA take priority with regard to access to evidence, data, and witnesses.
- Managers, supported by the SHE Technician and the SHE Manager, investigate all other mishaps, including lost time and medical treatment cases.
- After the appropriate Manager completes his/her investigation of the mishap and, when appropriate, develops a plan of corrective action, the Manager reports to the SHE Manager to complete the required information into the IRIS database. The SHE Manager will submit the available investigation information into IRIS within 24 hours of the mishap. All incident investigation information will be entered into IRIS for permanent recordkeeping.
- The goal of the incidents/accidents investigation team is to determine facts, identify causes, and develop corrective actions.
- Make recommendations for corrective and preventive actions after the causes are determined. Recommendations include the action(s) to be taken to prevent the mishap from reoccurring.
- As appropriate, the SHE Manager submits a lessons learned report to the NASA safety center office for inclusion in the NASA Lessons Learned Information System (LLIS) database.

4.1.1 Purpose

The purpose of defining the incident reporting and investigation process is to provide the LJT team with guidelines for the reporting of mishaps that resulted in injury, illness, or property damage. Guidelines follow those established by NPR 8621.1B, NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping.

We identify site-specific reporting and investigation coordination requirements and establish procedures for all WICC II locations on LJT or third-party property. Reporting is mandatory to ensure that:

- We identify causes and initiate corrective action to prevent a recurrence.
- LJT strives to abate all hazards prior to a mishap or close call.
- We meet all NASA and OSHA reporting and record keeping requirements.
- Meeting Insurance notification requirements.

4.1.2 General Requirements for Mishaps

Employees shall immediately report all mishaps to their manager or site lead and the LJT SHE Manager (after emergency procedures) regardless of apparent degree of severity or injury. The LJT SHE Manager will initiate a report in the NASA Incident Reporting Information System (IRIS) database. Mishaps that occur at WFF facilities have additional reporting requirements (refer to NPR 8715.3.C).

Our SHE Manager is responsible for notifying the Corporate Human Resources Manager immediately concerning:

- Any accident that results in a serious injury/illness or death to a LJT employee. Serious injuries or illnesses are those that are defined as (at minimum) OSHA recordable or generate a medical expense as a result of treatment or precautionary examinations.
- Any damage to contract property where the cost to repair or replace the damaged property is more than $1,000
- Any accident involving damage to a contractor-owned or leased vehicle

4.1.3 LJT Reporting Requirements for Mishaps

For reporting mishaps that occur at WFF, we follow the procedures outlined in Figure 8. For mishaps that occur on contractor or third-party property, in addition to these procedures, we immediately report mishaps to the site's management or safety personnel. Where LJT personnel are in an onsite resident role, we use site specific reporting procedures to augment these procedures, which we pre-coordinate with the site's safety representative and provide to affected LJT personnel.

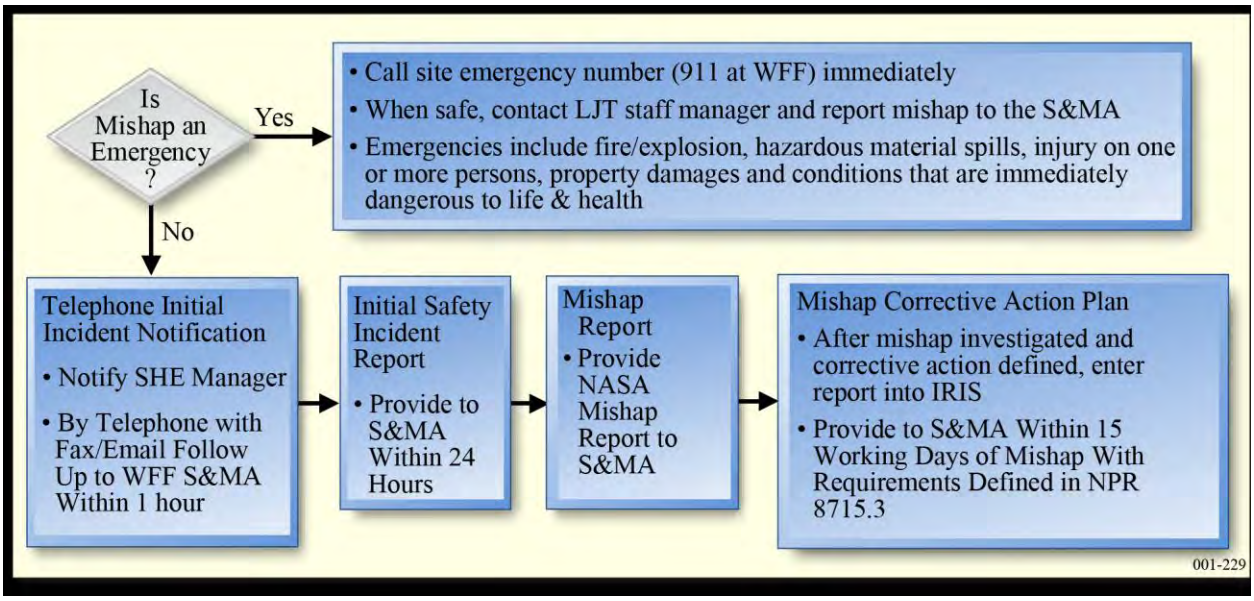

Figure 8. Mishap Reporting. *LJT uses a process that is well established at WFF for reporting mishaps*

The LJT SHE Manager notifies the NASA Safety and Mission Assurance Branch as soon as possible after a mishap or incident. The SHE Manager then initiates an incident report within the IRIS database within 24 hours of the occurrence. If information is incomplete at that time, LJT submits an initial report to meet the deadline, with a final Mishap Report following as soon as

possible (but not more than 10 days). We distribute copies of the report to the appropriate personnel as required. Immediate responsibilities for personnel who are first on the scene of a mishap are as follows:

- Call 911 and report the mishap (if appropriate)
- If possible and trained, render assistance to victims, and attempt to limit further injury and property/equipment damage
- If possible and until relieved by competent authority, secure the scene of mishap against action that could impair investigation
- Obtain names and addresses of witnesses
- Obtain all information necessary to complete required reporting forms

Managers, who receive a clinical report of an occupational injury or illness on one of their employees may also transfer the information using the NASA Incident Reporting System (IRIS) or by forwarding the report to a safety representative.

4.1.4 Investigating Mishaps

For investigating mishaps that occur at WFF, we follow the procedures outlined below. For mishaps that occur on LJT or third-party property, in addition to the given procedures, we coordinate mishap investigations with the site's management or safety personnel. LJT members fully cooperate with the site in performing investigations. Where LJT Team personnel are in an onsite resident role, we pre-coordinate site specific investigating procedures to augment the given procedures, with the site's safety representative and provide to affected employees. We report to NASA Safety, Health, and Environmental Incidents, Mishaps, and Close Calls.

A WFF-appointed mishap investigation board investigates mishaps that are Type A or Type B, or close calls that could have been mishaps of Type A or Type B. The LJT SHE Manager performs collateral investigations, but NASA investigations take priority with regard to access to evidence, data, and witnesses.

The LJT SHE Manager/ WICC II Program Manager have the opportunity to comment on the investigation report in accordance with NASA protocols.

LJT Managers investigate Type C mishaps, incidents, first aid cases, and close calls, supported by the SHE Manager and consistent with guidelines presented in NPR 8715.3C, and NPR 8621.1.

After the Manager completes his/her investigation with the support of the SHE Technician and develops a plan of corrective action, he/she reports this to the SHE Manager which in turn submits the required information to the S&MA within 15 working days of the mishap.

If more than 15 days is required to perform the investigation, LJT immediately notifies S&MA and requests an extension.

LJT implements corrective action through coordination with the SHE Team and the WFF S&MA Office via the following tools and capabilities.

4.1.4.1 Public releases of information

The NASA Director of Public Affairs is the only person allowed to coordinate releases of information to the news media.

Refer news media to the NASA Public Affairs office for information regarding a mishap or close call.

4.1.4.2 Lessons Learned

Attach any lessons learned from the mishap or close call investigation to the final report sent to S&MA and enter into the NASA Lessons Learned system on the Internet.

Share this information with other WFF employees and organizations that might benefit from the report.

4.1.5 Responsibilities

Table 7 (next page) shows LJT employees and management personnel responsibilities associated with the reporting and investigation of mishaps.

4.2 Trend Analysis

LJT uses an SHE metrics system, which consists of six primary and 15 supplemental metrics (e.g. Injury Frequency, Injury Severity, Loss Severity by type, etc.). LJT will use SeeSOR to provide electronic storage, tracking and trend analysis of key safety metrics in coordination with the Quality Assurance Manager. This metrics system provides the LJT SHE Team with tools to use to chart individual safety and health performance. The system includes a mechanism for setting annual goals, and utilizes charts and reports for better understanding of the factors that affect SHE performance. The LJT metrics system includes all information necessary to satisfy the OSHA reporting requirements in 29 CFR 1904.

LJT provides the following reports in support of WFF-wide trend analysis performed by the Government schedule:

4.2.1 Accident/Incident Summary Report

We describe all new and open mishaps, including vehicle accidents, incidents, injuries, fires, and any close calls in summary form along with status. This report is available on a monthly basis; the due date is the 10th day of the month following each month reported. We also include negative reports, on a monthly basis, delivered to the WFF Safety Office.

The LJT SHE Manager submits a mishap/incident summary report to the WICC II Program Manager and NASA S&MA. The report consists of the OSHA Statistical Information of the WICC II Contract. LJT describes in summary form all new and open mishaps, including the status of vehicle mishaps, incidents, injuries, fire, and close calls. This information assists LJT and NASA in measuring incident, mishap, close call, and audit findings occurring on the WICC II contract.

4.2.2 Incident Rate Report

Incident rates assist in identifying problems in the workplace, or progress that has resulted from preventing work-related injuries and illnesses through established HSE programs. Constant measurement of SHE performance provides detailed information for addressing areas of improvement and opportunity. With this data, LJT is able to establish priorities for preventing injuries and illnesses.

Table 7. LJT Mishap Responsibilities. *Our employees and management team all have clearly defined roles and responsibilities relative to reporting and investigating mishaps.*	
Position	**Mishap Responsibilities**
Employees	• Report all incidents, mishaps, Close Calls, or hazardous conditions to their Manager or SHE Manager
Managers	• Indoctrinate all employees in incident, mishap, and Close Call reporting requirements • Ensure that employees report all incidents, mishaps, close calls, and hazardous conditions in accordance with established procedure • Ensure the safety of personnel and property. Notify emergency response personnel if necessary. Preserve evidence, witnesses, and secure the mishap scene from disturbance • Report incident, mishap, and Close Calls in accordance with paragraph 3.6.1 and 3.6.2 • Complete and submit the Managers Mishap Investigation Report to the LJT SHE Manager and the injured employee's Human Resources Representative within 24 hours of first knowledge of an accident • Investigate all mishaps, incidents, and first aid cases with support from the SHE Manager in accordance with established procedure • Take necessary actions to correct hazards discovered during the investigation • Complete reporting requirements within 15 days of the mishap after an investigation, and a plan of corrective action is developed within 15 days. ▪ Forward to the SHE Manager and the S&MA • Monitor the recovery of an employee with a lost-time injury and arrange for that employee to return to work on light or restricted duty as soon as possible • Ensure that drug and alcohol testing is completed at the time of report or treatment (whichever is first) and ensure a copy of the results are forwarded to the LJT SHE Manager. • Review close and mishap information to evaluate trends in his/her work area • Take action to correct hazards and include temporary measures to protect employees while waiting on building or equipment changes
SHE Manager	• Assist Managers in investigating incidents, mishap, and close call root cause to determine actions required to preclude recurrence • Maintain a permanent file of mishap investigation and related reports including the OSHA Form 300 and copies of the Employer's Report of Occupational Injury or Illness provided by the LJT (as appropriate) Human Resources Representative • Report information on a serious injury/illness or death to OSHA officials as required by law • Report to NASA all mishaps. • Follow up on implementation of recommended corrective action(s) • Maintain a database for internal incident, mishap, and close call tracking • Assist NASA management with reporting, investigating, implementing corrective action, and documenting lessons learned as necessary, to include coordination and procedure development with representatives at all WICC II sites
Human Resources Representative	• Complete and forward to the worker's compensation insurance carrier and the SHE Manager an Employer's First Report of Occupational Injury or Illness within 24 hours of first knowledge of a work-related injury or illness that requires medical attention • Provide the injured employee a copy of his/her Employer's First Report of Occupational Injury or Illness. • Coordinate Workers Compensation benefits and reporting • Coordinate assessment of Early Return to Work potential with the worker compensation carrier, medical personnel, management, SHE Manager, and the employee

4.2.3 Log of Occupational Injuries and Illnesses

The Occupational Safety and Health Act requires employers to report (within 8 hours to OSHA) any accident that involves a death, or the in-patient hospitalization of three or more employees, and to maintain certain records regarding work-related injuries and illnesses.

LJT maintains an OSHA Form 300, Log and Summary of Occupational Injuries and Illnesses, for each contract location. We record each recordable injury or illness (as defined on the Form 300) on the log within 6 working days after learning of its occurrence. LJT develops an annual summary based on the information contained in the log for each establishment.

We complete the Annual summary at the conclusion of the calendar year and post it in a place where all employees are likely to see it (such as the WFF LJT web page and office bulletin boards). This posting requirement applies even if no recordable injuries occurred for the subject calendar year. We post the summary no later than February 1, and it remains in place until April 30. After that date, we retain the log and summary, and OSHA Form 301 (or its equivalent) on the premises for 5 years.

For each establishment on and off NASA property that performs work on the WICC II Contract, LJT delivers to the Government a copy of its annual summary of occupational injuries and illnesses (or equivalent). We compile data and report by calendar year, providing to the Government within 45 days after the end of the year reported (i.e., no later than February 15 of the following year).

5 Hazard Prevention and Control

LJT eliminates or controls hazards identified during inspections, hazard analyses, operational readiness inspections, facilities analyses, and/or job safety analyses to prevent injury. The Safety Representatives enter findings that are the result of inspections performed into the WFF LJT sites' hazard tracking system. We capture this data for trending, tracking to closure, and employee awareness.

To prevent mishaps and injuries, LJT also studies existing or developing trends in close calls, mishaps, and inspection findings. LJT uses this information to analyze trends and identify required corrective action.

As stated in earlier paragraphs, we maintain all findings from inspections, close call reports, and mishap investigations and analyze the findings to discover underlying trends. Our SHE Team provides tailored reports for all mishap data to include first aid, lost time, medical treatment, OSHA record injuries/illnesses, property damage, hazard-tracking information, and submitted close calls. We present the trending information to the Contract Safety Committee, Program Managers, and employees monthly. NASA has insight to this data through contract status reporting. We further analyze this information to identify specific areas, facilities, organizations, etc., that identify negative or adverse trends, and the underlying root causes contributing to the trend. Corrective actions taken to minimize or reverse the undesired trend include hardware and/or procedure modifications and revised or revisited training. We present the proposed course of action to the Safety Committee, and a recommendation carried forward to the WICC II Program Manager and staff for review and action. We report this information on an online dashboard, available to key management and NASA personnel.

LJT proactively identifies and analyzes hazards, and implements effective controls to prevent an injury and/or property damage. We base the selection of these controls on the hazard reduction precedence described in section 3.3.

5.1 Appropriate Controls

LJT determines corrective actions according to the established hazard reduction guidelines.

5.1.1 Design to Eliminate the Hazard

Design or substitution of a less hazardous material will first eliminate hazards, if possible. Damage control, containment, and isolation of potential hazards is a consideration in the design phase, where possible, and throughout the life of the system.

5.1.2 Provide Safety Devices

We reduce hazards through design with appropriate safety devices as part of the system, subsystem, equipment, facility, or operations.

5.1.3 Provide Cautions and Warnings

Where it is not possible to preclude the existence or occurrence of a known hazard, we employ devices to detect hazardous conditions and generate an adequate warning signal.

5.1.4 Special Procedures

LJT uses administrative controls, such as special work procedures, training, barriers, and signs, if we cannot reduce the magnitude of existing or potential hazards through the design or use of safety and warning devices.

5.1.5 Personal Protective Equipment (PPE)

LJT uses PPE in conjunction with administrative controls to mitigate risk and hazard exposure, when we are unable to engineer a process or condition concerning a potential hazard.

5.1.6 Hazard Control Design Criteria

- Handling of Hazardous Materials is by direction of the WFF NASA Environmental Office.
- Safety design requirements based on sound engineering practices and safety design principles for a particular system
- Materials selected to serve the need while having the least amount of risk
- Hazardous substances, components, and operations isolated from personnel and incompatible materials
- Equipment located so that access during operations, servicing, maintenance, or repair minimizes personnel exposure to hazards such as electrical, toxic substances, radiation, and sharp injury-producing surfaces
- Control or minimize environmental conditions such as temperature, pressure, noise, toxicity, acceleration, or vibration
- Designs incorporate displays, controls, and operating procedures that minimize risk for human error
- Use alternate approaches to minimize risk, such as interlocks, redundancy, fire suppression, protective clothing and equipment, devices, and procedures
- Protect power sources, controls, and critical components by physical separation or shielding
- Minimize the severity of personnel injury or damage to equipment in the event of a mishap
- Design software-controlled or monitored functions to minimize hazards resulting from software malfunctions

LJT re-evaluates the project, facility, or equipment after we select controls and use design measures to eliminate hazards. We reassess the hazard assuming that proposed controls are eliminated. If any new hazards arise from the assessment, we evaluate and implement controls to prevent occurrence. We consider all phases of the operation, such as test, startup, operation, maintenance, and disposal.

The implementation of effective controls involves a coordination effort between Team LJT, emergency authorities, and field site Environmental Compliance office or representative. Specific services required to respond to a particular emergency are coordinated through these entities. We present to their management specific hazards that may affect these organizations for control approval and acceptance.

5.1.7 Hazardous Operations

We define a hazardous operation as a job that involves hazardous materials, conditions, or equipment that requires special precautions to prevent injury or property damage. We achieve safety of operations through incorporating safety requirements and controls into test plans and procedures, advanced planning for contingency and emergency situations, pre-task briefings, safety surveillance and exposure assessments during hazardous operations, and post task critiques.

Hazardous operations require greater attention of LJT managers and safety personnel to ensure safe operations. Prior to assigning personnel to tasks that involve hazardous operations, LJT

develops procedures approved by management, trains and certifies employees, and completes all permit requirements. LJT Managers are responsible for identifying any hazardous operations not previously identified and ensuring that employees receive the proper training and follow procedures. NASA has access on request to any hazardous operations procedure or related implementation data to verify implementation.

Certain operations or projects on WICC II may require personnel to work in or around various hazardous operations involving high pressure systems and other ground support equipment at WFF. LJT follows all ground safety requirements established in RSM-2002 Range Safety Manual for Goddard Space Flight Center Wallops Flight Facility. Certain operations require the utilization of Operations Safety Supervisors (OSS). As defined by NASA S&MA (Ground Safety), LJT will ensure that any OSS's supporting operations that require an OSS are properly trained and certified as defined in 800-PG-8715.0.4 "Certification Procedures for Operations Safety Supervisor at Wallops Flight Facility (WFF)".

If previous uncontrolled hazardous conditions exist, we stop operations until hazard controls are in place. All managers and employees have the authority and responsibility to stop work when hazardous conditions occur. Once we initiate a stop-work order, the Area Manager and safety representative must approve the return to operations.

5.1.7.1 Identification of Hazardous Operations

To determine if a given job task or process is considered a hazardous operation, you may refer to NPR 8715.3C as a guide. Our SHE Manager develops and maintains a list of all potentially hazardous operations that impact LJT contracts.

WICC II program management and S&MA office jointly decide which operations are hazardous, with WFF serving as the final authority. After WICC II Contract operations commence, our SHE Team develops a reasonable schedule to create written hazardous operations procedures with particular emphasis on the job safety steps required. We implement the hazardous operations procedures and enforce by line management. NASA has access on request to data necessary to verify implementation.

Area managers, assisted by the LJT SHE Team, access and analyze all potentially hazardous operations to determine risk to personnel, equipment, and facilities. Where a serious degree of risk dictates, personnel always work in pairs. Managers ensure compliance with applicable requirements, including all required permits. Managers take extra care to recognize and respond to dangerous situations when employees work in hazardous areas that are new to them, or are working near public access areas.

5.1.8 Written Procedures

Our written procedures describe the process for identification of methods to ensure that the relevant hazardous situations and proper controls are identified in documentation such as inspection procedures, test procedures, etc., and other related information. We include information for all hazardous operations, including testing, maintenance, repairs, and handling of hazardous materials and hazardous waste in the written procedures. LJT develops procedures in a format suitable for use as safety documentation (such as a safety manual) and are readily available to personnel as required to perform their duties.

Hazardous Operations Procedures or a hazardous operating permit

These written procedures include the following steps:

- Ensure safety and health of personnel
- Provide applicable cautions and warning statements
- Specify actions to bring an emergency situation under control
- Return the system(s) to nearest possible safe condition
- Identify applicable Personal Protective Equipment (PPE)

Areas of concern marked conspicuously on the title page to alert operators that strict adherence to the procedural steps and the safety and health precautions is required

LJT SHE Manager approves all WICC II determined hazardous operations. Deviations or changes to the operations require approval and signature by the same authorities.

The LJT SHE Team or manager responsible for oversight of the hazardous operations will ensure that WFF LJT Ground Safety Group has developed and approved any ground safety plans required for any hazardous operations required as defined in the WFF Range Safety Manual.

The SHE Manager reviews and updates procedures on an annual basis, with support from the S&MA office.

Managers ensure implementation of and compliance with hazardous operations procedures.

Managers approve all testing, maintenance, repair, and handling of hazardous materials or waste hazardous operations procedures.

5.1.8.1 Personnel Certification

Line managers ensure the certification of employees who perform or control hazardous operations including the use and transport of hazardous material to ensure that the individuals possess the necessary knowledge, skill, judgment, and physical ability to do the job in a safe and healthful manner. The SHE Manager supports the area manager in identification of training requirements based on the identified hazardous operations. LJT employees are required to undertake a written test, and receive documented certification. LJT personnel are trained in the hazards to which they may be exposed as well as trained and certified in the test operating procedures, test emergency procedures, safety requirements, individual tasks, and personnel involved in hazardous operations.

5.1.8.2 Notification

All facilities containing hazardous operations receive appropriate signage to alert all personnel of that hazard. Line managers ensure notification of all employees in the affected facility. For example, individual systems, such as electrical, use the Lock Out / Tag Out procedures to ensure no one is exposed to electrical shock.

5.1.8.3 Space Systems and Test Safety

This paragraph addresses employees who may participate in operations that include testing activities at WFF and WFF Field Sites or are involved in tests at other locations including those with WFF equipment.

LJT personnel involved in an operations that involves a test participate in test readiness reviews, pre-test briefings, pre-test checkout, dry runs, simulated emergency drills unique to the specific test, and post-test debriefing as required ensuring full knowledge of the test hazards, procedures, and full integration in the test team.

5.1.9 Personal Protective Equipment (PPE)

PPE includes devices and clothing used for the protection or safety of an individual while in potentially hazardous areas or performing potentially hazardous operations.

5.1.9.1 Policy

As stated previously within this document, LJT's preferred method for hazard or risk mitigation is to engineer the hazard out of the process. If the hazard cannot be engineered out of the process then administrative processes shall be put into place to minimize the risk to employees. If administrative process cannot fully mitigate the hazard then PPE will be evaluated and implemented. LJT provides PPE appropriate to the task to reduce the chances of an employee getting seriously injured during an incident. Our Managers, supported by the LJT SHE Team, assess the workplace to identify potential hazards and hazardous operations that necessitate the use of PPE and provide direction to employees on PPE required for all hazardous operations. Managers ensure that employees receive training in the proper selection, use and limitations, inspection and maintenance of required PPE. Each area, through its Manager, is responsible for identifying and obtaining the correct protective equipment, while enforcing its use. We do not use defective or damaged PPE.

5.1.9.2 Responsibilities

LJT employees and management each have specific responsibilities associated with the use of PPE, shown in Table 8.

5.1.9.3 General Requirements for Personal Protective Equipment

Hazard Assessment - OSHA regulation 29 CFR 1910.132 requires an assessment of each work place to determine if hazards are present, or likely to be present, for which we require the use of PPE. LJT uses the Sample Format for Job Hazard Assessments to Support Personal Protective Equipment Selection (see Appendix D).

We certify this assessment by including the name of the facility evaluated, date of the assessment, and name of the person performing the assessment. We base the selection of PPE on the results of the hazard assessment performed by the Manager, and supported by the SHE Team and occupational health representatives.

Training – We train each employee who is required to use PPE and require employees to demonstrate the ability to use PPE. Training includes:

- Determining when PPE is necessary
- What specific PPE is necessary, how to don, doff, adjust, and wear PPE, limitations of the PPE, and proper care, maintenance, useful life, and disposal

Training is required upon initial hire, when changes in the work place or types of PPE used render previous training obsolete, or if inadequacies in an employee's knowledge or use of assigned PPE indicate that the employee has not retained the requisite understanding or skill.

Table 8. Personal Protective Equipment Responsibilities. *Our employees and management team all have clearly defined roles and responsibilities relative to the usage of PPE.*	
Position	**Use of PPE Responsibilities**
SHE Team	• Performs and maintains records of hazard assessments performed to identify PPE requirements • Assists the Manager in selecting appropriate PPE • Ensures recommended PPE conforms to applicable standards (i.e., American National Standards Institute, National Institute for Occupational Safety and Health) • Provides training on PPE requirements, use, limitations, proper care, maintenance, useful life, and disposal • Implements and administers the eye and foot protection programs, as applicable
Managers	• Selects required PPE with support of the SHE Team and occupational health representatives as required • Ensures required PPE is readily available to employees working in areas or performing operations that require PPE for protection • Enforces the mandatory use of PPE when required to protect employee health and safety • Ensures employees receive and understand training on proper PPE selection, use, limitations, inspection, and maintenance • Ensures PPE is properly stored and maintained
Employees	• Use, maintain, and store PPE in accordance with this procedure and instructions provided by the Manager or SHE Team • Report all problems associated with PPE (i.e., damaged, worn, or inadequate) to the Manager or SHE Team • Do not use damaged or defective PPE

5.1.10 Hazardous Operations Permits

Identified hazardous operations not addressed by Hazardous Operating Procedures require a permit prior to each single operation event, in accordance with NPR 8715.3C, and site requirements. Examples of such operations include:

- Hazardous processing operations
- Live Electrical Work
- Confined space entry
- Hot work
- Tower Work
- Other designated permit required hazardous operations.

The LJT SHE Manager or the designated site lead approves all permit requests. Our Managers ensure that employees are aware of permit requirements and follow the established permit system. We follow the applicable site (WFF and field sites) permit system for each hazardous operation as required.

5.1.10.1 Operations Involving Potential Asbestos Exposure

General Requirements – Various WICC II activities such as facility maintenance and demolition can result in the disturbance of asbestos containing materials. LJT follows all federal, state, local regulations, and guidelines to control hazards associated with asbestos in accordance with 29 CFR

1910.1001 or 29 CFR 1926.1101. Management, supported by the SHE Team, identifies operations with potential asbestos exposures and identifies specific site requirements. We train our employees to identify and avoid disturbing asbestos containing materials. Those employees that are required to disturb asbestos containing materials for sampling purposes only and the work has the potential to generate friable asbestos fibers shall be trained in proper abatement/encapsulation and proper PPE use in accordance with OSHA 1910.1001or OSHA 1926.1101. Suspect materials shall be tested to confirm the presence of asbestos containing materials by certified testing procedures and facilities. Materials that are confirmed (positive test results) to contain asbestos shall be properly identified and either left undisturbed or abated by trained and certified abatement subcontractors.

Prohibited Activities - Employees involved in various operations could potentially disturb Asbestos Containing Materials and create an employee exposure risk without proper training, procedures, and permits. To ensure that this does not occur, we prohibit LJT employees from performing the following without prior approval of management, all required site permits, and approved plans:

- Cutting or drilling holes in the ceiling or any potential other Asbestos Containing Material
- Installing hangers, fasteners, drapes, or dividers in such a manner that they will damage Asbestos Containing Material
- Sanding or grinding any Asbestos Containing Material
- Moving of equipment or furniture, which could damage floor tiles
- Damaging pipe or mechanical systems insulation that might contain asbestos

Training – We notify employees who work in any buildings that contain asbestos of its presence and given procedures to follow if a suspected asbestos release occurs in the area. Employees that are required to disturb asbestos containing materials shall be trained in the identification and proper abatement methods defined by the United States Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA) requirements or a properly certified vendor shall be solicited for proper material abatement and disposal.

5.1.10.2 Operations Involving Exposure to Toxic or Unhealthful Materials

When new operations are considered, we review applicable task information, such as procedures, equipment manuals, and Safety Data Sheets (SDS) to identify potentially toxic or unhealthful materials that may be involved. If such hazards are discovered, LJT notifies the site Occupational Health Office (NASA or field site) prior to initiation of any such procedures.

Contract operations comply with site requirements for handling toxic or hazardous materials. Management and occupational health are involved in the development of effective controls for the process to ensure that employee health is not compromised or jeopardized. Specific policies are already in place for controlling specific health hazards and are contained in this SHE Plan. A listing of these procedures is as follows:

- Hearing Conservation and Noise Control
- Laser Safety Procedure
- Radiation Protection
- Blood borne Pathogens
- Cryogens
- Hypergolic Fuels

5.1.10.3 Operations Involving Hazardous Waste

For hazardous waste generated on this contract, LJT personnel are responsible for the following:

- Participation in annual hazardous waste training.
- Performing hazardous waste determinations on all waste streams
- Ensuring that hazardous wastes accumulate in compatible containers and are prepared for shipment in appropriate containers.
- Completing proper documentation for miscellaneous Hazardous Wastes disposal
- Notifying site Environmental Office, ESO, to obtain pickup service when quantity of wastes in the satellite accumulation equals 45 gallons, if available or arranging for commercial service for offsite projects when required.
- Ensuring that a Safety Data Sheet is available for each pure chemical or unaltered product
- Designating a (satellite) area for accumulation of up to 45 gallons of hazardous waste and for designating a Point of Contact to be responsible for the area.
- Ensure proper labeling is on each container.

At WFF, WICC II is responsible for hazardous waste identification, satellite area accumulation and to provide proper notification when the accumulated waste is prepared for pickup and disposal. WICC II Environmental Office or approved vendor is responsible for transportation, storage, and disposal of wastes according to all state and federal regulations. Disposal of hazardous wastes at offsite locations will be coordinated with the management of the site or scheduled with an approved vendor.

5.1.11 Interface with WFF Environmental and Occupational Health Offices

Prior to any hazardous waste generation onsite, we notify the NASA or site Environmental Services Office for an evaluation of the proper controls. Should there be subsequent new or modified hazardous waste operations, we notify the NASA Environmental office prior to these initiations. Prior to any handling of toxic materials onsite, LJT notifies the S&MA Group and WFF or site Occupational Health Office for an evaluation of the proper controls.

5.1.12 Waste Management

This procedure provides instructions for identifying and controlling hazardous waste for employee and community safety, as well as complying with environmental laws and regulations. NASA WFF is responsible for the transportation, storage, and disposal of waste generated on-site. LJT personnel are responsible for properly storing materials in containers, labeling those containers, inspecting satellite accumulation points, and abiding by WFF 's requirements for the notification, generation, and handling of hazardous waste on site and at all contract locations. LJT observes field site standards, but we will not accept standards inferior to those imposed at WFF.

5.1.12.1 Operations Involving New or Modified/Emissions/Discharges to the Environment

LJT scrutinizes all contract operations for potential impact to the environment. LJT accomplishes this through the implementation of established procedures.

We require Managers to notify the SHE Team and the Environmental Group of all waste streams and the processes from which they emanate. The procedure requires the requester of hazardous materials or devices to route the request to the LJT SHE Manager before implementing the material request. The LJT SHE Manager reviews a Notice of Hazardous Material and determines the potential environmental impact of the materials used and if permitting is required. The LJT SHE

Manager notifies the WFF Environmental office of any changes in waste streams or emissions that may potentially impact and permits or regulations currently in place.

Hazardous materials are scrutinized for environmental impact and managed to maintain the lowest possible quantity, and for substitution of non-hazardous or less hazardous materials for hazardous materials. LJT implements proper hazardous materials handling, to include quantity minimization, storage segregation, and waste segregation and handling requirement. When we identify operations requiring permitting, we allow sufficient lead time for processing permits through the appropriate state and or federal environmental protection agency due to the length of time necessary for the processing of such permits. Existing procedures and their applicability to this section are as follows:

Chemical Hygiene Plan and Laboratory Safety Program - addresses proper hazardous material handling and storage where applicable. The Environmental Office of WICC II shall have an approved specific chemical hygiene plan and laboratory safety program in place to ensure safe operations while conducting testing, assessments, or handling of potentially hazardous materials.

Hazard Communications and Hazardous Material Control - requires managers to notify the SHE Team and potentially impacted employees of all waste streams (and the processes from which they emanate), and changes in processes that would increase the volume of toxicity of wastes generated.

Change Analysis - establishes evaluation and review of all new or modified projects or procedures to identify any potential impacts and alternatives that may minimize environmental effects or permit requirements.

Water Quality and Permit Compliance - establishes procedures to ensure compliance with the applicable provisions of the federal Water Pollution Control Act. All projects and modifications to existing facilities or operations are analyzed to determine potential changes to water discharges. In the event a process increases the discharge amounts, the proper regulatory agency to ensure permits requirements are met.

Air Quality and Permit Compliance - implements applicable provisions of the federal Clean Air Act and state or local air pollution control laws and regulations, including permitting of stationary sources of air pollution associated with manufacturing operations, laboratories, field activities, and office buildings.

If any process onsite at WFF requires Environment Protection Agency or other permits, we will notify the WFF Environmental Services Office. The WFF Environmental Office is shall obtain and maintain all permits and LJT shall abide by the requirements and conditions of those permits.

5.1.12.2 Pollution Prevention/Waste Minimization

The EPA and many states identify pollution prevention as their first priority in combating environmental releases and reducing waste generation. Pollution prevention refers to a broad array of methods to reduce or eliminate the volumes and/or toxicity of pollutants in wastes or released to the environment. The pollution prevention program ensures that the Safety and Health Plan goes beyond mere regulatory requirements. The pollution prevention program is implemented in conjunction with Safety and Health auditing, training, and reporting policies and is subject to all tracking and disciplinary provisions of the program. Contract operations are compliant with requirements of NPR 8553.1A, NPR 8570.1, Energy Efficiency and Water Conservation with

Change 1 and NPR 8580.1, Implementing the National Environmental Policy Act and Executive Order 12114. The LJT Pollution Prevention Program will coordinate with the WFF Environmental Office.

5.1.12.3 Affirmative Procurement

LJT ensures that all products purchased for use at WFF meets the requirements of the Bio-preferred Program established by Executive order 13514. LJT's Safety Team works closely with the logistics and environmental teams to determine the applicability and suitability of bio-based products for use on all contracts.

5.2 Facilities Baseline Documentation

We analyze contract facilities to determine if facilities baseline documentation is required for these sites. LJT maintains a list of those contract occupied facilities at WFF and other contract locations that require such documentation. This requirement ensures that we develop, validate, and maintain a set of baseline documentation for critical, complex, or hazardous facilities. Employees support this process by providing documentation of procedures, analyses, etc. as defined in NPR 8590.1, NASA Environmental Compliance and Restoration (ECR) Program. This documentation includes the following:

- Configuration control documentation including current facility drawings, equipment drawings, functional schematics, block drawings, and nonmetallic surveys
- General operating procedures that contain basic policies, describes the facility organization and responsibility, and procedures for collecting and maintaining baseline documentation
- Safety requirements and procedures that include emergency planning, certification of pressure systems and lifting equipment, calibration, testing involving human subjects, operations performed in vacuum or oxygen-enriched environments, and operations involving hazardous materials
- Detailed procedures that describe system and machinery operations
- Hazard analyses for the facility, equipment, and systems, which will be approved by S&MA
- Failure Modes and Effects Analyses for systems and subsystems that are critical systems
- Documented inspections
- Training documentation for personnel who are qualified to operate systems and equipment
- Preventive maintenance documentation for all critical systems and equipment
- Records generated from operational readiness inspections, test readiness reviews, approval of variances, pressure systems certifications, etc.

5.3 Preventive Maintenance

LJT recognizes preventive maintenance as a critical element in preventing injury and continuance of safe and healthy operations. We establish a preventive maintenance program for facilities, critical safety and health equipment, and equipment which creates potential exposure to injury or property damage. Equipment or facilities needing service are identified and appropriate schedules are developed in accordance with manufacturer instructions, lessons learned from known performance history and known environmental exposures. LJT trains employees on the proper performance of preventive maintenance at the required intervals through detailed procedures and on-the-job observation.

5.3.1 General

The equipment, systems, or facilities that require preventive maintenance have established procedures to provide for required preventive maintenance and maintenance tracking. WICC II employees perform maintenance and repair of equipment, such as lighting, structures, air conditioners, heaters, plumbing, and office furniture that are the responsibility of the WICC II contract. It is not the responsibility of WICC II employees to perform maintenance on copiers or other equipment in machine shops that are not within the scope of the WICC II contract. Our employees are responsible to ensure well maintained equipment and to notify appropriate individuals when a requirement for service, maintenance, or repair occurs.

For equipment, systems and facilities that are the responsibility of the WICC II contract, we provide special attention for safety critical systems and equipment that is necessary to protect employees and property from potential damage and harm. LJT identifies and tracks all items requiring preventive maintenance to ensure timely completion and to identify adverse trends. This type of data is also helpful in promoting awareness and providing visibility. LJT reviews and tracks the data monthly or more frequently when trends dictate. We track this level of detail through our risk management tools and work planning management systems. By focusing on the leading indicators provided by our preventative maintenance program and analyzing improved performance trends we take a proactive approach to managing the SHE Plan.

Safety Alerts, Safety Flashes, recalls, etc. that are received from WFF, site, corporate or other sources are reviewed by the SHE Manager and appropriate action implemented if it affects WFF facilities, equipment and processes. When appropriate, the responsible Manager supported by the SHE Team ensures documented communication of all adverse system or equipment experiences.

5.3.2 Responsibilities

Maintenance responsibility lies with the individual assigned to that specific area or to each specific piece of equipment. We properly train employees assigned to perform maintenance and follow all applicable safety procedures such as electrical safety, confined space entry, and Lockout/Tagout before maintenance performance.

5.4 Medical Program

The SHE Team identifies hazards and risks based on a risk assessment. These findings enable the SHE Manager to recommend participation in a medical surveillance program, suggest job restrictions, and provide health education based on the results of the assessment. Through the risk assessment, the SHE Team implements an exposure control plan that is specific to the hazards identified. LJT includes all identified employees in the Medical Surveillance Program who have potential exposures to lead or asbestos, and those who are subject to sight and hearing conservation programs, respiratory protection programs, or other exposures that require health monitoring due to occupational exposures.

The SHE Team performs annual inspections to ensure the proper level of protection based on exposure, and if hazards are introduced into the work environment, or if identified during the inspection.

The SHE Team recommends and implements engineering controls, such as substitution of process or materials; local exhaust ventilation; barriers or structures that separate or isolate the workers from the exposure; and redesigns the equipment or the process itself.

The SHE Team verifies the calibration of equipment used for the program on an annual basis based on a method traceable to a recognized authority such as the NIST.

Records - The SHE Manager maintains all records in accordance with 29 CFR 1910.1020, 1915, and 1960, and 40 CFR. We maintain records by automated (soft) records and hard copy records.

Automated records include the following:

- Demographic information for the installation
- Health hazards evaluations
- Existing health hazard control methods
- Recommendations for control
- Status of equipment calibration improvement
- Hard copy records consist of the following:
- Analytical laboratory reports
- Equipment calibration records
- Survey officer records

5.4.1 Purpose

The health and safety of employees is of primary importance. An important part of the contract is to ensure that LJT encourages a preventive approach regarding health maintenance and to comply with Federal, State, and local requirements. These requirements include monitoring the health of those employees exposed to chemical or physical hazards in the workplace. We institute a comprehensive health maintenance program, and address the elements necessary for such a program. This program is to complement the requirements of NASA Environmental Health Program and NPR 1800.1B, NASA Occupational Health Program Procedures. Occupational Health Services will provide Medical services at the WFF clinic. The Government does not provide emergency medical and evacuation services outside the United States. The WICC II Program Manager makes arrangements for Emergency Evacuation when required. The SHE Manager provides the Chief, Occupational Health Branch, with the following:

- A breakdown of the various health examinations required in support of the WICC II contract; providing type, frequency, and a roster of affected personnel
- Applicable physical requirements standards for personnel certification, when or if any are identified that are more stringent than the applicable WFF standards

5.4.2 CPR, First Aid, and Emergency Response

For emergencies that occur at WFF facilities, employees must use the program (or WFF) on-site clinic, and/or call the on-site emergency number. Individuals are not expected or required to provide emergency response, such as CPR or First Aid, unless they choose to do so as Good Samaritans. We encourage safety representatives, fire wardens, and employees the opportunity to attend First Aid/Cardio Pulmonary Resuscitation training on a voluntary basis. We identify Site-specific procedures for all WICC II sites, including Contractor and third-party sites to ensure training for emergency response for that location. We post first aid supplies in facilities where it is appropriate due to potential hazards that may exist.

5.4.3 Safety and Health Variance

The need for a variance to a safety requirement results from a situation where standard safety precautions and regulations do not permit accomplishment of, or unacceptably delay, a particular mission or operation. If departure from a safety requirement results in an unacceptable risk, the requesting organization prepares a variance. The WICC II Program Manager approves safety variances that are internal to LJT operations. Approval of variances that are Contract task-related must be in accordance with the variance policy. We fully coordinate all variances with S&MA.

6 Emergency Response

LJT is committed to proactive emergency preparedness. The LJT Team will provide responsive and efficient all hazards, emergency services to Wallops Flight Facility. To implement this, we operate two fire stations staffed with response crews trained and equipped to meet the needs of the Wallops Flight Facility mission. The Emergency Services team operates with an approved NFPA 1500 safety plan. The LJT Team crews at both locations are trained in both Emergency Response and the National Incident Management System (NIMS). All emergency responders will be trained on ICS-100 Introduction to the Incident Command System, ICS-200 ICS for Single Resources and Initial Action Incidents and ICS-700 National Incident Management System, an Introduction. Our Officers are trained to ICS- 300 Intermediate ICS for Expanding Incidents or higher. The senior emergency services person responding to an incident will be the incident commander until relieved by a competent authority. Additionally, The Project Manager and the O&M Manager certified to ICS 400. If the emergency is a law enforcement issue, the LJT team will provide a supporting role.

All LJT full time emergency response personnel will be trained and hold certifications to the following levels: Fire Fighter II, EMT-B, ARFF and Hazmat Operations. Some full time employees will hold higher certifications to include EMT-E, Hazmat Technician, Confined Space Rescue, High Angle Rescue, Fire Inspector, and Fire Officer II. Part-time employees and trainees will be certified to Fire Fighter II and EMT-B as a minimum and enrolled in training to meet the requirements of a full time emergency responder at WFF. The Emergency Management Officer Manager (Fire Chief) will review the staffing plans to ensure that the correct mixes of skills are available to respond to all reasonably expected incidents.

Incident Command Structure (Figure 9). All LJT emergency operations will have an incident commander and will utilize NIMS. The emergency response teams will be trained on the elements of the Wallops Emergency Operations Plan. The diagram below shows how the LJT Team would organize to respond to an emergency at Wallops Flight Facility. The Incident Commander creates sections as needed. Any section not created remains the Incident Commander's responsibility. The command structure grows as the scope of an incident grows. The LJT training and resources will allow us to establish command and control of nearly any incident at WFF with the flexibility to transfer command when appropriate.

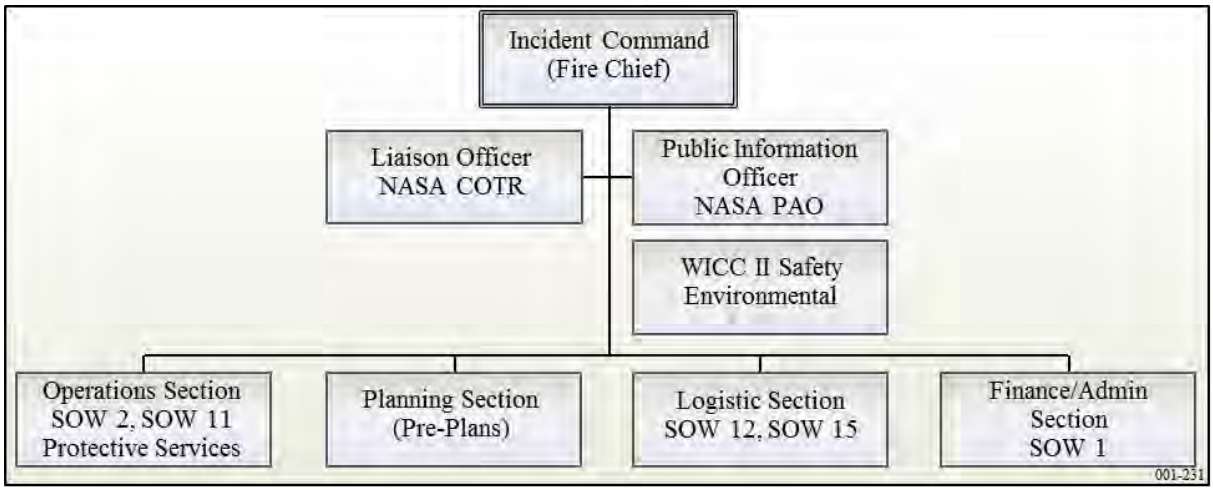

Figure 9. Incident Command Structure (moderately complex event).

We develop all emergency procedures using NPR 8715.2, NASA Emergency Preparedness Plan Procedural Requirement. Plans and procedures address individual operations and our operating procedures contain specific instructions necessary to deal with emergencies to provide rapid shutdown and saving of operations for the protection of personnel and equipment. These procedures address the following:

- Means of notification
- Evacuation routes
- Emergency and protective equipment locations
- Supervisor and employee responsibilities during emergencies, disasters, and adverse weather conditions.

All Emergency plans will be based on the four tenants of emergency management: mitigation, preparedness, response and recovery. The plans will be tested with an annual Testing, Training & Exercise plan. The LJT Fire Chief will work with the NASA emergency preparedness coordinator to develop a series of exercises to demonstrate LJT's and Wallops' ability to execute the Wallops Comprehensive Emergency Management Plan. Each exercise will be evaluated for strengths and weaknesses. Corrective actions will be developed for the weaknesses. The exercise plan will be submitted each January.

6.1 General

LJT reports all fires, medical emergencies, and bomb threats immediately to those in the immediate area, emergency services, dial 911 on WFF internal phones, or if calling from a cell phone dial 757-824-1333 and the SHE Manager from a safe location. The SHE Team is part of the WFF Emergency Notification System (ECHO) and receive facility alerts on a continual basis. Those alerts that affect WICC II employees or operations are passed on immediately to the responsible are a lead to ensure rapid response by all team members. The WFF 911 dispatch is managed by the protective services contract.

We signal the evacuation of the building by voice, fire alarm, or public address system. All work area doors are closed as employees exit the building. Employees do not reenter the building until the "All Clear" signal is issued. The incident commander or fire officials signal the all clear.

We evacuate employees from the immediate area where the fire or medical emergency has occurred and from adjacent areas endangered by the occurrence.

When an incident is so severe that it endangers a major portion of the building or involves the entire building, we evacuate the facility. Employees proceed at least 200 feet away from the building to the designated Emergency Evacuation Assembly Point and remain in this area until released by management.

We post emergency cards listing site specific emergency instructions, emergency telephone numbers, and emergency signals throughout work areas. The SHE Manager completes all sections of the Emergency Card with site-specific information and post copies of the completed form.

LJT provides Fire Wardens, alternate fire wardens, and assistant fire wardens for each building at WFF in which WICC II employees are located in accordance with the building's emergency action plan. Fire wardens assist facility managers to carry out the building emergency evacuation plan. Fire wardens attend training provided by the SHE Team. We will consult the appropriate facility operations managers and select LJT employees from each WICC II area/floor to serve as a fire

warden. The LJT fire department will conduct annual fire drills to ensure that the plans are functional and any deficiencies will be forwarded to the FOM and the SHE team.

6.2 Responsibilities

LJT employees and management have specific responsibilities associated with our emergency response, shown in Table 9.

Table 9. LJT Emergency Responsibilities.
Our employees and management team all have clearly defined roles and responsibilities for emergency response.

Position	Emergency Response Responsibilities
SHE Manager	• Complete the required information on the Emergency Card, and post copies throughout the office • Ensure that all employees are trained in emergency procedures and document the training
Managers	• Have a thorough understanding of emergency procedures. • Conduct employee training as described in Paragraph 5.8, Employee Education and Drills • Evacuate employees in the event of an emergency • Ensure employees are aware of designated Emergency Evacuation Assembly Point • Account for employees and report results to emergency services (e.g., Fire officials)
Employees	• Report emergencies promptly • Be knowledgeable of emergency procedures, evacuation routes, and EEAP location • Proceed to Emergency Evacuation Assembly Point and stay out of an evacuated area until an all clear is given. • Sign Evacuation Accountability Form
Fire Wardens	• Enforce safety rules and make sure all persons in his/her designated area follow the building emergency evacuation plan • Support Manager in developing evacuation plans, ensuring evacuation during alarms, and conducting fire inspections of his/her area • Ensure that all persons requiring assistance during evacuation are assigned a buddy and alternate • Assist Manager in completing the Evacuation Accountability Form
Emergency Services Personnel	• Develop and Coordinate Emergency Response Plans • Respond to Emergencies to minimize risks to personnel, property, the public and high value assets. • Conduct annual TT&E

6.3 Emergency Reporting

Employees immediately report an emergency using posted emergency response numbers - dial 911, or if calling from a cell phone dial 757-824-1333. Employees include the following in the call:

- Your name and exact location of emergency
- Nature of the emergency (e.g., fire)
- Stay on the line unless immediate evacuation is necessary

6.4 Evacuation Procedure

Employees do the following upon instruction to evacuate the area:

- If time permits, shut down equipment that, if allowed to run, may create a hazard or cause damage if left unattended
- Close all doors to work areas

- Exit the building in an orderly manner by the nearest and safest evacuation route and meet at designated Emergency Evacuation Assembly Point or safe area using exit route diagrams posted in the hallways of WFF facilities
- Remain in the rendezvous area until an all clear is signaled or a management decision is made to leave the area

LJT assigns a buddy to persons requiring special assistance during evacuation to assist them during the procedure. Examples of physical conditions, either temporary or permanent, which require assistance include:

- Use of wheelchair, crutches, or walkers
- Hearing or visual impairments
- Pregnancy (second to third trimester)
- Heart or lung conditions
- Temporary injuries
- Other disabilities hindering mobility

6.5 Fire

Employees who discover a fire must report or direct another employee to report the fire (including the exact location) to emergency services by dialing 911 or if calling from a cell phone dial 757-824-1333.

Employees in the vicinity of a fire may attempt to extinguish the fire with available extinguishers only if trained to use extinguishers, and only if done safely during, or after, emergency services notification.

All employees not assisting in extinguishing a fire must leave the area by the nearest and safest evacuation route in an orderly manner and gather at the designated meeting area.

Employees must report any smoke or smell of smoke to the emergency number (911) even if no fire is apparent.

All Fire Calls will be responded to with a four person emergency services team to permit the initiation of operations in a hazardous area. Our goal is to roll out within 60 seconds and have a total response time of 5 minutes. The Fire Officer will establish Incident Command and direct Protective Services to provide scene control. As the incident commander, the Fire Officer will advise the Dispatcher of the incident status and any needs for additional support. The Incident Commander will ensure that the fire is completely extinguished and will assign staff to periodically check the scene to insure that the fire does not rekindle.

The LJT team will work with Protective Services to develop standard operating procedures for the Dispatch function. For example, if the Dispatch should receive a second call during an emergency response, they will attempt to determine if it is the same event. If it is the same event, the data will be logged and the Incident Commander notified. If it is a second event, the other WFF Station will be dispatched and Mutual Aid will be requested to provide backup. The Dispatcher will log all data in the Government provided Emergency Reporting System.

The LJT Team will maintain Fire Department consumables sufficient to restock all emergency service vehicles after an event and will have supply contracts in place to rapidly replenish the

backup supplies. Emergency service equipment will be inspected, resupplied and returned to service immediately after returning to station. A post event debriefing will be held after each response

6.6 Bomb Threat

An employee takes the following actions if he or she receives a bomb threat:

Attempt to obtain as much of the following information as possible:

- Location of bomb (building, area, room, and other details)
- The time the bomb is set to go off
- What the bomb looks like (whether it is concealed or in the open)
- How the bomb got into the office

Attempt to identify the caller's sex, knowledge of the building, and accent

Attempt to identify background noise

Notify the SHE Team or WICC II Program Manager and the emergency number (911) when the call ends. Do not talk to anyone else about the call except as instructed by the SHE Manager or WICC II Program Manager.

Fire Protection Services, working in conjunction with Protective Services and local authorities, determine whether to evacuate the building. LJT management assists in ensuring an orderly and timely evacuation.

6.7 Employee Education and Drills

Managers are responsible for training their employees in emergency procedures. A thorough understanding of reporting, actions, and evacuation procedures is required to avoid confusion during an actual emergency.

Employees are trained annually, and new-hires and temporaries at the time of initial assignment. LJT documents all training.

LJT documents annual employee training, and forwards a copy forwarded to the SHE Team. We document new-hire and temporary employee training on the Orientation Acknowledgment kept in a training file with a copy forwarded to the SHE Team.

Training concentrates on the following:

- We take immediate action in the event of a fire or medical emergency.
- If possible, we perform identification of equipment shut down in an emergency.
- Location of fire extinguishers, fire blankets, and any other emergency equipment in the employees' work area.
- Method by which we notify employees of an emergency including facility and site warning system.
- Identification of evacuation routes and Emergency Evacuation Assembly Points.

We hold one fire drill per calendar year (in coordination with site Fire Protection). We document all drills including an evaluation of the drill and send to the SHE Manager.

6.8 Hazardous Material Event

LJT Employees will in the event of a spill or activity resulting in the potential exposure of people directly or indirectly to hazardous material, we use the following procedure:

- Activate area alarms if evacuation is required
- Evacuate the area if required
- Make the appropriate phone notification from a safe location (dial 911)
- Notify the area supervisor
- Terminate the operation and stop the source of the spill or leak, without risk of injury
- Contact the SHE Team

If the spill is incidental to operations and/or cleaned up by site personnel, we call the NASA WFF Duty office (757-824-1333 if calling from a cell phone).

Emergency Responders will be trained to the HAZMAT operations level. Our emergency services operations plan identified in section sow 11 will include all hazardous waste operations and emergency response organizational requirements.

Upon notification of a hazardous material spill, the LJT team will respond with a four person emergency services crew. We will establish incident command, secure the area with the assistance of Protective Services, and assess the situation. At the same time a flash report will be sent to a predetermined list of officials. The on-scene commander will utilize the WFF Integrated Contingency Plan, the information gained from routine fire inspections and fire department operations, and any technical experts reporting to the command post to assess the situation and develop an action plan. The first order of business after assessment will be move any personnel, not associated with the emergency response, from the hazardous area. The next action will be to contain the spill to protect environmentally sensitive areas. The LJT team will have the equipment and supplies necessary to contain the largest spill identified in the integrated contingency plan. Depending on the scope of the spill, Additional staff will be called in to assist with the containment and cleanup actions as well as maintaining emergency response capabilities.

6.9 Hurricanes/Severe Weather

To provide for the protection of personnel, facilities, and equipment when a hurricane or other severe weather threatens, we develop a WFF WICC II Hurricane/Severe Weather Plan for all WICC II locations following the WFF Emergency Preparedness and Disaster Recovery Plan (EPDRP), and the WFF NASA Hurricane Plan (803-GS-PLN-INST-EM-02 Hurricane/Nor'easter Preparedness Plan). These plans detail the steps to protect employees, property, equipment, and the procedures required after an emergency to bring the Contract operations back to normal operations. LJT tailors this Plan to implement the existing WFF and field site plans.

Should severe weather threaten, we authorize the site manager to release employees and discontinue operations. Managers are encouraged to honor liberal leave policies to allow employees to secure his/her personal property and to evacuate their families in advance of community warnings. However, we ask employees to make certain preparations prior to their departure.

In the event of a severe weather/hurricane alert, we ask employees to:

- Unplug all electrical equipment

- Unplug personal computers and wrap them in plastic bags
- Close all doors
- Secure all valuable papers and classified materials
- Remove bottom file drawers and place on desks or tables
- Raise window blinds to near the top of the windows

Other general responsibilities include:

- Staying informed of emergency action plans regarding hurricanes/severe weather
- Staying informed of anticipated local weather conditions and the status of the plan implementation by dialing the WFF Status Line.

Employees are encouraged to take measures before hurricane season begins to protect their homes, including collecting ample water supplies, canned foods, and obtaining necessary materials to board windows or otherwise protect their homes from wind and rain damage.

Essential personnel are from the WICC II contract are designated support for emergency operations at WFF during storm events. LJT ensures these personnel are properly trained and equipped to provide the necessary support requested by NASA or other agencies that may be housed at WFF during a storm event.

6.10 Earthquakes

Earthquakes strike suddenly, violently and without warning. Identifying potential hazards ahead of time and advance planning reduces the dangers of serious injury or loss of life from an earthquake. Although extremely rare at WFF some WICC II personnel may be deployed to locations that are prone to seismic activity. Employees that are deployed to locations prone to Earthquake events will receive emergency response information prior to deployment.

7 Safety and Health Training

All LJT employees working on the WICC II Contract receive proper training in accident reporting, emergency evacuation procedures, and any hazards pertaining to their job assignments. LJT provides training upon hire, prior to reassignment, and at regular intervals for refresher training to ensure employee understanding and retention. Where possible, our employees utilize the training classes available through WFF, the NASA Safety Training Center (NSTC), and other organizations. We provide certification classes for some tasks, as required by LJT and field site requirements. LJT makes all safety training materials and documentation available to NASA for review upon request.

Our employee training program includes orientation training, ongoing training, and specialized training (Table 10).

Table 10. Safety and Health Training.
LJT provides SHE training to all employees on an initial and ongoing basis.

Level of Training	Instruction
Orientation Training	• For newly hired employees covering general and specific SHE issues related to their work environment and their jobs • Includes review of the following: • LJT SHE Program organization and policies • Organizational operations, potential hazards and types and use of control measures and safe work practices • Emergency response procedures and evacuation responsibilities • Reporting requirements and procedures for SHE hazards, injuries, fires, and other SHE related emergencies
Ongoing Training	• Required to remind all employees of LJT accident prevention procedures during the course of their employment • Needed to refresh memories, outline new policies, and review accident experience and to receive suggestions • Ongoing training provides refresher information regarding LJT SHE policies and any required regulatory information • Training frequency meets any applicable regulatory requirements and is frequent enough to ensure understanding and competence • Makes use of all applicable and available NASA provided safety training
Specialized Training	• Provided for employees who perform duties involving unique hazardous conditions, prior to initial assignment and as necessary • Managers responsible for ensuring specialized training completed for laboratory activities • SHE Manager coordinates specialized first aid training as part of the SHE Program • Computer-Based Training may be used to satisfy requirements • Examples of types of training available: ▪ First aid/CPR/AED ▪ Hazard communication ▪ Use of PPE ▪ Fire extinguisher use ▪ Confined space entry ▪ Electrical safety ▪ Lockout /Tagout procedures ▪ Ergonomics

Additional information regarding training requirements, training frequency, training methods, and training records is located in section 7.1.4. SHE training includes integration from top management to the worker level. The results include strong SHE programs and sound SHE practices.

SHE Training – Through the identification of SHE risks, hazards, and project requirements, our SHE Manager requires each WICC II project to:

- Identify training applicable to specific employees
- Track the training using a standardized matrix (reported monthly to LJT Headquarters for review)

We implement a training program, documented and audited by external LJT auditors to ensure that employees have the knowledge and ability to prevent accidents and injury

7.1 General

The SHE Manager and LJT Managers ensure that all employees receive safety orientation and that we document the orientation activities. We provide formal training, conducted on a periodic basis, as determined by Managers and the SHE Manager.

7.1.1 Training Requirements

We determine training requirements by reviewing applicable requirements, Safety and Health training questionnaire results, hazard data, injury and illness statistics, training records, audits, and surveillance of all operations. Job training, as a minimum, includes the following:

- Potential hazards of the job
- Potential hazards of the work environment
- How to use applicable protective equipment and procedures
- Location and use of emergency equipment with hands-on evaluations.
- Emergency, protective, and first aid procedures applicable to the task and environment.
- How to identify and report hazards to proper authorities

Safety and health standards and practices applicable to the job, such as: Safety Representative Certification, Fire Warden training, Manager's Safety Course, Lockout/Tagout, PPE, Respiratory Personal Protective Equipment Training, Radiation Safety, Chemical Hygiene Plan, Hazard Communication, and Hazardous Waste Management.

7.1.2 Training Frequency

We base the frequency of training on the need in relation to changing equipment, procedures, regulations, processes, and the potential for accident or injury. The following situations indicate the need for refresher training:

- New equipment or processes are introduced
- Revised Standard Operating Procedures
- Need for improvement in employee performance
- New or revised NASA, US Navy, Federal, State, or local standards
- Increased injury and illness rates, unsafe work practices, or close calls
- Revised SHE policies

7.1.3 Training Methods

We conduct SHE training through formal classroom training, online courses, use of WFF resources, NSTC or through on-the-job instructions. Whatever method we use, we evaluate training effectiveness through post-training testing, line management observation of performance, and injury/illness statistics.

7.1.4 Training Records

The LJT team documents its training through an enrollment and tracking system. All training documentation includes the names of all attendants, date and time of the training, and outlines/lesson plans for the course. For training provided by external sources, the employees have access to hands-on course materials and the organizations/ names of who conducted the training. LJT documents this training within the tracking system. We provide training reports to Managers on a monthly basis for review to ensure that all personnel complete required training for his/her job tasks.

7.1.5 Training Certifications

Some operations performed by WICC II personnel require certifications in order for individuals to perform these tasks. The Manager maintains a list of all processes, and performs observations to ensure employees maintain qualifications for certification. LJT adds these requirements to the employee's individuals training plan.

7.2 Responsibilities

LJT employees and management personnel have specific responsibilities associated with safety and health training and certifications, as shown in below.

Table 11. LJT Safety and Health Training Responsibilities.
Our employees and management team all have clearly defined roles and responsibilities for safety and health training

Position	Safety and Health Training Responsibilities
SHE Manager	• Provides a Safety and Health orientation course that addresses the contents of Safety and Health Plan and is presented to each new or temporary employee during the new employee orientation • Obtains signed acknowledgment from each employee certifying that he/she reviewed and understands the applicable contents of this manual • Maintains the original documentation of training • Develops training for employees as necessary
Managers	• Ensure that no new or temporary employee begins any work assignment without first reviewing the applicable Safety and Health Plan and signing an acknowledgment form • Ensure that all employees receive needed safety training prior to beginning a new task and that he/she receives refresher training as necessary

7.3 Certification

Certain tasks, such as hazardous waste disposal, cryogenic handling, pressure vessel servicing, monitoring of hazardous operations, crane operations, forklift operations, etc. are of a significantly hazardous nature and require special training prior to permitting an employee to perform these functions. Certification and on the job technical training is conducted under the direct supervision of a Qualified Person (Authorized Person) in accordance with GPR 1700.7 Para 3.2.

When training is complete, employees are tested, and those passing the written test go through a period of on-the-job training and are reviewed by the SHE Manager and other personnel as deemed necessary for their specific operation or area. We track certification status in the training database. All certifications require periodic renewal by demonstrating continued knowledge and proficiency in the operation.

8 Appendix A – LJT Safety and Health Program Status and Approach to Achieve and Maintain Level 5 in all Areas. (Assessment to meet VPP Compliance)

PEP Element	Status Level	Supporting Rationale	Plan to Achieve a Level 5
Management Leadership and Employee Participation			
Management Leadership	4	LJT management has communicated a clearly stated SHE policy that is consistent with WFF's. Management has made a commitment to provide a hazard free workplace through site inspections, incident reviews, and program reviews. Line management is responsible for proactive safety performance objectives as part of annual evaluations. We routinely establish a safety and health committee including employee and management representation in other divisions and plan to form a committee for the WICC II Contract. LJT management has provided adequate support and resources to conduct occupational safety and health activities.	To achieve a rating of 5, the LJT team will document management leadership activities such as assigning responsibility for safety/health, ensuring accountability in line management performance plans, establishing Contract safety & health goals, including safety as an agenda item during regular Contract meetings, and performing an annual assessment of the safety and health program. This will take place over the next 24 months from the contract start date.
Employee Participation	4	Employee involvement is encouraged through Close Call reporting, mishap reporting, program development input, and participation in the hazard evaluation process. Given the nature of the activities we perform under the WICC II Contract, employees will have a wealth of resources and knowledge to participate in these activities. Established systems are already in place for documenting safety reports, audits, close calls, industrial hygiene reports, and other SHE information. We document these in the SHE Plan. This information is employee-accessible. We inform employees of their right to stop work and right to refuse job assignments that pose hazards until further management investigation.	To achieve a rating of 5, the LJT team will document all employee involvement activities such as participation and conducting of safety training/education, their OSHA rights, and their right to stop work. We select employees and appropriately train them to participate in audits, program reviews, and to serve as safety representatives for the WICC II safety and health committee. We establish committees, develop audit schedules, and will commence employee training within the initial months of the Contract. We will implement all activities within 24 months from the contract start date.
Implementation Tools	4	LJT provides adequate resources such as budget and personnel for the safety and health program. LJT establishes written safety procedures and policies in this SHE plan and will update according to changes in processes, tasks, and/or applicable requirements and regulations. Safety and health expenditures are a line item in the facility budget. Management is responsible for hazard abatement. All records are kept by management and the SHE Manager for at least 3 years, or longer, if required by regulation.	LJT will implement and effectively use all tools during the next 24 months for documentation of funding, personnel, accountability systems, and program reviews.
Contractor Safety	4	LJT chooses contractors with safety performance as an element of selection criteria. Documentation such as OSHA 300 logs,	Any Contractors used will be encouraged to participate in existing safety and health activities. We

PEP Element	Status Level	Supporting Rationale	Plan to Achieve a Level 5
		Workers' Compensation Experience Modification Rate, OSHA violations, and existing safety programs used as evaluation tools. All Contractors must operate safely.	continuously evaluate contractors in terms of safety performance and safety will be included in a technical management review item. LJT will implement all activities during the next 24 months from the contract start date.
Workplace Analysis			
Survey and Hazard Analysis	4	The LJT team has a commitment to conduct hazard analysis, Job Safety Analysis, and safety audits for complete coverage of Contract operations. Other divisions currently perform the above and quarterly safety audits of all company workspaces and track all items to closure using an audit tracking system and through WFF systems as appropriate. All hazard analyses are available and communicated directly to affected employees where appropriate. The Contract is well staffed with trained safety professionals to perform initial and subsequent surveys. Employees are encouraged to identify hazards in the workplace.	To achieve a rating of 5, the LJT team will effectively implement and document the survey and hazard analysis process supporting WFF and Contract VPP initiatives. We perform and document Hazard Analysis and Job Safety Analysis of all processes and work practices. Certified Safety and Health Professionals will be involved in conducting baseline facilities surveys, Personal Protective Equipment assessments, Industrial Hygiene surveys, etc. of Contract spaces. Findings will be documented and corrective action implemented in a timely manner with management accountability for such actions. We conduct Surveys and Hazard Analyses within the initial months of the Contract with all activities completed within 24 months from the contract start date.
Inspection	3	All of the above activities listed in Survey and Hazard Analysis apply. Both certified safety professionals and trained employee representatives perform inspections of all Contract spaces on a quarterly basis. We inspect High-hazard areas such as laboratories or other processes in other divisions on a more frequent basis. We use standard checklists and audit forms to document key findings and observations.	We establish Inspection schedules within the initial months of the Contract. We select and train Employee representatives to participate in audits/inspections. We document findings and corrective action, make the findings available to employees and management. We analyze results and identify trends for management review and action. We implement all activities within the next 24 months from the contract start date.
Hazard Reporting	3	Management has established a process to identify and eliminate hazards. We inform Employees of existing systems available to report hazards such as close call reporting, communication with facility managers, and others. We closeout and document all hazards in a timely manner.	LJT will implement the written process outlined in this SHE Plan. We train employees to report hazards and expect closeout information in a timely manner. Open hazards will be posted as a warning for employees and will be periodically reviewed by management. We implement all activities within the next 24 months from the contract start date.

PEP Element	Status Level	Supporting Rationale	Plan to Achieve a Level 5
Accident and Record Analysis			
Accident Investigation	3	LJT establishes Procedures within this SHE Plan to investigate all OSHA recordable, first aid, and Type C mishaps. Other LJT divisions currently perform investigations of all incidents, identify root cause, and develop action plans for preventing recurrence. LJT shares the reports with the employee safety committees and employees. Managers and Functional Leads are responsible for conducting investigations, later reviewed by qualified safety and health professionals. Employees are currently encouraged and rewarded through recognition awards for reporting close calls and hazards.	To achieve a level 5, the LJT team will implement the established written procedures and ensure that all incidents, whether near miss or lost-time will be effectively investigated and reported according to WFF , NASA, and OSHA requirements. These procedures will become effective immediately upon initiation of the Contract, monitoring of the investigation process will be conducted over the next 24 months from the contract start date.
Data Analysis	3	Injury and close call trends will be tracked utilizing processes established in this plan and used throughout other divisions of the company. Contract management takes responsibility and accountability for safety and is therefore interested and responsive to this data. LJT communicates audit findings, accident trends, and other safety/health information directly to employees by line management and is available via a Contract webpage. We will use databases established for tracking audit findings to identify potential accident sources. A trained safety professional collects and maintains injury/illness data.	To achieve a level 5, LJT documents all accident statistics and provides to NASA on a monthly basis. We conduct Trending analysis and communicate to management and employees on a monthly basis. Audit findings will also be trended to measure program effectiveness and develop action plans for eliminating hazardous conditions. We identify and evaluate all hazardous operations and exposures. All of these activities will be ongoing throughout the first 24 months from the contract start date.
Hazard Prevention and Control			
Hazard Control	3	LJT requires strict compliance with all OSHA, NASA, WFF, and company safety rules and regulations. We use Engineering controls as the preferred method of eliminating hazards. Safety equipment is routinely to ensure proper calibration and operation. We implement successful Safety programs currently in place for other divisions and programs.	We evaluate all hazard controls to ensure effective design and elimination of hazards. We document and develop these controls and procedures where needed to ensure employee safety. Certified health and safety professionals will conduct periodic reviews of program elements, facilities, and hazard controls. We will make all adequate funding available to support an effective safety program. All of these activities will be ongoing throughout the first 24 months from the contract start date
Maintenance	3	LJT recognizes preventive maintenance is a critical element in preventing injury and continuance of Contract operations. A preventive maintenance program currently exists for other company divisions and we use	To achieve a level 5, we identify and document all equipment serviced and maintained by the Contract including specific maintenance, calibration, or other tasks we will perform or develop.

PEP Element	Status Level	Supporting Rationale	Plan to Achieve a Level 5
		basic principles consistently. LJT will identify equipment to be serviced by the contractor, and develop a schedule. LJT trains employees through sophisticated procedures and on-the-job observation to check safety devices prior to operation.	Contract employee training will specifically address preventive maintenance and daily inspection of all equipment for appropriate safety devices and overall working condition. We conduct these activities for purchased or inherited equipment. All schedules and specific maintenance tasks will be developed and documented when first identified and no later than the first 24 months from the contract start date
Medical Program	3	Employees who need treatment for occupational injuries and illnesses will use the WFF on-site clinic. A company physician has also been identified and has been used in the past to provide medical surveillance where needed such as pulmonary function tests and medical evaluations to ensure fitness to use a respirator. We use the industrial hygiene services available to all of WFF to evaluate indoor air quality, chemical exposure, ventilation performance, asbestos concerns as they have been with other company divisions. We house employees in WFF facilities where a history of industrial hygiene services and hazards review exists. We will inform employees of any specific hazards associated with workspaces. LJT will implement a sophisticated Personal Protective Equipment program.	To achieve a level 5, we review information such as air monitoring reports, ventilation surveys, and hazards analysis that are available for all workspaces. LJT uses Certified safety and health professionals to conduct and evaluate these assessments. Employees will be informed of the medical services available for both on-site and off-site as well as medical surveillance necessary to perform his/her specific job tasks. LJT developed a written respiratory program that is Compliant with the new OSHA standard and implements where necessary. LJT documents all Personal Protective Equipment (PPE) assessments of all hazardous areas and we use appropriate PPE based on level of exposure. We conduct all of these activities within the first months of the Contract.
Emergency Response			
Emergency Preparedness	3	LJT has developed emergency response plans for other on-site divisions of the program and we communicate specific procedures to follow to employees through new employee training, refresher training, and information booklets. We choose building fire wardens for all floors occupied by other company divisions including alternates to ensure accountability in an emergency. We choose designated rendezvous locations congruent with locations recommended by facility managers. WICC II provides emergency response teams and employees are trained to utilize the WFF emergency number to summon assistance.	To achieve a level 5, LJT chooses building fire wardens for each floor of each building occupied by the Contract employees. Fire wardens will be responsible for selecting alternates, ensuring and accounting for all persons requiring special evacuation assistance. LJT conducts drills at least annually and as needed for potential situations including fire, chemical spill, bomb threat, tornado, etc. We review with employees the results of each fire drill conducted on Contract facilities on-site. LJT chooses emergency evacuation plans and fire wardens within the initial months of the Contract. We implement

PEP Element	Status Level	Supporting Rationale	Plan to Achieve a Level 5
			all other elements within the first 24 months from the contract start date.
First Aid	3	On-site medical facilities provided by WFF are within close proximity to handle any major or minor emergencies. Safety representatives in other divisions are also encouraged to attend company-provided First Aid/CPR training.	To achieve a level 5, LJT provides First Aid Training to safety representatives designated for WFF Contracts. We train employees to use the on-site WFF emergency number to summon immediate assistance and utilize the WFF medical clinic to handle non-emergency medical situations. The company physician conducts medical surveillance as necessary for specific hazards. We implement all elements within the first 24 months from contract start date.
Safety and Health Training	3	LJT has effective safety and health training programs in place for other division, and we will use these sophisticated programs for the WICC II Contract. We use certified safety and health professionals with appropriate expertise to provide safety training for employees. Training includes procedures for reporting injuries, notifying management of hazards, OSHA standards, and OSHA rights. We document all training, including safety and other training completed, available, and/or scheduled. Management is responsible for establishing training plans consistent with employee job tasks and job hazards.	To achieve a level 5, we will implement current training and tracking systems for the WICC II Contract employees. LJT provides and documents safety training for all new employees. Safety and health professionals will conduct training with specific expertise in the areas of instruction such as Lockout/Tagout, fire safety, hazard communication, emergency response, etc. Management will be responsible for developing training plans specific for each employee based upon job tasks and job hazards. We will implement these activities and further develop throughout the first 24 months from the contract start date.

9 Appendix B—Managers VPP Implementation Guide

32 Elements of VPP	If you are a Manager, then you will…	Examples of Documentation
1.1 Management Commitment • Clearly established policies and procedures • Goal-oriented objectives and accountability	• Know and implement the WICC II SHE Plan • Communicate the LJT SHE Policy to all employees and sub-contractors • Provide example of visible leadership in your safety and health program through inspections • Communicate Safety metrics and open hazards to all supervisors and employees • Establish Goals and results-oriented objectives (with due dates), using PEP results, with measures to achieve them and annually review the effectiveness of implementation • Communicate safety goals and objectives to all supervisors and employees • Encourage safety committees and staff safety meetings with representation from all levels of organization	• Walkthrough inspections • Position Descriptions and Performance Plans • Employee Recognition & Awards • Hazard Tracking Data (especially examples of fixes you have implemented) • Annual written goals and objectives - tracked to closure • Safety Meeting Minutes
1.2 VPP Commitment • Commitment to meeting and maintaining VPP requirements	• Show commitment to VPP and show commitment to maintaining the VPP element requirements	• Safety Meeting Minutes • Participate in VPP Participants' Association conferences
1.3 Planning • Safety and health integral to change planning	• Ensure that your organization includes the safety and health disciplines in change planning, where applicable.	• Work processes that show how we integrate safety and health disciplines into the change planning process.
1.4 Written Safety and Health Program • Includes critical elements • Is appropriate to site size	• Know and implement WICC II SHE Plan	• Know how to find the WICC II SHE Plan on the WICC II web page
1.5 Top Management Leadership • Clear lines of communication with employees • Sets example of safe behaviors • Ensures all workers including Contractors are covered by the same high quality safety and health program	• Be aware of the Program Manager's emphasis on maintaining and continuously improving the WICC II SHE Program	• Safety Meeting Minutes reflect that you promote the Program Manager's SHE philosophy

32 Elements of VPP	If you are a Manager, then you will…	Examples of Documentation
1.6 Authority and Resources • Proper authority given to meet safety and health responsibilities • Commitment of adequate resources	• Ensure adequate resources including staff, equipment, and incentive programs are available	• Identifiable Safety portion in Budget
1.7 Line Accountability • Documented system for holding all line managers and supervisors accountable for Safety & Health	• Ensure that employees are held accountable for their safety and health responsibilities and are evaluated annually on performance effectiveness according to measurements included in performance appraisal plans • Delegate clearly defined accountability, commensurate with responsibility, within the organization • Assure that all employees read and understand their responsibilities as defined in the SHE Plan	• Performance Plans and Reviews • Position Descriptions
1.8 Contract Workers • Written program • Selection criteria • Contract requirements • Evaluation/Enforcement	• Ensure that Safety is a source selection factor, and that safety is a part of Contractor's Performance Evaluation • Ensure Contractors follow NASA, OSHA, and WFF requirements - Contractor Safety & Health programs will be consistent with WFF 's Safety & Health Program • Ensure that Contractor involvement in the WFF Safety and Health Program is appropriate	• Document that Contractors participate in the LJT Safety and Health Program • Contractor Performance Evaluations
1.9 Employee Involvement • Meaningful ways for employees to participate in the Safety & Health Program	• Involve employees in active, meaningful projects that provide opportunities for employees to positively impact decision-making on safety and health issues (e.g., participation in inspection planning activities, workplace safety inspections, mishap/accident boards, safety procedure revisions, training and certification requirements, hazard analysis plans) • Develop formal process to document, evaluate, and review discrepancies, track corrective actions, and communicate results to employees	• Safety Meeting Minutes • Incentive Program • Safety & Health Awareness Activities • Activity Reports

32 Elements of VPP	If you are a Manager, then you will…	Examples of Documentation
1.10 Safety and Health Program Evaluation • Must be in written narrative form • Must have action dates • Must cover all of the 32 program elements • Must cover the status of the action dates from the prior year annual evaluation	• Use the PEP as a tool for the annual performance evaluation. Must cover the status of the action dates from the prior year annual evaluation	• Annual written goals and objectives - tracked to closure • PEP results and get well plans
2.1 Management Understanding • Management understands the hazards of the workplace	• Be aware of the current hazards in their organization's worksites	• Facility and Process Hazard Analyses • Job Hazard Analyses
2.2 Industrial Hygiene • Baseline surveys • Sampling, testing, and analysis with written records of results • Tracking of hazards to correction	• Cooperate with Occupational Health personnel when they visit your area • Know who to call when Occupational Health issues arise • Track Occupational Health Hazards and open items to closure • Periodically, re-evaluate that all documentation reflects actual conditions in the workplace and programs (i.e., Personal Protective Equipment, safety equipment, monitoring and sampling)	• Hazard Tracking Data • Health monitoring records
2.3 Pre-Use Analysis • All new processes, materials and equipment are analyzed before use • All hazards identified are eliminated or controlled	• Conduct Preliminary Hazard Analysis and other types of safety and health analysis with employee participation • Eliminate or control hazards (See Element 3.2) • Ensure that the Safety and Health staff are involved with analysis of all new or changes to existent processes, materials, or equipment • Communicate analysis data/results and resulting preventive actions to employees • Track Hazards to closure	• Design Reviews • Facility Baseline Documentation • ORI, URR, TRR • Job Hazard Analysis • Chemical Hygiene Plans • MSDS

32 Elements of VPP	If you are a Manager, then you will…	Examples of Documentation
2.4 Hazard Analysis • Written procedures covering routine as well as when changes occur • Must include affected employees	• Conduct Job Hazard Analysis and other types of safety and health analysis with employee participation • Communicate analysis data/results and resulting preventive actions to employees • Track Hazards to closure	• Facility Baseline Documentation • ORI, URR, TRR • Job Hazard Analysis • Chemical Hygiene Plans • MSDS
2.5 Routine Inspections • Monthly • Cover entire worksite quarterly • Tracking of hazards to correction • JPG 1700.1H Chapter 107	• Ensure that supervisors participate in routine self-inspections of work areas, following written procedures or guidelines, after having been trained in hazard recognition, employee participation in these is mandatory • Monthly • Cover entire workplace quarterly • Tracking of hazards to closure	• Walkthrough Inspection Reports that spell out action items and assignees • Hazard Tracking reports
2.6 Employee Hazard Reporting System • Formal written reporting system • Timely and appropriate responses • Tracking of hazards to correction	• Actively encourage employees to report, without fear of reprisal, any mishaps, close calls, or safety and health concerns that they identify • Periodically remind employees of WICC II and WFF Safe Alert System, the WFF Directors Hotline, the WFF Safety Hotline, and the NASA Safety Reporting System (NSRS) • Ensure timely and appropriate responses to employee concerns • Track hazards to closure	• Close Calls • Hazard Tracking reports • Corrective Action Plans
2.7 Mishap/Incident Investigation • Goal is to strengthen prevention program • Written procedures • Written reports of findings • Tracking of hazards to correction	• Assure that mishaps and close calls are thoroughly investigated in a timely manner to determine root cause and that corrective action plans are developed, documented and tracked to closure • Ensure safety information regarding mishaps and near-misses in the workplace is made available to employees	• Document Mishaps • Investigation and Trending Analysis (see Element 2.8)

32 Elements of VPP	If you are a Manager, then you will…	Examples of Documentation
2.8 Trend Analysis • Three-year average rate • Total Recordable Cases • Lost Workday Cases • Restricted Duty Cases • Medical Treatments • Lost Workday + Restricted Duty Cases • Close Calls • Mishap Investigations • Reviewed periodically by management and used to improve safety and health program	• Use WICC II Statistical data as a management tool. (See VPP Element #8) • Global WICC II Data • Location Specific Data • Significant one versus the Suspicious few • Review periodically and use results to improve safety and health program	• Document Mishaps • Investigation and Trending Analysis • Monthly Metrics • Top 3 for location, including solutions
3.1 Certified Professional Resources Access to: • Certified Safety Professionals (CSP) • Certified Industrial Hygienists (Industrial Hygiene)	• Be aware that certified safety professionals and certified industrial hygienists are provided by the Safety, Health and Mission Assurance Area, and those Occupational Health Office organizations are available from site resources and corporate resources	• WICC II organization charts
3.2 Hazard Elimination or Control • Engineering Controls • Administrative Controls • Safety and Health Rules – Written and appropriate • Personal Protective Equipment • Hazard Control Programs, including thorough chemical control program	• Eliminate or control hazards by (in descending order of preference): • engineering controls, or design changes • administrative controls • personal protective equipment • safety and health rules • preventive or predictive maintenance	• Procedures and Work instructions • Hazard Analysis • Chemical Hygiene plans
3.3 Process Safety Management • Assess applicability based on quantity of targeted chemicals	• Be aware that WICC II operations are evaluated for the types and the quantities of hazardous materials to invoke the Process Safety Management program. • *LJT will pursue VPP Star Compliancy and manage an effective PSM program*	• Implementation documentation of the 14 Elements for areas that fall under the standard • Coordinate with the WFF Environmental, Health, and Safety offices on the Process Safety Management program • Coordinate with environmental, Health and Safety on the Process Safety Management program

32 Elements of VPP	If you are a Manager, then you will…	Examples of Documentation
3.4 Preventive Maintenance • Written Preventive Maintenance Program • Ongoing monitoring and maintenance of workplace equipment	• Ensure ongoing monitoring and maintenance of workplace equipment • Ensure operations procedures are reviewed regularly for adequacy	• Preventive Maintenance Plan and tracking • Documentation on assignments of Responsibility
3.5 Hazard Correction Tracking • System for tracking hazards to closure	• Be aware of and use the WFF Safety Information Tracking System and NASA Surveillance system to track hazards to closure	• Be able to demonstrate a working knowledge of how to use data systems (data input and data retrieval)
3.6 Occupational Healthcare Program • Availability of physician services • Program appropriate to site • Medical experts used in analyzing health hazards • Personnel trained in First Aid/CPR	• Ensure employees are knowledgeable of on-site medical clinic and after hours medical care • Ensure employees are knowledgeable of special medical needs based on occupational health hazards	• Injuries and illnesses documented on NASA Forms 1627 • Occupational Health Analyses and reports
3.7 Disciplinary System • Written Program, communicated to ALL employees • Covers both supervisors and their employees	• Know the Disciplinary program and use it as required • Take action for willful or repeated safety violations by Contractors, sub-Contractors or individuals • Ensure that employees know the Disciplinary program	• Document Disciplinary Actions, if any • • Training employees to be aware of Disciplinary program
3.8 Emergency Procedures • Written emergency program • Drills for ALL employees • Preparedness Plan	• Ensure development, communication, and documentation of and training in, procedures for emergency response in your employees' work areas • Provide emergency telephone numbers, exit routes and training drills • List required personal protective equipment • Ensure that all employees participate in drills • Periodically, re-evaluate workplace emergency preparedness requirements and emergency response plans	• Emergency Action Plans • Fire Drill Attendance Records • Employee Accountability Records

32 Elements of VPP	If you are a Manager, then you will…	Examples of Documentation
4.1 Safety & Health Training Program Description • Must be written	• Involve employees in the development of training requirements, certification requirements, and training plans including orientation plan for new hires • Maintain retrievable record keeping system for employee training	• Training Plans/Records • Performance Reviews
4.2 Supervisors Training • Must understand and carry out responsibilities • Must know hazards in their areas of responsibility	• Ensure that Supervisors are trained • Must understand hazards in their work areas • Potential effects on their employees • Ensure employees follow rules	• Training Plans/Records • Performance Reviews
4.3 Employee Training • Must understand hazards associated with job	• Ensure that your employees are trained to understand and effectively carry out their safety and health responsibilities and tasks. Use Job Hazard Analysis to determine required training • Hazard Awareness • Safe work procedures • Emergency situations • Personal Protective Equipment use	• Training Plans/Records • Performance Reviews
4.4 Emergencies Training • ALL persons on site will know what to do in an emergency, including visitors	• Ensure that everyone is trained to understand and effectively protect themselves in emergency situations	• Annual Fire Drill Attendance records • Other Emergency training records
4.5 Personal Protective Equipment • Appropriate Personal Protective Equipment • Training on care and use • Replacement of Personal Protective Equipment	• Ensure that employees have required Personal Protective Equipment, are trained in its use, and are using it • Ensure that Personal Protective Equipment is maintained or replaced as required	• Budget line item for Personal Protective Equipment • Personal Protective Equipment Training records
4.6 Managers Training • Must understand and carry out responsibilities	• Ensure managers are trained to understand and carry out their responsibilities	• Training Plans/Records • Performance Reviews

10 Appendix C – Sample Safety Report Forms

Prepared by: LJT & Associates, Inc. *Exceeding Expectations through Innovation and Quality*	1B8X1-FORM-000103-_ ROC Monthly Safety Inspection Form
Effective Date: December 1, 2010	Version: Original

AREA: _____ LOCATION(S): _____ DATE: _____

INSPECTOR: _____

INSPECTION ITEMS	Y N N/A	PROBLEMS / COMMENTS
1. Fire Extinguishers	☐	
a) Easily accessible	☐ ☐ ☐	
b) Inspection tag current; seal unbroken	☐ ☐ ☐	
c) Correct pressure (if applicable)	☐ ☐ ☐	
d) Mounted securely	☐ ☐ ☐	
2. Sprinkler Heads		
a) 18 inch clearance below heads	☐ ☐ ☐	
3. First Aid Kits (where applicable)	☐	
a) All inventory items available	☐ ☐ ☐	
b) Provides necessary items	☐ ☐ ☐	
c) Expired items removed	☐ ☐ ☐	
4. Eye Wash Stations	☐	
a) Rapidly accessible (not blocked)	☐ ☐ ☐	
b) Activates appropriately and has adequate drainage (fixed units)	☐ ☐ ☐	
c) Solution expired (portable units)	☐ ☐ ☐	
d) Inspection tag current	☐ ☐ ☐	
5. Emergency Lighting	☐	

1B8X1-FORM-000103 Original December 1, 2010 Page 1

CHECK THE CONFIGURATION MANAGEMENT SYSTEM AT HTTPS://ROMS.WFF.NASA.GOV/ TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE

SAMPLE

a) Function properly when tested	☐ ☐ ☐	
b) Illuminates all essential areas	☐ ☐ ☐	
6. Floors	☐	
a) Clean and dry	☐ ☐ ☐	
b) No exposed holes in walkways	☐ ☐ ☐	
c) Carpets free of tears and frayed edges	☐ ☐ ☐	
d) No loose tiles, edges smooth and flush	☐ ☐ ☐	
7. Ceilings	☐	
a) Lighting adequate and secure	☐ ☐ ☐	
b) Ceiling tiles in place and unbroken	☐ ☐ ☐	
c) Ceiling tiles clean with no stains	☐ ☐ ☐	
8. Storage	☐	
a) Items stored neatly and securely	☐ ☐ ☐	
b) Chemicals stored in proper containers and labeled properly	☐ ☐ ☐	
c) No items stored in corridors or walkways	☐ ☐ ☐	
d) No items stored on top of cabinets	☐ ☐ ☐	
9. Floor Pullers	☐	
a) Sufficient number available	☐ ☐ ☐	
b) Easily accessible	☐ ☐ ☐	

CHECK THE CONFIGURATION MANAGEMENT SYSTEM AT HTTPS://ROMS.WFF.NASA.GOV/ TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE

Prepared by: LJT & Associates, Inc. *Exceeding Expectations through Innovation and Quality*	1B8X1-FORM-000103-_ ROC Monthly Safety Inspection Form
Effective Date: December 1, 2010	Version: Original

	Y N N/A	
10. Furniture & Equipment	☐	
a) Office machines securely placed on desk	☐ ☐ ☐	
b) Arranged so not to block exits	☐ ☐ ☐	
c) Does not create trip hazard	☐ ☐ ☐	
d) Drawers & doors closed while not in use	☐ ☐ ☐	
e) Guards & latches used on paper cutters	☐ ☐ ☐	
f) Heavy file drawers placed against wall	☐ ☐ ☐	
g) Broken chairs removed and marked and all chairs have five leg bases.	☐ ☐ ☐	
11. Safety Practices	☐	
a) Personal protective equipment worn	☐ ☐ ☐	
b) Personal protective equipment in good condition	☐ ☐ ☐	
c) Objects being lifted properly	☐ ☐ ☐	
d) Safeguards/interlocks not bypassed	☐ ☐ ☐	
e) Workspaces and benches organized	☐ ☐ ☐	
12. Portable Electric Tools	☐	
a) Cords & plugs in good condition	☐ ☐ ☐	
b) Not dulled or damaged	☐ ☐ ☐	
c) Blades and switches properly guarded	☐ ☐ ☐	
d) All insulated or properly grounded	☐ ☐ ☐	

SAMPLE

CHECK THE CONFIGURATION MANAGEMENT SYSTEM AT HTTPS://ROMS.WFF.NASA.GOV/ TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE

Prepared by: LJT & Associates, Inc. *Exceeding Expectations through Innovation and Quality*	1B8X1-FORM-000103-_ ROC Monthly Safety Inspection Form
Effective Date: December 1, 2010	Version: Original

13. Extension Cords & Cables	☐	
a) Not a substitute for fixed wiring (in place <120 days)	☐ ☐ ☐	
b) Not running through doors or holes in walls	☐ ☐ ☐	
c) Doesn't create a trip hazard; is not concealed	☐ ☐ ☐	
d) Not frayed or spliced	☐ ☐ ☐	
e) Is the grounded cord type (3 Prong) and is UL listed	☐ ☐ ☐	
14. Electrical Safety	☐	
a) Switches & breakers labeled	☐ ☐ ☐	
b) Electrical Panels and Equipment controls accessible (36" clear directly in front)	☐ ☐ ☐	
a) Face plates undamaged and in place	☐ ☐ ☐	
b) Receptacles firmly mounted	☐ ☐ ☐	
15. Signage and Communications	☐	
a) Securely mounted where appropriate	☐ ☐ ☐	
b) Positioned in plain view	☐ ☐ ☐	
c) Description of hazard complete	☐ ☐ ☐	
d) Lighted signs are illuminated	☐ ☐ ☐	
e) MSDS are current (≤ 5 years old if possible) and conveniently located	☐ ☐ ☐	

ADDITIONAL REMARKS:

SAMPLE

CHECK THE CONFIGURATION MANAGEMENT SYSTEM AT HTTPS://ROMS.WFF.NASA.GOV/ TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE

Prepared by: LJT & Associates, Inc. *Exceeding Expectations through Innovation and Quality*	**1B8X1-FORM-000103-_** **ROC Monthly Safety Inspection Form**
Effective Date: December 1, 2010	Version: Original

Instructions: 1) This Inspection Report is due by the end of each month.

2) Area is the Group, Department, or Section inspected.

3) Location(s) is the building, room, van, etc. that is inspected.

4) Supervisors/Leads or designees are responsible for inspections and corrective action.

5) Original is to be maintained in each Area, copy to SH&E Office

RETURN COMPLETED COPY TO THE SHE OFFICE

Monthly Ladder Inspection

Ladder #:_____ **Location:**_____ **Date:**_____

CHECK THE CONFIGURATION MANAGEMENT SYSTEM AT HTTPS://ROMS.WFF.NASA.GOV/ TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE

SAMPLE

Prepared by: LJT & Associates, Inc. *Exceeding Expectations through Innovation and Quality*	**1B8X1-FORM-000103-_** **ROC Monthly Safety Inspection Form**
Effective Date: December 1, 2010	Version: Original

Inspector: _____

1. Ladder Type				Comments
a) Wood	☐	a) Single	☐	
b) Aluminum	☐	b) Extension	☐	
c) Steel	☐	c) Step	☐	
d) Fiberglass	☐	d) Platform	☐	
		e) Other	☐	

2. Visual Inspection	Pass	Fail	N/A	Comments
a) Side Rails	☐	☐	☐	
b) Rungs and Steps	☐	☐	☐	
c) Slide Guides	☐	☐	☐	
d) Truss Rods and Blocks	☐	☐	☐	
e) Spreader Braces	☐	☐	☐	
f) Rung Locks	☐	☐	☐	
g) Pail Shelf	☐	☐	☐	
h) Safety Shoes	☐	☐	☐	
i) Other	☐	☐	☐	

SAMPLE

CHECK THE CONFIGURATION MANAGEMENT SYSTEM AT HTTPS://ROMS.WFF.NASA.GOV/ TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE

j) Rivets	☐	☐	☐	
k) General Overall Condition	☐	☐	☐	

ADDITIONAL REMARKS:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

****Note: All defective equipment shall be removed from service immediately and tagged out until a replacement or repair can be made.

SAMPLE

CHECK THE CONFIGURATION MANAGEMENT SYSTEM AT HTTPS://ROMS.WFF.NASA.GOV/ TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE

11 Appendix D – Sample Job Hazard Analysis Form

Prepared by: LJT & Associates, Inc. *Exceeding Expectations through Innovation and Quality*	1B8X1-FORM-000137 Job Hazard Analysis
Effective Date: March 31, 2011	Version: Original

JOB HAZARD ANALYSIS	JOB OR OPERATION:		DATE:
JOB LOCATION: Wallops Flight Facility	JOB TITLE OF EMPLOYEE:	SUPERVISOR:	AREA:
SPECIAL OR PRIMARY HAZARD:			
REQUIRED AND/OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT:			APPROVED BY:

SEQUENCE OF BASIC JOB STEPS	POTENTIAL OR EXISTING HAZARDS	RECOMMENDED CORRECTIVE MEASURES

Through signature above, ROC-Wallops Flight Facility, verifies that the 29CFR 1910.132(d) required hazard assessment has been performed and this document shall act as the certification of hazard assessment.

CHECK THE CONFIGURATION MANAGEMENT SYSTEM AT HTTPS://ROMS.WFF.NASA.GOV/ TO VERIFY THAT THIS IS THE CORRECT VERSION PRIOR TO USE

1 of 1

SAMPLE

12 Appendix E – Sample Risk Assessment Template

	Aero Risk Assessment Template- Instructions for Use
1	Complete the Site Description tab first. Data from this tab will be automatically populated into several other cells in the workbook. Selecting the Site Name will automatically fill in several other cells on the worksheet
2	Complete the scope description for the site level risk assessment. Each of the cell tabs contains an area to provide a description of the scope for the cell and the risk assessment team
3	Enter cell level risk assessments in the tabs labeled *Cell1_RA, Cell2_RA* , etc. These tabs can be renamed; however, **all cell level risk assessment tabs must be located between the Cell1_RA tab and the last_cell tab for the site level RA to properly calculate.**
4	The workbook is pre-loaded with 5 cell level tabs. Additional tabs can be added by clicking on the button to the right---->
5	Do not enter data in the tab labeled "last_cell". The tab is in the workbook to allow roll-up of the cell level risk assessment to the site level summary
6	Site specific hazards are added in the *Site RA* tab starting on row 62. Hazards entered in the *Site RA* tab will be populated to the cell level tabs
7	**The Site RA tab shows the summary for the cell level risk assessment tabs.**
	The Subjects at Risk section shows the total number of cells that indicated subjects at risk for each area.
	The Cell Maximum section shows the maximum value for each area from the cell level risk assessment. The HRN and RRN are the maximum for any cell for this hazard type.
	The site level HRN and RRN are calculated from the maximum values for each component based on the cell level maximums. The Manual Override section can be used to change the numbers used in the site level calculations at the discretion of the RA team. If no entry is made in a manual override cell, the calculation will default to the cell level maximum
8	**Combining data from multiple workbooks**
	If the risk assessment is done using multiple workbook files, the data can be consolidated by copying and pasting from one worksheet to another. Areas of the RA tool that require user completion for the cell level RA are highlighted. Copy this data and paste it into a tab in a master workbook. Multiple copy and pastes must be completed to transfer the ranking and applicability/assessment information.
	Another option to combine multiple workbooks is to use the move or copy tab function. Right click on the tab and select move or copy. Copy the tab to the master workbook and make sure it is located between the Cell1_RA and last_cell tabs. Links in the sheet will still reference the original workbook. To correct this, choose Edit Links from the Data ribbon and change the reference for the worksheet in the master workbook. Links will have to be edited for each cell level tab copied to the master workbook.

Click Here to Insert New Cell Level RA Tabs

SAMPLE

Hazard and Risk Assessment Scope

Site: Range Operations Contract (ROC)

Date of Assessment: 3/29/2012

Describe the parameters of the business location, or process, that is the subject of the assessment. This description serves as a historical reference for future assessments, and should provide detailed information on the scope of the evaluation as well as nature of the business or process being assessed. For example, if evaluating a growing business operation/location, it would be important to identify new operations or processes such as machining, plating, product testing, or individual responsibilities of co-located business operations. These types of changes are critical as they substantially affect the profile of a facility and, subsequently, the results of the hazard and risk assessment. Large facilities might be geographically or functionally segregated for assessment purposes. In these cases, it is important to identify the boundaries of the assessments so as not to overlap or fail to evaluate critical operations and their associated hazards and risks. The "site description" sections in third party inspection reports, such as those generated by Global Risk Consultants, can often serve as a baseline for a good scope document.

Each cell level tabs includes a place to provide the scope for that particular cell.

Description of Business / Process Evaluated:

Provide description of the risk assessment scope here

SAMPLE

Site	#REF!			Cell							Date:	3/29/2012	
POTENTIAL HAZARD Note- all cell tabs should be located after this tab	Subject at Risk			Risk Profile								Applicability	Assessment Rationale
				RSK/ SIG	FE/ FREQ	MPL	NP/ IA	RC	HRN	RRN	Haz Rating	Risk Rating	
	P	F	R										
Hazardous material / chemical exposure									0	0			
Exposure to poor indoor air									0	0			
Injury from vehicles									0	0			
Exposure to poor drinking water									0	0			
Exposure to poor food									0	0			
Exposure to poor restroom sanitation									0	0			
Injury during emergencies due to inadequate emergency response program									0	0			
Injury from exposure to hazardous energy									0	0			
Injury during confined space entry activities									0	0			
Injury due to exposure to live electrical									0	0			
Fall from heights									0	0			
Motor vehicle accident									0	0			
Employee injury due to inadequately controlled or separated construction and/or renovation activities									0	0			
Ergonomic injury in the office environment									0	0			
Ergonomic injury in the industrial environment (lifting, repetitive motion, etc.)									0	0			
Exposure to Bloodborne Pathogens									0	0			
Exposure to injury from work place violence									0	0			
Injury from exposure to lasers and/or radiation									0	0			
Injury from unguarded or inadequately guarded machinery									0	0			
Injury from lifting devices									0	0			
Injury from Lift Trucks and Industrial Vehicles									0	0			
Injury from exposure to hazardous noise									0	0			
Injury from loading dock operations									0	0			
Injury from walking or working surfaces									0	0			
Fire or explosion from hot work									0	0			
Eye injury from flying objects									0	0			
Injury from power or hand tools									0	0			
Injury from exposure to SHARPS (objects with a sharp edge or point, such as a knife, X-Acto™ or razor blade)									0	0			
Injury from industrial battery Charging or changing									0	0			
Injury from exposure to compressed air / gasses									0	0			
Accident or injury resulting from pneumatic (pressurized) test operations. (i.e.; leak, proof or flow)									0	0			
Exposure to fines/penalties from shipment of Dangerous Goods									0	0			
Regulatory or Corporate HSE non-compliance or adverse effects resulting from failure to manage change. (administrative / organizational)									0	0			
Regulatory or Corporate HSE non-compliance or adverse effects resulting from failure to manage change. (facilities or process)									0	0			
Risk of fine or penalty due to inadequate FAA Compliance.									0	0			

SAMPLE

Site	#REF!			Cell								Date:	3/29/2012	
POTENTIAL HAZARD Note- all cell tabs should be located after this tab	Subject at Risk			Risk Profile									Applicability	Assessment Rationale
				RSK/ SIG	FE/ FREQ	MPL	NP/ IA	RC	HRN	RRN	Haz Rating	Risk Rating		
	P	F	R											
Loss or accident due to absent/inadequate Loss Control Processes									0	0				
General Environmental Conditions									0	0				
Air Pollution - resulting from normal practices									0	0				
Air Pollution - resulting from environmental incidents/abnormal conditions									0	0				
Air Pollution - resulting from ODS									0	0				
Air Pollution - green house gases									0	0				
Air Pollution - asbestos release									0	0				
Water Pollution (sewer/foul drainage system) - resulting from normal practices									0	0				
Water Pollution (sewer/foul drainage system) - resulting from environmental incidents/abnormal conditions									0	0				
Water Pollution (storm water system) - resulting from normal practices									0	0				
Water Pollution (storm water system) - resulting from environmental incidents/abnormal conditions									0	0				
Land Pollution - resulting from normal working practices									0	0				
Land Pollution - resulting from environmental incidents/abnormal conditions									0	0				
Waste - environmental impact from storage of hazardous waste									0	0				
Waste - environmental impact from storage of non-hazardous waste									0	0				
Waste - environmental impact from storage of clinical/bio-hazard waste									0	0				
Waste - environmental impact from disposal of hazardous waste									0	0				
Waste - environmental impact from disposal of non-hazardous waste									0	0				
Waste - environmental impact from disposal of clinical/biehazard waste									0	0				
Chemical Storage - environmental impact from storage of hazardous chemicals									0	0				
Noise - off-site environmental noise of nuisance value or greater									0	0				
Physical Attributes - detrimental local view of site and activities									0	0				
PROMPT: Always ask assessment team participants if other hazards, not specifically addressed on this worksheet, should be added to this assessment and formally evaluated. Overwrite this text to incorporate an additional Potential Hazard or to capture individual Pressure Test Operations.									0	0				

SAMPLE

Site				Cell							Date:		
POTENTIAL HAZARD	Subject at Risk			Risk Profile								Applicability	Assessment Rationale
Note: all cell tabs should be located after this tab				RSK/ SIG	FEI FREQ	MPL	MPUA	RC	HRN	RRN	Haz	Risk		
	P	F	R								Rating	Rating		
PROMPT: Always ask assessment team participants if other hazards, not specifically addressed on this worksheet, should be added to this assessment and formally evaluated. Overwrite this text to incorporate an additional Potential Hazard or to capture individual Pressure Test Operations									0	0			
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PROMPT: Always ask assessment team participants if other hazards, not specifically addressed on this worksheet, should be added to this assessment and formally evaluated. Overwrite this text to incorporate an additional Potential Hazard or to capture individual Pressure Test Operations									0	0			
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PROMPT: Always ask assessment team participants if other hazards, not specifically addressed on this worksheet, should be added to this assessment and formally evaluated. Overwrite this text to incorporate an additional Potential Hazard									0	0			
PROMPT: Always ask assessment team participants if other hazards, not specifically addressed on this worksheet, should be added to this assessment and formally evaluated. Overwrite this text to incorporate an additional Potential Hazard									0	0			
PROMPT: Always ask assessment team participants if other hazards, not specifically addressed on this worksheet, should be added to this assessment and formally evaluated. Overwrite this text to incorporate an additional Potential Hazard									0	0			

SAMPLE

APPENDIX D

Chemical Process Hazard Analyses

No Review Required

Chlorine (Free, Total), Field Test kit

Temperature, pH, conductivity Field Test Probes/Meters

Low Hazard

Alkalinity as $CaCo_3$ - 22 SM 2320 B 2011

Ammonia as N – 22 SM 4500-NH3 D 2011

Biochemical and Carbonaceous Oxygen Demand – 22 SM 5210 B 2011

Chemical Oxygen Demand – HACH 8000

Enterococci using Enterolert - ENTEROLERT

Escherichia coli - Colilert

Fecal coliforms – Colilert 18 and Quanti-Tray

Ignitability – EPA 1010 (9/86)

Lead (Pb) in Paint Chip Samples, D-Lead Paint Kit

Nitrate as N – 22 SM 4500-$NO3^-$D 2011

Oil and Grease – EPA 1664A 1999

Oil viscosity, ASTM D445-61

Particulate Count in oil and hydraulic fluid, Millipore

PCB in liquid/soil, Dexsil

Percent water by Karl Fischer Titration, ASTM D4006-81

Colilert Total Coliform and *E.coli* Presence/Absence– 22 SM 9223 B Colilert P/A

Colilert Total Coliform and *E.coli* Quanti-Tray MPN – 22 SM 9223 B Colilert MPN

Residue-Non-filterable (TSS) – 22 SM 2540 D 2011

Total Hardness as $CaCO_3$ - HACH 8226

Total Kjeldahl Nitrogen (TKN) – 22 SM 4500-NH3 D

Total Residual Chlorine – HACH 8167

Volatile Solids – EPA 160.4 1971

Moderate Hazard

Fuel, Oil, and Water Analysis by inductively coupled plasma optical emission spectrometry (ICP-OES)

Compressed and Cryogenic gases by Gas chromatography–mass spectrometry (GC-MS), Fourier transform infrared spectroscopy (FTIR), Paramagnetic Analyzer and Moisture Analyzer

High Hazard

No High Hazard Analyses are presently conducted in the Bldg. F160 Analytical Lab.

General Instructions for Laboratory Process Hazard Analysis

Introduction

The identification and control of hazards in the laboratory is the responsibility of the owning organization. The Laboratory Process Hazard Analysis is designed to aid management in meeting this responsibility.

The Process Hazard Analysis (PHA) is mandatory for laboratories and other areas that use chemicals for other than normal housekeeping purposes. These analyses are used to assess the hazards associated with new or modified processes or operations in a laboratory environment. There are three levels of reviews for three anticipated levels of hazards: Low, Moderate, and High.

The Hazard Analysis Selection Matrix provides the Laboratory Manager a quick way to assess the level of process hazard analysis required. The matrix has three vertical columns that correspond to the three levels of review. Horizontal lines describe various potential hazards. By checking those that apply in the appropriate columns, the necessary review level becomes easier to define.

Approach

The first step in determining the level of review required is to fill out the **HAZARD ANALYSIS SELECTION MATRIX** on the last page of these instructions. There are four major sections to the matrix: Material Hazards, Processing Hazards, Equipment Hazards, and Environmental Hazards. Various criteria within these categories determine the level of hazard analysis required.

These guidelines are the MINIMUM suggested, 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, the Laboratory Manager may choose a lower level of hazard review than indicated, if approved by the Division Chief.

Levels of Process Hazard Analysis

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. A LHR requires completion of a brief description of the process, the potential hazards, and what steps will be taken to mitigate those hazards. A set of operating procedures, the personal protective equipment required, special training required, and the signature of those involved with the review must be included. Laboratory managers 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. Laboratory Managers and users conduct an MHR. The involvement of a safety representative can be requested and is encouraged. A MHR requires the completion of a comprehensive checklist, and must be 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 which 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.

A HHR Committee shall be established for each Laboratory that meets the criteria for High Hazard Review. The HHR Committee will consist of a chairperson, researcher, technician, member of the Chemical Safety Committee (CSC), an S&EB representative, 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 an S&EB 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. Piping and instrument diagrams, chemical reaction characteristics, relevant incident reports, process chemistry, and operation procedures are all required.

The review is performed using GSFC Form 23-58 and must be documented completely. The HHR Committee must approve significant changes.

Required Participation for Process Hazard Analysis

Position	LHR	MHR	HHR
Laboratory Manager and users	X	X	X
Research Manager/Design Lead		X	X
Safety Representative			X
Additional Technical Sources			X

Documentation Requirements:

- The Hazard Analysis Selection matrix, a copy of the most recent Hazard Review, and operating procedures/attachments must be available in a prominent location in the laboratory while the work is going on.
- A dated copy of all safety documentation packages, including hazard reviews, Hazard Analysis Selection matrices, and operating procedures, shall be sent to the Safety and Environmental Branch, Code 205.2.

Hazard Analysis Selection Matrix

For new, modified or relocated processes, equipment or experiments, or scale-up of previous work, characterize your process according to the criteria below. Then use the most detailed analysis method called for by any single criterion.

	No Review Required	**LHR***	**MHR***	**HHR***
1. Material Hazard – Acute Toxicity				
HMIS Health Rating: circle the Hazardous Material Identification System rating, found in the Material Safety Data Sheet (MSDS)	0	1-2	3	4
Cylinder DOT Label: if a cylinder, circle Yes if the DOT label on the cylinder indicates Poison Gas, Corrosive Gas, or Flammable Gas			Yes	
2. Material Hazard – Chronic Toxicity. Circle Yes if the MSDS indicates the material exhibits Chronic Toxicity.			**Yes**	
3. Material Hazard – Flammability. Choose applicable line and circle the MHIS rating from the MSDS				
<1 Liter & MHIS Flammability Rating	0-1	2-4		
>1 Liter & MHIS Flammability Rating	0	21-2	3-4	
≥ Liter and under Pressure or above Flash Point & MHIS Flammability Rating	0		1	2-4
4. Material Hazard – Reactivity. Circle one.				
HMIS Reactivity Rating from MSDS	0-1	2	3-4	
5. Processing Hazard – Radiation. Circle all that apply.				
Laser		Class I-IIIA	Class IIIB– IV	
X-Ray Source		<20kv	>20kv	
Radioisotopes in use	None		Yes	
UV, Infra-red, Microwave, Radio wave		<TLV	>TLV	
6. Processing Hazard – Pressure. Circle any one that applies.				
Non-glass	= 0 psig	<0 psig or >0 psig & <90 psig	>90 psig	
Glassware			<0 or >0 psig	
7. Processing Hazard – Chemical Reaction Energy				
Will adiabatic reaction lead to temperature change? Circle the one that applies. (Check MSDS).	<60° F		>60° F	
Will this cause solvent to boil? Circle yes, if applicable.			Yes	
8. Processing Hazard – New Technology				
New chemistry or technology. Circle correct answer, if applicable.	None		Outside of Experience	Unknown Reactions
9. Equipment Hazard – Electrical. Circle one if applicable.	**Protected <120V**	**Exposed or >120V**		
10. Equipment Hazard – Mechanical. Circle yes or no.				
Exposed pinch points, belts, chains, rotating parts, knives, suspended loads, stored energy, etc.	No	Yes		
11. Equipment Hazard – Thermal. Circle one if applicable.				
Unprotected heated or chilled surfaces	> -20° F & < 140° F	< -20° F & >140° F		
12. Environmental Hazards.				
Noise. Circle one. Call x6-6669 if you need assistance.	<80 dBA	>80 dBA		
Hood/Ventilation Testing. Circle one if applicable.		Exemption	Permit	

* See acronyms below

Contact the Safety and Environmental Branch for assistance if ratings are not available, or if any other assistance is needed in completing the matrix for the forms.

ACRONYMS

DBA decibels, A-scale
DOT Department of Transportation
HHR High Hazard Review
HMIS Hazardous Material Identification System
LHR Low Hazard Review
MHR Moderate Hazard Review
OT Odor Threshold
TLV Threshold Limit Value

CHEMICAL PROCESS HAZARD ANALYSIS
MINIMUM HAZARD REVIEW CHECKLIST

Brief description of process:

Minimal or no review is required for the following analyses. The include: Use of field test kits for water quality analysis that have premeasured chemical additives that are used to evaluate reactions in closed system, or electronic equipment that measures a parameter (such as dissolved oxygen) that makes use of an electrode or simple observation.

These analyses are: Total and Free Chlorine, dissolved Oxygen, conductivity, pH and temperature of water, organic liquids, or soils by electronic meter by field instruments. Refer to procedure outline. Standard operating procedures/work instructions are found in Appendix A manual.

What are the potential hazards: *(indicate source of info, i.e. - MSDS, etc.)*

Chemical irritation of mucus membranes.

What is done to mitigate the hazards:

PPE includes protective eyeware, gloves and a lab coat or apron.

Fill in following boxes by double-clicking the appropriate box, and selecting Checked or Not Checked.

Operating Procedures	☒ yes	☐ no	*If yes, attach procedures*
Personal Protective Equipment	☒ yes	☐ no	*If yes, attach brief description*
Equipment Changes	☐ yes	☒ no	*If yes, attach brief description*
Special Training	☐ yes	☒ no	*If yes, attach brief description*
Safe for "Lone Worker"	☒ yes	☐ no	*If no, explain on separate sheet*

Signatures/Certification:

We understand operation/process/experiment, and believe it can be done safely.
Individuals involved:

Signature/Code	*Title*	*Date*
Marianne Simko	Marianne Simko Med & Env Div Mgr	4/11/18
250	Jason Freischlag project manager	4/13/18
Mark Culver	Mark Culver/Chem Tech I	4-26-18
250	Michael Bonsteel/Env. Scientist II	5-1-18
	Brian Cornwell/Chemical Technician	05-01-18

Analytical Chemistry Laboratory Safety Analysis Worksheet

Task/Job: Analytical Chemistry Laboratory Safety Analysis (Low Hazard)	**Facility**: Center wide	**Date:** Original 2/06/2012 Revised 4/13/2018
PPE: Protective eyewear, gloves and a lab coat or apron.	**Analysis by**: J.Freischlag	**Reviewed by:** M. Simko

Sequence of Basic Task/Job Steps	Potential Hazards	Recommended Safe Job Procedure
1. Receive analysis request.	• No hazards associated with receiving analysis request. However, there is an opportunity to minimize all hazard risks for the entire process.	• Review all hazards, SDS Sheets, and work instructions.
2. Cleaning and preparing sample containers.	• Chemical exposure. • Lifting/dropping injuries. • Flammability. • Slips and falls(spill).	• Review process description. • Review the SDS for each chemical being handled for analysis. • Don PPE. • Maintain HazCom training. • Work under hood when using acids, bases, or solvents. • Observe proper lifting techniques. • Keep all flammables away from open flames and other sources of ignition. • Use absorbent material to clean up small spills immediately.
3. Driving to and from sampling and shipping locations.	• Vehicle accident.	• Only authorized and licensed operators may drive. • Wear seatbelt. • Observe state and facility traffic laws and rules.

4. Field sampling.	• Chemical /pathogen exposure. • Biological hazards – ticks, snakes, rodents, poisonous insects, poison ivy, poison oak, poison sumac. • Lifting/dropping injuries. • Slips/trips/falls/muscle strains. • Electrocution. • Confined space. • Ladders. • Airfield hazards. • Weather related hazards (hypothermia/frostbite/heat stress).	• Carry radio for weather alerts. Cell phones may be carried in addition to radios. If an emergency presents itself, call (757) 824-1333. • Always use the Buddy System. • Perform a Tailgate Safety Talk. • Maintain HazCom training. • No smoking, eating, or drinking during sampling event. • Re-check PPE. • Avoid stands of tall grass; use repellant when appropriate. Wear light-colored clothing for easy identification of pests. Re-check body prior to leaving area. Carry object to deter snakes and rodents by sweeping grass and brush. • Be able to identify and avoid poisonous plants. • Observe proper lifting techniques/wear proper PPE. Stretch before lifting. • Use care when working with batteries. Keep hands dry. • Obtain a Dig Permit if soil surface will be broken. • Obtain and use Confined Space Permit if required. • Check to ensure ladder is secure. • Maintain communication with Tower when near runways. Ask permission from Tower to leave and enter runway. Annually update Airfield Driver training. • Wear warm clothing when hypothermia or frostbite may be a danger.

4. Field sampling (continued).	• Flammability. • Munitions and Explosives of Concern (MEC) hazards.	• Take frequent breaks in hot weather or during intense activity. • Keep all flammables away from open flames and other sources of ignition. • Remember the 3 Rs for suspected MEC: Recognize, Retreat, Report. Be aware that MEC has the potential to be located anywhere on the facility (MB, ML, and WI). Call 911 (757-824-1333) and then Supervisor.
5. Sample handling and analysis.	• Chemical /pathogen exposure. • Flammability. • Lifting/dropping injuries. • Electrical. • Pressure and temperature transitions.	• Wear PPE. • Some samples may contain biological and chemical hazards. These samples should be handled with suitable protection to skin, eyes, etc. • When working with potentially hazardous materials or situations, follow EPA, OSHA, and specific health or safety procedures. • Be aware if samples are preserved such as acids. • Slowly open all containers opening away from face. • Keep bench areas free of clutter and clean bench surfaces with disinfectant before and after bacteriological testing. • Always put tops back on containers when not in use. • Keep all flammables away from open flames and other sources of ignition. • Observe proper lifting techniques when handling coolers. • Ensure proper bonding and grounding of equipment. Use surge protectors. • Equip high pressure gas cylinders with relief valves (except hydrogen).

5. Sample handling and analysis (continued).	• Ergonomics. • Thermal equipment hazards.	• Allow space for access to equipment and for physical requirements of job. • Use tongs and insulated gloves as necessary.
6. Sample shipping.	• Chemical exposure. • Lifting/dropping injuries. • Unauthorized access.	• Use proper PPE. • Observe proper lifting techniques. • Tape coolers and apply tamper resistant labels.
7. Sample disposal/waste management.	• Chemical /pathogen exposure.	• Wear PPE (safety glasses, lab coats, and nitrile gloves) • Slowly open all containers opening away from face. • Observe proper lifting techniques when handling coolers. • Keep bench areas free of clutter All wastes from these procedures shall be collected and disposed of according to existing waste policies within the LJT & Associates, Inc. Analytical Lab. Volumes of reagents made should be appropriate for the number of samples being analyzed. Adjustments should be made to reduce waste. • Outdated chemicals shall be discarded following proper procedures. • Liquid hazardous waste will be placed in a container (typically 5-gallon) equipped with a lid or screw cap. Liquid waste may include materials such as: samples, reagents, and used chemicals. The container will remain closed at all times except during the transfer of waste to another container.

7. Sample disposal/waste management (continued).	• Sharp objects.	• All water samples may be dumped down the sink. • All media tubes should be disinfected before disposing as trash. • Pipettes and sample containers can be discarded in the laboratory trash. Any glass waste should be placed in the glass bin.

CHEMICAL PROCESS HAZARD ANALYSIS
LOW HAZARD REVIEW CHECKLIST

Brief description of process:

A Low Level Hazard Review is required for the following analyses. They include bench level analytical chemistry analyses using reagents with an HMIS heal rating of 1 or w. They may include health hazards of flammability, reactivity, corresivity, gas or heat production, and use of electrical power.

These analyses are: see attachment of Low Hazard analyses. SOP/WI's are found in appendix A manual.

What are the potential hazards: *(indicate source of info, i.e. - MSDS, etc.)*

Chemical irritation of mucus membranes, thermal equipment hazards, exposure to biological/infectious wastes, inhalation of noxious vapors, fire, fume hood failure.

What is done to mitigate the hazards:

PPE includes protective eyeware, gloves and a lab coat or apron.

Fill in following boxes by double-clicking the appropriate box, and selecting Checked or Not Checked.

Operating Procedures	☒ yes	☐ no	*If yes, attach procedures*
Personal Protective Equipment	☒ yes	☐ no	*If yes, attach brief description*
Equipment Changes	☐ yes	☒ no	*If yes, attach brief description*
Special Training	☐ yes	☒ no	*If yes, attach brief description*
Safe for "Lone Worker"	☒ yes	☐ no	*If no, explain on separate sheet*

Signatures/Certification:

We understand operation/process/experiment, and believe it can be done safely.
Individuals involved:

Signature/Code	*Title*	*Date*
Marianne Simko	Medical & Div Mgr Marianne Simko	4/11/18
250	Jason Preischlag project manager	4/13/18
Mark Culver	Mark Culver / Chem Tech I	4-26-18
250	Michael Bunstedl / Env. Scientist II	5-1-18
	Brian Cornwell / Chemical Technician	05-01-18

GSFC 23-56 (Nov 2002) Previous versions are obsolete

Chemical Process Hazard Analysis
Moderate Hazard Review Checklist

Introduction

Every laboratory-type facility should have a current hazard analysis. The Process Hazard Analysis (PHA) is mandatory for chemical processing laboratories to assess the hazards associated with new or modified chemical processes or operations. The Moderate Hazard Review Checklist is to be used in evaluating the safety of new, modified, or relocated experiments or tests which present a moderate potential hazard to employees, equipment and facilities, or the environment.

Instructions at the end of this template provide information on the hazard review process, and aid the Laboratory Manager in determining which level of Process Hazard Review is appropriate: Low, Moderate, or High. The Moderate Hazard Review Checklist is used for those processes or experiments that present a moderate potential hazard, but do not require a full High Hazard Review (HHR).

This is a multi-page checklist that requires laboratory managers and workers to work together to ensure that all potential problem areas are analyzed, documentation is generated where necessary, and personnel are made aware of the hazards and safety review findings that affect their work. This checklist, when complete, becomes part of a safety documentation package that will be controlled in accordance with GPG 1410.2. This package should be available in a prominent location in the laboratory while the work is in progress.

Procedure

Before a new, modified, or relocated experiment or test is started, this Moderate Hazard Review Checklist must be completed. Laboratory Managers are responsible for completing the checklist. Participation by a representative of the Safety and Environmental Branch (S&EB), Code 205.2, is recommended.

During the review, the review team normally identifies changes or upgrades to the process and/or apparatus and operating procedures. These upgrades will be documented on the checklist, and the team will sign-off.

Additional instructions are contained within the checklist.

Laboratory Identification

Laboratory Name/Description LJT & Associates

Laboratory Location Bldg F160

Laboratory Manager Jason Freischlag Code 200 Ext. 2352

Product/Experiment Description Compressed and Cryogenic gases by Gas Chromatography, FTIR, GC-MS, and Paramagnetic Analyzer.

Moderate Hazard Review Checklist

BRIEF DESCRIPTION OF PROCESS:

Analysis of compressed and cryogenic gases by gas chromatography to determine total hydrocarbons and impurities.

To check a checkbox, double-click on the box, and select Checked or Not Checked.

A. Have the following been defined by appropriate documentation? Check if done.

- ☒ 1. Process description
- ☐ 2. Process flow diagram/equipment
- ☒ 3. Material Safety Data Sheets (MSDS)
- ☒ 4. Laboratory Safety Procedures, including (as applicable)
  - ☒ a. Emergency Procedures
    - Shut-down
    - Spills
  - ☐ b. Specialized Operating Procedures:
    - Normal Start-Up
    - Normal Operation
    - Normal Shutdown
  - ☐ c. Lockout Procedure
  - ☐ d. Operating Hazards (including chemical, mechanical, etc.)
  - ☐ e. Line Break Procedure
  - ☒ f. Personal Protective Equipment
  - ☐ g. Procedure for Modifications
  - ☐ h. Waste Disposal Procedures

ATTACH all of the above documentation to this checklist

B. Evaluate and describe the following potential hazards, and the necessary precautions taken for each. Attach supplemental sheets as necessary. Check when completed.

- ☐ 1. Toxicity of solids, liquids, and gases associated with the process (Consult MSDS)
- ☐ 2. Reactivity and explosion hazards of solids, liquids, and gases associated with the experiment or process (Consult MSDS)
- ☐ 3. Corrosiveness of solids, liquids, and gases associated with the process (Consult MSDS) S
- ☐ 4. Ignition sources such as sparking motors, switches, alarms, exposed heaters, etc.
- ☐ 5. Fuel sources such as feedstock, products, solvents, gaseous reaction products, insulation, etc., in the area that could be ignited (Consult MSDS)
- ☐ 6. Sound level exposure
- ☐ 7. Nuclear radiation
- ☐ 8. Radiations such as ultraviolet, infrared, microwaves, lasers, X-rays, etc.

☐ 9. Pressure system failure (projectiles, shrapnel, sprays from leaks, etc.)

☒ 10. Electrical (e.g., bonding, grounding, sources identified/labeled)
Use of electrical with surge protectors.

☒ 11. Pressure and temperature transients
High pressure gas cylinders equipped with relief valves.

☐ 12. Ergonomics (spacing, access to equipment, physical requirements of job)

☐ 13. Other (describe)

C. Consider and evaluate the effect of your work in the following environmental areas. Attach supplemental sheets as necessary. Check when completed.

☐ 1. Identification and resolution of potential air, water and soil pollution

☐ 2. Identification and development of written disposal methods for all wastes

☐ 3. Air emissions and air emission rates calculated and reported to the Safety and Environmental Branch

D. Confirm that the following have been provided in the design and construction of the equipment/apparatus. Check left column if OK.

1. Piping and Instrumentation

☒ a. Pressure relief valves and/or rupture disks where necessary (vessels, positive displacement pumps, blocked-in lines, blocked-in heat exchangers, compressors, etc.) with no valves or restrictions of any kind in the lines between the equipment and the protective devices

(1) Properly sized ☒ Yes ☐ N/A

(2) Proper set pressure ☒ Yes ☐ N/A

☐ b. Proper relief and blow-down system with no valves or restrictions of any kind in the lines between the protective devices and the point of discharge

☐ c. Emergency overflow lines ☐ Yes ☒ N/A

☒ d. Emergency shutdown system ☒ Yes ☐ N/A

☒ e. Suitable alarms, shutdowns, interlocks, purges, etc., to bring unit to a safe automatic shutdown in the event of an emergency such as:

(1) Loss of instrument air ☐ Yes ☒ N/A

(2) Loss of steam ☐ Yes ☒ N/A

(3) Loss of cooling water ☐ Yes ☒ N/A

(4) Loss of electric power ☒ Yes ☐ N/A

(5) Loss of fuel ☐ Yes ☒ N/A

(6) Severe leakage by rupture of piping or equipment, by leakage from stuffing boxes or mechanical seals, or due to corrosion ☐ Yes ☒ N/A

(7) Fire in the area of the unit ☒ Yes ☐ N/A

(8) Other (Explain if Yes) ☐ Yes ☐ No

☐ f. Alarms for all other critical variables (high/low temperature, high/low pressure, high/low flow, high/low level, etc.)

☐ g. Automatic shutdown of certain pieces of equipment if certain critical variables are exceeded (high/low temperature, high/low pressure, high/low flow, high/low level, etc.)

☐ h. Fail-safe positioning of control valves and solenoid valves in the event of instrument air loss or electrical failure

☐ i. Pressure, temperature, flow, and level measurement devices installed at all critical points

☐ j. Suitable devices to prevent the flow or backup of materials into undesirable areas

☐ k. Suitable interconnect methods to utility systems such as water, gas, electricity, etc. (e.g., use of Back Flow Preventer Valve in a potable water system)

☐ l. Backup pumps, compressors, etc., where required for safety

☐ m. Automatic detection devices, as applicable, for:

(1) Toxic materials	☐ Yes	☒ N/A
(2) Combustible mixtures	☐ Yes	☒ N/A
(3) Radiation	☐ Yes	☒ N/A
(4) Oxygen detection	☒ Yes	☒ N/A
(5) Fire	☐ Yes	☒ N/A

If Yes for any of above, describe: Confined space meter is operated in Room E-108.

2. Pressure vessels, pumps, compressors, heat exchangers, etc.

☐ a. Proper materials of construction with consideration for corrosion, fatigue, stress cracking, embrittlement, strength, toughness, etc. Special care should be taken when using glass.

☐ b. Proper design and material for seals and gaskets

☐ c. Proper design pressures and temperatures

☐ d. Guards on all rotating, reciprocating, and conveying equipment

☐ 3. Vessel identification, tagging, and record keeping in accordance with Center's procedures? If not, explain.

E. Chemical Description. Check left column if OK.

OK

☐ 1. What ***Chemicals*** are used in your process?

☐ 2. Are any of the Chemicals: (check all that apply)

☐ Carcinogen	☐ Developmental Toxin
☐ Flammable	☐ Light Sensitive
☐ Mutagen	☐ Peroxidizable
☐ Pyrophoric	☐ Radioisotope
☐ Reactive With Air	☐ Reproductive Toxin
☐ Shock Sensitive	☐ Temperature Sensitive
☐ Toxic/Poison	

☐ 3. If your Chemicals display any of the above listed characteristics, is the ductwork certified as leakproof? ☐ Yes ☒ N/A

☐ 4. If your Chemicals display any of the above listed characteristics, will access to the roof be prohibited while you are running your experiment or equipment? ☐ Yes ☒ N/A

☐ 5. How will these Chemicals be stored? Chemical storage lockers appropriate for characteristic.

☐ 6. If refrigeration is required, is the refrigerator or freezer alarmed, approved, and properly marked for chemical storage? ☐ Yes ☒ N/A

F. Transportation and Storage. Check left column if OK.

OK

☐ 1. How will you transport chemicals in the building or across the site?

☐ 2. Will chemicals be shipped off site? ☐ Yes ☒ No

If Yes, do you have the necessary information for the 20-4 Shipping Request?

☐ Yes ☒ N/A

G. Area: Evaluate the following safety items and describe the reason or location for each.

OK Check left column if OK.

☐ 1. Are there limits on personnel in attendance while operating?

☐ 2. Are there special area requirements, e.g., High Noise?

☐ 3. Are barricades required?

☐ 4. Are special signs or alarms needed?

☒ 5. Are exits from laboratory or area adequate (standard and emergency)?
Yes, there are several exits from the analytical lab as described in the attached fire bill and evacuation plan, as well as, the chemical hygiene plan.

☒ 6. Where are the nearest fire and/or evacuation alarms?
Central hallway of lab, just inside from the loading dock entrance.

☒ 7. Where are the nearest fire extinguishers?
Central hallway near loading dock and hallway just outisde Room E-108.

☒ 8. Have extinguishers been inspected within a year? When?
Yes, monthly.

☒ 9. Where is the nearest Safety Shower and/or Eye Wash?
Safety showers and/or eye washes are located in rooms E108, E110, E114 and E115.

☒ 10. Has the eyewash been inspected weekly?
Yes.

☒ 11. What is the location of the nearest telephone?
Telephones are located in each room of the lab, including E-108.

☒ 12. Does the nearest telephone have a 911 emergency sticker?
Yes.

☐ 13. Will there be any unattended operation of this process? If so, what special procedures will be implemented?

☐ 14. Will this process be operated by a lone worker?
If yes, explain.

☒ 15. Will this process be operated after normal working hours? If yes, what special procedures will be implemented? Yes, the lab will be staffed from 8:00 am during operation of mission. The Security will be notified and Fire Department Personnel will also be notified when overnight testing is conducted.

☒ 16. Are the Emergency Contact names and phone numbers posted on the door?
Yes, the Emergency Contacts listed in the Chemical Hygiene Plan are posted at the door of each lab. If an alarm sounds, notify the Fire Department, then notify F160 FOM, Joel Mitchell, code 250.

H. Training: describe or attach list of any special training required, and identify for whom.

Performance of any medium risk analysis requires a a bachelor's degree or equivalent education in a related science, or specialized "on the job" technical training.

I. Are there any corrections that must be made before startup?

No.

At this time, print this document and obtain the appropriate signatures. The following are required:

CERTIFICATION AND APPROVAL:

Certification by the Laboratory Manager that all required corrections have been completed, the laboratory process is safe (subject to completion of required training), and procedures are properly implemented and understood.

250 — Date 4/13/18

Laboratory Technical Director *Signature/Code*

Marianne Smith 200.C — Date 4/11/18

Environmental Program Manager *Signature/Code*

Certification by laboratory personnel that they have read and understood this Hazard Review and associated laboratory procedures: (use additional sheets if necessary)

200.C — Date 4-26-18

Laboratory User Signature/Code

250 — Date 5-1-18

Laboratory User Signature/Code

250 — Date 05-01-18

Laboratory User Signature/Code

Marianne Smith 250 — Date 5/1/18

Laboratory User Signature/Code

250 — Date 5-1-18

Laboratory User Signature/Code

Branch Head Approval:

Date _____

Signature/Code

Analytical Chemistry Laboratory Safety Analysis Worksheet

Task/Job: Fuel and Oil Analysis (Moderate Hazard)	**Facility**: Center wide	**Date:** Original 2/06/2012 Revised 4/13/2018
PPE: Protective eyewear, gloves and a lab coat or apron.	**Analysis by**: J. Freischlag	**Reviewed by:** M. Simko

Sequence of Basic Task/Job Steps	Potential Hazards	Recommended Safe Job Procedure
1. Receive analysis request.	• No hazards associated with receiving analysis request. However, there is an opportunity to minimize all hazard risks for the entire process.	• Review all hazards, SDS Sheets, and work instructions.
2. Cleaning and preparing sample containers.	• Chemical exposure. • Flammability. • Slips and falls (spill).	• Review process description. • Review the SDS for each chemical being handled for analysis. • Don PPE. • Maintain HazCom training. • Work under hood when using acids, bases, or solvents. • Keep all flammables away from open flames and other sources of ignition. • Use absorbent material to clean up small spills immediately.
3. Driving to and from sampling and shipping locations.	• Vehicle accident.	• Only authorized and licensed operators may drive. • Wear seatbelt. • Observe state and facility traffic laws and rules.

4. Field sampling.	• Severe Weather • Chemical exposure. • Biological hazards – ticks, snakes, rodents, poisonous insects, poison ivy, poison oak, poison sumac. • Lifting/dropping injuries. • Slips/trips/falls/muscle strains. • Electrocution. • Confined space. • Ladders. • Airfield hazards.	• Carry radio for weather alerts. Cell phones may be carried in addition to radios. If an emergency presents itself, call (757) 824-1333. • Wear warm clothing when hypothermia or frostbite may be a danger. • Take frequent breaks in hot weather or during intense activity. • Always use the Buddy System. • Perform a Tailgate Safety Talk. • Maintain HazCom training. • No smoking, eating, or drinking during sampling event. • Re-check PPE. • Avoid stands of tall grass; use repellant when appropriate. Wear light-colored clothing for easy identification of pests. Re-check body prior to leaving area. Carry object to deter snakes and rodents by sweeping grass and brush. • Be able to identify and avoid poisonous plants. • Observe proper lifting techniques/wear proper PPE. Stretch before lifting. • Use care when working with batteries. Keep hands dry. • Obtain a Dig Permit if soil surface will be broken. • Obtain and use Confined Space Permit if required. • Check to ensure ladder is secure. • Maintain communication with Tower when near runways. Ask permission from Tower to

	• Munitions and Explosives of Concern (MEC) hazards.	leave and enter runway. Annually take Airfield Driver Training. • Remember the 3 Rs for suspected MEC: Recognize, Retreat, Report. Be aware that MEC has the potential to be located anywhere on the facility (MB, ML, and WI). Call 911 (757-824-1333) and then Supervisor.
5. Sample handling and analysis.	• Chemical exposure. • Flammability. • Lifting/dropping injuries. • Electrical. • Pressure and temperature transitions.	• Wear PPE. • Some samples may contain chemical hazards. These samples should be handled with suitable protection to skin, eyes, etc. • When working with potentially hazardous materials or situations, follow EPA, OSHA, and specific health or safety procedures. • Slowly open all containers opening away from face. • Always put tops back on containers when not in use. • Keep all flammables away from open flames and other sources of ignition. • Observe proper lifting techniques when handling coolers. • Ensure proper bonding and grounding of equipment. Use surge protectors. • Equip high pressure gas cylinders with relief valves (except hydrogen).

6. Sample disposal/waste management.	• Chemical Exposure • Sharp objects.	• Wear PPE (safety glasses, lab coats, and nitrile gloves) • Outdated chemicals shall be discarded following proper procedures. • Liquid hazardous waste will be placed in a container (typically 5-gallon) equipped with a lid or screw cap. Liquid waste may include materials such as: samples, reagents, and used chemicals. The container will remain closed at all times except during the transfer of waste to another container.

Analytical Lab Inductively Coupled Plasma – Optical Emission Spectrometer (ICP-OES) Safety Analysis Worksheet

Task/Job: Analytical Lab ICP-OES Analysis (Moderate Hazard)	**Facility**: Wallops Flight Facility	**Date:** Original 02/29/2012 Revised 04/13/2018
PPE: Closed-toe shoes, chemical/pathogen protective gloves, safety glasses, and lab coat.	**Analysis by**: J. Freischlag	**Reviewed by:** M. Simko

Sequence of Basic Task/Job Steps	Potential Hazards	Recommended Safe Job Procedure
1. Receive analysis request/sample.	• No hazards associated with receiving an analysis request/sample. However, there is an opportunity to minimize all hazard risks for entire process.	• Review all hazards, SDS Sheets, and work instructions.
2. Preserve sample.	• Chemical exposure (i.e., nitric acid, heavy metals). • Spill hazard.	• Don appropriate PPE. • Spill kits should be on hand to clean up acid and heavy metal spills.
3. Sample and standard preparation.	• Chemical Exposure (i.e., nitric acid, hydrochloric acid, heavy metals). • Spill hazard.	• Don appropriate PPE. • Part of sample preparation includes sample digestion (warming acid/sample mixture with a heat block). This should be done in a fume hood to prevent inhalation of fumes. • Spill kits should be on hand to clean up acid and heavy metal spills.

Sequence of Basic Task/Job Steps	Potential Hazards	Recommended Safe Job Procedure
4. Perform analysis.	• High pressure gas.	• Obtain NASA Safety in High Pressure System Operations Training, Cryogen Safety Training, Flexible Hose Safety Training, Compressed Gas Cylinder Safety Training, and Pressure Vessel/System Inspection and Certification Training. • Obtain onsite training from WFF LJT laboratory staff to become familiar with the laboratory's high pressure systems. • Ensure relief valves are installed downstream of regulators on all compressed gas systems (except for hydrogen). • Maintain 6 feet of distance between oxygen and hydrogen gas systems.
	• Asphyxiation.	• Ensure oxygen meters are operating to monitor oxygen content of lab environment, and that the fume hood for the ICP-OES is operational before igniting the plasma. • Ensure that areas where compressed gas systems are in use are well-ventilated.
	• Chemical exposure (i.e., nitric acid, hydrochloric acid, heavy metals).	• Don appropriate PPE.
	• Burn hazard.	• The ICP-OES argon plasma is 10,000 degrees Kelvin. Ensure instrument surfaces are cool before touching/handling.
	• Spill hazard.	• Spill kits should be on hand to clean up acid and heavy metal spills.
	• Ultraviolet hazard.	• Do not look directly at plasma arc.
5. Waste disposal.	• Chemical exposure (i.e., nitric acid, heavy metals). • Spill hazard.	• Don appropriate PPE. • Spill kits should be on hand to clean up acid and heavy metal spills.

Analytical Lab Cryogenic Fluid and Compressed Gas Safety Analysis Worksheet

Task/Job: Analytical Lab Cryogenic Fluid and Compressed Gas Analysis (Moderate Hazard)	**Facility**: Wallops Flight Facility	**Date:** Original 02/28/2012 Revised 04/13/2018
PPE: Steel toed boots (when moving compressed gas cylinders), chemical/ pathogen protective gloves, safety glasses, lab coat, and ear plugs/muffs.	**Analysis by**: J. Freischlag	**Reviewed by:** M. Simko

Sequence of Basic Task/Job Steps	Potential Hazards	Recommended Safe Job Procedure
1. Receive analysis request.	• No hazards associated with receiving analysis request. However, there is an opportunity to minimize all hazard risks for the entire process.	• Review all hazards, SDS Sheets, and work instructions.
2. Clean/prepare sampling equipment.	• High pressure gas/cryogens. • Asphyxiation. • Ear damage. • Chemical exposure (isopropyl alcohol - IPA). • Flammability (IPA).	• Obtain NASA Safety in High Pressure System Operations Training, Cryogen Safety Training, Flexible Hose Safety Training, Compressed Gas Cylinder Safety Training, and Pressure Vessel/System Inspection and Certification Training. • Obtain onsite training from WFF LJT laboratory staff to become familiar with laboratory's high pressure system. • Ensure relief valves are installed downstream of regulators on all compressed gas systems (except for hydrogen). • Ensure oxygen meters are operating to monitor oxygen content of lab environment. • Ensure areas where compressed gas systems are in use are well-ventilated. • Wear proper PPE. • Maintain HAZWOPER training. • Keep all flammables away from open flames and other sources of ignition.

Sequence of Basic Task/Job Steps	Potential Hazards	Recommended Safe Job Procedure
2. Clean/prepare sampling equipment (continued).		• Store all flammable liquids in a flammable locker. The flammable locker must be able to contain 110% of stored contents in case of a spill. • Work with IPA in a well-ventilated area.
3. Maintain equipment used for analysis by changing out portable gas cylinders.	• High pressure gas/cryogens. • Lifting/dropping injuries.	• Obtain NASA Safety in High Pressure System Operations Training. • Obtain onsite training from WFF LJT laboratory staff to become familiar with laboratory's high pressure system. • Ensure relief valves are installed downstream of regulators on all compressed gas systems (except for hydrogen). • Ensure oxygen meters are operating to monitor oxygen content of lab environment. • Ensure areas where compressed gas systems are in use are well-ventilated. • Wear proper PPE. • Ensure portable K-bottles are capped and secured to a bottle cart when in transit. Do NOT slide or roll bottles. • Ensure K-bottles are secured to a proper anchor point with a safety chain or strap when in use or in storage.

Sequence of Basic Task/Job Steps	Potential Hazards	Recommended Safe Job Procedure
4. Perform analysis.	• High pressure gas/cryogens. • Asphyxiation. • Ear damage. • Chemical exposure (IPA). • Flammability (IPA).	• Obtain NASA Safety in High Pressure System Operations Training. • Obtain onsite training from WFF LJT laboratory staff to become familiar with laboratory's high pressure system. • Ensure relief valves are installed downstream of regulators on all compressed gas systems (except for hydrogen). • Ensure oxygen meters are operating to monitor oxygen content of lab environment. • Ensure areas where compressed gas systems are in use are well-ventilated. • Wear proper PPE. • Maintain HAZWOPER training. • Keep all flammables away from open flames and other sources of ignition. • Store all flammable liquids in a flammable locker. The flammable locker must be able to contain 110% of stored contents in case of a spill. • Work with IPA in a well-ventilated area.
5. Waste disposal.	• Chemical exposure (IPA). • Flammability (IPA).	• Wear proper PPE. • Maintain HAZWOPER training. • Keep all flammables away from open flames and other sources of ignition. • Store all flammable liquids in a flammable locker. The flammable locker must be able to contain 110% of stored contents in case of a spill. • Work with IPA in a well-ventilated area.